CHAPTER

72

ENGINE

(CFM56 ENGINES (CFM56-7))

CHAPTER 72
ENGINE

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207	Oct 15/2017	
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229	Oct 15/2017	
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658	Feb 15/2024	

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660	Jun 15/2023	
661	Oct 15/2024	
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698.68	Oct 15/2024	

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698.69	Oct 15/2024	
698.70	Oct 15/2024	
698.71	Oct 15/2024	
698.72	Oct 15/2024	
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72-00-00 (cont)		
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717	Oct 15/2024	
718	Jun 15/2023	
R 719	Feb 15/2025	
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721	Jun 15/2024	
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723	Jun 15/2024	
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72-00-00 (cont)		
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72-21-00		
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72-21-00		
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405	Oct 15/2017	
406	Oct 15/2017	
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72-21-02		
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72-21-02		
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619	Feb 15/2023	
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623	Feb 15/2022	
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626	Nov 15/2022	
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628	Feb 15/2022	
629	Feb 15/2022	
630	Feb 15/2022	

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633	Feb 15/2022	
634	Feb 15/2022	
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72-21-02		
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815	Jun 15/2016	
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817	Oct 15/2019	
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819	Jun 15/2016	
820	Feb 15/2018	
821	Jun 15/2016	
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823	Oct 15/2017	
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827	Oct 15/2017	
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834	Jun 15/2023	
835	Feb 15/2022	
836	Feb 15/2022	
837	Feb 15/2022	
838	Feb 15/2022	
72-21-03		
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402	Jun 15/2023	
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405	Jun 15/2016	
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72-21-03		
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811	Oct 15/2021	
812	Oct 15/2021	
813	Oct 15/2021	
814	Oct 15/2021	
815	Oct 15/2021	
816	Oct 15/2021	

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819	Oct 15/2021	
820	Oct 15/2021	
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404	Jun 15/2016	
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407	Feb 15/2018	
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412	Feb 15/2023	
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607	Oct 15/2017	
608	Jun 15/2016	
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605	Oct 15/2020	
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607	Jun 15/2016	
608	Jun 15/2016	
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604	Feb 15/2020	
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72-23-05 (cont)		
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72-23-05		
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814	Oct 15/2017	
815	Oct 15/2017	
816	Oct 15/2017	
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818	Oct 15/2017	
819	Oct 15/2017	
820	Oct 15/2017	
821	Oct 15/2017	
822	Oct 15/2017	

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825	Feb 15/2022		861	Feb 15/2022		897	Feb 15/2022	
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829	Feb 15/2022		865	Feb 15/2022		898.3	Feb 15/2022	
830	Feb 15/2022		866	Feb 15/2022		898.4	Feb 15/2022	
831	Feb 15/2022		867	Feb 15/2022		898.5	Feb 15/2022	
832	Feb 15/2022		868	Feb 15/2022		898.6	Feb 15/2022	
833	Feb 15/2022		869	Feb 15/2022		898.7	Feb 15/2022	
834	Feb 15/2022		870	Feb 15/2022		898.8	Feb 15/2022	
835	Feb 15/2022		871	Feb 15/2022		898.9	Feb 15/2022	
836	Feb 15/2022		872	Feb 15/2022		898.10	Feb 15/2022	
837	Feb 15/2022		873	Feb 15/2022		898.11	Jun 15/2023	
838	Feb 15/2022		874	Feb 15/2022		898.12	Jun 15/2023	
839	Feb 15/2022		875	Feb 15/2022		898.13	Jun 15/2023	
840	Feb 15/2022		876	Jun 15/2023		898.14	Jun 15/2023	
841	Feb 15/2022		877	Jun 15/2023		898.15	Feb 15/2022	
842	Feb 15/2022		878	Jun 15/2022		898.16	Feb 15/2022	
843	Feb 15/2022		879	Jun 15/2022		898.17	Feb 15/2022	
844	Feb 15/2022		880	Jun 15/2022		898.18	Feb 15/2022	
845	Feb 15/2022		881	Jun 15/2022		898.19	Feb 15/2022	
846	Feb 15/2022		882	Jun 15/2023		898.20	Feb 15/2022	
847	Jun 15/2023		883	Jun 15/2022		898.21	Feb 15/2022	
848	Apr 15/2022		884	Jun 15/2023		898.22	Feb 15/2022	
849	Apr 15/2022		885	Jun 15/2022		898.23	Feb 15/2022	
850	Apr 15/2022		886	Jun 15/2022		898.24	Feb 15/2022	
851	Jun 15/2022		887	Jun 15/2022		898.25	Feb 15/2022	
852	Jun 15/2024		888	Jun 15/2022		898.26	Feb 15/2022	
853	Jun 15/2022		889	Feb 15/2022		898.27	Feb 15/2022	
854	Jun 15/2024		890	Feb 15/2022		898.28	Jun 15/2023	
855	Feb 15/2022		891	Feb 15/2022		898.29	Oct 15/2022	
856	Feb 15/2022		892	Feb 15/2022		898.30	Oct 15/2022	
857	Feb 15/2022		893	Feb 15/2022		898.31	Oct 15/2022	
858	Feb 15/2022		894	Feb 15/2022		898.32	Oct 15/2022	

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Subject/Page	Date	COC
72-23-05 (cont)		
898.33	Oct 15/2022	
898.34	Oct 15/2022	
898.35	Oct 15/2022	
898.36	Oct 15/2022	
898.37	Oct 15/2022	
898.38	Oct 15/2022	
898.39	Oct 15/2022	
898.40	Oct 15/2022	
898.41	Oct 15/2022	
898.42	Jun 15/2023	
898.43	Oct 15/2022	
898.44	Oct 15/2022	
898.45	Oct 15/2022	
898.46	Oct 15/2022	
898.47	Oct 15/2022	
898.48	BLANK	
72-23-06		
401	Jun 15/2021	
402	Jun 15/2021	
403	Jun 15/2021	
404	Jun 15/2021	
405	Jun 15/2023	
406	Jun 15/2021	
72-23-06		
601	Jun 15/2021	
602	Jun 15/2021	
72-23-07		
401	Oct 15/2017	
402	Oct 15/2014	
403	Jun 15/2016	
404	Jun 15/2016	
405	Oct 15/2024	
406	Oct 15/2017	
72-23-07		
601	Feb 15/2024	
602	Feb 15/2024	
603	Feb 15/2024	
72-23-07 (cont)		
604	Jun 15/2016	
605	Jun 15/2016	
606	BLANK	
72-23-08		
401	Jun 15/2021	
402	Jun 15/2021	
403	Feb 15/2021	
404	Feb 15/2021	
405	Oct 15/2024	
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72-24-01		
601	Jun 15/2023	
602	Jun 15/2023	
603	Jun 15/2023	
R 604	Feb 15/2025	
605	Oct 15/2024	
R 606	Feb 15/2025	
R 607	Feb 15/2025	
R 608	Feb 15/2025	
609	Feb 15/2024	
610	Feb 15/2024	
611	Feb 15/2024	
612	Feb 15/2024	
613	Oct 15/2024	
614	Oct 15/2024	
615	Feb 15/2024	
616	Jun 15/2023	
617	Jun 15/2023	
618	Jun 15/2023	
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621	Jun 15/2023	
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623	Jun 15/2023	
624	Jun 15/2023	
625	Jun 15/2023	
626	Jun 15/2023	
72-24-01 (cont)		
627	Jun 15/2023	
628	Jun 15/2023	
629	Jun 15/2023	
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631	Jun 15/2023	
632	Jun 15/2023	
633	Jun 15/2023	
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636	Jun 15/2023	
637	Jun 15/2023	
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649	Jun 15/2023	
650	Jun 15/2023	
72-24-01		
801	Jun 15/2023	
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803	Oct 15/2024	
804	Oct 15/2024	
805	Oct 15/2024	
806	Jun 15/2023	
807	Jun 15/2023	
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809	Jun 15/2023	
810	Jun 15/2023	
811	Jun 15/2023	

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Subject/Page	Date	COC
72-24-01 (cont)		
812	Jun 15/2023	
813	Jun 15/2023	
814	Jun 15/2023	
815	Jun 15/2023	
816	Jun 15/2023	
817	Jun 15/2023	
818	Jun 15/2023	
819	Jun 15/2023	
820	Jun 15/2023	
821	Jun 15/2023	
822	Jun 15/2023	
823	Jun 15/2023	
824	Jun 15/2023	
825	Jun 15/2023	
826	Jun 15/2023	
827	Jun 15/2023	
828	Jun 15/2023	
829	Jun 15/2023	
830	Jun 15/2023	
831	Jun 15/2023	
832	Jun 15/2023	
833	Jun 15/2023	
834	Jun 15/2023	
835	Jun 15/2023	
836	Jun 15/2023	
837	Jun 15/2023	
838	Jun 15/2023	
839	Jun 15/2023	
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842	Feb 15/2024	
843	Feb 15/2024	
844	Feb 15/2024	
845	Jun 15/2023	
846	Jun 15/2023	
847	Jun 15/2023	
72-24-01 (cont)		
848	Jun 15/2023	
849	Jun 15/2023	
850	Jun 15/2023	
851	Jun 15/2023	
852	Jun 15/2023	
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854	Jun 15/2023	
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864	Jun 15/2023	
865	Jun 15/2023	
866	Jun 15/2023	
867	Jun 15/2023	
868	Jun 15/2023	
869	Jun 15/2023	
870	Jun 15/2023	
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879	Jun 15/2023	
880	Jun 15/2023	
881	Jun 15/2023	
882	Jun 15/2023	
883	Jun 15/2023	
72-24-01 (cont)		
884	Feb 15/2024	
885	Feb 15/2024	
886	Feb 15/2024	
887	Feb 15/2024	
888	Jun 15/2023	
889	Jun 15/2023	
890	Jun 15/2023	
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893	Jun 15/2023	
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895	Jun 15/2023	
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898	Feb 15/2024	
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898.2	Jun 15/2023	
898.3	Jun 15/2023	
898.4	Jun 15/2023	
898.5	Jun 15/2023	
898.6	Jun 15/2023	
898.7	Jun 15/2023	
898.8	Jun 15/2023	
898.9	Jun 15/2023	
898.10	Jun 15/2023	
898.11	Jun 15/2023	
898.12	Jun 15/2023	
898.13	Jun 15/2023	
898.14	Jun 15/2023	
898.15	Jun 15/2023	
898.16	Jun 15/2023	
72-24-02		
601	Feb 15/2021	
602	Feb 15/2023	
603	Feb 15/2023	
604	Feb 15/2023	

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72-24-02 (cont)		
605	Feb 15/2018	
606	Jun 15/2020	
72-24-02		
801	Feb 15/2021	
802	Feb 15/2024	
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807	Feb 15/2024	
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811	Feb 15/2024	
812	Feb 15/2024	
813	Oct 15/2023	
814	Feb 15/2024	
815	Feb 15/2018	
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818	Feb 15/2018	
819	Feb 15/2018	
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821	Feb 15/2018	
822	Feb 15/2018	
823	Feb 15/2018	
824	Feb 15/2018	
825	Feb 15/2018	
826	Feb 15/2018	
827	Feb 15/2018	
828	Feb 15/2018	
829	Feb 15/2018	
830	Feb 15/2018	
831	Feb 15/2018	
832	Feb 15/2018	
833	Feb 15/2018	
72-24-02 (cont)		
834	Feb 15/2018	
835	Feb 15/2018	
836	BLANK	
72-32-00		
601	Oct 15/2021	
602	Feb 15/2020	
603	Feb 15/2020	
604	Feb 15/2020	
605	Feb 15/2020	
606	Feb 15/2020	
607	Feb 15/2020	
608	Feb 15/2020	
R 609	Feb 15/2025	
610	Feb 15/2020	
611	Feb 15/2020	
612	Feb 15/2020	
613	Feb 15/2020	
614	Oct 15/2024	
615	Feb 15/2023	
616	Feb 15/2023	
617	Feb 15/2023	
R 618	Feb 15/2025	
619	Jun 15/2024	
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624	Jun 15/2024	
625	Jun 15/2024	
626	Jun 15/2024	
627	Jun 15/2024	
628	Jun 15/2024	
72-32-00		
801	Oct 15/2021	
802	Jun 15/2018	
803	Jun 15/2018	
804	Jun 15/2016	
72-32-00 (cont)		
805	Jun 15/2015	
806	Oct 15/2017	
807	Oct 15/2017	
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809	Jun 15/2016	
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811	Oct 15/2021	
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821	Oct 15/2021	
822	Oct 15/2021	
823	Oct 15/2021	
824	Jun 15/2023	
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72-41-00		
601	Feb 15/2020	
602	Feb 15/2020	
603	Feb 15/2020	
604	Feb 15/2020	
605	Feb 15/2020	
606	Jun 15/2016	
72-54-00		
601	Feb 15/2020	
602	Feb 15/2020	
603	Feb 15/2020	

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Subject/Page	Date	COC
72-54-00 (cont)		
604	Feb 15/2020	
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606	Oct 15/2015	
607	Jun 15/2016	
608	Oct 15/2015	
609	Oct 15/2015	
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72-54-00		
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803	Oct 15/2017	
804	Oct 15/2017	
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806	Jun 15/2016	
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72-55-00		
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203	Oct 15/2017	
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205	Oct 15/2017	
206	Oct 15/2017	
207	Oct 15/2023	
208	Feb 15/2021	
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213	Oct 15/2024	
214	Feb 15/2021	
215	Jun 15/2018	
216	Oct 15/2024	
217	Oct 15/2017	
218	Oct 15/2017	
72-55-00 (cont)		
219	Oct 15/2017	
220	Oct 15/2017	
72-55-00		
601	Jun 15/2015	
602	Feb 15/2019	
603	Feb 15/2019	
604	Jun 15/2016	
72-56-00		
401	Feb 15/2024	
402	Feb 15/2024	
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R 411	Feb 15/2025	
412	Oct 15/2024	
R 413	Feb 15/2025	
414	Oct 15/2023	
415	Jun 15/2024	
416	Feb 15/2024	
72-56-00		
601	Oct 15/2024	
602	Oct 15/2024	
603	Feb 15/2023	
604	Oct 15/2024	
605	Oct 15/2024	
606	Jun 15/2016	
607	Jun 15/2016	
608	Jun 15/2016	
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610	Jun 15/2016	
611	Feb 15/2021	
612	Feb 15/2020	
72-56-00 (cont)		
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614	Feb 15/2021	
72-56-00		
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702	Feb 15/2024	
703	Oct 15/2024	
704	Feb 15/2024	
705	Feb 15/2024	
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707	Oct 15/2024	
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715	Jun 15/2022	
716	Jun 15/2022	
717	Jun 15/2022	
718	Oct 15/2024	
719	Jun 15/2023	
720	Oct 15/2022	
721	Jun 15/2022	
722	Oct 15/2024	
723	Jun 15/2022	
724	Jun 15/2022	
725	Jun 15/2022	
726	BLANK	
72-56-00		
801	Jun 15/2023	
802	Oct 15/2024	
803	Oct 15/2024	
804	Jun 15/2024	
805	Jun 15/2024	
806	Jun 15/2022	
807	Jun 15/2018	

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Subject/Page	Date	COC
72-56-00 (cont)		
808	Jun 15/2022	
809	Jun 15/2022	
810	Oct 15/2019	
811	Jun 15/2024	
812	Jun 15/2024	
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815	Jun 15/2024	
816	Jun 15/2018	
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822	Jun 15/2018	
823	Jun 15/2018	
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825	Jun 15/2018	
826	Oct 15/2020	
827	Oct 15/2020	
828	Jun 15/2018	
829	Jun 15/2018	
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834	Jun 15/2018	
835	Jun 15/2018	
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837	Jun 15/2018	
838	Jun 15/2018	
72-56-01		
401	Oct 15/2024	
402	Oct 15/2021	
403	Jun 15/2016	
404	Jun 15/2016	
72-56-01 (cont)		
405	Jun 15/2016	
406	Jun 15/2016	
407	Jun 15/2023	
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72-60-00		
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202	Oct 15/2017	
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207	Feb 15/2017	
208	Jun 15/2023	
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225	Jun 15/2024	
226	Feb 15/2020	
227	Jun 15/2021	
228	Jun 15/2021	
229	Feb 15/2020	
72-60-00 (cont)		
230	Jun 15/2021	
231	Oct 15/2020	
232	Feb 15/2020	
72-60-00		
601	Jun 15/2019	
602	Jun 15/2015	
603	Jun 15/2016	
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605	Jun 15/2018	
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72-62-00		
201	Oct 15/2024	
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205	Oct 15/2017	
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207	Oct 15/2017	
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216	Jun 15/2023	
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72-62-00		
401	Jun 15/2023	
402	Oct 15/2018	
R 403	Feb 15/2025	
404	Oct 15/2018	
405	Jun 15/2016	
406	Feb 15/2019	
407	Jun 15/2016	

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72-62-00 (cont)		
408	Jun 15/2016	
409	Oct 15/2024	
410	Oct 15/2020	
411	Oct 15/2020	
R 412	Feb 15/2025	
413	Oct 15/2020	
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72-62-00		
601	Feb 15/2020	
602	Feb 15/2020	
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605	Feb 15/2020	
606	Feb 15/2020	
R 607	Feb 15/2025	
608	Oct 15/2020	
609	Oct 15/2020	
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72-63-00		
201	Jun 15/2015	
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207	Oct 15/2020	
208	Oct 15/2020	
209	Jun 15/2023	
210	Jun 15/2016	
211	Jun 15/2023	
212	Oct 15/2020	
72-63-00		
401	Feb 15/2022	
402	Oct 15/2017	
403	Feb 15/2022	
72-63-00 (cont)		
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405	Feb 15/2022	
406	Feb 15/2022	
407	Feb 15/2022	
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433	Feb 15/2022	
R 434	Feb 15/2025	
R 435	Feb 15/2025	
R 436	Feb 15/2025	
O 437	Feb 15/2025	
O 438	Feb 15/2025	
O 439	Feb 15/2025	
72-63-00 (cont)		
R 440	Feb 15/2025	
O 441	Feb 15/2025	
O 442	Feb 15/2025	
O 443	Feb 15/2025	
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72-63-00		
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605	Jun 15/2016	
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607	Jun 15/2016	
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72-63-00		
R 801	Feb 15/2025	
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803	Oct 15/2019	
804	Oct 15/2019	
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807	Oct 15/2019	
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72-63-01		
201	Jun 15/2015	
202	Oct 15/2014	
203	Jun 15/2016	
204	Jun 15/2016	
205	Jun 15/2023	
206	Oct 15/2020	
72-99-99		
401	Apr 15/2022	
402	Apr 15/2022	

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72-99-99 (cont)								
403	Apr 15/2022							
404	Apr 15/2022							

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
ENGINE - MAINTENANCE PRACTICES	72-00-00		201	LOM ALL
Turn the N2 Rotor TASK 72-00-00-980-801-F00			201	LOM ALL
Find the Zero Index Mark on the N2 Rotor TASK 72-00-00-980-802-F00			212	LOM ALL
Engine Tubes, Hoses, and Fittings Inspection TASK 72-00-00-910-801-F00			217	LOM ALL
Engine Power Deactivation TASK 72-00-00-040-801-F00			227	LOM ALL
Engine Power Activation TASK 72-00-00-440-801-F00			230	LOM ALL
ENGINE - INSPECTION/CHECK	72-00-00		601	LOM ALL
Continue-In-Service (CIS) Limits - General TASK 72-00-00-200-801-F00			601	LOM ALL
Borescope Inspection Preparation TASK 72-00-00-200-802-F00			602	LOM ALL
Stages 2-4 Booster Blades and Vanes Borescope Inspection TASK 72-00-00-200-803-F00			609	LOM ALL
HP Compressor Blades Borescope Inspection TASK 72-00-00-200-804-F00			619	LOM ALL
HP Compressor Blades (Stages 2,4,6 and 8) Borescope Inspection TASK 72-00-00-200-817-F00			640	LOM ALL
Combustion Section Borescope Inspection TASK 72-00-00-200-805-F00			650	LOM ALL
HPT Nozzle Guide Vanes Borescope Inspection (SAC (/1) and DAC Engines) TASK 72-00-00-220-801-F00			681	LOM ALL
HPT Nozzle Guide Vanes Borescope Inspection (Tech Insertion (/3) and CFM56-7BE Engines) TASK 72-00-00-200-818-F00			694	LOM ALL
HPT Blades Borescope Inspection TASK 72-00-00-200-807-F00			698.10	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
HPT Shrouds Borescope Inspection TASK 72-00-00-200-815-F00			698.28	LOM ALL
Stage 1-3 LPT Blades Borescope Inspection TASK 72-00-00-200-808-F00			698.34	LOM ALL
Stage 4 LPT Blades Borescope Inspection TASK 72-00-00-200-809-F00			698.51	LOM ALL
Stage 4 LPT Blades Axial Preload Check TASK 72-00-00-200-810-F00			698.62	LOM ALL
Stage 1 LPT Nozzle Guide Vanes Inspection TASK 72-00-00-200-811-F00			698.64	LOM ALL
Stage 2-4 LPT Nozzle Guide Vanes Inspection TASK 72-00-00-200-812-F00			698.75	LOM ALL
LPT Outer Stationary Air Seals Inspection TASK 72-00-00-200-813-F00			698.80	LOM ALL
Borescope Inspection of the Stage 1 Low-Pressure Turbine Nozzle Outer Air Duct Condition TASK 72-00-00-290-801-F00			698.83	LOM ALL
Put the Airplane Back to Its Usual Condition TASK 72-00-00-200-814-F00			698.96	LOM ALL
ENGINE - CLEANING/PAINTING	72-00-00		701	LOM ALL
Engine Cleaning Specifications TASK 72-00-00-100-801-F00			701	LOM ALL
Clean the Fan Blades TASK 72-00-00-100-802-F00			703	LOM ALL
Clean the Engine Gas-Path with Pure Water TASK 72-00-00-100-803-F00			706	LOM ALL
Clean the Engine Gas-Path with Cleaning Solution TASK 72-00-00-100-804-F00			719	LOM ALL
Clean the External Engine Surfaces TASK 72-00-00-100-805-F00			732	LOM ALL
ENGINE - REPAIRS	72-00-00		801	LOM ALL
Repair the HPC Rotor Blades TASK 72-00-00-300-801-F00			801	LOM ALL

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AIR INLET SECTION - INSPECTION/CHECK	72-20-00		601	LOM ALL
TGB and AGB Mount Lugs Inspection (Visual Check) TASK 72-20-00-210-801-F00			601	LOM ALL
FAN AND BOOSTER ASSEMBLY - MAINTENANCE PRACTICES	72-21-00		201	LOM ALL
Fan Rotor Blades and Fan Disk Lubrication TASK 72-21-00-640-801-F00			201	LOM ALL
FAN AND BOOSTER ASSEMBLY - INSPECTION/CHECK	72-21-00		601	LOM ALL
Power Plant Inlet and Fan Blades Inspection (General Visual) TASK 72-21-00-200-801-F00			601	LOM ALL
Engine Inlet and Fan Blades Inspection (Detail) TASK 72-21-00-220-801-F00			603	LOM ALL
SPINNER CONES - REMOVAL/INSTALLATION	72-21-01		401	LOM ALL
Spinner Cones - Removal TASK 72-21-01-000-801-F00			401	LOM ALL
Spinner Cones Installation TASK 72-21-01-400-801-F00			409	LOM ALL
SPINNER CONE - INSPECTION/CHECK	72-21-01		601	LOM ALL
Spinner Cone and Retaining Flange Inspection TASK 72-21-01-200-801-F00			601	LOM ALL
SPINNER CONES - REPAIR	72-21-01		801	LOM ALL
Fan Retaining Flange Replacement TASK 72-21-01-900-801-F00			801	LOM ALL
Replace or Retighten the Threaded Pins on the Fan Retaining Flange TASK 72-21-01-300-801-F00			802	LOM ALL
Repair the Fan Retaining Flange Slots TASK 72-21-01-300-802-F00			805	LOM ALL
FAN BLADE - REMOVAL/INSTALLATION	72-21-02		401	LOM ALL
Fan Blade Removal (Complete Set) TASK 72-21-02-000-801-F00			401	LOM ALL

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Fan Blade Installation (Complete Set) TASK 72-21-02-400-801-F00			417	LOM ALL
Fan Blade Replacement (Complete Set) TASK 72-21-02-900-801-F00			424	LOM ALL
Fan Blade Replacement (Blade Pair) TASK 72-21-02-000-802-F00			426	LOM ALL
FAN BLADE - INSPECTION/CHECK	72-21-02		601	LOM ALL
Fan Module Inspection TASK 72-21-02-200-801-F00			601	LOM ALL
FAN BLADE - REPAIRS	72-21-02		801	LOM ALL
Repair the Fan Blade TASK 72-21-02-300-801-F00			801	LOM ALL
Fan Blade Platform Forward Lug Repair TASK 72-21-02-300-808-F00			812	LOM ALL
Platform Balance Weight Replacement TASK 72-21-02-300-806-F00			817	LOM ALL
Replace or Retighten the Fan Disk Mid Lug Threaded Pins TASK 72-21-02-300-804-F00			822	LOM ALL
Replace or Retighten the Booster Spool Threaded Pins TASK 72-21-02-300-805-F00			825	LOM ALL
Recondition the Lubricant Coating on the Fan Blade Shim TASK 72-21-02-300-807-F00			830	LOM ALL
Fan Blade Platform Blend Repairs TASK 72-21-02-300-809-F00			834	LOM ALL
SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - REMOVAL/INSTALLATION	72-21-03		401	LOM ALL
Splitter Fairing Removal TASK 72-21-03-000-801-F00			401	LOM ALL
Splitter Fairing Installation TASK 72-21-03-400-801-F00			402	LOM ALL
Stage 1 Booster Vane Assembly Removal TASK 72-21-03-000-802-F00			406	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Stage 1 Booster Vane Assembly Installation TASK 72-21-03-400-802-F00			407	LOM ALL
SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - INSPECTION/CHECK	72-21-03		601	LOM ALL
Stage 1 Booster Vane Assembly Inspection (Visual) TASK 72-21-03-200-801-F00			601	LOM ALL
SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - REPAIRS	72-21-03		801	LOM ALL
Repair the Stage 1 Booster Vane Assembly TASK 72-21-03-300-801-F00			801	LOM ALL
OUTLET GUIDE VANES - REMOVAL/INSTALLATION	72-23-01		401	LOM ALL
Outlet Guide Vanes Removal TASK 72-23-01-000-801-F00			401	LOM ALL
Outlet Guide Vanes Installation TASK 72-23-01-400-801-F00			404	LOM ALL
OUTLET GUIDE VANES - INSPECTION/CHECK	72-23-01		601	LOM ALL
Outlet Guide Vanes (OGV) Inspection TASK 72-23-01-200-801-F00			601	LOM ALL
OGV Inner Shrouds and Seals Inspection TASK 72-23-01-200-802-F00			604	LOM ALL
OUTLET GUIDE VANES - REPAIRS	72-23-01		801	LOM ALL
Outlet Guide Vanes (Inner Shroud Attachment Holes By Bushing) Repair TASK 72-23-01-300-801-F00			801	LOM ALL
AFT ACOUSTICAL PANELS - REMOVAL/INSTALLATION	72-23-02		401	LOM ALL
Aft Acoustical Panel Removal TASK 72-23-02-000-801-F00			401	LOM ALL
Aft Acoustical Panel Installation TASK 72-23-02-400-801-F00			405	LOM ALL
Strut Profile Removal TASK 72-23-02-000-802-F00			408	LOM ALL
Strut Profile Installation TASK 72-23-02-400-802-F00			410	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
AFT ACOUSTICAL PANELS - INSPECTION/CHECK	72-23-02		601	LOM ALL
Acoustical Panels and Profile Struts Inspection TASK 72-23-02-200-801-F00			601	LOM ALL
THRUST REVERSER EXTENSION RING (INNER) - REMOVAL/INSTALLATION	72-23-03		401	LOM ALL
Shroud Segments Removal TASK 72-23-03-000-802-F00			401	LOM ALL
Shroud Segments Installation TASK 72-23-03-400-802-F00			416	LOM ALL
THRUST REVERSER EXTENSION RING (INNER) - INSPECTION/CHECK	72-23-03		601	LOM ALL
Thrust Reverser Extension Ring (Inner) Inspection TASK 72-23-03-200-801-F00			601	LOM ALL
12 O'clock Engine Strut Inspection TASK 72-23-03-200-802-F01			606	LOM ALL
THRUST MOUNT - REMOVAL/INSTALLATION	72-23-04		401	LOM ALL
Thrust Mount Removal TASK 72-23-04-000-801-F00			401	LOM ALL
Thrust Mount Installation TASK 72-23-04-400-801-F00			404	LOM ALL
THRUST MOUNT - INSPECTION/CHECK	72-23-04		601	LOM ALL
Thrust Mounts Inspection TASK 72-23-04-200-801-F00			601	LOM ALL
Thrust Mount Attach Bolts Inspection (Visual) TASK 72-23-04-200-802-F00			603	LOM ALL
FAN FRAME - INSPECTION/CHECK	72-23-05		601	LOM ALL
Fan Frame (Detailed) Inspection TASK 72-23-05-700-801-F00			601	LOM ALL
FAN FRAME - REPAIRS	72-23-05		801	LOM ALL
Fan Frame (Stop Drill) Repairs TASK 72-23-05-300-801-F00			801	LOM ALL
Fan Frame Aft Lip Blend Area Repairs TASK 72-23-05-300-803-F00			808	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Fan Frame Shroud Aft Lip Cold Reforming Repairs TASK 72-23-05-350-801-F00			813	LOM ALL
Fan Frame (Under Anchor Bolts Corrosion) Repairs TASK 72-23-05-300-805-F00			824	LOM ALL
Fan Frame Shroud (Replacement of the Riveted Self-Locking Nuts, Angle Plate, Boss, Fitting, Bracket and Cover Plates) Repairs TASK 72-23-05-300-806-F00			847	LOM ALL
Fan Frame Shroud (Removal of the Corrosion in Acoustic Panels Bolt Holes by Bushing and/or Washer Installation) Repairs TASK 72-23-05-300-807-F00			875	LOM ALL
Fan Frame Shroud (Removal of high metal from handling bosses) - Repairs TASK 72-23-05-300-808-F00			898.11	LOM ALL
Fan Frame Shroud (IDG Air/Oil Cooler Attachment Holes) Repairs TASK 72-23-05-300-809-F00			898.28	LOM ALL
Fan Frame Shroud (Inner skin areas of the IDG Air/Oil Cooler by blending) Repairs TASK 72-23-05-300-810-F00			898.41	LOM ALL
INNER RADIAL DRIVE SHAFT ASSEMBLY - REMOVAL/INSTALLATION	72-23-06		401	LOM ALL
Inner Radial Drive Shaft Assembly Removal TASK 72-23-06-000-801-F00			401	LOM ALL
Inner Radial Drive Shaft Assembly Installation TASK 72-23-06-400-801-F00			405	LOM ALL
INNER RADIAL DRIVE SHAFT - INSPECTION/CHECK	72-23-06		601	LOM ALL
Inner Radial Drive Shaft Inspection TASK 72-23-06-200-801-F00			601	LOM ALL
FAN DUCT PANELS - REMOVAL/INSTALLATION	72-23-07		401	LOM ALL
Fan Duct Panel Removal TASK 72-23-07-000-801-F00			401	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Fan Duct Panel Installation TASK 72-23-07-400-801-F00			405	LOM ALL
FAN DUCT PANELS - INSPECTION/CHECK	72-23-07		601	LOM ALL
Fan Duct Panels Inspection TASK 72-23-07-200-801-F00			601	LOM ALL
OIL RETURN TUBE NO. 7 STRUT-REMOVAL/INSTALLATION.	72-23-08		401	LOM ALL
Oil Return Tube No. 7 Strut Removal TASK 72-23-08-000-801-F00			401	LOM ALL
Oil Return Tube No. 7 Strut Installation TASK 72-23-08-400-801-F00			405	LOM ALL
FAN INLET CASE - INSPECTION/CHECK	72-24-01		601	LOM ALL
Fan Inlet Case Inspection (Detail) TASK 72-24-01-200-801-F00			601	LOM ALL
Fan Inlet Case Erosion Inspection TASK 72-24-01-270-801-F00			628	LOM ALL
Fan Inlet Case Template Inspection TASK 72-24-01-220-801-F00			633	LOM ALL
FAN INLET CASE - REPAIRS	72-24-01		801	LOM ALL
Replacement of Hi-Lite Attachment of the Mount Fitting and/or of the Handling Bracket TASK 72-24-01-300-801-F00			801	LOM ALL
Removal of the Corrosion in the Self-Locking Nuts Holes by Drilling TASK 72-24-01-300-802-F00			810	LOM ALL
Removal of the Corrosion in the Self-Locking Nuts Holes by Bushing Installation TASK 72-24-01-300-803-F00			815	LOM ALL
Removal of Corrosion/Fretting Under and Around Gang Channel Nuts by Blending TASK 72-24-01-300-804-F01			827	LOM ALL
Reconditioning of the Attachment Holes on Flange A1 by Bushing TASK 72-24-01-300-806-F00			838	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Reconditioning of the Attachment Holes on Flange A1 by Drilling TASK 72-24-01-300-807-F00			860	LOM ALL
Repair of Flange A1 Area G by Blending TASK 72-24-01-300-808-F00			873	LOM ALL
Repair of the Radii of Flanges A1, B1, B2, B3, B4, B5, and B6 on the Containment Case by Blending TASK 72-24-01-300-809-F00			882	LOM ALL
Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit TASK 72-24-01-300-810-F00			894	LOM ALL
ABRADABLE SHROUD - INSPECTION/CHECK	72-24-02		601	LOM ALL
Abradable Shroud (Detail) - Inspection TASK 72-24-02-200-801-F00			601	LOM ALL
ABRADABLE SHROUD - REPAIRS	72-24-02		801	LOM ALL
Recondition of the Abradable Shroud TASK 72-24-02-200-802-F00			801	LOM ALL
HIGH PRESSURE COMPRESSOR FRONT STATOR - INSPECTION/CHECK	72-32-00		601	LOM ALL
High Pressure Compressor Front Stator Inspection TASK 72-32-00-200-801-F00			601	LOM ALL
High Pressure Compressor Front Stator Actuation Rings Inspection TASK 72-32-00-200-802-F00			609	LOM ALL
HPC Variable Stator Vane (VSV) Resistance Check TASK 72-32-00-200-803-F00			614	LOM ALL
High Pressure Compressor Stage 4 Vane Trailing Edge Inspection TASK 72-32-00-200-804-F00			618	LOM ALL
HIGH PRESSURE COMPRESSOR FRONT STATOR - REPAIRS	72-32-00		801	LOM ALL
Replace the Actuation Ring Flanged Bushing (Stage 1 and 2) TASK 72-32-00-900-801-F00			801	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Replace the Lever Arms and Bushings (IGV and Stage 3) TASK 72-32-00-900-802-F00			805	LOM ALL
High Pressure Compressor Front Stator Actuation Ring Connecting Links Replacement TASK 72-32-00-900-804-F00			810	LOM ALL
Variable Stator Vane (VSV) Bellcrank Assembly Removal and Installation TASK 72-32-00-900-805-F00			815	LOM ALL
Variable Stator Vane (VSV) Actuator System Hardware Repair TASK 72-32-00-900-806-F00			820	LOM ALL
COMBUSTION CASE - INSPECTION/CHECK	72-41-00		601	LOM ALL
Combustion Case Inspection TASK 72-41-00-200-801-F00			601	LOM ALL
LOW PRESSURE TURBINE CASE - INSPECTION/CHECK	72-54-00		601	LOM ALL
Low Pressure Turbine Case Inspection TASK 72-54-00-200-801-F00			601	LOM ALL
LOW PRESSURE TURBINE CASE - REPAIR	72-54-00		801	LOM ALL
Replacement of Broken Studs on the T49.5 Probe Bracket Assembly TASK 72-54-00-300-801-F00			801	LOM ALL
LOW PRESSURE TURBINE SHAFT - MAINTENANCE PRACTICES	72-55-00		201	LOM ALL
Replacement of the LPT Shaft Plug O-ring (PRE-CFM-SB 72–0124) TASK 72-55-00-941-801-F00			201	LOM ALL
Replacement of the LPT Shaft Plug O-ring (POST-CFM-SB 72-0921) TASK 72-55-00-960-801-F00			207	LOM ALL
Replacement of the CVT O-ring and Damper Seals TASK 72-55-00-941-802-F00			213	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
LOW PRESSURE TURBINE SHAFT - INSPECTION	72-55-00		601	LOM ALL
Low Pressure Turbine Shaft Assembly Inspection TASK 72-55-00-200-801-F00			601	LOM ALL
TURBINE FRAME ASSEMBLY - REMOVAL/INSTALLATION	72-56-00		401	LOM ALL
Turbine Rear Frame (TRF) Oil Inlet Cover Removal TASK 72-56-00-000-802-F00			401	LOM ALL
Turbine Rear Frame (TRF) Oil Inlet Cover Installation TASK 72-56-00-400-801-F00			411	LOM ALL
TURBINE FRAME ASSEMBLY - INSPECTION/CHECK	72-56-00		601	LOM ALL
Turbine Frame Assembly Inspection TASK 72-56-00-200-801-F00			601	LOM ALL
Turbine Frame Assembly Engine Clevis Mounts Inspection TASK 72-56-00-200-802-F00			611	LOM ALL
TURBINE FRAME ASSEMBLY - CLEANING/PAINTING	72-56-00		701	LOM ALL
Oil Inlet Cover Cleaning TASK 72-56-00-100-801-F00			701	LOM ALL
Oil Supply Line Cleaning TASK 72-56-00-000-801-F00			702	LOM ALL
Oil Scavenge Line Cleaning TASK 72-56-00-100-802-F00			718	LOM ALL
TURBINE FRAME ASSEMBLY - REPAIRS	72-56-00		801	LOM ALL
Oil Supply Tube Replacement TASK 72-56-00-300-801-F00			801	LOM ALL
Bushings in the Clevis Mounts of the TRF Assembly Replacement TASK 72-56-00-300-802-F00			810	LOM ALL
Defective Studs on the AFT Face of the Inner Hub of the Turbine Frame Replacement TASK 72-56-00-300-803-F00			824	LOM ALL

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TURBINE FRAME AIR/OIL SEPARATOR - REMOVAL/INSTALLATION	72-56-01		401	LOM ALL
Air/Oil Separator Removal TASK 72-56-01-000-801-F00			401	LOM ALL
Air/Oil Separator Installation TASK 72-56-01-400-801-F00			407	LOM ALL
ACCESSORY DRIVES - MAINTENANCE PRACTICES	72-60-00		201	LOM ALL
Magnetic Seal Removal TASK 72-60-00-000-801-F00			201	LOM ALL
Magnetic Seal Installation TASK 72-60-00-400-801-F00			208	LOM ALL
Sealol Seal - Removal TASK 72-60-00-000-802-F00			210	LOM ALL
Sealol Seal - Installation TASK 72-60-00-400-802-F00			225	LOM ALL
ACCESSORY DRIVES - INSPECTION/CHECK	72-60-00		601	LOM ALL
Accessory Gearbox and Transfer Gearbox Mount Inspection TASK 72-60-00-200-801-F00			601	LOM ALL
Accessory Gearbox, Transfer Gearbox, and Horizontal Drive Shaft - Oil Leakage Inspection TASK 72-60-00-200-802-F00			605	LOM ALL
TRANSFER GEARBOX ASSEMBLY - MAINTENANCE PRACTICES	72-62-00		201	LOM ALL
Replacement of the 32-Tooth Bevel Gear Oil Nozzle O-rings TASK 72-62-00-960-801-F00			201	LOM ALL
Replacement of the 31-Tooth Bevel Gear Oil Nozzle O-rings TASK 72-62-00-960-804-F00			209	LOM ALL
Replacement of the Bevel Gear Oil Nozzle O-rings TASK 72-62-00-960-803-F00			212	LOM ALL

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TRANSFER GEARBOX ASSEMBLY - REMOVAL/INSTALLATION	72-62-00		401	LOM ALL
Transfer Gearbox Assembly Removal TASK 72-62-00-000-801-F00			401	LOM ALL
Transfer Gearbox Assembly Installation TASK 72-62-00-400-801-F00			409	LOM ALL
TRANSFER GEARBOX - INSPECTION/CHECK	72-62-00		601	LOM ALL
Transfer Gearbox External Inspection TASK 72-62-00-200-801-F00			601	LOM ALL
Transfer Gearbox Internal Inspection TASK 72-62-00-200-802-F00			607	LOM ALL
ACCESSORY GEARBOX - MAINTENANCE PRACTICES	72-63-00		201	LOM ALL
Axial Link End Dampers Removal TASK 72-63-00-000-802-F00			201	LOM ALL
Axial Link End Dampers Installation TASK 72-63-00-400-802-F00			206	LOM ALL
Axial Link End or Upper (Lower) Mount Link Removal TASK 72-63-00-000-803-F00			209	LOM ALL
Axial Link End or Upper (Lower) Mount Link Installation TASK 72-63-00-400-803-F00			210	LOM ALL
ACCESSORY GEARBOX - REMOVAL/INSTALLATION	72-63-00		401	LOM ALL
Accessory Gearbox Removal TASK 72-63-00-000-804-F00			401	LOM ALL
Accessory Gearbox Installation TASK 72-63-00-400-804-F00			434	LOM ALL
ACCESSORY GEARBOX - INSPECTION/CHECK	72-63-00		601	LOM ALL
Accessory Gearbox Inspection TASK 72-63-00-200-801-F00			601	LOM ALL
ACCESSORY GEARBOX - REPAIRS	72-63-00		801	LOM ALL
Replacement of a Damper in the Mount Fitting TASK 72-63-00-300-801-F00			801	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
HANDCRANKING DRIVE COVER - MAINTENANCE PRACTICES	72-63-01		201	LOM ALL
Handcranking Drive Cover Removal TASK 72-63-01-000-801-F00			201	LOM ALL
Handcranking Drive Cover Installation TASK 72-63-01-400-801-F00			205	LOM ALL
ENGINE MODULES - REMOVAL/INSTALLATION	72-99-99		401	LOM ALL
Discard the Fan Disk TASK 72-99-99-000-801-F00			401	LOM ALL
Discard the Booster Spool TASK 72-99-99-000-802-F00			401	LOM ALL
Discard the Fan Shaft TASK 72-99-99-000-803-F00			401	LOM ALL
Discard the Stages 1 and 2 Spool TASK 72-99-99-000-804-F00			401	LOM ALL
Discard the Stage 3 Disk TASK 72-99-99-000-805-F00			401	LOM ALL
Discard the Stages 4 thru 9 Spools TASK 72-99-99-000-806-F00			402	LOM ALL
Discard the Front Shaft TASK 72-99-99-000-807-F00			402	LOM ALL
Discard the Rear Rotation (CDP) Seal TASK 72-99-99-000-808-F00			402	LOM ALL
Discard the HPT Front Shaft TASK 72-99-99-000-809-F00			402	LOM ALL
Discard the HPT Front Rotating Air Seal TASK 72-99-99-000-810-F00			402	LOM ALL
Discard the HPT Disk TASK 72-99-99-000-811-F00			403	LOM ALL
Discard the HPT Front and Rear Shafts TASK 72-99-99-000-812-F00			403	LOM ALL
Discard the LPT Rotor Support TASK 72-99-99-000-813-F00			403	LOM ALL
Discard the LPT Shaft TASK 72-99-99-000-814-F00			403	LOM ALL

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Discard the LPT Stage Disks TASK 72-99-99-000-815-F00			403	LOM ALL

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1. General

A. This procedure has these tasks:

(1) Turn the N2 rotor.

(2) Find the zero-index mark on the N2 rotor.

(3) Engine Tubes, Hoses and Fittings Inspection.

(4) Engine power - deactivation.

(5) Engine power - activation.

TASK 72-00-00-980-801-F00

2. Turn the N2 Rotor

(Figure 201 and Figure 202)

A. General

(1) This task gives the steps on how to turn the N2 rotor manually with an extension or with a drive motor.

(2) The high pressure compressor rotor is also referred to as the N2 rotor.

(3) For this procedure, the accessory gearbox will be referred to as the Accessory Gear Box (AGB).

(4) For this procedure, the handcranking gearbox drive pad will be referred to as the drive pad and the handcranking drive cover will be referred to as the cover.

B. References

Reference	Title
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
77-11-02-000-801-F00	N2 Speed Sensor Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2298	Drive Motor - Hand Operated - Core Engine
	Opt Part #: 856A1815G02 Supplier: 58828
	Opt Part #: 856A1815G05 Supplier: 58828
SPL-11936	Drive - Manual Drive Without Motor, Core Engine
	Opt Part #: 856A1815G06 Supplier: 58828
SPL-11937	Drive Motor - Hand Operated, Core Engine
	Opt Part #: 856A1815G01 Supplier: 58828
	Opt Part #: 856A1815G04 Supplier: 58828
STD-858	Tag - DO NOT OPERATE
STD-1057	Air Source - Regulated, Dry Filtered, Compressed 60-105 PSIG (414-723.9 KPa)(22 SCFM)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00601 [CP2101]	Vaseline - Graphite Mineral	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
4	O-ring	72-63-00-02-100	LOM ALL
		72-63-00-02-102	LOM ALL

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

G. Prepare to Turn the N2 Rotor

SUBTASK 72-00-00-040-001-F00

(1) Install a DO NOT OPERATE tag, STD-858, on the start lever for the applicable engine.

SUBTASK 72-00-00-860-073-F00

(2) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-00-00-860-074-F00

(3) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-00-00-860-075-F00

(4) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

SUBTASK 72-00-00-020-001-F00

(5) Remove the handcranking drive cover [3] as follows:

(a) Remove the four bolts [1] and four washers [2] that attach the handcranking drive cover [3] to the AGB.

(b) Install three bolts [1] in the three threaded holes of the handcranking drive cover [3].

1) Turn the three bolts [1] to loosen the handcranking drive cover [3].

2) Remove the handcranking drive cover [3] from the AGB.

(c) Remove and discard the two O-rings [4].

(d) Move the handcranking drive cover [3] away from the AGB drive pad.

1) Do not remove the lanyard that attaches the handcranking drive cover [3] to the AGB.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

SUBTASK 72-00-00-020-008-F00

(6) Remove the handcranking drive cover [3] as follows:

(a) Remove the three bolts [1] and three washers [2] that attach the handcranking drive cover [3] to the AGB.

1) Do not remove the lanyard that attaches the handcranking drive cover [3] to the AGB.

(b) Remove and discard the O-ring [4].

LOM ALL

H. Turn the N2 Rotor

SUBTASK 72-00-00-480-020-F00

(1) Turn the N2 rotor manually with hand tools as follows:

(a) Make sure that the tool is fully clean of foreign objects or dirt before you insert it into the gearbox drive pad.

CAUTION

DO NOT USE A TOOL TO PUT THE 3/4-INCH SQUARE DRIVE INTO THE GEAR SHAFT. THIS CAN CAUSE DAMAGE TO THE AGB BEARING.

(b) Attach a 3/4-inch square drive tool with a two-foot long extension to the drive pad.

NOTE: If it is necessary for more access near the N2 drive pad, you can disconnect the connectors to the N2 speed sensor.

(c) Turn the handle of the tool in the counterclockwise direction as seen from the rear.

NOTE: During engine operation, the engine turns in the clockwise direction as seen from the rear. Because of the accessory gearbox gearing, when you turn the tool in the counterclockwise direction as seen from the rear, the engine will turn in the correct clockwise direction.

(d) Remove the tools from the drive pad.

(e) Remove the 3/4-inch square drive tool and the two-foot long extension.

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

SUBTASK 72-00-00-480-021-F00

(2) Turn the N2 rotor with the drive motor [15] as follows:

(a) Make sure that the tool is fully clean of foreign objects or dirt before you insert into the gearbox drive pad.

(b) Install the Drive Motor, SPL-11937, Drive Motor, SPL-2298, or Drive - Motor, SPL-11936, on the gearbox drive pad [13].

NOTE: If it is necessary for more access near the N2 drive pad, you can disconnect the connectors to the N2 speed sensor.

1) Engage the extension [6] with the gearshaft [10].

a) Make sure that the drive motor [15] is horizontal and the ports for the air hoses face outboard.

(c) Align the fastener holes in the adapter flange [9] with the gearbox drive pad [13].

(d) Install the adapter flange [9] on the gearbox drive pad [13] with the screw [14], three screws [7], and four washers [8].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879 (Continued)

(e) Connect the air hoses [11] from the foot or hand control to the quick disconnect ports [5] on the drive motor [15].

(f) Connect the air supply inlet [12] to a compressed 60-105 PSIG dry filtered regulated air source, STD-1057.

1) Adjust the air supply pressure to 90 psi (621 kPa).

CAUTION	DO NOT USE THE DRIVE MOTOR AS A BRAKE TO STOP ENGINE MOVEMENT. THE REVERSAL OF THE DRIVE MOTOR WHILE THE ENGINE TURNS CAN BREAK THE TORQUE LIMIT DEVICE OF THE DRIVE.

(g) Use the manufacturer's instructions to operate the foot or hand control to turn the drive motor in a counterclockwise direction as seen from the rear.

NOTE: During engine operation, the engine turns in the clockwise direction as seen from the rear. Because of the accessory gearbox gearing, when you turn the tool in the counterclockwise direction as seen from the rear, the engine will turn in the correct clockwise direction.

(h) Do these steps to remove the drive motor [15] from the gearbox drive pad [13] as follows:

1) Disconnect the air supply inlet [12] from the facility air supply.

2) Disconnect the air hoses [11] from the foot or hand control at the quick disconnect ports [5] on the drive motor [15].

3) Loosen and remove the screw [14], three screws [7] and washers [8].

4) Remove the drive motor [15] from the gearbox drive pad [13].

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

SUBTASK 72-00-00-480-031-F00

(3) Turn the N2 rotor with the drive motor [15] as follows:

(a) Make sure that the tool is fully clean of foreign objects or dirt before you insert it into the gearbox drive pad.

(b) Install the Drive Motor, SPL-11937, Drive Motor, SPL-2298, and Drive - Motor, SPL-11936, on the gearbox drive pad [13].

NOTE: If it is necessary for more access near the N2 drive pad, you can disconnect the connectors to the N2 speed sensor.

1) Engage the extension [6] with the gearshaft [10].

a) Make sure that the drive motor is horizontal and the ports for the air hoses face outboard.

(c) Align the fastener holes in the adapter flange [9] with the gearbox drive pad [13].

(d) Attach the adapter flange [9] to the gearbox drive pad [13] with the three screws [7] and three washers [8].

(e) Connect the air hoses [11] from the foot or hand control to the quick disconnect ports [5] on the drive motor [15].

(f) Connect the air supply inlet [12] to a compressed 60-105 PSIG dry filtered regulated air source, STD-1057.

1) Adjust the air supply pressure to 90 psi (621 kPa).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **CAUTION** DO NOT USE THE DRIVE MOTOR AS A BRAKE TO STOP ENGINE MOVEMENT. THE REVERSAL OF THE DRIVE MOTOR WHILE THE ENGINE TURNS CAN BREAK THE TORQUE LIMIT DEVICE OF THE DRIVE.

(g) Use the manufacturer's instructions to operate the foot or hand control to turn the drive motor in a counterclockwise direction as seen from the rear.

NOTE: During engine operation, the engine turns in the clockwise direction as seen from the rear. Because of the accessory gearbox gearing, when you turn the tool in the counterclockwise direction as seen from the rear, the engine will turn in the correct clockwise direction.

(h) Do these steps to remove the drive motor [15] from the gearbox drive pad [13]:

1) Disconnect the air supply inlet [12] from the facility air supply.
2) Disconnect the air hoses [11] from the foot or hand control at the quick disconnect ports [5] on the drive motor [15].
3) Loosen and remove the three screws [7] and washers [8].
4) Remove the drive motor [15] from the gearbox drive pad [13].

LOM ALL

I. Put the Airplane Back to Its Usual Condition

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

SUBTASK 72-00-00-420-001-F00

> **CAUTION** INSTALL THE COVER ON THE AGB. WITHOUT THE COVER, OIL LEAKS WILL OCCUR. THIS CAN CAUSE DAMAGE TO THE ENGINE.

> **CAUTION** INSTALL NEW O-RINGS ON THE COVER OF THE AGB. USED O-RINGS CAN CAUSE OIL LEAKS. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(1) Install the handcranking drive cover [3] on the AGB drive pad as follows:

NOTE: Installation of the AGB hand-cranking cover must be classified as “flight safety sensitive maintenance”. An independent inspection of the correct installation of the hand-cranking cover must be carried out prior to release to service of the aircraft or the engine, as applicable.

(a) Make sure that the cover is fully clean of foreign objects or dirt before you install the cover.

> **WARNING** DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(b) Lubricate the two new O-rings [4] with oil, D00599 [CP2442].

(c) Put the two new O-rings [4] on the handcranking drive cover [3].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879 (Continued)

(d) Install the handcranking drive cover [3] on the AGB drive pad.

(e) Lightly lubricate the threads of the bolts [1] with graphite mineral vaseline, D00601 [CP2101].

(f) Install the four bolts [1] and four washers [2].

1) Tighten the bolts to 97 in-lb (11 N·m) - 106 in-lb (12 N·m).

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

SUBTASK 72-00-00-420-004-F00

CAUTION

INSTALL THE COVER ON THE AGB. WITHOUT THE COVER, OIL LEAKS WILL OCCUR. THIS CAN CAUSE DAMAGE TO THE ENGINE.

CAUTION

INSTALL NEW O-RINGS ON THE COVER OF THE AGB. USED O-RINGS CAN CAUSE OIL LEAKS. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(2) Install the handcranking drive cover [3] on the AGB drive pad as follows:

(a) Make sure that the cover is fully clean of foreign objects or dirt before you install the cover.

WARNING

DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(b) Lubricate the O-ring [4] with oil, D00599 [CP2442].

(c) Put the new O-ring [4] on the handcranking drive cover [3].

(d) Install the handcranking drive cover [3] on the AGB drive pad.

(e) Lightly lubricate the threads of the bolts [1] with graphite mineral vaseline, D00601 [CP2101].

(f) Install the three bolts [1] and three washers [2].

1) Tighten the bolts to 97 in-lb (11 N·m) - 106 in-lb (12 N·m).

LOM ALL

SUBTASK 72-00-00-410-027-F00

(3) If disconnected, make sure that you install the connectors to the N2 speed sensor (TASK 77-11-02-000-801-F00).

SUBTASK 72-00-00-410-042-F00

(4) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-00-00-860-076-F00

(5) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-00-00-860-077-F00

(6) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-00-00-700-003-F00

(7) Do the test(s) listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G44633 S0006582215_V3

Handcranking Drive Cover Installation
Figure 201/72-00-00-990-822-F00 (Sheet 1 of 2)

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Handcranking Drive Cover Installation
Figure 201/72-00-00-990-822-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Core Engine Drive Motor Installation
Figure 202/72-00-00-990-823-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Core Engine Drive Motor Installation
Figure 202/72-00-00-990-823-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-980-802-F00

3. Find the Zero Index Mark on the N2 Rotor

(Figure 203)

A. General

(1) This task provides the instructions on how to find the zero index position of the high pressure compressor rotor.

(2) The high pressure compressor rotor is also referred to as the N2 rotor.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
75-31-00-790-801-F00	VSV Actuation System - Manual Operation (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Description	Specification
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare to Find the Zero Index Mark

SUBTASK 72-00-00-480-022-F00

(1) Do this task: Turn the N2 Rotor, TASK 72-00-00-980-801-F00.

SUBTASK 72-00-00-010-052-F00

(2) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

SUBTASK 72-00-00-440-001-F00

(3) Do this task: VSV Actuation System - Manual Operation, TASK 75-31-00-790-801-F00.

SUBTASK 72-00-00-210-103-F00

(4) Connect the applicable rigid borescope to its light source as follows:

NOTE: Use the rigid borescope with the yellow band.

(a) Connect rigid borescope, COM-2195, to light source, SPL-4305.

(b) Connect rigid borescope, COM-4302, to light source, SPL-4306.

(c) Connect rigid borescope, COM-4303, to light source, SPL-2197.

(d) Connect rigid borescope, COM-4304, to light source, SPL-4308

SUBTASK 72-00-00-480-043-F00

(5) Connect the rigid borescope with the long, right angle borescope extension, 90 degree right-angle viewer, and 60 degree field of vision.

SUBTASK 72-00-00-480-044-F00

(6) Turn the light source to the ON position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G. Find the Index Mark

SUBTASK 72-00-00-010-018-F00

(1) Remove the plug from the S4 borescope port on the stage 3 compressor case:

(a) The plug can be found between the 4:00 and 5:00 o'clock position on the case.

SUBTASK 72-00-00-480-023-F00

(2) Put the rigid borescope probe with the 90 degree right angle viewer and a 60 degree field of vision into the borescope port.

SUBTASK 72-00-00-700-001-F00

(3) Find the zero index mark on the N2 rotor as follows:

(a) Turn the N2 rotor so the blades turn in a clockwise direction when seen through the borescope.

NOTE: Counterclockwise when seen from the rear.

(b) Turn the rotor until you can see the locking lug of the first blade slot.

1) The locking lug is found between the blades.

(c) Turn the rotor again until you can see the subsequent (second) locking lug.

NOTE: The subsequent blade after the second lug is the blade 1 of the stage 4 compressor.

(d) Align the leading edge of the blade 1 with the leading edge of the stage 4 vane (as seen from the rear).

NOTE: This is the zero index mark.

SUBTASK 72-00-00-080-010-F00

(4) Remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

SUBTASK 72-00-00-410-016-F00

(5) Do these steps to install the S4 borescope plug:

(a) Apply a light layer of graphite mineral vaseline, D00601 [CP2101], to the threads and to the friction surfaces of the plug.

(b) Install the plug in the compressor case.

1) Tighten the plug to 57 in-lb (6.4 N·m) - 63 in-lb (7.1 N·m).

(c) Put safety wire, G02345 [CP8001], or cable, G50065 [CP8006], on the plug.

SUBTASK 72-00-00-080-025-F00

(6) Remove the tools or the drive motor [15] from the gearbox drive pad [13] (TASK 72-00-00-980-801-F00).

SUBTASK 72-00-00-410-043-F00

(7) Install the handcranking drive cover [3] on the gearbox drive pad [13] (TASK 72-00-00-980-801-F00).

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H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-410-044-F00

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-00-00-860-007-F00

(2) Remove the DO NOT OPERATE tags, STD-858, from the start levers.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G-M56-NT-0030(1)-00-C
G44654 S0006582218_V3

N2 Rotor Indexing
Figure 203/72-00-00-990-825-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-910-801-F00

4. Engine Tubes, Hoses, and Fittings Inspection

(Figure 204)

A. General

(1) This task provides the instructions on how to examine and replace CFMI engine tubes and hoses.

(2) The assemblies included in this task do not contain parts that have regular replacement or inspection schedules.

B. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
70-30-01-910-802-F00	Seals (Preformed Packings and O-Rings) and Gaskets (P/B 201)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
73-11-05-700-801-F00	Fuel Manifold - Inspection/Check (P/B 601)

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00672 [CP5070]	Vaseline - Pure Mineral	V V-P-236
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

D. Engine Tubes, Hoses, and Fittings Inspection

SUBTASK 72-00-00-210-119-F00

CAUTION USE THESE INSTRUCTIONS FOR CFMI SUPPLIED PARTS. DO NOT USE THESE INSTRUCTIONS FOR BOEING SUPPLIED PARTS. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Examine the engine tube, hose, or fitting.

NOTE: The limits in this procedure are general and do not replace the limits on components given in other locations in this manual. If you will examine the fuel manifold, refer to this task: Fuel Manifold - Inspection/Check, TASK 73-11-05-700-801-F00.

(a) Tubing for:

1) Splits, cracks, or kinks:

a) Not permitted, replace the tube.

2) Dents or flat areas:

a) Permitted when the contour is not more than 20 percent of the original tube Outside Diameter (OD).

b) If the damage is more than 20 percent, replace the tube.

3) Nicks or scores on drain lines, drain shrouds, and scavenge lines, but does not include the aft sump oil scavenge line:

a) Blend the nicks or scores. Refer to Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

b) The maximum permitted depth is not more than 0.010 inch (0.26 mm) after blending.

4) Nicks or scores on all other air and oil lines and aft sump oil scavenge lines:

a) Blend the nicks or scores. Refer to Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00.

b) The maximum permitted depth is not more than 0.005 inch (0.13 mm) after blending.

5) Nicks or scores on all other fuel lines:

a) Blend the nicks or scores. Refer to Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00.

b) The maximum permitted depth is not more than 0.010 inch (0.26 mm) after blending.

(b) Seating surfaces of the fitting for:

1) Scratches in the circumference areas A and C:

a) Remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).

b) All amounts up to 0.005 inch (0.13 mm) is permitted after you remove the high metal.

2) Scratches in circumference area B:

a) Remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).

b) Amounts not found when you use a 0.040 inch (1.02 mm) radius ball scribe.

3) Axial scratches in areas A and C:

a) Remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).

b) Amounts not more than 0.005 inch (0.13 mm) is permitted after you remove the high metal.

4) Axial scratches in area B:

a) Not permitted, replace the tube.

5) Nicks and pits in area C:

a) Blend the depressions. Refer to Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00.

b) Amounts not more than 0.03 inch (0.8 mm) in depth is permitted after blending.

6) Nicks and pits in areas A and B:

a) Not permitted, replace the tube.

7) Score marks in the circumference of silver plated seating (mating) surfaces:

a) Permitted if the score mark does not go through the parent metal.

b) If the damage goes through, replace the tube.

8) Deformation in the circumference (spreading) of the tube/ferrule:

a) Permitted if the nut is free to turn.

b) If the nut does not turn, replace the tube.

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9) Deformation in the circumference (spreading) of the flare nut:
   a) Permitted if the nut is free to turn.
   b) If the nut does not turn, replace the tube.
10) Axial deformation (dishing) of the spherical seat fitting surfaces:
   a) Permitted if the depth does not change and is less than 0.005 inch (0.13 mm) to the initial surface.
   b) If the damage is more than the limit, replace the tube.

(c) Tube and hose fitting nuts for:
1) Damaged corners:
   a) Permitted only if you can apply the correct torque.
   b) If you cannot apply the correct torque, replace the tube or hose.
2) Damaged threads:
   a) Total of one full thread or one continuous thread can be missing after chasing the thread.
   b) Chase the threads.
3) Lockwire hole torn out:
   a) Permitted, if one hole is still there.
   b) If one hole is not there, replace the tube of hose.

(d) Swivel flange fittings for:
1) Nicks or scratches on seating surface (surface B):
   a) Not permitted, replace the tube.
2) Nicks or scratches on mating surfaces (areas A and C):
   a) Nicks or scratches not more than 0.020 inch (0.51 mm) deep are permitted if you remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).
3) Cracks:
   a) Not permitted, replace the tube.
4) Seating surfaces (surface B) out-of-flat:
   a) The maximum out-of-flat dimension permitted is 0.006 inch (0.15 mm).
   b) If the out-of-flat dimension is more than the above limit, replace the tube.
5) Cracks that extend out from the bolt holes:
   a) The cracks are permitted when not more than two bolt holes are cracked.
   b) If more than the above limit, replace the tube.
6) Weld joint cracks:
   a) Not permitted, replace the tube.

(e) Tube and hose assemblies for:
1) Leakage:
   a) Not permitted, replace the tube or hose.

(f) Hose assemblies for:
1) Broken hose braid:

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a) Three broken wires per plait and no more than six broken wires per assembly or per 1.0 linear foot (305 mm) of hose is permitted.

b) If more than the above limit, replace the hose.

2) Crimps:

a) Not permitted, replace the tube or hose.

3) Internal obstructions:

a) Not permitted, remove the obstruction or replace the hose.

4) Cuts in the fire sleeve in areas A and B:

NOTE: Area A is defined as follows: L = 2.5 x hose OD at the two ends of the hose. Area B is defined as the length between the two areas A.

a) Up to 3 cuts that do not cross per hose section are permitted if the length is not more than 0.20 inch (5.1 mm).

b) If the cuts are more than the limit, replace the hose.

5) Tears in the fire sleeve material in area A:

a) Not permitted, replace the hose.

6) Tears in the fire sleeve material in area B:

a) One per hose section is permitted if the depth is not more than 0.010 inch (0.25 mm) and the total area is not more than 0.40 square inch (258 square mm).

b) Replace the hose.

(g) Tube mechanical joint (ferrules) for:

1) Wear on the end face:

a) Permitted if the O-ring retention flange is not deformed.

2) Nicks, dents, and scratches on the end face:

a) Permitted if the O-ring retention flange is not deformed after you remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).

SUBTASK 72-00-00-910-001-F00

(2) If it is necessary, replace the damaged tube as follows:

WARNING

DO NOT GET FUEL IN YOUR MOUTH, OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE FUEL. KEEP THE FUEL AWAY FROM SPARKS, FLAME, AND HEAT. FUEL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

WARNING

DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(a) Disassemble the connection.

NOTE: Tubes can have oil or fuel in them as they are removed. Drain the fuel into a container.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Install protective covers and caps on all drilled passages, fuel lines, oil lines, air lines and open engine ports when the parts are removed.

(c) Give protection to all machined surfaces to prevent damage.

(d) Remove and discard the O-rings, if it is necessary.

(e) Remove and do an inspection of the gaskets or seals, if it is necessary (TASK 70-30-01-910-802-F00).

(f) Do an inspection of the mating and threaded surfaces for cleanliness, contamination, scratches, dents or other surface defects.

(g) Do an inspection of the tube for satisfactory general condition and make sure that no damage has occurred.

(h) Remove the protective covers and caps before you install the tube again.

(i) Lubricate the new O-rings with vaseline, D00672 [CP5070].

WARNING

DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(j) Apply a thin layer of oil, D00599 [CP2442], to the gaskets and seals.

(k) Install the new O-rings or serviceable gaskets as necessary.

(l) Install the tube but do not use force.

NOTE: A small elastic distortion is permitted to engage the connections.

(m) Tighten all the end fittings and all clamps with your hand.

1) After a system is installed, tighten the clamps first, then tighten the end fittings.

(n) Do not chafe the tubes when you install the clamps.

1) Attach the tube loosely with a clamp and orient the tube to get the best clearance and tighten the clamps.

(o) Use the correct size of clamps for the tube you install.

(p) Make sure that there is clearance between the tube and each adjacent part.

NOTE: Use the correct minimum clearances between the tube and equipment given below.

1) Structure (frames, bolts, rivets, webs, etc.):

a) The minimum clearance is 0.25 inch (6.4 mm).

b) Not less than 0.06 inch (1.5 mm) clearance in 1.0 inch (25.4 mm) or less of clamping points.

2) Mechanism (actuators, linkages, etc.):

a) The minimum clearance is 0.50 inch (12.7 mm).

b) Keep the clearance during the full travel of (25.4 mm) of the mechanism.

3) Grouped tubes (parallel runs, intersections, etc.):

a) The minimum clearance is 0.19 inch (4.8 mm).

b) Attach clamps to the lines that go across each other to get the minimum clearance of 0.12 inch (3.0 mm).

(q) Coupling nuts must turn freely in your hand.

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(r) The mating surfaces of the flanges of the tube must be installed at 90 degrees to each other.

> **CAUTION**
> USE TWO WRENCHES TO LOOSEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(s) Make sure that the fasteners are installed correctly after you tighten them to the specified value.

(t) Attach safety wire, G02345 [CP8001] or cable, G50065 [CP8006] to the connection.

NOTE: Make sure that the lockwire or cable is corrosion resistant steel.

SUBTASK 72-00-00-910-002-F00

(3) If it is necessary, replace the damaged hose as follows:

> **WARNING**
> DO NOT GET FUEL IN YOUR MOUTH, OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE FUEL. KEEP THE FUEL AWAY FROM SPARKS, FLAME, AND HEAT. FUEL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

> **WARNING**
> DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(a) Disassemble the connection.

NOTE: The hoses can have oil or fuel in them as they are removed. Drain the fluid into a container.

(b) Install the protective covers and caps on all drilled passages, fuel lines, air lines, and open engine ports when the parts are removed.

(c) If it is necessary, remove and discard the O-rings.

(d) Remove and do an inspection of the gaskets or seals, if it is necessary (TASK 70-30-01-910-802-F00).

(e) Examine mating and threaded surfaces for cleanliness, contamination, scratches, dents or other surface defects.

(f) Examine the hose for satisfactory general condition and to make sure that there is no damage.

(g) Remove the protective covers and caps immediately before the installation.

(h) Lubricate the new O-rings with vaseline, D00672 [CP5070].

> **WARNING**
> DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(i) Apply a thin layer of oil, D00599 [CP2442] to the gaskets and seals.

(j) Install the new O-rings, serviceable gaskets or seals as necessary.

NOTE: Do not bend or try to make the preformed hoses straight.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(k) Tighten all end fittings and clamps with your hand.

1) After a system is installed, tighten the clamps first, then tighten the end fittings.

(l) Attach the tube loosely with a clamp and adjust the hose to get the best clearance, then tighten the clamps.

NOTE: Do not chafe the hoses when you install the clamps.

(m) Use the correct size clamp for the hose you install.

NOTE: A clamp that is too large will cause chafing. A clamp that is too small will cause the hose diameter to be decreased and can cause blockage.

(n) Make sure there is clearance between the hose and each adjacent part.

(o) Make sure that all coupling nuts must turn freely with your hand.

(p) Install the mating surfaces of the flanges of the hose at 90 degrees to each other.

CAUTION USE TWO WRENCHES TO LOOSEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(q) Make sure that the installation of the fasteners is correct when you tighten them to the specified value.

(r) Attach safety wire, G02345 [CP8001] or cable, G50065 [CP8006] to the connection.

NOTE: Make sure that the lockwire or cable is corrosion resistant steel.

SUBTASK 72-00-00-790-002-F00

(4) If a fuel or oil line was disconnected, do the idle power leak check (TASK 71-00-00-700-801-F00).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HOSE AND TUBE ASSEMBLY
(EXAMPLE)

SEATING SURFACES OF
SPHERICAL SEAT FITTINGS

A

SEATING SURFACES OF
TUBE/HOSE FERRULE

B

GMM-1130351-00-A
W20034 S0006582220_V3

Tube and Hose Fitting Inspection
Figure 204/72-00-00-990-835-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SWIVEL FLANGE FITTINGS

C

SWIVEL FLANGE FITTING

D

GMM-1130356-00-A
W20036 S0006582221_V2

Tube and Hose Fitting Inspection
Figure 204/72-00-00-990-835-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HOSE ASSEMBLY

E

GMM-1130355-00-A
W20035 S0006582222_V2

Tube and Hose Fitting Inspection
Figure 204/72-00-00-990-835-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-040-801-F00

5. **Engine Power Deactivation**

(Figure 205)

A. **General**

(1) This task will deactivate the power to the engines.

B. **References**

Reference	Title
24-22-00-860-812	Remove Electrical Power (P/B 201)

C. **Tools/Equipment**

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. **Location Zones**

Zone	Area
211	Flight Compartment - Left
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Engine Power Deactivation**

SUBTASK 72-00-00-020-016-F00

(1) Do this task: Remove Electrical Power, TASK 24-22-00-860-812.

SUBTASK 72-00-00-020-017-F00

(2) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	1	C00458	ENGINE 1 IGNITION RIGHT
A	3	C00153	ENGINE 1 IGNITION LEFT
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A
B	3	C01312	ENGINE 1 RUN/PWR
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
B	5	C01313	ENGINE 2 RUN/PWR
C	4	C00154	ENGINE 2 START VALVE
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT
D	7	C01391	ENGINE 2 ALTN PWR CHAN B
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

F. **Engine Power Tryout**

NOTE: This tryout is to make sure that the engine power is in a zero energy state.

SUBTASK 72-00-00-210-124-F00

(1) Make sure that the start levers are in the CUTOFF position.

(a) Install a DO NOT OPERATE tags, STD-858.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-00-00-210-125-F00

(2) Make sure that the ENGINE START switches are in the OFF position.

(a) Install a DO NOT OPERATE tags, STD-858.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FLIGHT COMPARTMENT

2378210 S0000544655_V1

Engine Controls
Figure 205/72-00-00-990-851-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-440-801-F00

6. Engine Power Activation

(Figure 205)

A. General

(1) This task activates the power to the engines.

B. References

Reference	Title
24-22-00-860-811	Supply Electrical Power (P/B 201)

C. Location Zones

Zone	Area
211	Flight Compartment - Left
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Engine Power Activation

SUBTASK 72-00-00-420-010-F00

(1) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	1	C00458	ENGINE 1 IGNITION RIGHT
A	3	C00153	ENGINE 1 IGNITION LEFT
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A
B	3	C01312	ENGINE 1 RUN/PWR
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
B	5	C01313	ENGINE 2 RUN/PWR
C	4	C00154	ENGINE 2 START VALVE
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT
D	7	C01391	ENGINE 2 ALTN PWR CHAN B
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

SUBTASK 72-00-00-020-018-F00

(2) Remove the DO NOT OPERATE tag from the start levers.

SUBTASK 72-00-00-020-019-F00

(3) Remove the DO NOT OPERATE tag from the ENGINE START switches.

SUBTASK 72-00-00-420-011-F00

(4) Do this task: Supply Electrical Power, TASK 24-22-00-860-811.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ENGINE - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has these tasks:
      (1) Continue-In-Service Limit (CIS) - General
      (2) Borescope Inspection Preparation
      (3) Stages 2-4 Booster Blades and Vanes Borescope Inspection
      (4) HP Compressor Blades Borescope Inspection
      (5) HP Compressor Blades (Stages 2,4,6 and 8) Borescope Inspection

LOM ALL; AIRPLANES WITH SINGLE ANNULAR COMBUSTOR (SAC) OR CFM56-7/3 ENGINES

      (6) Combustion Section Borescope inspection

LOM ALL

      (7) HPT Nozzle Guide Vanes Borescope Inspection (SAC (/1) and DAC Engines)
      (8) HPT Nozzle Guide Vanes Borescope Inspection (Tech Insertion (/3) and CFM56-7BE Engines)
      (9) HPT Blades Borescope Inspection
      (10) HPT Shrouds Borescope Inspection
      (11) Stages 1-3 LPT Blades Borescope Inspection
      (12) Stage 4 LPT Blades Borescope Inspection
      (13) Stage 4 LPT Blades Axial Preload Check
      (14) Stage 1 LPT Nozzle Guide Vanes Inspection
      (15) Stages 2-4 LPT Nozzle Guide Vanes Inspection
      (16) LPT Outer Stationary Seals Inspection
      (17) The put the airplane back to its usual condition procedure.
   C. Alternative videoscope/borescope tool sets, that meet the minimum requirements of the GE Commercial Engine Standard Practice Manual, SPM 70-32-84, Borescope Systems, may be used as alternates for the tools listed in the procedure. If you use alternative tools or equipment, it is the operator's responsibility to make sure that they give the same results and are as safe to the parts and personnel as the tools or equipment specified in the procedure.

TASK 72-00-00-200-801-F00

2. **Continue-In-Service (CIS) Limits - General**
   A. General
      (1) Use the CIS limits when you find a defect that you cannot correct at the present location.
      (2) The CIS limit permits the airplane to be flown to a facility where the defect can be corrected.
         (a) The necessary maintenance must be scheduled before the end of the CIS limit extension.
         (b) The CIS limit can be used only one time.
            1) When the limit is reached, the defect must be corrected.
      (3) When CIS flight cycles and flight hours are given in the same limit, the condition that occurs first is the maximum limit.
      (4) The CIS limits are listed after the serviceable limits.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) On defects that do not have CIS limits, contact CFM.

——— END OF TASK ———

TASK 72-00-00-200-802-F00

3. Borescope Inspection Preparation

(Figure 601 and Figure 602)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the instructions on how to prepare for the borescope inspection.

B. References

Reference	Title
70-10-03-910-801-F00	Temporary Marking Procedures (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-71-00-200-801-F00	Engine Vents and Drains Inspection (P/B 601)
72-00-00-980-802-F00	Find the Zero Index Mark on the N2 Rotor (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828 Opt Part #: 856A1321P05 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-2198	Kit - Borescope Guide, HP Turbine, CFM56 Engines Part #: 856A1310G01 Supplier: 58828
SPL-2207	Guide - Borescope Inspection - Booster Part #: 856A1351P01 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828

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(Continued)

Reference	Description
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4307	Light Source - Borescope, Machida Part #: 856A1322P07 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-10711	Shop Vacuum (400Hz if using aircraft power)

D. Consumable Materials

Reference	Description	Specification
G50262	Wiper - Cleaning	BMS15-5
G50530 [CP5061]	Marker - Temporary	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Borescope Inspection Preparation

SUBTASK 72-00-00-860-001-F00

(1) For the applicable engine, install a DO-NOT-OPERATE tag on the start lever.

SUBTASK 72-00-00-860-080-F00

(2) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-00-00-860-081-F00

(3) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-00-00-860-082-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

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WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

SUBTASK 72-00-00-480-001-F00

(5) Refer to the applicable steps and borescope equipment to prepare for the inspection:

NOTE: For this procedure, borescope equipment is used for all inspections but not for the axial preload check of the Stage 4 Low Pressure Turbine (LPT) blades.

NOTE: Refer to the CFM Illustrated Tool and Equipment manual for the current part number for all the borescope equipment.

NOTE: Alternative borescope equipment that is as good or better than the CFM Borescope Specification is permitted for use. Refer to the CFM Non-Destructive Test Manual (CFM-TP-NT.11), Borescope Inspection, Part 7, for requirements.

CAUTION MAKE SURE THAT THE POWER SWITCH IS IN THE OFF POSITION. MAKE SURE THAT THE LIGHT INTENSITY CONTROL IS IN THE MINIMUM POSITION BEFORE YOU CONNECT THE LIGHT SOURCE TO THE POWER SUPPLY. MAKE SURE THAT YOU ATTACH THE LIGHT SOURCE AND THE POWER SUPPLY CORRECTLY TO A GROUND. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Connect the applicable light source to a power source that is grounded.

(b) You will use these borescope tools to do a complete borescope inspection of the engine:

NOTE: For more data on the use of this borescope equipment, refer to CFM NDTM 72-00-00, Part 7.

It is not recommended to do a borescope inspection at temperatures more than 150°F (65.6°C). You can do a dry motor to increase the engine cool down rate.

1) The applicable borescope and light source:
   a) The rigid borescope, COM-2195 and the light source, SPL-4305
   b) The rigid borescope, COM-4302 and the light source, SPL-4306
   c) The rigid borescope, COM-4303 and the light source, SPL-2197
   d) The rigid borescope, COM-4304 and the light source, SPL-4308
   e) Alternative light source, SPL-4307.
2) The monitor, MSE-64
3) The fiber borescope, COM-2196 to do the inspection of these areas:
   a) The combustion chamber
   b) The High Pressure Turbine (HPT) nozzle guide vanes
   c) The HPT blades.
4) The borescope guide kit, SPL-2198 and the borescope guide, SPL-2207 to do the inspection of these areas:
   a) The HPT nozzle guide vanes
   b) The HPT blades.

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SUBTASK 72-00-00-210-001-F00

(6) If it is necessary to index the N2 rotor, do this task: Find the Zero Index Mark on the N2 Rotor, TASK 72-00-00-980-802-F00.

NOTE: It is recommended that you stop the N2 rotor when you put each blade in position for inspection. This will permit you to do a full inspection of each blade.

SUBTASK 72-00-00-210-002-F00

(7) If it is necessary to turn or index the N1 rotor, do these steps:

(a) Put a protective mat, STD-585 in the inlet cowl.

(b) Find the number one fan blade.

NOTE: The fan blade 1 is adjacent to a machined dimple in the aft area of the rear spinner cone.

(c) Use a temporary marker, G50530 [CP5061] to make a mark to identify the number one fan blade (TASK 70-10-03-910-801-F00).

(d) Align the leading edge of the number one fan blade with the T12 temperature sensor.

NOTE: The T12 temperature sensor is approximately at the 10:30 o'clock position as you look in the inlet cowl.

SUBTASK 72-00-00-210-129-F00

(8) Do a general visual inspection of the primary plug assembly for oil puddling.

NOTE: An oil puddle in the exhaust system can occur after the engine is dry or wet motored (refer to Engine Vents and Drains Inspection, TASK 71-71-00-200-801-F00).

SUBTASK 72-00-00-100-016-F00

(9) If oil puddling is found, remove the oil from the primary plug:

NOTE: Cleaning the exhaust plug on engines with the long exhaust configuration usually requires it to be removed. However, commercially available materials that allow access to inner area of the exhaust plug can be used to reach the oil without removing the exhaust plug. Cleaning the short exhaust plug is not usually necessary since it does not accumulate as much oil as the long plug configuration.

(a) Clean the unwanted oil from the surface with a wiper, G50262 or a vacuum, STD-10711.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

SOME ENGINE COMPONENTS
REMOVED FOR CLARITY.

S-M56-MM-03504-00-B
H50646 S0006582226_V2

Borescope Port Locations
Figure 601/72-00-00-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G47263 S0006582229_V3

Engine Airfoil Count
Figure 602/72-00-00-990-824-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOMENCLATURE	STAGE	NUMBER OF BLADES
FAN AND BOOSTER	1	24
	2	74
	3	78
	4	74
HIGH PRESSURE COMPRESSOR (HPC)	1	38
	2	53
	3	60
	4	68
	5	75
	6	82
	7	82
	8	80
	9	76
HIGH PRESSURE TURBINE (HPT) NON-7BE ENGINE		80
HIGH PRESSURE TURBINE HPT 7BE ENGINE		76
LOW PRESSURE TURBINE (LPT) NON-7BE ENGINE	1	162
	2	150
	3	150
	4	134
LOW PRESSURE TURBINE LPT 7BE ENGINE	1	154
	2	134
	3	136
	4	138

G48151 S0006582230_V4

Engine Airfoil Count
Figure 602/72-00-00-990-824-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-200-803-F00

4. Stages 2-4 Booster Blades and Vanes Borescope Inspection

(Figure 601, Figure 603, and Figure 604)

A. General

(1) This task provides the instructions on how to examine the booster blades and vanes with a borescope.

(2) These are the areas of the booster rotor blades that you can see:

(a) The leading edge of the stage 2 blades, through the inlet to the primary gas path or the booster inlet.

(b) The trailing edge of the stage 3 blades, through the borescope port S0.

(c) The leading edge of the stage 4 blades, through the borescope port S0.

(3) The area of the stage 2-4 booster vanes that can be seen is limited to what you can see through the inlet and around the S0 borescope port.

B. References

Reference	Title
72-21-03-200-801-F00	Stage 1 Booster Vane Assembly Inspection (Visual) (P/B 601)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Prepare for the Inspection

SUBTASK 72-00-00-210-004-F00

(1) Do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

F. Stages 2-4 Booster Blades and Vanes Borescope Inspection

SUBTASK 72-00-00-210-003-F00

(1) Examine the stage 1 booster vanes (TASK 72-21-03-200-801-F00).

SUBTASK 72-00-00-210-005-F00

(2) Connect the applicable rigid borescope to its light source as follows:

NOTE: Use the rigid borescope with the yellow band.

(a) Connect rigid borescope, COM-2195, to light source, SPL-4305.

(b) Connect rigid borescope, COM-4302, to light source, SPL-4306.

(c) Connect rigid borescope, COM-4303, to light source, SPL-2197.

(d) Connect rigid borescope, COM-4304, to light source, SPL-4308.

SUBTASK 72-00-00-480-045-F00

(3) Connect the rigid borescope with the long, right-angle borescope extension, 90 degree right-angle viewer, and 60 degree field of vision.

SUBTASK 72-00-00-480-046-F00

(4) Turn the light source to the ON position.

SUBTASK 72-00-00-210-006-F00

(5) Do these steps to do an inspection of the stage 2 booster blades:

NOTE: If you find Foreign Object Damage (FOD) or missing pieces, you must examine all of the downstream booster blades and vanes, and the compressor.

NOTE: If the fan blades are removed, you can see the leading edges of the stage 2 booster blades without borescope equipment.

WARNING BE CAREFUL WHEN YOU TURN THE FAN ROTOR. MAKE SURE THAT YOU ARE IN A STABLE POSITION. ALSO, YOU MUST WEAR HEAVY PROTECTIVE GLOVES TO PREVENT PERSONAL INJURY.

(a) Manually turn the fan rotor, from the front of the engine, while you do the inspection of the stage 2 booster blades.

(b) Put the borescope probe so that you can view the stage 2 booster blades as you look through the booster inlet.

SUBTASK 72-00-00-210-007-F00

(6) Examine the stage 2 booster blades as follows:

(a) Missing pieces in Area G and the tip corners of the leading and trailing edges

1) A maximum of 20 blades is permitted with these conditions:

a) The axial length is less than 0.252 in. (6.4 mm).

b) The radial length is less than 0.252 in. (6.4 mm).

2) The Continue-In-Service limit is 50 cycles or 75 flight hours with these conditions:

a) The radial length is less than 0.787 in. (20 mm).

b) The axial length is less than 0.492 in. (12.5 mm).

(b) Cracks or tears in Area G

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) There is no limit if the radial length and the axial length are less than 0.256 in. (6.5 mm).
2) The Continue-In-Service limit is 50 cycles or 75 flight hours with these conditions:
   a) The radial length is less than 0.787 in. (20 mm).
   b) The axial length is less than 0.492 in. (12.5 mm).

(c) Worn areas or local distortion at the blade tip corner on the leading and trailing edges
1) There is no limit with these conditions:
   a) The radial length is less than 0.787 in. (20 mm).
   b) The axial length is less than 0.492 in. (12.5 mm).
2) The Continue-In-Service limit is 100 cycles or 150 flight hours with these conditions:
   a) The radial length is less than 0.984 in. (25 mm).
   b) The axial length is less than 0.59 in. (15 mm).
   c) No more than 15 blades are damaged.

(d) Nicks, dents, and scratches on the airfoil surfaces that are in Area E
1) Permitted with these conditions:
   a) The indication is less than 0.019 in. (0.5 mm) deep.
   b) The indication does not go through the metal.
2) The Continue-In-Service limit is 50 cycles or 75 flight hours with these conditions:
   a) The diameter is less than 0.59 in. (15.0 mm).
   b) The damage does not go through the metal.

(e) Nicks, dents, and scratches on the airfoil surfaces that are not in Area E, and not on the leading and trailing edges
1) Permitted with these conditions:
   a) The diameter is less than 0.157 in. (4.0 mm).
   b) The damage does not go through the metal.
2) The Continue-In-Service limit is 50 cycles or 75 flight hours with these conditions:
   a) The diameter is less than 0.236 in. (6.0 mm).
   b) The damage does not go through the metal.

(f) Nicks, dents, and scratches on the leading and trailing edges, but not in Area E
1) Permitted if the maximum axial length is not more than 0.039 in. (1.0 mm).
2) The Continue-In-Service limit is 50 cycles or 75 flight hours if the axial length is less than 0.059 in. (1.5 mm).

(g) Distortion to the leading and trailing edges and not in Area E
1) Permitted with these conditions:
   a) The maximum axial length is 0.197 in. (5.0 mm).
   b) The maximum radial length is 0.59 in. (15 mm).
2) The Continue-In-Service limit is 50 cycles or 75 flight hours with these conditions:
   a) The maximum axial length is 0.275 in. (7.0 mm).
   b) The maximum radial length is 0.708 in. (18.0 mm).

(h) Nicks, dents and scratches on the leading and trailing edges in Area E

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Permitted with this condition:
   a) The indication is less than 0.010 in. (0.25 mm) deep.

(i) Distortion to the leading and trailing edges in Area E
   1) Permitted with this condition:
      a) The damage is less than 0.010 in. (0.25 mm) from original contour.

(j) Deposits and erosion
   1) Permitted.

SUBTASK 72-00-00-210-008-F00

(7) Do these steps to install the borescope probe for the inspection of the stage 2 through 4 stator vanes:
   (a) Put the probe so that you can view the stage 2 stator vanes through the booster inlet.
   (b) Put the probe so that you can view the stage 3 and 4 stator vanes through borescope port S0.

   NOTE: This inspection is limited to what you can see with the rigid borescope.

SUBTASK 72-00-00-210-009-F00

(8) Examine the stage 2 through 4 booster vanes as follows:
   (a) Missing pieces
      1) A maximum of 20 vanes is permitted with these conditions:
         a) The axial length is less than 0.256 in. (6.5 mm).
         b) The radial length is less than 0.728 in. (18.5 mm).
         c) The damage is not in Areas A and B.
      2) The Continue-In-Service limit is 50 cycles or 75 flight hours with these conditions:
         a) No cracks start from the damaged area.
         b) Cracks do not go into Areas A and B.
   (b) Cracks or tears
      1) There is no limit to the number in Areas A and B with these conditions:
         a) The damage is less than 0.128 in. (3.25 mm) radially.
         b) The damage is less than 0.04 in. (1 mm) axially.
      2) The Continue-In-Service limit is 10 cycles or 15 flight hours if the damage is more than the limits but there is no possibility that a piece could break free.
   (c) Nicks, dents, and scratches in Areas A and B of the concave and convex surfaces
      1) There is no limit to the number with these conditions:
         a) The diameter is less than 0.09 in. (2.3 mm).
         b) The damage does not go through the metal.
      2) The Continue-In-Service limit is 10 cycles or 15 flight hours with this condition:
         a) The diameter is less than 0.157 in. (4 mm).
   (d) Nicks, dents, and scratches in Area C
      1) Permitted with this condition:
         a) The diameter is less than 0.197 in. (5 mm).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) The Continue-In-Service limit is 50 cycles or 75 flight hours if the diameter is less than 0.295 in. (7.5 mm).

(e) Nicks, dents, and scratches on the leading and trailing edges

1) Permitted if the axial length is less than 0.079 in. (2 mm).

(f) Vanes which have disengaged from the inner shroud

1) Vanes that are disengaged are not permitted.

(g) Distortion of the leading and trailing edges

1) Permitted with these conditions:

a) The damage is less than 0.709 in. (18 mm) radially.

b) The damage is less than 0.256 in. (6.5 mm) axially.

2) The Continue-In-Service limit is 50 cycles or 75 flight hours with these conditions:

a) The damage is less than 1 in. (25.4 mm) radially.

b) The damage is less than 0.492 in. (12.5 mm) axially.

(h) Separation, flaking, missing material, or booster blade tip rubbing on the abradable material of the outer shroud (stage 3 and stage 4 booster vanes only)

1) Permitted.

(i) Surface oxidation, pitting or corrosion marks

1) Permitted.

SUBTASK 72-00-00-210-010-F00

(9) Do an inspection of the trailing edges of the stage 3 blades and the leading edges of the stage 4 blades.

(a) Carefully put the borescope in the borescope port S0.

NOTE: This port is found between the Outlet Guide Vanes (OGV) at the 3:30 o'clock position.

(b) While you turn the fan rotor manually, examine the trailing edges of the stage 3 blades and the leading edges of the stage 4 blades.

1) Use the same damage limits given for the stage 2 blades above.

SUBTASK 72-00-00-080-001-F00

(10) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower on until the lamp and case are cool.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-210-012-F00

(1) If the borescope inspection is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

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STAGE	NUMBER OF BLADES	LEADING EDGE VIEW THRU:	TRAILING EDGE VIEW THRU:
1	24	---	---
2	74	Booster inlet	---
3	78	---	Port SO
4	74	SO	---

S-M56-MM-03498-00-B
G23184 S0006582232_V2

Stages 2-4 Booster Blades and Vanes Borescope Inspection
Figure 603/72-00-00-990-802-F00 (Sheet 1 of 3)

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STAGE 2 BOOSTER BLADE BORESCOPE INSPECTION

B

S-M56-MM-03470-00-B
G23198 S0006582233_V2

Stages 2-4 Booster Blades and Vanes Borescope Inspection
Figure 603/72-00-00-990-802-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

STAGE 3 AND 4 BOOSTER BLADE AND VANE BORESCOPE INSPECTION

C

1 THE BORESCOPE PORT SO IS AT 3:30 O'CLOCK (ALF), THROUGH THE INNER WALL OF THE FAN BYPASS DUCT, AND BETWEEN 2 OGV"S.

S-M56-MM-03485-00-B
G23212 S0006582234_V2

Stages 2-4 Booster Blades and Vanes Borescope Inspection
Figure 603/72-00-00-990-802-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03472-00-B
G23441 S0006582235_V2

Stages 2-4 Booster Blades and Vanes Borescope Inspection Limits
Figure 604/72-00-00-990-803-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stages 2-4 Booster Blades and Vanes Borescope Inspection Limits
Figure 604/72-00-00-990-803-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-200-804-F00

5. HP Compressor Blades Borescope Inspection

(Figure 601, Figure 605, Figure 606, Figure 607, Figure 608 and Figure 609)

A. General

(1) This task provides the instructions on how to examine the HP compressor blades with a borescope.

B. References

Reference	Title
71-00-00-700-821-F00	Dry Motor the Engine (P/B 201)
72-00-00-300-801-F00	Repair the HPC Rotor Blades (P/B 801)
72-00-00-980-801-F00	Turn the N2 Rotor (P/B 201)
72-23-03-000-802-F00	Shroud Segments Removal (P/B 401)
72-23-03-400-802-F00	Shroud Segments Installation (P/B 401)
75-31-00-790-801-F00	VSV Actuation System - Manual Operation (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Inspection

SUBTASK 72-00-00-210-013-F00

(1) Do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-210-109-F00

(2) Connect the applicable rigid borescope to its light source as follows:

NOTE: Use the rigid borescope with the yellow band.

(a) Connect rigid borescope, COM-2195 to light source, SPL-4305.

(b) Connect rigid borescope, COM-4302 to light source, SPL-4306.

(c) Connect rigid borescope, COM-4303 to light source, SPL-2197.

(d) Connect rigid borescope, COM-4304 to light source, SPL-4308

SUBTASK 72-00-00-480-047-F00

(3) Connect the rigid borescope with the long, right angle borescope extension, 90 degree right-angle viewer, and 60 degree field of vision.

SUBTASK 72-00-00-480-048-F00

(4) Turn the light source to the ON position.

SUBTASK 72-00-00-210-014-F00

(5) Actuate the variable stator vanes (VSV) to full open (TASK 75-31-00-790-801-F00).

NOTE: During engine shutdown, the VSV's will close and VSV actuator will be fully extended.

(a) As an alternate procedure, do these steps:

1) If installed, remove the borescope equipment from the engine.

2) For engine no. 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

3) For engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

4) Do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

5) Put the ENGINE START switch to the CONT position to stop the dry motor procedure.

NOTE: When you stop the engine with the ENGINE START switch in the CONT position, the EEC will command the VSV's to the full open position and the VBV's to the full close position.

6) After the engine stops completely, put the ENGINE START switch to the off position and do the remaining steps in the Dry Motor Procedure.

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LOM 429-432; AIRPLANES WITH AUTO-IGNITION

a) The AUTO position is off.

LOM ALL

7) For engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

8) For engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-00-00-010-032-F00

(6) Find the applicable borescope plugs for the HPC stages you will examine as follows:

NOTE: Do the applicable steps to get access to the applicable HPC stage.

(a) Remove the lower right shroud segment (TASK 72-23-03-000-802-F00).

NOTE: This is required to access the S1 borescope plug.

(b) Remove the S1-S6 borescope plugs.

1) Put a tag on each plug to make sure it will be installed in the correct borescope port.

(c) Remove the S7-S9 borescope plug assemblies as follows:

1) Loosen the borescope cap.

a) Disengage the borescope cap from the compressor case.

b) Pull the borescope cap outward to engage the internal shaft spline.

CAUTION

WHEN YOU REMOVE THE BORESCOPE PLUG, DO NOT APPLY MORE THAN 280 IN-LB (32 N·M) TO THE PLUG. THE BORESCOPE PLUG CAN BREAK. THIS CAN CAUSE DAMAGE TO THE ENGINE.

2) Loosen the borescope plug from the stator rear case.

a) Remove the borescope plug assembly.

3) If the borescope plugs do not come loose at 280 in-lb (32 N·m) or less of torque, do these steps:

a) Remove the retaining ring.

NOTE: The retaining ring attaches the borescope cap to the shaft of the borescope plug.

b) Remove the borescope cap from the borescope plug.

c) Remove the borescope plug with a deep well socket.

d) If it is not damaged, put the borescope cap on the borescope plug again.

e) Install the retaining ring.

4) If the borescope plug breaks, do these steps:

a) Remove all the pieces that fall between the inner and outer cases.

b) Remove the borescope plug with a deep well socket.

c) Discard the parts of the borescope plug assembly.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5) Put a tag on the borescope plug assemblies to make sure that they will be installed in the correct borescope port.

(d) When you examine the 6th thru 9th-stage rotor blades, and the vane segments have moved to a position that covers the borescope holes, do these steps:

1) If the diameter of the borescope holes are more than 0.24 in. (6.1 mm), use the 0.24 in. (6.1 mm) flexible borescope.

2) If the diameter of the borescope holes are less than 0.24 in. (6.1 mm), do these steps:

a) Put an alignment rod (locally available) in the hole for the vane segment.

b) Apply a light, downward force on the end of the rod to move the vane up in the case.

NOTE: The aluminum rod has a diameter of 0.375 inch (9.52 mm), with a length of 18 inches (457 mm). There is a 4 inch (102 mm) taper at one end. Because of this taper, the diameter of the rod decreases to 0.062 inch (1.57 mm) at the end.

3) If the 7th-stage borescope hole is closed, do this step:

a) Do a borescope inspection of the aft end of the compressor through the 8th or 6th stage blades, in that sequence.

SUBTASK 72-00-00-210-017-F00

(7) Prepare for the inspection of the compressor blades as follows:

(a) Connect the rigid borescope to the light source.

1) Use the rigid borescope with the yellow band to get a general view of the airfoil.

2) Use the rigid borescope with the green band to get a better view of the blade platform area.

3) Use the rigid borescope with the blue band to get a better view of the blade tips.

(b) Make sure the borescope is correctly adjusted.

(c) Turn the light source ON.

G. HP Compressor Blades Borescope Inspection

SUBTASK 72-00-00-210-018-F00

(1) Examine the compressor rotor blades as follows:

(a) Turn (and index, if it is necessary) the N2 rotor (TASK 72-00-00-980-801-F00).

(b) Put the borescope into the applicable borescope port.

(c) Stop the N2 rotor when you put each blade in a position for its inspection.

NOTE: This lets you do a full inspection of each blade.

SUBTASK 72-00-00-290-009-F00

(2) Examine the applicable stages of the compressor blades (Figure 608):

NOTE: Unless otherwise identified, all damage limits for the HPC blades are the same for the different blade configurations. Use the limits for the applicable stages.

NOTE: The depth of a defect such as a nick is measured along the axis of the damage unless stated differently.

NOTE: HPC blades with P/N P33XPXX (3D Aero) have a 'C' marked on the aft platform. HPC blades with P/N P39XPXX (TI) have a 'H' marked on the aft platform.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Cracks in stages 1 thru 4 are not serviceable unless they meet the conditions that follows:

1) Any number of radial tip cracks within 0.30 inch (7.6 mm) of the leading or trailing edge, up to 0.25 inch (6.4 mm) in length are serviceable.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.25 inch (6.4 mm) but less than 0.40 inch (10.2 mm) in length.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

2) Any number of radial tip cracks more than 0.30 inch (7.6 mm) from the leading or trailing edge, up to 0.10 inch (2.5 mm) in length are serviceable.

3) Any number of chord-wise cracks up to 0.30 inch (7.6 mm) from the tip, up to 0.20 inch (5.1 mm) in length are serviceable.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.20 inch (5.1 mm) but less than 0.30 inch (7.6 mm) in length.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(b) Cracks in stages 5 thru 9 are not serviceable unless they meet the conditions that follows:

1) Up to 25 blades across stages 5 thru 9 can have radial tip cracks that are no more than 0.20 inch (5.1 mm) from the leading or trailing edge.

a) The cracks can be up to 0.15 inch (3.8 mm) in length and are serviceable.

b) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.15 inch (3.8 mm) but less than 0.20 inch (5.1 mm) in length on less than 20% in each stage.

c) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

d) Radial tip cracks more than 0.20 inch (5.1 mm) from the leading or trailing edge are not serviceable.

2) Up to 25 blades across stages 5 thru 9 can have chord-wise cracks that are no more than 0.20 inch (5.1 mm) from the tip.

a) The cracks can be up to 0.15 inch (3.8 mm) long are serviceable.

b) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.15 inch (3.8 mm) but less than 0.20 inch (5.1 mm) long.

c) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(c) Missing or chipped erosion coating on the stages 1 thru 9 blades:

1) There is no limit with this condition.

(d) Nicks, dents and scratches in the airfoil root radius, stages 1 thru 9, (does not include the trailing edge root radius of stage 2 and stage 3)

1) There is no limit to the number with any of these conditions:

a) Elliptical, smooth, round bottom dents having no sharp edges with a maximum diameter of 0.030 inch (0.76 mm). Dents must not connect or overlap.

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b) Any damage with 0.005 inch (0.13 mm) maximum in depth.

c) The scratches are not parallel to the platform.

(e) Tears in the root radius, stages 1 thru 9

1) Not serviceable.

(f) Nicks, dents and scratches in the trailing edge root radius of stage 2 and stage 3

1) There is no limit to the number of nicks, dents and scratches that are less than 0.03 inch (0.8 mm) in depth.

2) Continue-In-Service limit is 10 cycles or 25 hours if the nicks, dents and scratches are more than 0.03 inch (0.8 mm) in depth but less than 0.08 inch (2.0 mm) in depth.

3) There is no limit to the amount of wear on the adjacent HPC inner shroud lip.

(g) Wear or scratches in the trailing edge platform of stage 2 and stage 3

1) There is no limit to the amount of wear or scratches that are less than 0.03 inch (0.8 mm) in depth.

2) Continue-In-Service limit is 10 cycles or 25 hours if the wear or scratch is more than 0.03 inch (0.8 mm) in depth but less than 0.08 inch (2.0 mm) in depth.

3) There is no limit to the amount of wear on the adjacent HPC inner shroud lip.

(h) Tears, nicks, dents, and missing material on the leading and trailing edge of stages 1 thru 9 compressor blades found in the lower 25% of the airfoil (but not in the root radius).

1) Tears are not permitted.

2) There is no limit of nicks, dents and missing material if the damage is less 0.03 inch (0.8 mm) in depth.

3) The Continue-In-Service limit is 10 cycles or 25 hours if the damage is less than 0.08 inch (2.0 mm).

4) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(i) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 1 thru 4 compressor blades found in Dim. B of the airfoil.

1) Tears are not serviceable.

a) If you find tears, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

NOTE: You can find the limits for the repair of tears in Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

2) For stages 1-3, no maximum number of nicks, missing material and erosion if the damage is less than 0.04 inch (1.0 mm) in depth.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.04 inch (1.0 mm) but less than 0.08 inch (2.0 mm) in depth.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

3) For NOT a Tech insertion stage 4 blade (P/N P394XXX), no maximum number of nicks, missing material and erosion if the damage is less than 0.04 inch (1.0 mm) in depth.

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a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.04 inch (1.0 mm) but less than 0.08 inch (2.0 mm) in depth.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

4) For Tech insertion stage 4 blade (P/N P394XXX), no maximum number of nicks, missing material and erosion on the leading and trailing edge found in Dim. B if the damage is less than 0.03 inch (0.8 mm) in depth.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.03 inch (0.8 mm) but less than 0.08 inch (2.0 mm) in depth.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

5) No maximum number of dents in Dim. B if the damage is less than 0.04 inch (1.0 mm) maximum depth and less than 0.06 inch (1.5 mm) maximum deflection from the original contour.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.04 inch (1.0 mm) but less than 0.08 inch (2.0 mm) in depth, and less than 0.06 inch (1.5 mm) deflection from the original contour.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(j) Tears, nicks, dents, missing material and erosion at the leading and trailing edge tip corners in Dim. A of stages 1 thru 4 compressor blades.

1) No maximum number of tears, nicks and dents if the damage is less than 0.25 inch (6.4 mm) in depth.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.25 inch (6.40 mm) in depth but less than 0.30 inch (7.6 mm) in depth.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

2) Missing material and erosion at the leading and trailing edge tip corners.

a) Individual blades with missing material greater than 0.30 x 0.30 inch (7.6 x 7.6 mm) on both leading and trailing edges are not permitted.

b) Any number of blades for each stage 1 thru 4, up to 0.30 x 0.30 inch (7.6 x 7.6 mm) if the downstream damage is serviceable.

c) For stage 2, a maximum of four blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm), and 46 blades up to 0.30 x 0.30 inch (7.6 x 7.6 mm) for total of 50 blades with missing tip corners.

d) For stage 3, a maximum of five blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm) and 51 blades up to .30 x 0.30 inch (7.6 x 7.6 mm) for a total of 56 blades with missing tip corners.

e) For stage 4, maximum of six blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm) and 57 blades up to 0.30 x 0.30 inch (7.6 x 7.6 mm) for a total of 63 blades with missing tip corners.

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f) A maximum service extension of 10 cycles or 25 hours is permitted if the stage 1 damage is more than 0.30 inch (7.6 mm) but less than 0.40 inch (10.2 mm) in depth.

g) A maximum service extension of 10 cycles or 25 hours is permitted if additional stage 2-4 blades have damage, which is more than 0.30 inch (7.6 mm) but less than 0.40 inch (10.2 mm) in depth.

(k) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 5-9 compressor blade found in Dim. B.

1) No maximum number of tears, nicks, missing material and erosion if the damage is less than 0.04 inch (1.0 mm) in depth.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.04 inch (1.0 mm) but less than 0.08 inch (2.0 mm).

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

2) No maximum number of dents if the damage is less than 0.04 inch (1.0 mm) maximum depth and less than 0.06 inch (1.5 mm) maximum deflection from original contour.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is less than 0.08 inch (2.0 mm) in depth, and less than 0.06 inch (1.5 mm) maximum deflection from the original contour.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(l) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 5-9 compressor blade found in Dim. A.

1) No maximum number of tears, nicks and dents if the damage is less than 0.15 inch (3.8 mm) in depth.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.15 inch (3.8 mm) but less than 0.20 inch (5.1 mm) in depth.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

2) Missing material and erosion at the leading edge and trailing edge tip corners.

a) All blades can have missing material and erosion at the tip corner up to 0.15 inch x 0.15 inch (3.8 mm x 3.8 mm) if the downstream damage is serviceable.

b) Up to a total of 25 blades across stages 5 thru 9, with missing material up to 0.20 inch x 0.20 inch (5.1 mm x 5.1 mm) if the downstream damage is serviceable.

c) If more than 25 blades across stages 5-9 have damage that is more than 0.15 inch x 0.15 inch (3.8 mm x 3.8 mm) but less than 0.20 inch x 0.20 inch (5.1 mm x 5.1 mm), a maximum service extension of 100 cycles is permitted.

d) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.20 inch x 0.20 inch (5.1 mm x 5.1 mm) but less than 0.30 inch x 0.30 inch (7.6 mm x 7.6 mm) on a maximum of 20% in each stage.

(m) Any amount of tears, nicks, dents, missing material, erosion, bends and burrs found on the stage 1 thru 9 compressor blade tip is serviceable.

NOTE: The blade tip is the top 0.10 inch (2.5 mm of the blade.

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(n) Curl on the end of the of the stage 1 thru 9 blades

1) Up to 25% of the stages 1 thru 4 blade chord, and maximum radial length of 0.30 inch (7.6 mm), when it does not engage the stationary parts during operation.

2) Up to 50% of the stages 5 thru 9 blade chord radially down 0.30 inch (7.6 mm) from the tip when it does not engage the stationary parts during operation.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is up to 75% of the blade chord radially down 0.30 inch (7.6 mm) from the tip when it does not engage the stationary parts during operation.

(o) Nicks, dents, erosion, and scratches on the stages 1 thru 9 blade airfoil center panel

1) There is no limit to the quantity of erosion and scratches.

2) There is no maximum number of nicks and dents if the damage is not cracked on either side of the blade.

(p) Platform of stages 4-9 locking blades.

1) Clearance between the blade platforms is permitted.

2) There is no maximum limit to the size and quantity of distortions on a blade.

3) Cracks in the material are not serviceable.

4) Shingling is not serviceable.

(q) Blade locks for the stages 4-9 blades

1) Any number of cracks on one lock is permitted for each stage.

a) A maximum service extension of 10 cycles or 25 hours is permitted for two blade locks in the same stage with any number of cracks, if no blade locks are loose in the given stage.

2) Loose blade locks are not permitted.

a) A maximum service extension of 10 cycles or 25 hours is permitted for one loose blade lock on a stage, if the other blade lock on the same stage is not loose or cracked.

(r) Material on blades

1) No maximum amount of material which is found on the blades.

(s) Compressor stator vane shrouds, stages (Figure 610)

1) No maximum limit of wear caused by rubbing on vanes.

(t) The rub coat at the stator flow path

NOTE: The area adjacent to the borescope ports is the only rub coat you can examine.

1) No maximum limit of areas where the rub coat is gone.

2) No maximum number of cracks which are crazed.

(u) Through holes on stage 1 thru 9 blades

1) Through holes are not serviceable.

SUBTASK 72-00-00-080-002-F00

(3) If the inspection is complete, remove the borescope equipment.

(a) Turn the lightsource to OFF, but keep the blower ON until the lamp and case are cool.

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H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-980-004-F00

(1) If you manually opened the VSV's, actuate the VSV's to full close and remove the equipment (TASK 75-31-00-790-801-F00).

NOTE: If you did the Dry Motor Procedure to open the VSV's, no action is necessary. The EEC will move the VSV's and VBV's to their usual position at the subsequent engine start.

SUBTASK 72-00-00-210-021-F00

(2) Do these steps to install the S1-S6 borescope plugs:

(a) Apply a light layer of graphite mineral vaseline, D00601 [CP2101], pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and to the friction surfaces of the plug.

(b) Install the plugs in the compressor case.

1) Tighten the plug to 57-63 pound-inches (6.4-7.1 Newton-meters).

(c) Put safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on the plugs.

SUBTASK 72-00-00-410-021-F00

(3) If removed, install the lower right shroud segment (TASK 72-23-03-400-802-F00).

SUBTASK 72-00-00-210-022-F00

(4) Do these steps to install the S7-S9 borescope plugs:

(a) Before you install the S7-S9 borescope plugs, make sure the inner borescope port is open as follows:

1) Put the compressor borescope tool in the borescope port (Figure 606).

(b) Apply a light layer of these lubricants to the borescope plug assembly as follows:

1) Apply pure nickel special compound, D50034 [CP2619], graphite mineral vaseline, D00601 [CP2101] or milk of magnesia compound, D50032 [CP1064] to the threads and mating surfaces on the inner plug.

2) Apply graphite mineral vaseline, D00601 [CP2101], pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads of the outer plug.

(c) Install the borescope plug in the applicable borescope port and tighten as follows:

1) Tighten the inner plug to 76-84 pound-inches (8.6-9.5 Newton-meters).

2) Loosen the inner plug by one-quarter turn.

3) Tighten the inner plug again to the run-on torque plus 15-20 pound-inches (1.7-2.3 Newton-meters).

4) Push the outer plug to engage the threads in the compressor case.

a) Tighten the outer plug by hand.

5) Tighten the outer plug to 57-63 pound-inches (6.4-7.1 Newton-meters).

a) Attach all three outer plugs together with cable, G50065 [CP8006] or safety wire, G02345 [CP8001].

SUBTASK 72-00-00-210-023-F00

(5) If the borescope inspection is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HP Compressor Case Borescope Plug Installation
Figure 605/72-00-00-990-804-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BORESCOPE PLUG ASSEMBLY
(EXAMPLE OF S7, S8, AND S9 LOCATIONS)

B-B

1 CONFIGURATION 1
2 CONFIGURATION 2

1137508-00-A
G23353 S0006582245_V4

HP Compressor Case Borescope Plug Installation
Figure 605/72-00-00-990-804-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

**DEEP SOCKET WRENCH
(USED TO REMOVE BROKEN
INNER BORESCOPE PLUG.)**

**ALIGNMENT ROD
(USED TO ALIGN VANE
BORESCOPE HOLE IN THE
CASE AS NECESSARY.)**

GMM-1137509-00-A
G24117 S0006582246_V3

**HP Compressor Borescope Tool Details
Figure 606/72-00-00-990-805-F00**

ECCN 9E991 BOEING PROPRIETARY - See title page for details

PORT IDENTIFICATION	PORT LOCATION STATOR STAGE	BORESCOPE PORT SIZE
S1	IGV	10 mm
S2	1	8 mm
S3	2	10 mm
S4	3	8 mm
S5	4	10 mm
S6	5	10 mm
S7	6	8 mm
S8	7	8 mm
S9	8	8 mm

1 CONFIGURATION 1

2 CONFIGURATION 2

GMM-1137510-00-A

G24189 S0006582247_V3

HP Compressor Borescope Port Locations
Figure 607/72-00-00-990-806-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

STAGE	NUMBER OF BLADES	LEADING EDGE VIEW THRU:	TRAILING EDGE VIEW THRU:
1	38	S1	S2
2	53	S2	S3
3	60	S3	S4
4	68	S4	S5
5	75	S5	S6
6	82	S6	S7
7	82	S7	S8
8	80	S8	S9
9	76	S9	---

G48156 S0006582248_V3

HP Compressor Borescope Port Locations
Figure 607/72-00-00-990-806-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

STAGE	DIM. R	25% of L
1	0.14 (3.6)	0.8 (20.3)
2	0.14 (3.6)	0.6 (15.2)
3	0.12 (3.0)	0.5 (12.7)
4	0.10 (2.5)	0.5 (12.7)
5	0.10 (2.5)	0.4 (10.2)
6	0.09 (2.3)	0.3 (7.6)
7	0.09 (2.3)	0.3 (7.6)
8	0.09 (2.3)	0.3 (7.6)
9	0.09 (2.3)	0.3 (7.6)

HP Compressor Borescope Inspection Limits
Figure 608/72-00-00-990-807-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AIRFOIL LEADING OR TRAILING EDGE TIP CORNER

C

POSSIBLE AIRFOIL DAMAGE

D

NOTE:

ALL DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

DEFECT DEPTH IS IN AXIS OF DAMAGE UNLESS OTHERWISE NOTED.

1254189-00
G24275 S0006582250_V6

HP Compressor Borescope Inspection Limits
Figure 608/72-00-00-990-807-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

COMPRESSOR BLADE AIRFOIL RADIUS

D1

1290677-00

1932481 S0000365870_V2

HP Compressor Borescope Inspection Limits
Figure 608/72-00-00-990-807-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E

1 CONTACT AREA BETWEEN HPC INNER SHROUD AND THE STAGE 2 AND STAGE 3 BLADE PLATFORM OR AIRFOIL TRAILING EDGE ROOT RADIUS.

1222449-00-A
432594 S0000140117_V3

HP Compressor Borescope Inspection Limits
Figure 608/72-00-00-990-807-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1250662-00 COMMERCIAL
1307757 S0000226264_V2

CFM56-7/3 HPC Blade
Figure 609/72-00-00-990-839-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1218766-00-A
364977 S0000132036_V2

HP Compressor - Stage 1-3 Stator Vane Shroud Rubbing
Figure 610/72-00-00-990-836-F01

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-200-817-F00

6. HP Compressor Blades (Stages 2,4,6 and 8) Borescope Inspection

(Figure 601, Figure 605, Figure 606, Figure 607 and Figure 608)

A. General

(1) This task provides the instructions on how to examine the HP compressor blades (stages 2, 4, 6 and 8) with a borescope.

B. References

Reference	Title
71-00-00-700-821-F00	Dry Motor the Engine (P/B 201)
72-00-00-300-801-F00	Repair the HPC Rotor Blades (P/B 801)
72-00-00-980-801-F00	Turn the N2 Rotor (P/B 201)
75-31-00-790-801-F00	VSV Actuation System - Manual Operation (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Inspection

SUBTASK 72-00-00-210-120-F00

(1) Do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-290-004-F00

(2) Connect the applicable rigid borescope to its light source as follows:

NOTE: Use the rigid borescope with the yellow band.

(a) Connect rigid borescope, COM-2195 to light source, SPL-4305.

(b) Connect rigid borescope, COM-4302 to light source, SPL-4306.

(c) Connect rigid borescope, COM-4303 to light source, SPL-2197.

(d) Connect rigid borescope, COM-4304 to light source, SPL-4308

SUBTASK 72-00-00-480-049-F00

(3) Connect the rigid borescope with the long, right angle borescope extension, 90 degree right-angle viewer, and 60 degree field of vision.

SUBTASK 72-00-00-480-050-F00

(4) Turn the light source to the ON position.

SUBTASK 72-00-00-860-022-F00

(5) To actuate the variable stator vanes (VSV) to full open, do this task: VSV Actuation System - Manual Operation, TASK 75-31-00-790-801-F00.

NOTE: During engine shutdown, the VSV's will close and the VSV actuator will be fully extended.

(a) As an alternate procedure, do these steps:

1) If installed, remove the borescope equipment from the engine.

2) For engine no. 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

3) For engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

4) Do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

5) Put the ENGINE START switch to the CONT position to stop the dry motor procedure.

NOTE: When you stop the engine with the ENGINE START switch in the CONT position, the EEC will command the VSV's to the fully open position and the VBV's to the fully closed position.

6) After the engine stops completely, put the ENGINE START switch to the OFF position and do the remaining steps in the dry motor procedure.

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LOM 429-432; AIRPLANES WITH AUTO-IGNITION

a) The AUTO position is off.

LOM ALL

7) For engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

8) For engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-00-00-010-041-F00

(6) Find the applicable borescope plugs (S2-S9) for the HPC stages (2,4,6 and 8) that you will examine.

SUBTASK 72-00-00-010-034-F00

(7) Do these steps to get access to the applicable HPC stage.

(a) Remove the S2-S6 borescope plugs.

1) Put a tag on each plug to make sure it will be installed in the correct borescope port.

(b) Do these steps to remove the S7-S9 borescope plug assemblies:

1) Loosen the borescope cap.

a) Disengage the borescope cap from the compressor case.

b) Pull the borescope cap outward to engage the internal shaft spline.

CAUTION

WHEN YOU REMOVE THE BORESCOPE PLUG, DO NOT APPLY MORE THAN 280 IN-LB (32 N·M) TO THE PLUG. THE BORESCOPE PLUG CAN BREAK. THIS CAN CAUSE DAMAGE TO THE ENGINE.

2) Loosen the borescope plug from the stator rear case.

a) Remove the borescope plug assembly.

3) If the borescope plugs do not come loose at 280 inch-pounds (31.5 Newton-meters) or less of torque, do these steps:

a) Remove the retaining ring.

NOTE: The retaining ring attaches the borescope cap to the shaft of the borescope plug.

b) Remove the borescope cap from the borescope plug.

c) Remove the borescope plug with a deep well socket.

d) If it is not damaged, put the borescope cap on the borescope plug again.

e) Install the retaining ring.

4) If the borescope plug breaks, do these steps:

a) Remove all the pieces that fall between the inner and outer cases.

b) Remove the borescope plug with a deep well socket.

c) Discard the parts of the borescope plug assembly.

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5) Put a tag on the borescope plug assemblies to make sure that they will be installed in the correct borescope port.

(c) When you examine the 6th and 8th-stage rotor blades, and the vane segments have moved to a position that covers the borescope holes, do these steps:

1) If the diameter of the borescope holes are larger than 0.24 inch (6.1 mm), use the 0.24 inch (6.1 mm) flexible borescope.

2) If the diameter of the borescope holes are less than 0.24 inch (6.1 mm), do these steps:

a) Put a alignment rod (locally available) in the hole for the vane segment.

b) Apply a light, downward force on the end of the rod to move the vane up in the case.

NOTE: The aluminum rod has a diameter of 0.375 inch (9.52 mm), with a length of 18 inches (457 mm). There is a 4 inch (102 mm) taper at one end. Because of this taper, the diameter of the rod decreases to 0.062 inch (1.57 mm) at the end.

3) If the 7th-stage borescope hole is closed, do this step:

a) Do a borescope inspection of the aft end of the compressor through the 8th or 6th stage blades, in that sequence.

SUBTASK 72-00-00-290-005-F00

(8) Do these steps to prepare for the inspection of the compressor blades:

(a) Connect the rigid borescope to the light source.

1) Use the rigid borescope with the yellow band to get a general view of the airfoil.

2) Use the rigid borescope with the green band to get a better view of the blade platform area.

3) Use the rigid borescope with the blue band to get a better view of the blade tips.

(b) Make sure the borescope is correctly adjusted.

(c) Turn the light source ON.

G. HP Compressor Blades (Stages 2,4,6 and 8) Borescope Inspection

SUBTASK 72-00-00-290-006-F00

(1) Examine the compressor rotor blades as follows:

(a) Turn (and index, if it is necessary) the N2 rotor (TASK 72-00-00-980-801-F00).

(b) Put the borescope into the applicable borescope port.

(c) Stop the N2 rotor when you put each blade in a position for its inspection.

NOTE: This lets you do a full inspection of each blade.

SUBTASK 72-00-00-290-010-F00

(2) Examine the stage 2, 4, 6 and 8 HP compressor blades with the HPC Inspection Limits for the applicable stages in the following subtask.

(a) If the HPC limits are listed for stages 1 thru 9, then use these limits for stages 2, 4, 6, and 8.

(b) If the HPC limits are listed for stages 1 thru 4, then use these limits for stages 2 and 4.

(c) If the HPC limits are listed for stages 5 thru 9, then use these limits for stages 6 and 8.

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SUBTASK 72-00-00-290-011-F00

(3) Examine the applicable stages of the compressor blades (Figure 608):

NOTE: Unless otherwise identified, all damage limits for the HPC blades are the same for the different blade configurations. Use the limits for the applicable stages.

NOTE: The depth of a defect such as a nick is measured along the axis of the damage unless stated differently.

NOTE: HPC blades with P/N P33XPXX (3D Aero) have a 'C' marked on the aft platform. HPC blades with P/N P39XPXX (TI) have a 'H' marked on the aft platform.

(a) Cracks in stages 1 thru 4 are not serviceable unless they meet the conditions that follows:

1) Any number of radial tip cracks within 0.30 inch (7.6 mm) of the leading or trailing edge, up to 0.25 inch (6.4 mm) in length are serviceable.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.25 inch (6.4 mm) but less than 0.40 inch (10.2 mm) in length.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

2) Any number of radial tip cracks more than 0.30 inch (7.6 mm) from the leading or trailing edge, up to 0.10 inch (2.5 mm) in length are serviceable.

3) Any number of chord-wise cracks up to 0.30 inch (7.6 mm) from the tip, up to 0.20 inch (5.1 mm) in length are serviceable.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.20 inch (5.1 mm) but less than 0.30 inch (7.6 mm) in length.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(b) Cracks in stages 5 thru 9 are not serviceable unless they meet the conditions that follows:

1) Up to 25 blades across stages 5 thru 9 can have radial tip cracks that are no more than 0.20 inch (5.1 mm) from the leading or trailing edge.

a) The cracks can be up to 0.15 inch (3.8 mm) in length and are serviceable.

b) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.15 inch (3.8 mm) but less than 0.20 inch (5.1 mm) in length on less than 20% in each stage.

c) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

d) Radial tip cracks more than 0.20 inch (5.1 mm) from the leading or trailing edge are not serviceable.

2) Up to 25 blades across stages 5 thru 9 can have chord-wise cracks that are no more than 0.20 inch (5.1 mm) from the tip.

a) The cracks can be up to 0.15 inch (3.8 mm) long are serviceable.

b) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.15 inch (3.8 mm) but less than 0.20 inch (5.1 mm) long.

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c) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(c) Missing or chipped erosion coating on the stages 1 thru 9 blades:

1) There is no limit with this condition.

(d) Nicks, dents and scratches in the airfoil root radius, stages 1 thru 9, (does not include the trailing edge root radius of stage 2 and stage 3)

1) There is no limit to the number with any of these conditions:

a) Elliptical, smooth, round bottom dents having no sharp edges with a maximum diameter of 0.030 inch (0.76 mm). Dents must not connect or overlap.

b) Any damage with 0.005 inch (0.13 mm) maximum in depth.

c) The scratches are not parallel to the platform.

(e) Tears in the root radius, stages 1 thru 9

1) Not serviceable.

(f) Nicks, dents and scratches in the trailing edge root radius of stage 2 and stage 3

1) There is no limit to the number of nicks, dents and scratches that are less than 0.03 inch (0.8 mm) in depth.

2) Continue-In-Service limit is 10 cycles or 25 hours if the nicks, dents and scratches are more than 0.03 inch (0.8 mm) in depth but less than 0.08 inch (2.0 mm) in depth.

3) There is no limit to the amount of wear on the adjacent HPC inner shroud lip.

(g) Wear or scratches in the trailing edge platform of stage 2 and stage 3

1) There is no limit to the amount of wear or scratches that are less than 0.03 inch (0.8 mm) in depth.

2) Continue-In-Service limit is 10 cycles or 25 hours if the wear or scratch is more than 0.03 inch (0.8 mm) in depth but less than 0.08 inch (2.0 mm) in depth.

3) There is no limit to the amount of wear on the adjacent HPC inner shroud lip.

(h) Tears, nicks, dents, and missing material on the leading and trailing edge of stages 1 thru 9 compressor blades found in the lower 25% of the airfoil (but not in the root radius).

1) Tears are not permitted.

2) There is no limit of nicks, dents and missing material if the damage is less 0.03 inch (0.8 mm) in depth.

3) The Continue-In-Service limit is 10 cycles or 25 hours if the damage is less than 0.08 inch (2.0 mm).

4) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(i) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 1 thru 4 compressor blades found in Dim. B of the airfoil.

1) Tears are not serviceable.

a) If you find tears, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

NOTE: You can find the limits for the repair of tears in Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

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2) For stages 1-3, no maximum number of nicks, missing material and erosion if the damage is less than 0.04 inch (1.0 mm) in depth.
   a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.04 inch (1.0 mm) but less than 0.08 inch (2.0 mm) in depth.
   b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.
3) For NOT a Tech insertion stage 4 blade (P/N P394XXX), no maximum number of nicks, missing material and erosion if the damage is less than 0.04 inch (1.0 mm) in depth.
   a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.04 inch (1.0 mm) but less than 0.08 inch (2.0 mm) in depth.
   b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.
4) For Tech insertion stage 4 blade (P/N P394XXX), no maximum number of nicks, missing material and erosion on the leading and trailing edge found in Dim. B if the damage is less than 0.03 inch (0.8 mm) in depth.
   a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.03 inch (0.8 mm) but less than 0.08 inch (2.0 mm) in depth.
   b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.
5) No maximum number of dents in Dim. B if the damage is less than 0.04 inch (1.0 mm) maximum depth and less than 0.06 inch (1.5 mm) maximum deflection from the original contour.
   a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.04 inch (1.0 mm) but less than 0.08 inch (2.0 mm) in depth, and less than 0.06 inch (1.5 mm) deflection from the original contour.
   b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(j) Tears, nicks, dents, missing material and erosion at the leading and trailing edge tip corners in Dim. A of stages 1 thru 4 compressor blades.
1) No maximum number of tears, nicks and dents if the damage is less than 0.25 inch (6.4 mm) in depth.
   a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.25 inch (6.40 mm) in depth but less than 0.30 inch (7.6 mm) in depth.
   b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.
2) Missing material and erosion at the leading and trailing edge tip corners.
   a) Individual blades with missing material greater than 0.30 x 0.30 inch (7.6 x 7.6 mm) on both leading and trailing edges are not permitted.
   b) Any number of blades for each stage 1 thru 4, up to 0.30 x 0.30 inch (7.6 x 7.6 mm) if the downstream damage is serviceable.

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c) For stage 2, a maximum of four blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm), and 46 blades up to 0.30 x 0.30 inch (7.6 x 7.6 mm) for total of 50 blades with missing tip corners.

d) For stage 3, a maximum of five blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm) and 51 blades up to .30 x 0.30 inch (7.6 x 7.6 mm) for a total of 56 blades with missing tip corners.

e) For stage 4, maximum of six blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm) and 57 blades up to 0.30 x 0.30 inch (7.6 x 7.6 mm) for a total of 63 blades with missing tip corners.

f) A maximum service extension of 10 cycles or 25 hours is permitted if the stage 1 damage is more than 0.30 inch (7.6 mm) but less than 0.40 inch (10.2 mm) in depth.

g) A maximum service extension of 10 cycles or 25 hours is permitted if additional stage 2-4 blades have damage, which is more than 0.30 inch (7.6 mm) but less than 0.40 inch (10.2 mm) in depth.

(k) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 5-9 compressor blade found in Dim. B.

1) No maximum number of tears, nicks, missing material and erosion if the damage is less than 0.04 inch (1.0 mm) in depth.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.04 inch (1.0 mm) but less than 0.08 inch (2.0 mm).

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

2) No maximum number of dents if the damage is less than 0.04 inch (1.0 mm) maximum depth and less than 0.06 inch (1.5 mm) maximum deflection from original contour.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is less than 0.08 inch (2.0 mm) in depth, and less than 0.06 inch (1.5 mm) maximum deflection from the original contour.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(l) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 5-9 compressor blade found in Dim. A.

1) No maximum number of tears, nicks and dents if the damage is less than 0.15 inch (3.8 mm) in depth.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.15 inch (3.8 mm) but less than 0.20 inch (5.1 mm) in depth.

b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

2) Missing material and erosion at the leading edge and trailing edge tip corners.

a) All blades can have missing material and erosion at the tip corner up to 0.15 inch x 0.15 inch (3.8 mm x 3.8 mm) if the downstream damage is serviceable.

b) Up to a total of 25 blades across stages 5 thru 9, with missing material up to 0.20 inch x 0.20 inch (5.1 mm x 5.1 mm) if the downstream damage is serviceable.

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c) If more than 25 blades across stages 5-9 have damage that is more than 0.15 inch x 0.15 inch (3.8 mm x 3.8 mm) but less than 0.20 inch x 0.20 inch (5.1 mm x 5.1 mm), a maximum service extension of 100 cycles is permitted.

d) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.20 inch x 0.20 inch (5.1 mm x 5.1 mm) but less than 0.30 inch x 0.30 inch (7.6 mm x 7.6 mm) on a maximum of 20% in each stage.

(m) Any amount of tears, nicks, dents, missing material, erosion, bends and burrs found on the stage 1 thru 9 compressor blade tip is serviceable.

NOTE: The blade tip is the top 0.10 inch (2.5 mm of the blade.

(n) Curl on the end of the of the stage 1 thru 9 blades

1) Up to 25% of the stages 1 thru 4 blade chord, and maximum radial length of 0.30 inch (7.6 mm), when it does not engage the stationary parts during operation.

2) Up to 50% of the stages 5 thru 9 blade chord radially down 0.30 inch (7.6 mm) from the tip when it does not engage the stationary parts during operation.

a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is up to 75% of the blade chord radially down 0.30 inch (7.6 mm) from the tip when it does not engage the stationary parts during operation.

(o) Nicks, dents, erosion, and scratches on the stages 1 thru 9 blade airfoil center panel

1) There is no limit to the quantity of erosion and scratches.

2) There is no maximum number of nicks and dents if the damage is not cracked on either side of the blade.

(p) Platform of stages 4-9 locking blades.

1) Clearance between the blade platforms is permitted.

2) There is no maximum limit to the size and quantity of distortions on a blade.

3) Cracks in the material are not serviceable.

4) Shingling is not serviceable.

(q) Blade locks for the stages 4-9 blades

1) Any number of cracks on one lock is permitted for each stage.

a) A maximum service extension of 10 cycles or 25 hours is permitted for two blade locks in the same stage with any number of cracks, if no blade locks are loose in the given stage.

2) Loose blade locks are not permitted.

a) A maximum service extension of 10 cycles or 25 hours is permitted for one loose blade lock on a stage, if the other blade lock on the same stage is not loose or cracked.

(r) Material on blades

1) No maximum amount of material which is found on the blades.

(s) Compressor stator vane shrouds, stages (Figure 610)

1) No maximum limit of wear caused by rubbing on vanes.

(t) The rub coat at the stator flow path

NOTE: The area adjacent to the borescope ports is the only rub coat you can examine.

1) No maximum limit of areas where the rub coat is gone.

2) No maximum number of cracks which are crazed.

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(u) Through holes on stage 1 thru 9 blades

1) Through holes are not serviceable.

SUBTASK 72-00-00-290-008-F00

(4) If the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-860-023-F00

(1) If you manually opened the VSV's, actuate the VSV's to full close and remove the equipment (TASK 75-31-00-790-801-F00).

NOTE: If you did the Dry Motor Procedure to open the VSV's, no action is necessary. The EEC will move the VSV's and VBV's to their usual position at the subsequent engine start.

SUBTASK 72-00-00-410-025-F00

(2) Do these steps to install the S2-S6 borescope plugs:

(a) Apply a light layer of graphite mineral vaseline, D00601 [CP2101], pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and to the friction surfaces of the plug.

(b) Install the plugs in the compressor case.

1) Tighten the plug to 57-63 pound-inches (6.4-7.1 Newton-meters).

(c) Put safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on the plugs.

SUBTASK 72-00-00-410-026-F00

(3) Do these steps to install the S7-S9 borescope plugs:

(a) Before you install the S7-S9 borescope plugs, make sure the inner borescope port is open.

1) Put the aluminum rod in the borescope port (Figure 606).

(b) Apply a light layer of these lubricants to the borescope plug assembly as follows:

1) Apply pure nickel special compound, D50034 [CP2619], graphite mineral vaseline, D00601 [CP2101] or milk of magnesia compound, D50032 [CP1064] to the threads and mating surfaces on the inner plug.

2) Apply graphite mineral vaseline, D00601 [CP2101], pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads of the outer plug.

(c) Install the borescope plug in the applicable borescope port.

1) Tighten the inner plug to 76-84 pound-inches (8.6-9.5 Newton-meters).

2) Loosen the inner plug by one-quarter turn.

3) Tighten the inner plug again to the run-on torque plus 15-20 pound-inches (1.7-2.26 Newton-meters).

4) Push the outer plug to engage the threads in the compressor case.

a) Tighten the outer plug by hand.

5) Tighten the outer plug to 57-63 pound-inches (6.4-7.1 Newton-meters).

a) Attach all three outer plugs together with cable, G50065 [CP8006] or safety wire, G02345 [CP8001].

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SUBTASK 72-00-00-210-121-F00

(4) If the borescope inspection is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

——— END OF TASK ———

TASK 72-00-00-200-805-F00

7. Combustion Section Borescope Inspection

(Figure 601, Figure 611, Figure 612 or Figure 613, Figure 614, Figure 615)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the instructions on how to examine the combustion section with a borescope.

B. References

Reference	Title
71-00-02-000-801-F00	Power Plant - Removal (P/B 401)
71-00-02-400-801-F00	Power Plant - Installation (P/B 401)
73-11-04-000-804-F02	Fuel Nozzle Removal (P/B 401)
73-11-04-000-805-F01	Fuel Nozzle Removal (P/B 401)
73-11-04-400-804-F02	Fuel Nozzle Installation (P/B 401)
73-11-04-400-805-F01	Fuel Nozzle Installation (P/B 401)
74-21-02-000-801-F00	Main Igniter Plug Removal (P/B 401)
74-21-02-400-801-F00	Main Igniter Plug Installation (P/B 401)
FIM 71-05 TASK 801	Birdstrike/FOD/Ice Ingestion in Engine - Fault Isolation

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828 Opt Part #: 856A1321P05 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828

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(Continued)

Reference	Description
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Inspection

SUBTASK 72-00-00-210-024-F00

(1) Do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-010-004-F00

(2) Remove the S13 and S15 borescope plugs.

NOTE: To do an initial inspection, it is only necessary to remove the S13 and S15 borescope plugs. If you find damage, you must remove the main igniter plugs and the other borescope plugs to do a complete inspection.

(a) Identify each BSI plug.

(b) Remove the S13 and S15 BSI plugs.

(c) Attach an identification tag onto the borescope plugs to make sure that each borescope plug is installed back in the correct borescope port after this procedure.

SUBTASK 72-00-00-010-005-F00

(3) If it is necessary to do a complete inspection, do these steps to remove the main igniter plugs and the other borescope plugs:

NOTE: The port for the 4:00 o'clock main igniter plug is referred to as the S10 borescope port. The port for the 8:00 o'clock main igniter plug is referred to as the S11 borescope port.

(a) Do this task: Main Igniter Plug Removal, TASK 74-21-02-000-801-F00.

(b) Remove the S12 and S14 borescope plugs.

1) Identify each BSI plug.

2) Remove the S12 and S14 BSI plugs.

3) Attach an identification tag onto the borescope plugs to make sure that each borescope plug is installed back in the correct borescope port after this procedure.

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SUBTASK 72-00-00-210-027-F00

(4) Do these steps to prepare for the inspection of the combustion section:

(a) Connect the applicable rigid borescope to the light source.

1) Connect rigid borescope, COM-2195, and light source, SPL-4305.

2) Connect rigid borescope, COM-4302, and light source, SPL-4306.

3) Connect rigid borescope, COM-4303, and light source, SPL-2197.

4) Connect rigid borescope, COM-4304, and light source, SPL-4308.

5) Use the rigid borescope with the yellow band to get a general view of the combustion chamber.

6) Use the rigid borescope with the green band as follows:

a) Use the borescope to view circumferentially around the combustion chamber.

b) Use the borescope to view the inner liner that is adjacent to the borescope port.

7) Use the rigid borescope with the blue band to view the outer liner that is adjacent the borescope port.

8) Use the rigid borescope with the black band to view the aft ends of the inner and outer liners.

9) Use the rigid borescope with the black band to evaluate defects that you found with the other borescopes.

10) Use the fiberscope to view the outside of the outer liner.

(b) Make sure that you adjust the borescope correctly.

(c) Turn the lightsource ON.

SUBTASK 72-00-00-210-028-F00

(5) If it is necessary to do an inspection of the cold-side of the outer liner, do these steps to prepare for the inspection:

(a) Connect the borescope, COM-2196, to the applicable light source.

(b) Make sure that you adjust the borescope correctly.

(c) Turn the light source ON.

G. Combustion Section Borescope Inspection

SUBTASK 72-00-00-210-118-F00

(1) Examine all surfaces as follow:

(a) Discoloration

1) Permitted.

(b) Carbon accumulation

1) Permitted.

(c) Missing, chipped or spalled areas of the thermal barrier coating

1) Permitted.

SUBTASK 72-00-00-210-029-F00

(2) Examine the dome assembly as follows:

(a) Distortion of the deflector or the sleeve

1) Permitted.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Radial cracks in the spectacle plate

1) Permitted with these conditions:

a) The cracks are not connected.

b) The cracks are less than 2 in. (50.8 mm) in length.

2) A continue-in-service limit of 25 flight hours is permitted with these conditions:

a) The cracks are not connected.

b) The cracks are less than 2.5 in. (63.5 mm) in length.

(c) Circumferential cracks in the spectacle plate

1) Permitted with these conditions:

a) The cracks are less than 3 in. (76.2 mm) in length.

b) The minimum distance between cracks is not less than 6 in. (152.4 mm) .

2) A continue-in-service limit of 25 flight hours, is permitted with these conditions:

a) The cracks are less than 3.6 in. (91.4 mm).

b) The minimum distance between cracks is not less than 4.8 in. (121.9 mm).

(d) Cracks in the spectacle plate that are connected

1) One radial crack can be connected to one circumferential crack that extends between adjacent deflectors with these conditions:

a) The radial crack is less than 2 in. (50.8 mm) in length.

b) The circumferential crack is less than 3 in. (76.2 mm).

c) The minimum distance between cracks is not less than 6 in. (152.4 mm).

2) A continue-in-service limit of 25 flight hours is permitted with these conditions:

a) The radial crack is not more than 2.5 in. (63.5 mm) in length.

b) The circumferential crack is not more than 3.6 in. (91.4 mm) in length.

c) The minimum distance between cracks is not less than 4.8 in. (121.9 mm).

(e) Missing material from the spectacle plate

1) A maximum area of 0.060 x 0.060 inch (1.52 x 1.52 mm) is permitted at the point where the cracks connect.

2) A continue-in-service limit of 25 flight hours is permitted if the damage is more than the limits.

(f) Radial cracks in the deflector or the sleeve

1) Permitted, if they are less than 0.5 in. (12.7 mm) in length.

2) A continue-in-service limit of 25 cycles is permitted if the cracks are not more than 0.6 in. (15.2 mm) in length.

(g) Circumferential cracks in the deflector or sleeve

1) There is no limit to the number of cracks if they are less than 0.75 in. (19.0 mm) in length.

2) A continue-in-service limit of 25 cycles is permitted if the cracks are not more than 0.9 in. (22.9 mm) in length.

(h) Cracks that connect in the deflector or sleeve

1) One radial and one circumferential crack that connect are permitted, with these conditions:

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a) The radial crack is less than 0.5 in. (12.7 mm) in length.

b) The circumferential crack is less than 0.75 in. (19.0 mm) in length.

2) A continue-in-service limit of 25 cycles is permitted with these conditions:

a) The radial crack is not more than 0.6 in. (15.2 mm) in length.

b) The circumferential crack is not more than 0.9 in. (22.9 mm) in length.

(i) Missing material from the extensions on the deflector

NOTE: Examine the deflector surface as close to perpendicular as possible.

1) Up to 15-exposed dome cooling holes permitted in each deflector quadrant (Figure 612 or Figure 613, View C2).

2) Not more than 20-exposed dome cooling holes in any deflector (Figure 612 or Figure 613, View C3).

3) Do this inspection again after 750 cycles if up to 25 dome cooling holes total in any deflector are exposed.

4) More than 25-exposed dome cooling holes total in any deflector, the continue-in-service limit is 25 cycles.

(j) Missing material from the extensions on the sleeve

1) Permitted if the depth is not more than 0.20 in. (5.08 mm).

2) A continue-in-service limit of 50 cycles is permitted if the depth is not more than 0.240 in. (6.10 mm).

(k) Burn holes

1) 3 areas for each dome are permitted if the maximum area of each hole is not more than 1.0 x 1.0 inch (25.4 x 25.4 mm).

2) A continue-in-service limit of 25 cycles is permitted with these conditions:

a) There are not more than 3 areas on each dome that have missing material.

b) Each area is not more than 1.2 x 1.2 inch (30.5 x 30.5 mm).

(l) Cracks in the primary swirl nozzle

1) Permitted.

(m) Cracks and missing material from the secondary swirl nozzle venturi.

1) Any number of secondary swirl nozzle venturis with indications (cracks) permitted.

2) Any number of secondary swirl nozzle venturis with total missing material at each venturi up to 0.100 in. (2.5 mm) in width permitted (Figure 612 or Figure 613 , View C1).

3) Up to six secondary swirl nozzle venturis with total missing material at each venturi over 0.100 in. (2.5 mm), but not more than 0.300 in. (7.6 mm) in width permitted.

4) Do this inspection again after 750 cycles if there is up to ten secondary swirl nozzle venturis with total missing material at each venturi over 0.100 in. (2.5 mm), but not more than 0.300 in. (7.6 mm) in width.

5) The Continue-In-Service limit is 25 cycles for:

a) Any of the secondary swirl nozzle venturis that have total missing material over 0.300 in. (7.6 mm) in width, or

b) More than ten secondary swirl nozzle venturis that have total missing material at each venturi over 0.100 in. (2.5 mm).

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SUBTASK 72-00-00-210-030-F00

(3) Examine the inner and outer liners as follow:

(a) Axial cracks on the outer liner

NOTE: The dome band is counted as a panel.

NOTE: Axial cracks that become circumferential cracks for a length that is less than one dilution land, should be counted as one continuous axial crack.

1) Cracks that go across only one panel are permitted.

2) A maximum of 4 cracks that go across more than one panel are permitted with this condition:

a) The cracks cannot go across more than 3 panels.

3) If a crack is longer than 3 panels, do the borescope inspection of the cold side of the outer liner.

NOTE: Do the inspection of the cold side only if you have no more than 3 cracks that are longer than 3 panels. More than 3 cracks that are longer than 3 panels are not permitted.

4) A continue-in-service limit of 100 cycles is permitted with these conditions:

a) There are not more than 5 cracks that go across more than one panel.

b) A crack cannot go across more than 5 panels in sequence.

(b) The cold side of the outer liner for cracks

NOTE: Do this inspection of the cold side only if you find not more than 3 cracks that are longer than 3 panels during the hot side inspection. More than 3 cracks that are longer than 3 panels is not permitted.

1) The cracks must not go through more than one of the last three cooling ribs (cooling ribs 4, 5, or 6).

2) Cooling rib 1 must not be cracked through.

3) Do this inspection again after 750 cycles.

4) A continue-in-service limit of 25 cycles is permitted with these conditions:

a) There are no more than 5 cracks that go across more than one panel.

b) There are no cracks that go across more than 5 panels.

c) At least one of the cooling ribs (3, 4, 5, or 6) do not have cracks that go through to the cold side.

d) Cooling rib 1 does not have a crack that goes through.

(c) Axial cracks on the inner liner

1) Permitted if the cracks do not go across more than one panel.

2) There are not more than 4 cracks that go across more than one panel.

3) Only one crack can go across more than three panels with these conditions:

a) The crack does not go across more than 4 panels.

b) The crack is connected to a hole caused by burn-through or missing material which is not more than 3 times the size of a dilution hole.

c) The crack is not connected to a circumferential crack that is more than 0.5 in. (12.7 mm) in length.

d) Do this inspection again after each 750 cycles.

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4) A continue-in-service limit of 100 cycles is permitted with these conditions:
   a) There are not more than 5 cracks that go across more than one panel.
   b) There are no cracks that go across more than 4 panels in sequence.

(d) Circumferential cracks on the inner and outer liners

NOTE: Use the length of the dilution lands to help you find the length of the cracks.

NOTE: For all non /3 Engines: For the dome bands and panel 2 of the inner and outer liner, use the dilution lands (the distance between the edges of the dilution holes) on panel 1. For the panels 4 and 5 on the outer liner and panel 4 of the inner liner, use the dilution lands on panel 3.

NOTE: For /3 and /3 PIP Engines: For the dome bands of the inner and outer liner, use the dilution lands (the distance between the edges of the dilution holes) on panel 1. For the panels 3 to 5 on the outer liner and panels 3 and 4 on the inner liner, use the dilution lands on panel 2.

1) Permitted with these conditions:
   a) The cracks are not longer than 2 dilution lands.
   b) There are no more than 2 adjacent cracks in a dilution land.
   c) The cracks are separated by a minimum of 3 dilution lands that do not have cracks.
2) A continue-in-service limit of 25 cycles is permitted with these conditions:
   a) The cracks are not longer than 3 dilution lands.
   b) The cracks are separated by a minimum of 3 dilution lands that do not have cracks.

(e) The inner and outer liners for axial and circumferential cracks that connect

1) One axial and one circumferential crack that connect are permitted, if the cracks are in the previous limits.
2) Multiple axial and circumferential cracks that connect are permitted, if:
   a) The cracks are contained in one panel.
   b) The cracks are contained in one dilution land area.
   c) There are not more than two locations in the adjacent panels that are axially aligned.
   d) The locations are separated by a minimum of 3 dilution lands that do not have cracks.
   e) There are not more than 5 locations with connected cracks.
3) A continue-In-service limit of 100 cycles is permitted with this condition:
   a) The cracks do not exceed their individual continue-in-service limits.

(f) Holes that are burned through

1) All quantities of holes total for the two liners are permitted with these conditions:
   a) There are not more than two holes in the adjacent panels that are axially aligned.
   b) The maximum size of all holes are not more than 5 times the size of a dilution hole.
   c) The total area of burn through does not to exceed 15 times the size of a dilution hole.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) If the current condition exceeds the above limits but does not exceed the continue-in-service limit, repeat this borescope inspection of the holes that are burned through on the inner and outer liner every 250 cycles until the current condition exceeds the continue-in-service limit.

3) A continue-in-service limit of 100 cycles is permitted with these conditions:

a) There are more than three holes in the adjacent panels that are axially aligned.

b) The maximum size of all holes are not more than 6 times the size of the dilution hole.

c) The total area of burn through exceeds 24 times the size of a dilution hole.

(g) Missing overhangs on the inner and outer liners

1) 14 areas in each liner are permitted with these conditions:

a) Each area is not more than 2 times the size of the dilution hole.

b) They are not axially aligned across more than 3 adjacent panels.

2) A continue-in-service limit of 25 cycles is permitted with these conditions:

a) There are not more than 17 areas in each liner.

b) Each area is not more than 2 times the size of the dilution hole.

c) They are not axially aligned across more than 3 areas in adjacent panels.

(h) Distortion of the inner and outer liners

1) All distortions are permitted if each is not distorted more than 0.5 in. (12.7 mm) from the original contour.

2) A continue-in-service limit of 25 cycles is permitted if the distortion is not more than 0.7 in. (17.8 mm) from the original contour for each area.

SUBTASK 72-00-00-210-115-F00

(4) If there was a birdstrike/FOD, do these steps to examine the combustion chamber:

(a) Remove the borescope plugs from the combustor as follows:

1) Attach an identification tag onto the borescope plugs to make sure that each borescope plug is installed back in the correct borescope port after this procedure.

2) Borescope plug S15 at 10:00 o'clock position

3) Borescope plug S12 at 1:00 o'clock position

4) Borescope plug S13 at 3:00 o'clock position

5) Borescope plug S14 at 6:00 o'clock position.

(b) Do a borescope or fiberscope inspection of the nozzle and swirlers as follows:

1) Put the borescope into one of the ports and turn on the light source for the borescope.

2) Look at the swirler and nozzle area in a clockwise and counter-clockwise direction.

NOTE: When you use a rigid borescope, you will only see one swirler and two deflectors in a clockwise or counter-clockwise direction.

3) Do the fuel nozzle tip inspection as follows:

a) The primary tips must be in the internal diameter of the primary swirler.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

b) If the damaged fuel nozzle is not in the internal diameter of the primary swirler, replace the engine (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

4) Look at the opening between the forward edge of the deflector plate and the spectacle plate.

a) The clearance must be more than 0.080 in. (2.03 mm).

b) The clearance must not be more than 0.300 in. (7.62 mm).

c) If the opening is more than 0.300 in. (7.62 mm), examine the area around the nozzle and the outer side of the combustion chamber.

5) Do the inspection through the other ports.

6) If one or more of the above deflector plates are out of limits, and if you are sure the tip is in the correct position, do these steps:

a) Identify the fuel nozzle adjacent to the damaged area.

b) Remove the borescope.

c) Remove the adjacent fuel nozzle (TASK 73-11-04-000-805-F01 or TASK 73-11-04-000-804-F02).

d) Examine the fuel nozzle for damage.

e) If the fuel nozzle is in the internal diameter and does not touch the sides, continue to use the engine.

f) If the fuel nozzle is damaged, replace the fuel nozzle (TASK 73-11-04-400-805-F01 or TASK 73-11-04-400-804-F02).

(c) It is recommended (not mandatory) to do a one-time borescope inspection of the HPT nozzle leading edges at 400-800 cycles after the birdstrike event:

1) If no leading-edge distress is seen, go back to the usual borescope inspection interval.

2) If you can see missing material or burn through on the HPT nozzle leading-edge wall, contact CFMI and, do this task: Birdstrike/FOD/Ice Ingestion in Engine - Fault Isolation, FIM 71-05 TASK 801.

SUBTASK 72-00-00-080-003-F00

(5) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-210-032-F00

CAUTION	MAKE SURE THAT THE BORESCOPE PLUGS ARE INSTALLED IN THE CORRECT PORT LOCATIONS. ENGINE DAMAGE CAN OCCUR IF A BORESCOPE PLUG IS NOT INSTALLED IN THE CORRECT LOCATION.

(1) Do these steps to install the borescope plugs as follow:

NOTE: The borescope plugs to the HPT, the LPT stage 1 and combustion case have the same thread size. The stem of the borescope plugs to the HPT or the LPT stage 1 nozzle will be burned away if it is installed in the borescope port for the combustion case (Figure 614).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Lubricate the threads of the borescope plugs with graphite mineral vaseline, D00601 [CP2101], pure nickel special compound, D50034 [CP2619], or milk of magnesia compound, D50032 [CP1064].

(b) Install the borescope plugs.

1) Tighten each borescope plug to 57 in-lb (6.4 N·m) - 63 in-lb (7.1 N·m).

2) Install a safety wire, G02345 [CP8001], or cable, G50065 [CP8006], on each borescope plug.

SUBTASK 72-00-00-210-033-F00

(2) If it is necessary, do this task: Main Igniter Plug Installation, TASK 74-21-02-400-801-F00.

SUBTASK 72-00-00-210-034-F00

(3) If the borescope inspection is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Combustion Chamber Borescope Port Locations
Figure 611/72-00-00-990-808-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-809-F00 (Sheet 1 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

DOME AREA CRACK DAMAGE (EXAMPLE)

C

DOME AREA MISSING MATERIAL DAMAGE (EXAMPLE)

C

1137534-02-A

G24887 S0006582255_V5

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-809-F00 (Sheet 2 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C1

5007925-00

2397102 S0000553802_V1

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-809-F00 (Sheet 3 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

DOME IN QUADRANT DEFINITION (AFT LOOKING FORWARD)

C2

SAMPLE EXPOSED COOLING HOLES

OR

C3

5007927-00

2088288 S0000440608_V3

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-809-F00 (Sheet 4 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OUTER LINER

D

OUTER LINER FOR CRACKS AND MISSING MATERIAL DAMAGE (EXAMPLE)

E

GMM-1137535-01-A
G24905 S0006582256_V2

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-809-F00 (Sheet 5 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OUTER LINER CRACKS AND MISSING MATERIAL DAMAGE

F

5058000-00
G24912 S0006582257_V4

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-809-F00 (Sheet 6 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OUTER LINER CIRCUMFERENTIAL CRACK DAMAGE

G

GMM-1137538-01-A
G24928 S0006582258_V2

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-809-F00 (Sheet 7 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INNER LINER

H

INNER LINER FOR CRACKS AND BURN THROUGH

I

GMM-1139051-00-A
G24967 S0006582259_V2

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-809-F00 (Sheet 8 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INNER LINER CIRCUMFERENTIAL CRACK DAMAGE

J

GMM-1137539-01-A
G24931 S0006582260_V2

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-809-F00 (Sheet 9 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Combustion Section Borescope Inspection
Figure 613/72-00-00-990-841-F00 (Sheet 1 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

DOME AREA CRACK DAMAGE (EXAMPLE)

C

DOME AREA MISSING MATERIAL DAMAGE (EXAMPLE)

C

1137534-02-A

G24887 S0006582255_V5

Combustion Section Borescope Inspection
Figure 613/72-00-00-990-841-F00 (Sheet 2 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C1

5007925-00

2397102 S0000553802_V1

Combustion Section Borescope Inspection
Figure 613/72-00-00-990-841-F00 (Sheet 3 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

DOME IN QUADRANT DEFINITION (AFT LOOKING FORWARD)

C2

SAMPLE EXPOSED COOLING HOLES

OR

C3

5007927-00

2088288 S0000440608_V3

Combustion Section Borescope Inspection
Figure 613/72-00-00-990-841-F00 (Sheet 4 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OUTER LINER

D

OUTER LINER CRACKS AND MISSING MATERIAL DAMAGE (EXAMPLE)

E

1250655-00

1307448 S0000226565_V2

Combustion Section Borescope Inspection
Figure 613/72-00-00-990-841-F00 (Sheet 5 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OUTER LINER CRACKS AND MISSING MATERIAL DAMAGE

F

5058001-00
1307795 S0000226567_V3

Combustion Section Borescope Inspection
Figure 613/72-00-00-990-841-F00 (Sheet 6 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OUTER LINER CIRCUMFERENTIAL CRACK DAMAGE

G

1250657-00
1307838 S0000226568_V2

Combustion Section Borescope Inspection
Figure 613/72-00-00-990-841-F00 (Sheet 7 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INNER LINER

H

INNER LINER FOR CRACKS AND BURN THROUGH

I

1250658-00
1307932 S0000226569_V2

Combustion Section Borescope Inspection
Figure 613/72-00-00-990-841-F00 (Sheet 8 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INNER LINER FOR CRACKS AND BURN THROUGH

J

1250659-00

1307933 S0000226570_V2

Combustion Section Borescope Inspection
Figure 613/72-00-00-990-841-F00 (Sheet 9 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S12-S15
BORESCOPE PLUGS

S16-S17
BORESCOPE PLUGS

S18-S20
BORESCOPE PLUGS

6039411-00
3054693 S0000819507_V1

Borescope Plugs
Figure 614/72-00-00-990-862-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

After Bird Strike Combustion Section Borescope Inspection
Figure 615/72-00-00-990-826-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-220-801-F00

8. HPT Nozzle Guide Vanes Borescope Inspection (SAC (/1) and DAC Engines)

(Figure 616, Figure 617 and Figure 619, Figure 618)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the steps on how to do the borescope inspection of the HPT nozzle guide vanes for SAC (/1) and DAC engines.

B. References

Reference	Title
74-21-02-000-801-F00	Main Igniter Plug Removal (P/B 401)
74-21-02-400-801-F00	Main Igniter Plug Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828 Opt Part #: 856A1321P05 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-2198	Kit - Borescope Guide, HP Turbine, CFM56 Engines Part #: 856A1310G01 Supplier: 58828
SPL-2207	Guide - Borescope Inspection - Booster Part #: 856A1351P01 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Description	Specification
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Inspection of the HPT Nozzle Guide Vanes

SUBTASK 72-00-00-840-028-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-210-130-F00

(2) Make sure that you verify the version of the CFM56 engine on the data placard.

NOTE: The newest version of the CFM56-7B series engine is the CFM56-7BXXE engine. The “XX” in CFM56-7BXX/3 is the thrust rating of the engine. This information is found on the engine data placard on the engine fan case.

NOTE: A Tech Insertion (TI) engine has a “/3” after the thrust rating on the engine data plate. An example of a Singular Annular Combustor (SAC) Engine with TI is CFM56-7B22/3. An example of a non-TI engine is CFM56-7B22. The “XX” in CFM56-7BXX/3 is the thrust rating of the engine. This information is found on the engine data placard on the engine fan case.

SUBTASK 72-00-00-010-038-F00

(3) Remove the S13 and S15 borescope plugs (Figure 611 and Figure 615):

NOTE: To do an initial inspection, it is only necessary to remove the S13 and S15 borescope plugs. If you find damage, you must remove the main igniter plugs and the other borescope plugs to do a complete inspection.

(a) Identify each BSI plug.

(b) Remove the S13 and S15 BSI plugs.

(c) Attach an identification tag onto the borescope plugs to make sure that each borescope plug is installed back in the correct borescope port after this procedure.

SUBTASK 72-00-00-010-039-F00

(4) If you find damage from the initial inspection, do these steps to remove the main igniter plugs and the other borescope plugs:

NOTE: The port for the 4:00 o'clock main igniter plug is referred to as the S10 borescope port. The port for the 8:00 o'clock main igniter plug is referred to as the S11 borescope port.

(a) Do this task: Main Igniter Plug Removal, TASK 74-21-02-000-801-F00.

(b) Remove the S12 and S14 borescope plugs.

1) Identify each BSI plug.

2) Remove the S12 and S14 BSI plugs.

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3) Attach an identification tag onto the borescope plugs to make sure that each borescope plug is installed back in the correct borescope port after this procedure.

SUBTASK 72-00-00-480-032-F00

(5) Do these steps to prepare for the inspection of the HPT nozzle.

(a) Connect the applicable borescope to the light source.

1) rigid borescope, COM-2195 and light source, SPL-4305

2) rigid borescope, COM-4302 and light source, SPL-4306

3) rigid borescope, COM-4303 and light source, SPL-2197

4) rigid borescope, COM-4304 and light source, SPL-4308

5) Use the rigid borescope with the black band.

(b) Put the rigid borescope through the borescope port.

(c) Turn the light source ON.

SUBTASK 72-00-00-480-033-F00

(6) If a complete inspection of the nozzle convex side is necessary, do the steps that follow (Figure 616/Figure 617):

NOTE: This inspection is only necessary if you find an indication of damage on the convex side during the initial or complete inspection with the rigid probes.

(a) Connect the borescope, COM-2196, to the applicable light source.

(b) Put the borescope guide kit, SPL-2198, or borescope guide, SPL-2207, into the borescope port.

1) Use the borescope guide kit, SPL-2198, to do the inspection of the leading edge and the concave surfaces.

2) Use the borescope guide, SPL-2207, to do the inspection of the convex surfaces.

(c) Put the fiberscope through the guide tube.

(d) Make sure that the borescope is correctly adjusted.

(e) Turn the lightsource ON.

G. Borescope Inspection of the HPT Nozzle Guide Vanes

SUBTASK 72-00-00-220-003-F00

(1) Examine the leading edges of the 42 HPT nozzle guide vanes:

NOTE: To estimate the size of distress, use the applicable visual aid. To find distress locations relative to specific rows, refer to the applicable figure.

NOTE: The airfoil baffle is visible inside the airfoil when missing material occurs. It is sheet metal with cooling holes.

(a) Cracks that connect nose holes

1) There is no limit to the number with these conditions:

a) The cracks are not longer than 0.3 in. (7.62 mm).

b) There is no missing material.

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The cracks are not longer than 0.3 in. (7.62 mm).

b) The total area of missing material is not more than 0.25 in^2 (161 mm^2) per vane. Maximum of 4 vanes per90°arc (1.57 rad).

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c) Missing material does not extend aft of rows 3 or 9.

3) Do the inspection again after each 400 cycle interval with these conditions:

a) The cracks are not more than 1 in. (25.4 mm) in length.

b) The total area of missing material is not more than 0.25 in^2 (161 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

c) Missing material does not extend aft of rows 3 or 9.

4) The Continue-In-Service limit is 25 cycles with this condition:

a) The cracks are longer than 1 in. (25 mm) in length

b) The total area of missing material is not more than 0.30 in^2 (194 mm^2)per vane. Maximum of 4 vanes per90°arc (1.57 rad).

(b) Other cracks

1) There is no limit to the number with these conditions:

a) The cracks are not longer than 0.5 in. (12.7 mm).

b) There is no missing material.

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The cracks are not longer than 0.5 in. (12.7 mm).

b) The total area of missing material is not more than 0.25 in^2 (161 mm^2) per vane. Maximum of 4 vanes per90°arc (1.57 rad).

c) Missing material does not extend aft of rows 3 or 9.

3) Do the inspection again after each 400 cycle interval with these conditions:

a) The cracks are not more than 1 in. (25.4 mm) in length.

b) The total area of missing material is not more than 0.25 in^2 (161 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

c) Missing material does not extend aft of rows 3 or 9.

4) The Continue-In-Service limit is 25 cycles with this condition:

a) The cracks are longer than 1 in. (25 mm) in length

b) The total area of missing material is not more than 0.30 in^2 (194 mm^2) per vane. Maximum of 4 vanes per90°arc (1.57 rad).

(c) Burns or spalled areas

1) There is no limit to the number with this condition:

a) The area of missing material is not more than 0.15 in^2 (97 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The total area of missing material is not more than 0.25 in^2 (161 mm^2) per vane. Maximum of 4 vanes per90°arc (1.57 rad).

b) The missing material does not extend aft of rows 3 or 9.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) The cracks are longer than 1 in. (25 mm) in length

b) The total area of missing material is not more than 0.30 in^2 (194 mm^2) per vane. Maximum of 4 vanes per90°arc (1.57 rad).

(d) Baffle missing material

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1) Not Permitted
2) The Continue-In-Service limit is 25 cycles with this condition:
   a) The area of missing material is equivalent to a rectangle defined by 4 adjacent holes.

SUBTASK 72-00-00-220-004-F00

(2) Examine the concave surfaces as follow:
   (a) Radial cracks that extend from the gill holes
      1) Permitted if there is no missing material.
      2) Do the inspection again after each 400 cycle interval with these conditions:
         a) The missing material, cause by cracks, is not more than 0.04 in^2 (25.81 mm^2).
         b) No more than 4 airfoils for each engine have missing material caused by cracks.
      3) The Continue-In-Service limit is 25 cycles with this condition:
         a) The missing material, caused by cracks, is not more than 0.45 in^2 (290 mm^2).
   (b) Other cracks (not in the gill hole rows)
      1) Permitted if there is no missing material.
      2) Do the inspection again after each 400 cycle interval with these conditions:
         a) The missing material, cause by cracks, is not more than 0.04 in^2 (25.81 mm^2).
         b) No more than 4 airfoils for each engine have missing material caused by cracks.
      3) The Continue-In-Service limit is 25 cycles with this condition:
         a) The missing material, caused by cracks, is not more than 0.45 in^2 (290 mm^2).
   (c) Burns
      1) There is no limit to the quantity with this condition:
         a) There is no burn-through into the inner cooling passages.
      2) The Continue-In-Service limit is 25 cycles with this condition:
         a) The area which is burned through is not larger than 0.45 in^2 (290 mm^2) on each vane..
   (d) Missing thermal barrier coating (TBC)
      1) There is no limit to the quantity of TBC that can be missing.

SUBTASK 72-00-00-220-005-F00

(3) Examine the convex surfaces as follows:

   NOTE: To find distress location relative to specific rows, refer to the applicable figure.

   (a) Radial or axial cracks
      1) Permitted if there is no missing material.
      2) If there is missing material, do the inspection again after each 800 cycle interval with these conditions:
         a) The total area of missing material is not more than 0.05 in^2 (32.3 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).
         b) Cracking does not occur aft of cooling hole row 16.
      3) The Continue-In-Service limit is 200 cycles with this condition:

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a) The missing material is not larger than 0.20 in^2 (129 mm^2).

4) The Continue-In-Service limit is 25 cycles with this condition:

a) The missing material caused by cracks is not larger than 0.45 in^2 (290 mm^2).

(b) Burns or bulges

NOTE: An open area of the cavity caused by bulging is to be interpreted as missing material where the following limits apply.

1) Permitted if there is no missing material.

2) If there is missing material, do the inspection again after each 800 cycle interval with these conditions:

a) The total area of missing material is not more than 0.05 in^2 (32.3 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

b) Bulging does not occur aft of cooling hole row 16.

3) The Continue-In-Service limit is 200 cycles with this condition:

a) The missing material is not larger than 0.20 in^2 (129 mm^2).

4) The Continue-In-Service limit is 25 cycles with this condition:

a) The missing material caused by cracks is not larger than 0.45 in^2 (290 mm^2).

(c) Missing thermal barrier coating (TBC)

1) There is no limit to the quantity of TBC that can be missing.

SUBTASK 72-00-00-220-006-F00

(4) Examine the trailing edges as follows:

(a) Cracks or burns

1) There is no limit to the number of cracks or the amount of burns permitted.

(b) Buckled or bowed material

1) There is no limit.

(c) Missing material

1) The maximum quantity of missing material from each vane is 0.5 in. (12.7 mm) length in the axial direction.

2) The Continue-In-Service limit is 25 cycles with these conditions:

a) The missing material is not larger than 0.75 in. (19.05 mm) in the axial direction.

b) Make sure that the HPT blades are in limits. (HPT Blades Borescope Inspection, TASK 72-00-00-200-807-F00).

SUBTASK 72-00-00-211-001-F00

(5) Examine all airfoil surfaces:

(a) Craze cracks

NOTE: Craze cracks look like many surface cracks that do not have visual width or depth.

1) There is no llimit.

(b) Nicks, marks, scratches, and dents

1) There is no limit.

(c) Metal splatter

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1) There is no limit.

SUBTASK 72-00-00-220-007-F00

(6) Examine the inner and outer platforms:

(a) Cracks in the parent metal

1) There is no limit.

(b) Missing metal or burning of parent metal

1) There is no limit of missing metal or burning of parent metal with no through holes.

2) Do the inspection again after 400 cycle interval with these conditions:

a) The through hole is in or less than 1 in. (25.4 mm) of the leading edge of the inner or outer platform.

b) The through hole is not more than 0.06 in^2 (38.71 mm^2).

c) No more than 4 segments for each engine have through holes on the inner or outer platform.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) Through hole is not more than 0.12 in^2 (77.42 mm^2).

(c) Nicks, scores, scratches and dents on the platform surface

1) There is no limit.

(d) Bulges and bowing

1) There is no limit.

(e) Cracks in the braze joints of the airfoil-to-platform surfaces

1) There is no limit to the number with this condition:

a) Separation of the braze joint is not permitted, unless it was caused by burning.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-420-022-F00

(1) Do these steps to install the borescope plugs:

(a) Lubricate the threads of the borescope plugs with pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] or graphite mineral vaseline, D00601 [CP2101].

(b) Install the borescope plugs.

NOTE: The borescope plugs to the HPT, the LPT stage 1 and combustion case have the same thread size. The stem of the borescope plugs to the HPT or the LPT stage 1 nozzle will be burned away if it is installed in the borescope port for the combustion case (Figure 618).

1) Tighten each borescope plug between 57 in-lb (6.4 N·m) to 63 in-lb (7.1 N·m).

2) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on each borescope plug.

SUBTASK 72-00-00-420-023-F00

(2) If they were removed, do this task: Main Igniter Plug Installation, TASK 74-21-02-400-801-F00.

SUBTASK 72-00-00-860-085-F00

(3) If the borescope procedure is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

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1352070-00
G24991 S0006582271_V4

HPT Nozzle Guide Vanes Borescope Inspection
Figure 616/72-00-00-990-844-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HPT Nozzle Guide Vanes Flexible Borescope Inspection
Figure 617/72-00-00-990-845-F00

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S12-S15
BORESCOPE PLUGS

S16-S17
BORESCOPE PLUGS

S18-S20
BORESCOPE PLUGS

6039411-00
3054693 S0000819507_V1

Borescope Plugs
Figure 618/72-00-00-990-864-F00

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NOTE:

0.09 INCH (2.28 mm) IS THE DISTANCE
BETWEEN COOLING HOLE CENTERLINE.

1218758-00-A
374095 S0000132048_V2

HPT NGV Dimensional Inspection
Figure 619/72-00-00-990-846-F00 (Sheet 1 of 3)

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HPT NGV Dimensional Inspection
Figure 619/72-00-00-990-846-F00 (Sheet 2 of 3)

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1295200-00
1987630 S0000386042_V2

HPT NGV Dimensional Inspection
Figure 619/72-00-00-990-846-F00 (Sheet 3 of 3)

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TASK 72-00-00-200-818-F00

9. HPT Nozzle Guide Vanes Borescope Inspection (Tech Insertion (/3) and CFM56-7BE Engines)

(Figure 620, Figure 621, and Figure 623, Figure 622)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the steps on how to do the borescope inspection of the HPT nozzle guide vanes for Tech Insertion (/3) and CFM56-7BE engines.

B. References

Reference	Title
74-21-02-000-801-F00	Main Igniter Plug Removal (P/B 401)
74-21-02-400-801-F00	Main Igniter Plug Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828 Opt Part #: 856A1321P05 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-2198	Kit - Borescope Guide, HP Turbine, CFM56 Engines Part #: 856A1310G01 Supplier: 58828
SPL-2207	Guide - Borescope Inspection - Booster Part #: 856A1351P01 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	

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(Continued)

Reference	Description	Specification
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Inspection

SUBTASK 72-00-00-840-030-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-210-123-F00

(2) Make sure that you verify the version of the CFM56 engine on the data placard.

NOTE: The newest version of the CFM56-7B series engine is the CFM56-7BXXE engine. The “XX” in CFM56-7BXX/3 is the thrust rating of the engine. This information is found on the engine data placard on the engine fan case.

NOTE: A Tech Insertion (TI) engine has a “/3” after the thrust rating on the engine data plate. An example of a Singular Annular Combustor (SAC) Engine with TI is CFM56-7B22/3. An example of a non-TI engine is CFM56-7B22. The “XX” in CFM56-7BXX/3 is the thrust rating of the engine. This information is found on the engine data placard on the engine fan case.

SUBTASK 72-00-00-010-040-F00

(3) Remove the S13 and S15 borescope plugs (Figure 611 and Figure 615).

NOTE: To do an initial inspection, it is only necessary to remove the S13 and S15 borescope plugs. If you find damage, you must remove the main igniter plugs and the other borescope plugs to do a complete inspection.

(a) Identify each BSI plug.

(b) Remove the S13 and S15 BSI plugs.

(c) Attach an identification tag onto the borescope plugs to make sure that each borescope plug is installed back in the correct borescope port after this procedure.

SUBTASK 72-00-00-020-012-F00

(4) If you find damage from the initial inspection, do these steps to remove the main igniter plugs and the other borescope plugs:

NOTE: The port for the 4:00 o'clock main igniter plug is referred to as the S10 borescope port. The port for the 8:00 o'clock main igniter plug is referred to as the S11 borescope port.

(a) Do this task: Main Igniter Plug Removal, TASK 74-21-02-000-801-F00.

(b) Remove the S12 and S14 borescope plugs.

1) Identify each BSI plug.

2) Remove the S12 and S14 BSI plugs.

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3) Attach an identification tag onto the borescope plugs to make sure that each borescope plug is installed back in the correct borescope port after this procedure.

SUBTASK 72-00-00-840-031-F00

(5) Do these steps to prepare for the inspection of the HPT nozzle (Figure 620 and Figure 621):

(a) Connect the applicable borescope to the light source.

1) rigid borescope, COM-2195, and light source, SPL-4305

2) rigid borescope, COM-4302, and light source, SPL-4306

3) rigid borescope, COM-4303, and light source, SPL-2197

4) rigid borescope, COM-4304, and light source, SPL-4308

5) Use the rigid borescope with the black band.

(b) Put the rigid borescope through the borescope port.

(c) Turn the light source ON.

SUBTASK 72-00-00-480-034-F00

(6) If a complete inspection of the nozzle convex side is necessary, do the steps that follow (Figure 620 and Figure 621):

NOTE: This inspection is only necessary if you find an indication of damage on the convex side during the initial or complete inspection with the rigid probes.

(a) Connect the borescope, COM-2196, to the applicable light source.

(b) Put the borescope guide kit, SPL-2198, or borescope guide, SPL-2207, into the borescope port.

1) Use the borescope guide kit, SPL-2198, to do the inspection of the leading edge and concave surfaces.

2) Use the borescope guide, SPL-2207, to do the inspection of the convex surfaces.

(c) Put the fiberscope through the guide tube.

(d) Make sure that you adjust the borescope correctly.

(e) Turn the lightsource ON.

G. HPT Nozzle Guide Vanes Borescope Inspection

SUBTASK 72-00-00-220-008-F00

(1) Examine the leading edges of the 42 HPT nozzle guide vanes as follow:

NOTE: To estimate the size of distress, use the applicable visual aid. To find distress locations relative to specific rows, refer to the applicable figure.

NOTE: The airfoil baffle is visible inside the airfoil when missing material occurs. It is sheet metal with cooling holes.

(a) Cracks that connect nose holes

1) There is no limit to the number with these conditions:

a) The cracks are not longer than 0.30 in. (7.62 mm).

b) There is no missing material.

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The cracks are not longer than 0.30 in. (7.62 mm).

b) The total area of missing material is not more than 0.25 in^2 (161 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

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c) Missing material does not extend aft of rows 3 or 9.

3) Do the inspection again after each 400 cycle interval with these conditions:

a) The cracks are not more than 1 in. (25.4 mm) in length.

b) The total area of missing material is not more than 0.25 in^2 (161 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

c) Missing material does not extend aft of rows 3 or 9.

4) The Continue-In-Service limit is 25 cycles with this condition:

a) The cracks are longer than 1 in. (25.4 mm) in length.

b) The total area of missing material is not more than 0.3 in^2 (194 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

(b) Other cracks

1) There is no limit to the number with these conditions:

a) The cracks are not longer than 0.5 in. (12.7 mm).

b) There is no missing material.

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The cracks are not longer than 0.5 in. (12.7 mm).

b) The total area of missing material is not more than 0.25 in^2 (161 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

c) Missing material does not extend aft of rows 3 or 9.

3) Do the inspection again after each 400 cycle interval with these conditions:

a) The cracks are not more than 1 in. (25.4 mm) in length.

b) The total area of missing material is not more than 0.25 in^2 (161 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

c) Missing material does not extend aft of rows 3 or 9.

4) The Continue-In-Service limit is 25 cycles with this condition:

a) The cracks are longer than 1 in. (25.4 mm) in length.

b) The total area of missing material is not more than 0.3 in^2 (194 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

(c) Burns or spalled areas

1) There is no limit to the number with this condition:

a) The area of missing material is not more than 0.15 in^2 (97 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The total area of missing material is not more than 0.25 in^2 (161 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

b) Missing material does not extend aft of rows 3 or 9.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) The cracks are longer than 1 in. (25.4 mm) in length.

b) The total area of missing material is not more than 0.3 in^2 (194 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

(d) Baffle missing material

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1) Not permitted
2) The Continue-In-Service limit is 25 cycles with this condition:
   a) The area of missing material is equivalent to a rectangle defined by 4 adjacent holes.

SUBTASK 72-00-00-220-009-F00

(2) Examine the concave surfaces as follow:
   (a) Radial cracks that extend from the gill holes.
      1) Permitted if there is no missing material.
      2) Do the inspection again after each 400 cycle interval with these conditions:
         a) The missing material, cause by cracks, is not more than 0.04 in^2 (25.81 mm^2).
         b) No more than 4 airfoils for each engine have missing material caused by cracks.
      3) The Continue-In-Service limit is 25 cycles with this condition:
         a) The missing material caused by cracks is not larger than 0.45 in^2 (290 mm^2).
   (b) Other cracks (not in the gill hole rows)
      1) Permitted if there is no missing material.
      2) Do the inspection again after each 400 cycle interval with these conditions:
         a) The missing material, cause by cracks, is not more than 0.04 in^2 (25.81 mm^2).
         b) No more than 4 airfoils for each engine have missing material caused by cracks.
      3) The Continue-In-Service limit is 25 cycles with this condition:
         a) The missing material, caused by cracks, is not more than 0.45 in^2 (290 mm^2).
   (c) Burns
      1) There is no limit to the quantity with this condition:
         a) There is no burn-through into the inner cooling passages.
      2) The Continue-In-Service limit is 25 cycles with this condition:
         a) The area which is burned through is not larger than 0.45 in^2 (290 mm^2) on each vane.
   (d) Missing thermal barrier coating (TBC)
      1) There is no limit to the quantity of TBC that can be missing.

SUBTASK 72-00-00-220-010-F00

(3) Examine the convex surfaces as follow:

NOTE: To find distress location relative to specific rows, refer to the applicable figure.

NOTE: The airfoil baffle is visible inside the airfoil when missing material occurs. It is sheet metal with cooling holes.

   (a) Radial or axial cracks
      1) Permitted if there is no missing material.
      2) If there is missing material, do the inspection again after each 800 cycle interval with these conditions:
         a) The total area of missing material is not more than 0.05 in^2 (32.3 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

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b) Cracking does not occur aft of cooling hole row 16.

3) The Continue-In-Service limit is 200 cycles with this condition:

a) The missing material is not more than 0.20 in^2 (129.0 mm^2).

4) The Continue-In-Service limit is 25 cycles with this condition:

a) The missing material caused by cracks is not larger than 0.45 in^2 (290 mm^2).

(b) Burns or bulges

NOTE: An open area of the cavity caused by bulging is to be interpreted as missing material where the limits that follow apply.

1) Permitted if there is no missing material.

2) If there is missing material, do the inspection again after each 800 cycle interval with these conditions:

a) The total area of missing material is not more than 0.05 in^2 (32.3 mm^2) per vane. Maximum of 4 vanes per 90°arc (1.57 rad).

b) Bulging does not occur aft of cooling hole row 16.

3) The Continue-In-Service limit is 200 cycles with this condition:

a) The missing material is not more than 0.20 in^2 (129.0 mm^2).

4) The Continue-In-Service limit is 25 cycles with this condition:

a) The missing material caused by cracks is not larger than 0.45 in^2 (290 mm^2).

(c) Missing thermal barrier coating (TBC).

1) Permitted

SUBTASK 72-00-00-220-011-F00

(4) Examine the trailing edges as follow:

(a) Cracks or burns

1) Permitted

(b) Buckled or bowed material

1) Permitted

(c) Missing material.

1) The maximum quantity of missing material from each vane is 0.5 in. (12.7 mm) length in the axial direction.

2) The Continue-In-Service limit is 25 cycles with these conditions:

a) The missing material is not longer than 0.75 in. (19.05 mm) in the axial direction.

b) Make sure that the HPT blades must be in limits (TASK 72-00-00-200-807-F00).

SUBTASK 72-00-00-211-002-F00

(5) Examine all airfoil surfaces as follow:

(a) Craze cracks

NOTE: Craze cracks look like many surface cracks that do not have visual width or depth.

1) Permitted

(b) Nicks, marks, scratches, and dents

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1) Permitted

(c) Metal splatter

1) Permitted

SUBTASK 72-00-00-211-003-F00

(6) Examine the inner and outer platforms as follow:

(a) Cracks in the parent metal.

1) Permitted

(b) Missing metal or burning of parent metal.

1) There is no limit of missing metal or burning of parent metal with no through holes.

2) Do the inspection again after 400 cycle interval with these conditions:

a) The through hole is in or less than 1 in. (25.4 mm) of the leading edge of the inner or outer platform.

b) The through hole is not more than 0.06 in^2 (38.71 mm^2).

c) No more than 4 segments for each engine have through holes on the inner or outer platform.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) Through hole is not more than 0.12 in^2 (77.42 mm^2).

(c) Nicks, scores, scratches, and dents on the platform surface.

1) Permitted

(d) Bulges and bowing

1) Permitted

(e) Cracks in the braze joints of the airfoil-to-platform surfaces.

1) Permitted with this condition:

a) Separation of the braze joint is not permitted, unless it was caused by burning.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-410-034-F00

(1) Do these steps to install the borescope plugs:

NOTE: The borescope plugs to the HPT, the LPT stage 1 and combustion case have the same thread size. The stem of the borescope plugs to the HPT or the LPT stage 1 nozzle will be burned away if it is installed in the borescope port for the combustion case (Figure 622).

(a) Lubricate the threads of the borescope plugs with pure nickel special compound, D50034 [CP2619], or milk of magnesia compound, D50032 [CP1064], or graphite mineral vaseline, D00601 [CP2101].

(b) Install the borescope plugs.

1) Tighten each borescope plug to 57 in-lb (6.4 N·m) - 63 in-lb (7.1 N·m).

2) Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006], on each borescope plug.

SUBTASK 72-00-00-410-035-F00

(2) If they were removed, do this task: Main Igniter Plug Installation, TASK 74-21-02-400-801-F00.

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SUBTASK 72-00-00-840-032-F00

(3) If the borescope procedure is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1352070-00
G24991 S0006582271_V4

HPT Nozzle Guide Vanes Borescope Inspection
Figure 620/72-00-00-990-847-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HPT Nozzle Guide Vanes (With Flexible) Borescope Inspection
Figure 621/72-00-00-990-848-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S12-S15
BORESCOPE PLUGS

S16-S17
BORESCOPE PLUGS

S18-S20
BORESCOPE PLUGS

6039411-00
3054693 S0000819507_V1

Borescope Plugs
Figure 622/72-00-00-990-865-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

0.09 INCH (2.28 mm) IS THE DISTANCE
BETWEEN COOLING HOLE CENTERLINE.

1218758-00-A
374095 S0000132048_V2

HPT NGV Dimensional Inspection
Figure 623/72-00-00-990-849-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HPT NGV Dimensional Inspection
Figure 623/72-00-00-990-849-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1295200-00
1987630 S0000386042_V2

HPT NGV Dimensional Inspection
Figure 623/72-00-00-990-849-F00 (Sheet 3 of 3)

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TASK 72-00-00-200-807-F00

10. HPT Blades Borescope Inspection

(Figure 601, Figure 624, Figure 625, Figure 627, Figure 628, Figure 629, Figure 630, Figure 626)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the instructions on how to examine the HPT blades from the forward and aft sides.

(a) Do an inspection of the rotor blades from the aft side with a rigid borescope through borescope port S16 or S17.

(b) Do an inspection of the rotor blades from the forward side with a fiberscope through the main igniter plug port S10 or S11.

B. References

Reference	Title
72-00-00-980-801-F00	Turn the N2 Rotor (P/B 201)
74-21-02-000-801-F00	Main Igniter Plug Removal (P/B 401)
74-21-02-400-801-F00	Main Igniter Plug Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828 Opt Part #: 856A1321P05 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-2198	Kit - Borescope Guide, HP Turbine, CFM56 Engines Part #: 856A1310G01 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Inspection

SUBTASK 72-00-00-210-048-F00

(1) Do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-010-008-F00

(2) Remove the S16 or S17 borescope plug.

(a) Identify each BSI plug.

(b) Remove the S16 and S17 BSI plugs.

(c) Attach an identification tag onto the borescope plugs to make sure that each borescope plug is installed back in the correct borescope port after this procedure.

SUBTASK 72-00-00-210-050-F00

(3) If it is necessary, remove the main igniter plugs to access the borescope inspection ports S10 and S11 (TASK 74-21-02-000-801-F00).

NOTE: The 4:00 o'clock main igniter plug is referred to as the S10 borescope port. The 8:00 o'clock main igniter plug is referred to as the S11 borescope port.

NOTE: If you see non-serviceable damage or fragmentation of the igniter plug tip, replace it and make a record of the findings in the borescope findings report. Pay special attention to the HPT Blades for impact damage, especially on the airfoil leading edge and outer/forward convex airfoil regions.

SUBTASK 72-00-00-210-051-F00

(4) Prepare for the inspection of the HPT blades from the aft side as follows:

(a) If you will use the rigid borescope, COM-2195, connect it to light source, SPL-4305.

(b) If you will use the rigid borescope, COM-4302, connect it to light source, SPL-4306.

(c) If you will use the rigid borescope, COM-4303, connect it to light source, SPL-2197.

(d) If you will use the rigid borescope, COM-4304, connect it to light source, SPL-4308.

(e) Use the rigid borescope with the yellow band to get a general view.

(f) Use the rigid borescope with the green band to view the blade platform.

(g) Use the rigid borescope with the blue band to view the blade tip.

(h) Put the rigid borescope through the borescope port.

(i) Make sure the borescope is correctly adjusted.

(j) Turn the light source ON.

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SUBTASK 72-00-00-210-052-F00

(5) Prepare for the inspection of the HPT blades from the forward side as follows:

(a) Put the borescope guide kit, SPL-2198, into the S10 or S11 borescope port.

(b) Connect the borescope, COM-2196, to the applicable light source.

(c) Put the fiberscope through the guide tube.

(d) Make sure that the borescope is correctly adjusted.

(e) Turn the light source ON.

SUBTASK 72-00-00-820-001-F00

(6) Do this task: Turn the N2 Rotor, TASK 72-00-00-980-801-F00.

G. HPT Blades Borescope Inspection

NOTE: Unless otherwise identified, all damage limits for the HPT blades are the same for the different blade configurations.

NOTE: One engine configuration has 76 HPT blades. The other engine configuration has 80 HPT blades.

NOTE: After long exposure, once protective coatings are consumed, the base metal can start to oxidize. This oxidation is usually black or very dark in color and usually has a rough surface.

SUBTASK 72-00-00-210-053-F00

(1) Examine the trailing edge of the HPT blades as follows:

(a) Cracks that connect to the trailing edge in Area A

1) One crack is permitted if the crack is not more than 0.1 in. (2.5 mm) in length.

2) For a crack that is more than 0.1 in. (2.5 mm) but less than 0.2 in. (5.1 mm) in length, do the inspection again in or less than 500 cycles.

3) The Continue-In-Service (C-I-S) limit is 10 cycles if the crack is more than 0.2 in. (5.1 mm) but less than 0.25 in. (6.4 mm) in length.

(b) Missing material, burning, or holes in the tip and Area A

1) There is no limit if the missing material is not more than 0.50 x 0.50 inch (12.7 x 12.7 mm).

2) The Continue-In-Service limit is 50 cycles if the missing material is not more than 0.50 inch axially x 0.75 inch radially (12.7 mm axially x 19.1 mm radially).

(c) Nicks and dents in Area A

1) Any number and size permitted.

(d) Nicks and dents in Area B and C

1) Any number of nicks and dents are permitted that are not more than 0.05 in. (1.27 mm) in length.

2) Repeat the inspection after each 400 cycles if the nicks and dents are 0.05 in. (1.27 mm) - 0.12 in. (3.05 mm) in length.

3) Repeat the inspection after each 200 cycles if the nicks and dents are 0.12 in. (3.05 mm) - 0.2 in. (5.08 mm) in length.

4) The Continue-In-Service limit is 40 cycles if the nicks and dents are more than 0.2 in. (5.08 mm), but less than 0.3 in. (7.62 mm) in length.

(e) Cracks that connect to the trailing edge in Areas B, C, and root fillet

1) One crack is permitted, with these conditions:

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a) Repeat the inspection after each 400 cycles, if the crack length is less than 0.12 in. (3.05 mm) in length.

b) Repeat the inspection after each 200 cycles, if the crack length is 0.12 in. (3.05 mm) - 0.2 in. (5.08 mm) in length.

2) The Continue-In-Service limit is 40 cycles if the crack is more than 0.2 in. (5.08 mm) but less than 0.3 in. (7.62 mm) in length.

(f) Missing Thermal Barrier Coating (TBC)

1) Any amount of TBC can be missing.

2) Oxidation related to the missing TBC is permitted.

(g) Plugged air slots in Area A or B

1) One plugged air slot in each blade is permitted.

2) The Continue-In-Service limit is 50 cycles if not more than two air slots in each blade are plugged.

(h) Plugged air slots in Area C

1) Plugged air slots are not permitted.

2) The Continue-In-Service (C-I-S) limit is 50 cycles if not more than one blade has plugged air slot in Area C.

(i) Bent material at the tip

1) Any amount.

(j) Distortions or signs of melting

1) Distortions or melting are not permitted.

2) The Continue-In-Service limit is 25 cycles if no more than 10 blades have distortions or melting.

SUBTASK 72-00-00-211-005-F00

(2) Examine HPT aft blade retainer outer seal wire protrusion at seal wire ends (Figure 630).

(a) HPT aft blade retainer outer seal wire protrusion is permitted if it occurs at no more than two locations.

NOTE: For all other, non-seal wire end, protrusions, contact CFM.

SUBTASK 72-00-00-210-054-F00

(3) Examine the tip of the HPT blade as follows:

NOTE: Two blades approximately 90 degrees apart are notched to show the level of blade tip rub. If you cannot see the notches or if the quantity of blades with notches is different, the condition is serviceable if in limits below. The blade rub data can be used to find causes for EGT margin changes and other trends.

(a) Damage that exposes the interior cooling passages of the blade between the leading and trailing edges.

1) Exposed interior cooling passages are not permitted unless the condition is acceptable per trailing edge inspection for Missing Material or Leading Edge Inspection for Through wall hole in area A and B.

2) The Continue-In-Service (C-I-S) limit is 10 cycles if the hole is less than 0.05 in. (1.27 mm) in diameter (or equivalent area).

(b) Radial cracks on the convex side that connect to the blade tip that are more than 0.5 in. (12.7 mm) distance from the trailing edge.

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1) Permitted, if the radial cracks are not more than 0.15 in. (3.81 mm) in length.
2) The Continue-In-Service (C-I-S) limit is 50 cycles if the radial cracks are not more than 0.35 in. (8.89 mm) in length.

(c) Radial cracks on the concave side that connect to the blade tip that are more than 0.5 in. (12.7 mm) distance away from the trailing edge.
1) Permitted, if the radial cracks are not more than 0.7 in. (17.8 mm) in length.
2) The Continue-In-Service (C-I-S) limit is 50 cycles if the radial cracks are not longer than 1 in. (25.4 mm).

(d) Radial cracks on either side of the airfoil that connect to the blade tip, 0.5 in. (12.7 mm) or closer to the trailing edge.
1) Permitted.

(e) Bent, curled, or missing material
1) Permitted, if the damage is in the tip area and none of the blade internal cavities are exposed.
2) The Continue-In-Service (C-I-S) limit is 10 cycles if missing material is below the tip shelf and the internal cavity is exposed with a size of less than 0.05 in. (1.27 mm) in diameter (or equivalent area).

(f) Distortions or signs of melting
1) Distortions or melting are not permitted.
2) The Continue-In-Service limit is 25 cycles if a maximum of 10 blades have distortions or melting.

(g) Missing thermal barrier coating (TBC)
1) Any amount of TBC can be missing.
2) Oxidation related to the missing TBC is permitted.

SUBTASK 72-00-00-210-055-F00

(4) Examine the convex and concave surfaces that are not in the leading edge, trailing edge, or tip as follows:

(a) Nicks or dents on the convex and concave surfaces in Areas A and B
1) Permitted, with these conditions:
a) In Area A, the damage is not more than 0.25 in. (6.35 mm) in length.
b) In Area B, the damage is not more than 0.1 in. (2.54 mm) in length.
2) The Continue-In-Service (C-I-S) limit is 25 cycles with this condition:
a) Cracks or missing material is not permitted.

(b) Nicks or dents on the convex and concave surfaces in Area C
1) Three nicks or dents are permitted with these conditions:
a) They are not longer than 0.05 in. (1.27 mm).
b) Dents are separated by at least 0.125 in. (3.18 mm).
2) The Continue-In-Service limit is 25 cycles with this condition:
a) Cracks or missing material is not permitted.

(c) Cracks in the concave and convex surfaces
1) Cracks are not permitted.

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(d) Distortions or signs of melting

1) Distortions or melting are not permitted.

2) The Continue-In-Service limit is 25 cycles, with this condition:

a) A maximum of 10 blades can have distortions or melting.

(e) Missing Thermal Barrier Coating (TBC)

1) Any amount of TBC can be missing.

2) Oxidation related to the missing TBC is permitted.

SUBTASK 72-00-00-210-056-F00

(5) Examine the leading edge of the HPT rotor blades as follows:

(a) Axial and radial cracks in Area A

1) Permitted with these conditions:

a) Cracks are not more than 0.05 in. (1.27 mm) in length.

b) Cracks can not connect more than 2 holes.

2) The Continue-In-Service limit is 10 cycles, with this condition:

a) Cracks are less than 0.1 in. (2.54 mm) in length.

(b) Axial and radial cracks in Area B and C, that include the root fillet, and that do not intersect the nose or gill holes

1) Not permitted.

2) The Continue-In-Service limit is 10 cycles, with this condition:

a) Cracks are less than 0.100 in. (2.54 mm) in length.

(c) Axial nose or gill hole cracks in Area B and C

1) Axial nose or concave (row 6) gill hole cracks in Area B and C:

a) Not permitted.

b) The Continue-In-Service limit is 10 cycles, with this condition:

<1> Cracks are not more than 0.050 in. (1.27 mm) in length.

2) Convex (row 1) gill hole cracks in Area B and C that extend toward the leading edge (Figure 627):

a) Permitted with these conditions:

<1> Cracks are not more than 0.050 in. (1.27 mm) in length.

<2> Do the inspection again after each 100 cycles.

b) The Continue-In-Service limit is 25 cycles, with this condition:

<1> Cracks are less than 0.100 in. (2.54 mm) in length.

3) Convex (row 1) gill hole cracks in Area B and C in the diffuser (Figure 627):

a) Permitted with these conditions:

<1> Cracks are not more than 0.050 in. (1.27 mm).

<2> Do the inspection again after each 100 cycles.

b) The Continue-In-Service limit is 25 cycles, with this condition:

<1> Cracks are less than 0.100 in. (2.54 mm) in length.

(d) Radial nose or gill hole cracks in Area B

1) One crack is permitted in Area B, with this condition:

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a) The crack is not more than 0.030 in. (0.76 mm) in length.

2) The Continue-In-Service limit is 10 cycles, with this condition:

a) The crack is not more than 0.060 in. (1.52 mm) in length.

(e) Radial nose or gill hole cracks in Area C

1) Not permitted.

2) The Continue-In-Service limit is 10 cycles, with this condition:

a) Cracks are not longer than 0.030 in. (0.76 mm).

(f) Nicks and dents in Area A and B

1) Any number and size permitted.

(g) Nicks and dents in Area C, that include the root radius

1) 3 nicks or dents are permitted, with these conditions:

a) The nicks and dents are not longer than 0.050 in. (1.27 mm).

b) The nicks and dents are separated by at least 0.125 in. (3.18 mm).

(h) Dirt or environmental contamination

1) Permitted.

(i) Discoloration, Missing Thermal Barrier Coating (TBC) or oxidation

NOTE: After long exposure, once protective coatings are consumed, the base metal can start to oxidize. This oxidation is usually black or very dark in color and usually has a rough surface.

NOTE: Once there is leading edge oxidation, it is possible that you can see cracks at cooling row #1, (convex gill hole row) holes 2, 3 and 4 up from the platform. Make sure that your borescope orientation provides good visibility of these holes.

1) Discoloration without oxidation is permitted.

2) Any amount of TBC can be missing.

3) Oxidation related to the missing TBC is permitted with reduced inspection interval as follows:

a) If you see oxidation with continuous radial length of 0.5 in. (12.7 mm) or less, do the inspection again after each 400 cycles.

b) If the oxidation has a continuous radial length of more than 0.5 in. (12.7 mm), do the inspection again after each 200 cycles.

(j) Through wall hole in Area A and B

1) Permitted with these conditions:

a) Cavity 2 is not exposed.

NOTE: Cavity 2 will only be exposed if the internal cavity is visible and the damage is aft of cooling row #1, convex gill hole row, or aft of cooling row #6, concave gill hole row.

b) Not more than 15 blades have a through wall hole.

LOM ALL POST SB 737-CFM56-7B-72-0636 OR POST SB 737-CFM56-7B-72-0886 OR POST SB 737-CFM56-7B-72-0918

c) Not more than two blades have a through wall hole in Area B.

LOM ALL

d) Do the inspection again after each 100 cycles.

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<1> After a minimum of four inspections, if the size of the through wall hole has not changed, increase the inspection interval to within every 400 cycles.

<a> After a minimum of four inspections at 400 cycle intervals, if the size of the through wall hole has not changed, increase the inspection interval to in or less than every 1600 cycles.

<2> After a minimum of four inspections, if the size of the through wall hole has increased, maintain the inspection interval at 100 cycles.

2) The Continue-In-Service limit is 25 cycles, with this condition:

a) Any number of blades have through wall holes and Cavity 2 is not exposed on any of the blades.

(k) Through wall hole in Area C

LOM ALL POST SB 737-CFM56-7B-72-0636 OR POST SB 737-CFM56-7B-72-0886 OR POST SB 737-CFM56-7B-72-0918

1) Permitted with these conditions:

a) The hole size is less than 0.070 in. (1.78 mm) diameter, or 0.0038 in^2 (2.45 mm^2) equivalent area.

<1> Do the inspection again after each 100 cycles.

LOM ALL

2) The Continue-In-Service limit is 50 cycles, with this condition:

a) The hole size is less than 0.30 in. (7.6 mm) diameter, or 0.0707 in^2 (45.61 mm^2) equivalent area.

SUBTASK 72-00-00-210-057-F00

(6) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-210-058-F00

(1) Do these steps to install the borescope plugs as follows:

NOTE: The borescope plugs to the HPT, the LPT stage 1 and combustion case have the same thread size. The stem of the borescope plugs to the HPT or the LPT stage 1 nozzle will be burned away if it is installed in the borescope port for the combustion case (Figure 626).

(a) Lubricate the threads of the borescope plugs with graphite mineral vaseline, D00601 [CP2101], pure nickel special compound, D50034 [CP2619], or milk of magnesia compound, D50032 [CP1064].

(b) Install the borescope plugs.

1) Tighten each borescope plug to 57 in-lb (6.4 N·m) - 63 in-lb (7.1 N·m).

2) Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006], on each borescope plug.

SUBTASK 72-00-00-410-007-F00

(2) If it was removed, install the main igniter plugs, do this task: Main Igniter Plug Installation, TASK 74-21-02-400-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-00-00-210-059-F00

(3) Do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HPT Blades Borescope Plug Installation
Figure 624/72-00-00-990-812-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HPT Blade Borescope Inspection Locations
Figure 625/72-00-00-990-813-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S12-S15
BORESCOPE PLUGS

S16-S17
BORESCOPE PLUGS

S18-S20
BORESCOPE PLUGS

6039411-00
3054693 S0000819507_V1

Borescope Plugs
Figure 626/72-00-00-990-866-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

THESE VIEWS ARE APPLICABLE TO ALL
HPT BLADE CONFIGURATIONS

1352453-00

G24473 S0006582279_V5

HPT Blade Inspection Borescope Common Limits
Figure 627/72-00-00-990-814-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ROW 1 AND 6-8 (GILL COOLING HOLES).
ROW 2-5 (NOSE COOLING HOLES).

GMM-1163838-00-A
GMM-1137423-02-A

(TOP VIEW)

B

NOTE:

80 BLADE HPT ROTOR CONFIGURATION

1 SOME HPT BLADES HAVE THE TRAILING EDGE TIP CORNER "CROPPED" DURING MANUFACTURE. THIS IS ACCEPTABLE. DO NOT CONFUSE WITH SHROUD DROP RUBBING OF THE BLADE TIP. SHROUD DROP RUBBING RESULTS IN A SHALLOWER ANGLE.

1352454-00
H87161 S0006582280_V3

HPT Blade Inspection Borescope Common Limits
Figure 627/72-00-00-990-814-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5039807-00

2631986 S0000627428_V2

HPT Blade Inspection Borescope Common Limits
Figure 627/72-00-00-990-814-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

80 BLADE HPT ROTOR CONFIGURATION WITH ADDED TRAILING EDGE COOLING HOLES AND TIP SHELF AREA.

1352455-00
2090811 S0000441462_V2

HPT Blade With Tip Shelf Inspection
Figure 628/72-00-00-990-840-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

76 BLADE CONFIGURATION WITH ADDED TIP CAVITY SEAL AND CONTOURED PLATFORM

1352455-00
2090818 S0000441466_V5

HPT Blade With Contoured Platform and Tip Cap Baffle Inspection
Figure 629/72-00-00-990-850-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

6020135-00
2954260 S0000731603_V1

Seal Wire Protrusion Inspection
Figure 630/72-00-00-990-861-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-200-815-F00

11. HPT Shrouds Borescope Inspection

A. General

(1) This task gives the instructions to examine the High Pressure Turbine (HPT) shrouds with a borescope.

(2) This inspection of the HPT shrouds is done with a rigid borescope through the borescope ports S16 and S17. You can see the shrouds from the aft side.

(3) If you find damage, you must do an inspection of the HPT shrouds from the forward side. This is done with a fiberscope through the main igniter ports (S10 or S11).

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Prepare for the Inspection

SUBTASK 72-00-00-840-020-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-010-019-F00

(2) Remove the S16 and S17 borescope plugs (Figure 633).

(a) Identify each BSI plug.

(b) Remove the S16 and S17 BSI plugs.

(c) Attach an identification tag onto the borescope plugs to make sure that each borescope plug is installed back in the correct borescope port after this procedure.

SUBTASK 72-00-00-480-024-F00

(3) Do these steps to prepare for the inspection of the HPT shrouds:

(a) Connect the applicable borescope to the light source.

1) rigid borescope, COM-2195 and light source, SPL-4305

2) rigid borescope, COM-4302 and light source, SPL-4306

3) rigid borescope, COM-4303 and light source, SPL-2197

4) rigid borescope, COM-4304 and light source, SPL-4308

5) Use the rigid borescope with the yellow band to get a general view.

(b) Connect the rigid borescope to a 90 degree right-angle viewer and a 60 degree field of vision.

(c) Put the rigid borescope through the borescope port (Figure 633).

(d) Make sure the borescope is correctly adjusted.

(e) Turn the light source ON.

F. HPT Shrouds Borescope Inspection

SUBTASK 72-00-00-290-001-F00

(1) Examine the HPT shrouds as follow (Figure 631):

(a) Axial cracks

1) Any amount.

(b) Circumferential cracks

1) There is no limit to the number of circumferential cracks that do not connect and are no more than 1.0 in. (25.4 mm) long.

2) The Continue-In-Service limit is 25 cycles if the circumferential cracks are more than 1.0 in. (25.4 mm) long.

3) Circumferential cracks that are connected to axial cracks cannot be more than 0.25 in. (6.35 mm) long and not less than 0.25 in. (6.35 mm) from the shroud edge.

4) The Continue-In-Service limit is 25 cycles if the circumferential cracks connected to axial cracks are more than 0.25 in. (6.35 mm) long or closer than 0.25 in. (6.35 mm) from the shroud edge, unless the connected cracks are in or less than the limit for missing material, then missing material can be used.

(c) Burning, erosion or chipped/missing TDC exposing the backstrip.

1) Any amount if the shrouds do not drop into the flowpath.

(d) Split-line aft corners

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Any amount of circumferential missing or distorted material less than 0.20 in. (5.08 mm) and axial missing or distorted material less than 0.40 in. (10.16 mm) measured from the edge of the shroud.

(e) Split-line forward corners

1) Any amount of missing material in or less than 0.25 in. (6.35 mm) in the axial direction from the leading edge and in or less than 0.080 in. (2.03 mm) in the circumferential direction from the shroud side edges.

2) Continue-In-Service 400 cycles if material loss is more than 0.25 in. (6.35 mm) in the axial direction and 0.080 in. (2.03 mm) in the circumferential direction, if there is no other burn-through on the shroud.

NOTE: This C-I-S limit is for a reduced interval, repeat inspection.

(f) Split-line other areas

1) Any amount of missing material if area (A) is below 0.013 in^2 (8.387 mm^2) and the distance from the original contour in the circumferential direction (d) is below 0.080 in. (2.03 mm).

2) Continue-In-Service 400 cycles if area (A) is above 0.013 in^2 (8.387 mm^2) or the distance from the original contour in the circumferential direction (d) is above 0.080 in. (2.03 mm), if there is no other burn-through on the shroud.

NOTE: This C-I-S limit is for a reduced interval, repeat inspection.

3) Continue-In-Service 200 cycles if area (A) is above 0.013 in^2 (8.387 mm^2) and the distance from the original contour in the circumferential direction (d) is above 0.080 in. (2.03 mm), if there is no other burn-through on the shroud.

NOTE: This C-I-S limit is for a reduced interval, repeat inspection.

4) Continue-In-Service limit 25 cycles if area (A) is above 0.013 in^2 (8.387 mm^2) and the distance from the original contour in the circumferential direction (d) is above 0.080 in. (2.03 mm) and other burn-through with the area over 0.001 in^2 (0.645 mm^2) is on the shroud.

(g) Rubs and wear

1) All rubs and wear are permitted.

(h) Distortion

1) There is no limit if the shroud is not in the flowpath.

(i) Burn-through on the rub land (this includes holes through the backstrip)

1) Burn-through is not permitted.

2) Continue-In-Service 75 cycles if burn-through size area on all HPT shrouds is in or less than 0.001 in^2 (0.645 mm^2) < Area < 0.005 in^2 (3.226 mm^2), if the shrouds do not drop into the flowpath.

NOTE: This C-I-S limit is for a reduced interval, repeat inspection.

3) Continue-In-Service 25 cycles if burn-through size area on all HPT shrouds is in or less 0.005 in^2 (3.226 mm^2) < Area < 0.015 in^2 (9.677 mm^2), if the shrouds do not drop into the flowpath.

NOTE: This C-I-S limit is for a reduced interval, repeat inspection.

4) Continue-In-Service limit 25 cycles if burn-through size area on all HPT shrouds is more than 0.015 in^2 (9.677 mm^2), if the shrouds do not drop into the flowpath.

(j) Missing, cracked or displaced shroud axial seals

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Permitted.

SUBTASK 72-00-00-080-011-F00

(2) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-480-025-F00

(1) Do these steps to install the borescope plugs:

NOTE: The borescope plugs to the HPT, the LPT stage 1 and combustion case have the same thread size. The stem of the borescope plugs to the HPT or the LPT stage 1 nozzle will be burned away if it is installed in the borescope port for the combustion case (Figure 632).

(a) Apply graphite mineral vaseline, D00601 [CP2101], pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and friction surfaces of the borescope plugs.

(b) Install the borescope plugs.

1) Tighten the borescope plugs to 57 in-lb (6.4 N·m) - 63 in-lb (7.1 N·m).

2) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on the borescope plugs.

SUBTASK 72-00-00-840-021-F00

(2) If the borescope procedure is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ACCEPTABLE CONNECTED CRACKS

ACCEPTABLE MISSING OR DISTORTED MATERIAL

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

6020473-00

2958044 S0000736266_V2

HPT Shroud (Thermal Densified Coating Limits) Inspection
Figure 631/72-00-00-990-838-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S12-S15
BORESCOPE PLUGS

S16-S17
BORESCOPE PLUGS

S18-S20
BORESCOPE PLUGS

6039411-00
3054693 S0000819507_V1

Borescope Plugs
Figure 632/72-00-00-990-867-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-200-808-F00

12. Stage 1-3 LPT Blades Borescope Inspection

(Figure 601, Figure 633 and Figure 634, Figure 635)

A. General

(1) This task provides the instructions on how to do a borescope inspection of the stage 1-3 Low Pressure Turbine (LPT) blades.

(2) The inspection of the stage 1-3 LPT blades is done with a rigid borescope through borescope ports S16 through S20.

(3) The number of Stage 1-3 LPT blades is as follows:

Table 601/72-00-00-993-814-F00 Number of Stage 1–3 LPT Blades

Engine	LPT Blades Stage 1	LPT Blades Stage 2	LPT Blades Stage 3
NON 7BE	162	150	150
7BE	154	134	136

B. References

Reference	Title
71-00-00-800-806-F00	Engine Operation Limits (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Inspection

SUBTASK 72-00-00-210-060-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

LOM ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-009-F00

> **CAUTION** DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(2) Remove the borescope plugs S16, S17, S18, S19, and S20, do these steps (Figure 633):

NOTE: The borescope plugs S16 and S17 are in the same plane and located, respectively, at 5:30 and 8:30 aft looking forward immediately in front of the combustion case aft flange. The borescope plugs S18, S19, and S20 are located approximately at 5:00 o'clock aft looking forward on the LPT case and, from front to rear, relate to the 2nd, 3rd, and 4th stages of the LPT, respectively.

(a) Cut and remove the lockwires from the borescope plugs.

(b) Identify each BSI plug.

(c) Remove the S16, S17, S18, S19, and S20 BSI plugs.

(d) Attach an identification tag onto the borescope plugs to make sure that each borescope plug is installed back in the correct borescope port after this procedure.

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-035-F00

(3) Remove the borescope plugs S16 and S17, do these steps:

NOTE: The borescope plugs S16 and S17 are in the same plane and located, respectively, at 5:30 and 8:30 aft looking forward immediately in front of the combustion case aft flange.

(a) Cut and remove the lockwires from the borescope plugs.

(b) Identify each BSI plug.

(c) Remove the S16 and S17 BSI plugs.

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LOM ALL POST SB 737-CFM56-7B-0293 (Continued)

(d) Attach an identification tag onto the borescope plugs to make sure that each borescope plug is installed back in the correct borescope port after this procedure.

SUBTASK 72-00-00-020-009-F00

> **CAUTION**
> DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(4) Remove the self-locking borescope cap assemblies S18, S19, and S20.

NOTE: The borescope plugs S18, S19, and S20 are located approximately at 5:00 o'clock aft looking forward on the LPT case and, from front to rear, relate to the 2nd, 3rd, and 4th stages of the LPT, respectively.

NOTE: Specific procedure is not required to remove a self-locking borescope cap assembly. You can use a 1/4 inch drive ratchet to loosen it.

LOM ALL

SUBTASK 72-00-00-210-062-F00

(5) Do these steps to prepare for the inspection of the LPT stage 1-3 blades:

(a) Connect the applicable borescope to the light source:

1) The rigid borescope, COM-2195, and light source, SPL-4305.
2) The rigid borescope, COM-4302, and light source, SPL-4306.
3) The rigid borescope, COM-4303, and light source, SPL-2197.
4) The rigid borescope, COM-4304, and light source, SPL-4308.
5) Use the rigid borescope with the yellow band to get a general view.
6) Use the rigid borescope with the green band to view the blade platform.
7) Use the rigid borescope with the blue band to view the blade tip.

(b) Connect the rigid borescope to a 90-degree right-angle viewer and a 60-degree field of vision.

(c) Put the rigid borescope through the borescope port (Figure 633).

(d) Make sure that the borescope is correctly adjusted.

(e) Turn the light source to the ON position.

SUBTASK 72-00-00-210-063-F00

(6) Put a protective mat, STD-585, in the inlet cowl.

G. Stages 1-3 LPT Blades Borescope Inspection

SUBTASK 72-00-00-210-064-F00

> **WARNING**
> BE CAREFUL WHEN YOU TURN THE FAN ROTOR. MAKE SURE THAT YOU ARE IN A STABLE POSITION. ALSO, YOU MUST WEAR HEAVY PROTECTIVE GLOVES TO PREVENT PERSONAL INJURY.

(1) Examine the LPT blades while you turn the fan rotor in a smooth, stable movement.

(a) To examine the airfoil as the blades turn, you must change the depth of the probe in the LPT case.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Turn the probe (azimuth) at the same time you change the depth of the probe.

NOTE: This will permit the maximum view for a given turn speed.

NOTE: It can be necessary to make more than one complete rotation of the LPT as the length of the blade increases. Also, to fully view the platform and root areas, it can be necessary to put the full probe length into the LPT case.

(c) When you examine the leading edges or concave sides of the blades, it is recommended that you reverse the rotation of the rotor so the blades come to the borescope, not away from it.

SUBTASK 72-00-00-210-065-F00

(2) Examine the LPT blades as follows (Figure 634):

NOTE: If you think there is damage, you can look at the damage with the retro-angle viewer. For the blade tip and platforms, you can use the fore-oblique angle viewer.

(a) Cracks in these areas

1) Airfoil surface

a) Cracks are not permitted.

2) Platform or tip shroud

a) Cracks are not permitted.

b) The Continue-In-Service limit is 5 cycles or 10 hours, with this condition:

<1> The crack is not more than 50 percent of the chord width.

(b) Nicks and dents in the leading and trailing edges

1) There is no limit to the number with these conditions:

a) The damage in Area E is less than 0.02 in. (0.51 mm) deep.

b) The damage not in Area E is less than 0.03 in. (0.76 mm) deep.

2) The Continue-In-Service limit is 5 cycles or 10 hours.

(c) Nicks and dents in the concave and convex surfaces

1) There is no limit to the number with these conditions:

a) The damage is less than 0.015 in. (0.38 mm) in depth.

b) The damage does not go through to the opposite side.

2) Not more than 5 dents are permitted with this condition:

a) The damage goes through less than 0.01 in. (0.25 mm) on the opposite side.

3) The Continue-In-Service limit is 5 cycles or 10 hours.

(d) Large dents or pieces of metal that are missing in Area E

1) Large dents or missing metal are not serviceable.

(e) Other areas for large dents or missing pieces

1) There must be less than two damaged areas on the same side of the airfoil.

2) There must be less than two damaged areas on opposite sides of the airfoil.

3) Damage must be separated by 0.5 in. (12.7 mm) radially and 0.2 in. (5.1 mm) from the leading edge and trailing edge.

4) There must be no more than 5 damaged blades in a 90-degree section.

5) No more than 5 percent of the blades can be damaged.

6) The Continue-In-Service limit is 5 cycles or 10 hours.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(f) Excess material on airfoil

1) Not more than 0.04 in^2 (25.8 mm^2) surface of cluster, 0.004 in. (0.10 mm) height, 0.02 in. (0.51 mm) diameter for each indication and maximum 5 percent of blade span impacted.

(g) Deposit material on blade tip shroud except on lateral faces (hard faces are part of lateral faces)

1) Any amount, the sum of all deposits does not exceed 0.0121 in^2 (7.81 mm^2) per blade tip shroud.

(h) Leading edges for distortion caused by over-temperature

NOTE: Over-temperature damage is seen as melted areas or parallel grooves in the hard coat of the blade.

1) Distortion of the leading edge is not permitted.

2) The Continue-In-Service limit is 15 cycles or 25 hours with these conditions:

a) The distortion is less than 0.8 in. (20.3 mm) on stage 1 blades.

b) The distortion is less than 0.08 in. (2.03 mm) on stage 2 and 3 blades.

(i) Gaps in the tip shroud interlocks

1) There is no limit, with these conditions:

a) The interlocks must not show wear.

b) Stage 2 and 3 gaps are not permitted.

2) The Continue-In-Service limit is 5 cycles.

(j) Shingled or unlatched tip shrouds

1) Shingled or unlatched tip shrouds are not permitted.

2) The Continue-In-Service limit is 5 cycles or 10 hours, with this condition:

a) The rotor must turn freely, with a vibration level that is not more than the advisory limit (TASK 71-00-00-800-806-F00).

(k) Tip shroud out-of-flush

NOTE: If this out-of-flush condition is caused by over welding and if there is no evidence of unusual wear on the mating or hard faces all along the notch and if the interlocks do fit one in another, this condition is serviceable. If different, refer to the criteria that follow.

1) Stage 1 blades

a) Not more than 0.0472 in. (1.20 mm), and not more than 0.0413 in. (1.05 mm) on the hard faces.

2) Stage 2 blades

a) Not more than 0.0472 in. (1.20 mm), and not more than 0.0354 in. (0.90 mm) on the hard faces.

3) Stage 3 blades

a) Not more than 0.0472 in. (1.20 mm), and not more than 0.0433 in. (1.10 mm) on the hard faces.

(l) Root platform out-of-flush

1) Stage 1 blades

a) Not more than 0.0198 in. (0.50 mm).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) Stage 2 and 3 blades

a) Not more than 0.0236 in. (0.60 mm).

(m) Circumferential looseness

1) There is no limit to circumferential looseness.

(n) Seal teeth wear

1) There is no limit, with these conditions:

a) If only one stage has wear, the wear must be less than 1/2 of the tooth height.

b) If two stages have wear, the wear must be less than 1/3 of the tooth height.

c) If three stages have wear, the wear must be less than 1/4 of the tooth height.

(o) Flaking on the hardened seal teeth

1) There is no limit to the quantity of flaking.

(p) Pitting / corrosion

1) Any amount.

SUBTASK 72-00-00-080-004-F00

(3) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to the OFF position, but keep the blower in the ON position until the lamp and case are cool.

H. Put the Airplane Back to Its Usual Condition

LOM ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-004-F00

(1) Do these steps to install the borescope plugs:

NOTE: The borescope plugs to the High Pressure Turbine (HPT), LPT stage 1, and combustion case have the same thread size. If the stem of the borescope plugs to the HPT or LPT stage 1 nozzle is installed in the borescope port for the combustion case, it will be burned away (Figure 635).

(a) Apply a light graphite mineral vaseline, D00601 [CP2101], or pure nickel special compound, D50034 [CP2619], or milk of magnesia compound, D50032 [CP1064], to the threads and friction surfaces of the borescope plugs S16, S17, S18, S19, and S20.

(b) Install S16 and S17 on the combustion case.

(c) Install S18, S19, and S20 on the LPT case.

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-005-F00

(2) Do these steps to install the borescope plugs:

NOTE: The borescope plugs to the HPT, LPT stage 1, and combustion case have the same thread size. If the stem of the borescope plugs to the HPT or LPT stage 1 nozzle is installed in the borescope port for the combustion case, it will be burned away (Figure 635).

(a) Apply a light graphite mineral vaseline, D00601 [CP2101], or pure nickel special compound, D50034 [CP2619], or milk of magnesia compound, D50032 [CP1064], to the threads and friction surfaces of the borescope plugs S16 and S17.

(b) Install S16 and S17 on the combustion case.

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LOM ALL POST SB 737-CFM56-7B-0293 (Continued)

(c) Apply graphite mineral vaseline, D00601 [CP2101], or pure nickel special compound, D50034 [CP2619], or milk of magnesia compound, D50032 [CP1064], to the threads of the self-locking borescope cap assemblies S18, S19, and S20.

(d) Install S18, S19, and S20 on the LPT case.

LOM ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-006-F00

(3) Tighten the plugs S16 and S17 to 57.0 in-lb (6.4 N·m) - 63.0 in-lb (7.1 N·m).

(a) Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006].

SUBTASK 72-00-00-420-017-F00

(4) Tighten the borescope plugs S18, S19, and S20 to 55.0 in-lb (6.2 N·m) - 60.0 in-lb (6.8 N·m).

(a) Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006].

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-007-F00

(5) Tighten the plugs S16 and S17 to 57.0 in-lb (6.4 N·m) - 63.0 in-lb (7.1 N·m).

(a) Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006], on the borescope plugs.

SUBTASK 72-00-00-410-047-F00

(6) Tighten the self-locking borescope cap assemblies S18, S19, and S20 to 49.6 in-lb (5.60 N·m) - 54.8 in-lb (6.19 N·m).

NOTE: To achieve the correct installation of the self-locking borescope cap assembly, the slot of its ring must be positioned on the borescope boss lug at the final tightening.

LOM ALL

SUBTASK 72-00-00-410-028-F00

(7) If the borescope procedure is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

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STAGE	QTY. OF BLADES	LEADING EDGE VIEW-PORT	TRAILING EDGE VIEW PORT
1	162	S16-S17	S18
2	150	S18	S19
3	150	S19	S20
4	134	S20	-

627-1
1377180 S0000249870_V2

LPT Borescope Plug Locations
Figure 633/72-00-00-990-815-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LPT Borescope Plug Locations
Figure 633/72-00-00-990-815-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SELF-LOCKING BORESCOPE CAP INSTALLATION

G

SELF-LOCKING BORESCOPE CAP INSTALLED

G

1377357 S0000249874_V2

LPT Borescope Plug Locations
Figure 633/72-00-00-990-815-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03474-00-B
G24453 S0006582285_V2

Stage 1-3 LPT Blade Borescope Inspection
Figure 634/72-00-00-990-816-F00 (Sheet 1 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03500-00-B

G24241 S0006582286_V2

Stage 1-3 LPT Blade Borescope Inspection
Figure 634/72-00-00-990-816-F00 (Sheet 2 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03502-00-B
G24251 S0006582287_V2

Stage 1-3 LPT Blade Borescope Inspection
Figure 634/72-00-00-990-816-F00 (Sheet 3 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stage 1-3 LPT Blade Borescope Inspection
Figure 634/72-00-00-990-816-F00 (Sheet 4 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

VIEW IN THE FORWARD DIRECTION

F

INTERLOCK WEAR

UNLATCHING

SHINGLING

-TIP SHROUD
INTERLOCK DISCONNECTED

-BLADE FORWARD/AFT EDGES OFFSET
-TIP SHROUDS OVERLAPPED AT
INTERLOCK OR CIRCUMFERENTIAL
MATE FACE

INTERLOCK WEAR
(EXAMPLE)

G

S-M56-MM-03494-00-B
G24421 S0006582288_V2

Stage 1-3 LPT Blade Borescope Inspection
Figure 634/72-00-00-990-816-F00 (Sheet 5 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stage 1-3 LPT Blade Borescope Inspection
Figure 634/72-00-00-990-816-F00 (Sheet 6 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S12-S15
BORESCOPE PLUGS

S16-S17
BORESCOPE PLUGS

S18-S20
BORESCOPE PLUGS

6039411-00
3054693 S0000819507_V1

Borescope Plugs
Figure 635/72-00-00-990-868-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-200-809-F00

13. Stage 4 LPT Blades Borescope Inspection

(Figure 633, Figure 636, and Figure 637)

A. General

(1) This task provides the instructions on how to do a borescope inspection of the stage 4 Low Pressure Turbine (LPT) blades.

(2) The inspection of the leading edges of the stage 4 LPT blades is done with a rigid borescope through borescope port S20. The inspection of the trailing edges of these blades is done from the aft end of the engine.

(3) There are 134 stage 4 blades on the NON-7BE engine.

(4) There are 138 stage 4 blades on the 7BE engine.

B. References

Reference	Title
71-00-00-800-806-F00	Engine Operation Limits (P/B 201)
78-11-01-000-801-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-801-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-1081	Flashlight - Explosion Proof
STD-3907	Mirror - Dental

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D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Inspection

SUBTASK 72-00-00-210-069-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-480-015-F00

(2) Put a protective mat, STD-585, in the inner surface of the inlet cowl.

SUBTASK 72-00-00-010-010-F00

(3) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00 or Primary Nozzle Assembly Removal, TASK 78-11-01-000-801-F00.

SUBTASK 72-00-00-210-111-F00

(4) Do these steps to prepare the borescope for the inspection:

(a) Connect the applicable borescope to the light source:

1) rigid borescope, COM-2195, and light source, SPL-4305.

2) rigid borescope, COM-4302, and light source, SPL-4306.

3) rigid borescope, COM-4303, and light source, SPL-2197.

4) rigid borescope, COM-4304, and light source, SPL-4308.

5) Use the rigid borescope with the yellow band.

(b) Connect the rigid borescope with the long, right angle borescope extension, 90-degree right-angle viewer, and 60-degree field of vision.

(c) Turn the light source to the ON position.

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SUBTASK 72-00-00-010-011-F00

(5) Cut and remove the lockwire from the borescope plug, S20.

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LOM ALL PRE SB 737-CFM56-7B-0293 (Continued)

SUBTASK 72-00-00-020-010-F00

> **CAUTION** DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(6) Remove the plug (Figure 633).

NOTE: This step is necessary to examine the leading edges of the stage 4 blades. You can visually examine the trailing edges of the stage 4 blades from the aft end of the engine.

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-036-F00

> **CAUTION** DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(7) Remove the self-locking borescope cap assembly, S20.

NOTE: The plug, S20, is the aftmost borescope plug located at 5:00 o'clock on the LPT case.

NOTE: Specific procedure is not required to remove a self-locking borescope cap assembly. You can use a 1/4 inch drive ratchet to loosen it.

LOM ALL

G. Stage 4 LPT Blades Borescope Inspection

SUBTASK 72-00-00-210-071-F00

(1) Examine the LPT blades while you turn the fan rotor in a smooth, stable movement.

> **WARNING** BE CAREFUL WHEN YOU TURN THE FAN ROTOR. MAKE SURE THAT YOU ARE IN A STABLE POSITION. ALSO, YOU MUST WEAR HEAVY PROTECTIVE GLOVES TO PREVENT PERSONAL INJURY.

(a) To examine the airfoil as the blades turn, you must change the depth of the probe in the LPT case.

(b) Turn the probe (azimuth) at the same time you change the depth of the probe. This will permit the maximum view for a given turn speed.

NOTE: It can be necessary to make more than one complete rotation of the LPT as the length of the blade increases. Also, to fully view the platform and the root areas, it can be necessary to put the full probe length into the LPT case.

(c) When you examine the leading edges or concave sides of the blades, it is recommended that you reverse the rotation of the rotor so the blades come to the borescope, not away from it.

SUBTASK 72-00-00-210-072-F00

(2) Examine the blades as follows (Figure 636):

(a) Cracks in Area E of the airfoils

1) Cracks are not permitted.

2) The Continue-In-Service limit is 5 cycles or 10 flight hours with these conditions:

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a) One full airfoil can be missing.

b) Engine vibration level is not more than the vibration advisory limit (TASK 71-00-00-800-806-F00).

(b) Cracks in the blade platform

1) Cracks are not permitted.

2) The Continue-In-Service limit is 5 cycles or 10 flight hours.

(c) Cracks in the tip shrouds

1) Cracks are not permitted.

2) The Continue-In-Service limit is 5 cycles or 10 flight hours with these conditions:

a) Engine vibration level is not more than the vibration advisory limit (TASK 71-00-00-800-806-F00).

b) There is no limit to the number of tip shrouds and related airfoil tips that can be missing.

(d) Nicks and dents on the leading and trailing edges, in Area E

1) There is no limit, with this condition:

a) Damage must be less than 0.02 in. (0.5 mm) in depth.

2) The Continue-In-Service limit is 5 cycles or 10 flight hours.

(e) Nicks and dents on the leading and trailing edges, not in Area E

1) There is no limit, with this condition:

a) Damage must be less than 0.03 in. (0.76 mm) in depth.

2) The Continue-In-Service limit is 5 cycles or 10 flight hours.

(f) Nicks and dents on the concave or convex airfoil surfaces

1) There is no limit, with these conditions:

a) Damage must be less than 0.015 in. (0.38 mm) in depth.

b) Damage must not go through to the opposite side.

2) A maximum of 5 dents are permitted, with this condition:

a) Damage goes through less than 0.01 in. (0.25 mm) on the opposite side.

3) The Continue-In-Service limit is 5 cycles or 10 flight hours.

(g) Nicks, dents and/or scratches (without protrusion) on front and rear edges of tip shroud

1) Any number not more than 0.002 in. (0.05 mm) deep, 0.003 in^2 (2 mm^2) length x width.

(h) Nicks, dents and/or scratches (without protrusion) on root rear edge

1) Any number not more than 0.002 in. (0.05 mm) deep, 0.003 in^2 (2 mm^2) length x width.

(i) Large dents or pieces of metal that are missing in Area E

1) Large dents or missing metal are not permitted.

(j) Other areas for large dents or missing pieces

1) There must be less than two damaged areas on the same side of the airfoil.

2) There must be less than two damaged areas on the opposite sides of the airfoil.

3) Damage must be separated by 0.5 in. (13 mm) radially and 0.2 in. (5 mm) from the leading and trailing edges.

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4) There must be no more than 5 damaged blades in each quadrant.

5) No more than 5 percent of the blades can be damaged.

6) The Continue-In-Service limit is 5 cycles or 10 flight hours with this condition:

a) Engine vibration level is not more than the vibration advisory limit (TASK 71-00-00-800-806-F00).

(k) Excess material on airfoil

1) Not more than 0.04 in^2 (25.8 mm^2) surface of cluster, 0.004 in. (0.1 mm) height, 0.02 in. (0.5 mm) diameter for each indication and maximum 5 percent of blade span impacted.

(l) Deposit material on blade tip shroud except on lateral faces (hard faces are part of lateral faces)

1) Any amount, the sum of all deposits does not exceed 0.0121 in^2 (7.81 mm^2) per blade tip shroud.

(m) Leading edges for distortion caused by over-temperature

NOTE: Overtemperature damage is seen as melted areas or parallel grooves in the hard coat of the blade.

1) Distortion of the leading edge is not permitted.

2) The Continue-In-Service limit is 15 cycles or 25 flight hours with this condition:

a) The distortion is less than 0.08 in. (2 mm).

(n) Tip shroud interlock gaps (Figure 637)

1) Gaps are not permitted.

a) Do this task: Stage 4 LPT Blades Axial Preload Check, TASK 72-00-00-200-810-F00.

2) The Continue-In-Service limit is 25 cycles or 50 flight hours.

(o) Shingled or unlatched tip shrouds

1) Shingled or unlatched tip shrouds are not permitted.

a) Do the procedure to put the shingled/unlatched blades back to their original position.

b) If the blade tip shrouds are successfully put back in the correct position, do a check of the blade tip shrouds.

2) For shingled blades, the Continue-In-Service limit is 25 cycles or 50 flight hours, with these conditions:

a) The rotor must turn freely.

b) Engine vibration level is not more than the vibration advisory limit (TASK 71-00-00-800-806-F00).

3) For unlatched blades, the Continue-In-Service limit is 100 cycles or 200 flight hours, with these conditions:

a) The rotor must turn freely.

b) Engine vibration level is not more than the vibration advisory limit (TASK 71-00-00-800-806-F00).

(p) Tip shroud interlock wear

NOTE: Maximum interlock wear usually occurs at 2 to 6 locations, equally spaced. Measurement should be done at these locations.

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1) Do these steps to measure the interlock wear:
   a) Use an explosion proof flashlight, STD-1081 and a dental mirror, STD-3907.
   b) You can measure the interlock wear from the alignment of the aft face of the tip shrouds.
   c) Do a check of the alignment with the honeycomb cells in the outer stationary seals as a reference. One cell is equivalent to 0.06 in. (1.5 mm).

      NOTE: If you are not sure, use modeling clay to get an accurate dimension.
   d) Measure the offset on the aft edge of the blades.

(q) Axial preload (Figure 638)
1) Do this task: Stage 4 LPT Blades Axial Preload Check, TASK 72-00-00-200-810-F00.
2) The tip shrouds must have axial preload.
3) The Continue-In-Service limit is 25 cycles or 50 flight hours.

(r) Interlock wear (Figure 637)
1) Interlock wear is serviceable, with these conditions:
   a) The bad alignment of the aft face on the tip shrouds is less than 0.059 in. (1.5 mm).
   b) The interlocks have axial preload.
2) Interlock wear more than 0.059 in. (1.5 mm) is not serviceable. Remove the engine before 100 cycles or 200 flight hours.

(s) Wear on the lateral faces of the tip shrouds
1) There is no limit, with this condition:
   a) There is axial preload.

(t) Tip shroud out of flush

NOTE: If this out-of-flush condition is caused by over welding and if there is no evidence of unusual wear on the mating or hard faces all along the notch and if the interlocks do fit one in another, this condition is serviceable. If different, refer to the criteria that follow.

1) Not more than 0.0354 in. (0.90 mm), with this condition:
   a) The tip shroud platforms must not overlap (shingling).

(u) Root platform out of flush
1) Not more than 0.039 in. (1.0 mm) on the hard faces.

(v) Circumferential looseness
1) There is no limit, with this condition:
   a) There is axial preload.

(w) Peeling of particles
1) There is no limit, with this condition:
   a) The airfoils are not bowed or melted.

LOM ALL; FOR ALL CFM56 NON-7BE

(x) Pitting or corrosion

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LOM ALL; FOR ALL CFM56 NON-7BE (Continued)

1) Any amount without missing material.

LOM ALL

SUBTASK 72-00-00-080-005-F00

(3) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-210-074-F00

(1) Do these steps to install the borescope plug (Figure 633):

(a) Apply graphite mineral vaseline, D00601 [CP2101], or pure nickel special compound, D50034 [CP2619], or milk of magnesia compound, D50032 [CP1064], to the threads and friction surfaces of the borescope plug.

(b) Install the borescope plug.

LOM ALL PRE SB 737-CFM56-7B-0293

1) Torque the plug to 55.0 in-lb (6.2 N·m) - 60.0 in-lb (6.8 N·m).

2) Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006], on the borescope plug.

LOM ALL POST SB 737-CFM56-7B-0293

(c) Install the self-locking borescope cap assembly, S20, on the LPT case.

1) Torque the cap assembly to 55.0 in-lb (6.2 N·m) - 60.0 in-lb (6.8 N·m).

NOTE: To achieve the correct installation of the self-locking borescope cap assembly, the slot of its ring must be positioned on the borescope boss lug at the final tightening.

LOM ALL

SUBTASK 72-00-00-410-024-F00

(2) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00 or Primary Nozzle Assembly Installation, TASK 78-11-01-400-801-F00.

SUBTASK 72-00-00-210-075-F00

(3) If the borescope procedure is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03475-00-B
G23444 S0006582290_V2

Stage 4 LPT Blade Borescope Inspection
Figure 636/72-00-00-990-817-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stage 4 LPT Blade Borescope Inspection
Figure 636/72-00-00-990-817-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G23752 S0006582291_V4

Stage 4 LPT Tip Shroud Inspection
Figure 637/72-00-00-990-818-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TIP SHROUD INTERLOCK GAPS

TIP SHROUD INTERLOCK WEAR

LATERAL FACES WEAR

INTERLOCK WEAR AT A 45‘ ANGLE

C-C

S-M56-MM-03495-00-B

G23803 S0006582292_V2

Stage 4 LPT Tip Shroud Inspection
Figure 637/72-00-00-990-818-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-200-810-F00

14. Stage 4 LPT Blades Axial Preload Check

(Figure 638)

A. General

(1) This task provides the instructions on how to do the axial preload check of the stage 4 LPT blades.

(2) There are 134 stage 4 LPT blades on the NON-7BE engine.

(3) There are 138 stage 4 blades on the 7BE engine.

B. References

Reference	Title
78-11-01-000-801-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-801-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Check

SUBTASK 72-00-00-010-012-F00

(1) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00 or Primary Nozzle Assembly Removal, TASK 78-11-01-000-801-F00.

E. Stage 4 LPT Blades Axial Preload Check

SUBTASK 72-00-00-210-077-F00

(1) Do the axial preload check as follows:

NOTE: You must separate two tip shrouds in each quadrant to do the check for axial preload.

(a) In a quadrant, separate the two tip shrouds by hand. Do not unlatch the tip shroud interlocks.

1) With your hands, push one blade as you pull the other.

NOTE: This will separate the tip shrouds.

(b) Release the blades, and do a check for a gap between the tip shroud interlocks.

1) Gaps between the tip shroud interlocks are not permitted.

2) The Continue-In-Service limit is 25 cycles or 50 flight hours.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-210-078-F00

(1) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00 or Primary Nozzle Assembly Installation, TASK 78-11-01-400-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03499-00-B
G23961 S0006582294_V2

Stage 4 LPT Blade Axial Preload Check
Figure 638/72-00-00-990-819-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-200-811-F00

15. Stage 1 LPT Nozzle Guide Vanes Inspection

(Figure 639, Figure 640, Figure 641)

A. General

(1) This task provides the instructions on how to examine the Stage 1 LPT nozzle guide vanes with rigid borescope or flexible borescope.

(2) This inspection must be done through the borescope ports S16 and S17 when using rigid borescope and it can be done through the borescope port S16 or through the borescope port S17 when using flexible borescope.

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828 Opt Part #: 856A1321P05 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Prepare for the Inspection

SUBTASK 72-00-00-210-079-F00

(1) Do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-210-112-F00

(2) Do these steps to prepare the rigid borescope for the inspection:

(a) Connect the applicable borescope to the light source.

NOTE: Use the rigid borescope with the yellow band.

1) Connect the rigid borescope, COM-2195 to the light source, SPL-4305.

2) Connect the rigid borescope, COM-4302 to the light source, SPL-4306.

3) Connect the rigid borescope, COM-4303 to the light source, SPL-2197.

4) Connect the rigid borescope, COM-4304 to the light source, SPL-4308.

(b) Connect the rigid borescope with the long, right angle borescope extension, 90 degree right angle viewer, and 60 degree field of vision.

(c) Turn the light source to the ON position.

SUBTASK 72-00-00-480-030-F00

(3) Do these steps to prepare the flexible borescope for the inspection:

(a) Connect the borescope, COM-2196 to the applicable light source.

(b) Turn the light source to ON.

SUBTASK 72-00-00-010-013-F00

(4) Remove the S16 and/or S17 borescope plugs, depending on the use of rigid borescope or flexible borescope.

SUBTASK 72-00-00-210-081-F00

(5) Put the borescope in the borescope port.

NOTE: If you use flexible borescope, make sure to adjust it correctly.

F. Stage 1 LPT Nozzle Guide Vanes Inspection

SUBTASK 72-00-00-210-082-F00

(1) Examine the nozzle guide vanes as follows:

NOTE: Use the rigid borescope or flexible borescope to do this inspection. If you use the rigid borescope, this inspection is limited to what you can see on the two airfoils of the nozzle segments.

(a) Axial cracks on the leading and trailing edges.

1) If a rigid borescope is used, examine the axial cracks on the leading and trailing edges as follows:

a) Cracks that are less than 1/3 of the chord width (0.6 in. (15.24 mm) in length) on the 2 airfoils of the nozzle segment are permitted.

b) One crack is permitted per airfoil if the length is more than 1/3 of the chord width (0.6 in. (15.24 mm)) but less than 1/2 of the chord width (1.0 in. (25.4 mm)).

c) A continue-in-service limit of 100 cycles is permitted for axial cracks over the above limits as follows:

<1> There is only one crack on each airfoil.

<2> There is no missing material on the airfoil.

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<3> The crack length is more than 1/2 of the chord width (1.0 in. (25.4 mm)) in length but less than 2/3 of the chord width (1.2 in. (30 mm)).

2) If a 360° flexible borescope is used, examine for axial cracks as follows:

NOTE: Inspection must be followed step by step.

a) Cracks that are less than 1/3 of the chord width (0.6 in. (15.24 mm) in length) on the airfoils of the nozzle segments are permitted.

b) Eight cracks are permitted per set of nozzles with these conditions:

<1> The length is more than 1/3 of the chord width (0.6 in. (15.24 mm)) but less than 3/4 of the chord width (1.35 in. (34.3 mm)).

<2> There are not more than two cracks per segment and one crack per airfoil.

<3> There is no missing material.

c) A continue-in-service limit of 1600 cycles is permitted for axial cracks over the above limits as follows:

<1> There is no full crack.

<2> There are not more than two cracks per segment and one crack per airfoil.

<3> There is no missing material.

<4> After completion of the cycles permitted as continue-in-service, a new 360° flexible borescope inspection of the complete set of nozzles must be performed for continued operations.

d) Use the continue-in-service limits in the Table 1 to Table 4 (Figure 641) below with these conditions:

NOTE: An axial crack is considered as full axial crack if it runs from leading edge to trailing edge on the two concave and convex sides.

<1> There are a maximum of two full cracks (leading edge to trailing edge) per LPT nozzle segment.

<2> There is a maximum of one full crack (leading edge to trailing edge) per airfoil added to any amount of non-full cracks.

<3> The missing material in each hole is not more than 0.039 in^2 (25 mm^2).

<4> There are no more than two holes per segment and no more than one hole per airfoil.

<5> Radial cracks: Each airfoil can only have one crack that is less than 1/2 of the chord width in length (1.0 in. (25.4 mm)).

<6> After completion of the cycles permitted as continue-in-service, a new 360° flexible borescope inspection of the complete set of nozzles must be performed for continued operations.

(b) Burns

1) Permitted with this condition:

a) Discoloration with no missing material.

2) A continue-in-service limit of 25 cycles is permitted with this condition:

a) Melted or missing material more than 0.102 sq. inch (66 sq. mm) for each engine set of nozzles.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Nicks, marks, scratches or dents in the concave/convex surfaces and inner and outer platforms.

1) Permitted.

(d) Cracks in the inner and outer platforms.

1) Two cracks are permitted for each segment, with these conditions:

a) The cracks are less than 0.5 in. (12.7 mm) in length.

b) The metal does not go into the gaspath.

2) The continue-in-service limit is 3 cycles, with this condition:

a) The cracks are less than 1.0 in. (25.4 mm) in length.

SUBTASK 72-00-00-080-006-F00

(2) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-210-084-F00

CAUTION

MAKE SURE THAT THE BORESCOPE PLUGS ARE INSTALLED IN THE CORRECT PORT LOCATIONS. ENGINE DAMAGE CAN OCCUR IF A BORESCOPE PLUG IS NOT INSTALLED IN THE CORRECT LOCATION.

(1) Do these steps to install the borescope plugs previously removed:

NOTE: The borescope plugs of the LPT stage one and combustor case have the same thread size. The stem of the borescope plug to the LPT stage one nozzle will burn away if you install it in the borescope port of the combustion chamber.

(a) Apply graphite mineral vaseline, D00601 [CP2101] to the threads and friction surfaces of the borescope plugs.

(b) Install the borescope plugs.

1) Tighten the borescope plugs to 57 in-lb (6.4 N·m) - 63 in-lb (7.1 N·m).

2) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on the borescope plugs.

SUBTASK 72-00-00-210-085-F00

(2) Do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

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NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

S-M56-MM-03476-00-B
6030980-00
G24000 S0006582296_V3

Stage 1 LPT Nozzle Guide Vane Borescope Inspection
Figure 639/72-00-00-990-820-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B-B

NOTE:
ALL DIMENSIONS ARE IN INCHES (mm).

6030900-00
2992134 S0000768869_V1

Stage 1 LPT Nozzle Guide Vane Borescope Inspection
Figure 639/72-00-00-990-820-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2846341 S0000663054_V1

Example of Axial Cracks, Radial Cracks, and Holes on Stage 1 LPT Nozzle Segment
Figure 640/72-00-00-990-860-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

		HOLES (TOTAL ON THE SET)							
		0		1-2		3			
FULL CRACKS (TOTAL ON THE SET)	0	▲300	▲1600	▲ 300	▲ 800	▲300	▲400	YES	MULTI CRACK ? (ON 1 AIRFOIL)
		▲300	SEE NOTE	▲ 300	▲ 800	▲300	▲400	NO	
	1-2	▲300	▲ 800	▲ 300	▲ 400	▲200	▲200	YES	
		▲300	▲1600	▲ 300	▲ 400	▲200	▲200	NO	
	3-4	▲300	▲ 800	▲ 200	▲ 200	■ 25	■ 25	YES	
		▲300	▲ 800	▲ 200	▲ 200	■ 25	■ 25	NO	
	5-6	▲300	▲ 400	NOT MORE THAN 5 FULL CRACKS: ■ 25	NOT MORE THAN 5 FULL CRACKS: ■ 25	REMOVE	REMOVE	YES	
		▲300	▲ 400	NOT MORE THAN 5 FULL CRACKS: ■ 25	NOT MORE THAN 5 FULL CRACKS: ■ 25	REMOVE	REMOVE	NO	
	7	▲200	▲200	REMOVE	REMOVE	REMOVE	REMOVE	YES	
		▲200	▲200	REMOVE	REMOVE	REMOVE	REMOVE	NO	
	8	■ 25	■ 25	REMOVE	REMOVE	REMOVE	REMOVE	YES	
		■ 25	■ 25	REMOVE	REMOVE	REMOVE	REMOVE	NO	
		YES	NO	YES	NO	YES	NO		
		RADIAL CRACKS ? (ON 1 AIRFOIL)							

LEGEND:

▲: NUMBER OF CYCLES

■: NUMBER OF CYCLES BEFORE REMOVAL

NOTE:

-MAKE SURE THAT INSPECTION FOR AXIAL CRACK WITH 360˚ BSI REQUIREMENTS ARE FULLY COMPLIANT. IF NOT NO RESTRICTION APPLY.

-MULTICRACK ON SAME AIRFOIL, THE AXIAL CRACKS RADIAL DISTANCE IS MORE THAN THAN 0.472 INCH (12 mm).

-MORE THAN ONE FULL CRACK (LEADING EDGE TO TRAILING EDGE) ON THE SAME AIRFOIL IS FORBIDDEN (ONE FULL CRACK ADDITIONED TO ANY AMOUNT OF NON-FULL CRACKS ARE ACCEPTED).

-NOT MORE THAN TWO FULL CRACKS PER SEGMENT.

-HOLE LESS THAN 0.039 INCH² (25 mm²).

-NOT MORE THAN ONE HOLE PER AIRFOIL.

2846347 S0000663055_V2

Airfoil with Missing Material or Full Axial Crack from LE to TE
Figure 641/72-00-00-990-859-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

		HOLES (TOTAL ON THE SET)							
		0		1-2		3			
FULL CRACKS (TOTAL ON THE SET)	0	▲ 300	▲ 800	▲ 300	▲ 800	▲ 300	▲ 400	YES	MULTI CRACK ? (ON 1 AIRFOIL)
		▲ 300	SEE NOTE	▲ 300	▲ 800	▲ 300	▲ 400	NO	
	1-2	▲ 300	▲ 800	▲ 300	▲ 400	▲ 200	▲ 200	YES	
		▲ 300	▲ 1600	▲ 300	▲ 400	▲ 200	▲ 200	NO	
	3-4	▲ 300	▲ 800	▲ 200	▲ 200	■ 25	■ 25	YES	
		▲ 300	▲ 800	▲ 200	▲ 200	■ 25	■ 25	NO	
	5-6	▲ 300	▲ 400	NOT MORE THAN 5 FULL CRACKS: ■ 25	NOT MORE THAN 5 FULL CRACKS: ■ 25	REMOVE	REMOVE	YES	
		▲ 300	▲ 400	NOT MORE THAN 5 FULL CRACKS: ■ 25	NOT MORE THAN 5 FULL CRACKS: ■ 25	REMOVE	REMOVE	NO	
	7	▲ 200	▲ 200	REMOVE	REMOVE	REMOVE	REMOVE	YES	
		▲ 200	▲ 200	REMOVE	REMOVE	REMOVE	REMOVE	NO	
	8	■ 25	■ 25	REMOVE	REMOVE	REMOVE	REMOVE	YES	
		■ 25	■ 25	REMOVE	REMOVE	REMOVE	REMOVE	NO	
		YES	NO	YES	NO	YES	NO		
		RADIAL CRACKS ? (ON 1 AIRFOIL)							

LEGEND:

▲: NUMBER OF CYCLES

■: NUMBER OF CYCLES BEFORE REMOVAL

NOTE:

-MAKE SURE THAT INSPECTION FOR AXIAL CRACK WITH 360˚ BSI REQUIREMENTS ARE FULLY COMPLIANT. IF NOT NO RESTRICTION APPLY.

-MULTICRACK ON SAME AIRFOIL, THE AXIAL CRACKS RADIAL DISTANCE IS LESS THAN THAN 0.472 INCH (12 mm) AND REMAIN PARALLEL.

-MORE THAN ONE FULL CRACK (LEADING EDGE TO TRAILING EDGE) ON THE SAME AIRFOIL IS FORBIDDEN (ONE FULL CRACK ADDITIONED TO ANY AMOUNT OF NON-FULL CRACKS ARE ACCEPTED).

-NOT MORE THAN TWO FULL CRACKS PER SEGMENT.

-HOLE LESS THAN 0.039 INCH^2 (25 mm^2).

-NOT MORE THAN ONE HOLE PER AIRFOIL.

2846360 S0000665097_V2

Airfoil with Missing Material or Full Axial Crack from LE to TE
Figure 641/72-00-00-990-859-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

		HOLES (TOTAL ON THE SET)							
		0		1-2		3			
FULL CRACKS (TOTAL ON THE SET)	0	▲ 300	▲ 400	▲ 300	▲ 400	▲ 300	▲ 400	YES	MULTI CRACK ? (ON 1 AIRFOIL)
		▲ 300	SEE NOTE	▲ 300	▲ 800	▲ 300	▲ 400	NO	
	1-2	▲ 300	▲ 400	▲ 300	▲ 400	▲ 200	▲ 200	YES	
		▲ 300	▲ 1600	▲ 300	▲ 400	▲ 200	▲ 200	NO	
	3-4	▲ 300	▲ 400	▲ 200	▲ 200	■ 25	■ 25	YES	
		▲ 300	▲ 800	▲ 200	▲ 200	■ 25	■ 25	NO	
	5-6	▲ 300	▲ 400	NOT MORE THAN 5 FULL CRACKS: ■ 25	NOT MORE THAN 5 FULL CRACKS: ■ 25	REMOVE	REMOVE	YES	
		▲ 300	▲ 400	NOT MORE THAN 5 FULL CRACKS: ■ 25	NOT MORE THAN 5 FULL CRACKS: ■ 25	REMOVE	REMOVE	NO	
	7	▲ 200	▲ 200	REMOVE	REMOVE	REMOVE	REMOVE	YES	
		▲ 200	▲ 200	REMOVE	REMOVE	REMOVE	REMOVE	NO	
	8	■ 25	■ 25	REMOVE	REMOVE	REMOVE	REMOVE	YES	
		■ 25	■ 25	REMOVE	REMOVE	REMOVE	REMOVE	NO	
		YES	NO	YES	NO	YES	NO		
		RADIAL CRACKS ? (ON 1 AIRFOIL)							

LEGEND:

▲: NUMBER OF CYCLES

■: NUMBER OF CYCLES BEFORE REMOVAL

NOTE:

-MAKE SURE THAT INSPECTION FOR AXIAL CRACK WITH 360˚ BSI REQUIREMENTS ARE FULLY COMPLIANT. IF NOT NO RESTRICTION APPLY.

-MULTICRACK ON SAME AIRFOIL, THE AXIAL CRACKS RADIAL DISTANCE IS LESS THAN THAN 0.472 INCH (12 mm) AND SECOND PARTIAL CRACK IS CURVED.

-MORE THAN ONE FULL CRACK (LEADING EDGE TO TRAILING EDGE) ON THE SAME AIRFOIL IS FORBIDDEN (ONE FULL CRACK ADDITIONED TO ANY AMOUNT OF NON-FULL CRACKS ARE ACCEPTED).

-NOT MORE THAN TWO FULL CRACKS PER SEGMENT.

-HOLE LESS THAN 0.039 INCH² (25 mm²).

-NOT MORE THAN ONE HOLE PER AIRFOIL.

2846362 S0000665099_V2

Airfoil with Missing Material or Full Axial Crack from LE to TE
Figure 641/72-00-00-990-859-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

		HOLES (TOTAL ON THE SET)							
		0		1-2		3			
FULL CRACKS (TOTAL ON THE SET)	0	▲200	▲200	■ 25	■ 25	■ 25	■ 25	YES	MULTI CRACK ? (ON 1 AIRFOIL)
		▲300	SEE NOTE	▲ 300	▲ 800	▲300	▲400	NO	
	1-2	▲200	▲ 200	■ 25	■ 25	■ 25	■ 25	YES	
		▲300	▲1600	▲ 300	▲ 400	▲200	▲200	NO	
	3-4	▲200	▲ 200	■ 25	■ 25	■ 25	■ 25	YES	
		▲300	▲ 800	▲ 200	▲ 200	■ 25	■ 25	NO	
	5-6	▲200	▲ 200	NOT MORE THAN 5 FULL CRACKS: ■ 25	NOT MORE THAN 5 FULL CRACKS: ■ 25	REMOVE	REMOVE	YES	
		▲300	▲ 400	NOT MORE THAN 5 FULL CRACKS: ■ 25	NOT MORE THAN 5 FULL CRACKS: ■ 25	REMOVE	REMOVE	NO	
	7	▲200	▲200	REMOVE	REMOVE	REMOVE	REMOVE	YES	
		▲200	▲200	REMOVE	REMOVE	REMOVE	REMOVE	NO	
	8	■ 25	■ 25	REMOVE	REMOVE	REMOVE	REMOVE	YES	
		■ 25	■ 25	REMOVE	REMOVE	REMOVE	REMOVE	NO	
		YES	NO	YES	NO	YES	NO		
		RADIAL CRACKS ? (ON 1 AIRFOIL)							

LEGEND:

▲: NUMBER OF CYCLES

■: NUMBER OF CYCLES BEFORE REMOVAL

NOTE:

-MAKE SURE THAT INSPECTION FOR AXIAL CRACK WITH 360° BSI REQUIREMENTS ARE FULLY COMPLIANT. IF NOT NO RESTRICTION APPLY.

-MULTICRACK ON SAME AIRFOIL, THE CRACKS ARE INTERSECTED.

-MORE THAN ONE FULL CRACK (LEADING EDGE TO TRAILING EDGE) ON THE SAME AIRFOIL IS FORBIDDEN (ONE FULL CRACK ADDITIONED TO ANY AMOUNT OF NON-FULL CRACKS ARE ACCEPTED).

-NOT MORE THAN TWO FULL CRACKS PER SEGMENT.

-HOLE LESS THAN 0.039 INCH² (25 mm²).

-NOT MORE THAN ONE HOLE PER AIRFOIL.

2846365 S0000665102_V2

Airfoil with Missing Material or Full Axial Crack from LE to TE
Figure 641/72-00-00-990-859-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-200-812-F00

16. Stage 2-4 LPT Nozzle Guide Vanes Inspection

(Figure 642)

A. General

(1) This task provides the instructions on how to examine the stage 2-4 LPT nozzle guide vanes.

(2) The number of stage 2-4 LPT nozzle guide vanes is as follows:

Number of Nozzle Guide Vanes LPT Stage 2-4

Engine	LPT NGV Stage 2	LPT NGV Stage 3	LPT NGV Stage 4
NON-7BE	108	140	132
7BE	108	108	108

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828 Opt Part #: 856A1321P05 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-00-00-210-086-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-840-026-F00

(2) Do these steps to prepare the rigid borescope for the inspection:

(a) Connect the applicable borescope to the light source.

NOTE: Use the rigid borescope with the yellow band.

1) Connect rigid borescope, COM-2195 to light source, SPL-4305.

2) Connect rigid borescope, COM-4302 to light source, SPL-4306.

3) Connect rigid borescope, COM-4303 to light source, SPL-2197.

4) Connect rigid borescope, COM-4304 to light source, SPL-4308.

(b) Connect the rigid borescope with the long, right angle borescope extension, 90-degree right-angle viewer, and 60-degree field of vision.

(c) Turn the light source to the ON position.

SUBTASK 72-00-00-840-025-F00

(3) Do these steps to prepare the flexible borescope for the inspection:

(a) Connect the borescope, COM-2196 to the applicable light source.

(b) Turn the light source to the ON position.

LOM ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-014-F00

(4) Cut and remove the lockwires from borescope plugs S18, S19 and S20.

SUBTASK 72-00-00-020-011-F00

CAUTION

DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(5) Remove the plugs.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-037-F00

> **CAUTION** DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(6) Remove the self-locking borescope cap assemblies S18, S19 and S20.

NOTE: Specific procedure is not required to remove a self-locking borescope cap assembly. You can use a 1/4 inch drive ratchet to loosen it.

LOM ALL

SUBTASK 72-00-00-210-088-F00

(7) Put the borescope through the borescope port.

F. Stage 2-4 LPT Nozzle Guide Vanes Inspection

SUBTASK 72-00-00-210-089-F00

(1) Examine the nozzle guide vanes as follows:

NOTE: You can use rigid borescope or flexible borescope to do this Inspection.

NOTE: If you use the rigid borescope, this inspection is limited to what you can see.

(a) Cracks in the leading and trailing edges for stages 2 through 4:

NOTE: LPT Stage 2 and 4 nozzles have six airfoils for each segment. LPT Stage 3 nozzles have seven airfoils for each segment.

1) There is no limit, with these conditions:

a) Any number of cracks (leading or trailing edges) if cracks are less than 0.5 inch (12,7 mm) in length (1/3 of the chord width).

b) One crack maximum for each nozzle segment that is 0.5 inch (12,7 mm) (1/3 of the chord width) to 1.0 inch (25,4 mm) in length (2/3 of the chord width).

2) The Continue-In-Service limit is 200 cycles with these conditions:

a) Three cracks maximum for each nozzle segment if cracks are more than 0.5 inch (12.7 mm) (1/3 of the chord width) and less than 1.0 inch (25.4 mm) (2/3 of the chord width) if the adjacent nozzle segments have no more than two cracks more than 0.5 inch (12.7 mm) (1/3 of the chord width) and less than 1.0 inch (25.4 mm) (2/3 of the chord width).

b) One crack maximum for each nozzle segment that is more than 1.0 inch (25.4 mm) (2/3 of the chord width) including open airfoil.

3) The Continue-In-Service limit is 25 cycles, with this condition:

a) One full chord crack on two airfoils for each segment if the adjacent nozzle segments have no more than one airfoil with a full chord crack.

(b) Burns

1) There is no limit, with this condition:

a) Discoloration with no missing material.

2) The Continue-In-Service limit is 25 cycles with this condition:

a) Missing material or melted.

(c) Corrosion/Pitting

1) Any amount, if there is no missing material.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(d) Oxidation for stage 3

1) Any amount, if there is no missing material.

SUBTASK 72-00-00-080-007-F00

(2) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

G. Put the Airplane Back to Its Usual Condition

LOM ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-210-091-F00

(1) Do these steps to install the borescope plugs:

(a) Apply graphite mineral vaseline, D00601 [CP2101] to the threads and friction surfaces of the borescope plugs.

(b) Install the borescope plugs.

1) Torque the borescope plugs to 55.0 in-lb (6.2 N·m) - 60.0 in-lb (6.8 N·m).

2) Apply safety wire, G02345 [CP8001] or cable, G50065 [CP8006] to the borescope plugs.

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-410-029-F00

(2) Do these steps to install the self-locking borescope cap assemblies:

(a) Apply graphite mineral vaseline, D00601 [CP2101] to the threads and friction surfaces of the self-locking borescope cap assemblies.

(b) Install the self-locking borescope cap assemblies S18, S19 and S20 on the LPT case.

(c) Tighten the cap assemblies to 55.0 in-lb (6.2 N·m) - 60.0 in-lb (6.8 N·m).

NOTE: To achieve the correct installation of a self-locking borescope cap assembly, the slot of its ring must be positioned on the borescope boss lug at the final tightening.

LOM ALL

SUBTASK 72-00-00-210-092-F00

(3) Do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stage 2-4 LPT Nozzle Guide Vanes Borescope Inspection
Figure 642/72-00-00-990-821-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-200-813-F00

17. LPT Outer Stationary Air Seals Inspection

(Figure 633)

A. General

(1) This task provides the instructions on how to examine the Low Pressure Turbine (LPT) outer stationary air seals with a borescope.

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope, Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope, Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope, Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope, Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-00-00-210-093-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-00-00-210-114-F00

(2) Do these steps to prepare the borescope for the inspection:

(a) Connect the applicable borescope to the light source:

1) rigid borescope, COM-2195 and light source, SPL-4305

2) rigid borescope, COM-4302 and light source, SPL-4306

3) rigid borescope, COM-4303 and light source, SPL-2197

4) rigid borescope, COM-4304 and light source, SPL-4308

5) Use the rigid borescope with the yellow band.

(b) Connect the rigid borescope with the long, right angle borescope extension, 90-degree right-angle viewer, and 60-degree field of vision.

(c) Turn the light source to the ON position.

LOM ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-015-F00

CAUTION

DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(3) Cut and remove the lockwires and remove the borescope plugs S16, S17, S18, S19 and S20 (Figure 633).

NOTE: The borescope plugs S16 and S17 are in the same plane and located, respectively, at 5:30 and 8:30 o'clock aft looking forward immediately in front of the combustion case aft flange. The borescope plugs S18, S19 and S20 are located approximately at 5:00 o'clock aft looking forward on the LPT case and, from front to rear, relate to the 2nd, 3rd and 4th stages of the LPT, respectively.

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-030-001-F00

(4) Cut and remove the lockwires and remove the borescope plugs S16 and S17.

NOTE: The borescope plugs S16 and S17 are in the same plane and located, respectively, at 5:30 and 8:30 o'clock aft looking forward immediately in front of the combustion case aft flange.

SUBTASK 72-00-00-030-002-F00

CAUTION

DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(5) Remove the self-locking borescope cap assemblies S18, S19 and S20.

NOTE: The self-locking borescope cap assemblies S18, S19 and S20 are located approximately at 5:00 o'clock aft looking forward on the LPT case and, from front to rear, relate to the 2nd, 3rd and 4th stages of the LPT, respectively.

NOTE: Specific procedure is not required to remove a self-locking borescope cap assembly. You can use a 1/4 inch drive ratchet to loosen it.

LOM ALL

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. LPT Outer Stationary Air Seals Inspection

SUBTASK 72-00-00-210-095-F00

(1) Put the rigid borescope, with a 90-degree angle viewer and a 60-degree field of vision in the appropriate borescope port.

SUBTASK 72-00-00-210-096-F00

(2) Examine the outer stationary seals as follows:

(a) Distortion of the outer stationary seals

1) There is no limit to the quantity with this condition:

a) The shroud does not extend into the air stream.

(b) Worn, jagged, or crushed honeycomb material

1) There is no limit.

SUBTASK 72-00-00-080-008-F00

(3) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

G. Put the Airplane Back to Its Usual Condition

LOM ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-008-F00

(1) Do these steps to install the borescope plugs:

(a) Apply graphite mineral vaseline, D00601 [CP2101] or pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and friction surfaces of the borescope plugs S16, S17, S18, S19 and S20.

(b) Install S16 and S17 on the combustion case.

(c) Install S18, S19, and S20 on the LPT case.

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-009-F00

(2) Do these steps to install the borescope plugs:

(a) Apply graphite mineral vaseline, D00601 [CP2101] or pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and friction surfaces of the borescope plugs S16 and S17.

(b) Install S16 and S17 on the combustion case.

(c) Apply graphite mineral vaseline, D00601 [CP2101] or pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads of the self-locking borescope cap assemblies S18, S19 and S20.

(d) Install the self-locking borescope cap assemblies S18, S19 and S20 on the LPT case.

LOM ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-010-F00

(3) Torque the plugs S16 and S17 to 57.0 in-lb (6.4 N·m) - 63.0 in-lb (7.1 N·m).

(a) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006].

SUBTASK 72-00-00-420-018-F00

(4) Torque the borescope plugs S18, S19 and S20 to 55.0 in-lb (6.2 N·m) - 60.0 in-lb (6.8 N·m).

(a) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-011-F00

(5) Torque the plugs S16 and S17 to 57-63 pound-inches (6.4-7.1 Newton-meters).

(a) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on the borescope plugs.

SUBTASK 72-00-00-410-046-F00

(6) Torque the self-locking borescope cap assemblies S18, S19 and S20 to 55.0 in-lb (6.2 N·m) - 60.0 in-lb (6.8 N·m).

NOTE: To achieve the correct installation of the self-locking borescope cap assembly, the slot of its ring must be positioned on the borescope boss lug at the final tightening.

LOM ALL

SUBTASK 72-00-00-210-099-F00

(7) If the borescope procedure is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

TASK 72-00-00-290-801-F00

18. Borescope Inspection of the Stage 1 Low-Pressure Turbine Nozzle Outer Air Duct Condition
(Figure 643, Figure 644, and Figure 645)

A. General

(1) This task provides the instructions on how to inspect the condition of the complete set of outer air ducts through the S17 or S18 borescope ports by using a flexible borescope, introduced in the cavity located between the Low Pressure Turbine (LPT) stage 1 outer platform and High Pressure Turbine (HPT) shroud support.

B. Tools/Equipment

Reference	Description
STD-1400	Fiberscope - Flexible Borescope
STD-10717	Light Source - Borescope, (Meets General Electric or CFM Standard Practices Manual Specification)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-00-00-210-126-F00

(1) Do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-00-00-480-051-F00

> **CAUTION** MAKE SURE THAT YOU ARE TRAINED TO DO THIS PROCEDURE. ACCESS TO THIS AREA OF THE ENGINE IS DIFFICULT. DAMAGE TO THE ENGINE AND THE FLEXIBLE BORESCOPE CAN OCCUR.

> **CAUTION** DO NOT TURN THE LOW PRESSURE TURBINE (LPT) ROTOR WHEN YOU DO THE BORESCOPE INSPECTION. DAMAGE TO THE ENGINE AND THE FLEXIBLE BORESCOPE CAN OCCUR.

(2) Do these steps to prepare the fiberscope, STD-1400, for the inspection:

(a) Connect the fiberscope, STD-1400, to the light source, STD-10717.

(b) Turn the light source, STD-10717, to ON.

LOM ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-053-F00

> **CAUTION** DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(3) Do these steps to remove borescope plugs S17 and S18 (Figure 643):

(a) Cut and remove lockwire and remove the borescope plug S17 at the 8:30 o'clock position immediately in front of the aft flange of the combustion case.

(b) Cut and remove lockwire and remove the plug S18 at the 5:30 o'clock position immediately in front of the aft flange of the combustion case.

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-054-F00

> **CAUTION** DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(4) Do these steps to remove these borescope plugs (Figure 644):

(a) Cut and remove lockwire and remove the plug S17 at the 8:30 o'clock position immediately in front of the aft flange of the combustion case.

(b) Remove the self-locking borescope cap assembly S18 at the 5:30 o'clock position immediately in front of the aft flange of the combustion case.

LOM ALL

F. Stage 1 LPT Outer Air Ducts Inspection

SUBTASK 72-00-00-210-127-F00

(1) Do a 360 degrees borescope inspection.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **CAUTION** DO NOT USE A FLEXIBLE BORESCOPE WITH A DIAMETER MORE THAN 0.153 INCH (3.9 MM) OR BLOCKAGE OF THE CAVITY BY THE BORESCOPE CAN OCCUR.

(a) Insert the fiberscope, STD-1400, through the S17 or S18 borescope ports.

1) Put the fiberscope, STD-1400, into the cavity (Figure 645).

(b) Do a 180 degrees borescope inspection alternating between the lower and upper side.

(2) Inspect the full set of stage 1 LPT nozzle outer air ducts and use the limits that follow:

Inspection/Check	Maximum Serviceable Limit	Remarks
Stage 1 LPT nozzle outer air ducts for: (Figure 643)		
Outer air duct found blocking port, dislodged or missing.	Not more than 1 outer air duct.	If more than 1 outer air duct is impacted, contact CFM for disposition.

SUBTASK 72-00-00-080-026-F00

(3) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source, STD-10717, to the OFF, but keep the blower ON until the lamp and case are cool.

G. Put the Airplane Back to Its Usual Condition

LOM ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-420-012-F00

> **CAUTION** MAKE SURE THAT THE BORESCOPE PLUGS ARE INSTALLED IN THE CORRECT PORT LOCATIONS. ENGINE DAMAGE CAN OCCUR IF A BORESCOPE PLUG IS NOT INSTALLED IN THE CORRECT LOCATION.

(1) Do these steps to install the borescope plugs S17 and S18:

(a) Apply graphite mineral vaseline, D00601 [CP2101], to the threads and friction surfaces of the borescope plugs S17 and S18.

(b) Install the borescope plugs S17 and S18 into the ports.

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-420-013-F00

> **CAUTION** MAKE SURE THAT THE BORESCOPE PLUGS ARE INSTALLED IN THE CORRECT PORT LOCATIONS. ENGINE DAMAGE CAN OCCUR IF A BORESCOPE PLUG IS NOT INSTALLED IN THE CORRECT LOCATION.

(2) Do these steps to install the borescope plug S17 and self-locking borescope cap assembly S18:

(a) Apply graphite mineral vaseline, D00601 [CP2101], to the threads and friction surfaces of the borescope plug S17.

1) Install the borescope plug S17 into the port.

(b) Apply graphite mineral vaseline, D00601 [CP2101], to the threads of the self-locking borescope cap assembly S18.

1) Install self-locking borescope cap assembly S18 into the port.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-420-014-F00

(3) Tighten the borescope plug S17 to 57 in-lb (6.4 N·m) - 63 in-lb (7.1 N·m).

(a) Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006].

SUBTASK 72-00-00-420-026-F00

(4) Tighten the borescope plug S18 to 55 in-lb (6.2 N·m) - 60 in-lb (6.8 N·m).

(a) Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006].

LOM ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-420-015-F00

(5) Tighten the borescope plugs S17 to 57 in-lb (6.4 N·m) - 63 in-lb (7.1 N·m).

(a) Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006].

SUBTASK 72-00-00-420-016-F00

(6) Tighten the self-locking borescope cap assembly S18 to 55 in-lb (6.2 N·m) - 60 in-lb (6.8 N·m).

NOTE: To achieve the correct installation of the self-locking borescope cap assembly, the slot of its ring must be positioned on the borescope boss lug at the final tightening.

LOM ALL

SUBTASK 72-00-00-210-128-F00

(7) Do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stage 1 LPT Nozzle and HPT Shroud
Figure 643/72-00-00-990-852-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5018982-00
2421113 S0000558633_V2

Stage 1 LPT Nozzle and HPT Shroud
Figure 643/72-00-00-990-852-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5018983-00
2421297 S0000558632_V1

Stage 1 LPT Nozzle and HPT Shroud
Figure 643/72-00-00-990-852-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5018984-00
2421301 S0000558635_V1

Stage 1 LPT Nozzle Outer Platform Cavity
Figure 644/72-00-00-990-855-F00 (Sheet 1 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5018985-00
2421307 S0000558641_V1

Stage 1 LPT Nozzle Outer Platform Cavity
Figure 644/72-00-00-990-855-F00 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

5018986-00
2421314 S0000558644_V1

Stage 1 LPT Nozzle Outer Platform Cavity
Figure 644/72-00-00-990-855-F00 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stage 1 LPT Nozzle Outer Platform Cavity
Figure 644/72-00-00-990-855-F00 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5018988-00
2421873 S0000558643_V1

Stage 1 LPT Nozzle Outer Platform Cavity
Figure 644/72-00-00-990-855-F00 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stage 1 LPT Nozzle Outer Platform Cavity
Figure 645/72-00-00-990-856-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-00-00-200-814-F00

19. Put the Airplane Back to Its Usual Condition

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the instructions on how to put the airplane back to its usual condition after an inspection.

B. References

Reference	Title
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-63-01-400-801-F00	Handcranking Drive Cover Installation (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-080-009-F00

> **CAUTION** MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the inner surface of the inlet cowl.

SUBTASK 72-00-00-210-100-F00

(2) Disassemble the borescope equipment as follows:

(a) Turn the light source to OFF.

1) Keep the blower ON until the lamp and case are cool.

(b) Make sure that the power switch is OFF.

(c) Make sure that the light intensity control is set to minimum.

(d) Disconnect the power supply and the ground.

(e) Disconnect the extension and the viewer from the borescope.

(f) Disconnect the borescope from the fiber light cable.

(g) Disconnect the fiber light cable from the light source.

SUBTASK 72-00-00-210-101-F00

> **CAUTION** MAKE SURE THAT YOU INSTALL THE COVER ON THE GEARBOX. IF YOU DO NOT INSTALL THE COVER, ENGINE OIL LEAKS CAN OCCUR DURING OPERATION AND ENGINE DAMAGE CAN OCCUR.

(3) If not already done, do this task: Handcranking Drive Cover Installation, TASK 72-63-01-400-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-00-00-410-045-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-00-00-860-078-F00

(5) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-00-00-860-079-F00

(6) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-00-00-860-006-F00

(7) On the applicable engine, remove the DO-NOT-OPERATE tag from the start lever.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ENGINE - CLEANING/PAINTING

1. General

A. This procedure has these tasks:

(1) Engine cleaning specifications

(2) To clean the fan blades

(3) To clean the engine gas path with pure water

(4) To clean the engine gas path with cleaning solution

(5) To clean the external engine.

TASK 72-00-00-100-801-F00

2. Engine Cleaning Specifications

A. General

CAUTION	DO NOT USE METHANOL SOLVENTS TO CLEAN THE ENGINE. DAMAGE TO TITANIUM PARTS CAN OCCUR.
CAUTION	DO NOT CLEAN AN ENGINE AFTER EXPOSURE TO DRY CHEMICAL FIRE EXTINGUISHING AGENTS. DAMAGE TO THE ENGINE CAN OCCUR.
CAUTION	DO NOT CLEAN THE ENGINE UNLESS THE EGT IS BELOW 150°F (66°C). IF NOT, DAMAGE TO EQUIPMENT COULD OCCUR.
CAUTION	DO NOT CLEAN AN ENGINE IF THE OUTSIDE AIR TEMPERATURE IS BELOW 14°F (-10°C). THIS CAN CAUSE ICE IN THE ENGINE AND POSSIBLE DAMAGE.
CAUTION	DO NOT USE BLEACH, DISINFECTANT OR SANITIZER ON ENGINE HARDWARE OR COMPONENTS. IF YOU DO NOT OBEY, DAMAGE CAN OCCUR.

(1) You can clean the engine with pure water only, or with a solution of gas path cleaner, B01024 [CP5060] (TASK 72-00-00-100-803-F00 or TASK 72-00-00-100-804-F00).

(a) For EGT margin recovery, it is recommended to do the engine gas- path water cleaning with pure water only (without cleaning agent) (TASK 72-00-00-100-803-F00). Pure water (without cleaning agent) is effective in most situations depending on the engine's operating environment and the engine gas-path cleaning program implemented by the Operator.

(b) An engine gas-path water cleaning with detergent provides the most effective method to clean the engine compressors (TASK 72-00-00-100-804-F00). For the use of detergent, it is necessary to follow strict application of the engine rinsing and bleed system cycling per the procedures to prevent fumes in the cabin when the airplane goes back into service.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) It may be necessary to clean the engine more than one time if initial results are not satisfactory.

2) Considerations should be given to do an engine gas-path cleaning with detergent for any of these following conditions:

a) Organic debris or oil deposits are observed on compressor airfoils

b) The engine has less than 10°C EGT margin left.

(2) If the air temperature is below 40°F (4°C), use alcohol, B00676 [CP1041], as the anti-freeze agent with the water rinse or the cleaner solution.

B. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01024 [CP5060]	Cleaner - Gas Path	

C. Engine Cleaning Specifications

SUBTASK 72-00-00-100-001-F00

(1) Water.

(a) Water properties.

1) Use water with less than 500 ppm total solids, less than 25 ppm sodium plus potassium (Na + K), and a PH of 6.0 - 8.0.

a) Potable water is usually sufficient.

(b) Water flow.

CAUTION

DO NOT USE A WATER FLOW OF MORE THAN 6 GPM (23 L/MIN). IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE CAN OCCUR.

1) A water flow of 5 gpm (19 l/min) - 6 gpm (23 l/min) is necessary at a temperature of more than 40°F (4°C).

NOTE: If the water cart does not have a flowmeter, to calculate the flow rate use a container of known quantity and a stop watch.

a) For the best results, increase the temperature of the water to 150°F (66°C) - 200°F (93°C) to wash and clean the gas path.

SUBTASK 72-00-00-100-007-F00

(2) Anti-freeze (if it is necessary).

(a) If the air temperature is below 40°F (4°C), prepare the anti-freeze mixture for the water wash or the cleaning solution.

WARNING

USE RUBBER GLOVES AND EYE PROTECTION WHEN YOU HANDLE LIQUID DETERGENT. LIQUID DETERGENT AND ANTI-FREEZE SOLVENT HAVE LOW FLASHPOINTS. KEEP AWAY FROM HEAT AND AN OPEN FLAME. MAKE SURE THAT THERE IS SUFFICIENT AIRFLOW. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT COULD OCCUR.

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(WARNING PRECEDES)

> **CAUTION** USE ONLY ISOPROPYL ALCOHOL AS AN ANTI-FREEZE MIXTURE. ALL OTHER ALCOHOL MIXTURES ARE NOT PERMITTED AND CAN CAUSE CORROSION OF THE TITANIUM PARTS OF THE ENGINE. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT CAN OCCUR.

1) For air temperatures of 23°F (-5°C) - 40°F (4°C), mix a solution of 25 percent alcohol, B00676 [CP1041], with 75 percent water.
2) For air temperatures of 14°F (-10°C) - 23°F (-5°C), mix a solution of 35 percent alcohol, B00676 [CP1041], with 65 percent water.
3) For air temperatures below 14°F (-10°C), do not clean an engine.

SUBTASK 72-00-00-100-006-F00

(3) Cleaning solutions (if it is necessary).

(a) Prepare the cleaning solution mixture.

> **WARNING** USE RUBBER GLOVES AND EYE PROTECTION WHEN YOU HANDLE LIQUID DETERGENT. LIQUID DETERGENT AND ANTI-FREEZE SOLVENT HAVE LOW FLASHPOINTS. KEEP AWAY FROM HEAT AND AN OPEN FLAME. MAKE SURE THAT THERE IS SUFFICIENT AIRFLOW. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT COULD OCCUR.

1) Mix a solution in volume ratio of 20 - 25 percent of gas path cleaner, B01024 [CP5060], with 75 - 80 percent of water.

END OF TASK

TASK 72-00-00-100-802-F00

3. Clean the Fan Blades

A. General

(1) It is recommended that you do the fan blade cleaning procedure and the gas path cleaning procedure at the same time.

(a) Use a cleaning agent only when organic debris or oil deposits are present.

(2) Fan blade cleaning is not necessary for EGT margin recovery.

B. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-4048	Bottle - Hand Spray

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01024 [CP5060]	Cleaner - Gas Path	
B50196 [CP2470]	Cleaner - BONDERITE C-AK 5948DPM AERO (TURCO 5948 DPM)	

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(Continued)

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	AMS3819 Class 1 Grade A or B Form 1 (Supersede BMS15-5 CL A)
G50766 [CP2240]	Sheet - Abrasive Sheet For Cleaning Up And Finishing, Scotch-Brite Type A CFS	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for The Fan Blades Cleaning

SUBTASK 72-00-00-840-022-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-00-00-860-008-F00

(2) Install a DO-NOT-OPERATE tag on the applicable START switch.

SUBTASK 72-00-00-860-009-F00

(3) Make sure the engine start levers are in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

SUBTASK 72-00-00-480-026-F00

CAUTION

MAKE SURE THAT YOU GIVE SUFFICIENT PROTECTION TO THE INNER SURFACE OF THE INLET COWL. IF YOU DO NOT GIVE SUFFICIENT PROTECTION TO THE INLET COWL, DAMAGE CAN OCCUR.

(4) Install the protective mat, STD-585 in the inlet cowl.

F. Clean The Fan Blades

SUBTASK 72-00-00-100-002-F00

(1) Do these steps to clean the fan blades:

WARNING

MAKE SURE TO WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES. IF YOU DO NOT WEAR GLOVES, PERSONAL INJURY CAN OCCUR.

(a) Move each fan blade you are to clean to the 6:00 o'clock position.

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> **CAUTION**
> DO NOT LET THE SOLUTION SPRAY INTO THE GASPATH. HOT CORROSION CAN CAUSE DAMAGE TO EQUIPMENT.

(b) Use a hand spray bottle, STD-4048 to apply gas path cleaner, B01024 [CP5060] to the two sides of each fan blade.

NOTE: This will decrease the quantity of solution that touches the fan blade dovetails. The solution will remove the lubricant. If you wipe the fan blades, do it in the down direction, away from the rotor.

(c) Remove the small particles from the fan blade with a soft cloth which is moist with the solution.

1) Flush the fan blade with water.

(d) Remove the hard-to-remove particles from the fan blade with a Scotch-Brite Type A CFS Sheet, G50766 [CP2240] which is moist with the cleaning solution.

1) Flush the fan blade with water.

(e) If the fan blade stays dirty, do the steps that follow:

> **WARNING**
> DO NOT LET THIS MATERIAL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THIS MATERIAL. PUT ON A RESPIRATOR WHEN YOU USE THIS MATERIAL. MAKE SURE THAT THERE IS SUFFICIENT AIRFLOW. CLEAN BARE SKIN FULLY AFTER YOU USE THIS MATERIAL. THIS MATERIAL CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

1) Remove the light deposits with a cotton wiper, G00034 and alcohol, B00676 [CP1041] or BONDERITE C-AK 5948DPM AERO cleaner, B50196 [CP2470].

a) Rinse thoroughly with water.

2) Remove heavy particles, which are not easy to remove, with a Scotch-Brite Type A CFS Sheet, G50766 [CP2240] and alcohol, B00676 [CP1041] or BONDERITE C-AK 5948DPM AERO cleaner, B50196 [CP2470].

a) Rinse thoroughly with water.

G. Put the Engine Back to Its Usual Condition

SUBTASK 72-00-00-080-012-F00

(1) Remove the protective mat, STD-585 from the engine inlet.

SUBTASK 72-00-00-080-013-F00

(2) Remove the DO-NOT-OPERATE tags from the start levers.

SUBTASK 72-00-00-080-014-F00

(3) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-00-00-440-003-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

TASK 72-00-00-100-803-F00

4. Clean the Engine Gas-Path with Pure Water

A. General

(1) For Exhaust Gas Temperature (EGT) margin recovery, it is recommended to clean the engine gas-path with pure water only.

(2) It is not recommended to use a cleaning agent in the water for EGT margin recovery.

NOTE: It is only recommended to clean the engine gas-path with a cleaning agent when organic debris or oil deposits are present or the remaining EGT margin is less than 50°F (10°C).

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
36-00-00-040-805	MMEL 36-9 (DDPG) Preparation - High Stage Valve Inoperative (P/B 901)
36-00-00-440-805	MMEL 36-9 (DDPG) Restoration - High Stage Valve Inoperative (P/B 901)
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-700-821-F00	Dry Motor the Engine (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (P/B 201)
71-00-00-800-810-F00	Start the Engine Procedure (Engine Cross Bleed Start) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

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Reference	Description
COM-2288	Cart - Water Wash, Engine Part #: 08-4044-0010 Supplier: 59603 Part #: 31658 Supplier: 6C9S2 Part #: 35030 Supplier: 6C9S2 Part #: AJW-114B Supplier: 6LU21 Part #: AJW-115 Supplier: 6LU21 Part #: JMP/CFM56/D/4777/C200 Supplier: U2066 Part #: JMP/GE90/D/4038/C200 Supplier: U2066 Part #: JMP/LUFT/D/4972/C500 Supplier: U2066 Part #: JMP/LUFT/D/4972/C800 Supplier: U2066 Part #: PWP2100 Supplier: 6C9S2 Part #: PWP3600 Supplier: 6C9S2 Part #: PWP3700 Supplier: 6C9S2
COM-14318	TDS - Digital Meter, Handheld, Range 0-9990 PPM, +/-2% Accuracy Part #: TDS-3 Supplier: 6VU32
COM-14781	Probe - Long, Water Wash, CMF56 Part #: JMP/CFM56/D/6645 Supplier: U2066
COM-14782	Probe - Short, Water Wash, CFM56 Part #: JMP/CFM56/D/4462 Supplier: U2066
COM-14887	Collection System - Engine Wash Part #: JMP/KYOTO/D/6777/C200 Supplier: U2066
SPL-2462	Deactivator - Check Valve Part #: C21006-7 Supplier: 81205 Opt Part #: C21006-1 Supplier: 81205 Opt Part #: PF80-012-500 Supplier: 053H3
SPL-15817	Adapter - Hose, Exhaust Part #: C21011-1 Supplier: 81205
STD-3940	Air Source - Regulated, Dry Filtered, 0-150 psig

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
G00018	Nitrogen - Gaseous, Pressurizing, 99.5 Percent Pure	A-A-59503 Type I Grade B, MIL-PRF-27401 Type I Grade A
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right
411	Engine 1 - Engine
421	Engine 2 - Engine

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F. Prepare to Clean the Engine

SUBTASK 72-00-00-100-008-F00

(1) Make sure that you obey the cleaning specifications in this task: Engine Cleaning Specifications, TASK 72-00-00-100-801-F00.

NOTE: If the air temperature is below 40°F (4°C), prepare a solution with anti-freeze.

SUBTASK 72-00-00-040-009-F00

WARNING

DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

SUBTASK 72-00-00-010-021-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-00-00-020-002-F00

(4) Do these steps to disconnect the PS3 line:

CAUTION

MAKE SURE THAT YOU USE TWO WRENCHES TO LOOSEN TUBE COUPLING NUTS. USE ONE WRENCH TO HOLD THE FITTING. USE THE OTHER WRENCH TO TURN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

(a) Disconnect the PS3 line at the Electronic Engine Control (EEC).

(b) Put end caps on the line and the EEC connection.

SUBTASK 72-00-00-600-003-F00

(5) Service the engine, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

NOTE: The minimum amount of 5 gal (19 l) of oil, D00599 [CP2442], is necessary to motor the engine.

SUBTASK 72-00-00-010-022-F00

(6) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-00-00-860-024-F00

(7) Make sure that the WING ANTI-ICE, ENG 1 ANTI-ICE, and ENG 2 ANTI-ICE switches, on the P5 overhead panel, are in the OFF position.

SUBTASK 72-00-00-860-025-F00

(8) Make sure that the BLEED 1 and BLEED 2 switches, on the P5-10 forward overhead panel, are in the OFF position.

SUBTASK 72-00-00-860-031-F00

(9) Make sure that the L PACK and R PACK switches, on the P5-10 forward overhead panel, are in the OFF position.

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SUBTASK 72-00-00-480-052-F00

(10) Install an engine wash collection system, COM-14887, below the engine.

NOTE: An engine wash collection system, COM-14887, collects the dirty water that falls from the engine during gas-path cleaning.

NOTE: It is optional to use an engine wash collection system, COM-14887, only if local environmental restrictions allow this. Consult the regulatory guidelines before you make a decision not to use this tool.

G. Clean the Engine Gas-Path With Water

SUBTASK 72-00-00-100-003-F00

CAUTION: DO NOT CLEAN AN ENGINE AFTER EXPOSURE TO DRY CHEMICAL FIRE EXTINGUISHING AGENTS. DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION: DO NOT CLEAN THE ENGINE UNLESS THE EGT IS BELOW 150°F (66°C). IF NOT, DAMAGE TO EQUIPMENT COULD OCCUR.

CAUTION: DO NOT CLEAN AN ENGINE WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 14°F (-10°C). ICE WILL FORM ON THE ENGINE.

CAUTION: THE FUEL PUMP AND HMU ARE FUEL LUBRICATED. DO NOT MOTOR, START, OR OPERATE THE ENGINE UNLESS THERE IS A POSITIVE FUEL INLET PRESSURE. DAMAGE TO COMPONENTS COULD OCCUR.

CAUTION: DO NOT MOTOR THE ENGINE MORE THAN STARTER DUTY CYCLE ENGINE OPERATION LIMITS, TASK 71-00-00-800-806-F00. STARTER DAMAGE COULD OCCUR.

CAUTION: MAKE SURE THAT THE N1 ROTOR TURNS FREELY DURING THE FULL CLEAN PROCEDURE. IF YOU DO NOT OBEY THIS INSTRUCTION, OIL SYSTEM CONTAMINATION COULD OCCUR.

CAUTION: DO NOT APPLY WATER AT MORE THAN 6 GAL (23 L) IN A MINUTE. ENGINE DAMAGE CAN OCCUR.

(1) Do these steps to clean the gas-path with water:

WARNING: MAKE SURE THAT YOU USE ANTI-FREEZE SOLUTIONS CORRECTLY. ANTI-FREEZE SOLUTIONS WITH LOW FLASH POINTS CAN CAUSE A FIRE. INJURY TO PERSONNEL CAN OCCUR.

(a) Make sure that you apply the recommended clean water specification to clean the engine listed at the front of this procedure (TASK 72-00-00-100-801-F00).

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1) An engine water wash cart, COM-2288, with immersion heater.

NOTE: If you use anti-freeze, do not use the immersion heater.

NOTE: You can use a short engine wash probe, COM-14782, with the thrust reverser in the open position, and long engine wash probe, COM-14781, with the thrust reverser in the closed position.

(b) EEC SOFTWARE VERSION 7.B.U OR LATER.

Do these steps to prepare the engine for the EEC Water Wash Test:

NOTE: It takes two persons to do this test. One person operates the Flight Management Computer System (FMCS) Control Display Unit (CDU) and the engine controls, and the other makes sure no one is injured when surfaces move and also monitors the engine.

NOTE: When engine operates, some oil leaks can occur at the aft sump rotating seal. After operation, an oil puddle in the exhaust is usual. When engine operations are done one after the other, it can cause a large oil puddle in the exhaust.

1) Do these steps to prepare the engine for the EEC Water Wash Test:

2) Before you use the EEC water wash function for your fleet maintenance, do a test wash with the wash function and your water wash equipment.

NOTE: The water wash function lets more water into the engine core during the wash. The quantity of water is also different for the type of water wash equipment. Some combinations of equipment and the water wash function can make a 60% N1 engine run necessary to prevent fumes or smoke in the cabin. Refer to the task to flush the cleaning solution (TASK 72-00-00-100-804-F00) for the engine operation.

3) Make sure that all persons and equipment are a safe distance from the engine before you start the test.

4) If the CDU is not active from other engine ground tests, do these steps:

a) Get access to the CDU in the flight compartment.

b) Push the INIT REF key to show the PERF INIT screen on the CDU.

NOTE: The FMCS CDU does not support a type-ahead function. You must have the prompt on the CDU screen before you type in the response.

c) Push these Line Select Key (LSK) on the CDU:

<1> INDEX

<2> MAINT

NOTE: This LSK causes the MAINT BITE INDEX screen to show.

<3> ENGINE

NOTE: This LSK causes the ENGINE/EXCEED BITE INDEX screen to show.

<4> Applicable ENGINE X, (X = 1 or 2)

NOTE: This LSK causes the ENGINE X BITE TEST MAIN MENU to show. Also, the ENGINE X LSK automatically applies power to the EEC and causes the EEC to initialize. The CDU can show INITIALIZING EEC X and EEC SORTING FAULT HISTORY DATA, for a short time, just before the ENGINE X BITE TEST MAIN MENU shows.

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<5> GROUND TESTS

NOTE: This LSK causes the ENGINE X BITE TEST GROUND TEST menu to show.

<6> If the FOR CH A ONLY or FOR CH B ONLY screen shows, push the INDEX LSK once, stop for 30 seconds, and then push the GROUND TESTS LSK again.

NOTE: The system has a 15-second timer for the FMCS CDU and EEC to initialize. Sometimes, this is not enough time and the system will show this problem.

5) Push the WATER WASH TEST LSK.

NOTE: This will cause screen 1 of the WATER WASH function to show. The screen contains a WARNING about the operation of the engine during this test.

6) Use the interphone to tell the person at the engine that the engine will begin the dry motor procedure.

7) Type "OK" on the CDU pad when you are ready to start the test.

8) Push the CONTINUE LSK.

9) Follow the instructions on the CDU screen.

(c) Optional - Collect a sample of the wash supply water and measure the total dissolved solids with the TDS meter, COM-14318.

1) Make a record of the measurement.

(d) Dry motor the engine for two minutes, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

WARNING STAND AT LEAST 3 FT (1 M) AWAY FROM THE COWLING INLET WHEN SPRAYING LIQUIDS INTO THE ENGINE. IF NOT, YOU CAN CAUSE INJURY.

(e) After ten seconds of motoring with positive fan rotation, inject the water 360 degrees around the Low Pressure Compressor (LPC) inlet through the fan blades or at the LPC inlet (if a specific rig is used) during the motoring.

(f) Let the engine soak for five minutes.

(g) Do the above steps again to dry motor, inject water and soak the engine.

NOTE: This step may be done additional times again for engines with heavy dirt deposits.

(h) Dry motor the engine again for two minutes.

(i) After ten seconds of motoring with positive fan rotation, inject the water for one minute 360 degrees around the LPC inlet through the fan blades or at the LPC inlet (if a specific rig is used) during the motoring.

(j) Let the engine soak for five minutes.

(k) Optional (if the above optional step to sample the wash water was done) - Collect a sample of the wash water that drains from the exhaust area of the engine.

1) Measure and make a record of the total dissolved solids with the TDS meter, COM-14318.

2) Do a calculation to subtract the initial supply water TDS value from the rinse effluent TDS value.

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a) If the net TDS value is less than 150 ppm, no additional rinse cycles are necessary.

b) If the net TDS value is more than 150 ppm, do the additional wash/soak cycles until the net TDS value is below 150 ppm, a maximum of four wash cycles.

(l) Dry motor the engine (TASK 71-00-00-700-821-F00) for two minutes.

(m) EEC SOFTWARE VERSION 7.B.U OR LATER.

1) Push the END WASH LSK on the CDU screen.

a) The CDU screen will show WASH COMPLETE, RETURN AIRPLANE TO NORMAL CONDITION.

SUBTASK 72-00-00-010-023-F00

(2) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-00-00-420-002-F00

(3) Do these steps to clean the PS3 line:

(a) Remove the end caps from the PS3 line and EEC connector.

CAUTION DO NOT BLOW AIR INTO THE EEC. DAMAGE COULD OCCUR.

(b) Use regulated air source, STD-3940, or nitrogen, G00018, set at 20 psi (138 kPa) - 100 psi (689 kPa) to clear the PS3 line of water.

(c) Do a visual inspection to make sure that the PS3 line weeping-hole is clear and there is no blockage.

NOTE: The 0.020 in. (0.508 mm) weep hole is found on the lowest point of the PS3 pressure line near the 6 o'clock strut.

1) If it is necessary, clean the weep hole with a drill bit or piece of rigid safety wire of the same size.

(d) Connect the PS3 line to the EEC.

CAUTION USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

1) Tighten the connection to 285 ±15 in-lb (32 ±2 N·m).

2) Loosen the connection.

3) Re-tighten the connection to 285 ±15 in-lb (32 ±2 N·m).

4) Loosen the connection.

5) Re-tighten the connection to 285 ±15 in-lb (32 ±2 N·m).

6) ENGINES POST-CFM-SB 73-062;

Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006], on the PS3 air tube coupling to the screw on the EEC.

SUBTASK 72-00-00-080-030-F00

(4) Remove an engine wash collection system, COM-14887.

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SUBTASK 72-00-00-410-036-F00

(5) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

H. Water Flushing From the Lube, Sumps, and Bleed Systems

NOTE: A post engine wash test is to purge water and oil from the bleed system in order to prevent potential bearing/sump corrosion or deterioration and to prevent fumes in the cockpit/cabin when the airplane is put back into service.

SUBTASK 72-00-00-550-005-F00

(1) At not more than two hours (or 30 minutes if icing conditions exist or about to occur) after you cleaned and serviced the engine, operate the engine using one of the two methods.

NOTE: This is to remove the water that was ingested into the engine systems.

SUBTASK 72-00-00-550-003-F00

(2) Method 1, Low Power engine Run (LPR) only.

(a) Flush the inlet cowl anti-ice system and the 5th stage port, do these steps:

1) Lock the high stage valve closed, do this task: MMEL 36-9 (DDPG) Preparation - High Stage Valve Inoperative, TASK 36-00-00-040-805.

WARNING MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

2) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

3) Operate the engine at idle for 3 minutes.

a) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the CLOSED position.

b) Make sure that the L and R PACK switches, on the P5-10 forward overhead panel, are in the OFF position.

4) Put the APU BLEED switch, on the P5-10 forward overhead panel, to the OFF position.

a) Make sure that the DUAL BLEED light goes out.

b) Make sure that the applicable BLEED switch, on the P5-10 forward overhead panel, is in the OFF position.

c) Put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the ON position.

<1> Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds, and then goes dim.

CAUTION THE MAXIMUM OPERATION TIME FOR THE INLET COWL ANTI-ICE SYSTEM IS 30 SECONDS AT AN AIR TEMPERATURE OF MORE THAN 65F (18C). IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE OR THE INLET COWL CAN OCCUR.

d) Within 30 seconds, put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the OFF position.

<1> Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds, and then goes off.

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5) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

6) Restore operation of the high stage valve, do this task: MMEL 36-9 (DDPG) Restoration - High Stage Valve Inoperative, TASK 36-00-00-440-805.

(b) Do these steps to flush the inlet cowl anti-ice system and the 9th stage port:

WARNING MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

1) Operate the engine at idle, do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

2) Put the APU BLEED switch, on the P5-10 forward overhead panel, to the OFF position.

   a) Make sure that the DUAL BLEED light goes out.

3) Make sure that the applicable ENG BLEED switch, on the P5-10 forward overhead panel, is in the OFF position.

4) Put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the ON position.

   a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds and then goes dim.

CAUTION THE MAXIMUM OPERATION TIME FOR THE INLET COWL ANTI-ICE SYSTEM IS 30 SECONDS AT AN AIR TEMPERATURE OF MORE THAN 65F (18C). IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE OR THE INLET COWL CAN OCCUR.

5) Within 30 seconds, put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the OFF position.

   a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds, and then goes off.

(c) Flush the wing anti-ice system, do these steps:

1) Put the applicable BLEED switch, on the P5-10 forward overhead panel, to the ON position.

2) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the CLOSED position.

3) Put the applicable engine WING ANTI-ICE switch, on the P5-11 panel, to the ON position.

   a) Make sure that the applicable VALVE OPEN light comes on brightly for one to three seconds and then goes dim.

4) After no more than 30 seconds, put the applicable engine WING ANTI-ICE switch, on the P5-11 panel, to the OFF position.

   a) Make sure that the applicable VALVE OPEN light comes on brightly for one to three seconds and then goes off.

5) Put the applicable engine 1 BLEED or 2 BLEED switch, on the P5-10 forward overhead panel, to the OFF position.

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a) Make sure that the duct pressure goes to zero that indicates that the Pressure Regulating and Shutoff Valve (PRSOV) closed.

WARNING PUT ON GLOVES FOR PROTECTION FROM HOT SURFACES WHEN YOU CONNECT OR DISCONNECT PNEUMATIC FITTINGS. PACK OPERATION CAN MAKE THE GROUND AIR CONNECTOR VERY HOT. A HOT GROUND AIR CONNECTOR WILL BURN YOUR BARE HANDS.

(d) Install the deactivator and exhaust hose adapter, SPL-15817, in the ground air connector as follows:

NOTE: This step is not mandatory. Its aim is to prevent fumes in the cockpit and cabin when the airplane is put back into service. Use of the deactivator helps decrease contamination of the bleed system during the engine wash.

1) If the engine 2 was cleaned, stop engine 2, do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

NOTE: This is for safety reason due to proximity of the ground air connector.

2) Put the deactivator and exhaust hose adapter, SPL-15817, in the ground air connector.

3) Make sure that the check valve flappers are open.

4) If you use deactivator, SPL-2462, install the coupling on the supply hose from the ground air cart onto the nipple of the ground air connector check valve assembly.

5) Make sure that the deactivator, SPL-2462, is in the correct position.

a) Make sure that you do not connect the supply hose to the ground cart.

b) Make sure that the exhaust from the hose flows to ambient.

(e) If the engine 1 was cleaned, do the steps that follow:

1) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the OPEN position.

2) Put the engine 1 BLEED switch, on the P5-10 forward overhead panel, to the ON position.

3) Operate the engine at idle for 5 minutes.

(f) If the engine 2 was cleaned, do the steps that follow:

WARNING MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

1) Start engine 2, do this task: Start the Engine Procedure (Engine Cross Bleed Start), TASK 71-00-00-800-810-F00.

2) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the CLOSED position.

3) Put the engine 2 BLEED switch, on the P5-10 forward overhead panel, to the ON position.

4) Operate the engine at idle for 5 minutes.

(g) Put the applicable engine 1 BLEED or 2 BLEED switch, on the P5-10 forward overhead panel, to the OFF position.

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WARNING PUT ON GLOVES FOR PROTECTION FROM HOT SURFACES WHEN YOU CONNECT OR DISCONNECT PNEUMATIC FITTINGS. PACK OPERATION CAN MAKE THE GROUND AIR CONNECTOR VERY HOT. A HOT GROUND AIR CONNECTOR WILL BURN YOUR BARE HANDS.

(h) If the exhaust hose adapter, SPL-15817, is installed, do the steps that follow:

1) If the engine 2 was cleaned, stop engine 2, do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

NOTE: This is for safety reason due to proximity of the ground air connector.

2) Disconnect the exhaust hose adapter, SPL-15817, from the ground air connector and remove the deactivator.

(i) If you used the deactivator, SPL-2462, disconnect the coupling on the supply hose from the ground air connector and remove the deactivator.

(j) Operate the engine at idle for 15 minutes to make sure that there are no odors or fumes in the cockpit or cabin.

WARNING MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

1) If the engine 2 was cleaned, start engine 2, do this task: Start the Engine Procedure (Engine Cross Bleed Start), TASK 71-00-00-800-810-F00.

2) Make sure that the cabin pressure outflow valve is open or at least one passenger door is open.

3) Put the L and R PACK switches, on the P5-10 forward overhead panel, to the AUTO position.

4) Put the applicable engine 1 BLEED or 2 BLEED switch, on the P5-10 forward overhead panel, to the ON position.

5) Operate the engine at idle for 15 minutes and do a check for fumes or odors in the cockpit or cabin.

a) If odors are present, do this task: Clean the Engine Gas-Path with Cleaning Solution, TASK 72-00-00-100-804-F00.

6) Put the L and R PACK switches, on the P5-10 forward overhead panel, to the OFF position.

7) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 72-00-00-550-004-F00

(3) Method 2, High Power engine Run (HPR) and Low Power engine Run (LPR).

NOTE: This method requires a HPR at N1 > 60%.

(a) Flush both engines at same time.

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> **WARNING** MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

(b) Operate the engine at N1 30%, do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

LOM 404, 407, 420 PRE SB 737-30A1063

(c) Make sure that the PROBE HEAT "A" or "B" switch, on the P5 overhead panel, is in the ON position.

NOTE: For engine operation at high power, the EEC can go into alternate mode operation if neither pitot probe is heated.

LOM 402, 406, 411, 412, 415, 416, 422-434, 437-447, 450-999; LOM 404, 407, 420 POST SB 737-30A1063

(d) Make sure that the PROBE HEAT "A" or "B" switch, on the P5 overhead panel, is in the AUTO position.

NOTE: For engine operation at high power, the EEC can go into alternate mode operation if neither pitot probe is heated.

LOM ALL

(e) Flush the inlet cowl anti-ice system, do these steps:

1) Put the L and R PACK switches, on the P5-10 forward overhead panel, to the OFF position.
2) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the CLOSED position.
3) Put the APU BLEED switch, on the P5-10 forward overhead panel, to the OFF position.
   a) Make sure that the DUAL BLEED light goes out.
4) Put the engine 1 BLEED and 2 BLEED switches, on the P5-10 forward overhead panel, to the OFF position.
5) Put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the ON position.
   a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds and then goes dim.

> **CAUTION** THE MAXIMUM OPERATION TIME FOR THE INLET COWL ANTI-ICE SYSTEM IS 30 SECONDS AT AN AIR TEMPERATURE OF MORE THAN 65F (18C). IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE OR THE INLET COWL CAN OCCUR.

6) Within 30 seconds, put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the OFF position.
   a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds and then goes off.

(f) Operate the engine at N1 ≥ 60% to flush the inlet cowl anti-ice system, do these steps:

1) Put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the ON position.

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a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds and then goes dim.

> **CAUTION** THE MAXIMUM OPERATION TIME FOR THE INLET COWL ANTI-ICE SYSTEM IS 30 SECONDS AT AN AIR TEMPERATURE OF MORE THAN 65F (18C). IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE OR THE INLET COWL CAN OCCUR.

2) Within 30 seconds, put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the OFF position.

a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds and then goes off.

(g) Operate the engine at N1 30% to flush the wing anti-ice system, do these steps:

1) Put the applicable BLEED switch, on the P5-10 forward overhead panel, to the ON position.

2) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the CLOSED position.

3) Put the applicable engine WING ANTI-ICE switch, on the P5-11 panel, to the ON position.

a) Make sure that the applicable VALVE OPEN light comes on brightly for one to three seconds and then goes dim.

4) After no more than 30 seconds, put the applicable engine WING ANTI-ICE switch, on the P5-11 panel, to the OFF position.

a) Make sure that the applicable VALVE OPEN light comes on brightly for one to three seconds and then goes off.

5) Put the applicable engine 1 BLEED or 2 BLEED switch, on the P5-10 forward overhead panel, to the OFF position.

a) Make sure that the duct pressure goes to zero that indicates that the PRSOV closed.

(h) Reduce throttle to idle.

(i) Make sure that the applicable engine 1 BLEED or 2 BLEED switch, on the P5-10 forward overhead panel, is in the OFF position.

(j) Operate the engine at idle for 15 minutes to make sure that there are no odors or fumes in the cockpit or cabin.

1) Make sure that the cabin pressure outflow valve is open or at least one passenger door is open.

2) Put the L and R PACK switches, on the P5-10 forward overhead panel, to the AUTO position.

3) Put the 1 BLEED and 2 BLEED switches, on the P5-10 forward overhead panel, to the ON position.

4) Operate the engine at idle for 15 minutes and do a check for fumes or odors in the cockpit or cabin.

a) If odors are present, do this task: Clean the Engine Gas-Path with Cleaning Solution, TASK 72-00-00-100-804-F00.

5) Put the L and R PACK switches, on the P5-10 forward overhead panel, to the OFF position.

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6) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

7) Make sure that the probe heat is off.

LOM 404, 407, 420 PRE SB 737-30A1063

a) Put the Probe Heat "A" and ‘‘B’’ switches, on the P5 overhead panel, to the OFF position.

LOM 402, 406, 411, 412, 415, 416, 422-434, 437-447, 450-999; LOM 404, 407, 420 POST SB 737-30A1063

b) Put the Probe Heat "A" and ‘‘B’’ switches, on the P5 overhead panel, to the AUTO position.

LOM ALL

I. Put the Airplane Back to its Usual Condition

SUBTASK 72-00-00-440-005-F00

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

TASK 72-00-00-100-804-F00

5. Clean the Engine Gas-Path with Cleaning Solution

A. General

(1) For Exhaust Gas Temperature (EGT) margin recovery, it is recommended to clean the engine gas-path with pure water only.

(2) It is recommended that you use a cleaning agent only when organic debris or oil deposits are present.

(3) It is recommended that you do the fan blade cleaning procedure and gas path cleaning procedure with cleaning agent at the same time.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
36-00-00-040-805	MMEL 36-9 (DDPG) Preparation - High Stage Valve Inoperative (P/B 901)
36-00-00-440-805	MMEL 36-9 (DDPG) Restoration - High Stage Valve Inoperative (P/B 901)
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-700-821-F00	Dry Motor the Engine (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (P/B 201)
71-00-00-800-810-F00	Start the Engine Procedure (Engine Cross Bleed Start) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

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C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2288	Cart - Water Wash, Engine Part #: 08-4044-0010 Supplier: 59603 Part #: 31658 Supplier: 6C9S2 Part #: 35030 Supplier: 6C9S2 Part #: AJW-114B Supplier: 6LU21 Part #: AJW-115 Supplier: 6LU21 Part #: JMP/CFM56/D/4777/C200 Supplier: U2066 Part #: JMP/GE90/D/4038/C200 Supplier: U2066 Part #: JMP/LUFT/D/4972/C500 Supplier: U2066 Part #: JMP/LUFT/D/4972/C800 Supplier: U2066 Part #: PWP2100 Supplier: 6C9S2 Part #: PWP3600 Supplier: 6C9S2 Part #: PWP3700 Supplier: 6C9S2
COM-14781	Probe - Long, Water Wash, CMF56 Part #: JMP/CFM56/D/6645 Supplier: U2066
COM-14782	Probe - Short, Water Wash, CFM56 Part #: JMP/CFM56/D/4462 Supplier: U2066
COM-14887	Collection System - Engine Wash Part #: JMP/KYOTO/D/6777/C200 Supplier: U2066
SPL-2462	Deactivator - Check Valve Part #: C21006-7 Supplier: 81205 Opt Part #: C21006-1 Supplier: 81205 Opt Part #: PF80-012-500 Supplier: 053H3
SPL-15817	Adapter - Hose, Exhaust Part #: C21011-1 Supplier: 81205
STD-3940	Air Source - Regulated, Dry Filtered, 0-150 psig

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
G00018	Nitrogen - Gaseous, Pressurizing, 99.5 Percent Pure	A-A-59503 Type I Grade B, MIL-PRF-27401 Type I Grade A
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right
411	Engine 1 - Engine
421	Engine 2 - Engine

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F. Prepare for the Engine Cleaning

SUBTASK 72-00-00-100-009-F00

(1) Make sure that you obey the cleaning specifications, do this task: Engine Cleaning Specifications, TASK 72-00-00-100-801-F00.

SUBTASK 72-00-00-040-010-F00

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

SUBTASK 72-00-00-010-024-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-00-00-020-003-F00

(4) Do these steps to disconnect the PS3 line:

(a) Disconnect the PS3 line at the Electronic Engine Control (EEC).

(b) Put end caps on the line and EEC connection.

SUBTASK 72-00-00-600-004-F00

(5) Service the engine, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

NOTE: The minimum amount of 5 gal (19 l) of oil, D00599 [CP2442], is necessary to motor the engine.

SUBTASK 72-00-00-010-025-F00

(6) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-00-00-860-026-F00

(7) Make sure that the WING ANTI-ICE, ENG 1 ANTI-ICE, and ENG 2 ANTI-ICE switches, on the P5 overhead panel, are in the OFF position.

SUBTASK 72-00-00-860-027-F00

(8) Make sure that the BLEED 1 and BLEED 2 switches, on the P5 overhead panel, are in the OFF position.

SUBTASK 72-00-00-860-030-F00

(9) Make sure that the L PACK and R PACK switches, on the P5 overhead panel, are in the OFF position.

SUBTASK 72-00-00-480-053-F00

(10) Install an engine wash collection system, COM-14887, below the engine.

NOTE: An engine wash collection system, COM-14887, collects the dirty water that falls from the engine during gas-path cleaning.

NOTE: It is optional to use an engine wash collection system, COM-14887, only if local environmental restrictions allow this. Consult the regulatory guidelines before you make a decision not to use this tool.

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G. Wash the Engine Gas Path With Cleaning Solution

SUBTASK 72-00-00-160-001-F00

CAUTION DO NOT CLEAN AN ENGINE AFTER EXPOSURE TO DRY CHEMICAL FIRE EXTINGUISHING AGENTS. DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION DO NOT CLEAN THE ENGINE UNLESS THE EGT IS BELOW 150°F (66°C). IF NOT, DAMAGE TO EQUIPMENT COULD OCCUR.

CAUTION DO NOT CLEAN AN ENGINE IF THE OUTSIDE AIR TEMPERATURE IS BELOW 14°F (-10°C). THIS CAN CAUSE ICE IN THE ENGINE AND POSSIBLE DAMAGE.

CAUTION THE FUEL PUMP AND HMU ARE FUEL LUBRICATED. DO NOT MOTOR, START, OR OPERATE THE ENGINE UNLESS THERE IS A POSITIVE FUEL INLET PRESSURE. DAMAGE TO COMPONENTS COULD OCCUR.

CAUTION DO NOT MOTOR THE ENGINE MORE THAN STARTER DUTY CYCLE ENGINE OPERATION LIMITS, TASK 71-00-00-800-806-F00. STARTER DAMAGE COULD OCCUR.

CAUTION MAKE SURE THAT THE N1 ROTOR TURNS FREELY DURING THE FULL CLEAN PROCEDURE. IF YOU DO NOT OBEY THIS INSTRUCTION, OIL SYSTEM CONTAMINATION COULD OCCUR.

CAUTION DO NOT APPLY WATER AT MORE THAN 6 GAL (23 L) IN A MINUTE. ENGINE DAMAGE CAN OCCUR.

(1) Do these steps to clean the gas-path with the cleaning solution:

WARNING IF YOU USE ANTI-FREEZE, KEEP ANTI-FREEZE AWAY FROM HEAT AND AN OPEN FLAME. ANTI-FREEZE HAS A LOW FLASHPOINT. MAKE SURE THAT THERE IS SUFFICIENT AIRFLOW. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT COULD OCCUR.

(a) Make sure that you use the recommended cleaning solution, that is listed in the specification (TASK 72-00-00-100-801-F00).

1) An engine water wash cart, COM-2288, with immersion heater.

a) If you use anti-freeze, do not use the immersion heater.

NOTE: You can use a short engine wash probe, COM-14782, with the thrust reverser in the open position, and long engine wash probe, COM-14781, with the thrust reverser in the closed position.

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> **WARNING** MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE CONTROL SURFACES AND LANDING GEAR AREAS. THE CONTROL SURFACES AND LANDING GEAR DOORS CAN MOVE WHEN YOU PRESSURIZE THE HYDRAULIC SYSTEMS. THIS CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

(b) EEC SOFTWARE VERSION 7.B.U OR LATER.

> **WARNING** MAKE SURE THERE IS A MINIMUM OF TWO PERSONS WHEN YOU OPERATE THE ENGINES. ONE PERSON MUST BE IN THE FLIGHT COMPARTMENT AND ONE PERSON MUST BE ON THE GROUND. THE PERSON ON THE GROUND MUST USE A HEADSET TO SPEAK TO THE PERSON IN THE FLIGHT COMPARTMENT. THEY MUST TELL EACH OTHER OF ALL PERSONS AND EQUIPMENT ON OR NEAR THE AIRCRAFT DURING ENGINE OPERATION. THIS WILL HELP PREVENT INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

1) Do these steps to prepare the engine for the EEC Water Wash Test:

NOTE: When engine operates, some oil leaks can occur at the aft sump rotating seal. After operation, an oil puddle in the exhaust is usual. When engine operations are done one after the other, it can cause a large oil puddle in the exhaust.

a) Before you use the EEC water wash function for your fleet maintenance, do a test wash with the wash function and your water wash equipment.

NOTE: The water wash function lets more water into the engine core during the wash. The quantity of water is also different for the type of water wash equipment. Some combinations of equipment and the water wash function can make a 60% N1 engine run necessary to prevent fumes or smoke in the cabin. Refer to the task to flush the cleaning solution (TASK 72-00-00-100-804-F00) for the engine operation.

b) Make sure that all persons and equipment are a safe distance from the engine before you start the test.

c) If the Control Display Unit (CDU) is not active from other engine ground tests, do these steps:

<1> Get access to the CDU in the flight compartment.

<2> Push the INIT REF key to show the PERF INIT screen on the CDU.

NOTE: The Flight Management Computer System (FMCS) CDU does not support a type-ahead function. You must have the prompt on the CDU screen before you type in the response.

<3> Push these Line Select Key (LSK) on the CDU:

<a> INDEX

<b> MAINT

NOTE: This LSK causes the MAINT BITE INDEX screen to show.

<c> ENGINE

NOTE: This LSK causes the ENGINE/EXCEED BITE INDEX screen to show.

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<d> Applicable ENGINE X, (X = 1 or 2)

NOTE: This LSK causes the ENGINE X BITE TEST MAIN MENU to show. Also, the ENGINE X LSK automatically applies power to the EEC and causes the EEC to initialize. The CDU can show INITIALIZING EEC X and EEC SORTING FAULT HISTORY DATA, for a short time, just before the ENGINE X BITE TEST MAIN MENU shows.

<e> GROUND TESTS

NOTE: This LSK causes the ENGINE X BITE TEST GROUND TEST menu to show.

<f> If the FOR CH A ONLY or FOR CH B ONLY screen shows, push the INDEX LSK once, stop for 30 seconds, and then push the GROUND TESTS LSK again.

NOTE: The system has a 15-second timer for the FMCS CDU and EEC to initialize. Sometimes, this is not enough time and the system will show this problem.

d) Push the WATER WASH TEST LSK.

NOTE: This will cause screen 1 of the WATER WASH function to show. The screen contains a WARNING about the operation of the engine during this test.

e) Use the interphone to tell the person at the engine that the engine will begin the dry motor procedure.

f) Type "OK" on the CDU pad when you are ready to start the test.

g) Push the CONTINUE LSK.

h) Follow the instructions on the CDU screen.

(c) Dry motor the engine for two minutes, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

WARNING

USE RUBBER GLOVES AND EYE PROTECTION WHEN YOU HANDLE LIQUID DETERGENT. LIQUID DETERGENT AND ANTI-FREEZE SOLVENT HAVE LOW FLASHPOINTS. KEEP AWAY FROM HEAT AND AN OPEN FLAME. MAKE SURE THAT THERE IS SUFFICIENT AIRFLOW. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT COULD OCCUR.

WARNING

STAND AT LEAST 3 FT (1 M) AWAY FROM THE COWLING INLET WHEN SPRAYING LIQUIDS INTO THE ENGINE. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT COULD OCCUR.

(d) After 30 seconds of motoring with positive fan rotation, inject the cleaning solution 360 degrees around the Low Pressure Compressor (LPC) inlet through the fan blades or at the LPC inlet (if a specific rig is used) during the motoring.

(e) Let the engine soak for five minutes.

(f) Do the above steps again, to dry motor, inject solution and soak the engine.

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H. Rinse the Cleaning Solution From The Engine Gas Path

SUBTASK 72-00-00-170-003-F00

(1) To prevent fumes in the cockpit and cabin when the airplane is put back into service, make sure to do rinse.

SUBTASK 72-00-00-100-004-F00

(2) Do these steps to rinse the cleaning solution from the engine gas path:

(a) Dry motor the engine for two minutes, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

> **WARNING** STAND AT LEAST 3 FT (1 M) AWAY FROM THE COWLING INLET WHEN SPRAYING LIQUIDS INTO THE ENGINE. IF NOT, YOU CAN CAUSE INJURY.

(b) After ten seconds of motoring with positive fan rotation, inject the water 360 degrees around the LPC inlet through the fan blades or at the LPC inlet (if a specific rig is used) during the motoring.

(c) Let the engine soak for five minutes.

(d) Dry motor the engine again for two minutes.

(e) After ten seconds of motoring with positive fan rotation, inject the water 360 degrees around the LPC inlet through the fan blades or at the LPC inlet (if a specific rig is used) during the motoring.

(f) Let the engine soak for five minutes.

(g) EEC SOFTWARE VERSION 7.B.U OR LATER.

1) Push the END WASH LSK on the CDU screen.

a) The CDU screen will show WASH COMPLETE, RETURN AIRPLANE TO NORMAL CONDITION.

SUBTASK 72-00-00-010-026-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-00-00-420-003-F00

(4) Do these steps to clean the PS3 line:

(a) Remove the end caps from the line and EEC connector.

> **CAUTION** DO NOT BLOW AIR INTO THE EEC. DAMAGE COULD OCCUR.

(b) Use regulated air source, STD-3940, or nitrogen, G00018, set at 20 psi (138 kPa) - 100 psi (689 kPa) to blow into the PS3 line and clear it of water.

(c) Do a visual inspection to make sure that the PS3 line weep-hole is clear and there is no blockage.

NOTE: The 0.020 in. (0.508 mm) weep hole is found on the lowest point of the PS3 pressure line near the 6 o'clock strut.

1) If it is necessary, clean the weep hole with a drill bit or piece of rigid safety wire of the same size.

(d) Connect the PS3 line to the EEC.

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> **CAUTION** USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

1) Tighten the connection to 285 ±15 in-lb (32 ±2 N·m).
2) Loosen the connection.
3) Re-tighten the connection to 285 ±15 in-lb (32 ±2 N·m).
4) Loosen the connection.
5) Re-tighten the connection to 285 ±15 in-lb (32 ±2 N·m).
6) ENGINES POST-CFM-SB 73-062;

   Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006], on the PS3 air tube coupling to the screw on the EEC.

SUBTASK 72-00-00-080-031-F00

(5) Remove an engine wash collection system, COM-14887.

SUBTASK 72-00-00-010-027-F00

(6) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

I. Water Flushing From the Lube, Sumps, and Bleed Systems

NOTE: A post engine wash test is to purge water and oil from the bleed system in order to prevent potential bearing/sump corrosion or deterioration and to prevent fumes in the cockpit/cabin when the airplane is put back into service.

SUBTASK 72-00-00-550-006-F00

(1) At not more than two hours (or 30 minutes if icing conditions exist or about to occur) after you cleaned and serviced the engine, operate the engine using one of the two methods.

NOTE: This is to remove the water that was ingested into the engine systems.

SUBTASK 72-00-00-550-007-F00

(2) Method 1, Low Power engine Run (LPR) only.

(a) Flush the inlet cowl anti-ice system and the 5th stage port, do these steps:

1) Lock the high stage valve closed, do this task: MMEL 36-9 (DDPG) Preparation - High Stage Valve Inoperative, TASK 36-00-00-040-805.

> **WARNING** MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

2) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.
3) Operate the engine at idle for 3 minutes.
   a) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the CLOSED position.
   b) Put the L and R PACK switches, on the P5-10 forward overhead panel, to the OFF position.
4) Put the APU BLEED switch, on the P5-10 forward overhead panel, to the OFF position.

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a) Make sure that the DUAL BLEED light goes out.

b) Make sure that the applicable BLEED switch, on the P5-10 forward overhead panel, is in the OFF position.

c) Put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the ON position.

<1> Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds, and then goes dim.

CAUTION THE MAXIMUM OPERATION TIME FOR THE INLET COWL ANTI-ICE SYSTEM IS 30 SECONDS AT AN AIR TEMPERATURE OF MORE THAN 65F (18C). IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE OR THE INLET COWL CAN OCCUR.

d) Within 30 seconds, put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the OFF position.

<1> Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds, and then goes off.

5) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

6) Restore operation of the high stage valve, do this task: MMEL 36-9 (DDPG) Restoration - High Stage Valve Inoperative, TASK 36-00-00-440-805.

(b) Do these steps to flush the inlet cowl anti-ice system and the 9th stage port:

WARNING MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

1) Operate the engine at idle, do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

2) Put the APU BLEED switch, on the P5-10 forward overhead panel, to the OFF position.

a) Make sure that the DUAL BLEED light goes out.

3) Make sure that the applicable BLEED switch, on the P5-10 forward overhead panel, is in the OFF position.

4) Put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the ON position.

a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds and then goes dim.

CAUTION THE MAXIMUM OPERATION TIME FOR THE INLET COWL ANTI-ICE SYSTEM IS 30 SECONDS AT AN AIR TEMPERATURE OF MORE THAN 65F (18C). IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE OR THE INLET COWL CAN OCCUR.

5) Within 30 seconds, put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the OFF position.

a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds, and then goes off.

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(c) Flush the wing anti-ice system, do these steps:

1) Put the applicable BLEED switch, on the P5-10 forward overhead panel, to the ON position.

2) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the CLOSED position.

3) Put the applicable engine WING ANTI-ICE switch, on the P5-11 panel, to the ON position.

a) Make sure that the applicable VALVE OPEN light comes on brightly for one to three seconds and then goes dim.

4) After no more than 30 seconds, put the applicable engine WING ANTI-ICE switch, on the P5-11 panel, to the OFF position.

a) Make sure that the applicable VALVE OPEN light comes on brightly for one to three seconds and then goes off.

5) Put the applicable engine 1 BLEED or 2 BLEED switch, on the P5-10 forward overhead panel, to the OFF position.

a) Make sure that the duct pressure goes to zero that indicates that the Pressure Regulating and Shutoff Valve (PRSOV) closed.

WARNING

PUT ON GLOVES FOR PROTECTION FROM HOT SURFACES WHEN YOU CONNECT OR DISCONNECT PNEUMATIC FITTINGS. PACK OPERATION CAN MAKE THE GROUND AIR CONNECTOR VERY HOT. A HOT GROUND AIR CONNECTOR WILL BURN YOUR BARE HANDS.

(d) Install the deactivator and exhaust hose adapter, SPL-15817, in the ground air connector as follows:

NOTE: This step is not mandatory. Its aim is to prevent fumes in the cockpit and cabin when the airplane is put back into service. Use of the deactivator helps decrease contamination of the bleed system during the engine wash.

1) If the engine 2 was cleaned, stop engine 2, do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

NOTE: This is for safety reason due to proximity of the ground air connector.

2) Put the deactivator and exhaust hose adapter, SPL-15817, in the ground air connector.

3) Make sure that the check valve flappers are open.

4) If you use deactivator, SPL-2462, install the coupling on the supply hose from the ground air cart onto the nipple of the ground air connector check valve assembly.

5) Make sure that the deactivator, SPL-2462, is in the correct position.

a) Make sure that you do not connect the supply hose to the ground cart.

b) Make sure that the exhaust from the hose flows to ambient.

(e) If the engine 1 was cleaned, do the steps that follow:

1) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the OPEN position.

2) Put the engine 1 BLEED switch, on the P5-10 forward overhead panel, to the ON position.

3) Operate the engine at idle for 5 minutes.

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(f) If the engine 2 was cleaned, do the steps that follow:

> **WARNING** MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

1) Start engine 2, do this task: Start the Engine Procedure (Engine Cross Bleed Start), TASK 71-00-00-800-810-F00.
2) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the CLOSED position.
3) Put the engine 2 BLEED switch, on the P5-10 forward overhead panel, to the ON position.
4) Operate the engine at idle for 5 minutes.

(g) Put the applicable engine 1 BLEED or 2 BLEED switch, on the P5-10 forward overhead panel, to the OFF position.

> **WARNING** PUT ON GLOVES FOR PROTECTION FROM HOT SURFACES WHEN YOU CONNECT OR DISCONNECT PNEUMATIC FITTINGS. PACK OPERATION CAN MAKE THE GROUND AIR CONNECTOR VERY HOT. A HOT GROUND AIR CONNECTOR WILL BURN YOUR BARE HANDS.

(h) If the exhaust hose adapter, SPL-15817, is installed, do the steps that follow:

1) If the engine 2 was cleaned, stop engine 2, do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

   NOTE: This is for safety reason due to proximity of the ground air connector.
2) Disconnect the exhaust hose adapter, SPL-15817, from the ground air connector and remove the deactivator.

(i) If you used the deactivator, SPL-2462, disconnect the coupling on the supply hose from the ground air connector and remove the deactivator.

(j) Operate the engine at idle for 15 minutes to make sure that there are no odors or fumes in the cockpit or cabin.

> **WARNING** MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

1) If the engine 2 was cleaned, start engine 2, do this task: Start the Engine Procedure (Engine Cross Bleed Start), TASK 71-00-00-800-810-F00.
2) Make sure that the cabin pressure outflow valve is open or at least one passenger door is open.
3) Put the L and R PACK switches, on the P5-10 forward overhead panel, to the AUTO position.
4) Put the applicable 1 BLEED or 2 BLEED switches, on the P5-10 forward overhead panel, to the ON position.
5) Operate the engine at idle for 15 minutes and do a check for fumes or odors in the cockpit or cabin.

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a) If odors are present, do the steps for Water Flushing From the Lube, Sumps, and Bleed Systems again.

6) Put the L and R PACK switches, on the P5-10 forward overhead panel, to the OFF position.

7) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 72-00-00-550-008-F00

(3) Method 2, High Power engine Run (HPR) and Low Power engine Run (LPR).

NOTE: This method requires a HPR at N1 > 60%.

(a) Flush both engines at same time.

WARNING	MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

(b) Operate the engine at N1 30%, do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

LOM 404, 407, 420 PRE SB 737-30A1063

(c) Make sure that the PROBE HEAT "A" or "B" switch, on the P5 overhead panel, is in the ON position.

NOTE: For engine operation at high power, the EEC can go into alternate mode operation if neither pitot probe is heated.

LOM 402, 406, 411, 412, 415, 416, 422-434, 437-447, 450-999; LOM 404, 407, 420 POST SB 737-30A1063

(d) Make sure that the PROBE HEAT "A" or "B" switch, on the P5 overhead panel, is in the AUTO position.

NOTE: For engine operation at high power, the EEC can go into alternate mode operation if neither pitot probe is heated.

LOM ALL

(e) Flush the inlet cowl anti-ice system, do these steps:

1) Put the L and R PACK switches, on the P5-10 forward overhead panel, to the OFF position.

2) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the CLOSED position.

3) Put the APU BLEED switch, on the P5-10 forward overhead panel, to the OFF position.

a) Make sure that the DUAL BLEED light goes out.

4) Put the engine 1 BLEED and 2 BLEED switches, on the P5-10 forward overhead panel, to the OFF position.

5) Put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the ON position.

a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds and then goes dim.

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> **CAUTION** THE MAXIMUM OPERATION TIME FOR THE INLET COWL ANTI-ICE SYSTEM IS 30 SECONDS AT AN AIR TEMPERATURE OF MORE THAN 65F (18C). IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE OR THE INLET COWL CAN OCCUR.

6) Within 30 seconds, put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the OFF position.
   a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds and then goes off.

(f) Operate the engine at N1 ≥ 60% to flush the inlet cowl anti-ice system, do these steps:
1) Put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the ON position.
   a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds and then goes dim.

> **CAUTION** THE MAXIMUM OPERATION TIME FOR THE INLET COWL ANTI-ICE SYSTEM IS 30 SECONDS AT AN AIR TEMPERATURE OF MORE THAN 65F (18C). IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE OR THE INLET COWL CAN OCCUR.

2) Within 30 seconds, put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 panel, to the OFF position.
   a) Make sure that the applicable COWL VALVE OPEN light comes on brightly for one to three seconds and then goes off.

(g) Operate the engine at N1 30% to flush the wing anti-ice system, do these steps:
1) Put the applicable BLEED switch, on the P5-10 forward overhead panel, to the ON position.
2) Put the ISOLATION VALVE switch, on the P5-10 forward overhead panel, to the CLOSED position.
3) Put the applicable engine WING ANTI-ICE switch, on the P5-11 panel, to the ON position.
   a) Make sure that the applicable VALVE OPEN light comes on brightly for one to three seconds and then goes dim.
4) After no more than 30 seconds, put the applicable engine WING ANTI-ICE switch to the OFF position.
   a) Make sure that the applicable VALVE OPEN light comes on brightly for one to three seconds and then goes off.
5) Put the applicable engine 1 BLEED or 2 BLEED switch, on the P5-10 forward overhead panel, to the OFF position.
   a) Make sure that the duct pressure goes to zero that indicates that the PRSOV closed.

(h) Reduce throttle to idle.

(i) Make sure that the applicable engine 1 BLEED or 2 BLEED switch, on the P5-10 forward overhead panel, is in the OFF position.

(j) Operate the engine at idle for 15 minutes to make sure that there are no odors or fumes in the cockpit or cabin.

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1) Make sure that the cabin pressure outflow valve is open or at least one passenger door is open.
2) Put the L and R PACK switches, on the P5-10 forward overhead panel, to the AUTO position.
3) Put the 1 BLEED and 2 BLEED switches, on the P5-10 forward overhead panel, to the ON position.
4) Operate the engine at idle for 15 minutes and do a check for fumes or odors in the cockpit or cabin.
   a) If odors are present, do the steps for Water Flushing From the Lube, Sumps, and Bleed Systems again.
5) Put the L and R PACK switches, on the P5-10 forward overhead panel, to the OFF position.
6) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

J. Put the Airplane Back to its Usual Condition

SUBTASK 72-00-00-440-006-F00

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

——— END OF TASK ———

TASK 72-00-00-100-805-F00

6. Clean the External Engine Surfaces

A. General

(1) There are two methods to clean the external engine surfaces:
   (a) The hydrocarbon cleaning method
   (b) The steam cleaning method.

B. References

Reference	Title
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE
STD-4048	Bottle - Hand Spray

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B00682 [CP2011]	Solvent - Stoddard	MIL-PRF-680 Type I, II or III
B50295 [CP2010]	Solvent - cleaning, White Spirit	

E. Location Zones

Zone	Area
211	Flight Compartment - Left

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(Continued)

Zone	Area
212	Flight Compartment - Right
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare to Clean the External Engine Surfaces

SUBTASK 72-00-00-860-018-F00

(1) For engine 1, do this step:

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	1	C00458	ENGINE 1 IGNITION RIGHT
A	3	C00153	ENGINE 1 IGNITION LEFT
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-00-00-860-019-F00

(2) For engine 2, do this step:

Open these circuit breakers and install safety tags:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT

SUBTASK 72-00-00-040-006-F00

(3) Make sure that the applicable engine START switch is in the OFF position.

(a) Install a DO NOT OPERATE tag, STD-858.

SUBTASK 72-00-00-010-028-F00

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) For the applicable thrust reverser or thrust reversers, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

G. Clean the External Engine Surfaces

SUBTASK 72-00-00-100-005-F00

(1) Make sure that five minutes passed after you stop the engine, before you do these steps:

(a) Hydrocarbon method

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WARNING HYDROCARBONS ARE FLAMMABLE AND TOXIC. AVOID PROLONGED CONTACT WITH THE SKIN AND OBSERVE PRECAUTIONS AGAINST FIRE. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION SOME PLASTICS AND RUBBER-BASE MATERIALS ARE DAMAGED BY HYDROCARBON SOLVENTS. IF YOU ARE NOT CAREFUL, DAMAGE TO THE ENGINE COULD OCCUR.

1) Light accumulations of grease, oil, gum and dirt can be removed as follows:

NOTE: This method is not effective in the removal of baked-on oil deposits.

a) Apply White Spirit, B50295 [CP2010], solvent, B00682 [CP2011] or alcohol, B00676 [CP1041], with a hand spray bottle, STD-4048 or use a soaked rag.

b) Remove the accumulation with a soft cloth.

c) Wipe the cleaned area dry with a clean cloth or rinse with clean water.

CAUTION DO NOT USE CLEANING COMPOUNDS IN THE STEAM THAT IS USED FOR CLEANING. IF YOU ADD COMPOUNDS, DAMAGE TO THE ENGINE COULD OCCUR.

(b) Steam cleaning method

NOTE: Steam cleaning is a surface cleaning process that is useful when you do not want to remove paint and surface coatings.

1) Cap all tube ends, manifold openings and air extraction ports to prevent entry of contaminants or foreign objects.

CAUTION DO NOT LET THE STEAM FLOW STAY IN ONE PLACE TOO LONG. IF YOU ARE NOT CAREFUL, DAMAGE TO ENGINE PARTS COULD OCCUR.

2) Steam clean the accessible external surfaces of the engine.

3) Remove covers that you installed above.

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-00-00-860-020-F00

(1) For engine 1, do this step:

Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	1	C00458	ENGINE 1 IGNITION RIGHT
A	3	C00153	ENGINE 1 IGNITION LEFT
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-00-00-860-021-F00

(2) For engine 2, do this step:

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Remove the safety tags and close these circuit breakers:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT

SUBTASK 72-00-00-080-015-F00

(3) Remove the DO NOT OPERATE tag, STD-858 from the engine START switch.

SUBTASK 72-00-00-010-029-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

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ENGINE - REPAIRS

1. General

A. This procedure has this task:

(1) The repair of the HPC rotor blades.

TASK 72-00-00-300-801-F00

2. Repair the HPC Rotor Blades

(Figure 801, Figure 802, Figure 803, Figure 804)

A. General

(1) Instructions that are given in this procedure are for the blend repair of the high pressure compressor (HPC) rotor blades, stages 1-9 (referred to as the compressor blades).

(2) The repair uses the limits that are given in this procedure.

B. References

Reference	Title
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
72-00-00-200-802-F00	Borescope Inspection Preparation (P/B 601)
72-00-00-200-804-F00	HP Compressor Blades Borescope Inspection (P/B 601)
72-00-00-200-814-F00	Put the Airplane Back to Its Usual Condition (P/B 601)
72-63-01-400-801-F00	Handcranking Drive Cover Installation (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2332	Borescope Blend Tool Part #: 5.08136.001 Supplier: 50958

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare To Repair the Compressor Blades

SUBTASK 72-00-00-040-007-F00

(1) If the preparation steps were not done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00

for the HP compressor inspection.

SUBTASK 72-00-00-010-033-F00

(2) If not already done, do the applicable steps in the reference task to get access to the compressor blade; do this task: HP Compressor Blades Borescope Inspection, TASK 72-00-00-200-804-F00.

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F. Blend Limits

SUBTASK 72-00-00-220-001-F00

(1) Make sure the damage and the area of the repair will be less than these blend limits (Figure 801):

NOTE: Multiple blends in the same area are acceptable if the total amount of material that is removed from the original contour is not more than the repairable limit.

(a) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 1-4 compressor blades found in Dim. B of the airfoil.

1) There is no limit to the number of blended damage areas on each blade with this condition:

a) Maximum depth is 0.08 inch (2.03 mm) after the blend.

(b) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 1-4 compressor blade found in Dim. A of the airfoil.

1) Any number of missing or damaged tip corners, with these conditions:

a) Individual blades with missing material greater than 0.30 x 0.30 inch (7.6 x 7.6 mm) missing tip corners after blend on both leading and trailing edges are not permitted.

b) Any number of blades for each stage 1 thru 4, up to 0.30 x 0.30 inch (7.6 x 7.6 mm) missing tip corners after blend if the downstream damage is serviceable.

c) For stage 2, a maximum of 4 blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm), and 46 blades up to 0.30 x 0.30 inch (7.6 x 7.6 mm) missing tip corners after blend for total of 50 blades with missing tip corners.

d) For stage 3, a maximum of 5 blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm) and 51 blades up to 0.30 x 0.30 inch (7.6 x 7.6 mm) missing tip corners after blend for a total of total of 56 blades with missing tip corners.

e) For stage 4, maximum of 6 blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm) and 57 blades up to 0.30 x 0.30 inch (7.6 x 7.6 mm) missing tip corners after blend for a total of total of 63 blades with missing tip corners.

(c) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 5-9 compressor blades found in Dim. B of the airfoil.

NOTE: Multiple blends in the same area are acceptable if the total amount of material that is removed from the original contour is not more than the repairable limit.

1) There is no limit to the number of blended damage areas on each blade with this condition.

a) Maximum depth is 0.08 inch (2.03 mm) after the blend.

(d) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 5-9 compressor blades found in Dim. A.

1) Up to 20% of the blades in each stage with tears, nicks, dents, missing material and erosion with this condition:

a) Maximum area is 0.20 X 0.20 inch (5.1 X 5.1 mm).

(e) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 1-9 compressor blades found in the lower 25% of the airfoil.

1) There is no limit to the number of blended damage areas on each blade with these conditions:

a) Maximum depth is 0.06 in. (1.52 mm) after the blend.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

b) You do not blend in the airfoil root radius (R).

G. Blend Repair of the Compressor Blades

SUBTASK 72-00-00-290-003-F00

(1) Use the borescope blend tool, SPL-2332 to do the repair.

(a) Equivalent HPC blending tools are not permitted unless approved by CFMI.

SUBTASK 72-00-00-220-002-F00

CAUTION	DO NOT INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING IF IT IS SET IN THE 0-DEGREE POSITION. IF YOU INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING WHILE IT IS SET IN THE 0-DEGREE POSITION, THE DRIVE BELT WILL DISENGAGE.

(2) Measure the damage area as follows:

NOTE: Do not blend into the airfoil root radius (R).

(a) Put the head with bearing in the 90-degree position.

NOTE: This will prevent damage to the rotor blades or the blend tool.

1) Install the measuring grid tip onto the head with bearing (Figure 804).

2) Tighten the lock screw.

(b) Put the measuring grid tip in the 0-degree position.

(c) Put the grid tool in the borescope port.

(d) Monitor the measuring grid tip, and put the head with bearing to the 90-degree position.

(e) Set the measuring grid tip near the compressor blade damage area.

1) Each square on the grid is 0.039 in. (0.99 mm) x 0.039 in. (0.99 mm).

2) The overall grid size is 0.197 in. (5.00 mm) x 0.197 in. (5.00 mm).

(f) Record the damage results such as the defect size and location.

(g) Compare the blade damage that you recorded against the permitted blend limits (Figure 801).

1) Make sure the blade damage is less than the permitted blend limits.

(h) If the damage is less than the permitted blend limits, find the length of the blend that is necessary to keep the minimum blend radius (Figure 803).

(i) Calculate the minimum blend radius at two times the depth of the defect, or one times on each side of the center of the blade defect (Figure 803).

NOTE: Do not blend into airfoil radius (R).

(j) Put the head with bearing (Figure 802) at the 0-degree position.

(k) Remove the tool from the borescope port.

(l) Put the head with bearing at the 90-degree position.

(m) Loosen the lockscrew and remove the measuring grid tip from the head with bearing.

SUBTASK 72-00-00-320-001-F00

(3) Blend the damaged area of the compressor blade:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CAUTION

DO NOT INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING IF IT IS SET IN THE 0-DEGREE POSITION. IF YOU INSTALL OR REMOVE THE TOOL TIP WITH THE HEAD WITH BEARING WHILE IT IS SET IN THE 0-DEGREE POSITION, THE DRIVE BELT WILL DISENGAGE.

(a) Put the head with bearing at the 90-degree position and install the primary blade edge grinding tip to blend the HPC stage damage (Figure 804).

NOTE: Use longer tool tips for the forward blades and shorter tool tips for the aft blades.

NOTE: Do not blend in the airfoil root radius (R).

CAUTION

MAKE SURE THAT YOU DO A CHECK THE DRIVE BELT FOR POSSIBLE TWISTED INSTALLATION. IF THE DRIVE BELT IS TWISTED, DAMAGE TO THE TOOL COULD OCCUR.

(b) Do these steps to do a check of the drive belt for possible twisted installation:

1) Make sure the tool tip is pointed away from the operator in the 90-degree position.
2) Start the drive motor and make sure the tool tip turns in the clockwise direction.
3) If the tool tip turns in the counter-clockwise direction, the drive belt could be twisted. Use the tool manufacturer's instructions to repair the drive tool.

(c) Apply the light source to the blend tool.

(d) Put the tool tip in the 0-degree position.

(e) Put the primary blade edge grinding tip (Figure 804) in the borescope port and view the tool tip.

1) Move the tool tip from the 0-degree to the 90-degree position.

(f) Put the primary blade edge grinding tip close to the HPC blade defect.

(g) Align the tool tip with the blade defect and do a check for correct movement across the total length of the area to be blended.

NOTE: Do not start the drive motor at this time.

NOTE: Make sure the blend tool tip correctly touches across the total area to be blended.

(h) Use the primary blade edge grinding tip and mark the two sides of the blades defect.

NOTE: The minimum blend radius should be two times the depth of the defect, or one times on each side of the center of the blade defect (Figure 803).

(i) With the drive motor off, apply pressure to the grind tool at the defect area to practice the movement that you will use to blend the defect.

(j) After sufficient practice with the grind tool on the defect surface, do these steps:

1) Turn ON the drive motor using the ON/OFF switch.
2) Use the speed control to increase the speed.

NOTE: If the grind tool does not turn freely, apply less pressure to the blade edge surface.

(k) Blend the defect.

1) Make sure that you put a contour on the edge of the compressor blade and remove the sharp edges.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(l) Stop the drive motor.

(m) Put the tool tip in the 0-degree position.

(n) Remove the grind tool from the borescope access port.

(o) Put the tool tip in the 90-degree position.

> **CAUTION**
> DO NOT INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING IF IT IS SET IN THE 0-DEGREE POSITION. IF YOU INSTALL OR REMOVE THE TOOL TIP WITH THE HEAD WITH BEARING WHILE IT IS SET IN THE 0-DEGREE POSITION, THE DRIVE BELT WILL DISENGAGE.

(p) Loosen the lockscrew and remove the tool tip from the head with bearing.

SUBTASK 72-00-00-320-002-F00

(4) Do these steps to polish the compressor blade that you blended:

> **CAUTION**
> DO NOT INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING IF IT IS SET IN THE 0-DEGREE POSITION. IF YOU INSTALL OR REMOVE THE TOOL TIP WITH THE HEAD WITH BEARING WHILE IT IS SET IN THE 0-DEGREE POSITION, THE DRIVE BELT WILL DISENGAGE.

(a) With the head with bearing in the 90-degree position, install the polishing ball tip (Figure 804) into the head with bearing and tighten the lockscrew.

(b) Put the polishing ball tip in the 0-degree position.

(c) Put the grind tool into the borescope access port.

(d) Put the head with bearing at the 90-degree position.

(e) Put the ON/OFF switch to ON to start the drive the motor.

(f) Polish the blended surface.

(g) Stop the drive motor.

(h) Put the polishing ball tip in the 0-degree position.

(i) Remove grind tool from the borescope port.

> **CAUTION**
> DO NOT INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING IF IT IS SET IN THE 0-DEGREE POSITION. IF YOU INSTALL OR REMOVE THE TOOL TIP WITH THE HEAD WITH BEARING WHILE IT IS SET IN THE 0-DEGREE POSITION, THE DRIVE BELT WILL DISENGAGE.

(j) Loosen the lockscrew and remove the polishing ball tip from the head with bearing.

SUBTASK 72-00-00-290-002-F00

(5) Do a borescope inspection of the blend repairs:

(a) Use a standard borescope probe 1 configuration, magnified 1 to 1 at 7 in. (178 mm) to examine the blend repair.

1) Make sure that you removed all of the defect.

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-00-00-410-023-F00

(1) Do these steps:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Do the applicable steps in the reference task to install the borescope plugs, do this task: HP Compressor Blades Borescope Inspection, TASK 72-00-00-200-804-F00.

(b) If you have no more borescope tasks to do, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

CAUTION	MAKE SURE THAT YOU INSTALL THE HANDCRANKING DRIVE COVER. IF THE HANDCRANKING DRIVE COVER IS NOT INSTALLED OR IT IS INSTALLED INCORRECTLY, ENGINE OIL LEAKAGE COULD OCCUR.

1) Make sure that you, do this task: Handcranking Drive Cover Installation, TASK 72-63-01-400-801-F00.

I. Blend Repair Test

SUBTASK 72-00-00-790-001-F00

(1) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

COMPRESSOR BLADE
(EXAMPLE)

STAGE	DIM. R	25% of L
1	0.14 (3.6)	0.8 (20.3)
2	0.14 (3.6)	0.6 (15.2)
3	0.12 (3.0)	0.5 (12.7)
4	0.10 (2.5)	0.5 (12.7)
5	0.10 (2.5)	0.4 (10.2)
6	0.09 (2.3)	0.3 (7.6)
7	0.09 (2.3)	0.3 (7.6)
8	0.09 (2.3)	0.3 (7.6)
9	0.09 (2.3)	0.3 (7.6)

TABLE A 1

NOTE:

ALL DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

1 FOR REFERENCE ONLY

1254066-00
K33262 S0006582309_V6

HPC Rotor Blade Blend Limits
Figure 801/72-00-00-990-831-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AIRFOIL LEADING OR TRAILING EDGE TIP CORNER

B

POSSIBLE AIRFOIL DAMAGE

C

NOTE:

ALL DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES

DEFECT DEPTH IS IN AXIS OF DAMAGE UNLESS OTHERWISE NOTED

GMM-1233642-00-A

K33263 S0006582310_V3

HPC Rotor Blade Blend Limits
Figure 801/72-00-00-990-831-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1132825-00-A
K33286 S0006582311_V2

HPC Blade Borescope Blending Tool
Figure 802/72-00-00-990-832-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1132826-00-A
K33299 S0006582312_V2

HPC Blade Borescope Blending Tool
Figure 802/72-00-00-990-832-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1228314-01-A
K33338 S0006582313_V5

Blend Area Examples
Figure 803/72-00-00-990-833-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Borescope Blend Tool Tip Selection and Tool Tip Installation
Figure 804/72-00-00-990-834-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AIR INLET SECTION - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has one task:
      (1) A visual check of the TGB and AGB mount lugs.

TASK 72-20-00-210-801-F00

2. **TGB and AGB Mount Lugs Inspection (Visual Check)**

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task is a visual check of the mount lugs on the fan frame and case which hold the transfer gearbox (TGB) and accessory gearbox (AGB). This is a scheduled maintenance task.

(2) The TGB is attached to the fan frame at approximately the 9:00 o'clock position. The AGB is attached on the left side of the fan case.

B. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-20-00-010-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-20-00-210-001-F00

(2) Visually examine the mount lugs on the fan frame which hold the TGB and the mount lugs on the fan case which hold the AGB for damage:

(a) Cracks that extend from the bolt holes in the mount lugs

1) Not serviceable.

2) A Continue-In-Service limit of 10 cycles is permitted for one crack that goes through one mounting lug bolt hole, not more than 0.25 in. (6.35 mm) in length.

(b) Cracks in the areas of the mount lugs

1) Not serviceable.

2) A Continue-In-Service limit of 10 cycles is permitted for one crack 0.25 in. (6.35 mm) in length.

(c) Nicks, marks, and scratches

1) There is no limit to the number of nicks, marks, and scratches which are permitted with these conditions:

a) Not more than 1.0 in. (25.4 mm) in length

ECCN 9E991 BOEING PROPRIETARY - See title page for details

b) Not more than 0.02 in. (0.51 mm) in depth, after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

c) Minimum separation of 1.0 in. (25.4 mm) between areas of damage.

(d) Cracks in the rubber damper

1) Any amount is permitted.

SUBTASK 72-20-00-410-001-F00

(3) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN AND BOOSTER ASSEMBLY - MAINTENANCE PRACTICES

1. General

A. This procedure gives the data to lubricate the fan rotor blades and the fan disk.

B. This procedure will decrease the wear on the fan blade and/or fan disk. It can also decrease the engine vibration, which occurs when the fan blades become seized in the disk.

C. The lubricated fan disk and fan blades will also increase the service life of these components.

TASK 72-21-00-640-801-F00

2. Fan Rotor Blades and Fan Disk Lubrication

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This procedure gives the data to lubricate the fan rotor blades and the fan disk.

(2) The fan and booster assembly is aft of the inlet cowl.

B. References

Reference	Title
70-10-05-600-801-F00	Application Of Molybdenum Disulfide And Other Lubricants Dispersed In An Inorganic Binder And Non-Flammable Solvent - Maintenance Practices (P/B 201)
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
G50766 [CP2240]	Sheet - Abrasive Sheet For Cleaning Up And Finishing, Scotch-Brite Type A CFS	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare For the Procedure

SUBTASK 72-21-00-865-001-F00

(1) For engine 1, do this step:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-00-865-002-F00

(2) For engine 2, do this step:

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-00-860-001-F00

(3) Make sure the start levers are in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

SUBTASK 72-21-00-490-001-F00

(4) Install a protective mat, STD-585 in the inlet cowl.

SUBTASK 72-21-00-010-001-F00

(5) Do this task, Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

SUBTASK 72-21-00-020-001-F00

(6) Do this task, Fan Blade Removal (Complete Set), TASK 72-21-02-000-801-F00.

G. Procedure

SUBTASK 72-21-00-110-001-F00

WARNING

DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

CAUTION

KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(1) Clean all dirt and unwanted material from the fan blade roots, fan disk dovetail slots and shims. Use a clean cloth soaked with alcohol, B00676 [CP1041].

(a) If it is necessary, a soft bristle brush or dry Scotch-Brite Type A CFS Sheet, G50766 [CP2240] with alcohol, B00676 [CP1041] can be used to remove dirt build-up.

SUBTASK 72-21-00-640-001-F00

(2) Lubricate the items that follow (TASK 70-10-05-600-801-F00):

NOTE: Make sure to use the reference, too much lubricant can cause high vibration or fumes in the cabin.

(a) Lubricate the mating faces of the fan blade spacer.

(b) Lubricate the threaded pins on the fan disk, booster spool and retaining flange.

(c) Lubricate the dovetail slots (pressure faces) of the fan disk.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(d) Lubricate the aft face of the shank of each fan blade.

(e) Lubricate the roots (Dovetails) of each blade.

LOM ALL POST SB CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

(f) Lubricate the shims.

LOM ALL

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-00-420-001-F00

(1) Do this task, Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-00-410-001-F00

(2) Do this task, Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-21-00-490-002-F00

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(3) Remove the protective mat, STD-585 from the lower surface of the inlet cowl.

SUBTASK 72-21-00-860-002-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-00-860-003-F00

(5) Remove the DO-NOT-OPERATE tag from the start lever for the applicable engine.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 ENGINES POST-CFM56-7B-SB 72-0485 OR
ENGINES POST-CFM56-7B-SB 72-0324

1651701 S0000302901_V3

Fan Rotor Blade and Fan Disk Lubrication
Figure 201/72-21-00-990-803-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN BLADE

B

SPACER

C

SHIM

D

DOVETAIL SLOT

E

(VIEW IN THE AFT DIRECTION)

F

A-A

1651762 S0000302902_V2

Fan Rotor Blade and Fan Disk Lubrication
Figure 201/72-21-00-990-803-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

THREADED PINS

G

1652026 S0000302903_V2

Fan Rotor Blade and Fan Disk Lubrication
Figure 201/72-21-00-990-803-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H

3000495330

2266508 S0000508479_V2

Fan Rotor Blade and Fan Disk Lubrication
Figure 201/72-21-00-990-803-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN AND BOOSTER ASSEMBLY - INSPECTION/CHECK

1. General
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has these tasks:
      (1) A general visual inspection of the power plant inlet and fan blades
      (2) A detailed inspection of the engine inlet and fan blades.

TASK 72-21-00-200-801-F00

2. Power Plant Inlet and Fan Blades Inspection (General Visual)

A. General

(1) This task provides the instructions on how to do the general visual inspection of the power plant inlet and the fan blades.

B. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

C. Power Plant Inlet and Fan Blades Inspection

SUBTASK 72-21-00-210-007-F00

(1) Do a visual check of these components for obvious signs of damage, and indications of birdstrike or foreign object damage (FOD):

NOTE: It is not necessary to enter the inlet cowl to do this check.

(a) Inlet cowl inner surfaces
(b) Spinner
(c) Fan blades
(d) Abradable shroud
(e) Inlet to the gas generator (primary gas path)
(f) Inner fan case (visible areas)

SUBTASK 72-21-00-810-001-F00

(2) If you find indications of birdstrike or FOD, do the applicable fault isolation procedure in the FIM.

SUBTASK 72-21-00-220-005-F00

(3) If you find other damage, compare the damage to the limits in the applicable detailed inspection procedure for that component.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A

2189319 S0000485877_V2

Power Plant Inlet and Fan Blades Inspection
Figure 601/72-21-00-990-804-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-00-220-801-F00

3. Engine Inlet and Fan Blades Inspection (Detail)

(Figure 602, Figure 603)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task is a scheduled maintenance task which examines the inside of the engine inlet.

(2) The visual check is for the two part spinner, fan blades, and inside surfaces of the fan inlet case and related components.

B. References

Reference	Title
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-200-801-F00	Spinner Cone and Retaining Flange Inspection (P/B 601)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-02-000-802-F00	Fan Blade Replacement (Blade Pair) (P/B 401)
72-21-02-200-801-F00	Fan Module Inspection (P/B 601)
72-24-01-200-801-F00	Fan Inlet Case Inspection (Detail) (P/B 601)
72-24-02-200-801-F00	Abradable Shroud (Detail) - Inspection (P/B 601)
72-24-02-200-802-F00	Recondition of the Abradable Shroud (P/B 801)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For the Inspection

SUBTASK 72-21-00-040-001-F00

(1) For engine 1, do this step:

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-00-040-004-F00

(2) For engine 2, do this step:

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-00-040-002-F00

(3) Make sure the start levers are in the CUTOFF position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

SUBTASK 72-21-00-480-001-F00

> **CAUTION**
> MAKE SURE YOU INSTALL THE PROTECTIVE MATS IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(4) Install a protective mat, STD-585, in the inlet cowl.

F. Visually Examine the Spinner Front Cone

SUBTASK 72-21-00-210-002-F00

(1) Examine the exposed area of the spinner front cone for damage (TASK 72-21-01-200-801-F00).

SUBTASK 72-21-00-210-010-F00

(2) If you find damage to the spinner front cone that is more than the limits, replace the spinner front cone, unless you are given other instructions, do these tasks:

- Spinner Cones - Removal, TASK 72-21-01-000-801-F00
- Spinner Cones Installation, TASK 72-21-01-400-801-F00.

G. Visually Examine the Spinner Rear Cone

SUBTASK 72-21-00-210-004-F00

(1) Examine the exposed areas of the spinner rear cone for damage (TASK 72-21-01-200-801-F00).

SUBTASK 72-21-00-210-011-F00

(2) If you find damage to the spinner rear cone that is more than the limits, replace the spinner rear cone, unless you are given other instructions, do these tasks:

- Spinner Cones - Removal, TASK 72-21-01-000-801-F00
- Spinner Cones Installation, TASK 72-21-01-400-801-F00.

H. Visually Examine the Fan Blades

SUBTASK 72-21-00-220-002-F00

> **WARNING**
> MAKE SURE YOU WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES, YOU CAN INJURE YOUR HANDS.

(1) Do a visual check of the exposed areas of the fan blades (TASK 72-21-02-200-801-F00).

NOTE: Fan blades removal is not required.

SUBTASK 72-21-00-210-012-F00

(2) If you find damage to the fan blade that is more than the limits, replace the fan blade, unless you are given other instructions, do this task: Fan Blade Replacement (Blade Pair), TASK 72-21-02-000-802-F00.

I. Visually Examine the Abradable Shroud

SUBTASK 72-21-00-210-008-F00

(1) Do a visual check of the abradable shroud for damage (TASK 72-24-02-200-801-F00).

SUBTASK 72-21-00-300-001-F00

(2) If you find damage that is more than these limits, do this task: Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00, unless you are given other instructions.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

J. Visually Examine the Fan Inlet Case

SUBTASK 72-21-00-210-009-F00

(1) Do a visual check of the exposed areas of the fan inlet case for damage (TASK 72-24-01-200-801-F00).

K. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-00-080-001-F00

> **WARNING** MAKE SURE THAT YOU REMOVE ALL TOOLS, PARTS OR UNWANTED MATERIAL FROM THE INLET COWL. THIS WILL PREVENT INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Remove the protective mat, STD-585, from the inlet cowl.

SUBTASK 72-21-00-080-002-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable engine start lever.

SUBTASK 72-21-00-040-005-F00

(3) For engine 1, do this step:

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-00-040-003-F00

(4) For engine 2, do this step:

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Spinner and Fan Blade Inspection
Figure 602/72-21-00-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Engine Inlet Inspection
Figure 603/72-21-00-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SPINNER CONES - REMOVAL/INSTALLATION

1. General

A. This procedure contains the following tasks:

(1) A removal of the spinner cones from the fan disk.

(a) This task includes a procedure to remove the retaining flange from the spinner rear cone (if it is necessary).

(2) An installation of the spinner cones.

(a) This task includes a procedure to install the retaining flange on the fan disk (if it is necessary).

TASK 72-21-01-000-801-F00

2. Spinner Cones - Removal

(Figure 401)

A. General

(1) The spinner cone is made of two parts:

(a) The spinner front cone.

(b) The spinner rear cone.

(2) For this task, the spinner front cone will be referred to as the front cone.

(3) For this task, the spinner rear cone will be referred to as the rear cone.

(4) As part of the Aircraft Maintenance Manual (AMM) validation program, this procedure has been validated at a customer site for the Jun-15-2012 revision.

B. References

Reference	Title
70-10-03-910-801-F00	Temporary Marking Procedures (P/B 201)
72-55-00-941-801-F00	Replacement of the LPT Shaft Plug O-ring (PRE-CFM-SB 72–0124) (P/B 201)
72-55-00-941-802-F00	Replacement of the CVT O-ring and Damper Seals (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2188	Tool Set - Jack Screws Part #: 856A1130G10 Supplier: 58828
SPL-2190	Pins - Guide, Spinner Rear Cone Part #: 856A3778G01 Supplier: 58828
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-858	Tag - DO NOT OPERATE

D. Location Zones

Zone	Area
411	Engine 1 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Zone	Area
421	Engine 2 - Engine

E. Prepare for the Removal

SUBTASK 72-21-01-040-001-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-01-040-002-F00

(2) Make sure that the engine start lever is in the CUTOFF position.

(a) Install a DO NOT OPERATE tag, STD-858, on the applicable engine start lever.

SUBTASK 72-21-01-480-001-F00

(3) Put a protective mat, STD-585, in the inlet cowl.

F. Spinner Cone Removal

SUBTASK 72-21-01-020-001-F00

(1) Remove the front cone [1] from the rear cone [4].

(a) Remove the six bolts [2] and the six washers [3].

(b) Install three jackscrews (P08) of jackscrews tool set, SPL-2188, into the jackscrew holes.

NOTE: There are nine holes on the front cone. Six holes are used to attach the front cone to the rear cone. The other three holes with jackscrews are used to disengage the front cone away from the rear cone.

(c) Turn the jackscrews until they touch the front flange of the rear cone [4].

(d) Tighten the jackscrews in a sequence order to disengage the front cone [1] from the rear cone [4].

(e) Remove the front cone [1].

(f) Remove the jackscrews from the front cone [1].

NOTE: If you find that the lug of the Low Pressure Turbine (LPT) shaft plug (Pre SB 72–0124) or center vent tube (Post SB 72–0124) is broken (Figure 402), remove the pieces. Replace the LPT shaft plug or the center vent tube at the next shop visit.

SUBTASK 72-21-01-020-002-F00

(2) Remove the rear cone [4] and the fan retaining flange [7] as an assembly.

CAUTION BE CAREFUL NOT TO DO DAMAGE TO THE FAN BLADES WHILE YOU REMOVE THE BALANCE SCREWS. DAMAGE TO EQUIPMENT COULD OCCUR.

(a) If you replace the rear cone [4], transfer the balance screws [8] to the replacement rear cone. Keep the same positions.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **CAUTION** USE ONE OF THE MARKERS THAT IS SHOWN IN THE REFERENCE. AN INCORRECT MARKER CAN CAUSE DAMAGE TO EQUIPMENT.

1) Make marks to show the relation between the rear cone balance screws [8] and the fan disk, refer to: (TASK 70-10-03-910-801-F00).

(b) Remove the twelve bolts [5] and twelve washers [6] that attach the rear cone [4] and fan retaining flange [7] to the fan disk.

NOTE: If it is necessary, you can remove the balance screws to get access to the bolts. Make sure that you make a mark and record the position of the balance screws for installation in their correct position. This is necessary to keep the rotor balanced.

> **CAUTION** MAKE SURE THAT YOU HOLD THE REAR CONE AND THE RETAINING FLANGE WHEN YOU DISCONNECT THEM FROM THE FAN DISK. IF YOU DO NOT HOLD THEM, THEY COULD FALL AND CAUSE DAMAGE TO EQUIPMENT.

(c) Install three guide pins, SPL-2190, in the fan disk as the support to guide the rear cone [4] and the fan retaining flange [7] during the removal.

NOTE: This is to make sure that the fan retaining flange does not fall.

> **CAUTION** DO NOT USE JACKSCREWS IF IT IS NOT NECESSARY TO REMOVE THE FAN RETAINING FLANGE FROM THE SPINNER CONE. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT COULD OCCUR.

(d) Pull with your hand the rear cone [4] and the fan retaining flange [7] to remove them as an assembly.

NOTE: If you find that the lug of the LPT shaft plug or center vent tube is broken (Figure 402), remove the pieces. Replace the LPT shaft plug or the center vent tube at the next shop visit.

SUBTASK 72-21-01-020-006-F00

(3) If it is necessary, do these steps to remove the fan retaining flange [7] from the rear cone [4]:

NOTE: This step is necessary if you replace the rear cone [4].

(a) Install the three jackscrews (P11) of jackscrews tool set, SPL-2188, equally spaced into the jackscrew holes on the rear flange of the rear cone [4].

(b) Turn the jackscrews until they touch the front flange of the fan retaining flange [7].

(c) Tighten the jackscrews in a clockwise direction and in a sequence order to disengage the retaining flange [7] from the rear cone [4].

(d) Remove the retaining flange [7].

(e) Remove the jackscrews from the rear cone [4].

G. OIL WETTING SPINNER CONES

SUBTASK 72-21-01-360-001-F00

(1) Oil wetting of the inner surface of the spinner cones, the fan disk and the fan shaft is not permitted.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) To correct the oil seepage, do this task: Replacement of the LPT Shaft Plug O-ring (PRE-CFM-SB 72–0124), TASK 72-55-00-941-801-F00 or Replacement of the CVT O-ring and Damper Seals, TASK 72-55-00-941-802-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Spinner Installation
Figure 401/72-21-01-990-801-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Spinner Installation
Figure 401/72-21-01-990-801-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 THE SEATING AT THE 12 LOCATION (2X6) IS CORRECT WHEN YOU CANNOT PUT A FEELER GAGE [THICKNESS 0.001 INCH (0.02 mm)] BETWEEN PARTS.

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Spinner Installation
Figure 401/72-21-01-990-801-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Inspection of the Lug of LPT Shaft Plug or Center Vent Tube
Figure 402/72-21-01-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-01-400-801-F00

3. Spinner Cones Installation

(Figure 401)

A. General

(1) For this task, the spinner front cone will be referred to as the front cone.

(2) For this task, the spinner rear cone will be referred to as the rear cone.

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2190	Pins - Guide, Spinner Rear Cone Part #: 856A3778G01 Supplier: 58828
SPL-9286	Pins - Guide, Spinner Cone Part #: 856A3409G01 Supplier: 58828
STD-442	Gun - Heat, 180 deg. F (82 deg. C) Maximum Output Temperature
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-858	Tag - DO NOT OPERATE

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00601 [CP2101]	Vaseline - Graphite Mineral	
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G Rapid Plus	
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	
D00673 [CP2569]	Lubricant - Molybdenum Disulfide, Solid - Dow Corning G-n Metal Assembly	
D50019 [CP2444]	Lubricant - Molydisulfide Solid Film, Paste - Molykote G-n Plus	
D50308 [CP 2171]	Lubricant - MOS2 Solid	MIL-L-8937

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Installation

SUBTASK 72-21-01-410-001-F00

(1) Make sure the retaining ring [9] is in its position on the fan disk.

F. Spinner Cones Installation

SUBTASK 72-21-01-420-001-F00

(1) If the fan retaining flange [7] was removed from the rear cone [4], do these steps to install the fan retaining flange [7] and then, the rear cone [4]:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Do these steps to install the fan retaining flange [7] on the fan disk:

1) Lubricate three guide pins, SPL-2190 with oil, D00599 [CP2442].

2) Install the three guide pins, SPL-2190, equally spaced on the fan disk with one guide pin in the offset hole.

3) Lubricate the locating threaded pins on the aft side of the fan retaining flange [7] with Molykote G Rapid Plus lubricant, D00640 [CP2104], Dow Corning G-n Metal Assembly lubricant, D00673 [CP2569] or Dow Corning 321 lubricant, D00641 [CP5062].

4) Install the fan retaining flange [7] on the fan disk:

NOTE: If some platforms have disengaged bushings and the fan retaining flange [7] moves forward after the fan retaining flange installation, there can be an acceptable clearance between the aft flange of the fan retaining flange [7] and the front face of the fan disk forward flange before you apply the final torque.

a) Align the offset hole of the fan retaining flange [7] with the offset guide pin.

NOTE: The offset hole of the fan retaining flange [7] is identified with a spherical indentation on the surface.

b) Fully engage the fan retaining flange [7] on the fan disk forward flange and the locating pins in the platform holes.

(b) Do these steps to install the rear cone [4]:

CAUTION

MAKE SURE THAT YOU INSTALL THE FAN RETAINING FLANGE [7] ON THE FAN DISK. DAMAGE TO ENGINE PARTS COULD OCCUR.

1) Lightly lubricate the threads of the 12 bolts [5] with graphite mineral vaseline, D00601 [CP2101].

WARNING

MAKE SURE THAT YOU WEAR GLOVES WHEN YOU HANDLE THE REAR CONE. THE AFT FLANGE OF THE REAR CONE WILL BE HOT WHEN YOU INCREASE THE TEMPERATURE OF THE AFT FLANGE FOR THE INSTALLATION. INJURY CAN OCCUR.

2) Increase the temperature of the aft flange of the rear cone [4] to approximately 140°F (60°C) with a 180 deg. F (82 deg. C) maximum output temperature heat gun, STD-442.

NOTE: Use a Thermocouple Contact Probe to make sure you increase the temperature of the aft flange of the rear cone [4] to the correct temperature.

3) Align the offset hole of the rear cone [4] with the offset guide pin.

NOTE: The offset hole of the fan retaining flange [7] is identified with a spherical indentation on the surface.

4) Engage the rear cone [4] on the fan retaining flange [7].

5) Install the nine bolts [5] and washers [6] and tighten by hand until the rear cone [4] is fully engaged on the fan retaining flange [7].

a) Make sure that all the bolts [5] go through the flanges of the fan disk, the rear cone [4] and the fan retaining flange [7].

6) Let the rear cone [4] cool to ambient temperature.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

7) Remove the three guide pins, SPL-2190.

8) Install the three remaining bolt [5] and washers [6].

a) Cross-tighten the bolt [5] to 135 in-lb (15.3 N·m) - 165 in-lb (18.6 N·m).

(c) Do the clearance check for the correct installation of the rear cone [4] and retaining flange [7] that follows:

SUBTASK 72-21-01-420-004-F00

(2) If the fan retaining flange [7] assembled with the rear cone [4], do these steps to install the rear cone [4] and fan retaining flange [7] on the fan disk:

(a) Lubricate three guide pins, SPL-2190 with oil, D00599 [CP2442].

(b) Install the three guide pins, SPL-2190, equally spaced on the fan disk with one guide pin in the offset hole.

(c) Lubricate the locating threaded pins on the aft side of the fan retaining flange [7] with Molykote G Rapid Plus lubricant, D00640 [CP2104], Dow Corning G-n Metal Assembly lubricant, D00673 [CP2569] or Dow Corning 321 lubricant, D00641 [CP5062].

(d) Lubricate the threads of the bolts [5] with graphite mineral vaseline, D00601 [CP2101].

(e) Align the offset hole of the rear cone [4] with the offset guide pin.

(f) Install the rear cone [4] and the fan retaining flange [7] assembly to the forward flange of the fan disk:

NOTE: If some platforms have disengaged bushings and the fan retaining flange [7] moves forward after the fan retaining flange installation, there is an acceptable clearance between the aft flange of the fan retaining flange [7] and the front face of the fan disk forward flange.

1) Engage the locating pins of the fan retaining flange [7] into the front holes of the inter fan blade platforms and the scallops of the fan retaining flange [7] into the scallops of the retaining ring [9].

2) Equally space and then install the three bolts [5] and three washers [6] through the fan retaining flange [7] and through the rear cone [4] into the fan disk.

3) Cross-tighten the bolts [5] to 135 in-lb (15.3 N·m) - 165 in-lb (18.6 N·m).

4) Remove the three guide pins, SPL-2190.

5) Install the remaining nine bolts [5] and washer [6] through the fan retaining flange [7] and through the rear cone [4] into the fan disk.

6) Cross-tighten the bolts [5] to 135 in-lb (15.3 N·m) - 165 in-lb (18.6 N·m).

(g) Do the clearance check for the correct installation of the rear cone [4] and retaining flange [7] that follows:

SUBTASK 72-21-01-211-003-F00

CAUTION: MAKE SURE THAT THE CLEARANCE BETWEEN THE REAR CONE AND THE FAN RETAINING FLANGE IS CORRECT. THE INCORRECT CLEARANCE CAN CAUSE DAMAGE TO THE EQUIPMENT.

(3) Do this clearance check for the correct installation of the rear cone [4] and retaining flange [7]:

(a) Examine, at six locations with a feeler gage, the clearance between the aft edge of the rear cone [4] and the inter-fan blade platforms:

NOTE: You must do a check of this clearance with the fan blade pulled on its forward stop.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) The clearance must be in 0 in. (0 mm)-0.0433 in. (1.1 mm).

(b) Make sure at six locations, that there is no clearance between the aft flange of the rear cone [4] and the forward flange of the fan retaining flange [7].

1) The installation is correct if you cannot put a 0.001 in. (0.02 mm) feeler gage at six different locations.

2) If the clearance is not correct, make sure the bolts [5] are tightened to the correct torque.

(c) Make sure at six locations, that there is no clearance between the aft flange of the fan retaining flange [7] and the forward flange of the fan disk.

1) The installation is satisfactory if you cannot put a 0.001 in. (0.02 mm) feeler gage at six locations.

2) If the clearance is not correct, make sure that the bolts [5] are tightened to the correct torque.

3) If the clearance is not correct, remove the rear cone [4] and the fan retaining flange [7], and find the cause of the problem. Reinstall the rear cone and retaining flange.

SUBTASK 72-21-01-410-005-F00

(4) If you removed some of the balance screw [8] from the rear cone [4], install the balance screw [8] in their correct positions.

(a) Lightly coat the balance screw [8] with Molykote G-n Plus lubricant, D50019 [CP2444] or Lubricant, D50308 [CP 2171].

(b) Tighten the balance screw [8] to 68 in-lb (7.7 N·m) - 74 in-lb (8.4 N·m).

SUBTASK 72-21-01-420-002-F00

(5) Do these steps to install the front cone [1] (Figure 401):

(a) Install the front cone [1]:

1) Lubricate three guide pins, SPL-9286 with oil, D00599 [CP2442].

2) Install the three guide pins, SPL-9286, equally spaced on the front flange of the rear cone [4] with one guide pin in the offset hole.

NOTE: The offset hole of the rear cone [4] is identified with a spherical indentation on its forward mounting flange.

WARNING MAKE SURE THAT YOU WEAR GLOVES WHEN YOU HANDLE THE FRONT CONE. YOU COULD TOUCH THE HOT FRONT FLANGE OF THE REAR CONE WHEN YOU INCREASE THE TEMPERATURE FOR THE INSTALLATION. INJURY CAN OCCUR.

3) Increase the temperature of the forward flange of the rear cone [4] to approximately 140°F (60°C) with a heat 180 deg. F (82 deg. C) maximum output temperature heat gun, STD-442.

NOTE: Use a Thermocouple Contact Probe to make sure that you increase the temperature of the forward flange to reach correct temperature.

4) Align the offset hole of the front cone [1] with the offset guide pin.

5) With the use of the guide pins, engage the front cone [1] to the rear cone [4].

6) Lubricate the threads of the bolts [2] with graphite mineral vaseline, D00601 [CP2101].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

7) Equally space and then install the three bolt [2] and three washer [3] through the front cone [1] into the rear cone [4].
   a) Hand tighten the bolts [2] until the front cone [1] is fully engaged.
8) Let the temperature of the front cone [1] decrease to the ambient temperature.
9) Remove the guide pins, SPL-9286 from the rear cone [4].
10) Install the remaining three bolts [2] and three washers [3].
   a) Cross-tighten the six bolt [2] to 110 in-lb (12.4 N·m) - 120 in-lb (13.6 N·m).

      NOTE: Appearance of a gap between the front spinner cone and rear spinner cone seating surfaces may be the result of the chamfer added to the rear spinner cone at manufacturing.

(b) Make sure that the front cone [1] is fully engaged on the rear cone [4]:
   1) If the front cone [1] is not fully engaged, make sure the bolts [2] are tightened to the correct torque.
      a) If the front cone [1] is not fully engaged and the bolts [2] are tight, remove the front cone [1] and find the cause of the problem.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-01-840-003-F00

> **CAUTION**: MAKE SURE THAT THERE ARE NO PARTS, TOOLS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. DAMAGE TO EQUIPMENT COULD OCCUR AT THE SUBSEQUENT ENGINE START.

(1) Remove the protective mat, STD-585 from the lower surface of the inlet cowl.

SUBTASK 72-21-01-440-001-F00

(2) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-01-080-001-F00

(3) Remove the DO NOT OPERATE tag, STD-858 from the start lever for the applicable engine.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SPINNER CONE - INSPECTION/CHECK

1. General

A. This procedure has these tasks:

(1) The inspection of the spinner cone.

(2) The inspection of the retaining flange.

TASK 72-21-01-200-801-F00

2. Spinner Cone and Retaining Flange Inspection

(Figure 601)

A. General

(1) The spinner cone is an assembly of two parts (the spinner front cone and the spinner rear cone).

(2) During the removal of the spinner rear cone, the rear cone and fan retaining flange are removed as an assembly.

(3) This task includes an inspection of the fan retaining flange.

B. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-300-801-F00	Replace or Retighten the Threaded Pins on the Fan Retaining Flange (P/B 801)
72-21-01-300-802-F00	Repair the Fan Retaining Flange Slots (P/B 801)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-01-900-801-F00	Fan Retaining Flange Replacement (P/B 801)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-200-801-F00	Fan Module Inspection (P/B 601)
72-21-02-300-804-F00	Replace or Retighten the Fan Disk Mid Lug Threaded Pins (P/B 801)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-1096	Micrometer - Depth, 0-1 inch, Readable to 1/1000 inch

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Prepare for Spinner Cone Inspection

SUBTASK 72-21-01-860-001-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-01-860-002-F00

(2) Make sure the start levers are in the CUTOFF position and install DO-NOT-OPERATE tags.

SUBTASK 72-21-01-480-002-F00

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(3) Install a protective mat, STD-585 in the fan inlet cowl.

SUBTASK 72-21-01-480-003-F00

(4) Use micrometer (0-1 inch, readable to 1/1000 inch), STD-1096 to determine the extent of damage during examinations.

SUBTASK 72-21-01-020-003-F00

(5) If there is evidence of damage to exposed areas that are visible, do this step:

NOTE: “Exposed areas” refer to areas that are readily visible when the fan blades and all other fan components are installed in the fan module.

(a) Remove the spinner front and rear cones for the full inspection with this condition (TASK 72-21-01-000-801-F00).

F. Examine the Spinner Front Cone

SUBTASK 72-21-01-210-002-F00

(1) Do a visual check of the spinner front cone for damage as follows (Figure 601):

NOTE: If you find damage that is more than the limits, replace the spinner front cone, unless you are given other instructions.

(a) Cracks, tears and local distortion

1) Not serviceable.

(b) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.02 inch (0.5 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

b) A Continue-In-Service limit of 100 cycles or 150 flight hours is permitted if the damage is more than 0.02 inch (0.5 mm) in depth.

(c) Missing white spiral-shaped mark (white anti-erosion paint)

1) 100 percent of missing white anti-erosion paint is permitted.

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(d) Missing anodized coating (black sulfuric anodizing) or black anti-erosion paint

1) 100 percent of missing coating or black anti-erosion paint is permitted if no corrosion mark is seen (white mushroom pattern).

2) A Continue-In-Service limit of 100 cycles or 150 flight hours is permitted if corrosion mark is seen.

(e) Erosion of parent material on the external contour surface

1) Erosion is permitted with these limits:

a) Not more than 0.02 inch (0.5 mm) in depth.

b) A Continue-In-Service limit of 100 cycles or 150 flight hours is permitted if the damage is more than 0.02 inch (0.5 mm) in depth.

(f) Erosion of parent material on the attachment bolt holes and jackscrew hole recess edges

1) Erosion is permitted without limit.

SUBTASK 72-21-01-210-007-F00

(2) Do a visual check of the mating surface (Surface B) and the rabbet diameter (Diameter A) that mate with the spinner rear cone for damage as follows:

(a) Nicks, dents, scratches and corrosion marks

1) All damage is permitted with these limits:

a) Not more than 0.004 inch (0.10 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).

b) A Continue-In-Service limit of 100 cycles or 150 flight hours is permitted if the damage is more than 0.004 inch (0.10 mm) in depth.

(b) Wear on the rabbet diameter (Diameter A)

1) Wear is permitted without limit.

SUBTASK 72-21-01-210-008-F00

(3) Do a visual check of the thread inserts (three equally spaced jackscrew holes) for damage as follows:

(a) Missing or loose thread insert

1) Not permitted.

(b) Damaged internal thread

1) Not permitted.

SUBTASK 72-21-01-210-014-F00

(4) Do a visual check of spinner front cone inner cavity for oil wetting:

(a) If there are signs of oil wetting, examine the fan disk and fan shaft inner cavity for oil wetting (TASK 72-21-02-200-801-F00).

G. Examine the Spinner Rear Cone

SUBTASK 72-21-01-210-003-F00

(1) Do a visual check of the spinner rear cone for damage as follows (Figure 601):

NOTE: If you find damage that is more than the limits, replace the spinner rear cone, unless you are given other instructions.

(a) Cracks, tears and local distortion

1) Not permitted.

(b) Nicks, dents and scratches

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1) All damage is permitted with these limits:

a) Not more than 0.01 inch (0.25 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

b) A Continue-In-Service limit of 100 cycles or 150 flight hours is permitted if the damage is more than 0.01 inch (0.25 mm) in depth.

(c) Damage of surface protection (yellow hard anodizing)

1) 100 percent of missing coating is permitted if no corrosion mark is seen (white mushroom pattern).

a) A Continue-In-Service limit of 100 cycles or 150 flight hours is permitted if corrosion mark is seen.

SUBTASK 72-21-01-210-009-F00

(2) Do a visual check of the mating surface (Surface E) and the rabbet diameter (Diameter C) that mate with the spinner front cone for damage as follows:

(a) Nicks, dents, scratches and corrosion marks

1) All damage is permitted with these limits:

a) Not more than 0.004 inch (0.10 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00)

b) A Continue-In-Service limit of 100 cycles or 150 flight hours is permitted if the damage is more than 0.004 inch (0.10 mm) in depth.

(b) Wear on the rabbet diameter (Diameter C)

1) Wear is permitted without limit.

(c) Contact marks on three equally spaced spot facings on mating surface (Surface E) front cone extraction screw galling

1) Contact marks are permitted without limit.

SUBTASK 72-21-01-210-010-F00

(3) Do a visual check of the mating surface (Surface B) and the rabbet diameter (Diameter A) that mate with the fan disk for damage as follows:

(a) Nicks, dents, scratches and corrosion marks

1) All damage is permitted with these limits:

a) Not more than 0.004 inch (0.10 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00)

b) A Continue-In-Service limit of 100 cycles or 150 flight hours is permitted if the damage is more than 0.004 inch (0.10 mm) in depth.

(b) Wear on the rabbet diameter (Diameter A)

1) Wear is permitted with these limits:

a) Not more than 0.004 inch (0.10 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).

b) A Continue-In-Service limit of 100 cycles or 150 flight hours is permitted if the damage is more than 0.004 inch (0.10 mm) in depth.

(c) Damaged jackscrew hole internal threads

1) All damage is permitted with this limit:

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a) A maximum of three damaged jackscrew holes is permitted with a minimum of one serviceable hole between two damaged holes.

SUBTASK 72-21-01-210-004-F00

(4) Do a visual check of the crimped self-locking nuts (Type A) for damage as follows:

(a) Missing self-locking nut

1) Not permitted.

(b) Loose self-locking nut

1) Looseness is permitted with this limit:

a) Not more than 0.008 inch (0.2 mm) of axial and/or radial looseness.

(c) Damaged internal threads

1) Not permitted.

(d) Loss of run-on torque

1) Not permitted.

SUBTASK 72-21-01-210-005-F00

(5) Do a visual check of the crimped self-locking nuts (Type B) for damage as follows:

NOTE: Do not remove the balance screws from the rear spinner cone to do this procedure.

(a) Missing self-locking nuts

1) Not permitted.

(b) Loose self-locking nut

1) Looseness is permitted with this limit:

a) Not more than 0.008 inch (0.2 mm) of axial and/or radial looseness.

(c) Damaged internal threads (if balance screws are removed)

1) Not permitted.

(d) Loss of run-on torque (if balance screws are removed)

1) Not permitted.

SUBTASK 72-21-01-210-011-F00

(6) Do a visual check of the rear cone aft end surface (Surface D) for damage as follows:

(a) Contact marks because of fan blade platform axial displacement

1) Contact marks are permitted without limit.

(b) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.02 inch (0.5 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).

b) A Continue-In-Service limit of 100 cycles or 150 flight hours is permitted if the damage is more than 0.02 inch (0.5 mm) in depth.

SUBTASK 72-21-01-210-015-F00

(7) Do a visual check of spinner rear cone inner cavity for oil wetting:

(a) If there are signs of oil wetting, examine the fan disk and fan shaft inner cavity for oil wetting (TASK 72-21-02-200-801-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H. Examine the Retaining Flange

SUBTASK 72-21-01-211-001-F00

(1) Examine the retaining flange for damage (Figure 602):

NOTE: If you find damage to the retaining flange that is more than the limits, replace the retaining flange (TASK 72-21-01-900-801-F00), unless you are given other instructions.

Do not remove the threaded pins from retaining flange to do this inspection.

(a) Cracks

1) Not serviceable

(b) Nicks, dents and scratches (except in areas H, I, J, Q, locating diameters and mating surfaces)

1) All damage is permitted with this limit:

a) The damage is not more than 0.006 inch (0.15 mm) in depth.

(c) Nicks, dents and scratches on the surfaces E, F and G and locating diameters K and M

1) All damage is permitted with this limit:

a) The damage is not more than 0.006 inch (0.15 mm) in depth.

(d) Wear or contact marks due to bolt head galling in area J (extraction screw spot facings)

1) All damage is permitted with this limit:

a) Not more than 0.008 inch (0.2 mm) in depth.

(e) Wear on surface E due to contact with the platform bushings

1) All damage is permitted with these limits:

a) The damage is not more than 0.004 inch (0.10 mm) in depth.

b) A Continue-In-Service extension of 3000 flight cycles or 5000 flight hours, whichever comes first, is permitted if the damage is not more than 0.006 inch (0.15 mm) in depth.

c) A Continue-In-Service extension of 100 flight cycles or 250 flight hours, whichever comes first, is permitted if the damage is not more than 0.008 inch (0.20 mm) in depth.

(f) Look for damage in area Q (Slots)

1) Nicks and dents are permitted with these limits:

a) The damage is not more than 0.002 inch (0.05 mm) in depth.

b) A Continue-In-Service extension of 3000 flight cycles or 5000 flight hours, whichever comes first, is permitted if the damage is not more than 0.004 inch (0.10 mm) in depth.

c) A Continue-In-Service extension of 100 flight cycles or 250 flight hours, whichever comes first, is permitted if the damage is not more than 0.008 inch (0.20 mm) in depth.

2) Scratches are permitted with these limits:

a) The damage is not more than 0.0008 inch (0.02 mm) in depth.

b) A Continue-In-Service extension of 3000 flight cycles or 5000 flight hours, whichever comes first, is permitted if the damage is not more than 0.002 inch (0.05 mm) in depth.

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c) A Continue-In-Service extension of 100 flight cycles or 250 flight hours, whichever comes first, is permitted if the damage is not more than 0.003 inch (0.08 mm) in depth.

LOM ALL PRE CFM56-7B-72-0366

3) Wear in slot edge due to contact with the fan blade spacer in area Q

a) The damage is not more than 0.002 inch (0.05 mm) in depth,

b) Wear on the filet radius more than the above limit must be blended per TASK 72-21-01-300-802-F00.

LOM ALL

(g) Look for damage in area H

1) Nicks and dents are permitted with this limit:

a) The damage is not more than 0.006 inch (0.15 mm) in depth.

2) Scratches are permitted with these limits:

a) The damage is not more than 0.002 inch (0.05 mm) in depth.

b) A Continue-In-Service extension of 3000 flight cycles or 5000 flight hours, whichever comes first, is permitted if the damage is not more than 0.004 inch (0.10 mm) in depth.

c) A Continue-In-Service extension of 100 flight cycles or 250 flight hours, whichever comes first, is permitted if the damage is not more than 0.006 inch (0.15 mm) in depth.

(h) Look for damage in area I

NOTE: Removal of the threaded pins and inspection of the attachment holes (Diameter P) are to be performed only if the threaded pins are found loose or other condition indicates a requirement. Refer to the appropriate instructions to retighten the threaded pins (TASK 72-21-01-300-801-F00).

1) Nicks and dents are permitted with these limits:

a) The damage is not more than 0.0008 inch (0.02 mm) in depth.

b) A Continue-In-Service extension of 3000 flight cycles or 5000 flight hours, whichever comes first, is permitted if the damage is not more than 0.002 inch (0.05 mm) in depth.

c) A Continue-In-Service extension of 100 flight cycles or 250 flight hours, whichever comes first, is permitted if the damage is not more than 0.003 inch (0.08 mm) in depth.

2) Scratches:

a) Not serviceable.

b) A Continue-In-Service extension of 100 flight cycles or 250 flight hours, whichever comes first, is permitted if the damage is not more than 0.0008 inch (0.02 mm) in depth.

3) Thread marks or hole ovalization:

a) Not serviceable.

LOM ALL POST SB 737-CFM56-7B-72-0678 OR POST SB 737-CFM56-7B-72-0325

SUBTASK 72-21-01-210-016-F00

(2) Examine the axial stop pins for damage (Figure 604):

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LOM ALL POST SB 737-CFM56-7B-72-0678 OR POST SB 737-CFM56-7B-72-0325 (Continued)

(a) Rubbing wear, rips, tears and missing pins

1) There is no limit of the quantity of missing pins and all damage is permitted.

LOM ALL

SUBTASK 72-21-01-211-002-F00

(3) Examine the threaded pins for damage (Figure 603):

NOTE: Do not remove threaded pins from retaining flange to do this inspection.

If you find damage to the threaded pin that is more than the limits, replace the threaded pins (TASK 72-21-01-300-801-F00), unless you are given other instructions.

(a) Examine the threaded pins for damage:

1) Cracks (head end)

a) Not serviceable.

2) Nicks, dents and scratches on the pin diameter (threaded end)

a) All damage is permitted with this limit:

<1> Not more than 0.02 inch (0.50 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

(b) Missing threaded pins

1) Not Serviceable.

2) Examine the holes in the fan retaining flange for obvious damage.

3) Remove and discard the fan blade platforms. Refer to these tasks: Fan Blade Removal (Complete Set), TASK 72-21-02-000-801-F00 and Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

4) Remove and discard the fan disk mid-flange threaded pins and nuts. Refer to this task: Replace or Retighten the Fan Disk Mid Lug Threaded Pins, TASK 72-21-02-300-804-F00.

5) Replace the threaded pins and nuts. Refer to this task: Replace or Retighten the Threaded Pins on the Fan Retaining Flange, TASK 72-21-01-300-801-F00.

(c) Loose threaded pins

1) Remove the loose threaded pins for a visual inspection:

a) If you find damage on the threaded pins, replace them (TASK 72-21-01-300-801-F00).

b) Examine the holes in the fan retaining flange for obvious damage.

c) Examine the nuts for damage.

(d) Incorrectly installed threaded pins (pin head points forward)

1) Remove and discard the threaded pins and nuts.

2) Remove and discard the fan blade platforms.

3) Remove and discard the fan disk mid-flange threaded pins and nuts.

4) Remove the retaining flange, spinner rear cone and fan disk for a full piece part inspection (refer to applicable Engine Shop Manual).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-01-420-003-F00

(1) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-21-01-080-002-F00

> **CAUTION**
> MAKE SURE THAT YOU REMOVE THE TOOLS, PARTS, AND UNWANTED MATERIAL FROM THE INLET COWL. DAMAGE TO THE ENGINE COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(2) Remove the protective mat, STD-585 from the fan inlet cowl.

SUBTASK 72-21-01-080-003-F00

(3) Remove the DO-NOT-OPERATE tag from the start levers.

SUBTASK 72-21-01-860-003-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Spinner Cone Inspection
Figure 601/72-21-01-990-802-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Spinner Cone Inspection
Figure 601/72-21-01-990-802-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(EXAMPLE)

A

J67696 S0000173985_V2

Fan Retaining Flange Inspection
Figure 602/72-21-01-990-805-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(ELASTOMER AXIAL STOP PINS NOT SHOWN)

A-A

B-B

(ELASTOMER AXIAL STOP PINS NOT SHOWN)

C-C

J67511 S0000173990_V2

Fan Retaining Flange Inspection
Figure 602/72-21-01-990-805-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

J67537 S0000173992_V2

Fan Retaining Flange Threaded Pin
Figure 603/72-21-01-990-806-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

J67559 S0000174113_V2

Fan Retaining Flange Axial Stop Pin
Figure 604/72-21-01-990-808-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SPINNER CONES - REPAIR

1. General

A. This procedure has these tasks:

(1) Fan Retaining Flange Replacement

(2) Replace or Retighten the Threaded Pins on the Fan Retaining Flange

(3) Repair the Fan Retaining Flange Slots.

TASK 72-21-01-900-801-F00

2. Fan Retaining Flange Replacement

A. General

(1) Use this task to replace the fan retaining flange.

B. References

Reference	Title
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Replacement

SUBTASK 72-21-01-010-001-F00

(1) Remove the rear cone and the fan retaining flange as an assembly (TASK 72-21-01-000-801-F00).

E. Fan Retaining Flange Replacement

SUBTASK 72-21-01-020-005-F00

(1) Remove the fan retaining flange from the spinner rear cone (TASK 72-21-01-000-801-F00).

SUBTASK 72-21-01-010-002-F00

(2) Remove the 24 threaded pins from the fan retaining flange (TASK 72-21-01-300-801-F00).

LOM ALL POST SB 737-CFM56-7B-72-0678 OR POST SB 737-CFM56-7B-72-0325

SUBTASK 72-21-01-030-001-F00

(3) Remove the axial stop pins from the aft face of the fan retaining flange.

LOM ALL

SUBTASK 72-21-01-410-002-F00

(4) Install the 24 threaded pins on the new retaining flange (TASK 72-21-01-300-801-F00).

LOM ALL POST SB 737-CFM56-7B-72-0678 OR POST SB 737-CFM56-7B-72-0325

SUBTASK 72-21-01-430-001-F00

(5) Install the axial stop pins in the aft face of the new retaining flange.

(a) Install the stop pins as a full set.

1) PRE-CFM-SB 72-0678 stop pins are P/N 340-252-401-0. POST-CFM-SB 72-0678 stop pins are P/N 340-252-402-0.

LOM ALL

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-21-01-420-005-F00

(6) Install the fan retaining flange on the fan disk (TASK 72-21-01-400-801-F00).

F. Put the Airplane Back To Its Usual Condition

SUBTASK 72-21-01-410-008-F00

(1) Install the spinner rear and front cones (TASK 72-21-01-400-801-F00).

——— END OF TASK ———

TASK 72-21-01-300-801-F00

3. Replace or Retighten the Threaded Pins on the Fan Retaining Flange

A. General

(1) Use this procedure to replace or retighten applicable threaded pins on the fan retaining flange.

B. References

Reference	Title
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D00601 [CP2101]	Vaseline - Graphite Mineral	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Procedure

SUBTASK 72-21-01-010-006-F00

(1) Remove the rear cone and the fan retaining flange as an assembly. Do this task: Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

F. Procedure

SUBTASK 72-21-01-020-007-F00

(1) Remove the threaded pin from the fan retaining flange (Figure 801):

(a) Install a standard wrench on the threaded pin head and loosen the threaded pin.

(b) Remove the threaded pin and nut.

SUBTASK 72-21-01-110-002-F00

CAUTION

KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(2) Remove oil and grease with a clean white cloth moistened with acetone solvent, B01058 [CP1039] or alcohol, B00676 [CP1041] from the removed parts, attachment holes and surrounding area.

SUBTASK 72-21-01-420-006-F00

(3) Do these steps to install the threaded pin on the fan retaining flange:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101] to the threads and below the head of the threaded pin.

> **CAUTION**
> INSTALL THE THREADED PINS WITH THEIR HEAD REARWARD. IF YOU INSTALL THEM INCORRECTLY, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(b) Install the threaded pin with the head rearward on the fan retaining flange (Figure 801).

(c) Install the nut and tighten with your hand.

(d) Tighten the threaded pin with this sequence of steps:

1) Tighten the threaded pin to 140-160 inch-pounds (16-18 newton-meters).
2) Loosen the pin by a quarter-turn or a half-turn.
3) Retighten the pin to 140-160 inch-pounds (16-18 newton-meters).

(e) Remove any excess grease.

G. Put The Airplane Back To Its Usual Condition

SUBTASK 72-21-01-410-006-F00

(1) Install the fan retaining flange and spinner cones. Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Threaded Pin Installation
Figure 801/72-21-01-990-809-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-01-300-802-F00

4. Repair the Fan Retaining Flange Slots

(Figure 802)

A. General

(1) This task is to do a blend repair of the 24 slots in the fan retaining flange.

B. References

Reference	Title
70-40-01-910-801-F00	Fluorescent Penetrant Inspection (Water Washable) (P/B 201)
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G01043	Cloth - Lint-free	
G02449 [CP2189]	Cloth - Abrasive, Silicone Carbide, 150 Grit - Durite G422	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Procedure

SUBTASK 72-21-01-020-009-F00

(1) Remove the retaining flange (TASK 72-21-01-000-801-F00).

SUBTASK 72-21-01-030-002-F00

(2) Remove the 24 threaded pins from the fan retaining flange (TASK 72-21-01-300-801-F00).

LOM ALL POST SB 737-CFM56-7B-72-0678 OR POST SB 737-CFM56-7B-72-0325

SUBTASK 72-21-01-030-003-F00

(3) Remove the axial stop pins from the aft face of the fan retaining flange.

LOM ALL

F. Repair Procedure

SUBTASK 72-21-01-110-005-F00

CAUTION

KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(1) Clean the repair areas with lint-free cloth, G01043 wet with alcohol, B00676 [CP1041] or acetone solvent, B01058 [CP1039].

SUBTASK 72-21-01-120-001-F00

(2) Do these steps to remove the wear and contact marks from the slot corners:

NOTE: When the slot repair is necessary for one slot, you should also repair all of the 24 slots whatever their visual condition.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING REMOVE THE TITANIUM PARTICLES WHILE YOU DO THE REPAIR. DO NOT LET TITANIUM PARTICLES COLLECT. TITANIUM PARTICLES CAN CAUSE A FIRE.

CAUTION DO NOT CAUSE TOO MUCH HEAT DURING THE BLEND REPAIR. TOO MUCH HEAT CAN MAKE THE PART WEAK.

(a) Use a low speed power tool with the correct titanium grinding tool (CFMI CFM56 Standard Practices Manual 70-41-12).

(b) During the repair, make sure there are no changes to the retaining flange shape over the transition area and remove a minimum of the base metal along with the damage depth.

(c) If you use power tools during the repair, regularly touch the retaining flange with a bare hand.

1) If the flange is too hot to the touch, let it cool before you continue.

(d) Complete the repair with strips of Durite G422 cloth, G02449 [CP2189] grade 150 or 180 used dry (CFMI CFM56 SPM 70-41-11). The repair area should make a smooth transition into the surrounding area.

(e) Finish the repair with strips of Durite G422 cloth, G02449 [CP2189] grade 400 or 800 used dry to get a surface finish as close to the original surface finish.

(f) Visually examine the repair area and make sure the damage is removed. Sharp grooves are not permitted.

SUBTASK 72-21-01-211-004-F00

(3) Examine the repair area for the correct dimensions (Table 801) and make sure the surface finish is at least the same as the adjacent area.

Table 801/72-21-01-993-802-F00 Repair Dimensions

DESCRIPTION	MINIMUM FINISH DIMENSION	MAXIMUM FINISH DIMENSION
DIMENSION K	0.002 inch (0.05 mm)	0.051 inch (1.29 mm)
RADIUS R1		0.335 inch (8.5 mm)
RADIUS R2		0.008 inch (0.2 mm)
DIMENSION P		0.020 inch (0.5 mm)
DIMENSION H		0.020 inch (0.5 mm)

(a) If the dimensions or the surface finish of the repair area is not in the limits, do the blend repair again.

SUBTASK 72-21-01-110-006-F00

(4) Clean the repair areas with lint-free cloth, G01043 wet with alcohol, B00676 [CP1041] or acetone solvent, B01058 [CP1039].

SUBTASK 72-21-01-230-003-F00

(5) Do this task: Fluorescent Penetrant Inspection (Water Washable), TASK 70-40-01-910-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-01-430-002-F00

(1) Install the 24 threaded pins on the new retaining flange (TASK 72-21-01-300-801-F00).

LOM ALL POST SB 737-CFM56-7B-72-0678 OR POST SB 737-CFM56-7B-72-0325

SUBTASK 72-21-01-430-003-F00

(2) Install the axial stop pins in the aft face of the new retaining flange.

(a) Install the stop pins as a full set.

1) PRE-CFM-SB 72-0678 stop pins are P/N 340-252-401-0. POST-CFM-SB 72-0678 stop pins are P/N 340-252-402-0.

LOM ALL

SUBTASK 72-21-01-420-008-F00

(3) To install the retaining flange, do these tasks (TASK 72-21-01-400-801-F00):

(a) Install the retaining flange on the fan disk.

(b) Install the spinner rear cone.

(c) Install the spinner front cone.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

M48242 S0006582395_V2

Retaining Flange Slot Repair
Figure 802/72-21-01-990-811-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN BLADE - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) A removal of a complete set of fan blades

(2) An installation of a complete set of fan blades

(3) A replacement of a complete set of fan blades

(4) A replacement of one pair (or pairs) of fan blades.

(a) This task includes the replacement of one fan blade.

TASK 72-21-02-000-801-F00

2. Fan Blade Removal (Complete Set)

(Figure 401, Figure 402, Figure 403, Figure 404, and Figure 405)

A. General

(1) To get access to the fan blades through the inlet cowl, remove the spinner front and rear cones.

(2) Each engine has twenty-four fan blades which are installed in the fan disk.

(3) Each fan blade is attached with a fan blade spacer and held in its position with a platform.

B. References

Reference	Title
70-10-03-910-801-F00	Temporary Marking Procedures (P/B 201)
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-13625	Slide Hammer - Threaded Tip Part #: CJ93B Supplier: 55719 Opt Part #: CG240-8 Supplier: 55719 Opt Part #: CG240-9 Supplier: 5K761 Opt Part #: CJ125-6 Supplier: 55719 Opt Part #: CJ93-1 Supplier: 55719
SPL-2324	Puller - Platform, Fan Blade Part #: 856A3779G02 Supplier: 58828 Opt Part #: 856A3779G01 Supplier: 58828
SPL-2325	Wrench - Fan Blade, Retainer Ring, Removal Part #: 856A3782G02 Supplier: 58828
SPL-8860	Pliers - Elastomer Spacer Part #: 856A2691G01 Supplier: 58828
SPL-11284	Puller - Spacers, Fan Blade Part #: 856A2954G02 Supplier: 58828 Opt Part #: 856A2954G01 Supplier: 58828
SPL-15042	Puller - Spacers, Fan Blade Part #: 856A3707G08 Supplier: 58828

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Description
SPL-15043	Puller - Spacer, Fan Blade Part #: 856A3947G02 Supplier: 58828 Opt Part #: 856A3947G01 Supplier: 58828
SPL-16077	Puller - Fan Blade Spacers Part #: 856A3948G02 Supplier: 58828 Opt Part #: 856A3948G01 Supplier: 58828
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-858	Tag - DO NOT OPERATE
STD-1315	Spatula - Plastic, Stiff

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
D00672 [CP5070]	Vaseline - Pure Mineral	V V-P-236
G50530 [CP5061]	Marker - Temporary	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Removal

SUBTASK 72-21-02-840-001-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-860-001-F00

(2) Make sure that the engine start levers are in the CUTOFF position.

(a) Install a DO NOT OPERATE tag, STD-858, on the applicable start levers.

SUBTASK 72-21-02-480-001-F00

CAUTION

MAKE SURE THAT YOU GIVE SUFFICIENT PROTECTION TO THE INNER SURFACE OF THE INLET COWL. IF YOU DO NOT GIVE SUFFICIENT PROTECTION TO THE INLET COWL, DAMAGE CAN OCCUR.

(3) Install a protective mat, STD-585, in the fan inlet cowl.

SUBTASK 72-21-02-840-002-F00

(4) Do this task: Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

NOTE: The fan retaining flange is removed during the spinner removal task.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G. Fan Blade Removal

LOM ALL POST SB CFM56-7B-72-548

SUBTASK 72-21-02-020-019-F00

(1) Remove the 8 elastomer spacers [12] equally spaced (360 degrees divided by 8) between the fan retaining ring and fan disk flange.

(a) Use the pliers, SPL-8860.

LOM ALL

SUBTASK 72-21-02-930-001-F00

> **CAUTION**
> USE ONLY APPROVED MARKING MATERIALS ON THE FAN BLADES. IF YOU DO NOT USE APPROVED MARKING MATERIALS, DAMAGE CAN OCCUR.

(2) Use a temporary marker, G50530 [CP5061], to put a mark on the fan blades as follows (for a list of markers, see the reference) (TASK 70-10-03-910-801-F00):

(a) Find blade No. 1.

1) The blade No. 1 is immediately above the offset hole on the fan disk bolt flange.

(b) Put a mark on the convex side of this blade to identify it as the blade No. 1.

(c) Number the remaining blades in a counterclockwise direction from two to twenty-four.

NOTE: This is counterclockwise as seen from the front of the engine.

SUBTASK 72-21-02-930-004-F00

(3) Use a temporary marker, G50530 [CP5061], to put a mark on the fan blades platform [2] as follows (for a list of markers, see the reference) (TASK 70-10-03-910-801-F00):

(a) Find platform No. 1.

1) Platform No. 1 is immediately at the left of the fan blade No. 1 when fan blade No. 1 is at the 12 o'clock location.

(b) Put a mark on this blade to identify it as the platform No. 1.

(c) Number the remaining platforms in the same counterclockwise direction from two to twenty-four as the fan blades.

NOTE: This is counterclockwise as seen from the front of the engine.

SUBTASK 72-21-02-020-001-F00

> **WARNING**
> MAKE SURE THAT YOU WEAR GLOVES WHEN YOU DO WORK ON THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU DO WORK ON THE FAN BLADES, YOU CAN CAUSE AN INJURY.

(4) Do these steps to remove the fan retaining ring [6] with the wrench, SPL-2325, from the fan disk [3] (Figure 402):

(a) Install the two pins (detail of wrench) in two opposite holes of the fan disk forward flange.

(b) Engage the support on the two pins and seat against the fan retaining ring [6], engaging the screw heads in the lugs of the retaining ring.

(c) Install the nuts on the pins and tighten.

(d) Tighten the knurled nuts.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(e) Turn the wrench handles clockwise to disengage the fan retaining ring [6] lugs from the fan disk [3] scallops.

(f) Remove the nuts to remove the tool and fan retaining ring [6] from the fan disk [3].

(g) Loosen the knurled nuts to remove the fan retaining ring [6] from the support.

(h) Remove the pins from the fan disk [3] forward flange.

SUBTASK 72-21-02-640-006-F00

(5) Apply a bead of vaseline, D00672 [CP5070], on each side of the fan blade No. 1, No. 2 and No. 24 airfoil, above the platform [2] seals when fan blade No. 1 is at the 12 o'clock position.

SUBTASK 72-21-02-860-008-F00

(6) Move fan blade No. 1 to the 6 o'clock position.

SUBTASK 72-21-02-020-022-F00

CAUTION DO NOT USE SHARP EDGE TOOLS TO REMOVE THE FAN BLADE PLATFORM OR FAN BLADE SPACER. SHARP EDGE TOOLS CAN CAUSE DAMAGE TO ADJACENT PARTS OF THE FAN BLADE PLATFORM OR FAN BLADE SPACER.

CAUTION DO NOT PUSH THE FAN BLADE SHIM BACK INTO THE SLOT IF THE FAN BLADE SHIM COMES OUT WITH THE FAN BLADE SPACER. IF YOU PUSH THE FAN BLADE SHIM INTO THE SLOT, DAMAGE TO EQUIPMENT CAN OCCUR.

NOTE: If the fan blade shim and fan blade spacer comes out, it is recommended to remove the fan blade.

(7) Remove the spacer from fan blades No. 1, No. 2, and No. 24 as follows (Figure 403):

NOTE: It is necessary to move the spacer along its axis, and not along the engine center line.

LOM ALL PRE SB 737-CFM56-7B-72-0649

(a) Install a puller, SPL-11284, against the spacer of fan blade No. 1.

1) If it is necessary, install the slide hammer, COM-13625.

LOM ALL POST SB 737-CFM56-7B-72-0649

(b) Install a puller, SPL-15042, against the spacer of fan blade No. 1.

1) If it is necessary, install the slide hammer, COM-13625.

CAUTION MAKE SURE THAT THE SHOULDER OF THE PIN OF THE PULLER, SPL-15042, IS IN THE CONTACT WITH THE STOP OF THE PULLER. IF YOU DO NOT OBEY, BENDING LOAD AND DAMAGE TO THE PIN CAN OCCUR.

LOM ALL

(c) Engage the pin of the puller in the spacer hole to attach it.

(d) Remove the spacer forward from the fan disk slot.

NOTE: If the removal of the spacer is easy, go to step 2.G.(7)(e).

1) Turn fan blade No. 1 at 12 o'clock position to remove fan blade platform No. 1 from the fan disk.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) Remove fan blade platforms No. 24 and No. 1:

NOTE: A standard or locally manufactured tool with appropriate hardness material, such as stiff plastic spatula, STD-1315, can be used as an alternative to the puller, SPL-2324.

a) Preferred method using puller, SPL-2324:

<1> Use the puller, SPL-2324, to put the platforms at the 12 o'clock position for removal.

<2> Shake and lower the three fan blades No. 1, No. 2, and No. 24 on their slots to lubricate the fan blade platforms seals.

<3> Install the puller on platform No. 24 as follows:

<a> Loosen the knurled nut, position the puller support on the platform with the wear stop of the puller against the rear edge of the platform.

<b> Engage the pin, detail of the plate, in the platform forward flange hole and tighten the knurled nut.

<4> Lift with your hand rear of fan blade No. 1 root in the dovetail slot.

NOTE: The rear slots on the fan blade root engage in the booster spool forward flange.

<5> Keep the rear of fan blade No. 1 root lifted in the dovetail slot with your hand while you push fan blade No. 24 with your elbow.

<6> Pull axially the platform puller to disengage platform No. 24 from the threaded pins.

<7> Remove fan blade platform No. 24 from the fan disk.

<8> Remove the platform puller from platform No. 24.

b) Alternative method using a standard or locally manufactured tool.

<1> Use the standard or locally manufactured tool, to put the platforms at the 12 o'clock position for removal.

<2> Shake an lower the three fan blades No. 1, No.2, and No. 24 on their slots to lubricate the fan blade platform seals.

<3> Use the alternative standard or locally manufactured tool as a lever arm, to disengage the rear of the platform or the forward lug of the platform.

<4> Lift with your hand rear of fan blade No. 1 root in the dovetail slot.

NOTE: The rear slots on the fan blade root engage in the booster spool forward flange.

<5> Keep the rear of fan blade No. 1 root lifted in the dovetail slot with your hand while you push fan blade No. 24 with your elbow.

<6> Pull axially the platform puller to disengage platform No. 24 from the threaded pins.

<7> Remove fan blade platform No. 24 from the fan disk.

<8> Remove the platform puller from platform No. 24.

3) Apply alcohol, B00676 [CP1041], and wait for 5 minutes to let the alcohol penetrate the lubricant.

4) Turn the fan until the spacer that you remove is at 6 o'clock position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5) Use the spacer puller, SPL-15043, to disengage the spacer.
   a) Do not fully remove the spacer with the spacer puller, SPL-15043.
   b) Fully engage the lever arm in the spacer.
   c) Disengage the spacer.
   d) Remove the spacer puller, SPL-15043.
   e) If it is necessary, apply alcohol, B00676 [CP1041], followed by 5 minutes of waiting time for additional help to remove the spacer.
6) Use the puller, SPL-15042, or puller, SPL-16077, to extract the spacer.
   a) If it is necessary, install the slide hammer, COM-13625.
   b) If the spacer comes out together with the shim, use the puller, SPL-15042, to remove fully the spacer.
   c) If the spacer comes out without the shim, use the puller, SPL-15042, or puller, SPL-16077, to remove fully the spacer.

(e) Remove the spacer from the puller, SPL-11284, or puller, SPL-15042, or puller, SPL-16077.

(f) Store the spacer in its related position in the suitable location.

(g) Do the above steps again to remove the spacers from fan blades No. 2 and No. 24.

SUBTASK 72-21-02-020-005-F00

(8) Do these steps to remove platforms No. 24 and No. 1 and fan blades No. 1 and No. 2 (Figure 404):

NOTE: A standard or locally manufactured tool with appropriate hardness material, such as stiff plastic spatula, STD-1315, can be used as an alternative to the puller, SPL-2324.

NOTE: If the platforms No.24 and No.1 are removed, go to step 2.G.(8)(a)9) or step 2.G.(8)(b)9).

(a) Preferred method using puller, SPL-2324:
   1) Use the puller, SPL-2324, to put the platforms at the 12 o'clock position for removal.
   2) Shake and lower the three fan blades No. 1, No. 2, and No. 24 on their slots to lubricate the fan blade platforms seals.
   3) Install the puller on platform No. 24 as follows:
      a) Loosen the knurled nut, position the puller support on the platform with the wear stop of the puller against the rear edge of the platform.
      b) Engage the pin, detail of the plate, in the platform forward flange hole and tighten the knurled nut.
   4) Lift with your hand the rear of the fan blade No. 1 root in the dovetail slot.

      NOTE: The rear slots on the fan blade root engage in the booster spool forward flange.
   5) Keep the rear of the fan blade No. 1 root lifted in the dovetail slot with your hand while you push fan blade No. 24 with your elbow.
   6) Pull axially the platform puller to disengage platform No. 24 from the threaded pins.
   7) Remove fan blade platform No. 24 from the fan disk.
   8) Remove the platform puller from platform No. 24.
   9) Lower the rear of fan blade No. 1 in the fan disk slot.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

10) Pull and remove fan blade No. 1 from the fan disk slot.
11) Put fan blade No. 1 and platform No. 24 in their related position in a suitable location.
12) Do the above steps again to remove fan blade platform No. 1 and fan blade No. 2.

(b) Alternative method using a standard or locally manufactured tool:
1) Use the standard or locally manufactured tool, to put the platforms at the 12 o'clock position for removal.
2) Shake and lower the three fan blades No. 1, No. 2, and No. 24 on their slots to lubricate the fan blade platforms seals.
3) Use the alternative standard or locally manufactured tool as a lever arm, to disengage the rear of the platform or the forward lug of the platform.
4) Lift with your hand the rear of the fan blade No. 1 root in the dovetail slot.

NOTE: The rear slots on the fan blade root engage in the booster spool forward flange.

5) Keep the rear of the fan blade No. 1 root lifted in the dovetail slot with your hand while you push fan blade No. 24 with your elbow.
6) Pull axially the platform puller to disengage platform No. 24 from the threaded pins.
7) Remove fan blade platform No. 24 from the fan disk.
8) Remove the platform puller from platform No. 24.
9) Lower the rear of fan blade No. 1 in the fan disk slot.
10) Pull and remove fan blade No. 1 from the fan disk slot.
11) Put fan blade No. 1 and platform No. 24 in their related position in a suitable location.
12) Do the above steps again to remove fan blade platform No. 1 and fan blade No. 2.

SUBTASK 72-21-02-020-017-F00

CAUTION
REMOVE THE PARTS AT EACH LOCATION IN THIS SEQUENCE: THE SPACER, FAN BLADE PLATFORM AND FAN BLADE. IF YOU DO NOT OBEY, DAMAGE TO THE PLATFORM AND FAN BLADE CAN OCCUR.

(9) To remove the rest of the fan blades, do the steps again in this sequence for each fan blade.

NOTE: During the fan blades removal, let the fan rotor turn until stabilization is accomplished.

(a) Remove spacers No. 3 to No. 23.
(b) Remove fan blade platforms No. 2 to No. 23.
(c) Remove fan blades No. 3 to No. 24.

SUBTASK 72-21-02-030-002-F00

LOM ALL POST SB CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

CAUTION
BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(10) Remove the shim from the root of the fan blade.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB CFM56-7B-72-0324

(a) Put the shims in their related position in a suitable location.

LOM ALL

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 ENGINES POST-CFM56-7B-SB 72-0548

2 ENGINES POST-CFM56-7B-SB 72-0485 OR ENGINES POST-CFM56-7B-SB 72-0324

J67027 S0000175576_V6

Fan Blade Installation
Figure 401/72-21-02-990-834-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN BLADE SPACER

B

2852882 S0000663740_V1

Fan Blade Installation
Figure 401/72-21-02-990-834-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

J67250 S0000175577_V2

Fan Retaining Ring
Figure 402/72-21-02-990-835-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Blade Spacer Removal
Figure 403/72-21-02-990-822-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Blade Spacer Removal
Figure 403/72-21-02-990-822-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2540147 S0000603055_V1

Fan Blade Spacer Removal
Figure 403/72-21-02-990-822-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

J67504 S0000175578_V2

Fan Blade Platform
Figure 404/72-21-02-990-836-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1631638 S0000300453_V2

Fan Retaining Ring Installation
Figure 405/72-21-02-990-842-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-02-400-801-F00

3. Fan Blade Installation (Complete Set)

(Figure 401 and Figure 405)

A. General

(1) This task provides the instructions on how to install a complete set of the fan blades.

B. References

Reference	Title
71-00-00-700-814-F00	Test 7 - Vibration Survey (P/B 501)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-00-00-993-939-F00	Table: Power Plant Test Reference Table (P/B 501)
72-21-00-640-801-F00	Fan Rotor Blades and Fan Disk Lubrication (P/B 201)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-10303	Tool - Assistance, Fan Blade, Retaining Ring Part #: 856A2956G01 Supplier: 58828
STD-123	Brush - Soft Bristle
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	
D00672 [CP5070]	Vaseline - Pure Mineral	V V-P-236
D50019 [CP2444]	Lubricant - Molydisulfide Solid Film, Paste - Molykote G-n Plus	
D50308 [CP 2171]	Lubricant - MOS2 Solid	MIL-L-8937

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Installation

SUBTASK 72-21-02-160-001-F00

(1) Clean the fan blades [1] with alcohol, B00676 [CP1041] and a soft bristle brush, STD-123.

NOTE: Make sure that you comply with the fan blade interchangeability limits given in CFM SB 72-0796 before the fan blade installation. If you do not follow the instructions, you may not concur with the configuration limitation of these engines:

CFM56-7B26E, -7B26E/F, -7B26E/B1, -7B26E/B2, -7B26E/B2F,

CFM56-7B27E, -7B27AE, -7B27E/B1, -7B27E/B3, -7B27E/F, -7B27E/B1F,

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Engine Assembly Configuration operated at B26 or B27 thrust rating with -7BE LPT kit, CFM SB 72-0809.

SUBTASK 72-21-02-640-001-F00

(2) Lubricate the fan blades and fan disk dovetails (TASK 72-21-00-640-801-F00).

SUBTASK 72-21-02-640-003-F00

(3) Lubricate the platform seal with vaseline, D00672 [CP5070] or Silicone.

NOTE: Apply the lubricant before you do the platform installation. If one hour occurs before you start the platform installation, apply the lubricant again.

NOTE: It is recommended to apply lubricant on the platform seal to help you during the platform installation.

SUBTASK 72-21-02-640-012-F00

(4) Lubricate the swaged bushings and the fan blade mating face with vaseline, D00672 [CP5070] or Silicone.

LOM ALL POST SB CFM56-7B-72-548

SUBTASK 72-21-02-640-011-F00

(5) Lubricate the 8 elastomer spacers [12] and the slots of the fan retaining ring with vaseline, D00672 [CP5070] or Lubricant, D50308 [CP 2171] or Dow Corning 321 lubricant, D00641 [CP5062] or Molykote G-n Plus lubricant, D50019 [CP2444].

LOM ALL

G. Fan Blade Installation

SUBTASK 72-21-02-210-019-F00

(1) Make sure that the fan disk slots are free of dust and turn the fan disk to put the fan disk slot No. 1 to the 6 o'clock position.

NOTE: The number one blade is immediately above the offset hole on the fan disk bolt flange. The number 1 engraved on each side of the slot identifies the fan disk slot No. 1. If the offset hole is not between the two engraved numbers 1, refer to the offset hole as the point to install the number one blade.

SUBTASK 72-21-02-420-001-F00

CAUTION

INSTALL THE FAN BLADES AND PLATFORMS IN THE CLOCKWISE DIRECTION WHEN YOU LOOK IN THE AFT DIRECTION. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE PLATFORMS CAN OCCUR.

(2) Do these steps to install the first fan blade [1]:

NOTE: The fan blades are installed in the clockwise direction. You start with the No. 24 blade and continue down to the No. 1 blade.

LOM ALL POST SB CFM56-7B-72-0324

CAUTION

OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB CFM56-7B-72-0324 (Continued)

(CAUTION PRECEDES)

> **CAUTION** BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(a) Install a shim [5] by sliding it on the fan blade root.

NOTE: Reworked fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, “SPACERS REQUIRED” and “DISK REPAIRED”.

LOM ALL POST SB CFM56-7B-72-0485

> **CAUTION** OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

> **CAUTION** BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(b) Install a shim [5] by sliding it on the fan blade root.

NOTE: These fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, ” SPACERS REQUIRED”.

LOM ALL

(c) Install the No. 24 fan blade [1] in the fan disk slot No. 24.

NOTE: With the disk slot No. 1 at the 6 o’clock position, the fan disk slot No. 24 is immediately to the left of the slot No. 1.

1) Push the fan blade [1] rearward until the fan lug on the rear of the fan blade [1] engages the booster spool recess on the fan disk.

SUBTASK 72-21-02-420-002-F00

(3) Do these steps to install the platform [2]:

NOTE: The fan blade platforms are installed in numerical order. They are numbered counterclockwise when you look in the aft direction.

NOTE: If you mix Pre- and Post-CFM SB 72-0353 platform configuration blades, this can effect engine balance if the blade platforms are not installed as a pair 180 degrees apart. A vibration survey (Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00) can be done at the operator's discretion. The survey will show if it is necessary to perform a fan trim balance or if the installation is correct.

NOTE: If you mix Pre- and Post-CFM SB 72-0909 platform configuration blades, this can effect engine balance if the blade platforms are not installed as a pair 180 degrees apart. A vibration survey (Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00) can be done at the operator's discretion. The survey will show if it is necessary to perform a fan trim balance or if the installation is correct.

NOTE: Intermixing platform 340-001-817-0 with the old platforms 340-001-814-0 or 340-001-816-0 are acceptable provided the engine vibration levels are within limits.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CAUTION MAKE SURE THAT THE BUSHINGS IN THE PLATFORM ARE CORRECTLY INSTALLED IN THEIR HOLES. IF THERE ARE MISSING BUSHINGS, DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION MAKE SURE THAT ALL THE LOCATING PINS ARE INSTALLED IN THE MIDDLE FLANGE OF THE FAN DISK. MAKE SURE THAT ALL THE LOCATING PINS ARE INSTALLED IN THE FRONT FLANGE OF THE BOOSTER SPOOL. IF THEY ARE MISSING, DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION INSTALL THE FAN BLADES AND PLATFORMS CLOCKWISE. IF YOU DO NOT INSTALL THE FAN BLADES IN THE CORRECT SEQUENCE, DAMAGE TO THE PLATFORM AND FAN BLADE CAN OCCUR.

(a) Install the No. 23 platform [2]:

1) Engage the fan blade platform [2] immediately at the left of the No. 24 fan blade, when dovetail slot No. 24 is at 6 o'clock location.

2) Push the fan blade platform [2] fully in position.

SUBTASK 72-21-02-020-002-F00

(4) Do these steps to install the fan blade spacer [4]:

CAUTION OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

(a) Make sure you install the correct fan blade spacer [4].

LOM ALL POST SB CFM56-7B-72-0324

1) There is a specific mark "R" or a notch on the front of the spacer.

NOTE: Reworked fan disks are identified with white paint on the hub of the fan disk: "SHIMS+SPECIFIC", "SPACERS REQUIRED" and "DISK REPAIRED".

LOM ALL POST SB CFM56-7B-72-0485

2) There is a specific mark "R" or a notch on the front of the spacer.

NOTE: These fan disks are identified with white paint on the hub of the fan disk: "SHIMS+SPECIFIC", "SPACERS REQUIRED".

LOM ALL

(b) Engage the No. 24 fan blade spacer [4] in the fan disk slot between the No. 24 fan blade [1] and the fan disk.

(c) Push the No. 24 fan blade spacer [4] fully in position.

SUBTASK 72-21-02-420-010-F00

CAUTION INSTALL THE PARTS IN THE SPECIFIED SEQUENCE AT EACH LOCATION. A DIFFERENT SEQUENCE CAN CAUSE DAMAGE TO THE PLATFORM AND FAN BLADE.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(CAUTION PRECEDES)

> **CAUTION** INSTALL THE FAN BLADES AND PLATFORMS CLOCKWISE. IF YOU DO NOT INSTALL THE FAN BLADES IN THE CORRECT SEQUENCE, DAMAGE TO THE PLATFORM AND FAN BLADE CAN OCCUR.

(5) Do the above steps again to install the fan blades [1], the platforms [2] and the fan blade spacers [4] for the No. 23 to No. 4 fan blades.

SUBTASK 72-21-02-420-011-F00

(6) Do these steps to install the remaining fan blades, No. 3 to No. 1:

LOM ALL POST SB CFM56-7B-72-0324

> **CAUTION** OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

> **CAUTION** BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(a) Install a shim [5] by sliding it on the fan blade root.

NOTE: Reworked fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, ” SPACERS REQUIRED”, “DISK REPAIRED”.

LOM ALL POST SB CFM56-7B-72-0485

> **CAUTION** OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

> **CAUTION** BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(b) Install a shim [5] by sliding it on the fan blade root.

NOTE: These fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, ” SPACERS REQUIRED”.

LOM ALL

(c) Install the three fan blades [1] No. 3 to No. 1 in the applicable fan disk slots.

NOTE: Install these fan blades with the fan disk slots at the 12 o’clock position.

(d) Remove the spacer No. 24 from under the fan blade No. 24.

(e) Engage the fan blade platforms [2] No. 3 to No. 1 at their corresponding location on the threaded pins.

(f) Push the fan blade platforms No. 3 to No. 1 fully in position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(g) Lift with your hand the rear of the No. 1 fan blade root in the dovetail slot while you push the fan blade No. 24 with your elbow to install horizontally the platform No. 24 on the locating threaded pins, between the No. 1 and the No. 24 fan blades.

(h) Push the fan blade platform No. 24 fully in position.

> **CAUTION** OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

(i) Make sure you install the correct fan blade spacer [4].

LOM ALL POST SB CFM56-7B-72-0324

1) There is a specific mark “R” or a notch on the front of the spacer.

NOTE: Reworked fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, “SPACERS REQUIRED” and “DISK REPAIRED”.

LOM ALL POST SB CFM56-7B-72-0485

2) There is a specific mark “R” or a notch on the front of the spacer.

NOTE: These fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, “SPACERS REQUIRED”.

LOM ALL

(j) Engage the four remaining spacers No. 3 to No. 1 and No. 24 in the applicable fan disk slots. Push all of the spacers in position.

NOTE: Do the installation of the remaining spacers with the fan disk slots at the 6 o’clock position.

(k) Make sure the forward retention tab of the spacers is in contact with the fan disk slot forward face.

SUBTASK 72-21-02-020-006-F00

(7) Do these steps to install the fan retaining ring (Figure 405):

(a) Install the fan retaining ring on the fan disk [3] forward flange.

NOTE: There is no offset hole on the retaining ring.

NOTE: Do not use a tool to install the retaining ring.

> **CAUTION** YOU CAN USE AN APPLICABLE TOOL TO MOVE THE PLATFORM INSTALLATION SLOWLY IN THE REARWARD POSITION. THE PLATFORM CAN CAUSE DAMAGE TO THE PARTS.

(b) Make sure the fan blades [1], platforms [2] and fan blade spacers [4] are in their correct positions.

(c) Align the lugs of the retaining ring in front of the scallops of the fan disk [3].

(d) Engage the retaining ring on the forward fan disk flange.

(e) Install the fan blade retaining ring assistance tool, SPL-10303 on the fan disk to maintain the spacers and platforms.

1) Install the eight bolts and tighten with your hand.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(f) Turn the retaining ring as necessary to put the retaining ring lugs in front of the fan disk lugs.

(g) Remove the eight bolts and remove the fan blade retaining ring assistance tool, SPL-10303.

LOM ALL POST SB CFM56-7B-72-548

SUBTASK 72-21-02-430-002-F00

(8) Install the eight elastomer spacers [12] equally spaced (360 degrees divided by 8) between the fan retaining ring and the fan disk flange.

(a) Make sure that the FWD indication on the elastomer spacer is readable when it is installed (Figure 401).

NOTE: The first spacer is installed under the fan disk slot No. 1.

LOM ALL

SUBTASK 72-21-02-410-001-F00

(9) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

NOTE: The fan retaining flange is installed during the spinner installation task.

SUBTASK 72-21-02-080-001-F00

CAUTION

MAKE SURE THAT YOU REMOVE THE TOOLS, PARTS, AND UNWANTED MATERIAL FROM THE INLET COWL. DAMAGE TO THE ENGINE COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(10) Remove the protective mat, STD-585 from the inlet cowl.

H. Fan Blade Installation Test

SUBTASK 72-21-02-840-003-F00

(1) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-860-002-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable start lever.

SUBTASK 72-21-02-720-001-F00

(3) Do the Fan Blades, Complete Set Test 7 as listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

NOTE: It is not necessary to do the Test 7 in the Power Plant Test Reference Table (Table 71-00-00-993-939-F00) for re-installation of fan blades in same position (for example, after you do the Fan Rotor Blades and Fan Disk Lubrication, TASK 72-21-00-640-801-F00).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-02-900-801-F00

4. Fan Blade Replacement (Complete Set)

A. General

(1) You can get access to the fan blades through the inlet cowl after you remove the spinner front and rear cones and the fan retaining flange.

(2) Each engine has twenty-four fan blades which are installed in the fan disk.

(3) Each fan blade is attached with a fan blade spacer and held in its position with a platform.

B. References

Reference	Title
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
D50019 [CP2444]	Lubricant - Molydisulfide Solid Film, Paste - Molykote G-n Plus	
D50308 [CP 2171]	Lubricant - MOS2 Solid	MIL-L-8937

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Replacement

SUBTASK 72-21-02-840-008-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-860-006-F00

(2) Make sure the engine start levers are in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

SUBTASK 72-21-02-490-001-F00

(3) Install a protective mat, STD-585 in the fan inlet cowl.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-21-02-010-005-F00

(4) Do this task: Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

NOTE: The fan retaining flange is removed during the spinner removal task.

G. Fan Blade (Complete Set) Replacement

SUBTASK 72-21-02-020-011-F00

(1) Do this task: Fan Blade Removal (Complete Set), TASK 72-21-02-000-801-F00.

SUBTASK 72-21-02-010-006-F00

(2) Remove all balance screws from the rear spinner cone and place them in a storage box.

SUBTASK 72-21-02-410-007-F00

(3) Install new P07/P14 balance screws on the rear spinner cone as follows:

(a) Lightly coat the balance screws with Molykote G-n Plus lubricant, D50019 [CP2444] or Lubricant, D50308 [CP 2171].

(b) Install the first screw in the No.1 hole near the offset hole.

(c) Install, in the counterclockwise direction, the other thirty-five balance screws.

(d) Tighten each balance screw to 67.5 in-lb (7.6 N·m) – 74.5 in-lb (8.4 N·m).

SUBTASK 72-21-02-110-002-F00

(4) Clean the fan blades with alcohol, B00676 [CP1041] and a brush

NOTE: Make sure that you comply with the fan blade interchangeability limits given in CFM SB 72-0796 before the fan blade installation. If you do not follow the instructions, you may not concur with the configuration limitation these engines:

CFM56-7B26E, -7B26E/F, -7B26E/B1, -7B26E/B2, -7B26E/B2F,

CFM56-7B27E, -7B27AE, -7B27E/B1, -7B27E/B3, -7B27E/F, -7B27E/B1F,

Engine Assembly Configurations operated at B26 or B27 thrust rating with -7BE LPT kit, CFM SB 72-0809.

SUBTASK 72-21-02-970-007-F00

(5) If it is necessary to do a fan blade set distribution, use the computer method Mapping Procedure 856A3770.

SUBTASK 72-21-02-420-004-F00

(6) Do this task: Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-02-410-008-F00

(7) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

NOTE: The fan retaining flange is installed during the spinner installation task.

SUBTASK 72-21-02-090-001-F00

(8) Remove the protective mat, STD-585 from the inlet cowl.

H. Fan Blade Installation Test

SUBTASK 72-21-02-865-001-F00

(1) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-860-007-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable start lever.

SUBTASK 72-21-02-710-001-F00

(3) As applicable, do the Fan Blades, Complete Set Test 7 as listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

——— **END OF TASK** ———

TASK 72-21-02-000-802-F00

5. Fan Blade Replacement (Blade Pair)

(Figure 406, Figure 407, Figure 408, Figure 409, Figure 410 and Figure 411)

A. General

(1) You can get access to the fan blades through the inlet cowl after you remove the spinner front and rear cones and the fan retaining flange.

(2) Each engine has twenty-four fan blades which are installed in the fan disk.

(3) Each fan blade is attached with a fan blade spacer and held in its position with a platform.

(4) You must replace the fan blades in single pair sets or in multiple pair sets. There is a procedure to replace an individual fan blade if a pair is not available.

B. References

Reference	Title
71-00-00-700-814-F00	Test 7 - Vibration Survey (P/B 501)
71-00-00-750-802-F00	Test 14A - Fan Trim Balance (Three-Shot Plot Procedure) (P/B 501)
71-00-00-990-844-F00	Figure: Balance Weights with the Center of Mass on One Screw (P/B 501)
71-00-00-990-845-F00	Figure: Balance Weights with the Center of Mass between Two Screws (P/B 501)
72-21-00-640-801-F00	Fan Rotor Blades and Fan Disk Lubrication (P/B 201)
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2324	Puller - Platform, Fan Blade Part #: 856A3779G02 Supplier: 58828 Opt Part #: 856A3779G01 Supplier: 58828
SPL-8860	Pliers - Elastomer Spacer Part #: 856A2691G01 Supplier: 58828
SPL-10303	Tool - Assistance, Fan Blade, Retaining Ring Part #: 856A2956G01 Supplier: 58828

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Description
STD-123	Brush - Soft Bristle
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
D00672 [CP5070]	Vaseline - Pure Mineral	V V-P-236
D50019 [CP2444]	Lubricant - Molydisulfide Solid Film, Paste - Molykote G-n Plus	
D50308 [CP 2171]	Lubricant - MOS2 Solid	MIL-L-8937
G50530 [CP5061]	Marker - Temporary	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Fan blade	72-21-00-01-070	LOM ALL

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

G. Prepare for the Removal (In Pairs)

SUBTASK 72-21-02-840-004-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-860-004-F00

(2) Make sure that the engine start levers are in the CUTOFF position.

(a) Install a DO NOT OPERATE tag, STD-858, on the applicable start lever.

SUBTASK 72-21-02-480-004-F00

CAUTION

MAKE SURE THAT YOU GIVE SUFFICIENT PROTECTION TO THE INNER SURFACE OF THE INLET COWL. IF YOU DO NOT GIVE SUFFICIENT PROTECTION TO THE INLET COWL, DAMAGE CAN OCCUR.

(3) Install a protective mat, STD-585, in the fan inlet cowl.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-21-02-840-005-F00

(4) Do this task: Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

NOTE: If it is necessary, you can remove the balance screws to get access to the bolts. Use a temporary marker, G50530 [CP5061], to make sure that you mark and record the position of the balance screws for installation in their correct position. This is necessary to keep the rotor balanced.

NOTE: The fan retaining flange is removed during the spinner removal task.

(a) Use a temporary marker, G50530 [CP5061], to mark the position of the rear spinner cone before you remove it.

H. Fan Blade Removal (In Pairs)

LOM ALL POST SB CFM56-7B-72-548

SUBTASK 72-21-02-010-010-F00

(1) Remove the 8 elastomer spacers [12] equally spaced (360 degrees divided by 8) between the fan retaining ring [6] and the fan disk [3] flange.

(a) Use the pliers, SPL-8860.

LOM ALL

SUBTASK 72-21-02-930-002-F00

CAUTION

USE ONLY APPROVED MARKING MATERIALS ON THE FAN BLADES. IF YOU DO NOT USE APPROVED MARKING MATERIALS, DAMAGE CAN OCCUR.

(2) Do these steps to identify the fan blades [1] and put a mark on them:

(a) Find the number one fan blade [1] and the fan blade platform [2] (TASK 72-21-02-000-801-F00).

NOTE: The number one fan blade is immediately above the offset hole on the fan disk bolt flange.

(b) Number the remaining fan blades [1] in a counterclockwise direction from two to twenty-four.

(c) Put a mark on the pairs of fan blades [1] you will remove.

SUBTASK 72-21-02-020-004-F00

WARNING

MAKE SURE THAT YOU WEAR GLOVES WHEN YOU DO WORK ON THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU DO WORK ON THE FAN BLADES, YOU CAN CAUSE AN INJURY.

CAUTION

IF YOU ARE TO INSTALL THE FAN BLADES AGAIN, YOU MUST RECORD THEIR INITIAL POSITIONS. IF YOU INCORRECTLY INSTALL THE FAN BLADES, A VIBRATION PROBLEM COULD OCCUR.

(3) Do these steps to remove the marked fan blade [1]:

(a) Remove the fan retaining ring from the fan disk [3] (TASK 72-21-02-000-801-F00).

(b) Do these steps to lubricate the applicable fan blade [1]:

1) Move the fan blade [1] to the 12 o'clock position.

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2) Apply a bead of vaseline, D00672 [CP5070], on each side of the fan blade [1] airfoil above the fan blade platform [2] seals.

3) Lubricate the two adjacent fan blades [1] of the fan blade you will remove.

(c) Move the fan blade [1] you will remove to the 6 o'clock position.

(d) Remove the fan blade spacer [4] from the fan blade [1] you will remove and from the two adjacent fan blades [1] (TASK 72-21-02-000-801-F00).

(e) Do these steps to remove the fan blade [1] you will replace:

NOTE: Put the fan blade you will remove to the 12 o'clock position to remove the platform with the puller, SPL-2324.

1) Shake and lower the three fan blades [1] on their slots to lubricate the fan blade platforms [2] seals.

2) Install the puller on the platform located on the convex side of the fan blade [1] you will remove.

a) Loosen the knurled nut, position the puller support on the platform [2] with the wear stop of the puller against the rear edge of the platform [2].

b) Engage the pin, detail of the plate, in the platform forward flange hole and tighten the knurled nut.

3) Lift with your hand the rear of the fan blade [1] root in the dovetail slot. The rear slots on the fan blade root engage in the booster spool forward flange (Figure 404).

4) Keep the rear of the fan blade [1] root lifted in the dovetail slot with your hand while you push with your elbow the other fan blade, adjacent to the platform.

5) Pull axially the platform puller to disengage the platform [2] from the threaded pins. Remove the fan blade platform from the fan disk.

6) Remove the platform puller from the platform [2].

LOM ALL POST SB CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

CAUTION BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(f) Remove the shim [5] from the root of the fan blade [1].

LOM ALL

(g) Put the removed fan blade [1] and parts on a pallet or other suitable location to avoid shock or damage to the other removed blades.

CAUTION TAKE CARE OF THE BLADES. SHOCK DAMAGE CAN OCCUR.

(h) Do the above steps again to remove the opposite blade.

(i) Record the location of each fan blade [1] to be replaced and each opposite fan blade.

(j) Record the moment-weight (cm.g) from the bottom of the removed fan blades.

NOTE: The serial number and moment-weight (cm.g) are found under the blade dovetail.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-21-02-160-004-F00

(4) Clean these parts with alcohol, B00676 [CP1041], and soft bristle brush, STD-123:

(a) The fan disk [3] slots

(b) The platform [2] seals

(c) The fan blade spacers [4]

(d) The fan retaining ring [6]

(e) The fan blades [1]

LOM ALL POST SB CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

(f) The shims [5]

LOM ALL

I. Fan Blade Preparation (In Pairs)

SUBTASK 72-21-02-970-002-F00

(1) Get a pair of spare fan blades [1].

NOTE: When you install the pairs, they must always be at a position 180 degrees apart.

NOTE: Spare fan blades are supplied and kept in pairs so that the difference between their moment-weights is not more than 78 g.in (200 cm.g). However the inspection and the corrections given in (Figure 406) must be done before and after the fan blade installation to make sure the engine imbalance is not more than the limits. Two imbalance conditions can exist, refer to (Figure 406).

NOTE: A vibration survey is at customer convenience.

NOTE: If three pairs of fan blades or less are replaced, and if each pair resultant (Figure 409) is lower or equal to 78 g.inch (200 cm.g), no mapping procedure is necessary. If more than three pairs of fan blades are replaced and the resultant is more than 236 g.inch (600 cm.g), do a mapping procedure. Use fan blade plotting program 856A3770. If the mapping procedure resultant is more than 236 g.in (600 cm.g), do the static correction procedure below. If you replace only one pair of fan blades and the moment-weight of the removed pair is greater than 78 g.inch (200 cm.g), do the static correction (Figure 409).

NOTE: Record the location of each blade to be replaced and each opposite blade. Record the moment-weight (cm.g) from the bottom of the removed blades.

NOTE: Make sure that you comply with the fan blade interchangeability limits given in CFM SB 72-0796 before the fan blade installation. If you do not follow the instructions, you may not concur with the configuration limitation of these engines:

CFM56-7B26E, -7B26E/F, -7B26E/B1, -7B26E/B2, -7B26E/B2F,

CFM56-7B27E, -7B27AE, -7B27E/B1, -7B27E/B3, -7B27E/F, -7B27E/B1F,

Engine Assembly Configuration operated at B26 or B27 thrust rating with -7BE LPT kit, CFM SB 72-0809.

J. Static Correction Procedure

SUBTASK 72-21-02-970-003-F00

(1) Do the static correction as follows (Figure 408) and (Figure 409):

(a) If you change more than 3 pairs of fan blades [1] and the resultant is more than 236 g.in (600 cm.g) or the "BLAMAP" resultant is more than 236 g.in (600 cm.g), do the static correction procedure.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Do a vector diagram work sheet (Figure 407) to calculate the resultant vector FR.

(c) Residual moment-weight calculations:

1) Calculate the delta difference between the moment-weights of the pairs of removed blades and the spare blade pair as follows (Figure 408) (sheet 2):

a) This example shows the case where 4 blades are impacted (24, 1, 2, 3), thus 4 pairs will be removed.

Table 401/72-21-02-993-827-F00

No. 24	207800 cm.g	No. 12	207600 cm.g
No. 1	208120 cm.g	No. 13	207920 cm.g
No. 2	208400 cm.g	No. 14	208230 cm.g
No. 3	208400 cm.g	No. 15	208240 cm.g

b) Calculate the differences between the moment-weights:

Table 402/72-21-02-993-826-F00

D1	No. 24-12	207800 - 207600 = 200 cm.g
D2	No. 1-13	208120 - 207920 = 200 cm.g
D3	No. 2-14	208400 - 208230 = 170 cm.g
D4	No. 3-15	208400 - 208240 = 160 cm.g

c) For this example, you install these new blades set with the moment-weights:

Table 403/72-21-02-993-828-F00

No. 24'	207700 cm.g	No. 12'	207680 cm.g
No. 1'	207120 cm.g	No. 13'	207110 cm.g
No. 2'	208500 cm.g	No. 14'	208480 cm.g
No. 3'	208650 cm.g	No. 15'	208630 cm.g

d) Calculate the moment-weights difference for the spare fan blades:

Table 404/72-21-02-993-829-F00

D1'	No. 24-12	207700 - 207680 = 20 cm.g
D2'	No. 1-13	207120 - 207110 = 10 cm.g
D3'	No. 2-14	208500 - 208480 = 20 cm.g
D4'	No. 3-15	208650 - 208630 = 20 cm.g

e) Calculate the differences between the blades that you have removed and the spare blades:

Table 405/72-21-02-993-830-F00

D1 - D1' = 200 - 20 = 180 cm.g = F1
D2 - D2' = 200 - 10 = 190 cm.g = F2
D3 - D3' = 170 - 20 = 150 cm.g = F3
D4 - D4' = 160 - 20 = 140 cm.g = F4

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f) Find the direction of the correction as follows:

NOTE: For each pair of blades, install the heaviest spare blade at the position of the heaviest blade to be removed.

SUBTASK 72-21-02-970-004-F00

(2) Make the vectorial diagram as follows:

(a) Use a polar chart (Figure 407) and draw the vectors of the moment-weight differences (F1 - F4) between the removed blades and the spare blades.

1) Do a vectorial addition as performed through (Figure 408).

2) The resultant vector FR will show the weight and the location for the balance screw.

3) If the FR is greater than 236 g.in (600 cm.g), the FR length will give the cm.g value for the balance screw and the opposite vector of the FR gives the location of the balance screw.

NOTE: In this example, the resultant vector is approximately 657 cm.g between blades 13 and 14 (screws 19 and 20). The opposite screws are between blades 1 and 2 (screws 2 and 1).

SUBTASK 72-21-02-970-005-F00

(3) Select the balance screw:

(a) Go to Figure 71-00-00-990-844-F00 (Vector is on a screw hole) or Figure 71-00-00-990-845-F00 (Vector is between screw holes) in Test 14A - Fan Trim Balance (Three Shot Plot Procedure) in this reference (TASK 71-00-00-750-802-F00).

NOTE: If the removed screw (or screws) weight is different than a P07 type, calculate a new screw weight, and select a new screw for installation.

(b) In Figure 71-00-00-990-845-F00 for this example, the resultant vector FR 660 cm.g is the nearest moment-weight to the 657 cm.g which corresponds to four P04 screws in holes 3, 36, 8, and 31:

1) These screw locations, which are shown on the inside of the polar chart, are related to locations 1 and 2, which are in the opposite direction of the FR resultant vector location (Figure 408).

K. Fan Blade Installation (In Pairs)

SUBTASK 72-21-02-640-002-F00

(1) Lubricate the applicable fan blade [1] pair (TASK 72-21-00-640-801-F00).

NOTE: Lubricate the fan blade [1] pair[s] that you will install.

SUBTASK 72-21-02-640-004-F00

CAUTION

APPLY THE LUBRICANT BEFORE YOU DO THE PLATFORM INSTALLATION. IF ONE HOUR OCCURS BEFORE YOU START THE PLATFORM INSTALLATION, APPLY THE LUBRICANT AGAIN. WITHOUT SUFFICIENT LUBRICANT, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(2) Lubricate the platform [2] seal, swaged bushings and the fan blade mating face with vaseline, D00672 [CP5070], or Silicone.

(a) If you mix Pre- and Post-CFM SB 72-0353 platform configuration blades, this can effect engine balance if the blade platforms are not installed as a pair 180 degrees apart. A vibration survey (Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00) can be done at the operator's discretion. The survey will show if it is necessary to perform a fan trim balance or if the installation is correct.

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(b) If you mix Pre- and Post-CFM SB 72-0909 platform configuration blades, this can effect engine balance if the blade platforms are not installed as a pair 180 degrees apart. A vibration survey (Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00) can be done at the operator's discretion. The survey will show if it is necessary to perform a fan trim balance or if the installation is correct.

SUBTASK 72-21-02-400-001-F00

(3) Do these steps to install the first fan blade [1]:

(a) Install the heavier fan blades in the location of the heavier original fan blades.

LOM ALL POST SB CFM56-7B-72-0324

CAUTION OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

CAUTION BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

1) Install a shim [5] by sliding it on the fan blade root.

NOTE: Reworked fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC SPACERS REQUIRED” and “DISK REPAIRED”.

LOM ALL POST SB CFM56-7B-72-0485

CAUTION OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

CAUTION BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

2) Install a shim [5] by sliding it on the fan blade root.

NOTE: These fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC SPACERS REQUIRED”.

LOM ALL

3) Move the fan disk slot for the first fan blade to the 12 o'clock position.

4) Install the fan blade [1] into the fan disk slot.

5) Lift the rear of the fan blade root in the dovetail slot while you push the fan blade [1] immediately at the right (forward looking aft) with your elbow to install horizontally the platform [2] on the locating threaded pins, between the two fan blades.

6) Push the fan blade platform [2] fully in position.

7) Engage the three fan blade spacers [4] in the fan disk slots of the fan blades [1]. Push all spacers in position.

NOTE: Do the installation of the fan blade spacers at the 6 o’clock position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

8) Make sure that the forward retention tab of the fan blade spacers [4] is in contact with the fan disk slot forward face.

SUBTASK 72-21-02-420-009-F00

(4) Do the above steps again to install the remaining fan blades [1].

NOTE: During the installation, do not stop the rotor. Let it turn freely until stabilization is completed.

NOTE: Install each pair in a clockwise direction.

SUBTASK 72-21-02-410-011-F00

(5) Do these steps to install the fan retaining ring [6]:

(a) Install the fan retaining ring [6] on the forward fan disk flange.

NOTE: There is no offset hole on the retaining ring.

NOTE: Do not use a tool to install the retaining ring.

CAUTION: YOU CAN USE AN APPLICABLE TOOL TO MOVE THE PLATFORM INSTALLATION SLOWLY IN THE REARWARD POSITION. THE PLATFORM CAN CAUSE DAMAGE TO THE PARTS.

(b) Make sure that the fan blades [1], platforms [2], and fan blade spacers [4] are in their correct positions.

(c) Align the lugs of the fan retaining ring [6] in front of the scallops of the fan disk [3].

(d) Engage the fan retaining ring [6] on the forward fan disk flange.

(e) Install the fan blade retaining ring assistance tool, SPL-10303, on the fan disk to maintain the fan blade spacers [4] and platforms [2].

1) Install the eight bolts and tighten with your hand.

(f) Turn the retaining ring as necessary to put the retaining ring lugs in front of the fan disk lugs.

(g) Remove the eight bolts and remove the fan blade retaining ring assistance tool, SPL-10303.

LOM ALL POST SB CFM56-7B-72-548

SUBTASK 72-21-02-410-014-F00

(6) Install the eight elastomer spacers [12] equally spaced (360 degrees divided by 8) between the fan retaining ring and the fan disk flange.

(a) Make sure that the FWD indication on the elastomer spacer [12] is readable when it is installed (Figure 401).

NOTE: The first elastomer spacer is installed under the fan disk slot No. 1.

LOM ALL

SUBTASK 72-21-02-410-012-F00

(7) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

NOTE: The fan retaining flange is installed during the spinner installation task.

SUBTASK 72-21-02-430-001-F00

(8) Install the balance screws identified from the static correction calculation task:

(a) Lightly coat the balance screws with Molykote G-n Plus lubricant, D50019 [CP2444], or Lubricant, D50308 [CP 2171].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Tighten each balance screw to 67.5 in-lb (7.6 N·m) – 74.5 in-lb (8.4 N·m).

SUBTASK 72-21-02-080-005-F00

> **CAUTION** MAKE SURE THAT YOU REMOVE THE TOOLS, PARTS, AND UNWANTED MATERIAL FROM THE INLET COWL. DAMAGE TO THE ENGINE COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(9) Remove the protective mat, STD-585, from the inlet cowl.

L. Individual Fan Blade Replacement

SUBTASK 72-21-02-840-006-F00

(1) Do these steps to replace an individual fan blade [1]:

NOTE: In all cases of individual fan blade replacement, you must remove the opposite fan blade to compare their moment-weights.

(a) Do the procedure above to Prepare for the Removal (In Pairs).

> **WARNING** MAKE SURE THAT YOU WEAR GLOVES WHEN YOU DO WORK ON THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU DO WORK ON THE FAN BLADES, YOU CAN CAUSE AN INJURY.

> **CAUTION** IF YOU RE-INSTALL THE FAN BLADES, MAKE A RECORD OF THEIR INITIAL POSITIONS. USE ONLY APPROVED MARKING MATERIALS. DAMAGE TO EQUIPMENT COULD OCCUR.

(b) Do the procedure above for Fan Blade Removal (In Pairs) to remove the fan blade [1] to be replaced and the opposite fan blade.

(c) Record the location of the heavier of the two fan blades [1] and their moment-weights.

(d) Clean these parts with alcohol, B00676 [CP1041], and a soft bristle brush, STD-123:

1) The fan disk [3] slots
2) The platform [2] seals
3) The fan blade spacers [4]
4) The fan retaining ring [6]
5) The fan blades [1]

LOM ALL POST SB CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

6) The shims [5]

LOM ALL

(e) Do these steps for Fan Blade Preparation (Figure 410, Figure 411):

NOTE: Make sure that you comply with the fan blade interchangeability limits given in CFM SB 72-0796 before the fan blade installation. If you do not follow the instructions, you may not concur with the configuration limitation of these engines:

CFM56-7B26E, -7B26E/F, -7B26E/B1, -7B26E/B2, -7B26E/B2F,

CFM56-7B27E, -7B27AE, -7B27E/B1, -7B27E/B3, -7B27E/F, -7B27E/B1F,

Engine Assembly Configuration operated at B26 or B27 thrust rating with -7BE LPT kit, CFM SB 72-0809.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Compare the moment-weight of the replacement fan blade [1] to the opposite fan blade.

2) Put the heavier of the two fan blades [1] into the location which you noted above for the heavier of the initial pair of fan blades.

3) Compare the moment-weight of the replacement fan blade [1] with the opposite fan blade to the removed fan blade.

a) If the difference between the moment-weights of the replacement fan blade [1] and the opposite fan blade to the removed fan blade is more than 78 g.inch (200 cm.g), do the procedure for the Static Correction. Make sure that you use these figures (Figure 410, Figure 411).

(f) Do the procedure for the Fan Blade Installation (In Pairs), which includes the lubrication steps.

CAUTION

MAKE SURE THAT YOU REMOVE THE TOOLS, PARTS, AND UNWANTED MATERIAL FROM THE INLET COWL. DAMAGE TO THE ENGINE COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(g) Remove the protective mat, STD-585, from the inlet cowl.

M. Fan Blade Installation Test

SUBTASK 72-21-02-840-007-F00

(1) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-860-005-F00

(2) Remove the DO NOT OPERATE tag, STD-858, from the applicable start lever.

SUBTASK 72-21-02-720-002-F00

(3) If the removed blades were re-installed in the same position with no change to the MWD (no repairs or other work on the blade) (Examples: fan Blade Lubrication, removal for access e.g. inspection, abradable shroud repair etc.):

(a) It is not necessary to do this task: Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00.

SUBTASK 72-21-02-720-003-F00

(4) If the individual or pair of fan blades were replaced and the resultant is lower or equal to 78 g. in (200 cm. g):

(a) At the Customer Convenience (not necessary), to do this task: Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00.

SUBTASK 72-21-02-720-004-F00

(5) If two or more individual or pair fan blades were replaced at the same time and the resultant is lower or equal to 236 g. in (600 cm. g):

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(a) At the Customer Convenience (not necessary), to do this task Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Change Diagram for Fan Blade Pairs
Figure 406/72-21-02-990-811-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-00030-00-B

H58374 S0006582355_V2

Polar Graph for Static Correction (Working Sheet)
Figure 407/72-21-02-990-812-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-00031-00-B

H58698 S0006582356_V2

Replacement of Several Pairs of Fan Blades
Figure 408/72-21-02-990-813-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT (cm.g)	SCREW TYPE														SCREW QUANTITY
	7	6	5	4	3	2	1	1	2	3	4	5	6	7	
532		P04	P03									P03	P04		4
541						P05			P05						2
548							P04	P04							2
558							P05	P05							2
580					P06					P06					2
596					P02		P03	P03		P02					4
597							P05	P05							2
619						P06			P06						2
627		P04				P03			P03				P04		4
638							P06	P06							2
660	P04					P04			P04					P04	4

BLADES REMOVED/ MOMENT-WEIGHT (cm.g)	NEW BLADES/ MOMENT-WEIGHT (cm.g)	DIFFERENCE D-D' = CORRECTION TO BE PERFORMED (cm.g)	DIRECTION OF CORRECTION (BLADE NO.)
NO. 24-12 207800 207600 } D1 = 200	207700 207680 } D'1 = 20	F1 = 180	NO. 12
NO. 1-13 208120 207920 } D2 = 200	207120 207110 } D'2 = 10	F2 = 190	NO. 13
NO. 2-14 208400 208230 } D3 = 170	208500 208480 } D'3 = 20	F3 = 150	NO. 14
NO. 3-15 208400 208240 } D4 = 160	208650 208630 } D'4 = 20	F4 = 140	NO. 15

S-M56-MM-00032-00-B
H58716 S0006582357_V2

Replacement of Several Pairs of Fan Blades
Figure 408/72-21-02-990-813-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BLADES TO BE REMOVED

NEW BLADES

TARGET BALANCE WEIGHT cm.g	SCREW TYPE 7	6	5	4	3	2	1	1	2	3	4	5	6	7	SCREW QUANTITY
237	P05													P05	2
244						P02			P02						2
251							P02	P02							2
260			P03									P03			2
270	P06													P06	2
271		P02				P01			P01				P02		4
272		P04											P04		2
301				P03							P03				2
308			P02				P01	P01				P02			4
309							P02	P02							2
321		P05											P05		2

1 SCREW P02
1 SCREW P02

LOCATION OF BALANCE SCREW
D > D'
INSTALL SCREW CLOSE TO
HEAVIEST BLADE

S-M56-MM-00033-00-B

H59339 S0006582358_V4

Replacement of One Pair of Fan Blades
Figure 409/72-21-02-990-814-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Change Diagram for an Individual Fan Blade
Figure 410/72-21-02-990-815-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BLADE YOU WILL REMOVE

TARGET BALANCE WEIGHT (cm.g)	SCREW TYPE 7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	SCREW QUANTITY
192	P05														P05	2
193				P02								P02				2
212	P02							P02							P02	3
218					P02						P02					2
218	P06														P06	2
227	P01							P03							P01	3
235			P03										P03			2
237						P02				P02						2
237.5								P04								1
237.5		P04												P04		2

1. SELECT BALANCE SCREWS AS FOLLOWS:
   (a) REFER TO THE UPPER TABLE TO FIND THE SOLUTION CLOSEST TO 215 cm.g :
   1 CENTRAL SCREW P02 + 2 LATERAL SCREW P02 AT THE 7th LOCATION FROM THE CENTRAL SCREW.

NOTE:

THIS SOLUTION PERMITS A SATISFACTORY CORRECTION TO PUT THE FAN CLOSE TO ITS INITIAL BALANCE CONDITION.

2. PUT THE BALANCE SCREWS IN THEIR POSITIONS AS FOLLOWS:
   (a) IF THE NEW BLADE IS LIGHTER THAN THE REMOVED BLADE, INSTALL THE BALANCE SCREWS CENTRALIZED ON THE NEW BLADE SIDE.
   (b) IF THE NEW BLADE IS HEAVIER THAN THE REMOVED BLADE, INSTALL THE BALANCE SCREWS CENTRALIZED ON THE OPPOSITE BLADE FROM THE NEW BLADE.

Static Imbalance Correction Example (Individual Fan Blade Replacement)
Figure 411/72-21-02-990-816-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN BLADE - INSPECTION/CHECK

1. **General**
   A. This procedure has this task:
      (1) Fan Module Inspection.

TASK 72-21-02-200-801-F00

2. **Fan Module Inspection**
(Figure 601, Figure 602, Figure 603, Figure 604, Figure 605, Figure 606, Figure 607, Figure 608, Figure 609, Figure 610, Figure 611, Figure 612, Figure 613 and Figure 614)

A. General

(1) This task gives the instructions on how to do these inspections:
   (a) The inspection of the elastomer spacers
   (b) The inspection of the retaining ring
   (c) The inspection of the platforms
   (d) The inspection of the spacers
   (e) The inspection of the fan blades
   (f) The inspection of the shims
   (g) The inspection of the fan disk
   (h) The inspection of the threaded pins
   (i) The inspection of the counterweights
   (j) The inspection of the booster spool
   (k) The inspection of the Low Pressure Turbine (LPT) shaft plug O-ring.

B. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-00-00-750-802-F00	Test 14A - Fan Trim Balance (Three-Shot Plot Procedure) (P/B 501)
71-00-00-750-803-F00	Test 14B - Fan Trim Balance (On Board Procedure - Vibro-meter AVM) (P/B 501)
71-00-00-750-805-F00	Test 14C - Fan Trim Balance (Analyzer Procedure) (P/B 501)
71-00-02-000-801-F00	Power Plant - Removal (P/B 401)
71-00-02-400-801-F00	Power Plant - Installation (P/B 401)
72-21-00-640-801-F00	Fan Rotor Blades and Fan Disk Lubrication (P/B 201)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-300-801-F00	Repair the Fan Blade (P/B 801)
72-21-02-300-804-F00	Replace or Retighten the Fan Disk Mid Lug Threaded Pins (P/B 801)
72-21-02-300-805-F00	Replace or Retighten the Booster Spool Threaded Pins (P/B 801)
72-21-02-300-807-F00	Recondition the Lubricant Coating on the Fan Blade Shim (P/B 801)

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(Continued)

Reference	Title
72-21-02-300-808-F00	Fan Blade Platform Forward Lug Repair (P/B 801)
72-21-02-300-809-F00	Fan Blade Platform Blend Repairs (P/B 801)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)
72-55-00-941-801-F00	Replacement of the LPT Shaft Plug O-ring (PRE-CFM-SB 72–0124) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2330	Tool - Inspection, Pressure Faces, Dovetail, Fan Blade, Missing Coating, Inch Units Part #: 856A4628G01 Supplier: 58828
SPL-2331	Tool - Inspection, Pressure Faces, Dovetail, Fan Blade, Missing Coating, MM Units Part #: 856A4628G02 Supplier: 58828
SPL-4052	Gauge - Fan Disk Dovetail Slots Part #: 856A4633G02 Supplier: 58828
SPL-7727	Tool - Inspection, Fan Disk Lugs Part #: 856A4640G01 Supplier: 58828
SPL-11481	Gauge - Fan Blade Rear Shank Part #: 856A4646G01 Supplier: 58828
SPL-12281	Inspection Tool - Booster Spool Forward Flange - CFM56-7B Part #: 856A4637G01 Supplier: 58828
SPL-18784	Zoning Tool, Root Radius - Fan Blade Part #: 856A3958G01 Supplier: 58828
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Prepare for the Inspection

SUBTASK 72-21-02-860-009-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-02-860-010-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-860-013-F00

(3) Make sure that the start levers are in the CUTOFF position.

SUBTASK 72-21-02-480-005-F00

(4) Install a DO NOT OPERATE tag, STD-858.

SUBTASK 72-21-02-480-002-F00

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(5) Install a protective mat, STD-585, in the inlet cowl.

SUBTASK 72-21-02-210-001-F00

(6) Examine the spinner, fan blades, and stage 1 booster vanes for the evidence of foreign object damage:

(a) If you find damage, do the applicable task in the fault isolation manual.

SUBTASK 72-21-02-020-003-F00

WARNING

PUT ON HEAVY GLOVES FOR PROTECTION BEFORE YOU TURN THE FAN ROTOR BLADES WITH YOUR HANDS. INJURIES TO YOUR HANDS CAN OCCUR.

(7) To examine the elastomer spacers, retaining ring, platforms, spacers, fan blades, shims, fan disk, threaded pins, counterweights, booster spool forward flange, and LPT shaft plug O-ring, do this task: Fan Blade Removal (Complete Set), TASK 72-21-02-000-801-F00.

SUBTASK 72-21-02-160-002-F00

WARNING

ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. DO NOT BREATHE VAPORS. USE IN WELL VENTILATED AREA FREE FROM SPARKS, FLAME, OR HOT SURFACES. WEAR SPLASH GOGGLES, SOLVENT RESISTANT GLOVES, AND OTHER PROTECTIVE GEAR. IN CASE OF EYE CONTACT, FLUSH WITH WATER FOR 15 MINUTES AND SEEK MEDICAL ATTENTION. IN CASE OF SKIN CONTACT, WASH WITH SOAP AND WATER.

(8) Clean all dirt and unwanted material from the fan blade with alcohol, B00676 [CP1041].

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G. Elastomer Spacers Examination

SUBTASK 72-21-02-220-061-F00

(1) If you find damage to the elastomer spacers that is more than the limits, replace the elastomer spacers unless you are given other instructions.

SUBTASK 72-21-02-220-060-F00

(2) Examine the elastomer spacers for damage (Figure 601):

(a) Cracks and tear

1) All quantities are permitted if the tear does not exceed 3/4 of the elastomer spacers length.

(b) Nicks, dents and scratches on the elastomer spacers

1) All damage is permitted with this limit:

a) Not more than 0.04 in. (1.0 mm) in depth.

(c) Missing elastomer spacers.

1) Two missing elastomer spacers are permitted.

a) In all cases, you will install the elastomer spacers in an even quantity and equal distance in the angular direction.

b) If more than two elastomer spacers are missing, a continue-in-service limit of 300 cycles or 500 flight hours is permitted.

NOTE: Repeat extension is not permitted.

<1> In all cases, you will install the elastomer spacers in an even quantity and equal distance in the angular direction.

H. Retaining Ring Examination

SUBTASK 72-21-02-220-034-F00

(1) If you find damage to the retaining ring that is more than the limits, replace the retaining ring, unless you are given other instructions.

SUBTASK 72-21-02-220-035-F00

(2) Examine the retaining ring for damage (Figure 602):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches that are not in centering diameter C

1) All damage is permitted with these limits:

a) Not more than 0.003 in. (0.08 mm) in depth.

(c) Nicks, dents and scratches in centering diameter C

1) All damage is permitted with this limit:

a) Not more than 0.002 in. (0.05 mm) in depth.

(d) Fretting/wear on the mating surfaces.

1) All damage is permitted with this limit:

a) Not more than 0.002 in. (0.05 mm) in depth.

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I. Platform Examination

SUBTASK 72-21-02-210-006-F00

(1) Examine the platform for damage (except in Area B, Area K, Area I, Area J, Area E, Area F, and Area V) (Figure 603):

LOM ALL POST CFM56-7B-72-0353

(a) Cracks in lugs

1) Cracks are not permitted, replace the damaged platform.

2) You must do a piece part inspection of the remaining platforms in the set with the shop manual.

a) A continue-in-service limit of 300 cycles or 500 flight hours is permitted.

LOM ALL

(b) Cracks in Area M

1) Not permitted.

(c) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.008 in. (0.20 mm) in depth after you remove the high metal.

NOTE: Refer to the general removal of a high metal (TASK 70-10-07-800-801-F00).

b) If not more than 0.010 in. (0.25 mm) in depth, a continue in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.012 in. (0.30 mm) in depth, a continue in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(d) Corrosion

1) All quantities of corrosion on the platform are permitted.

(e) Marks because of the shim on surface C (Figure 603).

1) Not permitted.

2) Blend repair the mark (TASK 72-21-02-300-808-F00).

SUBTASK 72-21-02-211-002-F00

(2) Examine the platform for damage in Area K (Figure 603):

(a) Cracks

1) Not permitted.

(b) Damage to the surface protection (anodized coating and anti-erosion paint)

1) 100 percent of missing coating is permitted.

(c) Erosion of parent material on the external contour surface

1) Erosion is permitted with these limits:

a) Not more than 0.012 in. (0.30 mm) in depth after you remove the high metal.

NOTE: Refer to the general removal of a high metal (TASK 70-10-07-800-801-F00).

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b) A continue in-service limit of 3000 cycles or 5000 flight hours is permitted if the damage is not more than 0.020 in. (0.508 mm) in depth.

NOTE: Repeat extension is not permitted.

(d) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.010 in. (0.25 mm) in depth after you remove the high metal.

NOTE: Refer to the general removal of a high metal (TASK 70-10-07-800-801-F00).

b) If not more than 0.012 in. (0.30 mm) in depth, a continue in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.015 in. (0.38 mm) in depth, a continue in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(e) Corrosion

1) All quantities of corrosion in Area K are permitted.

(f) Distortion

1) All distortion is permitted with this limit:

a) The distortion is not more than 0.04 in. (1.0 mm) in depth from the original contour.

(g) Tears or missing material

NOTE: For all platforms found with tears or missing material on Area K lateral side, remove and visually examine the fan disk mid-flange lug threaded pin and booster spool forward flange lug threaded pin shank diameter for damage per the Fan Disk and Booster Spool procedures. Replace the platform, unless you are given other instructions.

1) Not permitted.

(h) Tip corner of Area I forward end.

1) All damage is permitted with these limits:

a) Not more than 0.04 in. (1.0 mm) X 0.04 in. (1.0 mm).

b) If not more than 0.24 in. (6.1 mm) X 0.24 in. (6.1 mm), a continue-in-service limit of 1500 cycles or 2500 flight hours is permitted.

NOTE: Repeat extension is not permitted.

SUBTASK 72-21-02-211-003-F00

(3) Examine the platform for damage in Area B (Figure 603):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.008 in. (0.20 mm) in depth after you remove the high metal.

NOTE: Refer to the general removal of a high metal (TASK 70-10-07-800-801-F00).

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b) If not more than 0.010 in. (0.25 mm) in depth, a continue-in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.014 in. (0.36 mm) in depth, a continue in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(c) Nicks and dents because of interference with the shim axial tab.

1) All damage is permitted with these limits:

a) Not more than 0.008 in. (0.20 mm) in depth after you remove the high metal.

NOTE: Refer to the general removal of a high metal (TASK 70-10-07-800-801-F00).

b) If not more than 0.098 in. (2.5 mm) in depth, a continue in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

SUBTASK 72-21-02-211-004-F00

(4) Examine the platform for damage in Area I and Area J (Figure 603):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.010 in. (0.25 mm) in depth after you remove the high metal.

NOTE: Refer to the general removal of a high metal (TASK 70-10-07-800-801-F00).

b) If not more than 0.012 in. (0.30 mm) in depth, a continue-in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.015 in. (0.38 mm) in depth, a continue in-service of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(c) Corrosion

1) All quantities of corrosion in Area I and Area J are permitted.

(d) Wear.

1) Wear is not permitted, except in Area I, if it is within the limits of the applicable repair (TASK 72-21-02-300-809-F00).

SUBTASK 72-21-02-211-006-F00

(5) Examine the platform for seal damage (Figure 603):

(a) Missing, torn, or unbonded elastomer seals.

1) All quantities are permitted if the elastomer seal missing or unbonded cumulated length is not more than 39.37 in. (1000.00 mm).

a) Only one elastomer seal can be missing or unbonded on each platform.

b) Cut and remove the loose material.

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2) If the missing or unbonded cumulated length of the elastomer seal is not more than 51 in. (1295 mm), a continue-in-service limit of 300 cycles is permitted as follows:

NOTE: Extension cycle is not permitted.

a) Only one elastomer seal can be missing or unbonded on each platform.

b) Cut and remove the loose material.

3) If the missing or unbonded cumulated length of the elastomer seal is not more than 63 in. (1600 mm), a continue-in-service limit of 200 cycles is permitted as follows:

NOTE: Extension cycle is not permitted.

a) Only one elastomer seal can be missing or unbonded on each platform.

b) Cut and remove the loose material.

4) If the missing or unbonded cumulated length of the elastomer seal is more than 63 in. (1600 mm), a continue-in-service limit of 50 cycles is permitted:

NOTE: Extension cycle is not permitted.

a) Only one elastomer seal can be missing or unbonded on each platform.

b) Cut and remove the loose material.

SUBTASK 72-21-02-211-008-F00

(6) Examine the platform for damage in Area E and Area F (Figure 603):

(a) Cracks

1) Not permitted.

(b) Nicks and dents

1) All damage is permitted with these limits:

a) Not more than 0.004 in. (0.10 mm) in depth after you remove the high metal.

NOTE: Refer to the general removal of a high metal (TASK 70-10-07-800-801-F00).

b) If not more than 0.006 in. (0.15 mm) in depth, a continue-in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.008 in. (0.20 mm) in depth, a continue-in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(c) Scratches

1) All damage is permitted with these limits:

a) Not more than 0.002 in. (0.05 mm) in depth.

b) If not more than 0.004 in. (0.10 mm) in depth, a continue-in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.006 in. (0.15 mm) in depth, a continue-in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(d) Corrosion.

1) Not permitted.

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SUBTASK 72-21-02-211-009-F00

(7) Examine the platform for damage Area V (Stiffener) (Figure 603):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.04 in. (1.0 mm) in depth after you remove the high metal.

NOTE: Refer to the general removal of a high metal (TASK 70-10-07-800-801-F00).

b) If not more than 0.06 in. (1.5 mm) in depth, a continue-in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.08 in. (2.0 mm) in depth, a continue-in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(c) Corrosion.

1) All quantities of corrosion in Area V are permitted.

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SUBTASK 72-21-02-211-011-F00

(8) Examine the platform swaged bushing:

(a) Missing swaged bushing

1) Not permitted.

(b) Looseness is permitted with this limit:

1) Not more 0.008 in. (0.2 mm).

LOM ALL

SUBTASK 72-21-02-210-014-F00

(9) Examine the platform for unbonded or missing weight adjustment elastomer strip.

NOTE: You will find these materials at the bottom of some platforms.

(a) There is no limit to the quantity of unbonded elastomer strips:

1) Cut and remove the loose material.

(b) There is no limit to the quantity of missing elastomer strip as long as the engine vibration level is in the limits.

1) If it is necessary, do this task: Test 14A - Fan Trim Balance (Three-Shot Plot Procedure), TASK 71-00-00-750-802-F00 or Test 14B - Fan Trim Balance (On Board Procedure - Vibro-meter AVM), TASK 71-00-00-750-803-F00 or Test 14C - Fan Trim Balance (Analyzer Procedure), TASK 71-00-00-750-805-F00.

J. Spacers Examination

SUBTASK 72-21-02-210-015-F00

(1) If you find damage to the spacers that is more than the limits, replace the spacers, unless you are given other instructions.

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SUBTASK 72-21-02-220-057-F00

(2) Examine the spacer for damage (Figure 604):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches on the parent material are permitted with this limit:

1) Not more than 0.0196 in. (0.50 mm) in depth after you remove the high metal.

NOTE: Refer to the general removal of a high metal (TASK 70-10-07-800-801-F00).

a) A continue-in-service limit of 500 cycles or 750 flight hours, whichever comes first, is permitted if the damage is more than 0.0196 in. (0.50 mm) in depth.

(c) Wear on the mating faces of the parent material is permitted with this limit:

1) Not more than 0.011 in. (0.28 mm) in depth.

a) A continue-in-service limit of 500 cycles or 750 flight hours, whichever comes first, is permitted if the damage is more than 0.011 in. (0.28 mm) in depth.

(d) Wear on the front and rear faces of the lug is permitted with this limit:

1) Not more than 0.011 in. (0.28 mm) in depth.

a) A continue-in-service limit of 500 cycles or 750 flight hours, whichever comes first, is permitted if the damage is more than 0.011 in. (0.28 mm).

(e) Elastomer strips for damage:

1) Missing, torn, or unbonded material is permitted with these limits:

a) A maximum of one elastomer strip is damaged per spacer.

b) A maximum of eight spacers are damaged per engine.

NOTE: It is permitted to cut and remove the damaged elastomer strip areas.

<1> A continue-in-service limit of 100 cycles or 175 flight hours, whichever comes first, is permitted if the damage is more than the above limits.

c) All scoring and scratches on the elastomer strips are permitted.

K. Fan Blade Examination

SUBTASK 72-21-02-200-001-F00

(1) Examine the fan blade for damage (Figure 605, Figure 606, Figure 607 and Figure 608):

(a) If you find damage that is more than the limits, you must replace the fan blade, unless you are given other instructions.

(b) Cracks or tears

1) Not permitted.

(c) Look for damage to the dovetail pressure faces (Figure 607):

NOTE: The fan blade dovetail pressure faces are defined as the contact area and the non-contact area. The contact area is the critical area where the fan disk dovetail slot pressure faces mate the fan blade dovetail pressure faces. Carefully examine the contact area for damage.

1) Damage of the Molydag coating on the pressure face is permitted with these limits:

a) All quantities of missing Molydag coating in the contact area and in the non-contact area are permitted with this limit:

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<1> You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

2) Cu-Ni-In coating on the pressure faces

a) If damage to the coating is found, do a visual inspection of each pressure face with the applicable transparent graduated tool, SPL-2330, or tool, SPL-2331, to find the extent of the damage.

b) Damage to the Cu-Ni-In coating in the non-contact area (Figure 607).

<1> Any amount of missing and/or chipped Cu-Ni-In coating is permitted in the non-contact area.

c) Damage to the Cu-Ni-In coating in the contact area (Figure 607).

<1> Missing or chipped Cu-Ni-In coating in the contact area is permitted.

<a> Missing and/or chipped Cu-Ni-In coating is permitted only in the Area X (Figure 608).

<b> There is no wear on base material.

<c> You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

<2> A continue-in-service limit of 50 flight cycles or 75 flight hours, whichever comes first, is permitted with these conditions:

<a> Missing and/or chipped Cu-Ni-In coating is more than Area X (Figure 608).

<b> There is no wear on base material.

<c> You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

NOTE: No repeat extension is permitted.

(d) Look for damage to the blade root critical Areas L (includes the forward and aft radius areas, Area S, and Area T) (Figure 605):

1) Nicks, dents and scratches

a) Not permitted.

2) Wear or rub marks along the concave and/or convex side(s) due to contact with platform seals are permitted with this limit:

a) The damage is not more than 0.004 in. (0.10 mm) in depth.

LOM ALL POST SB CFM56-7B-72-0324

3) Damage in the forward radius area concave side due to contact with fan blade shim axial stop/tab is permitted with this limit:

a) The damage is not more than 0.004 in. (0.10 mm) in depth.

LOM ALL POST SB CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

4) Wear along the blade concave side in Area T due to contact with the fan blade shim are permitted with this limit:

a) The damage is not more than 0.004 in. (0.10 mm) in depth.

5) Wear along the blade concave and convex sides in Area S due to contact with the fan blade shim are permitted with this limit:

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LOM ALL POST SB CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324 (Continued)

a) The damage is not more than 0.002 in. (0.05 mm) in depth.

NOTE: The fan blade root radius zoning tool, SPL-18784, helps the identification of the Areas S and T on Fan Blade root radius. The tool applies a mask on areas S and T where findings can be accepted depending on their depth. Contact CFM for tooling availability options.

LOM ALL

6) Wear or rub marks in other areas.

a) Not permitted.

(e) Look for damage in the blade root Area H and Area W (does not include the blade root critical area and the dovetail pressure faces) (Figure 605):

1) Distortion on the trailing edge

a) Not permitted.

2) All nicks, dents and scratches are permitted with these limits:

a) The damage is not more than 0.004 in. (0.10 mm) in depth.

b) The scratches are not more than 0.40 in. (10.2 mm) in length.

3) Damage to the rear surface of the shank are permitted with these limits:

a) All quantities of missing Molydag coating are permitted with this limit:

<1> You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

LOM ALL PRE SB 737-CFM56-7B-72-0753

b) Wear due to contact with the forward flange of the booster spool is permitted with these limits:

NOTE: Use the fan blade rear shank gauge, SPL-11481, or equivalent to measure the depth.

<1> The wear is not more than 0.0098 in. (0.25 mm) in depth.

<2> You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

LOM ALL POST SB 737-CFM56-7B-72-0753

c) Missing CoCrAlYSi coating on the rear shank is permitted with these limits:

<1> The missing CoCrAlYSi coating is not more than ten percent of the total coating area and if there is no sign of worn areas on base material.

<2> A continue-in-service limit of 500 cycles is permitted with these conditions:

<a> The missing coating is not more than twenty percent of the total coating area.

<b> There is no sign of worn areas on base material.

LOM ALL

4) Wear or rub marks on the front surface of the shank due to contact with fan blade spacer are permitted with this limit:

a) Not more than 0.004 in. (0.10 mm) in depth.

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LOM ALL POST SB CFM56-7B-72-0296

5) Wear or rub marks on the trailing edge due to contact with booster spool counter weight is permitted with this limit:
   a) Not more than 0.004 in. (0.10 mm) in depth.

LOM ALL

6) Wear or rub marks along the concave and/or convex side(s) due to contact with platform seals are permitted with this limit:
   a) The damage is not more than 0.004 in. (0.10 mm) in depth.
7) Wear or rub marks on the trailing edge convex side (Area W) due to contact with the aft edge corner of the platform is permitted with this limit:
   a) The damage is not more than 0.016 in. (0.4 mm) in depth.

(f) Look for damage in the critical Area J:
1) Distortion on the leading edge
   a) Not permitted.
2) All nicks, dents and scratches are permitted with these limits:
   a) The damage is not more than 0.004 in. (0.10 mm) in depth.
   b) The scratches are not more than 0.40 in. (10.2 mm) in length.

(g) Look for damage in the fan blade airfoil Area I:
1) Cracks and tears
   a) Not permitted.
2) All nicks and dents on the leading edge and trailing edge are permitted with this limit:
   a) Not more than 0.028 in. (0.7 mm) in depth.
3) All nicks, dents and scratches on the airfoil (contour surface) are permitted with this limit:
   a) Not more than 0.012 in. (0.3 mm) in depth.

CAUTION	WHEN YOU DO THIS PROCEDURE, BE SURE TO USE GOOD SHOP PRACTICES AND COMMON SENSE. ABUSIVE BLENDING CAN CAUSE DAMAGE THAT IS HARMFUL TO THE LIFE AND FUNCTION OF THE REPAIRED PART.

4) Blend repair all nicks, dents and scratches on the leading and trailing edges and blade airfoil that are out of the above limits (TASK 72-21-02-300-801-F00).
5) Local distortion on the leading edge is permitted with these limits:
   a) Not more than two locations and the circumferential dimension (Q) must not be more than 0.4 in. (10 mm).
   b) The depth (M) into the airfoil chord must be more than six times the circumferential dimension (Q).
   c) The radial displacement (N) must be more than ten times the circumferential dimension (Q).
   d) The bend radius (R) must be more than one and a half times the radial displacement (N) and, in all cases, must be more than 0.79 in. (20 mm).

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e) Do a Fluorescent Penetrant inspection of the distorted area (TASK 70-40-01-230-801-F00).

NOTE: Deferral of this inspection is not permitted.

(h) Look for damage in the fan blade airfoil Area K:

NOTE: Area K does not include the tip.

1) Cracks and tears

a) Not permitted.

2) All nicks and dents on the leading edge and trailing edge are permitted with this limit:

a) Not more than 0.04 in. (1.02 mm) in depth.

3) All nicks, dents and scratches on the airfoil (contour surface) are permitted with this limit:

a) Not more than 0.012 in. (0.3 mm) in depth.

CAUTION	WHEN YOU DO THIS PROCEDURE, BE SURE TO USE GOOD SHOP PRACTICES AND COMMON SENSE. ABUSIVE BLENDING CAN CAUSE DAMAGE THAT IS HARMFUL TO THE LIFE AND FUNCTION OF THE REPAIRED PART.

4) Blend repair all nicks, dents and scratches on the leading and trailing edges and blade airfoil that are out of the above limits (TASK 72-21-02-300-801-F00).

5) Local distortion on the leading edge is permitted with these limits (Figure 606):

a) Not more than two locations and the circumferential dimension (Dim. Q) is not more than 0.4 in. (10 mm).

b) The depth (Dim. M) into the blade chord is at least six times greater than the circumferential dimension (Dim. Q).

c) The radial displacement (Dim. N) along the leading edge is at least ten times greater than the circumferential dimension (Dim. Q).

d) The bend radius (Radius R) is more than one and a half times the radial displacement (Dim. N) and, in all cases, is more than 0.79 in. (20 mm).

e) The distance (Dim. O) along the leading edge between the end of the distortion and the blade tip is more than 4.33 in. (110.0 mm).

<1> If the distance (Dim. O) along the leading edge between the end of the distortion and the blade tip is less than 4.33 in. (110.0 mm), do a fluorescent penetrant Inspection of the upper panel (Area K) of the adjacent fan blade (TASK 70-40-01-230-801-F00).

NOTE: For instance, if fan blade positions #17, #18 and #19 are found with leading edge distortion more than the above limit, do a fluorescent penetrant Inspection of the adjacent fan blade position #16. If fan blade positions #17, #19 and #20 are found with leading edge distortion more than the above limit, do a fluorescent penetrant Inspection of the adjacent fan blades position #16 and #18. Numbers are counterclockwise when you look in the aft direction.

NOTE: Deferral of this inspection is not permitted.

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f) Do a Fluorescent Penetrant inspection of the distorted area (TASK 70-40-01-230-801-F00).

NOTE: Deferral of this inspection is not permitted.

(i) Look for fan blade tip damage:

1) Cracks and tears

a) Not permitted.

2) Nicks, dents and scratches are permitted with this limit:

a) Not more than 0.04 in. (1.02 mm) in depth.

CAUTION	WHEN YOU DO THIS PROCEDURE, BE SURE TO USE GOOD SHOP PRACTICES AND COMMON SENSE. ABUSIVE BLENDING CAN CAUSE DAMAGE THAT IS HARMFUL TO THE LIFE AND FUNCTION OF THE REPAIRED PART.

3) Blend repair all nicks, dents and scratches on the leading and trailing edges and blade airfoil that are out of the above limits (TASK 72-21-02-300-801-F00).

(j) Look for leading edge tip curl:

1) There is no limit to the quantity of blades with tip curl with these conditions:

a) The tip curl (X) does not extend more than 0.79 in. (20.1 mm) across the blade tip.

b) The tip curl (W) does not extend more than 0.79 in. (20.1 mm) down the leading edge.

c) The bend can not be more than a 60 degree deflection.

d) The maximum deflection (U) from the initial contour is not more than 0.40 in. (10.2 mm).

2) A maximum of four blades with tip curl are permitted with these conditions:

a) The tip curl (X) does not extend more than 1.3 in. (33.0 mm) across the blade tip.

b) The tip curl (W) does not extend more than 2.0 in. (50.8 mm) down the leading edge.

c) The bend can not be more than a 60 degree deflection.

d) No more than two adjacent blades can have tip curl.

e) The maximum deflection (U) from the initial contour is not more than 0.6 in. (15.2 mm).

3) One blade with tip curl is permitted with these conditions:

a) The tip curl (X) does not extend more than 2.0 in. (50.8 mm) across the blade tip.

b) The tip curl (W) does not extend more than 2.0 in. (50.8 mm) down the leading edge.

c) The bend can not be more than a 60 degree deflection.

d) The maximum deflection (U) from the initial contour is not more than 1 in. (25.4 mm).

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e) If the tip curl for one blade is more than the above limits, do a fluorescent penetrant Inspection of the upper panel (Area K) of the adjacent fan blade (TASK 70-40-01-230-801-F00).

NOTE: For instance, if fan blade positions #17, #18 and #19 are found with leading edge tip curl more than the above limit, do a fluorescent penetrant Inspection of the adjacent fan blade position #16. If fan blade positions #17, #19 and #20 are found with leading edge tip curl more than the above limit, do a fluorescent penetrant Inspection of the adjacent fan blades position #16 and #18. Numbers are counterclockwise when you look in the aft direction.

NOTE: Deferral of this inspection is not permitted.

(k) Look for trailing edge tip curl:

1) No limits to the quantity of blades with tip curl are permitted with these conditions:

a) The tip curl (Z) does not extend more than 0.79 in. (20.1 mm) across the blade tip.

b) The tip curl (Y) does not extend more than 0.79 in. (20.1 mm) down the trailing edge.

c) The bend can not be more than a 60 degree deflection.

d) The maximum deflection (V) from the initial contour is not more than 0.40 in. (10.2 mm).

2) A maximum of four blades with tip curl of the trailing edge are permitted with these conditions:

a) The tip curl (Z) does not extend more than 1.2 in. (30.5 mm) across the blade tip.

b) The tip curl (Y) does not extend more than 1.2 in. (30.5 mm) down the trailing edge.

c) The bend can not be more than a 60 degree deflection.

d) No more than two adjacent blades can have tip curl.

e) The maximum deflection (V) from the initial contour is not more than 0.6 in. (15.2 mm).

L. Shim Examination

SUBTASK 72-21-02-220-056-F00

(1) Examine the shim for damage (Figure 609):

NOTE: A reworked fan disk have a white line of paint that circles the fan disk, along with the words SHIMS + SPECIFIC SPACERS REQUIRED, DISK REPAIRED in white letters on one side of the disk.

(a) If you find damage to the shim that is more than the limits, replace the part, unless you are given other instructions.

(b) Damage on the Molydag coating on shim pressure face is permitted with these limits:

1) 25% of Molydag missing is permitted on the shim pressure face contact area.

2) 100% of Molydag coating is missing with these conditions:

NOTE: Repeat extension is not permitted.

a) There is no wear on the shim base material.

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b) You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00.

3) You can recondition the Molydag coating on the shim (TASK 72-21-02-300-807-F00).

(c) Cracks, tears or punctures

1) Not permitted.

(d) Scratches

1) All damage is permitted with this limit:

a) Not more than 0.003 in. (0.08 mm) in depth.

(e) Nicks and dents

1) All damage is permitted with this limit:

a) Affected surface is less than 10% of each contact pressure face.

(f) Axial retention distortion

1) All damage is permitted with this limit:

a) Not more than 0.04 in. (1.0 mm) X 0.04 in. (1.0 mm) from the original contour.

(g) Local distortion and deformation.

1) Not permitted.

M. Fan Disk Examination

SUBTASK 72-21-02-220-036-F00

(1) If you find damage to the fan disk that is more than the limits, replace the engine, unless you are given other instructions (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

SUBTASK 72-21-02-220-037-F00

(2) Examine the fan disk (other than the dovetail slots, referenced areas and surfaces, flange locating diameter and mating faces) for damage (Figure 610 and Figure 611):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches (Views B-B and C-C).

1) All damage is permitted with these limits:

a) Not more than 0.003 in. (0.08 mm) in depth.

b) A continue-in-service limit of 2000 cycles is permitted if the damage is not more than 0.004 in. (0.1 mm) in depth.

SUBTASK 72-21-02-220-058-F00

(3) Examine the fan disk the referenced areas (other than the dovetail slots, flange locating diameter and mating faces) for damage (Figure 610 and Figure 611):

(a) Nicks, dents and scratches (Area F; View B-B)

1) All damage is permitted with these limits:

a) Not more than 0.0012 in. (0.03 mm) in depth.

b) A continue-in-service limit of 2000 cycles is permitted if the damage is not more than 0.003 in. (0.08 mm) in depth.

(b) Nicks, dents and scratches (Area B; View B-B)

1) All damage is permitted with these limits:

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a) Not more than 0.002 in. (0.05 mm) in depth.

b) A continue-in-service limit of 2000 cycles is permitted if the damage is not more than 0.003 in. (0.08 mm) in depth.

(c) Nicks, dents and scratches (Area J; Views A-A and C-C, and Area W; View B-B)

1) All damage is permitted with this limit:

a) Not more than 0.004 in. (0.1 mm) in depth.

(d) Nicks, dents and scratches (Area K; View A-A).

1) All damage is permitted with these limits:

a) Not more than 0.003 in. (0.08 mm) in depth.

b) A continue-in-service limit of 2000 cycles is permitted if the damage is not more than 0.004 in. (0.1 mm) in depth.

SUBTASK 72-21-02-220-041-F00

(4) Examine the dovetail slots (Figure 610 and Figure 611):

(a) Cracks

1) Not permitted.

(b) Scratches and superficial marks on the pressure faces (only Area Q)

1) All damage is permitted with these limits:

a) Not more than 0.0008 in. (0.02 mm) in depth.

b) A continue-in-service limit of 100 cycles is permitted if the damage is not more than 0.002 in. (0.05 mm) in depth.

(c) Fretting or wear on the pressure faces (Area Q) (Figure 611)

NOTE: The fan disk pressure face (Area Q) is defined as the contact area and Areas V. The Areas V are opposite the fan blade undercut areas.

NOTE: CFM SB 72-0525 provides the fan disk slot pressure face (Area Q) wear depth inspection threshold, unless given other AMM instructions. If you find fretting/wear on the fan disk pressure faces (Area Q), the wear depth has to be measured in the first (forward and aft) two inches of the slot with the fan disk dovetail slots gauge, SPL-4052.

1) All damage limits.

a) Wear depth measurement that is less than or equal to 0.007 in. (0.18 mm) is permitted (TASK 72-21-00-640-801-F00).

b) A continue-in-service limit for 1500 cycles is permitted for wear depth measurement that is more than 0.007 in. (0.18 mm) but less than or equal to 0.009 in. (0.23 mm) with this condition:

NOTE: Repeated service extension is permitted.

<1> Lubricate the fan blade and fan disk (TASK 72-21-00-640-801-F00).

c) A continue-in-service limit of 500 cycles is permitted for a wear depth measurement that is more than 0.009 in. (0.23 mm) but less than or equal to 0.010 in. (0.25 mm) with this condition:

NOTE: Repeated service extension is not permitted.

<1> Lubricate the fan blade and fan disk (TASK 72-21-00-640-801-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

d) A continue-in-service limit of 50 cycles is permitted for a wear depth measurement that is more than 0.010 in. (0.25 mm) but less than or equal to 0.011 in. (0.28 mm) with this condition:

NOTE: Repeated service extension is not permitted.

<1> Lubricate the fan blade and fan disk (TASK 72-21-00-640-801-F00).

e) If the wear depth measurement is more than 0.011 in. (0.28 mm), the fan disk is not permitted, replace the engine.

(d) Nicks, dents and scratches on the dovetail slot forward face (Surface BA, not in Area N)

1) All damage is permitted with these limits:

a) Not more than 0.003 in. (0.08 mm) in depth.

b) If the depth measurement is not more than 0.005 in. (0.127 mm) in depth, a continue-in-service limit of 3000 cycles is permitted.

c) If the depth measurement is not more than 0.006 in. (0.15 mm) in depth, a continue-in-service limit of 50 cycles is permitted.

d) If the depth measurement is more than 0.006 in. (0.15 mm) in depth, no service extension is permitted.

(e) Nicks, dents and scratches on the bottom edge of the pressure faces radius (only Area L)

1) All damage is permitted with this limit:

a) Not more than 0.0008 in. (0.02 mm) in depth.

(f) Nicks, dents and scratches in the bottom of the dovetail slots (only Area M)

1) All damage is permitted with this limit:

a) Not more than 0.0016 in. (0.04 mm) in depth on the face.

(g) Nicks, dents and scratches in the dovetail slots fillet radius of the fan disk (only on the forward and aft radius in Area N) (View C).

1) All damage is permitted with these limits:

a) Not more than 0.0016 in. (0.04 mm) in depth

b) A continue-in-service limit of 500 cycles is permitted if the damage is not more than 0.003 in. (0.08 mm) in depth.

SUBTASK 72-21-02-220-059-F00

(5) Examine the fan disk in the referenced surfaces, mating faces and locating diameter for damage (Figure 610 and Figure 611):

(a) Nicks, dents and scratches on surface PA

1) All damage is permitted with this limit:

a) Not more than 0.004 in. (0.1 mm) in depth.

(b) Nicks, dents and scratches on mating surfaces R and S

NOTE: The mating surfaces are with the fan blade platforms and booster bolts.

1) All damage is permitted with this limit:

a) Not more than 0.004 in. (0.1 mm) in depth.

(c) Wear on the mating surfaces R and S

1) All damage is permitted with this limit:

a) Not more than 0.002 in. (0.05 mm) in depth.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(d) Nicks, dents and scratches on the locating diameters (diameter P)

1) All damage is permitted with this limit:

a) Not more than 0.004 in. (0.1 mm) in depth.

(e) Fretting or wear (diameter P)

1) All damage is permitted with this limit:

a) All depths with maximum limit of 0.004 in. (0.1 mm) which is not more than 10% of circumference is permitted.

(f) Nicks, dents and scratches (Area O and Area DA, Views B-B and D)

1) All damage is permitted with these limits:

a) Not more than 0.002 in. (0.05 mm) in depth.

b) A continue-in-service limit of 2000 cycles is permitted if the damage is not more than 0.003 in. (0.08 mm).

(g) Nicks, dents and scratches (Area G, View B-B)

1) All damage is permitted with these limits:

a) Not more than 0.003 in. (0.08 mm) in depth.

b) A continue-in-service limit of 2000 cycles is permitted if the damage is not more than 0.004 in. (0.1 mm) in depth.

(h) Nicks, dents and scratches (Area EA and Diameter V, Views A-A and D)

1) All damage is permitted with this limit:

a) Not more than 0.0059 in. (0.15 mm) in depth.

(i) Fretting or wear (Area EA and Diameter V, Views A-A and D).

1) Measure the depth of Area EA with the inspection tool, SPL-7727.

a) A wear depth measurement less than or equal to 0.004 in. (0.1 mm) is permitted.

b) A wear depth measurement more than 0.004 in. (0.1 mm) but less than or equal to 0.006 in. (0.15 mm) is permitted with these conditions:

<1> A one time continue-in-service limit of 500 cycles is permitted if the elastomer spacers (SB 72-0548) are not installed.

LOM ALL POST SB CFM56-7B-72-548

c) A wear depth measurement less than or equal to 0.0157 in. (0.40 mm) is permitted.

LOM ALL

SUBTASK 72-21-02-210-018-F00

(6) Examine the threaded pins on the fan disk mid lug for damage (Figure 612):

NOTE: Do not remove the threaded pins from the fan disk to do this inspection.

NOTE: If you find damage to the threaded pin that is more than the limits, replace the threaded pins unless you are given other instructions (TASK 72-21-02-300-804-F00).

(a) Examine the threaded pins for damage:

1) Cracks on the head end

a) Not permitted.

2) Nicks, dents and scratches on the pin diameter (threaded end).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

a) All damage is permitted with this limit:

<1> Not more than 0.02 in. (0.51 mm) in depth after you remove the high metal.

NOTE: Refer to the general removal of high metal (TASK 70-10-07-800-801-F00).

(b) Missing threaded pins

1) Not permitted

2) Examine the holes in the mid lug for damage.

(c) Loose threaded pins.

1) Remove the loose threaded pins for a visual inspection:

a) If you find damage on the threaded pins, replace them (TASK 72-21-02-300-804-F00).

b) Examine the holes in the mid lug for damage.

c) Examine the nuts for damage.

N. Counterweight Examination

SUBTASK 72-21-02-210-011-F00

(1) If you find damage to the counterweights that is more than the limits, replace the counterweight, unless you are given other instructions (TASK 72-21-02-300-805-F00).

SUBTASK 72-21-02-211-001-F00

(2) Examine the counterweights for damage (Figure 613)|:

(a) Nicks, dents and scratches.

1) All damage is permitted with this limit:

a) Not more than 0.008 in. (0.20 mm) in depth.

O. Booster Spool Examination

SUBTASK 72-21-02-210-020-F00

(1) Examine the booster front seal teeth and the front face (Figure 613):

(a) Nicks, dents, scratches.

1) All damage is permitted with this limit:

a) Not more than 0.002 in. (0.05 mm) in depth.

SUBTASK 72-21-02-220-053-F00

(2) If you find damage to the front flange (Surface A) of the booster spool that is more than the limits, replace the engine, unless you are given other instructions (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

SUBTASK 72-21-02-220-054-F00

(3) Examine the front flange (Surface A) of the Booster spool for damage (Figure 613):

(a) Fretting/wear due to contact with the rear surface of the blade shank

NOTE: If you find fretting/wear on the booster spool front flange, use the inspection tool, SPL-12281, or equivalent or cast impression to find the extent of the damage.

1) Fretting/wear is permitted if not more than 0.016 in. (0.41 mm) in depth.

a) Lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) A 3000 cycles continue in-service extension is permitted if the fretting/wear is not more than 0.020 in. (0.51 mm) in depth with this condition:

NOTE: Repeat extension is permitted.

a) Lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

3) A continue-in-service limit of 1500 cycles is permitted if the fretting/wear is not more than 0.022 in. (0.56 mm) in depth with this condition:

NOTE: Repeat extension is permitted.

a) Lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

4) A continue-in-service limit of 50 cycles is permitted if the fretting/wear is not more than 0.031 in. (0.79 mm) in depth with this condition:

NOTE: Repeat extension is not permitted.

a) Lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

5) The booster spool must be removed if the fretting/wear is more than 0.031 in. (0.79 mm) in depth.

(b) Damage to the Molydag coating on the forward surface.

1) All quantities of missing Molydag coating is permitted.

SUBTASK 72-21-02-210-016-F00

(4) Examine the threaded pins on the booster spool forward lug for damage (Figure 612):

NOTE: Do not remove the threaded pins from the booster spool to do this inspection.

NOTE: If you find damage to the threaded pin that is more than the limits, replace the threaded pins unless you are given other instructions (TASK 72-21-02-300-805-F00).

(a) Examine the threaded pins for damage:

1) Cracks on the head end

a) Not permitted.

2) Nicks, dents and scratches on the pin diameter (threaded end).

a) All damage is permitted with this limit:

<1> Not more than 0.02 in. (0.51 mm) in depth after you remove the high metal.

NOTE: Refer to the general removal of high metal (TASK 70-10-07-800-801-F00).

(b) Missing threaded pins

1) Not permitted

2) Examine the holes in the forward lug for obvious damage.

(c) Loose threaded pins.

1) Remove the loose threaded pins for a visual inspection:

a) If you find damage on the threaded pins, replace them (TASK 72-21-02-300-805-F00).

b) Examine the holes in the forward lug for obvious damage.

c) Examine the nuts for damage.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

P. Fan Shaft and Fan Disk Inner Cavity Examination

SUBTASK 72-21-02-210-017-F00

(1) Examine the exposed area of the fan shaft and fan disk inner cavity for oil wetting (Figure 614):

(a) Oil wetting of the inner surface of the spinner cones, the fan disk and the fan shaft is not permitted.

(b) To correct the oil seepage, do this task: Replacement of the LPT Shaft Plug O-ring (PRE-CFM-SB 72–0124), TASK 72-55-00-941-801-F00.

Q. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-02-200-004-F00

> **CAUTION**
> MAKE SURE THAT YOU REMOVE ALL TOOLS, LOOSE PARTS AND UNWANTED MATERIAL FROM THE AREA WHEN YOU COMPLETE MAINTENANCE. DAMAGE TO EQUIPMENT COULD OCCUR.

(1) Make sure that you remove tools, parts or unwanted material from the blades and inlet cowl.

SUBTASK 72-21-02-410-002-F00

(2) Do this task: Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-02-080-002-F00

> **CAUTION**
> MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(3) Remove the protective mat, STD-585, from the fan inlet.

SUBTASK 72-21-02-440-001-F00

(4) Remove the DO NOT OPERATE tag, from the applicable engine start lever.

SUBTASK 72-21-02-860-011-F00

(5) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-02-860-012-F00

(6) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Elastomer Spacer Inspection
Figure 601/72-21-02-990-841-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03750-00-B
G22828 S0006582380_V2

Retaining Ring Inspection
Figure 602/72-21-02-990-819-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Platform Inspection
Figure 603/72-21-02-990-805-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

B0044300

2243896 S0000502559_V2

Platform Inspection
Figure 603/72-21-02-990-805-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MM-00061-02-B
G22379 S0006582377_V4

Spacer Inspection
Figure 604/72-21-02-990-806-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 ENGINES POST SB CFM56-7B-72-0324 OR ENGINES POST SB CFM56-7B-72-0485

B0024702

2918917 S0000702799_V1

Fan Blade Inspection
Figure 605/72-21-02-990-802-F00 (Sheet 1 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Blade Inspection
Figure 605/72-21-02-990-802-F00 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CONVEX SIDE

H

LEGEND:

AREA S

AREA T

CONCAVE SIDE

J

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

B0070801

2918990 S0000702800_V1

Fan Blade Inspection
Figure 605/72-21-02-990-802-F00 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Blade Inspection
Figure 605/72-21-02-990-802-F00 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G

B0044100
1930149 S0000364380_V2

Fan Blade Inspection
Figure 605/72-21-02-990-802-F00 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DOTTED LINES INDICATE ORIGINAL CONTOUR OF LEADING EDGE

U32723 S0000192366_V2

Fan Blade LE Distortion Area K
Figure 606/72-21-02-990-837-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

CONVEX SIDE OF BLADE IS SHOWN,
CONCAVE SIDE IS EQUIVALENT.

1 CONTACT AREA

2 NON CONTACT AREA

MM-00248-00

N73330 S0006582367_V6

Fan Blade Pressure Faces Coating/Contact Area Inspection
Figure 607/72-21-02-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

L07142 S0006582370_V6

Fan Blade Pressure Faces Coating Inspection
Figure 608/72-21-02-990-804-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES.

J67249 S0000174879_V3

Shim Inspection
Figure 609/72-21-02-990-817-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Disk Inspection
Figure 610/72-21-02-990-820-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G22876 S0006582382_V4

Fan Disk Inspection
Figure 610/72-21-02-990-820-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B-B

C-C

2988729 S0000765661_V1

Fan Disk Inspection
Figure 610/72-21-02-990-820-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

AREAS [V] RELATES TO THE FAN BLADE UNDERCUT AREAS.
THERE IS NO PRESSURE CONTACT ON THE AREAS [V].

- CV FAN DISK SIDE RELATES TO CC FAN BLADE SIDE.
- CC AND DISK SIDE RELATES TO CV FAN BLADE SIDE.

L32879 S0006582384_V5

Fan Disk Pressure Faces Inspection
Figure 611/72-21-02-990-821-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

J67492 S0000175026_V2

Fan Disk and Booster Spool Threaded Pins Inspection
Figure 612/72-21-02-990-807-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Booster Spool Inspection
Figure 613/72-21-02-990-823-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LPT Shaft Plug Inspection
Figure 614/72-21-02-990-829-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN BLADE - REPAIRS

1. General

A. This procedure has these tasks:

(1) Repair the Fan Blade

(2) Fan Blade Platform Forward Lug Repair

(3) Replace the Platform Balance Weight

(4) Replace or Retighten the Fan Disk Mid Lug Threaded Pins

(5) Replace or Retighten the Booster Spool Threaded Pins

(6) Recondition the Lubricant Coating on the Fan Blade Shim

(7) Fan Blade Platform Blend Repairs.

TASK 72-21-02-300-801-F00

2. Repair the Fan Blade

(Figure 801, Figure 802)

A. General

(1) Each fan blade can be repaired by blending, as specified in this task.

NOTE: A blending repair of the fan blade leading edge can be done with the blade installed. The fan blade must be removed for all other repairs.

NOTE: At the first shop maintenance opportunity where the fan blade is removed from the rotor or when the engine is removed, a) measure the moment-weight of the blade, b) keep a record of the new moment-weight. If the moment-weight changes more than 79 g-in. (200 g-cm), correct the balance of the fan blade rotor.

(2) Blades that have damage that is more than the blending limits in this task must be replaced.

B. References

Reference	Title
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-40-02-200-801-F00	Fan Blade Leading Edge Eddy Current Inspection (P/B 201)
71-00-00-700-814-F00	Test 7 - Vibration Survey (P/B 501)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8468	Inspection Kit - Eddy Current Part #: 856A2682G01 Supplier: 58828
SPL-8910	Template - Fan Blade Leading Edge Part #: 856A3771G01 Supplier: 58828
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D. Consumable Materials

Reference	Description	Specification
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00676 [CP1041]	Alcohol - Isopropyl	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare To Repair the Fan Blade

SUBTASK 72-21-02-040-003-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-040-004-F00

(2) Make sure that the START switches are in the OFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable START switch.

SUBTASK 72-21-02-480-003-F00

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(3) Install a protective mat, STD-585 in the inlet cowl.

SUBTASK 72-21-02-160-003-F00

(4) If the fan blade is dirty, clean unwanted material from the fan blade with alcohol, B00676 [CP1041].

G. Examine the Fan Blades

SUBTASK 72-21-02-220-052-F00

(1) Make sure that the damage and the area of the repair will be less than the blending limits that follow (Figure 801, Figure 802):

(a) If the damage or repair area is more than the limits, replace the fan blades.

1) These are the tasks:

a) Fan Blade Removal (Complete Set), TASK 72-21-02-000-801-F00.

b) Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

(b) Repairs are permitted if they are in blending limits.

SUBTASK 72-21-02-350-001-F00

(2) The leading edge, trailing edge, and root area repair in the critical areas:

(a) Find the critical area J on the leading edge as follows (Figure 801):

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) The size and location of the critical area J are nearest the blade root.
   a) The distance (DIM. AB) from the bottom of the blade root is 1.34 in. (34 mm).
   b) The critical area longitudinal dimension (DIM. AN) is 2.36 in. (60 mm) and the chordal dimension (DIM. AC) is 0.79 in. (20 mm).

(b) Blend repairs are not permitted in the critical area and the root area (Figure 801).

SUBTASK 72-21-02-350-002-F00

(3) The leading edge and trailing edge repair in the non-critical area (not in the root area) (Figure 801):

(a) The leading edge dimensions.

1) Taper the blend repair for the dimensions (DIM. W), (DIM. WA), and (DIM. WB) as follows:
   a) The blend repair is not more than 0.339 in. (8.600 mm) in the chordal direction (DIM. W).
   b) The blend repair is not more than 0.16 in. (4.06 mm) in the chordal direction (DIM. WA).
   c) The blend repair is not more than 0.08 in. (2.03 mm) in. the chordal direction (DIM. WB)
   d) When the distance (DIM. O) between two blend repairs is less than or equal to five times the depth of the smallest of these blends, tangentially blend out the bottom of the two blends (Figure 802).
   e) The leading edge cumulative length of blend repairs for each blade is less than or equal to 5.51 in. (140 mm).
   f) The leading edge cumulative length of blend repairs for each engine is less than or equal to 36.22 in. (920 mm).

(b) Leading edge (AREAS A and B) blend repairs are permitted with these limits (Figure 802):

1) Make sure after you do the blending repair, that the edge thickness is not less than the initial thickness.
2) The longitudinal direction of the repair must be equal to or more than fifteen times the depth (DIM. P) of the damage (View A).
3) The radius minimum (R4) is equal to or more than twenty times the depth (DIM. P) of the damage.
4) The radius minimum (R3) for the blend repair on each side of the initial damage is a minimum radius blend of 0.20 in. (5 mm).
5) The radius maximum (R3) for the blend repair on each side of the initial damage is a maximum radius blend of 0.31 in. (8 mm).

(c) Leading edge (AREA C) blend repairs are permitted with these limits (Figure 802):

1) Make sure after you do the blending repair, that the edge thickness is not less than the initial thickness.
2) The longitudinal direction of the repair must be equal to or more than eight times the depth (DIM. P) of the damage (View A).
3) The radius minimum (R4) is equal to or more than ten times the depth (DIM. P).
4) The radius minimum (R3) for the blend repair on each side of the initial damage is a minimum radius blend of 0.20 in. (5 mm).

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5) The radius maximum (R3) for the blend repair on each side of the initial damage is a maximum radius blend of 0.31 in. (8 mm).

6) If the distance (DIM. O1) between the blend repair and the blade tip is not more than two times the depth P of the repair, do this step:

a) Blend the bottom area of the repair tangentially from the depth (DIM. P) of the area to the blade tip and blend the tip to the blending tip radius (R1).

(d) The trailing edge dimensions (Figure 801).

1) Taper the blend repair for dimension (AH) as follows:

a) The blend repair is not more than 0.16 in. (4.06 mm) in the chordal direction (AH).

b) The trailing edge cumulative length of blend repairs is less than or equal to 2.76 in. (70 mm).

(e) Trailing edge (AREA E) blend repairs are permitted with these limits (Figure 802):

1) Make sure after you do the blending repair, that the edge thickness is not less than the initial thickness.

2) The longitudinal direction of the repair must be equal to or more than eight times the depth (DIM. P) of the damage (View A).

3) The radius minimum (R4) is equal to or more than ten times the depth (DIM. P) of the damage.

4) The radius minimum (R3) for the blend repair on either side of the initial damage is a minimum radius blend of 0.2 in. (5 mm).

5) The radius maximum (R3) for the blend repair on either side of the initial damage is a maximum radius blend of 0.31 in. (8 mm).

6) If the distance (DIM. O1) between the blend repair and the blade tip is not more than two times the depth (DIM. P) of the repair, do this step:

a) Blend the bottom area of the repair tangentially from the depth (DIM. P) of the area to the blade tip and blend the tip to the blending tip radius R2.

SUBTASK 72-21-02-320-001-F00

(4) Blade root area blend repair:

(a) Not permitted.

SUBTASK 72-21-02-320-002-F00

(5) Blade tip repair (AREA D):

(a) The blend repair does not extend more than 0.04 in. (1 mm) in the longitudinal direction (AD) (Figure 801).

(b) The chordal direction of the repair must be equal to or more than eight times the depth (DIM. P) of the damage (Figure 802) (View A).

(c) The minimum radius (R4) is equal to or more than ten times the depth (DIM. P) of the damage.

(d) The radius (R1) blend repair between the leading edge and the tip is not less than 0.01 in. (0.25 mm) and is not more than 0.67 in. (17 mm).

(e) The radius (R2) blend repair between the trailing edge and the tip is not less than 0.01 in. (0.25 mm) and is not more than 0.5 in. (12.7 mm).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(f) When the distance (DIM. O) between two blend repairs is less than or equal to two times the depth of the repair, blend the two repairs together to a line which tangentially connects the bottom areas.

(g) If the distance (DIM. O1) between the blend tip repair and the blade leading edge is less than two times the depth of the repair, do this step:

1) Blend the bottom of the repair tangentially across to the blade leading edge and blend the tip to the blending tip radius R1.

(h) If the distance (DIM. O1) between the blend tip repair and the blade trailing edge is less than two times the depth of the repair, do this step:

1) Blend the bottom of the repair tangentially across to the blade trailing edge and blend the tip to the blending tip radius R2.

(i) The blade tip total cumulative length of the blend repairs is less than or equal to 0.80 in. (20 mm).

SUBTASK 72-21-02-350-003-F00

(6) Fan blade airfoil blend repairs:

(a) The convex or the concave surface repairs.

1) Repairs are permitted on the surface with this limit (Figure 801):

a) Do not do repairs inside the blade critical areas.

b) Blending airfoil repair is not permitted in the blade root area.

2) If the blade thickness in the damaged area is less than 0.08 in. (2 mm), do this step (Figure 802) (View C-C):

a) The concave or convex blend repair depth (DIM. K) becomes not more than one-half of the blade thickness (DIM. U).

3) If the blade thickness in the damaged area is equal to or more than 0.08 in. (2 mm), do this step:

a) The concave or convex blend repair depth is not more than 0.04 in. (1 mm).

4) The concave or convex blend repair minimum radius (R5) is not less than eight times the depth (DIM. K).

5) The concave or convex blend repair area length is the sum of (DIM. S) and (DIM. T).

a) The total length of the (DIM. S) and (DIM. T) for a blend repair is not more than 1.0 in. (25.4 mm).

b) The maximum length of the (DIM. T) is two times the length (DIM. S).

c) The convex side cumulated length of all blend repairs (All DIM. S + All DIM. T) is less than or equal to 3.0 in. (76.2 mm).

d) The concave side cumulated length of all blend repairs (All DIM. S + All DIM. T) is less than or equal to 3.0 in. (76.2 mm).

e) The distance (DIM. O2) between two blend repairs must be more than the larger of the two sums (DIM. S)+(DIM. T) of the repairs.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H. Repair the Fan Blades

SUBTASK 72-21-02-350-004-F00

> **CAUTION**
> DO NOT CAUSE TOO MUCH HEAT DURING THE BLEND REPAIR. TOO MUCH HEAT CAN MAKE THE PART WEAK.

(1) If you use power tools during the repair, regularly touch the blade with a bare hand.

(a) If the blade is too hot to the touch, let it cool before you continue.

SUBTASK 72-21-02-350-007-F00

(2) Do a blending of the defects as follows:

(a) Hand blend the defects (CFM CFM56 Standard Practices Manual 70-41-11) with a fine file or a silicone carbide abrasive cloth, grade 150 or 180, used dry.

(b) Hand finish/polish with strips of silicone carbide abrasive cloth, grade 400 or 800, until you get a surface finish of 32 micro in. (0.8 micrometers).

(c) If large or deep blends are necessary, you can do blending (CFM CFM56 Standard Practices Manuel 70-41-12) with a low speed power tool equipped with appropriate titanium grinding tool, to decrease the time necessary to remove metal for major blending repairs.

SUBTASK 72-21-02-350-005-F00

(3) These conditions are necessary to get the correct blade repair results:

(a) Do a check that the leading edge blend repairs depths are in the limits of fan blade leading edge template, SPL-8910, or equivalent. The leading and trailing edge radius of the areas that you repaired must agree with the initial contour.

1) See the correct contour specifications to blend the leading edge to the existing profile (Figure 802 and Figure 803).

NOTE: Make sure that the profile is continuous.

(b) Do a check that the convex and concave side depths of the blend repairs relative to adjacent unrepaired surfaces are in the blending limits.

(c) Remove the material to a minimum of 0.03 in. (0.76 mm) below the damage.

SUBTASK 72-21-02-110-003-F00

(4) Clean the blended areas with a white cloth moistened with solvent, B00062, or alcohol, B00676 [CP1041].

SUBTASK 72-21-02-320-005-F00

(5) Make sure that the damage is fully removed, do one of these inspections:

(a) Do this task, Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

1) No indication is permitted.

2) For blend repairs in Area B, C, D or E, it is permitted to defer the penetrant inspection for 10 cycles or 25 flight hours after the repair.

3) For blend repairs in Area A, do the penetrant inspection immediately after the repair.

(b) Or do this task, Fan Blade Leading Edge Eddy Current Inspection, TASK 70-40-02-200-801-F00.

1) Use the eddy current inspection kit, SPL-8468.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) No indication is permitted.

3) For blend repairs in Area B, C, D or E, it is permitted to defer the inspection for 10 cycles or 25 flight hours after the repair.

4) For blend repairs in Area A, do the inspection immediately after the repair.

I. Put the Airplane Back to its Usual Condition:

SUBTASK 72-21-02-080-003-F00

> **CAUTION** MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, DAMAGE TO THE ENGINE CAN OCCUR.

(1) Remove the protective mat, STD-585 from the fan inlet cowl.

SUBTASK 72-21-02-080-004-F00

(2) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-21-02-860-003-F00

(3) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

J. Fan Blade Repair Installation Test

SUBTASK 72-21-02-210-008-F00

(1) If it is necessary, do this task: Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00.

NOTE: Fan rotor balance could be affected if the moment-weight of a blade is changed more than 79 g-in. (200 g-cm). When a significant amount of base material was removed during fan blade blend repair or if the engine imbalance was close to the limits, make sure that the engine imbalance is not more than the guidelines. A vibration survey (TASK 71-00-00-700-814-F00) can be done if the operator thinks that it is necessary. The results from the vibration survey will indicate if a dynamic fan trim balance is necessary.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Definition of Critical Areas
Figure 801/72-21-02-990-809-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

	AREAS A and B
RADIUS R4 MIN.	20 x DIM.P
DIM. L MIN.	15 x DIM.P
	AREAS C,D and E
RADIUS R4 MIN.	10 x DIM.P
DIM. L MIN.	8 x DIM.P

LEGEND:

EXAMPLES OF AREAS TO BE BLENDED DEPENDING ON DIM. 0 AND DIM. 01 VALUES.

MM-00073-01-B
G97056 S0006582390_V4

Fan Blade Blend Limits
Figure 802/72-21-02-990-810-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TYPICAL BLEND REPAIR VALID
FOR CONVEX AND CONCAVE SIDES
(OUT OF L/E AND T/E AND
BLADE TIP AREAS)

RADIUS R5 MINI = 8 x DIM. K
DIM. S MINI = 10 x DIM. K
DIM. T MINI = 1 x DIM. S
DIM. T MAX. = 2 x DIM. S
DIM. O2 MINI = DIM. S + DIM. T

C-C

C-C

MM-00235-00-B
MM-00073-01-B

G97277 S0006582391_V3

Fan Blade Blend Limits
Figure 802/72-21-02-990-810-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TYPICAL EXAMPLES OF UNACCEPTABLE LEADING EDGE CONTOURS

LEGEND:

NOMINAL CONTOUR
UNACCEPTABLE CONTOUR

NOTE:

THE LEADING EDGE MUST BE CONTINUOUS WITHOUT STRAIGHT OR SHARP AREAS AND IRREGULARITIES OR SUDDEN CHANGES IN THE SHAPE. ABRUPT BREAKS IN CONTOUR OR FLAT SPOTS ON THE LEADING EDGE ARE UNACCEPTABLE.

MM-00236-00-B

438748 S0000141800_V2

Leading Edge Contours
Figure 803/72-21-02-990-825-F01

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-02-300-808-F00

3. Fan Blade Platform Forward Lug Repair

(Figure 804 and Figure 805)

A. General

(1) This task gives the instructions on how to repair the forward lug on the fan blade platform.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G51412 [CP2721]	Cloth - Abrasive, Silicone Carbide - CS 333X	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Repair

SUBTASK 72-21-02-010-011-F00

(1) Remove the applicable fan blade platform (TASK 72-21-02-000-801-F00).

F. Fan Blade Platform Repair

SUBTASK 72-21-02-110-010-F00

> **WARNING**
> DO NOT GET ACETONE, ISOPROPYL ALCOHOL, OR DESOCLEAN CLEANING SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON EYE PROTECTION, AND GLOVES. KEEP THE SOLVENTS AWAY FROM SPARKS, FLAME, AND HEAT. THEY ARE POISONOUS AND FLAMMABLE. THEY CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(1) Remove the grease from the area that you will repair with a clean cloth made moist with alcohol, B00676 [CP1041] or acetone solvent, B01058 [CP1039].

SUBTASK 72-21-02-320-006-F00

> **WARNING**
> DO NOT BREATHE THE PARTICLES FROM BLENDING OR LET THE PARTICLES TOUCH YOU. THE PARTICLES FROM BLENDING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(2) Remove the marks as follows:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Do a hand-blending to remove a quantity of material as small as possible.

NOTE: Contact the engine manufacturer for the Standard Practices Manual 70-41-12. Refer to the manual for the hand-blending procedure.

NOTE: To do a large or deep blending, you can use the low-speed power tool given in the Standard Practices Manual 70-41-12. If you use the power tool, you must do a hand-finish as given in the procedure that follows.

NOTE: Blending must be done on the platform edge.

NOTE: Blending is not permitted in Dia. C.

NOTE: You must do the blending in a radial direction to the engine axis.

(b) Do a hand-blending to get a clean and smooth surface with abrasive cloth, G51412 [CP2721].

NOTE: The surface finish (roughness) must be equal to 63 microinches (1.6 micrometers).

(c) Do a visual inspection of the repair area.

1) Make sure that you fully remove the mark.

NOTE: Sharp grooves are not permitted.

SUBTASK 72-21-02-230-001-F00

(3) Do these steps for the fluorescent penetrant inspection of the platform:

(a) Do a local swab etching on all the blended areas with aluminum alloys etchant (S1096).

NOTE: Contact the engine manufacturer for the Standard Practices Manual 70-53-11. Refer to the manual for the swab etching procedure.

(b) Do this task: Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

(c) Make sure that there are no cracks.

SUBTASK 72-21-02-220-062-F00

(4) Do a dimensional inspection of the repaired area as follows:

(a) Dim. A

1) Maximum Finish Dimension - 0.098 in. (2.5 mm).

(b) Dim. B

1) Minimum Finish Dimension - 0.114 in. (2.9 mm).

(c) Dim. C

1) Maximum Finish Dimension - 0.717 in. (18.2 mm).

(d) Dim. D

1) Maximum Finish Dimension - 0.55 in. (14.0 mm).

(e) Dim. E

1) Maximum Finish Dimension - 0.043 in. (1.1 mm).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-21-02-390-001-F00

WARNING	DO NOT GET BONDERITE M-CR 600 AERO IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM BONDERITE M-CR 600 AERO. PUT ON GOGGLES AND GLOVES WHEN YOU USE BONDERITE M-CR 600 AERO. KEEP BONDERITE M-CR 600 AERO AWAY FROM SPARKS, FLAME, AND HEAT. BONDERITE M-CR 600 AERO IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(5) Do a spot touch-up of oxide film coating on the repaired area per Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

SUBTASK 72-21-02-280-002-F00

(6) Find the weight of the fan blade platform.

LOM ALL PRE SB 737-CFM56-7B-72-0909

(a) The minimum weight of the platform that is acceptable is 0.73 lb (331 g).

LOM ALL POST SB 737-CFM56-7B-72-0909

(b) The minimum weight of the platform that is acceptable is 0.712 lb (323 g).

LOM ALL

(c) If the weight is less than the minimum, replace the fan blade platform.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-02-410-015-F00

(1) Install the applicable fan blade platform (TASK 72-21-02-400-801-F00).

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Blade Platform Forward Lug (Back Side Corner) Repair
Figure 804/72-21-02-990-845-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:
-BLENDING IS NOT PERMITTED IN DIA. C
-BLENDING MUST BE DONE ON THE PLATFORM EDGE

2243972 S0000502609_V3

Fan Blade Platform (Forward Lug Back Side Corner) Finish Dimensions
Figure 805/72-21-02-990-846-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-02-300-806-F00

4. Platform Balance Weight Replacement

(Figure 806)

A. General

(1) This task is to replace the balance weight on the fan blade platform.

(a) It is necessary to remove the platform to do this repair.

B. References

Reference	Title
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Consumable Materials

Reference	Description	Specification
A50411 [CFMI, CP2604]	Adhesive - Liquid adhesive Agent	
B00676 [CP1041]	Alcohol - Isopropyl	
C50292 [CFMI, CP2603]	Primer - Polyolefin	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Replacement

SUBTASK 72-21-02-010-009-F00

(1) Remove the applicable fan blade platform (TASK 72-21-02-000-801-F00).

F. Platform Balance Weight Replacement

SUBTASK 72-21-02-110-007-F00

(1) Remove the grease from the platform with a light alkaline degreasing solution (CFM56 SPM 70-21-14).

NOTE: SPM 70-21-14 is applicable to the AZ5GU.

SUBTASK 72-21-02-020-018-F00

(2) Remove the balance weight (elastomer strip).

SUBTASK 72-21-02-370-001-F00

(3) If you can see the base metal, do a touch-up of sulfuric anodizing at the first shop visit (see CFMI engine shop manual (CFMI-TP.SM.10)).

SUBTASK 72-21-02-221-001-F00

(4) Weigh the platform and record the weight.

LOM ALL PRE SB 737-CFM56-7B-72-0909

SUBTASK 72-21-02-221-002-F00

(5) Cut the elastomer strip to get a total weight of 11.676 oz (331 g) – 11.746 oz (333 g) for the platform and elastomer strip.

NOTE: The adhesive does not change the weight of the parts.

(a) The elastomer strip is 0.31 in. (8 mm) high and 0.59 in. (15 mm) wide.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL PRE SB 737-CFM56-7B-72-0909 (Continued)

0.03527 oz (1 g) = 0.169 in. (4.3 mm) = length of the elastomer strip.

LOM ALL POST SB 737-CFM56-7B-72-0909

SUBTASK 72-21-02-220-063-F00

(6) Cut the elastomer strip to get a total weight of 11.394 oz (323 g) – 11.464 oz (325 g) for the platform and elastomer strip.

NOTE: The adhesive does not change the weight of the parts.

(a) The elastomer strip is 0.31 in. (8 mm) high and 0.59 in. (15 mm) wide.

0.03527 oz (1 g) = 0.169 in. (4.3 mm) = length of the elastomer strip.

LOM ALL

SUBTASK 72-21-02-110-008-F00

(7) Remove the grease from the platform and elastomer strip with a clean cloth made moist with alcohol, B00676 [CP1041].

SUBTASK 72-21-02-350-010-F00

(8) Apply Loctite 770, C50292 [CFMI, CP2603] to the part you will bond.

(a) Let the part dry from one minute to one hour at ambient temperature.

SUBTASK 72-21-02-350-011-F00

(9) Apply Loctite 480, A50411 [CFMI, CP2604] to the other part you will bond.

(a) Apply an approximately 0.004 in. (0.1 mm) – 0.008 in. (0.2 mm) thick layer.

SUBTASK 72-21-02-350-012-F00

(10) Quickly bond the elastomer strip.

NOTE: You cannot change the position of the elastomer strip after contact.

SUBTASK 72-21-02-350-013-F00

(11) Cure the parts for 30 seconds to two hours at ambient temperature.

LOM ALL PRE SB 737-CFM56-7B-72-0909

SUBTASK 72-21-02-221-003-F00

(12) Weigh the platform. Make sure the final weight is 11.676 oz (331 g) - 11.746 oz (333 g).

LOM ALL POST SB 737-CFM56-7B-72-0909

SUBTASK 72-21-02-220-064-F00

(13) Weigh the platform. Make sure the final weight is 11.394 oz (323 g) - 11.464 oz (325 g).

LOM ALL

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-02-410-013-F00

(1) Install the applicable fan blade platforms (TASK 72-21-02-400-801-F00).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

U66288 S0000212552_V2

Platform Balance Weight Replacement
Figure 806/72-21-02-990-838-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

U66290 S0000212554_V3

Platform Balance Weight Replacement
Figure 806/72-21-02-990-838-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

U66295 S0000212592_V2

Platform Balance Weight Replacement
Figure 806/72-21-02-990-838-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-02-300-804-F00

5. **Replace or Retighten the Fan Disk Mid Lug Threaded Pins**
(Figure 807)

A. **General**

(1) This task is to replace or retighten the threaded pins on the fan disk mid lug.

B. **References**

Reference	Title
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. **Consumable Materials**

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D00601 [CP2101]	Vaseline - Graphite Mineral	

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Prepare For The Procedure**

SUBTASK 72-21-02-010-007-F00

(1) Remove the applicable fan blades (TASK 72-21-02-000-801-F00).

F. **Procedure**

SUBTASK 72-21-02-020-014-F00

(1) Remove the applicable threaded pin from the fan disk mid lug:

(a) Use a standard wrench on the threaded pin head to loosen the threaded pin.

(b) Remove the threaded pin and nut.

SUBTASK 72-21-02-110-004-F00

CAUTION

KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(2) Remove oil and grease with a clean white cloth moistened with acetone solvent, B01058 [CP1039] or alcohol, B00676 [CP1041] from the removed parts, attachment holes and surrounding area.

SUBTASK 72-21-02-420-006-F00

(3) Do these steps to install the threaded pin on the fan disk mid lug:

(a) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101] to the threads and below the head of the threaded pin.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **CAUTION** INSTALL THE THREADED PINS WITH THE HEAD FORWARD. AN INCORRECT INSTALLATION WILL CAUSE DAMAGE TO THE EQUIPMENT.

(b) Install the threaded pin, with the head forward, on the fan disk mid lug (Figure 807).

(c) Install the nut and tighten with your hand.

LOM ALL PRE SB 737-CFM56-7B-72-0777

(d) Tighten the threaded pin with this sequence of steps:

1) Tighten the pin to 140-160 inch-pounds (16-18 newton-meters).
2) Loosen the pin by a quarter-turn or a half-turn.
3) Re-tighten the pin to 140-160 inch-pounds (16-18 newton-meters).

LOM ALL POST SB 737-CFM56-7B-72-0777

(e) Tighten the threaded pin with this sequence of steps:

1) Tighten the pin to 278-307 inch-pounds (31.4-34.7 newton-meters).
2) Loosen the pin by a quarter-turn or a half-turn.
3) Re-tighten the pin to 278-307 inch-pounds (31.4-34.7 newton-meters).

LOM ALL

(f) Remove any excess grease.

G. Put The Airplane Back To Its Usual Condition

SUBTASK 72-21-02-410-009-F00

(1) Install the applicable fan blades (TASK 72-21-02-400-801-F00).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

J67021 S0000175514_V2

Fan Disk Mid Lug Threaded Pin
Figure 807/72-21-02-990-831-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-02-300-805-F00

6. Replace or Retighten the Booster Spool Threaded Pins

A. General

(1) This task is to replace or retighten the threaded pins on the booster spool.

LOM ALL POST SB CFM56-7B-72-0296

(a) The threaded pin is installed into a counterweight.

LOM ALL

B. References

Reference	Title
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D00601 [CP2101]	Vaseline - Graphite Mineral	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Procedure

SUBTASK 72-21-02-010-008-F00

(1) Remove the applicable fan blades (TASK 72-21-02-000-801-F00).

LOM ALL POST SB CFM56-7B-72-0296

F. Replace or Retighten the Threaded Pins and Counterweights on the Booster Spool

(Figure 808)

SUBTASK 72-21-02-020-015-F00

(1) Remove the applicable counterweight and threaded pin from the booster spool:

(a) Use a standard wrench on the threaded pin head to loosen the threaded pin.

(b) Remove the threaded pin and the counterweight.

SUBTASK 72-21-02-110-005-F00

> **CAUTION**
> KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(2) Remove oil and grease from the removed parts, attachment holes and surrounding area with a clean white cloth moistened with acetone solvent, B01058 [CP1039] or alcohol, B00676 [CP1041].

SUBTASK 72-21-02-420-007-F00

(3) Do these steps to install the threaded pin and counterweight on the booster spool:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB CFM56-7B-72-0296 (Continued)

(a) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101] to the threads and below the head of the threaded pin.

> **CAUTION** INSTALL THE THREADED PINS WITH THE HEAD FORWARD. AN INCORRECT INSTALLATION WILL CAUSE DAMAGE TO THE EQUIPMENT.

(b) Install the threaded pin, with the head forward, and the counterweight on the booster spool (Figure 808). Tighten with your hand.

(c) Tighten the threaded pin with this sequence of steps:

1) Tighten the pin to 312.55 in-lb (35.31 N·m) - 345.45 in-lb (39.03 N·m).

2) Loosen the pin by a quarter-turn or a half-turn.

3) Re-tighten the pin to 312.55 in-lb (35.31 N·m) - 345.45 in-lb (39.03 N·m).

(d) Remove any excess grease.

LOM ALL POST SB CFM56-7B-72-0300

G. Replace or Retighten the Threaded Pins and Counterweights on the Booster Spool (Figure 809)

SUBTASK 72-21-02-020-016-F00

(1) Remove the applicable threaded pin from the booster spool:

(a) Use a standard wrench on the threaded pin head to hold the threaded pin.

(b) Loosen the nut while you hold the threaded pin.

(c) Remove the threaded pin and nut.

SUBTASK 72-21-02-110-006-F00

> **CAUTION** KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(2) Remove oil and grease from the removed parts, attachment holes and surrounding area with a clean white cloth moistened with acetone solvent, B01058 [CP1039] or alcohol, B00676 [CP1041].

SUBTASK 72-21-02-420-008-F00

(3) Do these steps to install the threaded pin on the booster spool:

(a) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101] to the threads and below the head of the threaded pin.

> **CAUTION** INSTALL THE THREADED PINS WITH THE HEAD FORWARD. AN INCORRECT INSTALLATION WILL CAUSE DAMAGE TO THE EQUIPMENT.

(b) Install the threaded pin, with the head forward, on the booster spool and nut (Figure 809). Tighten with your hand.

(c) Tighten the threaded pin with this sequence of steps:

1) Use a standard wrench to hold the nut.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB CFM56-7B-72-0300 (Continued)

2) Tighten the pin to 465.5 in-lb (52.6 N·m) - 514.5 in-lb (58.1 N·m).
3) Loosen the pin by a quarter-turn or a half-turn.
4) Re-tighten the pin to 465.5 in-lb (52.6 N·m) - 514.5 in-lb (58.1 N·m).

(d) Remove any excess grease.

LOM ALL

H. Put the Airplane back to its Usual Condition

SUBTASK 72-21-02-410-010-F00

(1) Install the applicable fan blades (TASK 72-21-02-400-801-F00).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

J67033 S0000175565_V2

Booster Spool Threaded Pin and Counterweight
Figure 808/72-21-02-990-832-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

J67048 S0000175566_V2

Booster Spool Threaded Pin
Figure 809/72-21-02-990-833-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-02-300-807-F00

7. Recondition the Lubricant Coating on the Fan Blade Shim

(Figure 810)

A. General

(1) This task is to recondition the Molydag coating on the fan blade shim.

B. References

Reference	Title
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50220 [CP 2229]	Lubricant - MOS2 Dry Film Lubricant, Heat Cured (Molydag 254)	
D50290 [CMFI CP 2686]	Lubricant - MOS2 Dry Film Lubricant, Heat Cured (Molydag 254N)	GE A50TF147CLA, MIL-L-8937
G00511	Tape - Glass Cloth - 3M No. 361	
G50766 [CP2240]	Sheet - Abrasive Sheet For Cleaning Up And Finishing, Scotch-Brite Type A CFS	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For The Procedure

SUBTASK 72-21-02-020-020-F00

(1) Remove the applicable fan blade shim (TASK 72-21-02-000-801-F00).

F. Procedure

SUBTASK 72-21-02-350-014-F00

(1) Prepare the areas of the shim before you apply the coating.

> **WARNING**
> DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. MAKE SURE TO PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN USING THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAMES AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY OR DAMAGE IF NOT HANDLED PROPERLY.

(a) Degrease the shim with a clean cloth moistened with acetone solvent, B01058 [CP1039].

(b) Remove the old lubricant on areas A and B with Scotch-Brite Type A CFS Sheet, G50766 [CP2240] (CFM SPM 70-41-11).

1) Use very fine grade scotch brite under tap water.

2) Change the scotch brite frequently.

SUBTASK 72-21-02-350-015-F00

(2) Mask the areas you do not coat with 3M No. 361 tape, G00511 (CP2208).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-21-02-640-014-F00

(3) Apply the Molydag 254 lubricant, D50220 [CP 2229] or Molydag 254N lubricant, D50290 [CMFI CP 2686] on the areas to be coated (CFM SPM 70-63-11).

(a) It is recommended to apply the lubricant with a brush.

(b) You must apply two coats maximum.

(c) An overcoat is permitted in the radius areas.

SUBTASK 72-21-02-350-016-F00

(4) Remove the tape from the shim.

SUBTASK 72-21-02-211-012-F00

(5) Make sure that the lubricant coating application is correct (CFM SPM 70-63-11).

(a) The thickness of the lubricant coating must be in the limits of 0.00059-0.00138 inch (0.015-0.035 mm).

G. Put The Airplane Back To Its Usual Condition

SUBTASK 72-21-02-420-012-F00

(1) Install the applicable fan blade and shim (TASK 72-21-02-400-801-F00).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Shim Lubricant Coating Application
Figure 810/72-21-02-990-843-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(AREA SPECIFICATIONS)

A-A

1846343 S0000328563_V2

Shim Lubricant Coating Application
Figure 810/72-21-02-990-843-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-02-300-809-F00

8. Fan Blade Platform Blend Repairs

(Figure 811, Figure 812)

A. General

(1) This task gives the instructions on how to repair the concave side on the aft end of the fan blade platform by blending (Figure 811).

(2) The subsequent table gives a list of part numbers that are applicable to this repair procedure. All part numbers are applicable to all paragraphs unless specified differently.

Part Number	Engine	Configuratioin
340-001-814-0	-7B / -7BE	1
340-001-816-0	-7B / -7BE	1
340-001-817-0	-7B / -7BE	2

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B50290 [CP2559]	Solvent - degreasing, Ardrox 5503	
B50333 [CP2687]	Solvent - Degreasing, Diestone DLS	
G51412 [CP2721]	Cloth - Abrasive, Silicone Carbide - CS 333X	
G51478 [S1096]	Etchant - Aluminum Alloy	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Repair

SUBTASK 72-21-02-010-012-F00

(1) Remove the applicable fan blade platform (TASK 72-21-02-000-801-F00).

F. Fan Blade Platform Blend Repairs

SUBTASK 72-21-02-970-008-F00

(1) Dimensional information for the repair application is shown in Table 801 (Figure 812).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 801/72-21-02-993-832-F00

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dim. A				0.0787 in. (2 mm)	
Dim. B				1.969 in. (50 mm)	
Dim. C			0.0039 in. (0.10 mm)		

SUBTASK 72-21-02-100-001-F00

WARNING ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. USE PERSONAL PROTECTION EQUIPMENT. USE IN A WELL-VENTILATED AREA.

(2) Remove a grease from the area that you want to repair with a clean cloth soaked in alcohol, B00676 [CP1041], Ardrox 5503, B50290 [CP2559], or degreasing solvent, B50333 [CP2687].

SUBTASK 72-21-02-110-011-F00

(3) Remove the surface indications as follows (Figure 812):

WARNING DO NOT BREATHE THE PARTICLES FROM BLENDING OR LET THE PARTICLES TOUCH YOU. THE PARTICLES FROM BLENDING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

CAUTION BE CAREFUL WHEN YOU DO BLENDING OF THE FAN BLADE PLATFORM. IF YOU ARE NOT CAREFUL, YOU CAN TOUCH OR HIT THE ELASTOMER SEAL. IF YOU DO NOT OBEY, DAMAGE TO THE ELASTOMER SEAL CAN OCCUR.

(a) Remove as less material as possible by hand blending (TASK 70-10-07-800-801-F00).

1) If you do a large or deep blend, you can use a low-speed power tool.

a) Do a hand finish.

2) During the blending, remove a minimum quantity of the base metal (Table 801).

a) Make sure that the blended area have a smooth transition with the adjacent areas.

(b) Do a hand blending to get a clean and smooth surface with abrasive cloth, G51412 [CP2721] (TASK 70-10-07-800-801-F00).

NOTE: Roughness of the repaired area must be 63 microinches (1.6 micrometers) or smaller.

(c) Do a visual inspection of the repaired area.

1) Make sure that the indication is fully removed.

2) Sharp grooves are not permitted.

(d) Clean the blended area with a clean cloth soaked in alcohol, B00676 [CP1041], Ardrox 5503, B50290 [CP2559], or degreasing solvent, B50333 [CP2687].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-21-02-220-065-F00

(4) Do a dimensional inspection of the blended area (Table 801, Figure 812).

SUBTASK 72-21-02-230-002-F00

(5) Do a fluorescent penetrant inspection as follows:

(a) If necessary, apply a masking tape on the elastomers seals.

(b) Do a locally swab etching of all the blended areas using aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

(c) Do a fluorescent penetrant inspection of all the repaired areas with the following conditions (TASK 70-40-01-230-801-F00):

1) Sensitivity level 3.

2) Indications are not permitted.

(d) If necessary, remove the masking tape.

SUBTASK 72-21-02-390-002-F00

(6) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

SUBTASK 72-21-02-970-009-F00

(7) If necessary, do the weight adjustment of the fan blade platform.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:
1- PLATFORM: 7749 (AZ7GU) FOR CONFIGURATION 1
OR 7075 (AZ5GU) FOR CONFIGURATION 2
2-BUSHING: A286 (EZ6NCT25)

COATING:
SULFURIC ANODIZING ON FULL PART, BUT NOT
BUSHING, ELASTOMER STRIP AND ELASTOMER SEAL
AREA A: POLYURETHANE PAINT
AREA B: PRIMER APPLICATION ONLY

2988561 S0000765703_V1

Fan Blade Platform Blend Repairs
Figure 811/72-21-02-990-852-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:
THE BLENDING MUST BE THE SMALLER AS POSSIBLE
AND MUST FOLLOW THE AREA TO BE REPAIRED

2988563 S0000765705_V1

Dimensional Information
Figure 812/72-21-02-990-853-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - REMOVAL/INSTALLATION

1. General

A. This procedure has four tasks:

(1) The removal of the splitter fairing

(2) The installation of the splitter fairing

(3) The removal of the stage 1 booster vane assembly

(4) The installation of the stage 1 booster vane assembly.

TASK 72-21-03-000-801-F00

2. Splitter Fairing Removal

(Figure 401)

A. General

(1) This procedure is the removal of the splitter fairing.

(2) The splitter fairing is at the interface of the secondary and primary airflows on the inner hub of the fan frame.

B. References

Reference	Title
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2252	Puller - Adapter, Splitter Fairing Part #: 856A2663G01 Supplier: 58828
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for Splitter Fairing Removal

SUBTASK 72-21-03-040-001-F00

(1) For engine 1, do this step:

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-03-040-002-F00

(2) For engine 2, do this step:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-03-040-003-F00

(3) Set the start levers in the CUTOFF position:

(a) Install DO-NOT-OPERATE tags on the start levers.

SUBTASK 72-21-03-480-001-F00

CAUTION

MAKE SURE YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(4) Install the protective mat, STD-585 in the inlet cowl.

SUBTASK 72-21-03-010-001-F00

(5) Do this task: Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

SUBTASK 72-21-03-010-002-F00

(6) Remove all of the fan blades (TASK 72-21-02-000-801-F00).

SUBTASK 72-21-03-820-001-F00

(7) Adjust the protective mat, STD-585 to protect the inlet cowl and fan case

F. Remove the Splitter Fairing

SUBTASK 72-21-03-020-001-F00

(1) Do these steps to remove the splitter fairing:

(a) Remove the screws.

(b) To disengage the splitter fairing from the inner shroud of the OGV fan:

1) Use the puller, SPL-2252 with a slide hammer.

(c) Remove the splitter fairing.

——— END OF TASK ———

TASK 72-21-03-400-801-F00

3. Splitter Fairing Installation

(Figure 401)

A. References

Reference	Title
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

B. Tools/Equipment

Reference	Description
STD-442	Gun - Heat, 180 deg. F (82 deg. C) Maximum Output Temperature
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
D00601 [CP2101]	Vaseline - Graphite Mineral	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for The Splitter Fairing Installation

SUBTASK 72-21-03-480-002-F00

(1) Make sure the protective mat, STD-585 is installed in the fan inlet case to prevent damage to the fan case.

SUBTASK 72-21-03-400-001-F00

> **WARNING** AVOID PROLONGED BREATHING OF VAPORS AND REPEATED OR PROLONGED CONTACT WITH SKIN. CLEANING SOLVENTS ARE FLAMMABLE, VOLATILE AND TOXIC. USE THEM WITH ADEQUATE VENTILATION.

(2) Clean the mating surfaces of the splitter fairing with alcohol, B00676 [CP1041].

F. Install the Splitter Fairing

SUBTASK 72-21-03-420-001-F00

> **WARNING** MAKE SURE THAT THE SOLVENT IS COMPLETELY EVAPORATED BEFORE YOU USE THE HEAT GUN. THE SOLVENT IS FLAMMABLE AND COULD IGNITE.

> **WARNING** USE HEAT INSULATED GLOVES WHEN YOU TOUCH CHILLED OR HOT PARTS TO PREVENT INJURY TO YOUR HANDS.

(1) Increase the temperature of the flange of the splitter fairing with a heat 180 deg. F (82 deg. C) maximum output temperature heat gun, STD-442.

(a) Increase the temperature of the flange to approximately 140 degrees F (60 degrees C).

(b) Move the splitter fairing on the forward edge of the inner shroud and align the screw holes.

(c) Lubricate the threads of screws with graphite mineral vaseline, D00601 [CP2101].

(d) Install the 18 screws.

1) Tighten to 55-65 pound-inches (6.5-7.5 Newton meters).

G. Put the Airplane back to Its Usual Condition

SUBTASK 72-21-03-410-001-F00

(1) Do this task: Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-03-410-002-F00

(2) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-21-03-210-001-F00

CAUTION

MAKE SURE YOU REMOVE ALL TOOLS, PARTS AND UNWANTED MATERIAL FROM THE INLET COWL. THIS WILL PREVENT DAMAGE TO EQUIPMENT.

(3) Make sure you remove tools, parts and unwanted material from the inlet cowl.

SUBTASK 72-21-03-080-001-F00

(4) Remove the protective mat, STD-585 from the fan inlet case.

SUBTASK 72-21-03-440-001-F00

(5) For engine 1, do this step:

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-03-440-002-F00

(6) For engine 2, do this step:

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-03-080-002-F00

(7) Remove the DO-NOT-OPERATE tags from the start levers.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Splitter Fairing Installation
Figure 401/72-21-03-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-21-03-000-802-F00

4. Stage 1 Booster Vane Assembly Removal

(Figure 402)

A. General

(1) You get access to the vane assembly of the stage 1 booster through the inlet cowl.

(2) You have to remove the spinner, all of the fan blades, and the splitter fairing.

B. References

Reference	Title
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2188	Tool Set - Jack Screws Part #: 856A1130G10 Supplier: 58828
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Vane Assembly Removal

SUBTASK 72-21-03-040-004-F00

(1) Set the start levers to the CUTOFF position.

(a) Install DO-NOT-OPERATE tags on the start levers.

SUBTASK 72-21-03-440-003-F00

(2) For engine 1, do this step:

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-03-440-004-F00

(3) For engine 2, do this step:

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-21-03-480-003-F00

> **CAUTION** MAKE SURE YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(4) Install the protective mat, STD-585 in the inlet cowl.

SUBTASK 72-21-03-010-003-F00

(5) Do this task: Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

SUBTASK 72-21-03-010-004-F00

(6) Remove all of the fan blades (TASK 72-21-02-000-801-F00).

SUBTASK 72-21-03-010-005-F00

(7) Do this task: Splitter Fairing Removal, TASK 72-21-03-000-801-F00.

F. Remove the Vane Assembly

SUBTASK 72-21-03-020-002-F00

(1) Do these steps to remove the vane assembly:

(a) Remove the 24 bolts.

(b) Do these steps to disengage the stage 1 vane assembly from the stage 2 vane assembly:

1) Find three equally spaced screw holes on the forward flange of the stage 2 vane assembly.

2) Install the three jackscrews from tool set, SPL-2188 on the forward flange.

3) Tighten each of the three jackscrews equally.

(c) Remove the vane assembly.

1) Remove the jackscrews.

END OF TASK

TASK 72-21-03-400-802-F00

5. Stage 1 Booster Vane Assembly Installation

(Figure 402)

A. References

Reference	Title
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-14597	Pin - Guide, Stage 1 to 4 Booster Part #: 856A3735G03 Supplier: 58828
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C. **Consumable Materials**

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
D00601 [CP2101]	Vaseline - Graphite Mineral	

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Prepare for the Vane Assembly Installation**

SUBTASK 72-21-03-480-004-F00

> **CAUTION**
> MAKE SURE YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(1) Make sure that the protective mat, STD-585 is installed in the fan inlet case.

SUBTASK 72-21-03-100-001-F00

> **WARNING**
> AVOID PROLONGED BREATHING OF VAPORS AND REPEATED OR PROLONGED CONTACT WITH SKIN. CLEANING SOLVENTS ARE FLAMMABLE, VOLATILE AND TOXIC. USE THEM WITH ADEQUATE VENTILATION.

(2) Clean the mating faces of the stage 1 vane and stage 2 vane assemblies with alcohol, B00676 [CP1041].

SUBTASK 72-21-03-410-003-F00

(3) Install two pins of the guide pin, SPL-14597 equally spaced on the forward flange of the stage 2 vane assembly.

F. **Install The Vane Assembly**

SUBTASK 72-21-03-420-002-F00

> **WARNING**
> MAKE SURE THAT THE SOLVENT IS COMPLETELY EVAPORATED BEFORE YOU USE THE HEAT GUN. THE SOLVENT IS FLAMMABLE AND COULD IGNITE.

> **WARNING**
> USE HEAT INSULATED GLOVES WHEN YOU TOUCH CHILLED OR HOT PARTS TO PREVENT INJURY TO YOUR HANDS.

(1) Increase the temperature of the rear flange of the stage 1 vane assembly with a heat gun to approximately 175°F (79°C).

SUBTASK 72-21-03-420-003-F00

(2) Engage the stage 1 vane assembly on the stage 2 vane assembly.

(a) Align the vane assembly to the two pins of guide pin, SPL-14597.

SUBTASK 72-21-03-420-004-F00

(3) Attach the stage 1 vane assembly as follows:

(a) Lubricate the bolts with graphite mineral vaseline, D00601 [CP2101].

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(b) Install the 21 bolts. Do not apply the final torque of 100 in-lb (11.3 N·m) - 110 in-lb (12.4 N·m).

(c) Remove the two pins of guide pin, SPL-14597.

(d) Install the 3 remaining bolts. Do not apply the final torque of 100 in-lb (11.3 N·m) - 110 in-lb (12.4 N·m).

SUBTASK 72-21-03-410-004-F00

(4) Let the temperature of the parts decrease to ambient temperature.

SUBTASK 72-21-03-420-006-F00

(5) Tighten the bolts to 100 in-lb (11.3 N·m) - 110 in-lb (12.4 N·m).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-03-410-005-F00

(1) Do this task: Splitter Fairing Installation, TASK 72-21-03-400-801-F00.

SUBTASK 72-21-03-410-006-F00

(2) Do this task: Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-03-410-007-F00

(3) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-21-03-210-002-F00

CAUTION MAKE SURE YOU REMOVE ALL TOOLS, PARTS AND UNWANTED MATERIAL FROM THE INLET COWL. THIS WILL PREVENT INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(4) Make sure you remove tools, parts and unwanted material from the inlet cowl.

SUBTASK 72-21-03-480-005-F00

(5) Remove the protective mat, STD-585 from the inlet cowl.

SUBTASK 72-21-03-080-003-F00

(6) Remove the DO-NOT-OPERATE tags from the start levers.

SUBTASK 72-21-03-440-005-F00

(7) For engine 1, do this step:

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-03-440-006-F00

(8) For engine 2, do this step:

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stage 1 Booster Vane Installation
Figure 402/72-21-03-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) The inspection of the stage 1 booster vane assembly.

TASK 72-21-03-200-801-F00

2. Stage 1 Booster Vane Assembly Inspection (Visual)

(Figure 601)

A. General

(1) The visual check is to examine the stage 1 booster vane assembly through the fan blades.

(a) If a full inspection is necessary, you must remove the stage 1 booster vane assembly.

(b) If damage is found, you must do a borescope inspection of the booster blades and the downstream vane stages.

B. References

Reference	Title
72-00-00-200-803-F00	Stages 2-4 Booster Blades and Vanes Borescope Inspection (P/B 601)
72-00-00-200-804-F00	HP Compressor Blades Borescope Inspection (P/B 601)
72-21-03-000-802-F00	Stage 1 Booster Vane Assembly Removal (P/B 401)
72-21-03-300-801-F00	Repair the Stage 1 Booster Vane Assembly (P/B 801)
72-21-03-400-802-F00	Stage 1 Booster Vane Assembly Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For the Inspection

SUBTASK 72-21-03-040-005-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-03-040-006-F00

(2) Make sure the start levers are in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

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SUBTASK 72-21-03-480-006-F00

> **CAUTION**
> MAKE SURE YOU INSTALL THE PROTECTIVE MATS IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(3) Install a protective mat, STD-585 in the fan inlet cowl.

F. Inspect The Booster Vanes

SUBTASK 72-21-03-210-003-F00

(1) Any amount of surface oxidation, pitting or corrosion marks on the stage 1, 2, 3 and 4 booster vanes is permitted.

SUBTASK 72-21-03-220-001-F00

(2) If you find damage to the stage 1 booster vane assembly that is not in the limits, replace the stage 1 booster vane assembly, unless you are given other instructions

These are the tasks:

Stage 1 Booster Vane Assembly Removal, TASK 72-21-03-000-802-F00,

Stage 1 Booster Vane Assembly Installation, TASK 72-21-03-400-802-F00.

SUBTASK 72-21-03-220-002-F00

(3) If you find damage to the stage 1 booster vane assembly not in the limits, all downstream booster stages and the HP compressor must be inspected with a borescope.

(a) Do this task: Stages 2-4 Booster Blades and Vanes Borescope Inspection, TASK 72-00-00-200-803-F00.

(b) Do this task: HP Compressor Blades Borescope Inspection, TASK 72-00-00-200-804-F00.

SUBTASK 72-21-03-200-001-F00

> **WARNING**
> MAKE SURE YOU WEAR GLOVES WHEN YOU TURN THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU TURN THE FAN BLADES, YOU CAN CAUSE AN INJURY TO YOUR HANDS.

(4) Turn the fan rotor as necessary to examine the stage 1 booster vanes through the fan blades.

SUBTASK 72-21-03-220-003-F00

(5) Examine the booster vanes for broken vanes:

(a) Not serviceable.

SUBTASK 72-21-03-220-004-F00

(6) Examine the tip of the vanes (Area D) for damage:

(a) Cracks and tears

1) Cracks and tears are not permitted.

2) A Continue-In-Service limit of 10 cycles or 15 flight hours is permitted; if the damage is less than 0.127 inch (3.25 mm) in length radially and 0.04 inch (1.0 mm) in length axially.

(b) Dents

1) All damage is permitted with these limits:

a) Not more than 25 percent in depth of the blade airfoil thickness.

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b) A Continue-In-Service limit of 10 cycles or 15 flight hours is permitted, if the damage is more than the limits and less than 40 percent of the blade airfoil thickness.

(c) Nicks and scratches in airfoil (not on the leading and trailing edges)

1) All damage is permitted with these limits:

a) Not more than 25 percent in depth of the blade airfoil thickness.

b) A Continue-In-Service limit of 10 cycles or 15 flight hours is permitted, if the damage is more than the limits.

(d) Nicks and scratches on the leading and trailing edges

1) All damage is permitted with these limits:

a) Not more than 0.04 inch (1 mm) in depth (axially).

b) A Continue-In-Service limit of 10 cycles or 15 flight hours is permitted, if the damage is more than the limits.

(e) Local distortion

1) All distortion is permitted with these limits:

a) The radially damaged dimension is more than six times the axially damaged dimension.

b) The dimension is less than 0.08 inch (2 mm) axially.

c) The dimension is less than 0.47 inch (12 mm) radially.

(f) Missing pieces

1) Missing pieces are not permitted.

SUBTASK 72-21-03-220-005-F00

(7) Examine the leading edge and trailing edges of the vane (Area E) for damage:

(a) Cracks

1) Cracks are not permitted.

2) A Continue-In-Service limit of 10 cycles or 15 flight hours is permitted; if the damage is less than 0.127 inch (3.25 mm) radially and 0.04 inch (1.0 mm) axially.

(b) Tears

1) Tears are not permitted.

2) A Continue-In-Service limit of 10 cycles or 15 flight hours is permitted if the damage is less than 0.127 inch (3.25 mm) radially and 0.04 inch (1.0 mm) axially.

(c) Dents

1) Dents are permitted with these limits:

a) Not more than 0.08 inch (2 mm) in depth axially.

2) A Continue-In-Service limit of 10 cycles or 15 flight hours is permitted before repair or replacement of the vane, if the damage is more than the limits.

3) If the damage is more than the limits, repair the vane assembly leading edge.

a) Do this task, Repair the Stage 1 Booster Vane Assembly, TASK 72-21-03-300-801-F00.

(d) Nicks and scratches

1) Nicks and scratches are permitted with these limits:

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a) Not more than 0.08 inch (2 mm) in depth (axially).

2) A Continue-In-Service limit of 10 cycles or 15 flight hours is permitted before repair or replacement of the vane, if the damage is more than the limits.

3) If the damage is more than the limits, repair the vane assembly leading edge.

a) Do this task, Repair the Stage 1 Booster Vane Assembly, TASK 72-21-03-300-801-F00.

(e) Local distortion

1) All local distortion is permitted with these limits

a) The damaged dimension L is more than six times the maximum damaged dimension X along the chord.

b) The maximum dimension X along the chord is less than 0.12 inch (3 mm).

c) The dimension L is less than 0.71 inch (18 mm).

2) A Continue-In-Service limit of 50 cycles or 75 flight hours is permitted, if the damage is more than the limits.

(f) Erosion and deposits

1) All erosion and deposits are permitted.

SUBTASK 72-21-03-220-006-F00

(8) Examine the airfoil of the vane (Area C) for damage:

(a) Cracks and tears

1) Cracks and tears are not permitted.

2) A Continue-In-Service limit of 10 cycles or 15 flight hours is permitted; if the damage is less than 0.127 inch (3.25 mm) radially and 0.04 inch (1.0 mm) axially.

(b) Dents

1) Dents are permitted with these limits:

a) Not more than 40 percent in depth of the blade airfoil thickness.

b) A Continue-In-Service limit of 50 cycles or 75 flight hours is permitted, if the damage is more than the limits.

(c) Nicks and scratches

1) Nicks and scratches are permitted with these limits:

a) Not more than 40 percent in depth of the blade airfoil thickness.

(d) Local distortion

1) All local distortion is permitted with these limits:

a) The radially damaged dimension is more than six times the axially damaged dimension.

b) The dimension is less than 0.12 inch (3 mm) axially.

c) The dimension is less than 0.71 inch (18 mm) radially.

2) A Continue-In-Service limit of 50 cycles or 75 flight hours is permitted, if the damage is more than the limits.

SUBTASK 72-21-03-220-007-F00

(9) Examine the inner shroud (visual inspection through the fan blades)

(a) Cracks

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1) Cracks are not permitted.
2) A Continue-In-Service limit of 10 cycles or 15 flight hours is permitted, if the damage is less than 0.127 inch (3.25 mm) in length.

(b) Vane loosness
1) Vane looseness is not permitted.

SUBTASK 72-21-03-220-008-F00

(10) Inner shroud (with stage 1 booster vane removed)
(a) To do this inspection, remove the stage 1 booster vane assembly from the power plant (TASK 72-21-03-000-802-F00).
(b) Inner shroud abradable coating for unbonding or flaking
1) Unbonding or flaking is permitted with these limits
a) If the total damaged surface area is not more than 15.5 square inches (100 sq cm).
b) Cut and remove the unbonded parts.
c) A Continue-In-Service limit of 100 flight hours is permitted, if the damage is more than the limits.
2) Rub marks from seal teeth
a) All rub marks on the seal teeth are permitted.
3) Dents on the forward or aft edge
a) All dents on the forward edge and aft edge are permitted.

SUBTASK 72-21-03-220-009-F00

(11) Outer shroud
(a) To do this inspection, remove the stage 1 booster vane assembly from the power plant (TASK 72-21-03-000-802-F00).
(b) Cracks
1) Cracks are not permitted.
2) A Continue-In-Service limit of 10 cycles or 15 flight hours is permitted; if the damage is less than 0.127 inch (3.25 mm) in length.
(c) Separation, flaking, or missing material on the abradable coating
1) All separation, flaking, or missing material are permitted with these limits:
a) The total damaged area is not more than 43.4 square inches (280 sq cm).
2) A Continue-In-Service limit of 100 flight hours is permitted, if the damage is more than the limits.
(d) Booster blade tip rubbing on the abradable coating
1) No limit for rubbing on the full circumference.
(e) Pitting, nicks, dents or local distortion on the abradable coating
1) All pitting, nicks, dents or local distortion on the abradable coating is permitted.

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G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-03-080-004-F00

> **CAUTION**
> MAKE SURE YOU REMOVE ALL TOOLS, PARTS AND UNWANTED MATERIAL FROM THE INLET COWL. THIS WILL PREVENT DAMAGE TO EQUIPMENT DURING THE SUBSEQUENT ENGINE START.

(1) Make sure you remove tools, parts or unwanted material from the blades and inlet cowl.

(a) Remove the protective mat, STD-585 from the inlet cowl.

SUBTASK 72-21-03-440-007-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable engine start lever.

SUBTASK 72-21-03-710-001-F00

(3) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stage 1 Booster Vane Inspection
Figure 601/72-21-03-990-803-F00 (Sheet 1 of 2)

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DISTORTION OF T/E AND L/E

B

S-M56-MM-00263-00-B

D38452 S0000154782_V2

Stage 1 Booster Vane Inspection
Figure 601/72-21-03-990-803-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - REPAIRS

1. General

A. This procedure has this task:

(1) The repair of the stage 1 booster vanes.

TASK 72-21-03-300-801-F00

2. Repair the Stage 1 Booster Vane Assembly

(Figure 801)

A. General

(1) The leading edge of the stage 1 booster vanes can be repaired by blending as specified in this task.

(2) Vane assemblies that have damage that is more than the blending limits in this task must be replaced.

B. References

Reference	Title
70-40-01-910-801-F00	Fluorescent Penetrant Inspection (Water Washable) (P/B 201)
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)
72-21-03-000-802-F00	Stage 1 Booster Vane Assembly Removal (P/B 401)
72-21-03-400-802-F00	Stage 1 Booster Vane Assembly Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
G02449 [CP2189]	Cloth - Abrasive, Silicone Carbide, 150 Grit - Durite G422	
G02450 [CP2191]	Cloth - Abrasive, Silicone Carbide, 180 Grit - Durite G421	

E. Location Zones

Zone	Area
212	Flight Compartment - Right
411	Engine 1 - Engine

F. Prepare to Repair the Booster Vanes

SUBTASK 72-21-03-040-007-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-03-040-008-F00

(2) Set the START switches in the OFF position:

(a) Install DO-NOT-OPERATE tags on the applicable start switch.

SUBTASK 72-21-03-480-007-F00

CAUTION

MAKE SURE YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(3) Install the protective mat, STD-585 in the inlet cowl.

SUBTASK 72-21-03-010-006-F00

(4) Do this task: Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

SUBTASK 72-21-03-010-007-F00

(5) Remove three of the fan blades, (TASK 72-21-02-000-801-F00).

NOTE: Make sure you number each blade as you remove it, to make sure each is installed in its initial position.

G. Examine the Booster Vanes

SUBTASK 72-21-03-220-010-F00

(1) Examine the dimensions and location of the defects on the leading edge

(a) Make sure the damage and the area of the repair will be less than the blend limits (Figure 801) and the information in the subsequent section.

(b) If the damage or repair area is more than the limits, replace the stage 1 booster vane assembly.

These are the tasks:

Stage 1 Booster Vane Assembly Removal, TASK 72-21-03-000-802-F00,

Stage 1 Booster Vane Assembly Installation, TASK 72-21-03-400-802-F00.

(c) Repairs are permitted if they will be in the blending limits.

H. Repair the Booster Vanes

SUBTASK 72-21-03-350-001-F00

(1) Use these tools to do the blending repair of the damage:

(a) Use a soft file or a silicone carbide abrasive stone, grade C150L8V, used dry.

(b) For major blending repairs, use these materials:

1) Use strips of Durite G422 cloth, G02449 [CP2189] for the prefinish.

2) Use strips of Durite G421 cloth, G02450 [CP2191] for the initial finish.

SUBTASK 72-21-03-350-002-F00

(2) These conditions are necessary to get the correct vane repair results:

(a) Do the blend in a longitudinal direction parallel with the length of the vane.

(b) Make sure the leading edge radius of the area that you repaired agrees with the initial contour.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) If you blend an area that includes a radius, keep the radius as near as possible to the initial radius.

(d) Make sure the finish on a blended area is as near as possible to the initial finish.

(e) Remove the material with these limits:

1) Not less than 0.079 inch (2.0 mm) in depth below the damage in zone A.

2) Not less than 0.01 inch (0.25 mm) in depth below the damage.

3) Not more than 0.16 inch (4.0 mm) in depth below the damage.

(f) Make sure the damage is fully removed, do this task: Fluorescent Penetrant Inspection (Water Washable), TASK 70-40-01-910-801-F00.

1) Replace the vane if you find a crack in the vane.

I. Put the Airplane Back to its Usual Condition:

SUBTASK 72-21-03-010-008-F00

(1) To install each of the three fan blades in their initial positions, do this task: Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-03-010-009-F00

(2) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-21-03-080-005-F00

CAUTION

MAKE SURE YOU REMOVE ALL TOOLS, PARTS AND UNWANTED MATERIAL FROM THE INLET COWL. DAMAGE TO EQUIPMENT COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(3) Remove the protective mat, STD-585 from the inlet cowl.

SUBTASK 72-21-03-080-006-F00

(4) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-21-03-040-009-F00

(5) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H13638 S0006582409_V2

Stage 1 Booster Vane Blend Limits
Figure 801/72-21-03-990-804-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stage 1 Booster Vane Blend Limits
Figure 801/72-21-03-990-804-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OUTLET GUIDE VANES - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of the outlet guide vanes (OGV) and their seals.

(2) The installation of the outlet guide vanes (OGV) and their seals.

TASK 72-23-01-000-801-F00

2. Outlet Guide Vanes Removal

(Figure 401)

A. General

(1) The OGVs are found between the fan blades and the fan frame struts, in the secondary air flow.

(2) There are 76 OGVs on each engine.

(3) In this procedure the outlet guide vanes will be referred to as the OGVs.

B. References

Reference	Title
72-23-01-200-802-F00	OGV Inner Shrouds and Seals Inspection (P/B 601)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 72-23-01-010-001-F00

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSERS (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

E. Outlet Guide Vanes Removal

SUBTASK 72-23-01-020-001-F00

(1) Do these steps to disconnect the OGV from the fan inlet:

(a) Remove the two bolts [1].

NOTE: Be prepared to catch each cup washer.

(b) Remove the two cup washers [2].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-01-000-001-F00

CAUTION

BE CAREFUL TO NOT TO CAUSE DAMAGE TO THE OGV'S LEADING EDGE OR TRAILING EDGE DURING THE REMOVAL.

(2) Move the inner platform of the OGV [3] into the inner shroud recess.

SUBTASK 72-23-01-000-002-F00

(3) Carefully move the outer platform of the OGV [3] forward until you can disengage the inner platform from the inner shroud recess.

SUBTASK 72-23-01-000-003-F00

(4) Remove the OGV [3] from the power plant.

SUBTASK 72-23-01-210-001-F00

(5) Examine the seal [4] on the inner shroud for damage (TASK 72-23-01-200-802-F00).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Outlet Guide Vane (OGV) Installation
Figure 401/72-23-01-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-01-400-801-F00

3. Outlet Guide Vanes Installation

(Figure 401)

A. References

Reference	Title
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Consumable Materials

Reference	Description	Specification
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Installation

SUBTASK 72-23-01-640-001-F00

(1) Apply a large quantity of anti-corrosion jointing compound, D50321 [CP2773] to the shafts of the two bolts [1] (thread included) and under bolt heads.

E. Outlet Guide Vanes Installation

SUBTASK 72-23-01-320-001-F00

(1) Do these steps to install the OGV seals [4]:

(a) Align the round cut of the two seals with the 4 o'clock hole of the inner OGV shroud (borescope port).

1) If you install a new OGV seal, drill the borescope hole at the 4 o'clock position to a diameter of 0.41 in. (10.4 mm).

(b) Align the round cut of the two seals with the 6 o'clock hole of the inner OGV shroud (draining hole).

1) If you install a new OGV seal, drill the borescope hole at the 6 o'clock position to a diameter of 0.16 in. (4 mm)

(c) Install the remaining 72 seals [4] in their related slots on the inner OGV shroud.

SUBTASK 72-23-01-420-001-F00

(2) Do these steps to put the OGV [3] into the inner shroud and the fan case:

> **CAUTION**
> BE CAREFUL NOT TO CAUSE DAMAGE TO THE OGV'S LEADING AND TRAILING EDGES DURING INSTALLATION.

(a) Carefully engage the OGV inner platform into the seal on the inner shroud.

(b) Move the OGV outer platform to the rear.

(c) Set the outward platform in the correct position on the fan case.

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SUBTASK 72-23-01-420-002-F00

CAUTION

AREA AROUND ATTACHMENT HOLES MUST BE CLEAN AND DRY OTHERWISE IT MAY FACILITATE CORROSION AND FRETTING.

(3) Do these steps to attach the OGV to the fan inlet:

(a) Install the two bolts [1] and the two cup washers [2].

(b) Tighten the bolts to 126.35 in-lb (14.28 N·m) - 139.65 in-lb (15.78 N·m).

(c) Remove all unwanted grease with a dry clean cloth.

F. Put the Aircraft Back to its Usual Condition

SUBTASK 72-23-01-010-002-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OUTLET GUIDE VANES - INSPECTION/CHECK

1. General

A. This procedure has two tasks:

(1) An inspection of the outlet guide vanes (OGV)

(2) An inspection of the OGV inner shrouds and seals.

TASK 72-23-01-200-801-F00

2. Outlet Guide Vanes (OGV) Inspection

(Figure 601)

A. References

Reference	Title
72-23-01-000-801-F00	Outlet Guide Vanes Removal (P/B 401)
72-23-01-400-801-F00	Outlet Guide Vanes Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

C. Prepare for the Inspection

SUBTASK 72-23-01-010-003-F00

WARNING	DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

D. Do a Check of the OGV's

SUBTASK 72-23-01-210-002-F00

(1) If you find damage that is not in the limits, replace the OGV, unless you are given other instructions.

These are the tasks:

Outlet Guide Vanes Removal, TASK 72-23-01-000-801-F00,

Outlet Guide Vanes Installation, TASK 72-23-01-400-801-F00.

SUBTASK 72-23-01-210-003-F00

(2) Examine the OGV's for damage:

(a) Broken or missing vane

1) Not serviceable.

(b) Cracks and tears in the OGV vane

1) Not serviceable.

(c) Missing paint or coating

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) All missing paint and anodized coating is permitted.

(d) Nicks or dents on the leading or the trailing edges

1) Nicks and dents are permitted if the damage is less than 0.04 inch (1.0 millimeter) in depth.

a) There is no limit to the number of nicks or dents.

2) If you find that the damage is more than 0.04 inch (1.0 millimeter) in depth.

a) There is no limit to the number of nicks or dents.

b) A Continue-In-Service limit of 10 cycles or 25 flight hours is permitted (use the first limit to occur).

(e) Nicks or dents on the concave and (or) convex surfaces

1) There is no limit to the number of dents or nicks if the damage is smooth and less than half of the vane thickness in depth.

a) There is no damage permitted on the two sides of the vane.

2) There is no limit to the number of nicks or dents if the damage is more than half of the vane thickness, with this condition.

a) A Continue-In-Service limit of 10 cycles or 25 flight hours is permitted (use the first limit to occur).

(f) Distortion of the leading or trailing edges

1) Distortion is permitted with these limits:

a) The axial depth is less than 0.1 inch (2.5 millimeter).

b) The radial length is less than 1.0 inch (25 mm).

SUBTASK 72-23-01-010-004-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Outlet Guide Vane Inspection
Figure 601/72-23-01-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-01-200-802-F00

3. OGV Inner Shrouds and Seals Inspection

(Figure 602)

A. References

Reference	Title
70-10-04 P/B 201	SPOT TOUCH-UP OF OXIDE FILM COATING ON ALUMINUM ALLOYS FOR PROTECTION - MAINTENANCE PRACTICES
70-40-01 P/B 201	FLUORESCENT PENETRANT INSPECTION - MAINTENANCE PRACTICES
72-23-01-000-801-F00	Outlet Guide Vanes Removal (P/B 401)
72-23-01-400-801-F00	Outlet Guide Vanes Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

C. Prepare for the Inspection

SUBTASK 72-23-01-010-005-F00

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

D. Do a Check of the OGV's Inner Shrouds and Seals

SUBTASK 72-23-01-210-004-F00

(1) If you find damage that is not in the limits, replace the inner shroud seal, unless you are given other instructions.

These are the tasks:

Outlet Guide Vanes Removal, TASK 72-23-01-000-801-F00,

Outlet Guide Vanes Installation, TASK 72-23-01-400-801-F00.

SUBTASK 72-23-01-210-005-F00

(2) Examine the OGV's inner shroud for damage as follows:

(a) Cracks in the OGV's inner shroud are not serviceable.

(b) Wear or scratches around fan duct panels attachment holes.

1) Maximum depth after a light hand blending to remove sharp edges is 0.012 in. (0.3 mm) with at least a length/depth ratio equal to 10.

2) Perform a FPI per FLUORESCENT PENETRANT INSPECTION - MAINTENANCE PRACTICES, PAGEBLOCK 70-40-01/201 and a spot touch up of bonderite per SPOT TOUCH-UP OF OXIDE FILM COATING ON ALUMINUM ALLOYS FOR PROTECTION - MAINTENANCE PRACTICES, PAGEBLOCK 70-10-04/201.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-01-210-006-F00

(3) Examine the damage to the seals that mate with the OGV surfaces.

(a) Cracks, cuts or tears on the mating surface of the seal with the OGV shroud.

1) Not serviceable.

a) Replace the seal.

b) The Continue-In-Service limit is 5 cycles, permitted if you find damage.

(b) Cracks, cuts or tears that are not on the mating surface of the seal.

1) There is no limit if you find no damage on the mating surface.

(c) A missing OGV seal is not serviceable.

E. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-01-010-006-F00

WARNING	OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Outlet Guide Vane and Liner Shroud Inspection
Figure 602/72-23-01-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OUTLET GUIDE VANES - REPAIRS

1. General

A. This procedure has one task:

(1) Outlet Guide Vanes (Inner Shroud Attachment Holes By Bushing) Repair.

TASK 72-23-01-300-801-F00

2. Outlet Guide Vanes (Inner Shroud Attachment Holes By Bushing) Repair

(Figure 801, Figure 802, Figure 803, Figure 804, Figure 805, Figure 806, Figure 807)

A. General

(1) This procedure gives instructions to repair the attachment hole areas on the inner shroud assembly of the fan Outlet Guide Vane (OGV), by bushing.

B. References

Reference	Title
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-40-01-910-801-F00	Fluorescent Penetrant Inspection (Water Washable) (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A01057	Adhesive - Hysol EA9394	BMS5-141
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Repairs

SUBTASK 72-23-01-010-007-F00

WARNING	DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

F. Fan and Booster Assembly (Inner Shroud Attachment Holes By Bushing) Repair

SUBTASK 72-23-01-300-003-F00

(1) Use the table below and Figure 801 to identify applicable parts.

Part-Number	Description
334-007-413-0	Bushing (Type 1)
334-007-416-0	Bushing (Type 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Part-Number	Description
649-020-004-0 NAS9307M-4-04	Rivet (for bushing Type 2)

SUBTASK 72-23-01-970-001-F00

(2) Refer to the dimensional information for the repair application in the table that follows:

Repair Dimensional Information

Description	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dim. E			1.449 in. (36.8 mm)
Dim. F	2.193 in. (55.7 mm)	2.209 in. (56.1 mm)	
Angle S			3°20'17”
Dia G	1.020 in. (25.9 mm)	1.027 in. (26.1 mm)	
Dim. J			1.000 in. (25.4 mm)
Dim. K			0.500 in. (12.7 mm)
Dia N			0.1890 in. (4.80 mm)
Angle T			100°
Dia M			0.0988 in. (2.51 mm)
Angle L			5°
Angle P			30°
Dia R	0.1291 in. (3.28 mm)	0.1319 in. (3.35 mm)	
Dim. S			0.91 in. (23 mm)
Dim. T			1.81 in. (46 mm)

SUBTASK 72-23-01-300-001-F00

CAUTION

DO NOT DO THIS REPAIR ON THE HOLES THAT HAVE BEEN REPAIRED BY PLATE.

(3) Alternative procedure available - Do the repair if there is a captive nut (first application of this repair).

NOTE: Do this procedure if the hole has not been repaired by plate, refer to Figure 807.

CAUTION

MAKE SURE YOU DO NOT DAMAGE THE SURFACES ADJACENT OF THE OGV INNER SHROUD ASSEMBLY AND THE RIVET HOLES WHEN YOU REMOVE THE RIVETS. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(a) Remove the captive nut (Figure 802):

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **WARNING** METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

1) Remove the rivet head with a 0.094 in. (2.4 mm) diameter drill. Refer to TASK 70-44-50 320-006 (70-44-50, Drilling) CFMI Standard Practices Manual.
2) Get rivets and captive nuts.
3) Collect the particles from machining and captive nuts.

> **WARNING** DO NOT BREATHE THE PARTICLES FROM GRINDING OR DRILLING OR LET THE PARTICULES TOUCH YOU. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

> **WARNING** METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(b) Machine the holes of the bushing. Refer to TASK 70-44-20-320-003 (70-44-20, Milling) CFMI Standard Practices Manual.
   1) Refer to the table of dimensional information (Figure 803).
   2) Refer to the information to make the drilling for bushing (Figure 805).
   3) Collect the particles from machining.

(c) Only for the holes between strut No. 5 and strut No. 6, machine the holes of the rivets.
   1) Refer to TASK 70-44-50 320-006 (70-44-50, Drilling) CFMI Standard Practices Manual.
   2) Refer to the table of dimensional information (Figure 803).
   3) Refer to the information to make the drilling for bushing (Figure 805).
   4) Collect the particles from machining.

(d) Do a hand blending to remove burrs after machining. Refer to TASK 70-41-11-350-009 (70-41-11, Hand blending) CFMI Standard Practices Manual.
   1) Collect the particles from machining.

(e) Do a dimensional and geometric inspection of the holes (Figure 803). Refer to the table of repair dimensional information.

(f) Do a swab etching on the repaired area with aluminum alloy etchant (S1096), Class E. Refer to TASK 70-53-11-110-023 (70-53-11, Swab etching) CFMI Standard Practices Manual.

(g) Do a Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00 or Fluorescent Penetrant Inspection (Water Washable), TASK 70-40-01-910-801-F00 of the repaired areas.
   1) No indications permitted.

SUBTASK 72-23-01-300-002-F00

(4) Alternative procedure: Do the repair if there is a bushing (Figure 804).
   (a) Remove the bushing as follows:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **WARNING** MAKE SURE TO USE PROTECTIVE EQUIPMENT WHEN YOU USE A DRILL. MAKE SURE TO COLLECT THE PARTICLES AFTER YOU USE A DRILL. METAL PARTICLES FROM THE OPERATION OF A DRILL CAN CAUSE DAMAGE TO THE EQUIPMENT AND INJURY TO PERSONS.

1) For all the holes except the holes between strut No. 5 and strut No. 6, unscrew the lock nut and remove the bushing.

2) For the holes between strut No. 5 and strut No. 6, do as follows:

   a) Remove the rivet head with a 0.118 in. (3.0 mm) diameter drill. Refer to TASK 70-44-50 320-006 (70-44-50, Drilling) CFMI Standard Practices Manual.

   b) Get rivets and remove the bushing.

(b) Do a dimensional and geometric inspection of the holes (Figure 803). Refer to the table of repair dimensional information.

SUBTASK 72-23-01-300-004-F00

(5) If necessary, do a spot touch-up of the sulfuric anodizing coating on the repaired area. Refer to TASK 70-62-14-380-008 (70-62-14, Spot touch-up) CFMI Standard Practices Manual.

SUBTASK 72-23-01-100-001-F00

(6) Clean the part. Refer to TASK 70-21-11-110-002 (70-21-11, Solvent degreasing) CFMI Standard Practices Manual or to TASK 70-21-18-160-003 (70-21-18, Light duty aqueous cleaning) CFMI Standard Practices Manual.

SUBTASK 72-23-01-390-001-F00

(7) Apply a large quantity of jointing compound, D50321 [CP2773] to the repaired area using a brush (Figure 804).

NOTE: Layer thickness can be approximately 0.004 in. (0.1 mm) to 0.008 in. (0.2 mm).

SUBTASK 72-23-01-210-007-F00

(8) Do an inspection after application.

   (a) Make sure that the fan frame shroud is coated fully with the paste.

   (b) Remove the excess layer.

SUBTASK 72-23-01-420-003-F00

(9) Do the mounting of the bushing Type 1 (Figure 804).

> **WARNING** HYSOL EA 9394 IS POISONOUS TO YOUR RESPIRATORY SYSTEM, IS AN IRRITANT, AND AN ALLERGEN. DO NOT LET THIS MATERIAL TOUCH YOU. DO NOT BREATHE THIS MATERIAL. DO NOT EAT OR DRINK. USE PERSONAL PROTECTION EQUIPMENT. USE MECHANICAL EXHAUST VENTILATION OR USE A RESPIRATOR.

   (a) Do a bonding between threaded bushing and nut with Hysol EA9394 adhesive, A01057. Refer to TASK 70-65-24-360-016 (70-65-24, Application of epoxy adhesive) CFMI Standard Practices Manual.

   (b) Install the assembly in the Fan OGV inner shroud.

   NOTE: Make sure that the notch of the threaded bush is pointed to the front of the engine.

   (c) Torque the assembly with the lock nut to 259.32 in-lb (29.3 N·m)-271.72 in-lb (30.7 N·m) with a wrench (Figure 806).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(d) Loosen the assembly with a wrench.

(e) Torque the assembly with the lock nut to 215.05 in-lb (24.3 N·m)-227.45 in-lb (25.7 N·m) with a wrench.

(f) Do the test of the bonding on the test specimen. Refer to TASK 70-65-01-280-003 (70-65-01, Shear test) CFMI Standard Practices Manual.

(g) Make sure that the notch of the threaded bush is pointed to the front of the engine.

SUBTASK 72-23-01-300-005-F00

(10) Do the mounting of the bushing Type 2 (Figure 804).

(a) Install the bushing in the Fan OGV inner shroud.

(b) Attach the bushing with rivets. Refer to TASK 70-43-11-390-003 (70-43-11, Formed Rivet Assemblies) CFMI Standard Practices Manual.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-01-410-002-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Repair of the OGV Inner Shroud Attachment Holes by Bushing
Figure 801/72-23-01-990-804-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LEGEND:

- REPAIRABLE HOLES WITH BUSHING TYPE 1
- REPAIRABLE HOLES WITH BUSHING TYPE 2

2976180 S0000754891_V1

Repair of the OGV Inner Shroud Attachment Holes by Bushing
Figure 801/72-23-01-990-804-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2577815 S0000619879_V1

Captive Nut Removal
Figure 802/72-23-01-990-805-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2577824 S0000619880_V1

Captive Nut Removal
Figure 802/72-23-01-990-805-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

2577826 S0000619881_V1

Captive Nut Removal
Figure 802/72-23-01-990-805-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FOR ALL THE HOLES EXCEPT THE HOLES BETWEEN STRUT NO. 5 AND STRUT NO. 6

A

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

2976181 S0000754892_V1

Repair of Attachment Holes - Final Dimensions
Figure 803/72-23-01-990-806-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FOR THE HOLES BETWEEN STRUT NO. 5 AND STRUT NO. 6

A

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

2976182 S0000754893_V1

Repair of Attachment Holes - Final Dimensions
Figure 803/72-23-01-990-806-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHING TYPE 1 FOR ALL THE HOLES EXCEPT THE HOLES BETWEEN STRUT NO. 5 AND STRUT NO. 6

2976185 S0000754894_V1

Mounting of the Bushing
Figure 804/72-23-01-990-807-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHING TYPE 2 FOR THE HOLES BETWEEN STRUT NO. 5 AND STRUT NO. 6

2976192 S0000754895_V1

Mounting of the Bushing
Figure 804/72-23-01-990-807-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2578506 S0000619884_V2

Information to Make Drilling for Bushing
Figure 805/72-23-01-990-808-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

2976204 S0000754897_V1

Information to Make Drilling for Bushing
Figure 805/72-23-01-990-808-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

24 MACHININGS IDENTICAL ON ALL THE STRUTS
(SCHEMATIC VIEW)
B-B

2578520 S0000619886_V1

Information to Make Drilling for Bushing
Figure 805/72-23-01-990-808-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2578521 S0000619887_V1

Information to Make Drilling for Bushing
Figure 805/72-23-01-990-808-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2578524 S0000619888_V1

Information to Make Lock Nut Tool
Figure 806/72-23-01-990-809-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2578525 S0000619889_V1

Plate Repair
Figure 807/72-23-01-990-810-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AFT ACOUSTICAL PANELS - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of the aft acoustical panels

(2) The installation of the aft acoustical panels

(3) The removal of the strut profiles

(4) The installation of the strut profiles.

TASK 72-23-02-000-801-F00

2. Aft Acoustical Panel Removal

(Figure 401)

A. General

LOM ALL PRE SB CFM56-7B-72-0512

(1) The engine has 12 aft acoustical panels found in the secondary air flow between the fan frame struts on the outer surface.

LOM ALL POST SB CFM56-7B-72-0512

(2) The engine has 13 aft acoustical panels found in the secondary air flow between the fan frame struts on the outer surface.

LOM ALL

(3) All screws and riveted self locking nuts that are locked with the RTV 732 adhesive, A50012 [CP2242] must be replaced at the first shop opportunity.

B. References

Reference	Title
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A50012 [CP2242]	Adhesive - Silicone, Thixotropic Paste, One-Part RTV - RTV 732	MIL-A-46106 Type I

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Removal

SUBTASK 72-23-02-010-001-F00

> **WARNING**
> DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Aft Acoustical Panel Removal

SUBTASK 72-23-02-000-001-F00

> **CAUTION** IF YOU USE A PNEUMATIC OR ELECTRICAL SCREW DRIVER TO LOOSEN AND REMOVE THE ACOUSTICAL PANEL SCREWS, MAKE SURE THE SPEED IS NOT MORE THAN 200 RPM. IF THE SPEED IS MORE THAN 200 RPM, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(1) Remove the five screws [1] and [2] from the applicable acoustical panel:

NOTE: The length of the forward three screws [1] is longer than the two aft screws [2].

(a) Eight acoustical panels [3]

(b) One acoustical panel [4]

(c) One acoustical panel [5]

(d) One acoustical panel [6].

(e) One acoustical panel [7].

LOM ALL POST SB CFM56-7B-72-0512

(2) Remove the four screws (9) and (10) from the acoustical panel (8).

NOTE: The length of the forward two screws (9) is smaller than the two aft screws (10).

LOM ALL

SUBTASK 72-23-02-020-001-F00

(3) If you find a screw which has no torque feel when it is removed, discard and replace it with a new screw.

SUBTASK 72-23-02-000-002-F00

(4) Remove the acoustical panel from the fan frame.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

SOME ENGINE COMPONENTS NOT SHOWN.

MM-00251-00-B

F30777 S0006582425_V4

Aft Acoustical Panels Installation
Figure 401/72-23-02-990-801-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

SOME ENGINE COMPONENTS NOT SHOWN.

D85633 S0000167082_V2

Aft Acoustical Panels Installation
Figure 401/72-23-02-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-02-400-801-F00

3. Aft Acoustical Panel Installation

(Figure 401)

A. General

(1) This procedure gives the instructions to install the aft acoustical panels at these different locations on the fan frame:

(a) Eight acoustical panels [3]

(b) One acoustical panel [4]

(c) One acoustical panel [5]

(d) One acoustical panel [6]

(e) One acoustical panel [7]

(f) One acoustical panel [8].

B. References

Reference	Title
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A01077 [CP2266]	Adhesive - Silicone Rubber - RTV 102	
A50012 [CP2242]	Adhesive - Silicone, Thixotropic Paste, One-Part RTV - RTV 732	MIL-A-46106 Type I
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Aft Acoustical Panel Installation

SUBTASK 72-23-02-400-002-F00

(1) Install the acoustical panel:

(a) Clean all the surfaces between the acoustical panels and the strut profiles with alcohol, B00676 [CP1041] for the application of RTV sealant.

LOM ALL PRE SB CFM56-7B-72-0512

(b) Apply a large quantity of anti-corrosion jointing compound, D50321 [CP2773] to the shaft of long screw [1] (thread included), to the shaft of short screw [2] (thread included) and under bolt head.

LOM ALL POST SB CFM56-7B-72-0512

(c) Apply a large quantity of anti-corrosion jointing compound, D50321 [CP2773] to the shaft of long screws [1] and [10] (thread included), to the shaft of short screws [2] and [9] (thread included) and under bolt head.

LOM ALL

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(d) Put the acoustical panel in its position on the fan frame.

(e) Attach the acoustical panel with five screws:

1) Install three long screws [1] in the forward holes.

2) Install two short screws [2] in the aft holes.

LOM ALL POST SB CFM56-7B-72-0512

3) Attach the acoustical panel [8] with the four screws:

4) Install two long screws [10] in the aft holes.

5) Install two short screws [9] in the forward holes.

LOM ALL

CAUTION	IF YOU USE A PNEUMATIC OR ELECTRICAL SCREW DRIVER TO TIGHTEN THE ACOUSTICAL PANEL SCREWS, MAKE SURE THE SPEED IS NOT MORE THAN 200 RPM. IF THE SPEED IS MORE THAN 200 RPM, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(f) As you tighten each screw, make sure that the torque of the self locking nut is 4.5-31 pound-inches (0.5-3.5 Newton meters).

1) If the self locking nut torque is more than 31 pound-inches (3.5 Newton meters), visually examine the installation to make sure the panel is seated correctly.

a) If the panel is not correctly seated, find the cause and correct it.

2) If the self locking nut torque is less than 4.5 pound-inches (0.5 Newton meters), do the steps below to lock the acoustical panel screw.

(g) Lock the acoustical panel screw as follows:

NOTE: Only do these steps if the torque above is less than 4.5 pound-inches (0.5 Newton meters).

1) Remove the screws [1] or [2] and the acoustical panel (if it is necessary).

2) Clean screws and nuts with acetone solvent, B01058 [CP1039].

NOTE: It is necessary to clean the nuts, if access is possible.

3) Apply RTV 732 adhesive, A50012 [CP2242] or RTV 102 adhesive, A01077 [CP2266] to the long screw [1] and short screw [2] threads and contact faces below the screw heads.

4) Re-install the acoustical panel (if removed) with the screws [1] and [2].

LOM ALL PRE SB CFM56-7B-72-0512

CAUTION	IF YOU USE A PNEUMATIC OR ELECTRICAL SCREW DRIVER TO TIGHTEN THE ACOUSTICAL PANEL SCREWS, MAKE SURE THE SPEED IS NOT MORE THAN 200 RPM. IF THE SPEED IS MORE THAN 200 RPM, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(h) Tighten the five screws [1] and [2] to 83.6 in-lb (9.4 N·m) - 92.4 in-lb (10.4 N·m).

1) Where it is possible, start at the screws in the center of the acoustical panels.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB CFM56-7B-72-0512

> **CAUTION** IF YOU USE A PNEUMATIC, OR ELECTRICAL SCREW DRIVER, MAKE SURE THAT THE SPEED IS NOT MORE THAN 200 RPM. IF YOU TIGHTEN THE SCREWS AT A FASTER SPEED, DAMAGE TO THE PANEL CAN OCCUR.

(i) Tighten the screws [1], [2], [9] and [10] to 83.6 in-lb (9.4 N·m) - 92.4 in-lb (10.4 N·m) for the applicable panel.

1) Where it is possible, start at the screws in the center of the acoustical panels.

LOM ALL

> **CAUTION** AREA AROUND ATTACHMENT HOLES MUST BE CLEAN AND DRY OTHERWISE IT MAY FACILITATE CORROSION AND FRETTING.

(j) Remove all unwanted grease with a dry clean cloth.

(k) Apply the RTV material between the acoustical panels and strut profiles as follows:

1) Apply adhesive RTV 732 adhesive, A50012 [CP2242] or RTV 102 adhesive, A01077 [CP2266] to fill up the space between the two acoustical panels and around the strut profile, the space between the intermediate case strut, and attachment clamps. Do the primer application and the RTV application with the applicator, spray gun or spatula.

NOTE: The difference between the adhesive RTV 102 and RTV 103 N (CP2266) is only the color, the characteristics are identical.

a) Apply the elastomer, Primer 1200 (CP2244) or Primer SS 4179 (CP2579) or Primers SS 4004 or SS 4044 (CP5065) with a brush on areas to be coated with sealant.

<1> Do this task: Bonding of Silicone Elastomer Seals to Metal Surfaces CFMI SPM 70-65-16 or Application of a Silicone Elastomer Adhesive/Sealant SPM 70-66-12.

b) Apply RTV 732 adhesive, A50012 [CP2242] with an applicator in the space between the acoustical panels, the strut profiles and between the attachment clamps and the strut profiles (if necessary).

<1> Do this task: Bonding of Silicone Elastomer Seals to Metal Surfaces CFMI SPM 70-65-16 or Application of a Silicone Elastomer Adhesive/Sealant SPM 70-66-12.

c) Alternate Procedure:

Apply RTV 102 adhesive, A01077 [CP2266] with a spray gun between the acoustical panels, the strut profiles and between the attachment clamps and the strut profiles (if necessary).

<1> Do this task: Bonding of Silicone Elastomer Seals to Metal Surfaces CFMI SPM TASK 70-65-16.

d) Alternate Procedure:

Apply a smooth layer of the RTV 732 adhesive, A50012 [CP2242] or RTV 102 adhesive, A01077 [CP2266] with a very clean spatula.

e) Let the RTV polymerize at room temperature and humidity.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Put the Aircraft Back to its Usual Condition

SUBTASK 72-23-02-010-002-F00

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

——— END OF TASK ———

TASK 72-23-02-000-802-F00

4. Strut Profile Removal

(Figure 402)

A. General

(1) This procedure gives the instructions to remove the strut profiles from their different locations on the fan frame.

B. References

Reference	Title
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 72-23-02-010-004-F00

> **WARNING** DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

E. Strut Profile Removal

SUBTASK 72-23-02-000-003-F00

(1) Cut the RTV material between the adjacent acoustical panels [2], the attachment clamps [5] (if necessary), and all around the strut profile [1] which must be replaced.

NOTE: Strut No.1 is located at the 12, o'clock position. Struts are numbered clockwise, aft looking forward.

NOTE: The attachment clamps [5] are installed on struts No. 4, 7 and 10.

(2) Remove the bolts [3] and the washers [4] that attach to the applicable strut profile [1].

(3) If you find a bolt which has no torque feel when it is removed, discard and replace it with a new bolt.

(4) Remove the strut profile [1] from the fan frame.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

SOME ENGINE COMPONENTS NOT SHOWN.

2830080 S0000656261_V1

Strut Profile Installation
Figure 402/72-23-02-990-804-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-02-400-802-F00

5. Strut Profile Installation

(Figure 402)

A. General

(1) This procedure gives the instructions to install the strut profiles to their different locations on the fan frame.

B. References

Reference	Title
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
SOPM 70-66-12	Application of a Silicone Elastomer Adhesive/Sealant

C. Consumable Materials

Reference	Description	Specification
A50012 [CP2242]	Adhesive - Silicone, Thixotropic Paste, One-Part RTV - RTV 732	MIL-A-46106 Type I
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Strut Profile Installation

SUBTASK 72-23-02-400-003-F00

> **WARNING**
> ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

(1) Clean all the surfaces between the acoustical panels and the strut profile with acetone solvent, B01058 [CP1039] for the application of RTV 732 adhesive, A50012 [CP2242].

> **WARNING**
> ANTI-CORROSION GREASE IS TOXIC AND FLAMMABLE. DO NOT LET THIS MATERIAL TOUCH YOU. DO NOT BREATHE THIS MATERIAL. USE PERSONAL PROTECTION EQUIPMENT. USE IN A WELL VENTILATED AREA.

> **CAUTION**
> CLEAN AND DRY THE AREA AROUND ATTACHMENT HOLES. IF YOU DO NOT CLEAN AND DRY IT, CORROSION AND FRETTING CAN OCCUR.

(2) Before you install the strut profile bolts, apply a large quantity of jointing compound, D50321 [CP2773] to the shaft of bolts [3] (thread included) and under bolt heads.

(3) Put the applicable strut profile in its position on the fan frame.

(4) Attach the strut profile [1] with the bolts [3] and the washers [4].

(5) Torque the bolts [3] to 83.6–92.4 in-lb (9.5–105 N.m).

(6) Remove all unwanted jointing compound with a dry clean cloth.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING

RTV 732 ADHESIVE IS TOXIC AND FLAMMABLE. USE PERSONAL PROTECTION EQUIPMENT. USE IN A WELL-VENTILATED AREA.

(7) Apply RTV 732 adhesive, A50012 [CP2242] to fill up space between strut profile [1] and the acoustical panel [2]; and between the strut profile [1] and the attachment clamp [5] (if necessary.

NOTE: Fill up the spaces with black RTV 732 adhesive, A50012 [CP2242] only.

(a) Clean the areas to be coated with acetone solvent, B01058 [CP1039].

(b) Do this task: Application of a Silicone Elastomer Adhesive/Sealant, SOPM 70-66-12.

F. Put the Aircraft Back to its Usual Condition

SUBTASK 72-23-02-010-005-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AFT ACOUSTICAL PANELS - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) The inspection of the acoustical panels and profile struts.

TASK 72-23-02-200-801-F00

2. Acoustical Panels and Profile Struts Inspection

(Figure 601, Figure 602)

A. General

(1) This task gives you instructions to visually examine the acoustical panels and profile struts.

B. References

Reference	Title
72-23-02-000-801-F00	Aft Acoustical Panel Removal (P/B 401)
72-23-02-400-801-F00	Aft Acoustical Panel Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Inspection

SUBTASK 72-23-02-010-003-F00

WARNING	DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

E. Visually Examine the Acoustical Panels and Profile Struts

SUBTASK 72-23-02-900-001-F00

(1) If you find damage to an acoustical panel that is not in the limits, replace the acoustical panel, unless you are given other instructions.

These are the tasks:

Aft Acoustical Panel Removal, TASK 72-23-02-000-801-F00,

Aft Acoustical Panel Installation, TASK 72-23-02-400-801-F00.

SUBTASK 72-23-02-210-002-F00

(2) Examine the acoustical panels for these conditions:

(a) Missing panel

1) Not serviceable.

a) Install a replacement acoustical panel.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) A maximum service extension of ten (10) flight cycles is permitted if only one acoustical panel is missing (except for IDG acoustical panel).

(b) Missing or loose bolts

1) Not serviceable.

a) Install or tighten the bolts.

SUBTASK 72-23-02-210-003-F00

(3) Damage to the protective coating (Tedlar film) on the acoustical panel:

(a) Missing coating

1) All missing coating is permitted if you remove the loose material with a sharp blade at the next maintenance opportunity.

(b) Other indications, such as dents, nicks, tears, cracks, or flaking that lets you see the inner skin.

1) The damage is permitted if you remove the loose material with a sharp blade.

SUBTASK 72-23-02-210-004-F00

(4) Look for damage to the inner skin of the acoustical panel:

(a) Superficial damage (dents, nicks, tears, impact, marks, delamination) that does not go through the inner skin

1) There is no limit to the number of damaged areas if the total surface area is less than 4 in^2 (25.81 cm^2) for each panel.

a) If the damage is less than 4 in^2 (25.81 cm^2), remove the loose material with a sharp blade.

b) If the damage is more than 4 in^2 (25.81 cm^2), replace the acoustical panel.

(b) Damage (tears, cracks, punctures) through the inner skin

1) Not serviceable.

a) Replace the acoustical panel.

2) A maximum service extension of 100 flight hours is permitted if the defect is less than 1 in^2 (6.45 cm^2).

(c) Erosion on Area A

1) The finding is permitted if less than 0.189 in. (4.8 mm) axial length.

SUBTASK 72-23-02-210-007-F00

(5) Visually examine the IDG air/oil cooler acoustical panel for damage (Figure 602):

(a) Cracks on panel arms

1) Not serviceable.

a) Install a replacement acoustical panel.

NOTE: If the part is not available, refer to CFMI-SB72-0440 to make sure that you can remove the IDG acoustical panel permanently.

(b) Bumps on surface panel arms

1) The damage is permitted for not more than 150 cycles.

SUBTASK 72-23-02-210-005-F00

(6) Visually examine the profile struts for damage (Figure 601):

(a) Cracks

1) Not serviceable.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

a) Replace the applicable part.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-02-210-006-F00

WARNING	OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

SOME ENGINE COMPONENTS NOT SHOWN.

Acoustical Panel and Profile Strut Inspection
Figure 601/72-23-02-990-802-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Acoustical Panel and Profile Strut Inspection
Figure 601/72-23-02-990-802-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

IDG Acoustical Panel Configuration
Figure 602/72-23-02-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

THRUST REVERSER EXTENSION RING (INNER) - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) A removal of the shroud segments

(2) An installation of the shroud segments.

TASK 72-23-03-000-802-F00

2. Shroud Segments Removal

(Figure 401, Figure 402)

A. General

(1) The task gives the instructions to remove the shroud segments on the thrust reverser extension ring (inner).

(2) The thrust reverser extension ring (inner) is found in the aft end of the fan and booster section.

(3) The four shrouds are found on the inner shroud of the thrust reverser extension ring.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-3949	Scalpel - X-ACTO Knife

D. Consumable Materials

Reference	Description	Specification
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	AMS3819 Class 1 Grade A or B Form 1 (Supersede BMS15-5 CL A)
G02314	Air - Compressed, Breathing	BB-A-1034 Source I Grade A
G02502 [CP2239]	Cloth - Abrasive, Alumina, Size 80 Or 120 - 3M 301D	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Prepare for the Removal

SUBTASK 72-23-03-040-001-F00

> **WARNING** DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

G. Shroud Segments Removal

SUBTASK 72-23-03-010-001-F00

(1) Do these steps to remove the applicable shroud segment [1] (Figure 401):

(a) Remove the two bolts [3].

(b) Remove the six bolts [2].

(c) For the upper shroud segments, remove the bolt [4], washer [5], and nut [6].

1) If installed, remove the spacer and clip.

(d) Remove the shroud segment [1].

H. RTV on the Shroud Segments Removal (If It is Necessary and Only For the Shroud To Be Removed)

SUBTASK 72-23-03-100-001-F00

(1) Do these steps to remove the RTV material from the shroud segment [1] (Figure 402):

(a) Remove the RTV material from the base metal with a X-ACTO knife scalpel, STD-3949.

(b) Use 3M 301D abrasive cloth, G02502 [CP2239], to remove the residual RTV material.

(c) Blow the part clean with air, G02314.

> **WARNING** DO NOT GET ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE GAS FROM ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN. KEEP ACETONE, ISOPROPYL ALCOHOL AND CLEANING SOLVENT DESOCLEAN AWAY FROM SPARKS, FLAME, AND HEAT. ACETONE, ISOPROPYL ALCOHOL AND CLEANING SOLVENT DESOCLEAN ARE POISONOUS AND FLAMMABLE SOLVENTS WHICH CAN CAUSE INJURY OR DAMAGE.

(d) Remove the grease from the part with cotton wiper, G00034, soaked in acetone solvent, B01058 [CP1039].

(e) Dry the part with air, G02314.

(f) Make sure to clean dirt and unwanted material from the thrust reverser extension ring.

1) Remove the grease from the part with cotton wiper, G00034, soaked in acetone solvent, B01058 [CP1039].

2) Dry the part with air, G02314.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-03-110-001-F00

(2) If a parent metal shows after the repair area cleaned, re-condition the sulfuric anodizing in that area:

(a) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Thrust Reverser Extension Ring (Inner) Shroud Segments Installation
Figure 401/72-23-03-990-801-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(EXAMPLE)

B

(RIGHT SIDE SEALANT APPLICATION SHOWN, LEFT SIDE SEALANT APPLICATION OPPOSITE)

C 1

LEGEND:

AND , AREAS OF SEALANT APPLICATION.

1 UPPER SHROUD SEGMENTS

3024376 S0000796144_V1

Thrust Reverser Extension Ring (Inner) Shroud Segments Installation
Figure 401/72-23-03-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 1 of 10)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 2 of 10)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C

D

E

LEGEND:

AREAS TO BE COATED
WITH PRIMER AND RTV

1847629 S0000328624_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 3 of 10)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1847644 S0000328625_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 4 of 10)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LEGEND:

H

AREAS TO BE COATED WITH PRIMER AND RTV

1847793 S0000328627_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 5 of 10)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 6 of 10)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LEGEND:

J

AREAS TO BE COATED WITH PRIMER AND RTV

1847827 S0000328630_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 7 of 10)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LEGEND:

AREAS TO BE COATED
WITH PRIMER AND RTV

1847838 S0000328631_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 8 of 10)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 9 of 10)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LEGEND:

P

AREAS TO BE COATED
WITH PRIMER AND RTV

1847856 S0000328633_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 10 of 10)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-03-400-802-F00

3. Shroud Segments Installation

(Figure 401, Figure 402)

A. References

Reference	Title
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Consumable Materials

Reference	Description	Specification
A00803	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63 Type I
A50012 [CP2242]	Adhesive - Silicone, Thixotropic Paste, One-Part RTV - RTV 732	MIL-A-46106 Type I
A50096	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63 Type II
A50236 [CP2244]	Primer - Liquid For Preparation of Surfaces Prior to Elastomer Application	
C00944	Primer - Firewall - Dapco No. 1-100	BMS5-63 Type I
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Installation

SUBTASK 72-23-03-390-001-F00

(1) If it is necessary, apply primer 1200 OS, A50236 [CP2244], and RTV 732 adhesive, A50012 [CP2242], only to the locations that are shown in the service bulletin, CFM SB 72-119 (Figure 402).

(a) Apply primer 1200 OS, A50236 [CP2244], to the areas.

(b) After 30 minutes, apply RTV 732 adhesive, A50012 [CP2242].

E. Shroud Segments Installation

SUBTASK 72-23-03-410-001-F00

(1) Do these steps to install the applicable shroud segment [1]:

(a) Apply Dow Corning 321 lubricant, D00641 [CP5062], to the threads of the bolts [2] and bolts [3].

(b) Put the applicable shroud segment [1] in its position.

(c) Install the six bolts [2].

(d) Install the two bolts [3].

(e) For the upper shroud segments, do these steps:

1) Install the bolt [4], washer [5], and nut [6].

2) If it was removed, install the spacer and clip.

(f) Tighten the bolts [2] and bolts [3] to 67.50 in-lb (7.63 N·m) - 74.50 in-lb (8.42 N·m).

(g) Tighten the bolt [4] to 65 in-lb (7.3 N·m) - 100 in-lb (11.3 N·m).

(h) For the upper shroud segments, apply sealant, A00803, or sealant, A50096, to the following locations (View C, Figure 401):

ECCN 9E991 BOEING PROPRIETARY - See title page for details

- To between the shroud segment [1] and transition fitting until provide a fairing surface.
- To fill the cavity of the bolt [4] until flush with the surface of the shroud segment [1].

1) If sealant, A00803, is used, apply Dapco No. 1-100 primer, C00944, to all fillet surfaces before sealant application.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-03-410-002-F00

WARNING	OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

THRUST REVERSER EXTENSION RING (INNER) - INSPECTION/CHECK

1. General

A. This procedure has these tasks:

(1) An inspection of the thrust reverser extension ring (inner).

(2) An inspection of the 12 o'clock engine strut.

TASK 72-23-03-200-801-F00

2. Thrust Reverser Extension Ring (Inner) Inspection

(Figure 601)

A. General

(1) The thrust reverser extension ring inner assembly parts can be found at the aft end of the fan and booster section.

(2) The inner shroud of the thrust reverser extension ring is the location of the parts that follow:

(a) The strut fairings and shroud segments

(b) The shroud pads and clamps.

B. References

Reference	Title
72-23-03-000-802-F00	Shroud Segments Removal (P/B 401)
72-23-03-400-802-F00	Shroud Segments Installation (P/B 401)
73-21-06-000-802-F00	3 O'clock Strut Harness Removal (P/B 401)
73-21-06-400-802-F00	3 O'clock Strut Harness Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare For The Inspection

SUBTASK 72-23-03-040-002-F00

> **WARNING**
> DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-03-210-001-F00

(2) Clean all of the dirt or unwanted materials from the inner extension ring.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Examine The 3:00 O'clock Strut Fairing

SUBTASK 72-23-03-210-002-F00

(1) If you find damage to the 3:00 o'clock strut fairing that is not in the limits, replace the 3:00 o'clock strut fairing, unless you are given other instructions. Do the applicable steps in the referenced tasks.

These are the tasks:

3 O'clock Strut Harness Removal, TASK 73-21-06-000-802-F00,

3 O'clock Strut Harness Installation, TASK 73-21-06-400-802-F00.

SUBTASK 72-23-03-220-001-F00

(2) Examine the strut fairings for damage:

(a) Cracks

1) Not serviceable.

(b) Marks and dents

1) All marks and dents are permitted with these limits:

a) All dents and marks with a maximum depth of 0.0197 inches (0.5 mm) are permitted if they have a smooth contour.

b) The minimum distance between two defects is a dimension of five times the diameter of the larger defect.

(c) Loose or missing bolts are not permitted.

1) Replace or tighten the bolt to 30-35 pound inches (3.5-4.0 Newton meters) as it is necessary.

(d) Damage to the 3:00 o'clock fairing seal:

1) Loss of the seal is not permitted.

a) Replace the 3:00 o'clock strut fairing.

2) Seal bond separation is not permitted.

a) Replace the 3:00 o'clock strut fairing.

F. Examine The Shroud Segments

SUBTASK 72-23-03-210-003-F00

(1) If you find damage to the shroud segments that is not in the limits, replace the shroud segments, unless you are given other instructions.

These are the tasks:

Shroud Segments Removal, TASK 72-23-03-000-802-F00,

Shroud Segments Installation, TASK 72-23-03-400-802-F00.

SUBTASK 72-23-03-220-002-F00

(2) Examine the shroud segments for damage (Figure 602):

(a) Cracks

1) Not serviceable.

(b) Marks and dents

1) All marks and dents in areas A and B of the v-groove:

a) Not serviceable.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) All marks and dents in areas other than area A and B of the v-groove are permitted with these limits:

a) All dents and marks with a maximum depth of 0.0197 inches (0.5 mm) are permitted if they have a smooth contour.

b) The minimum distance between two defects is a dimension of five times the diameter of the larger defect.

(c) Loose or missing bolts

1) Not serviceable.

2) Replace or tighten the bolt to 70-75 pound-inches (8-8.5 Newton meters) as it is necessary.

(d) Look for wear to the v-groove (areas A and B).

1) Any amount of fretting/wear and missing coating (varnish PTFE or sulfuric anodization) on V-groove and sealing surface is permitted.

NOTE: The wear coating is a yellow-green in color.

2) Aluminum parent material that shows is permitted.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-03-440-001-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

WHEN IN GOOD CONDITION, THE SEAL IS NOT VISIBLE IF THE FAIRING IS CORRECTLY INSTALLED AND ALSO IN GOOD CONDITION.

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Thrust Reverser Adapter Ring (Inner) Inspection
Figure 601/72-23-03-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Shroud Segment Inspection
Figure 602/72-23-03-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-03-200-802-F01

3. 12 O'clock Engine Strut Inspection

A. General

(1) The 12 o'clock engine strut can be found at the thrust reverser extension ring.

(2) Contact with the thrust reverser insulation blanket can damage the 12 o'clock engine strut.

B. References

Reference	Title
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
G00251	Abrasive - Mat, Non-Woven, Non-Metallic	A-A-58054

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For The Inspection

SUBTASK 72-23-03-010-002-F01

> **WARNING** DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

F. Procedure

SUBTASK 72-23-03-211-001-F01

(1) Look for signs of wear and gouges on the 12 o'clock engine strut.

(a) If the damage is 0.010 in. (0.254 mm) or less in depth, do this blend repair:

1) Use a light abrasive mat, G00251 or emory cloth and blend out the gouges.

2) Use a 20:1 length-to-depth ratio for smooth transition.

3) Blend no deeper than the depth of the gouges.

4) Maintain a 125RA or better surface finish.

(b) If the damage is 0.011 in. (0.279 mm)-0.020 in. (0.508 mm) in depth, do these steps:

1) Do the above blend repair.

2) The 12 o'clock strut can remain in service for up to 60 months.

a) When this period is up, replace the 12 o'clock strut.

(c) If the damage is 0.021 in. (0.533 mm)-0.030 in. (0.762 mm) in depth, do these steps:

1) Do the above blend repair.

2) The 12 o'clock strut can remain in service for up to 24 months.

a) When this period is up, replace the 12 o'clock strut.

(d) If the damage is more than 0.030 in. (0.762 mm) in depth, there is no on-wing repair:

1) Replace the 12 o'clock strut within 10 days.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-23-03-410-003-F01

WARNING	OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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12 O'clock Engine Strut Inspection
Figure 603/72-23-03-990-804-F01

ECCN 9E991 BOEING PROPRIETARY - See title page for details

THRUST MOUNT - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) A removal of the thrust mount

(2) An installation of the thrust mount.

TASK 72-23-04-000-801-F00

2. Thrust Mount Removal

(Figure 401)

A. General

(1) The forward thrust mount can be found on the top right and top left positions on the fan frame aft bulkhead.

(2) Disconnect only one thrust link at a time, do not disconnect the two thrust links at the same time.

B. References

Reference	Title
71-21-02-000-801-F00	Thrust Link Assembly Removal (P/B 401)
72-23-03-000-802-F00	Shroud Segments Removal (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Thrust Mount Removal

SUBTASK 72-23-04-010-003-F00

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-04-040-007-F00

(2) For engine 1, do this step:

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-04-040-008-F00

(3) For engine 2, do this step:

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Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-04-010-004-F00

(4) To remove the applicable shroud segment, do this task: Shroud Segments Removal, TASK 72-23-03-000-802-F00.

SUBTASK 72-23-04-000-001-F00

CAUTION

DO NOT REMOVE OR DISCONNECT THE TWO THRUST LINKS AT THE SAME TIME. INSTALLATION COULD NOT BE POSSIBLE BECAUSE THE ENGINE GEOMETRY WILL CHANGE. IF YOU DO NOT OBEY, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(5) Disconnect the applicable thrust link from the thrust mount only, do this task: Thrust Link Assembly Removal, TASK 71-21-02-000-801-F00.

E. Remove the Thrust Mount

SUBTASK 72-23-04-010-005-F00

(1) Do these steps to remove the applicable forward thrust mount [1]:

(a) Cut and remove the lockwire.

(b) Remove the four bolts [2].

(c) Remove the thrust mount [1].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

LEFT THRUST MOUNT IS SHOWN,
RIGHT THRUST MOUNT IS THE SAME.

Forward Engine Thrust Mount Installation
Figure 401/72-23-04-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-04-400-801-F00

3. Thrust Mount Installation

(Figure 401)

A. General

(1) The forward thrust mounts can be found on the top right and top left positions on the fan frame aft bulkhead.

(2) Do not disconnect the two thrust links at the same time.

B. References

Reference	Title
71-21-02-400-801-F00	Thrust Link Assembly Installation (P/B 401)
72-23-03-400-802-F00	Shroud Segments Installation (P/B 401)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Thrust mount	71-21-00-01-035	LOM 402, 404, 406, 407, 411, 416, 445
		71-21-00-01-040	LOM 402, 404, 406, 407, 411, 416, 445
		71-21-00-01A-055	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-21-00-01A-060	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Install the Thrust Mount

SUBTASK 72-23-04-410-002-F00

(1) Do these steps to install the applicable thrust mount [1]:

NOTE: The installation steps are the same for the left and right thrust mounts.

(a) Put the applicable thrust mount [1] in its position with thrust mount centering pin in the guide pin slot.

(b) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101], on the threads of the four bolts [2].

(c) Install the four bolts [2].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Tighten the bolts [2] to 547 in-lb (61.8 N·m) - 603 in-lb (68.1 N·m).

(d) Install the safety wire, G02345 [CP8001], or cable, G50065 [CP8006], to the bolts [2] in groups of 2.

SUBTASK 72-23-04-000-002-F00

(2) Connect the thrust link to the thrust mount, do this task: Thrust Link Assembly Installation, TASK 71-21-02-400-801-F00.

SUBTASK 72-23-04-410-003-F00

(3) For the applicable extension ring shroud segment, do this task: Shroud Segments Installation, TASK 72-23-03-400-802-F00.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-04-040-009-F00

(1) For engine 1, do this step:

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-04-040-010-F00

(2) For engine 2, do this step:

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-04-010-006-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

THRUST MOUNT - INSPECTION/CHECK

1. General

A. This procedure has two tasks:

(1) An inspection of the forward thrust mounts

(2) An inspection of the thrust mount attach bolts.

TASK 72-23-04-200-801-F00

2. Thrust Mounts Inspection

(Figure 601)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) The forward thrust mounts can be found on the upper right and left side of the fan frame.

B. References

Reference	Title
72-23-03-000-802-F00	Shroud Segments Removal (P/B 401)
72-23-03-400-802-F00	Shroud Segments Installation (P/B 401)
72-23-04-000-801-F00	Thrust Mount Removal (P/B 401)
72-23-04-400-801-F00	Thrust Mount Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-23-04-040-003-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-04-040-004-F00

(2) Install a DO NOT OPERATE tag, STD-858, on the applicable engine start switch.

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SUBTASK 72-23-04-040-001-F00

> **WARNING**
> DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-04-020-001-F00

(4) Clean all dirt and unwanted material from the thrust mounts.

NOTE: You should use a flashlight and an inspection mirror to examine the areas of the mounts that are not easy to see.

SUBTASK 72-23-04-010-007-F00

(5) Remove the applicable shroud segment, do this task: Shroud Segments Removal, TASK 72-23-03-000-802-F00.

F. Examine the Thrust Mount

SUBTASK 72-23-04-210-001-F00

(1) Examine the thrust mount for cracks:

(a) Cracks are not permitted.

SUBTASK 72-23-04-900-001-F00

(2) If you find damage that is not in the limits, replace the thrust mount, unless you are given other instructions. These are the tasks:

- Thrust Mount Removal, TASK 72-23-04-000-801-F00
- Thrust Mount Installation, TASK 72-23-04-400-801-F00.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-04-010-008-F00

(1) Install the applicable shroud segment, do this task: Shroud Segments Installation, TASK 72-23-03-400-802-F00.

SUBTASK 72-23-04-440-001-F00

> **WARNING**
> OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-23-04-440-003-F00

(3) Remove the DO-NOT-OPERATE tag from the applicable engine start switch.

SUBTASK 72-23-04-710-001-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

TASK 72-23-04-200-802-F00

3. **Thrust Mount Attach Bolts Inspection (Visual)**
(Figure 601)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) The forward thrust mounts can be found on the top right and left side of the fan frame.

B. References

Reference	Title
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
72-23-03-000-802-F00	Shroud Segments Removal (P/B 401)
72-23-03-400-802-F00	Shroud Segments Installation (P/B 401)
72-23-04-000-801-F00	Thrust Mount Removal (P/B 401)
72-23-04-400-801-F00	Thrust Mount Installation (P/B 401)
72-23-07-000-801-F00	Fan Duct Panel Removal (P/B 401)
72-23-07-400-801-F00	Fan Duct Panel Installation (P/B 401)
75-32-00-730-801-F00	VBV Actuation System - Manual Operation (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-23-04-040-005-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-04-040-006-F00

(2) Install a DO-NOT-OPERATE tag on the applicable engine start switch.

SUBTASK 72-23-04-040-002-F00

> **WARNING**
> DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION FOR THE LEADING EDGE AND THE THRUST REVERSERS (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-04-010-001-F00

(4) If it is necessary, remove the applicable shroud segment, do this task: Shroud Segments Removal, TASK 72-23-03-000-802-F00.

SUBTASK 72-23-04-020-002-F00

(5) Clean all dirt and unwanted material from the thrust mounts and bolts.

F. Examine the Thrust Mount Bolts

SUBTASK 72-23-04-210-004-F00

(1) If you find damage that is not in the limits, replace the thrust mount bolts, unless you are given other instructions.

These are the tasks:

Thrust Mount Removal, TASK 72-23-04-000-801-F00,

Thrust Mount Installation, TASK 72-23-04-400-801-F00.

SUBTASK 72-23-04-210-005-F00

(2) Make sure the attach bolts and lockwire for each of the thrust mounts is not missing or loose:

NOTE: You should use a flashlight and an inspection mirror to examine the bolts that are not easy to see.

> **CAUTION**
> BE CAREFUL WHEN YOU INSTALL PARTS THAT ARE AROUND AN OPEN VBV DOOR. PARTS THAT FALL INTO AN OPEN VBV DOOR CAN FALL IN THE HIGH PRESSURE COMPRESSOR OF THE ENGINE. PARTS WHICH FALL INTO THE ENGINE CAN CAUSE ENGINE DAMAGE AT THE FIRST ENGINE RUN.

(a) Missing or broken bolt

1) Use a flashlight to shine thru the nut where the bolt is missing:

NOTE: The nuts are in the VBV cavity in the fan frame.

a) Make sure that a piece of broken bolt is not in the nut.

2) If no piece of bolt [3] stays in the nut [4], do these steps:

a) Lubricate the threads of a replacement bolt with graphite mineral vaseline, D00601 [CP2101].

b) Install the bolt [3].

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c) Tighten the bolt [3] to 547-603 pound-inches (62-68 Newton meters).

d) Examine the other bolts [3] for missing or damaged lockwire.

e) Install new safety wire, G02345 [CP8001] or cable, G50065 [CP8006] [2] to the bolts [3] in groups of two.

3) If a piece of bolt [3] stays in the nut, do these steps:

CAUTION	BE CAREFUL WHEN YOU INSTALL PARTS THAT ARE AROUND AN OPEN VBV DOOR. PARTS THAT FALL INTO AN OPEN VBV DOOR CAN FALL IN THE HIGH PRESSURE COMPRESSOR OF THE ENGINE. PARTS WHICH FALL INTO THE ENGINE CAN CAUSE ENGINE DAMAGE AT THE FIRST ENGINE RUN.

a) Make sure that the VBV doors are in the closed position.

b) If the VBV doors are not fully closed, do this task: VBV Actuation System - Manual Operation, TASK 75-32-00-730-801-F00

c) Remove the applicable fan duct panel, do this task: Fan Duct Panel Removal, TASK 72-23-07-000-801-F00.

d) Remove the two bolts [5].

CAUTION	MAKE SURE THE NUT DOES NOT FALL AND REMAIN IN THE VBV CAVITY. WHEN THE BRACKET IS REMOVED, THE NUT IS NOT HELD ON THE FAN FRAME AND COULD FALL INTO THE ENGINE.

e) Remove the bracket [6] and nut [4].

f) Install a new nut [4].

g) Install the bracket [6].

h) Lubricate the threads of the two bolts [5] with Dow Corning 321 lubricant, D00641 [CP5062].

i) Install and tighten the two bolts [5] with your hand.

NOTE: This is to hold the bracket [6].

j) Make sure that the nut [4] can move freely axially.

k) Tighten the two bolts [5] to 110-120 pound-inches (12.4-13.6 Newton meters).

l) Lubricate the threads of a new bolt [3] with graphite mineral vaseline, D00601 [CP2101].

m) Install the bolt [3].

n) Tighten the bolt [3] to 547-603 pound-inches (62-68 Newton meters).

o) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] [2] to the bolts [3] in groups of two.

(b) Missing or damaged lockwire

1) Remove all damaged pieces of lockwire.

2) Tighten the bolts [3] to 547-603 pound-inches (62-68 Newton meters).

3) Install new safety wire, G02345 [CP8001] or cable, G50065 [CP8006] to the bolts [3] in groups of two.

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SUBTASK 72-23-04-410-001-F00

(3) To install the applicable fan duct panel, do this task: Fan Duct Panel Installation, TASK 72-23-07-400-801-F00.

SUBTASK 72-23-04-010-009-F00

(4) Install the applicable shroud segment, do this task: Shroud Segments Installation, TASK 72-23-03-400-802-F00.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-04-440-002-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-23-04-440-004-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable engine start switch.

SUBTASK 72-23-04-710-002-F00

(3) Close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-04-700-001-F00

(4) If you did the task to manually close the VBV doors, make sure that you do the tests related to the VBV actuation that are listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

END OF TASK

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LEFT THRUST MOUNT IS SHOWN WITH THE FAN DUCT PANEL REMOVED
(EXAMPLE)

B

G29745 S0006582447_V2

Thrust Mount Attach Bolt Inspection
Figure 601/72-23-04-990-801-F00 (Sheet 1 of 2)

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Thrust Mount Attach Bolt Inspection
Figure 601/72-23-04-990-801-F00 (Sheet 2 of 2)

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FAN FRAME - INSPECTION/CHECK

1. **General**

A. This procedure has one task:

(1) A detailed inspection of the fan frame.

TASK 72-23-05-700-801-F00

2. **Fan Frame (Detailed) Inspection**

(Figure 601)

A. General

(1) This task is the detailed inspection of the fan frame, which includes the fan frame case and struts.

B. References

Reference	Title
51-31-00-390-804	Fillet Seal Application (P/B 201)
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-23-05-300-801-F00	Fan Frame (Stop Drill) Repairs (P/B 801)
72-23-05-300-803-F00	Fan Frame Aft Lip Blend Area Repairs (P/B 801)
72-23-05-300-805-F00	Fan Frame (Under Anchor Bolts Corrosion) Repairs (P/B 801)
72-23-05-300-807-F00	Fan Frame Shroud (Removal of the Corrosion in Acoustic Panels Bolt Holes by Bushing and/or Washer Installation) Repairs (P/B 801)
72-23-05-300-810-F00	Fan Frame Shroud (Inner skin areas of the IDG Air/Oil Cooler by blending) Repairs (P/B 801)
72-23-05-350-801-F00	Fan Frame Shroud Aft Lip Cold Reforming Repairs (P/B 801)
72-63-00-200-801-F00	Accessory Gearbox Inspection (P/B 601)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A50096	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63 Type II
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	

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D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For the Inspection

SUBTASK 72-23-05-860-029-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-030-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-860-031-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable START switch.

SUBTASK 72-23-05-010-007-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

F. Fan Frame (Detailed) Inspection

SUBTASK 72-23-05-210-010-F00

(1) Remove the sharp edges and high metal (TASK 70-10-07-800-801-F00).

SUBTASK 72-23-05-220-003-F00

(2) Do a local swab etching of the blended area (TASK 70-10-11-800-801-F00).

SUBTASK 72-23-05-210-009-F00

(3) Do a Fluorescent Penetrant Inspection (FPI) of the suspected areas (TASK 70-40-01-230-801-F00).

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SUBTASK 72-23-05-210-001-F00

(4) Do a check of the fan frame for damage:

(a) Cracks in the fan frame case, except between fan frame struts 7 and 8.

1) Cracks are not permitted.

2) Missing material is not permitted.

NOTE: There is no service extension permitted for all cracks or missing material found.

(b) Cracks in the fan frame shroud located at the forward acoustical panel attachment (between fan frame struts 7 and 8).

NOTE: It is necessary to remove the acoustical panel before you do this procedure. If corrosion under the anchor nut is observed during removal of the acoustical panel, do the Corrosion under anchor nuts procedure below.

1) One single crack per forward acoustical panel attachment is permitted with these conditions:

a) It is not more than 5.0 in. (127.0 mm) in length.

b) There is a minimum separation of 4.0 in. (101.6 mm) from other cracks.

c) You make sure that all cracks are inside the “NDT inspection area” (Figure 604).

d) A crack must have two or more legs and must have the same source of each leg from the same rivet or hole.

NOTE: One leg cannot divide from another leg.

e) You do the stop drill procedure to stop the crack (TASK 72-23-05-300-801-F00).

f) A continue-in-service limit of 10 cycles or 15 hours is permitted if you find cracks that are more than the above serviceable limits:

<1> 10-flight cycle deferral is permitted, contact your CFM Support Center for disposition.

<2> To use this 10-flight cycle deferral, you must put a bead of sealant, A50096 on the outer surface of the crack (TASK 51-31-00-390-804).

Table 601/72-23-05-993-801-F00 Serviceable Crack Limits

Example Number	Type of Cracks	Characteristics of Cracks	Shroud Serviceability Recommendations
Example 1	Single crack	Length A+B less than 5.0 inches (127.0 mm) with the measure done along the crack and not just between the end-points. Legs “A” and “B” touch the same point (AFT rivet hole of the left nut plate).	SERVICEABLE if Angle C is equal to or more than 90 degrees and if the above conditions are correct. If Angle C is less than 90 degrees, contact your CFM Support Center for disposition.
Example 2	Only one leg	Length D is less than 5.0 inches (127.0 mm).	SERVICEABLE. No CFM Disposition is necessary.

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Table 601/72-23-05-993-801-F00 Serviceable Crack Limits (Continued)

Example Number	Type of Cracks	Characteristics of Cracks	Shroud Serviceability Recommendations
		This crack is in NDT area at the middle nut plate. The minimum distance “C” between the Example 1 crack is more than 4.0 inches (101.6 mm) and the “NDT inspection area” (shaded area) completely contains the legs.	
Example 4	Branched crack (also called “Multi-directional” or Spider Web Crack”)	Leg “B” does not touch leg “A” in a rivet or bolt hole and the Angle C is less than 90 degrees.	NOT SERVICEABLE. Report Dimensions (A, B, D, and the Angle C) to your CFM Support Center for disposition.
Example 5	Not one crack	Leg “A” does not touch leg “B” at the same hole.	NOT SERVICEABLE. Report Dimensions (A, B, D and the Angle C) to your CFM Support Center for disposition.
Example 6	More than one crack	Leg “D” touches leg “E” and leg “F” at the same nut plate area.	NOT SERVICEABLE. Report Dimensions (A, B, D and the Angle C) to your CFM Support Center for disposition.

2) Cracks that go in all directions are not permitted.

(c) Dents or nicks on the struts

1) All dents or nicks are permitted with these limits:

a) It is not more than 0.08 in. (2.0 mm) in depth.

b) A continue-in-service limit of 10 cycles or 25 hours is permitted if you find dents or nicks that are more than the limit.

(d) Fretting wear on V-groove outer ring (Figure 601)

1) All quantities of fretting/wear and missing varnish Poly Tetra Fluoro Ethylene (PTFE) or sulfuric anodization coating on V-groove and sealing surface is permitted.

(e) Distortion on the aft lip (Figure 601 (Sheet 2)).

1) Distortion on the aft lip is permitted with these conditions:

a) It is not more than 0.180 in. (4.57 mm) in width.

b) It is not more than 0.094 in. (2.4 mm) in depth.

c) It is not more than 1.496 in. (38.0 mm) in length.

d) There is only one area that has the distortion.

2) If the distortion is not in the permitted limits, do this task: Fan Frame Shroud Aft Lip Cold Reforming Repairs, TASK 72-23-05-350-801-F00.

(f) Nicks, dents or impacts on the aft lip

1) Nicks, dents or impacts on the aft lip are not permitted.

2) If nicks, dents or impacts are found, do this task: Fan Frame Aft Lip Blend Area Repairs, TASK 72-23-05-300-803-F00.

(g) Elongated holes on the fan frame flanges

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1) All elongated holes for single or double bracket configuration are permitted with these conditions:
   a) The hole is not more than 0.279 in. (7.1 mm) in width.
   b) The hole is not more than 0.31 in. (7.9 mm) in length (unidirectional wear).
   c) The hole is not more than 0.019 in. (0.5 mm) in depth.
   d) Install again the applicable bracket with the new bolts, washers and nuts after the initial installation procedure.
2) All elongated holes with double bracket (on each side of flange) are permitted with these conditions:
   a) The hole is not more than 0.279 in. (7.1 mm) in width.
   b) The hole is not more than 0.433 in. (11.0 mm) in length (unidirectional wear).
   c) The hole is not more than 0.039 in. (1.0 mm) in depth.
   d) Install again the applicable new bracket with the new bolts, washers and nuts after the initial installation procedure.
   e) A continue-in-service limit of 250 cycles is permitted to replace the bracket.

(h) Corrosion under anchor nuts

1) Corrosion is not permitted, remove the corrosion under the anchor nuts of the fan frame shroud. Refer to TASK 72-23-05-300-805-F00 or TASK 72-23-05-300-807-F00.

   NOTE: The TASK 72-23-05-300-807-F00 has to be done to remove the corrosion on acoustic panel bolt holes only.

   NOTE: The TASK 72-23-05-300-807-F00 can only be performed if one of these conditions is met:

   - Corrosion is limited to the hole in a 0.4449 in. (11.3 mm) diameter area centered on the holes.

   - Corrosion is 0.0394 in. (1.0 mm) deep in an 1.4567 in. (37.0 mm) area centered on the holes with a remaining wall thickness more than 0.157 in. (4.0 mm) for section A-A, or more than 0.165 in. (4.2 mm) for section E-E. Refer Figure 606.

   NOTE: This task is applicable with restrictions in the area between the struts 7 and 8 (IDG Air/Oil cooler) on the fan frame shroud POST SB 72-0495.

   a) A continue-in-service of 50 cycles is permitted to remove the corrosion if no crack is found during the General Visual Inspection of the corroded area.
2) After repair applications, if the repair is out of the dimensional limits of Fan Frame (Under Anchor Bolts Corrosion) Repairs, TASK 72-23-05-300-805-F00, a continue-in-service of 8000 hours is permitted if the following dimensional inspection is respected (Figure 606):
   - Minimum remaining thickness inside Area 1: 0.142 in. (3.6 mm)

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- Minimum remaining thickness inside Area 2: 0.158 in. (4.0 mm) for section A-A and 0.166 in. (4.2 mm) for section E-E.

NOTE: If the repaired areas are within limits of Fan Frame (Under Anchor Bolts Corrosion) Repairs, TASK 72-23-05-300-805-F00, no repeat inspections are required.

NOTE: This task is not applicable for acoustic panel and profile strut attachment holes between 11 and 1 o' clock.

a) Do a local swab etching (TASK 70-10-11-800-801-F00).

b) Inspect the fan frame shroud by Fluorescent Penetrant Inspection (FPI). Refer to TASK 70-40-01-230-801-F00.

<1> No indication is permitted.

c) Do a spot touch-up of oxide film coating on the repaired area. Refer to TASK 70-10-04-380-801-F00.

d) Apply jointing compound, D50321 [CP2773] as follows:

<1> Apply jointing compound, D50321 [CP2773] using a brush.

<2> Make sure that all the repaired areas, the bolt hole and the rivet holes are coated all over with the paste.

e) Install new anchor nuts on the fan frame shroud.

f) Remove any excess coating of jointing compound, D50321 [CP2773].

g) Apply sealant, A50096 as follows (refer to TASK 51-31-00-390-804):

<1> Apply on outer skin of the fan frame shroud repaired area and on the entire anchor nut in order to create at least a 0.158 in. (4 mm) thick layer all over the blended area, the anchor nut and slightly around.

h) At the end of the 8000 hours, remove the anchor nuts to inspect for any traces of corrosion.

<1> If any traces of corrosion are found, go to step 2.F. (4) (h) 1).

<2> If no traces of corrosion are found, go to step 2.F. (4) (h) 2).

LOM 402, 404, 406, 407, 411, 412, 415, 416, 420, 422-434, 437-447, 450-465; AIRPLANES WITHOUT PMUX

(i) Riveted PS13 boss.

1) Missing end fitting is permitted.

LOM ALL POST SB 737-CFM56-7B-72-0975

(j) Fretting or wear on anti-wear strips.

1) All quantities of fretting/wear are permitted.

(k) Missing or disbonded anti-wear strips on area V (Figure 601).

1) All quantities of missing or disbonded anti-wear strips are permitted with these conditions:

a) Not more than 7.09 in. (180 mm) cumulated on area B. Random distribution allowed and cuttable way.

b) Not more than 22.83 in. (580 mm) cumulated on area T.

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LOM ALL POST SB 737-CFM56-7B-72-0975 (Continued)

c) The 2 criteria can be cumulated.

NOTE: The area T is located between the strut No. 11 and the strut No. 3.

LOM ALL

(l) Protective coating (sulfuric anodization)

1) The missing of protective coating is not permitted. Do a spot touch-up of oxide film coating. Refer to Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

(m) Fretting on the attachment area of the IDG air/oil cooler (Figure 607).

1) Fretting is not permitted. Remove the fretting on the inner skin area of the IDG air/oil cooler. Refer to Fan Frame Shroud (Inner skin areas of the IDG Air/Oil Cooler by blending) Repairs, TASK 72-23-05-300-810-F00.

SUBTASK 72-23-05-390-001-F00

(5) Do a spot touch-up of the oxide film coating on the inspected areas (TASK 70-10-04-380-801-F00).

SUBTASK 72-23-05-210-004-F00

(6) Do a visual inspection of the AGB mounts (TASK 72-63-00-200-801-F00).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-05-860-032-F00

(1) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-23-05-860-033-F00

(2) Make sure that you remove all tools, parts and unwanted material from the fan frame.

SUBTASK 72-23-05-860-034-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-035-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-006-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

L45614 S0006582452_V3

Fan Frame Inspection
Figure 601/72-23-05-990-801-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Frame Inspection
Figure 601/72-23-05-990-801-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

PRE-CFM-SB 72-0975

D

POST-CFM-SB 72-0975

D

NUMEROTATION OF STRUTS 1-12
(VIEW IN THE AFT DIRECTION)

2791549 S0000634520_V1

Fan Frame Inspection
Figure 601/72-23-05-990-801-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

SOME ENGINE COMPONENTS
NOT SHOWN

MM-00239-00-B

436055 S0000141304_V2

Fan Frame Shroud Inspection
Figure 602/72-23-05-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MM-00240-00-B
436061 S0000141305_V2

Flange Elongated Holes
Figure 603/72-23-05-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARANTHESES.

INNER SIDE

B

B-00327-00

1328297 S0000234022_V2

Fan Frame Shroud Inspection Data Sheet
Figure 604/72-23-05-990-804-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OUTER SIDE

C

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.

B-00328-00

1328351 S0000234023_V3

Fan Frame Shroud Inspection Data Sheet
Figure 604/72-23-05-990-804-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B-00329
1328545 S0000234024_V2

Fan Frame Shroud Inspection Cracks Details Description
Figure 605/72-23-05-990-808-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2541339 S0000602855_V1

Fan Frame Shroud Inspection Corrosion Under Anchor Nuts
Figure 606/72-23-05-990-817-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:
ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

3015374 S0000788687_V1

Fan Frame Shroud Inspection Attachment Area of the IDG Air/Oil Cooler
Figure 607/72-23-05-990-839-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN FRAME - REPAIRS

1. **General**

A. This procedure has these tasks:

(1) Fan Frame (Stop Drill) Repairs

(2) Fan Frame Aft Lip Blend Area Repairs

(3) Fan Frame Shroud Aft Lip Cold Reforming Repair

(4) Fan Frame (Under Anchor Bolts Corrosion) Repairs

(5) Fan Frame Shroud (Replacement of the Riveted Self-Locking Nuts, Angle Plate, Boss, Fitting, Bracket and Cover Plates) Repairs

(6) Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation) Repairs

(7) Fan Frame Shroud (Removal of high metal from handing bosses) Repairs

(8) Fan Frame Shroud (IDG/OIL Cooler Attachment Holes) Repairs

(9) Fan Frame Shroud (Inner skin areas of the IDG air/oil cooler by blending) Repairs.

TASK 72-23-05-300-801-F00

2. **Fan Frame (Stop Drill) Repairs**

(Figure 801)

A. General

(1) This task is an on-wing repair procedure to stop a crack in the fan frame shroud.

(a) You must stop the crack by a stop drill.

B. References

Reference	Title
51-31-00-390-804	Fillet Seal Application (P/B 201)
51-31-00-390-812	Fillet Seals Repair (P/B 201)
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-23-05-700-801-F00	Fan Frame (Detailed) Inspection (P/B 601)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A00803	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63 Type I
A50096	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63 Type II
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Repairs

SUBTASK 72-23-05-860-025-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-026-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-040-004-F00

(3) Make sure that the START switches is in the OFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable START switch.

SUBTASK 72-23-05-010-006-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

F. Fan Frame (Stop Drill) Repairs

SUBTASK 72-23-05-300-001-F00

(1) You can do this repair for these conditions:

(a) Do this repair no later than 20 flight cycles after the fan frame shroud inspection.

1) To use this 20 flight cycles deferral, you must put a bead of the sealant, A00803, on the outer surface to the location of the crack (TASK 51-31-00-390-812).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) If the above 20 flight cycles deferral are used, do the fluorescent penetrant inspection (FPI) or eddy current inspection (ECI) again before you do the stop drill procedure.

SUBTASK 72-23-05-350-001-F00

(2) Do the stop drill procedure for the serviceable crack with the following recommendations.

SUBTASK 72-23-05-350-002-F00

(3) A maximum of 2 holes is permitted for each crack.

(4) Measure the length A, B, or D of each crack leg on both the inner and the outer surface of the fan frame shroud.

(a) If the maximum length of a crack leg is less than 0.50 inch (12.7 mm).

1) Do not do the stop drill on the crack leg, because it can touch with the rivet hole.

(b) If you have all other conditions given in the inspection procedure (TASK 72-23-05-700-801-F00).

1) If the crack is less than 0.50 inch (12.7 mm), this crack is serviceable without the stop drill, but you must continue the necessary repetitive inspection to examine the evaluation.

SUBTASK 72-23-05-350-003-F00

WARNING	USE EYE PROTECTION WHEN YOU USE COMPRESSED AIR TO CLEAN, COOL, OR DRY PARTS OR TOOLS. PARTICLES CAN CAUSE AN INJURY TO YOUR EYES. DO NOT USE MORE THAN 30 PSI (207 KPA). DO NOT POINT COMPRESSED AIR AT YOURSELF OR OTHER PERSONS.

NOTE: If the hole that is more than 0.25 inch (6.35 mm) is not permitted, you must stop drill the hole.

NOTE: Use a satisfactory ventilation system for extraction of cutting chips or dust.

(5) Drill a 0.16 to 0.24 inch (4.06 to 6.10 mm) hole at each end of the crack and break the sharp angles.

NOTE: We recommend to do the stop drill procedure from the surface of the fan frame shroud that has the longer crack leg dimension, and to drill the holes perpendicular to the surface.

SUBTASK 72-23-05-350-004-F00

(6) Do a Non Destructive Test (NDT) inspection to make sure that the correct position of the stop drill holes.

NOTE: Make sure that the external and internal cracks do not go more than the stop drilled hole.

SUBTASK 72-23-05-350-005-F00

WARNING	DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(WARNING PRECEDES)

> **CAUTION** KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(7) Degrease the reworked area with a clean cloth soak in the solvent, B00062 or alcohol, B00676 [CP1041].

NOTE: The isopropyl alcohols is poisonous and flammable. Use personal protection equipment. Use in a well ventilated area.

SUBTASK 72-23-05-350-006-F00

(8) Do a spot touch up of the oxide film coating on the aluminum alloys (TASK 70-10-04-380-801-F00).

SUBTASK 72-23-05-350-007-F00

(9) Fill the stop drilled holes, the rivet holes and put a bead with the sealant, A50096 on the outer surface of the fan frame shroud at the cracks locations (TASK 51-31-00-390-804).

NOTE: We recommend to use the sealant BMS 5-63, Type II, Class B-1/2 because the dry out time is short.

SUBTASK 72-23-05-350-008-F00

(10) Do the inspection again at 100 cycles and then every 500 cycles per fluorescent penetrant inspection (FPI) (TASK 70-40-01-230-801-F00) or eddy current inspection (ECI) (Refer to BOEING 737 Non Destructive Test Manual, Chapter 6, 51-00-00 for application procedure.

(a) If the crack is more than the limits or it go above the stop drill hole.

1) 10 flight cycles is allowance is permitted.

2) Contact the CFM Support Center for the disposition.

(b) If the crack is in above the limits and if you find the sealant missing, fill the stop drilled holes and put a bead with the sealant, A50096 on the outer surface of the fan frame shroud at the cracks locations.

NOTE: For the cracks which increase through the shroud (visible on both sides of the shroud) an inspection only of the inner skin is permitted.

NOTE: You must do a local swab etching before the examination of the fan frame shroud by the per fluorescent penetrant inspection (FPI) (TASK 70-40-01-230-801-F00).

NOTE: See the CFM Standard Practices Manual for the local swab etching procedure.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-23-05-080-001-F00

(1) Remove the DO-NOT-OPERATE tag from the START switch.

NOTE: Make sure that you remove all tools, parts and unwanted material from the fan frame. Damage to the equipment could occur on the subsequent engine start.

SUBTASK 72-23-05-860-027-F00

(2) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-05-860-028-F00

(3) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-005-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

SOME ENGINE COMPONENTS NOT SHOWN

MM-00239-00-B

1328223 S0000234124_V2

Fan Frame (Stop Drill) Repairs
Figure 801/72-23-05-990-807-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C

D

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.

1328543 S0000234125_V3

Fan Frame (Stop Drill) Repairs
Figure 801/72-23-05-990-807-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-05-300-803-F00

3. Fan Frame Aft Lip Blend Area Repairs

(Figure 802)

A. General

(1) This task is an on-wing repair procedure to blend the aft lip of the fan frame shroud.

(a) You must blend the nicks, dents, and other impacts on the aft lip.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	

D. Prepare for the Repairs

SUBTASK 72-23-05-860-021-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-022-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-210-002-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable START switch.

SUBTASK 72-23-05-010-005-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

E. Fan Frame Aft Lip Blend Area Repairs

> **WARNING** DO NOT BREATHE PARTICLES FROM BLENDING OR LET PARTICLES TOUCH YOU. PARTICLES FROM BLENDING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

SUBTASK 72-23-05-320-001-F00

(1) Blend the nicks, dents, and other impacts as follows (Figure 802):

(a) Power-blend the nicks, dents, and other impacts with smoothed contour.

1) Break all sharp edges with a minimum radius of 0.0032 inch (0.08 mm).

2) The blending length must not be more than 1.96 inch (50 mm).

3) The blending depth must not be more than 0.180 inch (4.5 mm).

4) The blending length must be a minimum of 10 times the blending depth.

5) Remove the material to a minimum radius of 1.000 inch (25.4 mm).

SUBTASK 72-23-05-160-002-F00

> **WARNING** ACETONE IS EXTREMELY FLAMMABLE AND HAS TOXIC VAPOR. AVOID PROLONGED BREATHING OF VAPOR AND PROLONGED OR REPEATED CONTACT WITH SKIN. AVOID CONTACT WITH EYES. CLEAN PARTS IN WELL-VENTILATED AREA AND USE APPROVED SAFETY EQUIPMENT.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(WARNING PRECEDES)

WARNING

ISOPROPYL ALCOHOL IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, AND POISONOUS. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN ISOPROPYL ALCOHOL IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET ISOPROPYL ALCOHOL IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

(2) Clean the blended areas with a white cloth made moist with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041].

SUBTASK 72-23-05-350-012-F00

(3) Do a local swab etching before you examine the fan frame shroud by Fluorescent Penetrant Inspection (FPI).

NOTE: See the CFM Standard Practices Manual for the local swab etching procedure.

SUBTASK 72-23-05-210-003-F00

(4) Make sure that the nicks, dents, and other impacts are fully removed, and examine as follows:

(a) Do this task: Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

1) No indication is permitted.

SUBTASK 72-23-05-350-011-F00

(5) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-05-860-008-F00

(1) Make sure that you remove all the tools, parts and unwanted material from the fan frame.

SUBTASK 72-23-05-860-005-F00

(2) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-23-05-860-023-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-024-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-05-410-004-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0046400

2240728 S0000501383_V2

Fan Frame Aft Lip Blend Area Repairs
Figure 802/72-23-05-990-809-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-05-350-801-F00

4. **Fan Frame Shroud Aft Lip Cold Reforming Repairs**
(Figure 803, Figure 804, Figure 805 and Figure 806)

A. **General**

(1) This task provides the instructions on how to repair the aft lip on the fan frame shroud by cold reforming.

B. **References**

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. **Consumable Materials**

Reference	Description	Specification
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00676 [CP1041]	Alcohol - Isopropyl	
G50320 [912-0041]	Cloth - Process Cleaning Absorbent Wiper	

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Prepare for the Repairs**

SUBTASK 72-23-05-860-009-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-010-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-860-011-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable START switch.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-05-010-004-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

F. Fan Frame Shroud Aft Lip Cold Reforming Repair

SUBTASK 72-23-05-970-001-F00

(1) Refer to the dimensional information for the repair application in the table that follows:

Repair Dimensional Information

Description	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dim. C	16.784 inches (426.3 mm)	16.799 inches (426.7 mm)	
Dim. E	0.398 inch (10.1 mm)	0.413 inch (10.5 mm)	
Radius F			0.787 inch (20.0 mm)
Radius G			1.250 inch (31.75 mm)
Dim. H	0.0189 inch (0.48 mm)	0.0346 inch (0.88 mm)	
Angle M			24°
Dim. Z			1.18 inch (30.0 mm)

SUBTASK 72-23-05-840-001-F00

(2) Do this repair with these conditions:

(a) Do an inspection of the fan frame shroud for an “R-047” or “R-047→” mark.

NOTE: An “R-047” or “R-047→” mark on the fan frame shroud indicates that this repair has already been applied once. That is in the area delimited by Dim Z.

1) If you find an “R-047” or “R-047→” mark, this repair procedure is not permitted.

(b) Do an inspection of the area that you will repair with these conditions:

1) The length of the cold reforming area shall be at least 10 times the depth of the dent area.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) The length of the cold reforming area should not be more than 2.36 inches (60.0 mm).

SUBTASK 72-23-05-110-001-F00

> **WARNING**
> DO NOT GET ACETONE, ISOPROPYL ALCOHOL, OR DESOCLEAN CLEANING SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON EYE PROTECTION, AND GLOVES. KEEP THE SOLVENTS AWAY FROM SPARKS, FLAME, AND HEAT. THEY ARE POISONOUS AND FLAMMABLE. THEY CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(3) Clean the impacted area with a clean cloth, G50320 [912-0041] made moist with solvent, B00062 or alcohol, B00676 [CP1041].

SUBTASK 72-23-05-230-002-F00

(4) Do a local swab etching before the examination of the fan frame shroud by Fluorescent Penetrant Inspection (FPI).

NOTE: See the CFM Standard Practices Manual for the local swab etching procedure.

SUBTASK 72-23-05-230-003-F00

(5) Do a FPI of the impacted area (TASK 70-40-01-230-801-F00).

(a) No indication is permitted.

SUBTASK 72-23-05-350-013-F00

(6) Do the reforming of the impacted area as follows:

(a) Cold-reform the impacted area to get the original profile of the thrust reverser seal surface of the V-groove.

1) Find the location of the impacted area (d1d2).

2) Make sure that you follow the specifications of the aft lip relative to the location of the impacted area.

NOTE: Do not use the sections of the aft lip previously repaired as a reference for new repair application.

(b) Cold-reform the impacted area gradually in one direction only and in the same way.

NOTE: Do not do shocks.

NOTE: The locally-manufactured inspection tool must have a shape with a maximum tolerance of 0.0020 inch (0.05 mm).

SUBTASK 72-23-05-210-005-F00

(7) Do an inspection of the repaired area as follows:

> **WARNING**
> DO NOT GET ACETONE, ISOPROPYL ALCOHOL, OR DESOCLEAN CLEANING SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON EYE PROTECTION, AND GLOVES. KEEP THE SOLVENTS AWAY FROM SPARKS, FLAME, AND HEAT. THEY ARE POISONOUS AND FLAMMABLE. THEY CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(a) Clean the impacted area with a clean cloth, G50320 [912-0041] made moist with solvent, B00062 or alcohol, B00676 [CP1041].

(b) Do a local swab etching before the examination of the fan frame shroud by FPI.

NOTE: See the CFM Standard Practices Manual for the local swab etching procedure.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Do a FPI of the impacted area (TASK 70-40-01-230-801-F00).

1) No indication is permitted.

SUBTASK 72-23-05-370-001-F00

(8) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

SUBTASK 72-23-05-930-001-F00

(9) Mark the fan frame shroud after the repair (Refer to CFMI SPM, Task 70-10-12-350-005, Vibro-Peen Marking):

NOTE: If necessary, remove an equipment to get better access.

(a) Write “R-047” or “R-047→” on the marking area, centered in front of the repaired area.

NOTE: The mark must have a depth of 0.0028-0.0059 inch (0.07-0.15 mm).

SUBTASK 72-23-05-370-002-F00

(10) Put the spot touch-up protection on the marking area (TASK 70-10-04-380-801-F00).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-05-480-001-F00

CAUTION

MAKE SURE THAT YOU REMOVE ALL TOOLS, LOOSE PARTS AND UNWANTED MATERIAL FROM THE AREA WHEN YOU COMPLETE MAINTENANCE. DAMAGE TO EQUIPMENT COULD OCCUR.

(1) Make sure that you remove all the tools, parts and unwanted material from the fan frame.

SUBTASK 72-23-05-480-002-F00

(2) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-23-05-860-012-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-013-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-003-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

PROTECTION: SULFURIC ANODIZATION

MATERIAL: 2219

B0048400
2246581 S0000503406_V2

Fan Frame Shroud Repair Area
Figure 803/72-23-05-990-810-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0048500
2246589 S0000503410_V2

Fan Frame Shroud (Area Angle) Repair
Figure 804/72-23-05-990-811-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

B0048600
2246593 S0000503411_V2

Fan Frame Shroud (Area Angle) Repair
Figure 804/72-23-05-990-811-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES
ROUGHNESS IS IN MICROINCHES
WITH MICROMETERS IN PARENTHESES.

B0048700
2246606 S0000503412_V2

Fan Frame Shroud (Repair Dimensions) Repair
Figure 805/72-23-05-990-812-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES
ROUGHNESS IS IN MICROINCHES
WITH MICROMETERS IN PARENTHESES.

B0048800
2246619 S0000503413_V2

Fan Frame Shroud (Repair Dimensions) Repair
Figure 805/72-23-05-990-812-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Frame Shroud (Marking Area) Repair
Figure 806/72-23-05-990-813-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-05-300-805-F00

5. Fan Frame (Under Anchor Bolts Corrosion) Repairs

(Figure 807, Figure 808)

A. General

(1) This task is an on-wing repair procedure to blend the corrosion under the anchor nuts of the fan frame shroud.

NOTE: The hole must be repaired if accessibility is not an issue.

(a) You must blend the corrosion under the anchor nuts.

(b) This repair must be done only on the outer skin of the fan frame shroud.

NOTE: The blending operation cannot be done on any flange or in radius.

(c) This repair is not applicable if “REP016” is marked in the part number location.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-23-05-700-801-F00	Fan Frame (Detailed) Inspection (P/B 601)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
G51478 [S1096]	Etchant - Aluminum Alloy	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Repairs

SUBTASK 72-23-05-860-014-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-05-860-015-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-860-020-F00

(3) Make sure that the START switches are in the OFF position.

(a) Put a DO NOT OPERATE tag, STD-858, on the applicable START switch.

SUBTASK 72-23-05-010-003-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

G. Fan Frame (Under Anchor Bolts Corrosion) Repairs

SUBTASK 72-23-05-020-001-F00

WARNING DO NOT LET THE SHARP METAL EDGES CUT YOU. PUT ON GLOVES. INJURIES TO PERSONS CAN OCCUR.

(1) Remove the anchor nuts (TASK 72-23-05-300-806-F00).

SUBTASK 72-23-05-350-014-F00

WARNING DO NOT BREATHE PARTICLES FROM BLENDING OR LET PARTICLES TOUCH YOU. PARTICLES FROM BLENDING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(2) Remove the corrosion in the anchor nut holes (Dia P) as follows (Figure 807):

(a) Refer to the dimensional information for the repair application in the table that follows:

Repair Dimensional Information

Description	Minimum finish dimension	Maximum finish dimension	Reference dimension
Angle G			4°42'

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Repair Dimensional Information (Continued)

Description	Minimum finish dimension	Maximum finish dimension	Reference dimension
Angle H			3°17'24”
Dia P	0.2815 in. (7.15 mm)	0.3327 in. (8.45 mm)	
Angle R			4°14'
Angle S			4°30'
Angle T			8°
Angle U			11°45'
Dim. V			6.1968 in. (157.40 mm)
Dim. W			11.4724 in. (291.40 mm)
Dim. X			2.1598 in. (54.86 mm)
Dim. Y			7.5945 in. (192.90 mm)
Dim. Z			2.8850 in. (73.28 mm)
Dim. AB			8.4409 in. (214.40 mm)
Dim. AC			14.5614 in. (369.86 mm)
Dim. AR			14.4433 in. (366.86 mm)
Dim. AS			15.3685 in. (390.36 mm)
Angle AD			15°
Angle AE			11°
Angle AF			1°0'38”
Angle AG			3°54'
Angle AH			3°39'22”
Angle AI			2°50'33”
Angle AJ			3°30'
Angle AK			8°
Angle AL			2°07'12”
Angle AM			4°14'04”
Angle AN			2°42'15”
Angle AO			2°37'52”
Angle AP			14°
Angle AQ			22°

(b) Remove corrosion by drilling.

NOTE: Do not remove more material than necessary.

(c) Remove all the corrosion, sharp edges and high metal.

NOTE: Roughness of the repaired area must be 125 microinches (3.2 micrometers).

SUBTASK 72-23-05-320-002-F00

(3) Do a blending of the corrosion under the anchor nut as follows (Figure 808):

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Refer to the dimensional information for the repair application in the table that follows:

Repair Dimensional Information

Description	Minimum finish dimension	Maximum finish dimension
Dim. D	0.158 in. (4.0 mm)	
Dim. E	0.158 in. (4.0 mm)	
Dim. F	0.165 in. (4.2 mm)	
Dia G		2.992 in. (75.997 mm)
Dim. H		0.243 in. (6.172 mm)
Dim. I		0.257 in. (6.528 mm)
Dim. J		0.462 in. (11.735 mm)
Dim. K		0.407 in. (10.338 mm)

(b) Remove corrosion by hand blending or by power blending.

NOTE: Do not remove more material than necessary.

(c) Remove all the corrosion, sharp edges and high metal.

NOTE: See CFM Standard Practices Manual for the power or hand blending procedures to remove the corrosion.

1) Make sure that the repaired area is as smooth and flat as possible to ensure good tightening.

SUBTASK 72-23-05-350-015-F00

(4) Remove grease from the part.

NOTE: See CFM Standard Practices Manual for the grease removal procedure.

SUBTASK 72-23-05-220-001-F00

(5) Do a dimensional inspection of the repaired area.

NOTE: A Continue-In-Service (CIS) might be allowed if you are out of the dimensional limits. Refer to TASK 72-23-05-700-801-F00.

SUBTASK 72-23-05-110-002-F00

(6) Do a local swab etching before the examination of the repaired areas with aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

SUBTASK 72-23-05-230-007-F00

(7) Do the Fluorescent Penetrant Inspection (FPI) of all repaired areas as follows (TASK 70-40-01-230-801-F00):

(a) Sensitivity level 3.

(b) Indications more than 0.0118 in. (0.30 mm) are not permitted.

(c) Linear indications are not permitted.

NOTE: Linear indications are indications that are at least four times longer than they are wide.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-05-370-003-F00

> **WARNING**
> DO NOT GET BONDERITE M-CR 600 AERO IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM BONDERITE M-CR 600 AERO. PUT ON GOGGLES AND GLOVES WHEN YOU USE BONDERITE M-CR 600 AERO. KEEP BONDERITE M-CR 600 AERO AWAY FROM SPARKS, FLAME, AND HEAT. BONDERITE M-CR 600 AERO IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(8) Do a spot touch-up of oxide film coating on the repaired area (TASK 70-10-04-380-801-F00).

SUBTASK 72-23-05-410-001-F00

(9) Install new anchor nuts on the fan frame shroud (TASK 72-23-05-300-806-F00).

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-05-860-016-F00

(1) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-23-05-860-017-F00

(2) Make sure that you remove all tools, parts, and unwanted material from the fan frame.

SUBTASK 72-23-05-860-018-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-019-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-002-F00

> **WARNING**
> OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2305458 S0000522871_V4

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 1 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0075001

2305607 S0000523549_V4

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 2 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

G-G

2305849 S0000523550_V4

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 3 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C-C

STRUT FAIRING ATTACHMENT HOLES

D-D

2789073 S0000633403_V2

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 4 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E-E

H-H

2789097 S0000633404_V2

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 5 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

I-I

STRUT FAIRING ATTACHMENT HOLES

2789114 S0000633405_V1

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 6 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F-F

STRUT FAIRING ATTACHMENT HOLES

J-J

2789118 S0000633406_V2

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 7 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

K-K

STRUT FAIRING ATTACHMENT HOLES

2789131 S0000633407_V1

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 8 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

L-L

2789138 S0000633408_V1

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 9 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

L-L

STRUT FAIRING ATTACHMENT HOLES

2789145 S0000633409_V2

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 10 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 11 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 12 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

2789313 S0000633412_V2

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 13 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Q-Q

T-T

◑ ACOUSTIC PANEL BOLT HOLES

2988746 S0000765728_V1

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 14 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Q-Q

U-U

◑ ACOUSTIC PANEL BOLT HOLES

2988749 S0000765729_V1

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 15 of 15)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL : 2219 (AU6M)

COATING : SULFURIC ANODIZATION

2789320 S0000633413_V2

Fan Frame (Under Anchor Bolts Blending) Repairs
Figure 808/72-23-05-990-824-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A-A

A-A

NOTE:

MATERIAL: 2219 (AU6M)

COATING: SULFURIC ANODIZATION

FOR FAN FRAME SHROUD WITH ACOUSTIC PANEL
IN TWO PARTS BETWEEN STRUTS 7 AND 8:
TWO ADDITIONAL ANCHOR NUTS

2789322 S0000633414_V3

Fan Frame (Under Anchor Bolts Blending) Repairs
Figure 808/72-23-05-990-824-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

MATERIAL: 2219 (AU6M)

COATING: SULFURIC ANODIZATION

DIMENSIONS ARE IN INCHES WITH
(MILLIMETERS IN PARENTHESES.)

DATUM SURFACES A, B, C, D, E, OR F MUST
BE ADJACENT TO THE BLENDED AREA.

2826738 S0000654803_V2

Fan Frame (Under Anchor Bolts Blending) Repairs
Figure 808/72-23-05-990-824-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-05-300-806-F00

6. Fan Frame Shroud (Replacement of the Riveted Self-Locking Nuts, Angle Plate, Boss, Fitting, Bracket and Cover Plates) Repairs

(Figure 809, Figure 810, Figure 811, Figure 812, Figure 813, and Figure 814)

A. General

(1) This task is an on-wing repair procedure to replace the riveted self-locking nuts, angle plate, boss, fitting, bracket, and cover plates on the fan frame shroud on wing. Refer to Figure 809.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-05-360-801-F00	Application of Two Part Epoxy Adhesive Hysol EA 934 NA (Bond) (P/B 801)
70-10-05-360-802-F00	Application of Epoxy Adhesive Hysol EA 9394 (Bond) (P/B 801)
70-10-10-320-801-F00	Drilling (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-43-11-300-801-F00	Formed Rivet Assemblies Repair (P/B 801)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	
G50402	Abrasive Cloth - Aluminum Oxide Coated - 400 grit	P-C-451

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Prepare for the Repair

SUBTASK 72-23-05-860-036-F00

(1) For Engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-037-F00

(2) For Engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-040-005-F00

(3) Make sure that the START switches are in the OFF position.

(a) Put a DO NOT OPERATE tag, STD-858, on the applicable START switch.

SUBTASK 72-23-05-010-008-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

G. Fan Frame Shroud (Replacement of the Riveted Self-Locking Nuts, Angle Plate, Boss, Fitting, Bracket and Cover Plates) Repairs.

SUBTASK 72-23-05-970-002-F00

(1) Refer to dimensional information for the repair application in the tables that follow:

(a) Replacement of the riveted self-locking nuts (Table 801, Figure 810).

Table 801/72-23-05-993-802-F00 Repair Dimensions

Description	Minimum finish dimension	Maximum finish dimension	Reference dimension
Dia E			2.48091 in. (63.015 mm)
Angle A			8°
Angle B			11°45'
Angle G			4°42'

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 801/72-23-05-993-802-F00 Repair Dimensions (Continued)

Description	Minimum finish dimension	Maximum finish dimension	Reference dimension
Angle H			3°17'24"
Dim. J			1.000 in. (25.4 mm)
Dia K (Initial size)	0.2047 in. (5.20 mm)	0.2126 in. (5.40 mm)	
Dia K (Repair size)	0.2146 in. (5.45 mm)	0.2205 in. (5.60 mm)	
Dim. L			0.500 in. (12.7 mm)
Dia M (Initial size)	0.0969 in. (2.46 mm)	0.1047 in. (2.66 mm)	
Dia M (Repair size)	0.1280 in. (3.25 mm)	0.1319 in. (3.35 mm)	
Angle N	99°30'	100°30'	
Dia Q (Initial size)	0.1890 in. (4.80 mm)	0.2008 in. (5.10 mm)	
Dia Q (Repair size)	0.2146 in. (5.45 mm)	0.2205 in. (5.60 mm)	
Dia P	Refer to TASK 72-23-05-300-805-F00		
Angle R			4°14'
Angle S			4°30'
Dim. V			0.2811 in. (7.14 mm)
Dim. W			0.5622 in. (14.28 mm)
Dim. X			2.1598 in. (54.86 mm)
Dim. Y			7.5945 in. (192.90 mm)
Dim. Z			2.8850 in. (73.28 mm)
Dim. AB			8.4409 in. (214.40 mm)
Dim. AC			14.5614 in. (369.86 mm)
Angle AD			15°
Angle AE			11°
Angle AF			1°0'38"
Angle AG			3°54'
Angle AH			3°39'22"
Angle AI			2°50'33"
Angle AJ			3°30'
Angle AK			8°
Angle AL			2°07'12"
Angle AM			4°14'04"
Angle AN			2°42'15"
Angle AO			2°37'52"
Angle AP			14°
Angle AQ			22°

(b) Replacement of the angle plate (Table 802, Figure 811).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 802/72-23-05-993-803-F00 Repair Dimensions

Description	Minimum finish dimension	Maximum finish dimension	Reference dimension
Dim. AW			0.98 in. (25 mm)
Dia M (Initial size)	0.0969 in. (2.46 mm)	0.1047 in. (2.66 mm)	
Dia M (Repair size)	0.1280 in. (3.25 mm)	0.1319 in. (3.35 mm)	
Angle N	99°30'	100°30'	
Dia Q (Initial size)	0.1890 in. (4.80 mm)	0.2008 in. (5.10 mm)	
Dia Q (Repair size)	0.2146 in. (5.45 mm)	0.2205 in. (5.60 mm)	
Dim. BN			0.197 in. (5.0 mm)
Dim. BP			0.394 in. (10.0 mm)

(c) Replacement of the boss and fitting (Table 803, Figure 812).

Table 803/72-23-05-993-804-F00 Repair Dimensions

Description	Minimum finish dimension	Maximum finish dimension	Reference dimension
Angle AR			39°30'
Dim. AS			2.323 in. (59.0 mm)
Dim. AT		1.098 in. (27.9 mm)	
Dia AU (Initial size)	0.2146 in. (5.45 mm)	0.2264 in. (5.75 mm)	
Dia AU (Initial size)*[1]	0.2146 in. (5.45 mm)	0.2205 in. (5.60 mm)	
Dia AU (Repair size)	0.2756 in. (7.00 mm)	0.2764 in. (7.02 mm)	
Dia AV (Initial size)	0.1280 in. (3.25 mm)	0.1358 in. (3.45 mm)	
Dia AV (Repair size)	0.1594 in. (4.05 mm)	0.1634 in. (4.15 mm)	
Dia BA (Initial size)		0.39 in. (10 mm)	
Dia BC (Initial size)		1.69 in. (43 mm)	
Angle N	99°30'	100°30'	

*[1] Only for P/N 340-059-918-0, 340-059-924-0 and 340-059-928-0.

(d) Replacement of the bracket (Table 804, Figure 813).

Table 804/72-23-05-993-805-F00 Repair Dimensions

Description	Minimum finish dimension	Maximum finish dimension	Reference dimension
Angle AX			12°
Dia M (Initial size)	0.0969 in. (2.46 mm)	0.1047 in. (2.66 mm)	
Dia M (Repair size)	0.1280 in. (3.25 mm)	0.1319 in. (3.35 mm)	
Angle N	99°30'	100°30'	
Dia Q (Initial size)	0.1890 in. (4.80 mm)	0.2008 in. (5.10 mm)	
Dia Q (Repair size)	0.2146 in. (5.45 mm)	0.2205 in. (5.60 mm)	

(e) Replacement of the cover plates (Table 805, Figure 814).

NOTE: Only for P/N 340-059-922-0, 340-059-934, and 340-059-944-0.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 805/72-23-05-993-806-F00 Repair Dimensions

Description	Minimum finish dimension	Maximum finish dimension	Reference dimension
Dim. AY			2.402 in. (61.0 mm)
Angle AZ			51°50'16"
Angle BA			69°32'38"
Angle BC			21°02'54"
Angle BD			37°34'13"
Angle BE			10°55'32"
Angle BF			39°56'19"
Angle BG			51°14'44"
Angle BH			81°26'35"

SUBTASK 72-23-05-840-002-F00

(2) Do this repair with these conditions.

NOTE: If necessary, for the repair size rivets, drill at the same time the rivet holes in the new nut you install and the rivet holes in the fan frame shroud (TASK 70-43-11-300-801-F00).

(a) If necessary, remove the hardware from the fan frame shroud.

(b) Do these steps to replace the riveted self-locking nuts (Figure 809 and Figure 810).

WARNING

DO NOT LET THE SHARP METAL EDGES CUT YOU. PUT ON GLOVES. INJURIES TO PERSONS CAN OCCUR.

1) For initial size rivets, remove the rivet heads with a 0.094 in. (2.4 mm) diameter drill (TASK 70-10-10-320-801-F00).

WARNING

DO NOT LET THE SHARP METAL EDGES CUT YOU. PUT ON GLOVES. INJURIES TO PERSONS CAN OCCUR.

2) If you cannot remove the rivet heads, use a 0.126 in. (3.2 mm) diameter drill related to the repair size rivets (TASK 70-10-10-320-801-F00 and TASK 70-43-11-300-801-F00).

3) Do a check of the rivet holes (TASK 70-43-11-300-801-F00).

4) If necessary, remove the corrosion from the holes on the riveted self-locking nuts (TASK 72-23-05-300-805-F00).

5) Do a local swab etching (TASK 70-10-11-800-801-F00).

6) Do the Fluorescent Penetrant Inspection (FPI) of all repaired areas as follows (TASK 70-40-01-230-801-F00):

a) Sensitivity level 3.

b) Indications more than 0.0118 in. (0.30 mm) are not permitted.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

c) Linear indications are not permitted.

NOTE: Linear indications are indications that are at least four times longer than they are wide.

7) If necessary, do the spot touch-up of oxide film coating on aluminum alloys for protection (TASK 70-10-04-380-801-F00).

8) Apply a thin layer of jointing compound, D50321 [CP2773], between the fan frame shroud and the self-locking nut.

9) Install the self-locking nuts on the fan frame shroud (TASK 70-43-11-300-801-F00).

NOTE: Carefully remove the excess of coating around and on the nut and the rivets. All visible paste around and on the nut must be removed.

(c) Do these steps to replace the angle plate (Figure 809 and Figure 811).

1) Refer to paragraph 6.G.(2)(b) 1 to 8.

2) Install the angle plate on the fan frame shroud (TASK 70-43-11-300-801-F00).

WARNING ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

WARNING ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. USE PERSONAL PROTECTION EQUIPMENT. USE IN A WELL-VENTILATED AREA.

WARNING EPOXY ADHESIVE IS TOXIC. DO NOT LET THIS MATERIAL TOUCH YOU. USE PERSONAL PROTECTION EQUIPMENT. USE VAPOR/FUME CONTROL OR A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURIES.

WARNING METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(d) Do these steps to replace the boss and fitting (Figure 809 and Figure 812).

NOTE: The replacement of the fitting requires the removal of the boss from the fan frame shroud.

WARNING DO NOT LET THE SHARP METAL EDGES CUT YOU. PUT ON GLOVES. INJURIES TO PERSONS CAN OCCUR.

1) For initial size rivets, remove the rivet heads with a 0.126 in. (3.2 mm) diameter drill (TASK 70-10-10-320-801-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING

DO NOT LET THE SHARP METAL EDGES CUT YOU. PUT ON GLOVES. INJURIES TO PERSONS CAN OCCUR.

2) If you cannot remove the rivet heads, use a 0.142 in. (3.6 mm) diameter drill related to the repair size rivets (TASK 70-10-10-320-801-F00 and TASK 70-43-11-300-801-F00).

CAUTION

BE CAREFUL NOT TO CAUSE DAMAGE THE FAN FRAME SHROUD WHEN YOU REMOVE THE BOSS. IF NOT, MORE DAMAGE CAN OCCUR.

3) Remove the boss.
4) Use abrasive cloth, G50402, to carefully remove the remaining adhesive.
5) Do a check of the rivet holes (TASK 70-43-11-300-801-F00).
6) Do a local swab etching (TASK 70-10-11-800-801-F00).
7) Do the FPI of all repaired areas as follows (TASK 70-40-01-230-801-F00):
   a) Sensitivity level 3.
   b) Indications more than 0.0118 in. (0.30 mm) are not permitted.
   c) Linear indications are not permitted.

      NOTE: Linear indications are indications that are at least four times longer than they are wide.
8) If necessary, do the spot touch-up of oxide film coating on aluminum alloys for protection (TASK 70-10-04-380-801-F00).
9) Clean the surface that you will bond with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041].
10) Prepare the adhesive (TASK 70-10-05-360-801-F00 or TASK 70-10-05-360-802-F00).
11) Apply a layer of this adhesive on the boss bonding surface (face touching the fan frame shroud) and in the boss to bond the fitting.

    NOTE: Environmental constraints specified in the TASK 70-10-05-360-802-F00, can be waived for this repair. However, CFM emphasis on the fact that the air around the repaired areas must be as clean as possible and the other conditions (temperature, humidity) as close as possible to the requirement in order to ensure a correct bonding).
12) Rivet the boss on the fan frame shroud (TASK 70-43-11-300-801-F00).
13) Remove the unwanted adhesive with a cloth moist with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041].

WARNING

USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

14) Let the adhesive become hard:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

a) For Application of Epoxy Adhesive Hysol EA 9394 (Bond), TASK 70-10-05-360-802-F00: - At ambient temperature for 24 hours or do the polymerizing cycle for one hour at 167°F (75°C)-185°F (85°C).

NOTE: Use a thermocouple contact probe to make sure that the correct temperature has been reached.

b) For Application of Two Part Epoxy Adhesive Hysol EA 934 NA (Bond), TASK 70-10-05-360-801-F00: - Do the polymerizing cycle for one hour at 185°F (85°C)-203°F (95°C).

NOTE: For the temperature polymerizing cycle, use a local heat source such as thermal blanket or infra-red lamps. Use a thermocouple contact probe to make sure that the correct temperature has been reached.

(e) Do these steps to remove and install the bracket (Figure 809 and Figure 813).

NOTE: You must install the bracket that you removed.

NOTE: Use the bracket as a guide to drill at the correct location. Drill at the same time the hole on the bracket and the hole on the fan frame shroud.

1) Refer to paragraph 6.G.(2)(b) 1 to 8.

2) Install the bracket on the fan frame shroud (TASK 70-43-11-300-801-F00).

(f) Do these steps to remove and install the cover plates (Figure 809 and Figure 814).

NOTE: Only applicable on fan frame shrouds P/N 340-059-922-0, P/N 340-059-934-0, and P/N 340-059-944-0.

1) Remove all the nuts, washers, bolts of the cover plates.

2) If necessary, do the spot touch-up of oxide film coating on aluminum alloys for protection (TASK 70-10-04-380-801-F00).

3) Install the cover plates at their correct positions.

4) Attach the cover plates with the nuts, washers and bolts on the fan frame shroud.

(g) Do the visual inspection of the sulfuric anodizing coating (TASK 70-10-04-380-801-F00).

(h) Install the hardware on the fan frame shroud if removed.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-05-480-003-F00

(1) Make sure that you remove all tools, parts and unwanted material from the fan frame shroud.

SUBTASK 72-23-05-480-004-F00

(2) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-23-05-860-038-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-039-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-05-410-007-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SCHEMATIC REAR VIEW
(NUMBERING OF STRUTS 1 TO 12)

2578193 S0000619299_V1

Fan Frame Shroud (Replacement of the riveted self-locking nuts, angle plate, boss, fitting, bracket and cover plates)
Figure 809/72-23-05-990-818-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL: 2219 (AU6M)

COATING: SULFURIC ANODIZATION

2578194 S0000619418_V2

Fan Frame Shroud (Replacement of the riveted self-locking nuts, angle plate, boss, fitting, bracket and cover plates)
Figure 809/72-23-05-990-818-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SCHEMATIC REAR VIEW
(NUMBERING OF STRUTS 1 TO 12)

NOTE:

OO VIEW AND PP VIEW REFER TO FRAME SHROUD WITH ACOUSTIC PANELS IN 2 PART BETWEEN STRUTS 7 AND 8

2578195 S0000619419_V2

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 1 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A

A-A

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

2578196 S0000619428_V1

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 2 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B-B

(ADDITIONAL SELF-LOCKING NUTS BETWEEN STRUTS 7 AND 8 WITH ACOUSTIC PANELS IN TWO PARTS)

O-O

C-C

(ADDITIONAL SELF-LOCKING NUTS BETWEEN STRUTS 7 AND 8 WITH ACOUSTIC PANELS IN TWO PARTS)

P-P

NOTE:

DETAILS E AND F ARE APPLICABLE TO ALL THE SECTIONS

2578197 S0000619429_V2

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 3 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2578204 S0000619424_V1

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 4 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E-E

2578206 S0000619425_V1

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 5 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2579331 S0000621117_V2

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 6 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2578207 S0000619426_V2

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 7 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 8 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

1. APPLICABLE FOR VIEW B-B, VIEW C-C AND VIEW H-H.
2. APPLICABLE FOR VIEW E-E, VIEW F-F AND VIEW G-G.
3. APPLICABLE FOR DETAIL E.
4. APPLICABLE FOR VIEW B-B.
5. APPLICABLE FOR DETAIL E, VIEW C-C, VIEW E-E, VIEW F-F, VIEW G-G AND VIEW H-H.

2578198 S0000619430_V2

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 9 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

2578200 S0000619420_V1

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 10 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

2578203 S0000619423_V2

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 11 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

APPLICABLE TO STRUTS 4 AND 10

E

2578201 S0000619421_V1

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 12 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2578202 S0000619422_V1

Replacement of the riveted self-locking nuts
Figure 810/72-23-05-990-819-F00 (Sheet 13 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

2578213 S0000619431_V1

Replacement of the angle plate
Figure 811/72-23-05-990-820-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Replacement of the boss and fitting
Figure 812/72-23-05-990-821-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2578216 S0000619433_V1

Removal and installation of the bracket
Figure 813/72-23-05-990-822-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ONLY APPLICABLE ON FAN FRAME SHROUD

P/N 340-059-922-0, 340-059-934-0 AND 340-059-944-0.

2578219 S0000619436_V2

Replacement of the cover plates
Figure 814/72-23-05-990-823-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-05-300-807-F00

7. Fan Frame Shroud (Removal of the Corrosion in Acoustic Panels Bolt Holes by Bushing and/or Washer Installation) Repairs

(Figure 815, Figure 816, Figure 817, Figure 818, Figure 819, and Figure 820)

A. General

(1) This repair task gives instructions to remove the corrosion in or around acoustic panels bolt holes, as follows (Figure 815):

NOTE: This repair must be done only in the acoustic panels bolt holes or on the outer skin of the fan frame shroud. The removal of corrosion cannot be done on a flange or a radius. Bushing or washer installation is not permitted if there is an interaction with a radius of the fan frame shroud.

NOTE: This repair is subject to restrictions for “Type B” P/N (with doubler between strut 7 and strut 8). Refer to the area with restrictions on the Figure 815.

(a) Bushing installation only, if corrosion is limited to the hole.

(b) Washer installation only, if corrosion is limited to the outer skin.

(c) Bushing and washer installation, if corrosion extends from the hole.

NOTE: If you need to apply paragraph 7.A.(1)(c), there are three different procedures:

- washer installation after bushing installation (Procedure 1)
- bushing installation after washer installation (Procedure 2)
- bushing and washer installation at the same time (Procedure 3).

(2) The subsequent table gives a list of part numbers that are applicable to this repair task.

NOTE: All part numbers are applicable to all paragraphs unless specified differently.

Part number	Engine	Configuration	Type
340-059-918-0	7B	1	A
340-059-921-0	7B; 7BE	2	
340-059-922-0	7B; 7BE	1	
340-059-925-0	7B; 7BE	2	
340-059-926-0	7B; 7BE	1	
340-059-929-0	7B; 7BE	2	
340-059-932-0	7B; 7BE	2	
340-059-933-0	7B; 7BE	1	
340-059-934-0	7B; 7BE	1	
340-059-935-0	7B; 7BE	2	
340-059-936-0	7B; 7BE	1	
340-059-942-0	7B; 7BE	2	
340-059-943-0	7B; 7BE	1	
340-059-944-0	7B; 7BE	1	

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(Continued)

Part number	Engine	Configuration	Type
340-059-923-0	7B; 7BE	2	B
340-059-924-0	7B; 7BE	1	
340-059-927-0	7B; 7BE	2	
340-059-928-0	7B; 7BE	1	
340-059-930-0	7B; 7BE	2	
340-059-931-0	7B; 7BE	1	
340-059-937-0	7B; 7BE	2	
340-059-938-0	7B; 7BE	1	
340-059-940-0	7B; 7BE	2	
340-059-941-0	7B; 7BE	1	

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-05-360-802-F00	Application of Epoxy Adhesive Hysol EA 9394 (Bond) (P/B 801)
70-10-08-320-801-F00	Machining (Material Removal) (P/B 201)
70-10-10-320-801-F00	Drilling (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-10-15-300-801-F00	Polysulfide Elastomer Sealant Application (Bond) (P/B 801)
70-21-00-100-803-F00	Light Duty Aqueous Cleaning (Immersion) with Chemical Agent (P/B 201)
70-21-00-100-804-F00	All Materials Solvent Degreasing with Chemical Agent (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
A50490 [CP2243]	Sealant - Elastomer - PR 1750 Class B2	
A50491 [CP2526]	Resin - Epoxy - LOCTITE EA 9394	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	
D50334 [CP2723]	Paste - Barium Chromate	
G51478 [S1096]	Etchant - Aluminum Alloy	

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(Continued)

Reference	Description	Specification
G51491 [CP1067]	Nitrogen - Liquid	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Repair

SUBTASK 72-23-05-860-040-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-041-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-860-042-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO NOT OPERATE tag, STD-858, on the applicable START switch.

SUBTASK 72-23-05-010-009-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

G. Dimensional Information for Fan Frame Shroud (Removal of the Corrosion in Acoustic Panels Bolt Holes by Bushing and/or Washer Installation) Repair

SUBTASK 72-23-05-970-003-F00

(1) Dimensional information for the repair application (Table 806, Table 807, and Figure 816).

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Table 806/72-23-05-993-807-F00

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Reference Dimension
Dim. X			2.1598 in. (54.86 mm)
Dim. AC			14.5614 in. (369.86 mm)
Angle AD			15°
Angle AE			11°
Angle AR			30°
Angle AQ			22°
Angle AK			8°
Angle AP			14°
Dia CA	0.6016 in. (15.28 mm)	0.6094 in. (15.48 mm)	
Dia CB	0.3720 in. (9.45 mm)	0.4449 in. (11.30 mm)	
Dim. CC	0.0748 in. (1.90 mm)	0.0807 in. (2.05 mm)	
Dim. CJ	0.122 in. (3.1 mm)		
Dim. CK	0.13 in. (3.3 mm)		

Table 807/72-23-05-993-808-F00

Description	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dim. CD	0	0.0059 in. (0.15 mm)	
Dia CF	1.4488 in. (36.80 mm)	1.4567 in. (37.00 mm)	
Radius CH	0.0304 in. (0.77 mm)	0.0347 in. (0.88 mm)	

H. Setup Information

SUBTASK 72-23-05-970-005-F00

(1) For the setup information refer to the Figure 820.

I. Fan Frame Shroud (Removal of the Corrosion in Acoustic Panels Bolt Holes by Bushing Installation) Repair

SUBTASK 72-23-05-300-002-F00

(1) Do this repair with these conditions.

NOTE: This repair is subject to restrictions for “Type B” P/N (with doubler between strut 7 and strut 8). Refer to the area with restrictions (Figure 815).

NOTE: This repair can be applied only if access is possible.

SUBTASK 72-23-05-020-004-F00

(2) Remove the self-locking nuts from the fan frame shroud as necessary (TASK 72-23-05-300-806-F00).

(a) If necessary, remove the hardware from the fan frame shroud.

SUBTASK 72-23-05-020-003-F00

(3) Remove the bushing.

(a) If necessary, remove the bushing installed before.

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SUBTASK 72-23-05-320-003-F00

> **WARNING**
> METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(4) Remove corrosion from the attachment holes.

(a) Machine the attachment holes to remove corrosion (TASK 70-10-10-320-801-F00 and Figure 816).

1) Do not remove more material than necessary.

SUBTASK 72-23-05-210-006-F00

(5) Do a visual inspection of the area that you machined.

(a) Make sure that there is no corrosion.

SUBTASK 72-23-05-300-003-F00

(6) Remove grease from the part. Do one of the following:TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

SUBTASK 72-23-05-300-005-F00

(7) Do a locally swab etching of the repaired area using aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

SUBTASK 72-23-05-230-005-F00

(8) Do the Fluorescent Penetrant Inspection of all the repaired areas (TASK 70-40-01-230-801-F00).

(a) Sensitivity level 3.

(b) Indications more than 0.0118 in. (0.30 mm) are not permitted.

(c) Linear indications are not permitted.

NOTE: Linear indications are indications that are four times (or more) longer then they are wide.

SUBTASK 72-23-05-390-004-F00

> **WARNING**
> DO NOT GET CHEMICAL CONVERSION COATING SOLUTION IN YOUR MOUTH, IN YOUR EYES, ON YOUR SKIN, OR ON YOUR CLOTHES. DO NOT BREATHE THE FUMES FROM THIS MATERIAL. AIR MUST FLOW FREELY THROUGH THE WORK AREA. USE THE NECESSARY RESPIRATORY PROTECTION. KEEP THIS MATERIAL AWAY FROM SPARKS, FLAME, AND HEAT. THIS MATERIAL IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(9) Do a spot touch-up of oxide film coating on aluminum alloys for protection (TASK 70-10-04-380-801-F00).

SUBTASK 72-23-05-140-001-F00

> **WARNING**
> METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(10) Make a locally manufactured bushing (TASK 70-10-08-320-801-F00 and Figure 817).

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SUBTASK 72-23-05-390-006-F00

(11) Apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], as follows:

(a) Remove grease from the part. Do one of the following: TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

(b) Use a brush to apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], on the repaired area.

NOTE: The layer applied on the fan frame shroud must be approximately to 0.004 in. (0.1 mm) - 0.008 in. (0.2 mm) thick.

(c) Do an inspection after application.

1) Make sure that the layer of paste is equally applied on the machined area of the fan frame shroud.

2) Make sure that you removed the unwanted paste.

(12) Install the bushing (Figure 816).

WARNING: ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

(a) Remove grease from the bushing with a clean cloth soaked in acetone solvent, B01058 [CP1039].

WARNING: LIQUID NITROGEN CAUSES LOW TEMPERATURE BURNS AND CAN CAUSE SUFFOCATION. DO NOT LET THIS MATERIAL TOUCH YOU. USE PERSONAL PROTECTION EQUIPMENT. USE EYE PROTECTION.

(b) Put the bushing fully into liquid nitrogen, G51491 [CP1067].

(c) Install the bushing in a maximum of 30 seconds.

SUBTASK 72-23-05-200-001-F00

(13) Do a check of the bushing location (Figure 816).

SUBTASK 72-23-05-390-002-F00

(14) Apply polysulfide elastomer sealant, A50490 [CP2243] (TASK 70-10-15-300-801-F00 and Figure 816).

SUBTASK 72-23-05-300-008-F00

(15) Remove grease from the part. Do one of the following: TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

SUBTASK 72-23-05-020-005-F00

(16) Remove the washer:

(a) If you did the bushing installation, make sure that you fully did the procedure before you start the washer installation procedure.

(b) If necessary, remove any washer installed before.

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SUBTASK 72-23-05-300-010-F00

> **WARNING**
> METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(17) Remove corrosion from the outer skin.

(a) Make sure that you have the adapting cutting tool for machining the fan frame shroud and bushing together

NOTE: The fan frame shroud material and bushing material are different.

(b) Alternative procedure available. Machine the outer skin of the fan frame shroud to install a grooved washer for each damaged hole:TASK 70-10-10-320-801-F00. Refer to Figure 816.

SUBTASK 72-23-05-210-007-F00

(18) Do a visual inspection of the area that you machined.

(a) Make sure that you removed all the corrosion.

SUBTASK 72-23-05-300-011-F00

(19) Remove grease from the part. Do one of the following: TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

SUBTASK 72-23-05-300-013-F00

(20) Do a locally swab etching of the repaired area using aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

SUBTASK 72-23-05-230-006-F00

(21) Do the Fluorescent Penetrant Inspection of all the repaired areas (TASK 70-40-01-230-801-F00).

(a) Sensitivity level 3.

(b) Indications more than 0.0118 in. (0.30 mm) are not permitted.

(c) Linear indications are not permitted.

NOTE: Linear indications are indications that are four times (or more) longer than they are wide.

SUBTASK 72-23-05-390-003-F00

> **WARNING**
> DO NOT GET CHEMICAL CONVERSION COATING SOLUTION IN YOUR MOUTH, IN YOUR EYES, ON YOUR SKIN, OR ON YOUR CLOTHES. DO NOT BREATHE THE FUMES FROM THIS MATERIAL. AIR MUST FLOW FREELY THROUGH THE WORK AREA. USE THE NECESSARY RESPIRATORY PROTECTION. KEEP THIS MATERIAL AWAY FROM SPARKS, FLAME, AND HEAT. THIS MATERIAL IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(22) Do a spot touch-up of oxide film coating on aluminum alloys for protection (TASK 70-10-04-380-801-F00).

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SUBTASK 72-23-05-140-002-F00

> **WARNING**
> METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(23) Make a locally manufactured grooved washer (TASK 70-10-08-320-801-F00 and Figure 818).

NOTE: A positive step is permitted between the washer and fan frame shroud (Figure 816).

(a) Make sure that you make an adapted washer.

SUBTASK 72-23-05-390-005-F00

(24) Apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], as follows (Figure 816):

(a) Remove grease from the fan frame shroud. Do one of the following:
TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

(b) Use a brush to apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], on the machined area of the fan frame shroud.

NOTE: The layer applied on the fan frame shroud must be approximately to 0.004 in. (0.1 mm) - 0.008 in. (0.2 mm) thick.

NOTE: If you install the bushing, you must not apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], on the bushing.

(c) Do an inspection after application.

1) Make sure that the layer of paste is equally applied on the fan frame shroud.

a) Make sure that you remove the unwanted paste.

SUBTASK 72-23-05-420-001-F00

(25) Install the grooved washer (Figure 816).

> **WARNING**
> DO NOT LET THIS MATERIAL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THIS MATERIAL. PUT ON A RESPIRATOR WHEN YOU USE THIS MATERIAL. MAKE SURE THAT THERE IS SUFFICIENT AIRFLOW. CLEAN BARE SKIN FULLY AFTER YOU USE THIS MATERIAL. THIS MATERIAL CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(a) Bond the grooved washer into the spot face.

1) Apply LOCTITE EA 9394 adhesive, A50491 [CP2526], in the circumferential groove with a syringe (TASK 70-10-05-360-802-F00 and Figure 816).

NOTE: The face with the circumferential groove and the chamfer is the face to be bonded.

SUBTASK 72-23-05-300-014-F00

(26) Counter-drill the washer using the rivet holes (TASK 70-10-10-320-801-F00 and TASK 72-23-05-300-806-F00).

SUBTASK 72-23-05-390-007-F00

(27) Apply polysulfide elastomer sealant, A50490 [CP2243] (TASK 70-10-15-300-801-F00 and Figure 816).

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SUBTASK 72-23-05-300-015-F00

(28) Remove grease from the part. Do one of the following: TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

J. Fan Frame Shroud (Removal of Corrosion in Acoustic Panels Bolt Holes by Bushing and Washer Installation)

NOTE: There are 3 different conditions with 3 different procedures.

SUBTASK 72-23-05-420-004-F00

(1) Do this procedure for washer installation after bushing installation (Procedure 1), as follows:

(a) Make sure that you have the adapting cutting tool.

NOTE: The fan frame shroud material and the bushing material are different.

(b) Remove corrosion from the outer skin.

1) Alternative procedure available. Machine the outer skin of the fan frame shroud to install a grooved washer for each damaged hole (TASK 70-10-10-320-801-F00 and Figure 816).

(c) Do a visual inspection of the area that you machined.

1) Make sure that you removed all the corrosion.

(d) Remove grease from the part. Do one of the following: TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

(e) Do a locally swab etching of the repaired areas with aluminum alloy etchant, G51478 [S1096] (Local Swab Etching - Maintenance Practices, TASK 70-10-11-800-801-F00).

(f) Do the Fluorescent Penetrant Inspection of all the repaired areas, as follows (TASK 70-40-01-230-801-F00):

1) Sensitivity level 3.

2) Indications more than 0.0118 in. (0.2997 mm) are not permitted.

3) Linear indications are not permitted.

NOTE: Linear indications are indications that are four times (or more) longer than they are wide.

(g) Do a spot touch-up of oxide film coating on aluminum alloys for protection (TASK 70-10-04-380-801-F00).

WARNING

METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(h) Make a locally manufactured grooved washer (TASK 70-10-08-320-801-F00 and Figure 818).

NOTE: A positive step is permitted between the washer and the fan frame shroud.

1) Make sure that you make an adapted washer.

(i) Apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], as follows (Figure 816):

1) Remove grease from the fan frame shroud. Do one of the following: TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

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2) Apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], on the fan frame shroud with a brush.

NOTE: The layer applied on the fan frame shroud must be approximately to 0.004 in. (0.102 mm) - 0.008 in. (0.203 mm) thick.

NOTE: If you install the bushing, you must not apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], on the bushing.

3) Do an inspection after application.

a) Make sure that the layer of paste is equally applied on the fan frame shroud.

<1> Make sure that you remove the unwanted paste.

(j) Installation of the grooved washer (Figure 816).

1) Bond the grooved washer into the spot face (Figure 816).

NOTE: The face with the circumferential groove and the chamfer is the face to be bonded.

WARNING	DO NOT LET THIS MATERIAL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THIS MATERIAL. PUT ON A RESPIRATOR WHEN YOU USE THIS MATERIAL. MAKE SURE THAT THERE IS SUFFICIENT AIRFLOW. CLEAN BARE SKIN FULLY AFTER YOU USE THIS MATERIAL. THIS MATERIAL CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

a) Apply LOCTITE EA 9394 adhesive, A50491 [CP2526], in the circumferential groove with a syringe (TASK 70-10-05-360-802-F00 and Figure 816).

(k) Use the rivet holes to counter-drill the washer (TASK 70-10-10-320-801-F00 and TASK 72-23-05-300-806-F00).

(l) Apply sealant, A50490 [CP2243] (TASK 70-10-15-300-801-F00 and Figure 816).

(m) Remove grease from the part. Do one of the following: TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

SUBTASK 72-23-05-420-005-F00

(2) Do this procedure for bushing installation after washer installation (Procedure 2), as follows:

WARNING	METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(a) Removal of corrosion from the attachment holes.

1) Make sure that you have the adapted cutting tool.

NOTE: The fan frame shroud material and the washer material are different.

2) Machine the washer installed before and the attachment holes to remove corrosion (TASK 70-10-10-320-801-F00 and Figure 816).

a) Do not remove more material than necessary.

(b) Do a visual inspection of the area that you machined.

1) Make sure that there is no corrosion.

(c) Remove grease from the part. Do one of the following: TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

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(d) Do a locally swab etching of the repaired areas with aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

(e) Do a fluorescent penetrant inspection of all the repaired areas, as follows (TASK 70-40-01-230-801-F00):

1) Sensitivity level 3.

2) Indications more than 0.0118 in. (0.30 mm) are not permitted.

3) Linear indications are not permitted.

NOTE: Linear indications are indications that are four times (or more) longer than they are wide.

(f) Do a spot touch-up of oxide film coating on aluminum alloys for protection (TASK 70-10-04-380-801-F00).

WARNING METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(g) Make a locally manufactured bushing (TASK 70-10-08-320-801-F00 and Figure 817).

(h) Apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], as follows:

1) Remove grease from the part. Do one of the following:TASK 70-21-00-100-804-F00 or Light Duty Aqueous Cleaning (Immersion) with Chemical Agent, TASK 70-21-00-100-803-F00.

2) Apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], on the repaired area with a brush.

NOTE: The layer applied on the fan frame shroud must be approximately to 0.004 in. (0.102 mm) - 0.008 in. (0.203 mm) thick.

3) Do an inspection after application.

a) Make sure that the layer of paste is equally applied on the fan frame shroud.

b) Make sure that all unwanted paste was removed.

(i) Installation of the bushing (Figure 816).

WARNING ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

1) Remove grease from the bushing with a clean cloth soaked in acetone solvent, B01058 [CP1039].

WARNING LIQUID NITROGEN CAUSES LOW TEMPERATURE BURNS AND CAN CAUSE SUFFOCATION. DO NOT LET THIS MATERIAL TOUCH YOU. USE PERSONAL PROTECTION EQUIPMENT. USE EYE PROTECTION.

2) Put the bushing fully into liquid nitrogen, G51491 [CP1067].

3) Install the bushing in a maximum of 30 seconds.

(j) Do a check of the bushing location (Figure 816).

(k) Apply sealant, A50490 [CP2243] (TASK 70-10-15-300-801-F00 and Figure 816).

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(l) Remove grease from the part. Do one of the following:TASK 70-21-00-100-804-F00 or Light Duty Aqueous Cleaning (Immersion) with Chemical Agent, TASK 70-21-00-100-803-F00.

SUBTASK 72-23-05-420-006-F00

(3) Do this procedure for bushing and washer installation at the same time as one piece (Procedure 3), as follows:

> **WARNING** METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(a) Removal of corrosion from the attachment holes.

1) Machine the attachment holes and the fan frame shroud to remove corrosion (TASK 70-10-10-320-801-F00 and Figure 816).

a) Do not remove more material than necessary.

b) Do a visual inspection of the area that you machined.

<1> Make sure that there is no corrosion.

c) Remove grease from the part. Do one of the following:TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

d) Do a locally swab etching of the repaired areas with aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

e) Do a fluorescent penetrant inspection of all the repaired areas, as follows (TASK 70-40-01-230-801-F00):

<1> Sensitivity level 3.

<2> Indications more than 0.0118 in. (0.30 mm) are not permitted.

<3> Linear indications are not permitted.

NOTE: Linear indications are indications that are four times (or more) longer than they are wide.

(b) Do a spot touch-up of oxide film coating on aluminum alloys for protection (TASK 70-10-04-380-801-F00).

> **WARNING** METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(c) Make a locally manufactured bushing-washer (TASK 70-10-08-320-801-F00 and Figure 819).

(d) Apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], as follows:

1) Remove grease from the part. Do one of the following:TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

2) Apply BOLICONE 73, D50334 [CP2723], or jointing compound, D50321 [CP2773], on the repaired area with a brush.

NOTE: The layer applied on the fan frame shroud must be approximately to 0.004 in. (0.102 mm) - 0.008 in. (0.203 mm) thick.

3) Do an inspection after application.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

a) Make sure that the layer of paste is equally applied on the fan frame shroud.

b) Make sure that all unwanted paste was removed.

(e) Installation of the bushing-washer (Figure 816).

> **WARNING** ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

1) Remove grease from the bushing-washer with a clean cloth soaked in acetone solvent, B01058 [CP1039].

> **WARNING** LIQUID NITROGEN CAUSES LOW TEMPERATURE BURNS AND CAN CAUSE SUFFOCATION. DO NOT LET THIS MATERIAL TOUCH YOU. USE PERSONAL PROTECTION EQUIPMENT. USE EYE PROTECTION.

2) Put the bushing-washer fully into liquid nitrogen, G51491 [CP1067].

3) Install the bushing-washer in a maximum of 30 seconds.

(f) Do a check of the bushing-washer location (Figure 816).

(g) Apply sealant, A50490 [CP2243] (TASK 70-10-15-300-801-F00 and Figure 816).

(h) Remove grease from the part. Do one of the following:TASK 70-21-00-100-804-F00 or TASK 70-21-00-100-803-F00.

K. Riveted Nuts Installation

SUBTASK 72-23-05-420-002-F00

(1) Install the riveted self-locking nuts on the part (TASK 72-23-05-300-806-F00).

(a) If necessary, install the removed hardware on the fan frame shroud.

L. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-05-860-043-F00

> **CAUTION** MAKE SURE THAT YOU REMOVE ALL TOOLS, LOOSE PARTS AND UNWANTED MATERIAL FROM THE AREA WHEN YOU COMPLETE MAINTENANCE. DAMAGE TO EQUIPMENT COULD OCCUR.

(1) Make sure that you remove all the tools, parts and unwanted material from the fan frame shroud.

SUBTASK 72-23-05-860-044-F00

(2) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-23-05-860-045-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-05-860-046-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-860-047-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SCHEMATIC REAR VIEW
(NUMBERING OF STRUTS 1 TO 12)

2801350 S0000641419_V1

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation)
Repairs
Figure 815/72-23-05-990-825-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL: AMS4143
COATING: SULFURIC ANODIZATION

2801351 S0000641420_V1

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation)
Repairs
Figure 815/72-23-05-990-825-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LEGEND:

AREA WITH RESTRICTIONS FOR "TYPE B" P/N: DOUBLER BETWEEN STRUTS 7 AND 8 (IDG AIR/OIL COOLER)

1 BUSHING OR WASHER INSTALLATION ARE NOT PERMITTED IN THIS AREA.

2991679 S0000766323_V1

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation) Repairs
Figure 815/72-23-05-990-825-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:
ALL DIMENSIONS ARE IN INCHES (mm).
ROUGHNESS IS IN MICROINCHES (µm).

2801354 S0000641421_V2

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation) Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 1 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

ROUGHNESS IS IN MICROINCHES (µm).

2801355 S0000641422_V2

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation) Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 2 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(CONFIGURATION BUSHING ONLY)

D1 OR D2

A

126 (3.2)

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

ROUGHNESS IS IN MICROINCHES (µm).

2801356 S0000641423_V2

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation) Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 3 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(CONFIGURATION WASHER ONLY)

D1 OR **D2**

1 : BOLICONE 73 OR CA1010 MASTINOX CHROMATE FREE JOINTING COMPOUND
2 : CHAMFER = 0.020 (0.5) at 45˚
3 : RADIUS = 0.030-0.035 (0.77-0.88)

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

2801357 S0000641424_V2

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation) Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 4 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(CONFIGURATION WASHER AFTER BUSHING INSTALLATION)

D1 **OR** **D2**

1 : BOLICONE 73 OR CA1010 MASTINOX CHROMATE FREE JOINTING COMPOUND
2 : CHAMFER = 0.020 (0.5) at 45˚
3 : RADIUS = 0.030-0.035 (0.77-0.88)

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

2801358 S0000641425_V2

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation)
Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 5 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(CONFIGURATION BUSHING AFTER WASHER INSTALLATION)

D1 OR **D2**

126 (3.2)

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

ROUGHNESS IS IN MICROINCHES (µm).

2991824 S0000766335_V1

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation) Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 6 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(CONFIGURATION BUSHING - WASHER)

D1 OR **D2**

B

126 (3.2)

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

ROUGHNESS IS IN MICROINCHES (µm).

2991840 S0000766336_V1

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation) Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 7 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(INSTALLATION AND CHECK)
(BUSHING ONLY)

D1 OR **D2**

2991842 S0000766337_V1

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation)
Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 8 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(INSTALLATION AND CHECK)
(WASHER ONLY)

D1 OR **D2**

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

2991857 S0000766338_V1

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation)
Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 9 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(INSTALLATION AND CHECK)
(WASHER AFTER BUSHING INSTALLATION)

D1 OR **D2**

2991860 S0000766339_V1

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation)
Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 10 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(INSTALLATION AND CHECK)
(BUSHING AFTER WASHER INSTALLATION)

D1 OR **D2**

2991865 S0000766340_V1

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation)
Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 11 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(INSTALLATION AND CHECK)
(BUSHING - WASHER)

D1 OR **D2**

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

2991869 S0000766341_V1

Fan Frame Shroud (Removal of the corrosion in acoustic panels bolt holes by bushing installation)
Repairs
Figure 816/72-23-05-990-826-F00 (Sheet 12 of 12)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL: A286 (E-Z6NCT25)

63 (1.6)

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES (mm)
ROUGHNESS IS IN MICROINCHES WITH
MICROMETERS IN PARENTHESES (µm)

2801359 S0000641426_V2

Locally Manufactured Bushing
Figure 817/72-23-05-990-827-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

ROUGHNESS IS IN MICROINCHES (μm).

MATERIAL: A286 (E-Z6NCT25)

63 (1.6)

2801368 S0000641427_V2

Locally Manufactured Grooved Washer
Figure 818/72-23-05-990-828-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

ROUGHNESS IS IN MICROINCHES (μm).

Locally Manufactured Bushing-Washer
Figure 819/72-23-05-990-829-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

2991882 S0000766345_V1

Setup Information
Figure 820/72-23-05-990-838-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

2991888 S0000766346_V1

Setup Information
Figure 820/72-23-05-990-838-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-05-300-808-F00

8. Fan Frame Shroud (Removal of high metal from handling bosses) - Repairs

(Figure 821, Figure 822, Figure 823, Figure 824)

A. General

(1) This procedure provides the instructions on how to perform the removal of high metal from the handling bosses.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Repair

SUBTASK 72-23-05-860-048-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-049-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-05-210-008-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO NOT OPERATE tag, STD-858 on the applicable START switch.

SUBTASK 72-23-05-010-010-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

G. Fan Frame Shroud Handling Boss Repair

SUBTASK 72-23-05-100-001-F00

> **WARNING** ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

> **WARNING** ISOPROPYL ALCOHOL IS FLAMMABLE. AVOID PROLONGED BREATHING OF VAPOR AND PROLONGED OR REPEATED CONTACT WITH SKIN. AVOID CONTACT WITH EYES. CLEAN PARTS IN WELL-VENTILATED AREA AND USE APPROVED SAFETY EQUIPMENT.

(1) If necessary, clean the repair area.

(a) Clean the area with a white cloth made moist with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041].

SUBTASK 72-23-05-300-018-F00

> **WARNING** DO NOT BREATHE PARTICLES FROM BLENDING OR LET PARTICLES TOUCH YOU. PARTICLES FROM BLENDING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(2) If high metal is present, remove the high metal from the handling bosses as follows: (Figure 822 and Figure 823)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

NOTE: Only one blending allowed in area 8

NOTE: In case of finding in a common area, apply the most restrictive criteria.

(b) After blending, the roughness of the repaired area must be 126 micro inches (3.2 micrometers) or better.

SUBTASK 72-23-05-220-002-F00

(3) Control the part

(a) Check the dimensions of the blended area as follows: (Figure 822 and Figure 823)

1) Maximum finish for dimension A is 1.18 in. (30 mm).
2) Maximum finish for dimension B is 0.79 in. (20 mm).
3) Minimum finish for dimension C is 0.20 in. (5 mm).
4) Maximum finish for dimension D is 0.47 in. (12 mm).
5) Maximum finish for dimension I is 0.04 in. (1 mm).
6) Maximum finish for dimension J is 0.10 in. (2.5 mm).
7) Maximum finish for dimension K is 0.06 in. (1.5 mm).
8) Maximum finish for dimension M is 0.02 in. (0.5 mm).
9) Maximum finish for dimension N is 0.01 in. (0.25 mm).
10) Minimum finish for radius P is 0.20 in. (5 mm).
11) Minimum finish for radius Q is 1.18 in. (30 mm).
12) Maximum finish for radius R is 0.08 in. (2 mm).
13) Maximum finish for radius S is 0.02 in. (0.5 mm).
14) Maximum finish for radius T is 1.97 in. (50 mm).
15) Maximum finish for radius U is 0.79 in. (20 mm).
16) Maximum finish for diameter BD is 0.79 in. (20 mm).
17) Maximum finish for diameter BE is 0.59 in. (15 mm).
18) Maximum finish for angle BF is 90°arc (2 rad).

(b) Do a local swab etching before you examine the fan frame shroud by Fluorescent Penetrant Inspection (FPI).

(c) Do a FPI of the suspected areas (TASK 70-40-01-230-801-F00).

SUBTASK 72-23-05-100-002-F00

WARNING ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

WARNING ISOPROPYL ALCOHOL IS FLAMMABLE. AVOID PROLONGED BREATHING OF VAPOR AND PROLONGED OR REPEATED CONTACT WITH SKIN. AVOID CONTACT WITH EYES. CLEAN PARTS IN WELL-VENTILATED AREA AND USE APPROVED SAFETY EQUIPMENT.

(4) Clean the blended area with a white cloth made moist with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-05-380-001-F00

(5) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-05-860-050-F00

(1) Make sure that you remove all the tools, parts and unwanted material from the fan frame.

SUBTASK 72-23-05-860-051-F00

(2) Remove the DO NOT OPERATE tag, STD-858 from the START switch.

SUBTASK 72-23-05-860-052-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-053-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-008-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDLING BOSSES
BETWEEN STRUTS 3 AND 4

A

HANDLING BOSSES
BETWEEN STRUTS 10 AND 11

B

S-M56-SM-50725-01
S-M56-SM-50726-01
2913199 S0000698872_V2

Fan Frame Shroud Handling Boss Repair
Figure 821/72-23-05-990-830-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SCHEMATIC REAR VIEW
(NUMERATION OF STRUTS 1 TO 12)

S-M56-SM-50724-01

2939486 S0000708416_V1

Fan Frame Shroud Handling Boss Repair
Figure 821/72-23-05-990-830-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDLING BOSSES BETWEEN STRUTS 3 AND 4

S-M56-SM-50725-01

2939491 S0000708456_V1

Handling Boss Areas
Figure 822/72-23-05-990-831-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDLING BOSSES BETWEEN STRUTS 10 AND 11

S-M56-SM-50726-01

2939498 S0000708457_V1

Handling Boss Areas
Figure 822/72-23-05-990-831-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDLING BOSSES BETWEEN STRUTS 3 AND 4 FOR INFORMATION

HANDLING BOSSES BETWEEN STRUTS 10 AND 11 FOR INFORMATION

TYPICAL BLENDING VIEW FOR AREA 1 (MAIN UPPER FACE OF HANDLING)

S-M56-SM-50727-01

2939501 S0000708458_V1

Dimensional Information
Figure 823/72-23-05-990-832-F00 (Sheet 1 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDLING BOSSES BETWEEN
STRUTS 3 AND 4 FOR INFORMATION

HANDLING BOSSES BETWEEN
STRUTS 10 AND 11 FOR INFORMATION

TYPICAL BLENDING VIEW FOR AREA 2
(MAIN CHAMFER OF BORE)

S-M56-SM-50728-01

2939507 S0000708459_V1

Dimensional Information
Figure 823/72-23-05-990-832-F00 (Sheet 2 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDLING BOSSES BETWEEN STRUTS 3 AND 4 FOR INFORMATION

HANDLING BOSSES BETWEEN STRUTS 10 AND 11 FOR INFORMATION

DETAIL OF AREA 3
(AVAILABLE FOR EACH ATTACHMENT HOLES)

TYPICAL BLENDING VIEW FOR AREA 3
(CLAMPING SURFACE AROUND THE ATTACHMENT HOLES)

V-V

S-M56-SM-50729-01

2939508 S0000708460_V1

Dimensional Information
Figure 823/72-23-05-990-832-F00 (Sheet 3 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDLING BOSSES BETWEEN
STRUTS 3 AND 4 FOR INFORMATION

HANDLING BOSSES BETWEEN
STRUTS 10 AND 11 FOR INFORMATION

TYPICAL BLENDING VIEW FOR AREA 4
(TOP EDGE EXCLUDING RIBS)

S-M56-SM-50730-01

2939594 S0000708461_V1

Dimensional Information
Figure 823/72-23-05-990-832-F00 (Sheet 4 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDLING BOSSES BETWEEN STRUTS 3 AND 4 FOR INFORMATION

HANDLING BOSSES BETWEEN STRUTS 10 AND 11 FOR INFORMATION

TYPICAL BLENDING VIEW FOR AREA 5 (UPPER FACES OF RIBS)

S-M56-SM-50739-01

2939597 S0000708463_V1

Dimensional Information
Figure 823/72-23-05-990-832-F00 (Sheet 5 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDLING BOSSES BETWEEN STRUTS 3 AND 4 FOR INFORMATION

HANDLING BOSSES BETWEEN STRUTS 10 AND 11 FOR INFORMATION

TYPICAL BLENDING VIEW FOR AREA 6 (ALL SIDE FACES)

S-M56-SM-50732-01

2939601 S0000708464_V1

Dimensional Information
Figure 823/72-23-05-990-832-F00 (Sheet 6 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDLING BOSSES BETWEEN
STRUTS 3 AND 4 FOR INFORMATION

HANDLING BOSSES BETWEEN
STRUTS 10 AND 11 FOR INFORMATION

TYPICAL BLENDING VIEW FOR AREA 7
(TOP EDGE OF RIBS)

S-M56-SM-50733-01

2939602 S0000708465_V1

Dimensional Information
Figure 823/72-23-05-990-832-F00 (Sheet 7 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDLING BOSSES BETWEEN STRUTS 3 AND 4

A

HANDLING BOSSES BETWEEN STRUTS 10 AND 11

B

BOTTOM OF HANDLING BOSSES
(TYPICAL BLENDING VIEW FOR AREA 8)

A-A

2913201 S0000698915_V1

Dimensional Information
Figure 823/72-23-05-990-832-F00 (Sheet 8 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HIGH METAL ON HANDLING BOSS
(EXAMPLE)

2913202 S0000698916_V1

High Metal on Handling Boss Example
Figure 824/72-23-05-990-833-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-05-300-809-F00

9. Fan Frame Shroud (IDG Air/Oil Cooler Attachment Holes) Repairs

A. General

(1) This task is a repair procedure of the IDG AIR/OIL cooler attachment holes by drilling or machiningl bushings.

(2) You can use equivalent alternatives for tools, equipment, and consumable materials.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-08-320-801-F00	Machining (Material Removal) (P/B 201)
70-10-10-320-801-F00	Drilling (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
A50490 [CP2243]	Sealant - Elastomer - PR 1750 Class B2	
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	
G50320 [912-0041]	Cloth - Process Cleaning Absorbent Wiper	
G51478 [S1096]	Etchant - Aluminum Alloy	
G51491 [CP1067]	Nitrogen - Liquid	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Prepare for the Repair

SUBTASK 72-23-05-860-054-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-055-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-860-056-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO NOT OPERATE tag, STD-858 on the applicable START switch.

SUBTASK 72-23-05-010-011-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

G. Dimensional Information for Fan Frame Shroud Repair

SUBTASK 72-23-05-970-004-F00

(1) Refer to dimensional information for the repair application in the following table:

(a) For the attachment hole repair dimensional information Table 808.

Table 808/72-23-05-993-809-F00 Dimensional Information

Description	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dim. AQ			8.9146 in. (226.43 mm)
Dim. AS			1.4799 in. (37.59 mm)
Dim. AT			1.4732 in. (37.42 mm)
Angle AU			0°36'24"

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Table 808/72-23-05-993-809-F00 Dimensional Information (Continued)

Description	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Angle AV			15°
Angle AZ			2°09'28"
Angle BA			2°10'01"
Angle BB			5°49'40'
Angle BC			5°50'02"
Dia BD	0.2716 in. (6.90 mm)	0.2804 in. (7.12 mm)	
Dia BE	0.3503 in. (8.90 mm)	0.3591 in. (9.12 mm)	
Dia BF	0.6653 in. (16.90 mm)	0.6733 in. (17.10 mm)	
Dim. BG	0.0374 in. (0.95 mm)	0.0414 in. (1.05 mm)	
Dim. BK	0.0374 in. (0.95 mm)	0.0414 in. (1.05 mm)	
Dim. BM	0.015 in. (0.38 mm)	0.024 in. (0.61 mm)	
Dim. BN	0.0433 in. (1.10 mm)	0.0473 in. (1.20 mm)	
Chamfer BH at 45°	0.007 in. (0.2 mm)	0.012 in. (0.3 mm)	
Radius BL	0.007 in. (0.2 mm)	0.012 in. (0.3 mm)	

H. Fan Frame Shroud (IDG Air/Oil Cooler Attachment Holes) Repair

NOTE: If the attachment holes are accessible, they must be repaired.

SUBTASK 72-23-05-020-006-F00

(1) If necessary, remove the hardware from the fan frame shroud.

SUBTASK 72-23-05-200-002-F00

(2) Do the following:

(a) Inspect the IDG Air/Oil Cooler attachment hole to be repaired.

1) No wear is permitted.

WARNING MAKE SURE THAT YOU USE PROTECTION EQUIPMENT. METAL PARTICLES WHEN YOU DRILL OR MILL CAN CAUSE DAMAGE TO EQUIPMENT AND INJURY TO PERSONS.

(b) If the hole dimension is not within the dimensional limits of diameter BD, Figure 826 and Table 808, machine the IDG air/oil cooler attachment hole to install a bushing by drilling (Drilling, TASK 70-10-10-320-801-F00). Refer to Table 808.

1) Do not remove more parent material than necessary.

(c) Inspect the hole dimension again.

SUBTASK 72-23-05-100-003-F00

(3) If the hole dimension is within the dimensional limits of diameter BD (after drilling) in Table 808, do these steps:

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WARNING ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

WARNING ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE. USE PROTECTION EQUIPMENT. MAKE SURE THAT YOU USE ISOPROPYL ALCOHOL IN AN AREA WITH AIRFLOW. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

(a) Degrease the repaired areas using a cloth, G50320 [912-0041] soaked in acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041].

(b) Do a local swab etching of the machined hole using aluminum alloy etchant, G51478 [S1096]. Refer to Local Swab Etching - Maintenance Practices, TASK 70-10-11-800-801-F00.

(c) Do the fluorescent penetrant inspection, portable post-emulsifiable, sensitivity level 3, of the area that you machined (Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00).

1) Indications of 0.0118 in. (0.30 mm) or less are permitted.

2) Linear indications are not permitted.

NOTE: Linear indications are indications that are at least four times longer than they are wide.

(d) Do the spot touch-up of oxide film coating on aluminum alloys on the repaired area (Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00).

(e) Install the hardware on the fan frame shroud if removed.

SUBTASK 72-23-05-300-019-F00

(4) If the hole dimension is not within the dimensional limits of diameter BD, Figure 826 and Table 808, do these steps:

WARNING MAKE SURE THAT YOU USE PROTECTION EQUIPMENT. METAL PARTICLES WHEN YOU DRILL OR MILL CAN CAUSE DAMAGE TO EQUIPMENT AND INJURY TO PERSONS.

(a) Machine the IDG air/oil cooler attachment hole again to install a bushing by drilling (Drilling, TASK 70-10-10-320-801-F00). Refer to Table 808.

1) Do not remove more parent material than necessary

WARNING ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

WARNING ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE. USE PROTECTION EQUIPMENT. MAKE SURE THAT YOU USE ISOPROPYL ALCOHOL IN AN AREA WITH AIRFLOW. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

(b) Degrease the repaired areas using a cloth, G50320 [912-0041] soaked in acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Do a local swab etching of the machined hole using aluminum alloy etchant, G51478 [S1096]. Refer to Local Swab Etching - Maintenance Practices, TASK 70-10-11-800-801-F00

(d) Do the fluorescent penetrant inspection, portable post-emulsifiable, sensitivity level 3, of the area that you machined (Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00).

1) Indications of 0.0118 in. (0.30 mm) or less are permitted.

2) Linear indications are not permitted.

NOTE: Linear indications are indications that are at least four times longer than they are wide.

(e) Do the spot touch-up of oxide film coating on aluminum alloys on the repaired area (Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00).

WARNING MAKE SURE THAT YOU USE PROTECTION EQUIPMENT. METAL PARTICLES WHEN YOU DRILL OR MILL CAN CAUSE DAMAGE TO EQUIPMENT AND INJURY TO PERSONS.

(f) Make a locally manufactured bushing. Refer to Figure 826, Figure 827 and Table 808 (Machining (Material Removal), TASK 70-10-08-320-801-F00).

(g) Apply an anti-corrosion compound.

1) Apply an approximately 0.004 in. (0.1 mm) to 0.008 in. (0.2 mm) thick layer of jointing compound, D50321 [CP2773] with a brush in the machined hole.

2) Make sure that the surfaces of the machined hole on the fan frame shroud are coated with jointing compound, D50321 [CP2773].

a) Remove any excess coating.

(h) Install the bushing. Refer to Figure 828.

NOTE: The bushing should be installed within 30 seconds of application of the solvent.

WARNING ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

1) Degrease the bushing using a cloth soaked in acetone solvent, B01058 [CP1039].

WARNING USE PROTECTION WHEN YOU USE LIQUID NITROGEN. MAKE SURE THAT THE AREA HAS A GOOD FLOW OF AIR. LIQUID NITROGEN CAN CAUSE INJURIES TO PERSONNEL.

WARNING USE PROTECTION EQUIPMENT WHEN YOU USE LIQUID NITROGEN. LIQUID NITROGEN CAUSE A LOW TEMPERATURE BURN AND CAN CAUSE NON-SUFFICIENT OXYGEN. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

2) Make sure that the area has a good flow of air.

NOTE: The supply of liquid nitrogen must be kept in an approved container.

3) Put the bushing fully into liquid nitrogen, G51491 [CP1067].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

4) Install the bushing within 30 seconds.

5) Remove any excess amount of jointing compound, D50321 [CP2773] using a dry clean cloth, G50320 [912-0041].

6) Make sure the bushing is flush to the fan frame shroud. Refer to Figure 828.

7) Apply sealant, A50490 [CP2243] on the outer and inner faces between the bushing and the fan frame shroud. Refer to Figure 828.

8) Install the hardware on the fan frame shroud if removed.

I. Put the Airplane Back to Its Usual Condition

CAUTION

MAKE SURE THAT YOU REMOVE ALL TOOLS, LOOSE PARTS AND UNWANTED MATERIAL FROM THE AREA WHEN YOU COMPLETE MAINTENANCE. DAMAGE TO EQUIPMENT COULD OCCUR.

SUBTASK 72-23-05-010-012-F00

(1) Make sure that you remove all tools, parts and unwanted material from the fan frame.

SUBTASK 72-23-05-860-057-F00

(2) Remove the DO NOT OPERATE tag, STD-858 from the START switch.

SUBTASK 72-23-05-860-058-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-059-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-009-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

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MATERIAL: 2219 (AU6M)
COATING: SULFURIC ANODIZATION

B0070901

2935454 S0000711385_V1

Dimensional Information
Figure 825/72-23-05-990-834-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D-D

NOTE:
ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

B0071001
2935528 S0000711386_V1

Dimensional Information
Figure 825/72-23-05-990-834-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:
ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

B0071101
2935555 S0000711387_V1

Dimensional Information
Figure 825/72-23-05-990-834-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FT-FT

FU-FU

B0071201

2935567 S0000711388_V1

Dimensional Information
Figure 825/72-23-05-990-834-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FT-FT

A

126 (3.2)

NOTE:

ROUGHNESS ARE IN MICROINCHES
(MICROMETERS ARE IN PARENTHESES).

B0071301

2935569 S0000711389_V1

Machining of the Fan Frame Shroud Holes
Figure 826/72-23-05-990-835-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL: A286 (E-Z6NCT25)

63 (1.6)

NOTE:
ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).
ROUGHNESS ARE IN MICROINCHES
(MICROMETERS ARE IN PARENTHESES).

B0071401

2935581 S0000711390_V1

Locally Manufactured Bushing
Figure 827/72-23-05-990-836-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0071501

2935599 S0000711391_V1

Installation and Check of the Bushing Location
Figure 828/72-23-05-990-837-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-05-300-810-F00

10. Fan Frame Shroud (Inner skin areas of the IDG Air/Oil Cooler by blending) Repairs

(Figure 829)

A. General

(1) This procedure gives the instructions to repair the inner skin areas of the IDG air/oil cooler by blending.

NOTE: This repair can be applied only if access is possible.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-21-00-100-802-F00	Hand Wipe Solvent Degreasing With Chemical Agent (P/B 201)
70-21-00-100-803-F00	Light Duty Aqueous Cleaning (Immersion) with Chemical Agent (P/B 201)
70-21-00-100-804-F00	All Materials Solvent Degreasing with Chemical Agent (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-43-42-300-803-F00	Blending Procedures - Power Blending (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
B00148	Solvent - Methyl Ethyl Ketone (MEK)	ASTM D740
B00676 [CP1041]	Alcohol - Isopropyl	
B00682 [CP2011]	Solvent - Stoddard	MIL-PRF-680 Type I, II or III
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
B50196 [CP2470]	Cleaner - BONDERITE C-AK 5948DPM AERO (TURCO 5948 DPM)	
B50290 [CP2559]	Solvent - degreasing, Ardrox 5503	
B50291 [CP2560]	Solvent - cleaning - BONDERITE C-SO IND 79 AERO (TURCO IND79)	
B50333 [CP2687]	Solvent - Degreasing, Diestone DLS	
B50344 [CP2726]	Solvent - Supersolve AS	

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Description	Specification
B50345 [CP2727]	Solvent - Lotoxane Fast	
B50394 [CP2615]	Cleaner - Mild Alkaline - Super Bee 300LF	
G51478 [S1096]	Etchant - Aluminum Alloy	
G51774 [S1240]	Solution - Chemical, Ardrox 6376	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Repair

SUBTASK 72-23-05-860-060-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-061-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-860-062-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO NOT OPERATE tag, STD-858 on the applicable START switch.

SUBTASK 72-23-05-010-013-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

G. Fan Frame Shroud (Inner skin areas of the IDG air/oil cooler by blending) Repairs

SUBTASK 72-23-05-010-014-F00

(1) If necessary, remove the hardware from the fan frame shroud.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-05-320-005-F00

(2) Remove the indication on the inner skin of the IDG air/oil cooler.

> **WARNING** DO NOT BREATHE THE PARTICLES, OR GET THEM IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES AND OTHER EQUIPMENT FOR PROTECTION. THESE PARTICLES CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(a) Blend the inner skin areas of the IDG air/oil cooler on the fan frame shroud (TASK 70-10-07-800-801-F00 or TASK 70-43-42-300-803-F00).

NOTE: Do not remove more material than necessary.

SUBTASK 72-23-05-100-004-F00

> **WARNING** ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

> **WARNING** METHYL ETHYL KETONE IS POISONOUS. USE PERSONAL-PROTECTION EQUIPMENT. MAKE SURE THAT THERE IS GOOD AIRFLOW OR INJURY CAN OCCUR.

> **WARNING** ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE. USE PROTECTION EQUIPMENT. MAKE SURE THAT YOU USE ISOPROPYL ALCOHOL IN AN AREA WITH AIRFLOW. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

> **WARNING** STODDARD SOLVENT IS FLAMMABLE. DO NECESSARY PRECAUTIONS AGAINST FIRE. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL CAN OCCUR.

(3) Clean and control the part.

(a) Depending on the condition of the part, its size, the extent of the area to be cleaned, use one of the products and / or solutions listed below:

NOTE: Use the product and / or solution chosen with one of the recommended standards practices.

1) Remove the grease from the blended areas with acetone solvent, B01058 [CP1039] or alcohol, B00676 [CP1041] or stoddard solvent, B00682 [CP2011] or Ardrox 5503, B50290 [CP2559] or BONDERITE C-SO IND 79 AERO solvent, B50291 [CP2560] or degreasing solvent, B50333 [CP2687] or solvent, B50345 [CP2727]. Refer to All Materials Solvent Degreasing with Chemical Agent, TASK 70-21-00-100-804-F00.

a) Make sure that no solvent remains, and fully dry the part.

2) Remove the grease from the blended areas with BONDERITE C-AK 5948DPM AERO cleaner, B50196 [CP2470] or Super Bee 300LF cleaner, B50394 [CP2615] or Ardrox 6376 chemical solution, G51774 [S1240]. Refer to Light Duty Aqueous Cleaning (Immersion) with Chemical Agent, TASK 70-21-00-100-803-F00.

a) Make sure that no solvent remains, and fully dry the part.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

3) Remove the grease from the blended areas with acetone solvent, B01058 [CP1039] or solvent, B00148 or alcohol, B00676 [CP1041] or degreasing solvent, B50333 [CP2687] or solvent, B50344 [CP2726]. Refer to Hand Wipe Solvent Degreasing With Chemical Agent, TASK 70-21-00-100-802-F00.

a) Make sure that no solvent remains, and fully dry the part.

(b) Do a dimensional inspection of the blended areas.

1) Make sure that the minimum thickness (DIM. A) 0.157 in. (4.0 mm) of the fan frame shroud is respected.

(c) Do a locally swab etching of the repaired areas with aluminum alloy etchant, G51478 [S1096]. Refer to Local Swab Etching - Maintenance Practices, TASK 70-10-11-800-801-F00.

(d) Do a fluorescent penetrant inspection (TASK 70-40-01-230-801-F00) and as follows:

1) Use sensitivity level 3.

2) Indications more than 0.0118 in. (0.30 mm) are not permitted.

3) Linear indications are not permitted.

NOTE: Linear indications are indications that are at least four times longer than they are wide.

SUBTASK 72-23-05-300-020-F00

(4) Do a spot touch-up of oxide film coating on aluminum alloys for protection (TASK 70-10-04-380-801-F00).

SUBTASK 72-23-05-210-011-F00

(5) Do a visual inspection of the blended inner skin areas of the IDG air/oil cooler.

SUBTASK 72-23-05-410-010-F00

(6) If it is necessary, install the hardware on the fan frame shroud.

H. Put the Airplane Back to Its Usual Condition

CAUTION

MAKE SURE THAT YOU REMOVE ALL TOOLS, LOOSE PARTS AND UNWANTED MATERIAL FROM THE AREA WHEN YOU COMPLETE MAINTENANCE. DAMAGE TO EQUIPMENT COULD OCCUR.

SUBTASK 72-23-05-940-001-F00

(1) Make sure that you remove all tools, parts and unwanted material from the fan frame.

SUBTASK 72-23-05-860-063-F00

(2) Remove the DO NOT OPERATE tag, STD-858 from the START switch.

SUBTASK 72-23-05-860-064-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-05-860-065-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-011-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

3015375 S0000788695_V1

Inner Skin Blended Area of the IDG Air/Oil Cooler
Figure 829/72-23-05-990-840-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

3015376 S0000788696_V1

Inner Skin Blended Area of the IDG Air/Oil Cooler
Figure 829/72-23-05-990-840-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INNER RADIAL DRIVE SHAFT ASSEMBLY - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of the inner radial drive shaft assembly.

(2) The installation of the inner radial drive shaft assembly.

TASK 72-23-06-000-801-F00

2. Inner Radial Drive Shaft Assembly Removal

(Figure 401)

A. References

Reference	Title
72-62-00-000-801-F00	Transfer Gearbox Assembly Removal (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8266	Pusher/Puller - Radial Drive Shaft Part #: 856A3708G01 Supplier: 58828

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 72-23-06-210-001-F00

(1) Do this task: Transfer Gearbox Assembly Removal, TASK 72-62-00-000-801-F00.

E. Inner Radial Drive Shaft Removal

SUBTASK 72-23-06-020-002-F00

(1) Do these steps to remove the inner radial drive shaft assembly [3]:

(a) Remove the bolts [1] from the drive shaft housing [2].

NOTE: The drive shaft housing [2] is on the fan frame shroud at the 9:00 o'clock (strut No. 10) position.

(b) Install the radial drive shaft pusher/puller tool, SPL-8266 in the drive shaft housing [2].

(c) Install a rod with a slide hammer on the puller.

(d) Remove the inner radial drive shaft [5] from the strut.

(e) Remove the puller from the drive shaft housing [2].

(f) Remove the inner radial drive shaft [5] from the splines of the radial IGB bevel gear.

(g) Remove and discard the O-ring [4].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Inner Radial Drive Shaft Assembly
Figure 401/72-23-06-990-801-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

REMOVAL OF THE INNER RADIAL DRIVE SHAFT ASSEMBLY

A-A

2965898 S0000744678_V1

Inner Radial Drive Shaft Assembly
Figure 401/72-23-06-990-801-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Inner Radial Drive Shaft Assembly
Figure 401/72-23-06-990-801-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-06-400-801-F00

3. Inner Radial Drive Shaft Assembly Installation

(Figure 401)

A. References

Reference	Title
72-62-00-400-801-F00	Transfer Gearbox Assembly Installation (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8266	Pusher/Puller - Radial Drive Shaft Part #: 856A3708G01 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00672 [CP5070]	Vaseline - Pure Mineral	V V-P-236

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
4	O-ring	72-20-00-01-485	LOM ALL

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Inner Radial Drive Shaft Assembly Installation

SUBTASK 72-23-06-420-002-F00

(1) Do these steps to install the inner radial drive shaft assembly [3]:

> **WARNING**
> DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(a) Lubricate the new O-ring [4] with vaseline, D00672 [CP5070].

(b) Install the O-ring [4] on the drive shaft housing [2].

(c) Lubricate the threads of the bolts [1] with oil, D00599 [CP2442].

(d) Do these steps to install the inner radial drive shaft assembly [3] in the splines of the radial Inlet Gearbox (IGB) bevel gear at the 9:00 o'clock (strut No. 10) position.

1) Engage the lugs of the radial drive shaft pusher/puller tool, SPL-8266 in the slots of the inner radial drive shaft [5].

2) Push and turn the pusher to engage the shaft splines in the IGB bevel gear.

(e) Remove the pusher from the inner radial drive shaft assembly [3].

(f) Make sure the drive shaft housing [2] is correctly seated on the fan frame shroud.

(g) Install the bolts [1] to attach the drive shaft housing [2] to the fan frame shroud.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Torque the bolts [1] to 140 in-lb (16 N·m)-160 in-lb (18 N·m).

SUBTASK 72-23-06-210-002-F00

(2) Do this task: Transfer Gearbox Assembly Installation, TASK 72-62-00-400-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INNER RADIAL DRIVE SHAFT - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) A detailed inspection of the inner radial drive shaft.

TASK 72-23-06-200-801-F00

2. Inner Radial Drive Shaft Inspection

A. General

(1) This task is the inspection of the inner radial drive shaft.

B. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
72-23-06-000-801-F00	Inner Radial Drive Shaft Assembly Removal (P/B 401)
72-23-06-400-801-F00	Inner Radial Drive Shaft Assembly Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare For the Inspection

SUBTASK 72-23-06-020-001-F00

(1) Do this task: Inner Radial Drive Shaft Assembly Removal, TASK 72-23-06-000-801-F00.

E. Procedure

SUBTASK 72-23-06-900-001-F00

(1) If you find damage that is not in the limits, replace the inner radial drive shaft, unless you are given other instructions.

SUBTASK 72-23-06-220-001-F00

(2) Do a check of the inner radial drive shaft:

(a) Nicks and dents

1) All damage is permitted with these limits:

a) Not more than 0.025 inch (0.64 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

(b) Scratches

1) All damage is permitted with these limits:

a) You cannot feel the scratch with a 0.03 inch (0.76 mm) radius scriber.

(c) Cracks

1) Not permitted.

(d) Lack of protective material on non-machined surfaces

1) All damage is permitted with these limits:

a) There is not more than 5 percent of the total surface area that does not have protective material.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(e) Corrosion

1) Not permitted.

(f) Wear

1) Not permitted.

F. Put the Airplane Back to its Usual Condition

SUBTASK 72-23-06-420-001-F00

(1) Do this task: Inner Radial Drive Shaft Assembly Installation, TASK 72-23-06-400-801-F00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN DUCT PANELS - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of the fan duct panels

(2) The installation of the fan duct panels.

TASK 72-23-07-000-801-F00

2. Fan Duct Panel Removal

A. General

(1) Each engine has 12 fan duct panels.

(a) Eleven panels have a grid and the twelfth panel has a scoop.

(2) The removal instructions for all the fan duct panels are equivalent.

(3) All the fan duct panels are on the engine fan frame, between the fan frame struts.

B. References

Reference	Title
75-32-00-730-801-F00	VBV Actuation System - Manual Operation (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 72-23-07-010-001-F00

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSERS (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-07-710-001-F00

(2) Manually operate the VBV actuation system to closed position (TASK 75-32-00-730-801-F00).

E. Remove the Fan Duct Panel

SUBTASK 72-23-07-020-001-F00

(1) Do these steps to remove the applicable fan duct panel (Figure 401):

(a) Loosen the two forward screws [3].

(b) Loosen the two middle screws [4].

(c) Loosen the two aft screws [5].

(d) Loosen the fan duct panel [1] or [2] from the engine.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL PRE SB CFM56-7B-72-202

(e) Disengage the seals on the fan duct panel from the fan frame.

LOM ALL

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Duct Panels Installation
Figure 401/72-23-07-990-801-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03467-00-B

1 BONDED SEAL:
PRE-CFMI-SB 72-202 ONLY

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Fan Duct Panels Installation
Figure 401/72-23-07-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-07-400-801-F00

3. Fan Duct Panel Installation

(Figure 401)

A. References

Reference	Title
75-32-00-730-801-F00	VBV Actuation System - Manual Operation (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Consumable Materials

Reference	Description	Specification
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G Rapid Plus	

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Install the Fan Cowl Panel

SUBTASK 72-23-07-640-001-F00

(1) Do these steps to install the applicable fan cowl panels:

LOM ALL PRE SB CFM56-7B-72-202

(a) Do a check of the seals on the fan duct panels to make sure that they are in good condition.

LOM ALL

(b) Lubricate the threads of the screws [3], [4] and [5] with Molykote G Rapid Plus lubricant, D00640 [CP2104].

SUBTASK 72-23-07-420-001-F00

(2) Do these steps to install the applicable fan duct panel [1] or [2]:

(a) Put the fan duct panel [1] or [2] in its position on the fan frame.

NOTE: Put the fan duct panel [1] with the scoop between struts 5 and 6.

LOM ALL PRE SB CFM56-7B-72-202

CAUTION

INSTALL THE TWO LONGER SCREWS ON THE REAR PART OF THE FAN DUCT PANEL WITH THE SCOOP. IF YOU DO NOT OBEY THE INSTRUCTIONS, DAMAGE TO EQUIPMENT CAN OCCUR.

1) Make sure the seals on the fan duct panel engage correctly.

LOM ALL

2) Tighten the screws [3], [4] and [5] to 60-65 pound-inches (6.6 - 7.3 Newton meters).

E. Put the Airplane Back to its Usual Condition

SUBTASK 72-23-07-710-002-F00

(1) Manually operate the VBV actuation system to open position (TASK 75-32-00-730-801-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-23-07-010-003-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN DUCT PANELS - INSPECTION/CHECK

1. General

A. This procedure has one task.

(1) The inspection of the fan duct panels and the LPTACC strut panel.

TASK 72-23-07-200-801-F00

2. Fan Duct Panels Inspection

(Figure 601)

A. General

(1) This task is to visually examine the fan duct panels, which are installed between the fan frame struts on the mid-box structure.

(a) The Low Pressure Turbine Active Clearance Control (LPTACC) strut panel at position 5 (with a scoop) between strut 5 and 6 is made from epoxy resin with carbon fabric material.

(b) The remaining 11 fan duct panels (referred to as strut panels) are made from titanium.

B. References

Reference	Title
72-23-07-000-801-F00	Fan Duct Panel Removal (P/B 401)
72-23-07-400-801-F00	Fan Duct Panel Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Inspection

SUBTASK 72-23-07-040-001-F00

> **WARNING**
> DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-07-100-001-F00

(2) Clean dirt or unwanted material from the panels.

E. Procedure

SUBTASK 72-23-07-210-002-F00

(1) If you find damage that is not in the limits, replace the panels, unless you are given other instructions.

These are the tasks:

Fan Duct Panel Removal, TASK 72-23-07-000-801-F00,

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Duct Panel Installation, TASK 72-23-07-400-801-F00.

SUBTASK 72-23-07-210-003-F00

(2) Examine the titanium strut panels for damage:

(a) A maximum service extension of 100 cycles is permitted with one missing fan duct panel.

1) Do a check every 10 cycles that the Variable Bleed Valve (VBV) cavity is free of foreign objects.

2) Remove the panel and all the attaching screws.

3) Make sure that all other panels are correctly tightened.

(b) Nicks, dents, and scratches

1) There is no limit to the number of nicks, dents, and scratches which are permitted with this condition:

a) Not more than 0.012 in. (0.3 mm) in depth.

(c) Missing material is not permitted

(d) ENGINES PRE-CFMI-SB 72-202;

Bonded seals

1) Missing or damaged seals are permitted.

a) There is no limit to the amount of missing or damaged seals.

2) Unbonded seal is permitted provided you cut and remove the pieces of unbonded seal.

a) There is no limit to the amount of unbonded seal.

(e) Loose captive bolts

1) Not permitted.

a) Tighten the bolts.

SUBTASK 72-23-07-210-004-F00

(3) Examine the LPTACC strut panel for damage:

(a) Punctures or tears

1) Not serviceable.

(b) Impact, marks, and scratches

1) There is no limit to the number of impact, marks, and scratches which are permitted with this condition:

a) Not more than 0.020 in. (0.5 mm) in depth.

(c) ENGINES PRE-CFMI-SB 72-202;

Bonded seal

1) Missing or damaged seal is permitted.

a) There is no limit to the amount of missing or damaged seal.

2) Unbonded seal is permitted provided you cut and remove the pieces of unbonded seal.

a) There is no limit to the amount of unbonded seal.

(d) VBV cascade vanes

1) Cracks

a) Not serviceable.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) Looseness is not permitted.

(e) LPTACC Scoop

1) Cracks

a) Not serviceable.

2) Impact, marks, or scratches

a) There is no limit to the number of impact, marks, or scratches which are permitted with these conditions:

b) Not more than 0.01 in. (0.25 mm) in depth

c) Not more than 0.59 in. (15 mm) in length

d) Not less than 0.39 in. (10 mm) between two defects.

3) Looseness of the LPTACC scoop is not permitted.

4) Missing or loose bolts are not permitted.

a) Replace or tighten the bolts.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-07-440-001-F00

WARNING	OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Duct Panels Inspection
Figure 601/72-23-07-990-802-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

S-M56-MM-03904-00-B

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Fan Duct Panels Inspection
Figure 601/72-23-07-990-802-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OIL RETURN TUBE NO. 7 STRUT- REMOVAL/INSTALLATION.

1. General

A. This procedure has two tasks:

(1) The removal of the oil return tube of the strut No. 7.

(2) The installation of the oil return tube of the strut No. 7.

TASK 72-23-08-000-801-F00

2. Oil Return Tube No. 7 Strut Removal

(Figure 401)

A. General

(1) This task is the removal procedure for the oil return tube from strut No. 7.

(2) The oil return tube is installed in strut No. 7 at the 6:00 o'clock position.

B. References

Reference	Title
12-15-31-610-802	Main Landing Gear Shock Strut Servicing, Airplane on the Ground (P/B 301)
70-30-01-910-802-F00	Seals (Preformed Packings and O-Rings) and Gaskets (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 72-23-08-860-001-F00

(1) For Engine No.1.

(a) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A

SUBTASK 72-23-08-860-002-F00

(2) For Engine No. 2.

(a) Open these circuit breakers and install safety tags:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	7	C01391	ENGINE 2 ALTN PWR CHAN B
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

SUBTASK 72-23-08-010-001-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Strut No. 7 Oil Return Tube Removal

WARNING DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING DO NOT LET HOT OIL GET ON YOU. AFTER FIVE MINUTES WHEN THE APU STOPS, LET THE OIL SYSTEM PRESSURE GO TO ZERO. PUT ON PROTECTIVE CLOTHES, GOGGLES AND EQUIPMENT, OR LET THE APU BECOME COOL. IF YOU REMOVE THE OIL FILLER CAP WITH THE OIL SYSTEM PRESSURIZED, A SPRAY OF HOT OIL CAN BURN YOU.

CAUTION DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

SUBTASK 72-23-08-020-001-F00

(1) Disconnection of the forward sump (oil scavenge) tube [2] from the oil return tube [1]:

(a) Remove the bolts [3].

(b) Disconnect the forward sump (oil scavenge) tube [2] from the oil return tube [1].

(c) Remove and examine the gasket [4] (Seals (Preformed Packings and O-Rings) and Gaskets, TASK 70-30-01-910-802-F00).

1) Discard the gasket [4], if it is in unsatisfactory condition.

2) Keep the gasket [4] for the subsequent installation, if it is in good condition.

SUBTASK 72-23-08-020-002-F00

(2) Remove the bolts [5] which attach the oil return tube [1] and the bracket assembly [6] to the fan frame shroud.

SUBTASK 72-23-08-020-003-F00

(3) Remove the oil return tube [1].

NOTE: It could be necessary to lift the airplane to get sufficient clearance between the engine and the ground. To get this clearance, extend the main and nose landing gear shock struts with dry air or nitrogen (TASK 12-15-31-610-802).

SUBTASK 72-23-08-020-004-F00

(4) Remove and discard the o-rings [7].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Oil Return Tube No. 7 Strut
Figure 401/72-23-08-990-801-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Oil Return Tube No. 7 Strut
Figure 401/72-23-08-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-23-08-400-801-F00

3. **Oil Return Tube No. 7 Strut Installation**

(Figure 401)

A. General

(1) This task is the installation procedure for the oil return tube in strut No. 7.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
12-15-31-610-802	Main Landing Gear Shock Strut Servicing, Airplane on the Ground (P/B 301)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00601 [CP2101]	Vaseline - Graphite Mineral	
D00672 [CP5070]	Vaseline - Pure Mineral	V V-P-236

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Oil return tube	72-23-00-03-145	LOM ALL
4	Gasket	79-21-00-01-165	LOM 402, 404, 406, 407, 411, 416, 445
		79-21-00-01A-255	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
7	O-ring	72-23-00-03-110	LOM ALL

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Strut No. 7 Oil Return Tube Installation

SUBTASK 72-23-08-600-001-F00

(1) Lubrication of the components:

(a) Lubricate new o-rings [7] with vaseline, D00672 [CP5070].

(b) Lubricate a serviceable gasket [4] with vaseline, D00672 [CP5070].

(c) Lubricate the threads of the bolts [3] with graphite mineral vaseline, D00601 [CP2101].

> **WARNING** DO NOT LET OIL STAY ON YOUR SKIN. THE SYNTHETIC OIL CONTAINS ADDITIVES THAT CAN BE POISONOUS IF THEY ARE ABSORBED THROUGH THE SKIN. CLEAN AWAY ALL OIL THAT GETS ON THE SKIN.

(d) Lubricate the threads of the bolts [5] with graphite mineral vaseline, D00601 [CP2101]or oil, D00599 [CP2442].

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SUBTASK 72-23-08-420-001-F00

(2) Installation of the oil return tube [1] in strut No. 7:

(a) Install the new o-rings [7] in the grooves of the oil return tube [1].

(b) Put the oil return tube [1] in its position in the strut No. 7.

(c) Attach the bracket assembly [6] and the oil return tube [1] to the fan frame shroud with the bolts [5].

(d) Torque the bolts [5] to 97 in-lb (11 N·m) - 110 in-lb (12.4 N·m).

SUBTASK 72-23-08-420-002-F00

(3) Installation of the oil return tube [1] on the forward sump (oil scavenge) tube [2]:

(a) Put the gasket [4] in its position between the oil return tube [1] and the forward sump (oil scavenge) tube [2].

(b) Attach the forward sump (oil scavenge) tube [2] and the gasket [4] to the oil return tube [1] with the bolts [3].

(c) Torque the bolts [3] to 97 in-lb (11 N·m) - 110 in-lb (12.4 N·m).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-08-410-001-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-23-08-860-003-F00

(2) For Engine No. 1:

(a) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A

SUBTASK 72-23-08-860-004-F00

(3) For Engine No. 2:

Remove the safety tags and close these circuit breakers:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	7	C01391	ENGINE 2 ALTN PWR CHAN B
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

SUBTASK 72-23-08-610-001-F00

(4) If the main and nose landing gear shock struts were extended for clearance between the engine and the ground, retract the struts to their usual service band limits.

(a) Do this task: Main Landing Gear Shock Strut Servicing, Airplane on the Ground, TASK 12-15-31-610-802.

H. Strut No. 7 Oil Return Tube Test

SUBTASK 72-23-08-700-001-F00

(1) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

SUBTASK 72-23-08-600-002-F00

(2) If the oil level is low, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

END OF TASK

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FAN INLET CASE - INSPECTION/CHECK

1. **General**

A. This procedure has these tasks:

(1) A detailed inspection of the fan inlet case.

(2) An erosion inspection of the fan inlet case.

(3) A template inspection of the fan inlet case.

TASK 72-24-01-200-801-F00

2. **Fan Inlet Case Inspection (Detail)**

(Figure 601, Figure 602, Figure 603, Figure 604, Figure 605, Figure 606, Figure 607, and Figure 608)

A. General

(1) This task is the detailed inspection of the fan inlet case.

B. References

Reference	Title
26-10-00-710-801	Fire and Overheat Detection System - Operational Test (P/B 501)
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-40-01-910-801-F00	Fluorescent Penetrant Inspection (Water Washable) (P/B 201)
72-24-01-300-802-F00	Removal of the Corrosion in the Self-Locking Nuts Holes by Drilling (P/B 801)
72-24-01-300-803-F00	Removal of the Corrosion in the Self-Locking Nuts Holes by Bushing Installation (P/B 801)
72-24-01-300-804-F01	Removal of Corrosion/Fretting Under and Around Gang Channel Nuts by Blending (P/B 801)
72-24-01-300-806-F00	Reconditioning of the Attachment Holes on Flange A1 by Bushing (P/B 801)
72-24-01-300-807-F00	Reconditioning of the Attachment Holes on Flange A1 by Drilling (P/B 801)
72-24-01-300-808-F00	Repair of Flange A1 Area G by Blending (P/B 801)
72-24-01-300-809-F00	Repair of the Radii of Flanges A1, B1, B2, B3, B4, B5, and B6 on the Containment Case by Blending (P/B 801)
72-24-01-300-810-F00	Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit (P/B 801)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

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Reference	Description
SPL-23266	Repair Kit - Fan Case, A1 Flange Part #: 856A4708G01 Supplier: 58828
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-858	Tag - DO NOT OPERATE

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-24-01-040-001-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-040-002-F00

(2) Make sure that the start levers are in the CUTOFF position.

SUBTASK 72-24-01-040-004-F00

(3) Install a DO NOT OPERATE tag, STD-858, on the applicable start switch.

SUBTASK 72-24-01-010-001-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-24-01-480-001-F00

CAUTION PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(5) Install a protective mat, STD-585, in the inlet cowl.

F. Examine the Shroud of the Fan Inlet Case

SUBTASK 72-24-01-210-002-F00

(1) Remove the high metal (TASK 70-10-07-800-801-F00).

SUBTASK 72-24-01-210-003-F00

(2) Do a local swab etching of the blended area (TASK 70-10-11-800-801-F00).

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SUBTASK 72-24-01-210-004-F00

(3) Do a Fluorescent Penetrant Inspection (FPI) of the suspected areas (TASK 70-40-01-230-801-F00).

SUBTASK 72-24-01-210-001-F00

(4) Do a check of the fan inlet case for damage (Figure 601, Figure 602, Figure 603, or Figure 604):

(a) Cracks (except for holes 84/85 and 103/104 on B1 flange).

1) Cracks are not permitted.

2) Missing material is not permitted.

3) Cracked holes 84/85 on B1 flange, refer to SB 72-0780.

4) Cracked holes 103/104 on B1 flange at location of fire detector bracket P/N 332A2920-XXX, refer to SB 72-0580 (Figure 603).

a) A Continue-In-Service (CIS) limit of 10 cycles is permitted, provided the following:

<1> The CIS limit is permissible only if one of the two lugs used at bracket P/N 332A2920-XXX is cracked or broken. Confirm by General Visual Inspection (GVI) of B1 flange approximately 11:30 o'clock Aft Looking Forward.

<2> The CIS limit is permissible only if the operational test for the fire and overheat detection is accomplished without fault (TASK 26-10-00-710-801).

<3> If both conditions are not met, proceed with B1 flange repair without deferral.

(b) Erosion on Areas 4, 5 and 6 (Figure 603).

1) Do this task: Fan Inlet Case Erosion Inspection, TASK 72-24-01-270-801-F00.

LOM ALL POST SB 737-CFM56-7B-72-0553

2) Missing anti-erosion paint: Any amount.

LOM ALL

(c) Nicks, dents, and scratches on the fan inlet case (Figure 603).

NOTE: The trinomial inspection is the quickest method but gives you less margin in terms of limits. The template inspection takes more time but gives larger limits.

NOTE: For areas 4, 5 and 6 post CFM56-7B-SB 72-0553, the following inspections are applicable after removal of a 13.937 in. (354 mm) radius anti-erosion paint around the nick, dent or scratch to check if other ones are present below anti-erosion paint.

NOTE: One of the three following inspections shall be used for inspection of nicks, dents and scratches of the inner and outer skin of the fan inlet case.

NOTE: Inspection of FWD and AFT zones (FWD zone: Areas 1 and 2, AFT zone: Areas 4, 5, and 6) shall be carried using only one inspection method. Each zone can be controlled with a different method. Area 3 can only be inspected per Inspection 2.

- Inspection 1 is the simplest inspection method that does not take into account indications with a depth of 0.004 in. (0.1 mm) or less (only applicable for Areas 1 and 2). For Post SB 72–0931 parts, we recommend that you use Inspection 2 which is more permissive.

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- Inspection 2 is the most common trinomial inspection method and takes into account all nicks, dents and scratches, whatever their depth (applicable for all Areas).
- Inspection 3 is the most efficient inspection method and provides the biggest range of indication allowance (only applicable for Areas 1, 2, 4, 5 and 6).

NOTE: Among Inspections 1, 2 and 3, if one inspection or more pass, the fan inlet case is serviceable.

1) Alternative procedure available - Simplified Criteria for Areas 1 and 2 only.

NOTE: Indications with a depth of 0.004 in. (0.1 mm) or less are not taken into account and are considered as acceptable whatever the distance with other indications.

NOTE: Take into account the distance between two indications all around the area without area restriction.

Example: If the indication one [Depth = 0.010 in. (0.25 mm); Length = 0.90 in. (22.86 mm)] is in Area 1 at 1.0 in. (25.4 mm) from Area 2, then no indication is permitted in Areas 1 and 2 if the distance is less than 3.0 in. (76.2 mm).

NOTE: Two opposite indications or repairs on outer and inner skin are not permitted.

a) All indications with depth up to 0.004 in. (0.1 mm) are permitted within these limits:

Table 601/72-24-01-993-806-F00 Fan Inlet Case Indication Limits

Area	Max. Depth Dim. X	Max. Length Dim. Y	Distance Between Two Indications Dim. Z
1	0.006 in. (0.15 mm)	1.0 in. (25.4 mm)	0.57 in. (14.47 mm)
1	0.012 in. (0.3 mm)	1.0 in. (25.4 mm)	3.0 in. (76.2 mm)
1	0.02 in. (0.508 mm)	0.40 in. (10.16 mm)	2.8 in. (71.12 mm)
1	0.031 in. (0.8 mm)	0.40 in. (10.16 mm)	10.0 in. (254 mm)
2	0.006 in. (0.15 mm)	1.0 in. (25.4 mm)	0.57 in. (14.47 mm)
2	0.0177 in. (0.45 mm)	1.0 in. (25.4 mm)	3.0 in. (76.2 mm)
2	0.02 in. (0.508 mm)	0.40 in. (10.16 mm)	2.8 in. (71.12 mm)

2) Alternate procedure available - Trinomial Inspection.

a) All damage is permitted with these limits:

NOTE: Take into account the distance between two damages all around the area without area restriction.

Example: If the damage one [Depth = 0.010 in. (0.25 mm); Length = 0.90 in. (22.86 mm)] is in Area 1 at 1.0 in. (25.4 mm) from Area 2, then no damage is permitted in Areas 1, 2 and 3 if the distance is less than 3.0 in. (76.2 mm) (Figure 603).

NOTE: Damages in the opposite inner skin and outer skin are not permitted.

NOTE: Indications in radius or on flanges are not permitted.

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LOM 402, 404, 406, 407, 411, 412, 415, 416, 420, 422-431, 433, 434, 437-447, 450-999 PRE SB 737-CFM56-7B-72-0032

Table 602/72-24-01-993-801-F00 Fan Inlet Case Damage Limits

Area	Max. Depth	Max. Length	Distance Between Two Damages
1	0.006 in. (0.15 mm)	1.0 in. (25.4 mm)	0.12 in. (3.048 mm)
1	0.012 in. (0.3 mm)	1.0 in. (25.4 mm)	3.0 in. (76.2 mm)
1	0.02 in. (0.508 mm)	0.40 in. (10.16 mm)	2.05 in. (52.07 mm)
1	0.031 in. (0.8 mm)	0.50 in. (12.7 mm)	10.0 in. (254 mm)
2	0.006 in. (0.15 mm)	1.0 in. (25.4 mm)	0.12 in. (3.048 mm)
2	0.0177 in. (0.45 mm)	1.0 in. (25.4 mm)	3.0 in. (76.2 mm)
2	0.02 in. (0.508 mm)	0.40 in. (10.16 mm)	2.05 in. (52.07 mm)
2	0.059 in. (1.5 mm)	1.0 in. (25.4 mm)	10.0 in. (254 mm)
3 (inner skin)	NOT PERMITTED	NOT PERMITTED	NOT PERMITTED
4&5	0.0252 in. (0.64 mm)	1.0 in. (25.4 mm)	10.00 in. (254 mm)
4&5	0.0252 in. (0.64 mm)	0.394 in. (10.0 mm)	5.865 in. (149 mm)
4&5	0.04 in. (1.016 mm)	0.50 in. (12.7 mm)	9.055 in. (230 mm)
6	0.039 in. (1.0 mm)	1.0 in. (25.4 mm)	12.60 in. (320.04 mm)
6	0.039 in. (1.0 mm)	0.591 in. (15 mm)	9.06 in. (230 mm)
NOTE: More specifically for Area 3, indications on outer skin are not permitted.			

LOM 402, 404, 406, 407, 411, 412, 415, 416, 420, 422-431, 433, 434, 437-447, 450-999 POST SB 737-CFM56-7B-72-0032 AND PRE SB 737-CFM56-7B-72-0931; LOM 432 PRE SB 737-CFM56-7B-72-0931

Table 603/72-24-01-993-802-F00 Fan Inlet Case Damage Limits

Area	Max. Depth	Max. Length	Distance Between Two Damages
1	0.006 in. (0.15 mm)	1.0 in. (25.4 mm)	0.12 in. (3.048 mm)
1	0.012 in. (0.3 mm)	1.0 in. (25.4 mm)	3.0 in. (76.2 mm)
1	0.02 in. (0.508 mm)	0.40 in. (10.16 mm)	2.05 in. (52.07 mm)
1	0.031 in. (0.8 mm)	0.50 in. (12.7 mm)	10.0 in. (254 mm)
2	0.006 in. (0.15 mm)	1.0 in. (25.4 mm)	0.12 in. (3.048 mm)
2	0.0177 in. (0.45 mm)	1.0 in. (25.4 mm)	3.0 in. (76.2 mm)
2	0.02 in. (0.508 mm)	0.40 in. (10.16 mm)	2.05 in. (52.07 mm)
2	0.059 in. (1.5 mm)	1.0 in. (25.4 mm)	10.0 in. (254 mm)
3 (inner skin)	0.0039 in. (0.1 mm)	ANY AMOUNT	ANY AMOUNT
4&5	0.0252 in. (0.64 mm)	1.0 in. (25.4 mm)	10.00 in. (254 mm)
4&5	0.0252 in. (0.64 mm)	0.394 in. (10.0 mm)	5.865 in. (149 mm)

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LOM 402, 404, 406, 407, 411, 412, 415, 416, 420, 422-431, 433, 434, 437-447, 450-999 POST SB 737-CFM56-7B-72-0032 AND PRE SB 737-CFM56-7B-72-0931; LOM 432 PRE SB 737-CFM56-7B-72-0931 (Continued)

Table 603/72-24-01-993-802-F00 Fan Inlet Case Damage Limits (Continued)

Area	Max. Depth	Max. Length	Distance Between Two Damages
4&5	0.04 in. (1 mm)	0.50 in. (12.7 mm)	9.055 in. (230 mm)
6	0.039 in. (1.0 mm)	1.0 in. (25.4 mm)	12.60 in. (320.04 mm)
6	0.039 in. (1.0 mm)	0.591 in. (15 mm)	9.06 in. (230 mm)

Table 604/72-24-01-993-807-F00 Fan Inlet Case Indication Limits

Areas	Depth	Length	Distance Between Two Indications
3A	0.0315 in. (0.8 mm)	1.181 in. (30 mm)	1.693 in. (43 mm)
3A	0.0354 in. (0.9 mm)	1.181 in. (30 mm)	4.567 in (116 mm)
3A	0.0512 in. (1.3 mm)	1.181 in. (30 mm)	5.748 in. (146 mm)

- On outer skin Area 3A, indications with a depth less than 0.0236 in. (0.6 mm) are not taken into account and are considered as acceptable.
- All other indications are permitted on outer skin Area 3A within limits listed above.

NOTE: For outer skin Area 3A, a serviceable impact can be in opposite to a serviceable impact on inner skin, even underneath the abradable shroud.

NOTE: On outer skin Area 3B, all indications are permitted within these limits: 0.0039 in. (0.10 mm) max. depth, if the cumulated length of all the indications within a 9.84 in. (250 mm) radius is less than 7.087 in. (180 mm), and if there is no opposite indication on inner skin in a radius of 9.84 in. (250 mm).

LOM ALL POST SB 737-CFM56-7B-72-0931

Table 605/72-24-01-993-808-F00 Fan Inlet Case Indication Limits

Area	Max. Depth	Max. Length	Distance Between Two Indications
1&2	0.019 in. (0.5 mm)	1.00 in. (25.40 mm)	0.57 in. (14.47 mm)
1&2	0.023 in. (0.6 mm)	1.00 in. (25.40 mm)	3.00 in. (76.20 mm)
1&2	0.053 in. (1.35 mm)	0.40 in. (10.16 mm)	2.80 in. (71.12 mm)

- Indications on areas 1 and 2 with a depth of less than 0.0118 in. (0.3 mm) are not taken into account and are considered as acceptable.
- All other indications are permitted on areas 1 and 2 within the limits listed above.

Table 606/72-24-01-993-809-F00 Fan Inlet Case Indication Limits

Areas	Depth	Length	Distance Between Two Indications
3A	0.0433 in. (1.1 mm)	1.181 in. (30 mm)	4.567 in. (116 mm)
3A	0.0473 in. (1.2 mm)	1.181 in. (30 mm)	5.748 in. (146 mm)

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LOM ALL POST SB 737-CFM56-7B-72-0931 (Continued)

Table 606/72-24-01-993-809-F00 Fan Inlet Case Indication Limits (Continued)

Areas	Depth	Length	Distance Between Two Indications
• On outer skin Area 3A, indications with a depth less than 0.0394 in. (1 mm) are not taken into account and are considered as acceptable. • All other indications are permitted on out skin Area 3A within the limits listed above.			

Table 607/72-24-01-993-810-F00 Fan Inlet Case Indication Limits

Areas	Depth	Length	Distance Between Two Indications
3B	0.00787 in. (0.2 mm)	1.181 in. (30 mm)	4.567 in. (116 mm)
3B	0.0118 in. (0.3 mm)	1.181 in. (30 mm)	5.748 in. (146 mm)
• On outer skin Area 3B, indications with a depth less than 0.0039 in. (0.1 mm) are not taken into account and are considered as acceptable. • All other indications are permitted on outer skin Area 3B within the limits listed above.			
NOTE: For outer skin Areas 3A and 3B, a serviceable impact can be in opposite to a serviceable impact on inner skin, even underneath the abradable shroud.			
NOTE: On inner skin Area 3, the abradable shroud must be removed within a 9.843 in. (250 mm) radius around the indication. All indications on the inner skin Area 3 are permitted within these limits: 0.0039 in. (0.10 mm) max. depth if the cumulated length of all indications within a 9.84 in. (250 mm) radius in Area 3 is less than 7.087 in. (180 mm).			

Table 608/72-24-01-993-811-F00 Fan Inlet Case Indication Limits

Area	Max. Depth	Max. Length	Distance Between Two Indications
4&5	0.023 in. (0.60 mm)	1.00 in. (25.40 mm)	1.00 in. (25.40 mm)
4&5	0.031 in. (0.80 mm)	0.393 in. (10.0 mm)	1.00 in. (25.40 mm)
4&5	0.039 in. (1.00 mm)	0.236 in. (6.0 mm)	1.00 in. (25.40 mm)
• Indications with a depth less than 0.0157 in. (0.4 mm) are not taken into account and are considered as acceptable. • All other indications are permitted on area 4 and 5 within the limits listed above.			

Table 609/72-24-01-993-812-F00 Fan Inlet Case Indication Limits

Area	Max. Depth	Max. Length	Distance Between Two Indications
6	0.039 in. (1.00 mm)	1.00 in. (25.40 mm)	12.60 in. (320.04 mm)
6	0.039 in. (1.00 mm)	0.591 in. (15.00 mm)	9.055 in. (230.00 mm)
• All indications are permitted on area 6 within the limits listed above.			

LOM ALL

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b) If you find nicks, dents, or scratches into the parent material of the case, do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

NOTE: No protruded material is permitted in the air flow path after the spot touch-up.

3) Alternative procedure - Template Inspection (TASK 72-24-01-220-801-F00).

4) The CIS limit of 25 cycles is permitted with no maximum number of nicks, dents, or scratches as follows:

a) All damages are in the maximum depth limit for each area.

(d) Nicks, dents and scratches on outer skin flange radii A1, B1, B2, B3, B4, B5, and B6 (Figure 604).

1) No indication is permitted.

2) If indication is found, do this task: Repair of the Radii of Flanges A1, B1, B2, B3, B4, B5, and B6 on the Containment Case by Blending, TASK 72-24-01-300-809-F00.

(e) Elongated holes on the fan inlet case flanges (Figure 602):

1) There is no limit to the number of elongated holes for a single or double bracket configuration which are permitted with these conditions:

a) Not more than 0.279 in. (7.1 mm) in width and not more than 0.31 in. (7.9 mm) in length (unidirectional wear) and not more than 0.019 in. (0.5 mm) in depth.

b) Re-install the applicable bracket with the new bolts, washers, and nuts following an initial installation procedure.

2) There is no limit to the number of elongated holes with a double bracket (bracket on each side of the flange) that are permitted with these conditions:

a) Not more than 0.279 in. (7.1 mm) in width and not more than 0.433 in. (11.0 mm) in length (unidirectional wear) and not more than 0.039 in. (1.0 mm) in depth.

b) Re-install the applicable new bracket with the new bolts, washers, and nuts following an initial installation procedure.

c) A CIS limit of 250 cycles is permitted to replace the bracket.

(f) Riveted nuts holes and gang channel nut holes:

1) Corrosion/Fretting

a) Not serviceable.

b) To repair with these limits, do these steps:

<1> Not more than 0.3326 in. (8.45 mm) diameter centered on the hole, do this task: Removal of the Corrosion in the Self-Locking Nuts Holes by Drilling, TASK 72-24-01-300-802-F00.

<2> Not more than 0.4448 in. (11.30 mm) diameter centered on the hole, do this task: Removal of the Corrosion in the Self-Locking Nuts Holes by Bushing Installation, TASK 72-24-01-300-803-F00.

<3> Within the limit of the repair, do this task: Removal of Corrosion/Fretting Under and Around Gang Channel Nuts by Blending, TASK 72-24-01-300-804-F01.

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SUBTASK 72-24-01-390-001-F00

(5) Do a spot touch-up of the oxide film coating on the inspected areas (TASK 70-10-04-380-801-F00).

G. Examine the Flanges of the Fan Inlet Case

SUBTASK 72-24-01-220-003-F00

(1) Remove the sharp edges and the high metal (TASK 70-10-07-800-801-F00).

(a) Do not increase the depth of the finding.

SUBTASK 72-24-01-220-004-F00

(2) Do a local swab etching of the blended area (TASK 70-10-11-800-801-F00).

SUBTASK 72-24-01-220-005-F00

(3) Do a FPI (Water Washable) of the suspected areas (TASK 70-40-01-910-801-F00).

SUBTASK 72-24-01-220-006-F00

(4) Do a check of the fan inlet case flanges for indications.

(a) Record the position of a mark "R" if it was found on Area A or Area E of the A1 flange.

1) If it is necessary to remove mark "R" during hand blending, mark "R" at the same position after hand blending is completed (TASK 72-24-01-300-810-F00).

NOTE: Without mark “R” the inlet cannot be assembled.

(b) Examine the A1 flange (Figure 605).

NOTE: If a finding is included in many areas, the most restrictive criterion of the concerned areas should be used.

NOTE: The hand blending ratio must be minimum 10 between the depth and length for areas E and F. No blending ration is required for areas A, B, C, and D.

1) Nicks, dents, and scratches on Area A (top of the inlet cowl lugs including the edge between Area A and Area E).

a) All indications are permitted if not more than 0.2125 in. (5.3975 mm) in axial length, not more than 0.157 in. (3.988 mm) in radial length, and not more than 0.787 in. (19.990 mm) in circumferential length.

2) Nicks, dents, and scratches on Area B (radius of the inlet cowl lugs).

a) All indications are permitted if not more than 0.2125 in. (5.3975 mm) in axial length, not more than 0.2125 in. (5.3975 mm) in radial length, and not more than 0.787 in. (19.990 mm) in circumferential length.

3) Nicks, dents, and scratches on Area C (inner edge of the forward face).

a) All indications are permitted if not more than 0.0787 in. (1.9990 mm) in axial length, not more than 0.0787 in. (1.9990 mm) in radial length, and not more than 0.787 in. (19.990 mm) in circumferential length.

4) Nicks, dents, and scratches on Area D (front face and rear face, except Area G and equipment lugs).

a) All indications are permitted if less than 0.00197 in. (0.0500 mm) in depth or if not more than 0.276 in. (7.0104 mm) in length, not more than 0.0394 in. (1.001 mm) in depth, and with a minimum distance between two findings of 0.984 in. (24.994 mm).

5) Nicks, dents, and scratches on Area E (front, top, and rear face of equipment lugs).

a) For holes 61 to 66:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

<1> No indication is permitted.

b) For all other holes:

<1> No indication is permitted in a circle of diameter 0.512 in. (13.005 mm) around the hole.

<2> All indications are permitted if S<0.0124 in^2 (8.0000 mm^2) with S = axial length x radial length if indication is on the edge, S = depth x length if indication is on the face, and if circumferential length is not more than 1.181 in. (29.997 mm).

6) Nicks, dents, and scratches on Area F.

a) All indications are permitted if S < 0.0093 in^2 (6.0000 mm^2) with S = axial length x radial length, and if circumferential length is not more than 1.575 in. (40.005 mm).

7) Nicks, dents, and scratches on Area G (0.984 in. (25.0 mm) diameter centered on fan inlet cowl holes).

a) No indication is permitted.

b) If indication is found, do this task: Repair of Flange A1 Area G by Blending, TASK 72-24-01-300-808-F00.

8) Corrosion, pitting, elongation for fan inlet cowl bolt holes.

a) No indication is permitted.

b) If hole diameter is less than 0.5303 in. (13.47 mm), do this task: Reconditioning of the Attachment Holes on Flange A1 by Drilling, TASK 72-24-01-300-807-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

NOTE: Hole 1 is not applicable to be repaired with fan case repair kit, SPL-23266 (Figure 605).

c) If indication is within dimensional inspection limits of Dia AS and/or Dia AT and if depth in the aft face is less than 0.079 in. (2.0 mm), do this task: Reconditioning of the Attachment Holes on Flange A1 by Bushing, TASK 72-24-01-300-806-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

NOTE: Hole 1 is not applicable to be repaired with fan case repair kit, SPL-23266 (Figure 605).

9) Corrosion, pitting, elongation for centering pin holes.

a) No indication is permitted.

b) If hole diameter is less than 0.2803 in. (7.12 mm), do this task: Reconditioning of the Attachment Holes on Flange A1 by Drilling, TASK 72-24-01-300-807-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

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c) If indication is within dimensional inspection limits of Dia AU and/or Dia AV and if depth on the forward face is less than 0.079 in. (2.0 mm), do this task: Reconditioning of the Attachment Holes on Flange A1 by Bushing, TASK 72-24-01-300-806-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

10) Corrosion, pitting, elongation for equipment holes.

a) No indication is permitted.

b) If hole diameter is less than 0.2803 in. (7.12 mm), do this task: Reconditioning of the Attachment Holes on Flange A1 by Drilling, TASK 72-24-01-300-807-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

NOTE: Only one hole into the group of five holes No. 31, 32, 33, 34, and 35 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

NOTE: Only one hole into the group of five holes No. 37, 38, 39, 40, and 41 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

NOTE: Only one hole into the group of six holes No. 61, 62, 63, 64, 65, and 66 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

c) If indication is within dimensional inspection limits of Dia AW and/or Dia AX and if depth on the forward face is less than 0.04 in. (1.0 mm), do this task: Reconditioning of the Attachment Holes on Flange A1 by Bushing, TASK 72-24-01-300-806-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

NOTE: Only one hole into the group of five holes No. 31, 32, 33, 34, and 35 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

NOTE: Only one hole into the group of five holes No. 37, 38, 39, 40, and 41 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

NOTE: Only one hole into the group of six holes No. 61, 62, 63, 64, 65, and 66 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

(c) Examine the A1 flange forward face.

1) Fretting, pitting, or corrosion around the fan inlet cowl bolt holes.

a) No indication is permitted.

b) If indication is within dimensional inspection limits of Dia AS, do this task: Reconditioning of the Attachment Holes on Flange A1 by Bushing, TASK 72-24-01-300-806-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

NOTE: Hole 1 is not applicable to be repaired with fan case repair kit, SPL-23266 (Figure 605).

2) Fretting, pitting, or corrosion around centering pin holes.

a) No indication is permitted.

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b) If indication is within dimensional inspection limits of Dia AV and if depth is less than 0.079 in. (2.0 mm), do this task: Reconditioning of the Attachment Holes on Flange A1 by Bushing, TASK 72-24-01-300-806-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

3) Fretting, pitting, or corrosion around equipment holes.

a) No indication is permitted.

b) If indication is within dimensional inspection limits of Dia AW and if depth is less than 0.04 in. (1.0 mm), do this task: Reconditioning of the Attachment Holes on Flange A1 by Bushing, TASK 72-24-01-300-806-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

NOTE: Only one hole into the group of five holes No. 31, 32, 33, 34, and 35 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

NOTE: Only one hole into the group of five holes No. 37, 38, 39, 40, and 41 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

NOTE: Only one hole into the group of six holes No. 61, 62, 63, 64, 65, and 66 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

(d) Examine the A1 flange aft face.

1) Fretting, pitting or corrosion around the fan inlet cowl bolt holes.

a) No indication is permitted.

b) If indication is within dimensional inspection limits of Dia AT and if depth is less than 0.079 in. (2.0 mm), do this task: Reconditioning of the Attachment Holes on Flange A1 by Bushing, TASK 72-24-01-300-806-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

NOTE: Hole 1 is not applicable to be repaired with fan case repair kit, SPL-23266 (Figure 605).

2) Fretting, pitting, or corrosion around centering pin holes.

a) No indication is permitted.

b) If indication is within dimensional inspection limits of Dia AU, do this task: Reconditioning of the Attachment Holes on Flange A1 by Bushing, TASK 72-24-01-300-806-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

3) Fretting, pitting or corrosion around equipment holes.

a) No indication is permitted.

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b) If indication is within dimensional inspection limits of Dia AX, do this task: Reconditioning of the Attachment Holes on Flange A1 by Bushing, TASK 72-24-01-300-806-F00 or Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit, TASK 72-24-01-300-810-F00.

NOTE: Only one hole into the group of five holes No. 31, 32, 33, 34, and 35 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

NOTE: Only one hole into the group of five holes No. 37, 38, 39, 40, and 41 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

NOTE: Only one hole into the group of six holes No. 61, 62, 63, 64, 65, and 66 can be repaired with fan case repair kit, SPL-23266 (Figure 605).

(e) Examine the B1 flange (except lugs 82, 83, 84, 85, 86, 87, 91, 92, 93, 95, 98, 99) (Figure 606).

LOM 402, 404, 406, 407, 411, 412, 415, 416, 420, 422-431, 433, 434, 437-447, 450-999 PRE SB 737-CFM56-7B-72-0032

1) Nicks, dents, and scratches.

a) No indication is permitted.

LOM 432; LOM 402, 404, 406, 407, 411, 412, 415, 416, 420, 422-431, 433, 434, 437-447, 450-999 POST SB 737-CFM56-7B-72-0032

2) Nicks, dents, and scratches on Area A (all edges of the flange).

NOTE: The hand blending ration must be minimum 7.5 between the axial/radial length and the circumferential length.

NOTE: If there is a washer due to repair, be careful to not extend the blended area on it.

a) All indications are permitted if the axial length is less than 0.059 in. (1.499 mm), the radial length is less than 0.059 in. (1.499 mm), and the circumferential length is less than 1.575 in. (40.005 mm).

NOTE: If the dimensions of an impact on an edge are more than the maximum axial and radial lengths after blending, do an estimate of the remaining length of the indication as per criteria of Area B or Area C.

3) Nicks, dents, and scratches on Area B (top areas of the flange, but not the top of the radius between the lugs).

NOTE: The hand blending ratio must be minimum 7.5 between the depth and the length in the circumferential direction.

a) All indications are permitted if the depth is less than 0.0079 in. (0.2007 mm) and the length is less than 1.181 in. (29.997 mm).

4) Nicks, dents, and scratches on Area C (the two faces of the lugs).

NOTE: The hand blending ratio must bet minimum 7.5 between the depth and the length in the circumferential direction.

NOTE: Two opposite indications or repairs on the front and rear sides of the lug are not permitted.

NOTE: If the attachment holes has not been repaired, be careful to not extend the blended area on the attachment holes.

NOTE: If there is a washer due to a repair, be careful to not extend the blended area on it.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

a) All indications are permitted if the depth is less than 0.020 in. (0.508 mm). The total cumulative blended areas must be less than 0.0465 in^2 (29.9999 mm^2).

LOM ALL

(f) Examine the B2 and B3 flanges (Figure 607).

1) Nicks, dents, and scratches

a) All indications are permitted if cumulated circumferential length of all nicks, dents and scratches on one flange 10.24 in. (260.10 mm). For each finding, maximum width 0.0079 in. (0.2007 mm), maximum depth 0.0079 in. (0.2007 mm). If the flange is not acceptable per the above limit, do the steps below:

<1> Nick, dent, and scratch on an edge.

<a> All indications are permitted if circumferential length is not more than 1.997 in. (50.724 mm) and if H x L - (J x K) / 2 - S > 0.

<2> Nick, dent, and scratch on skin.

<a> All indications are permitted if circumferential length is not more than 1.997 in. (50.724 mm) and if H x L - (J x K) - S > 0.

(g) Examine the B4 and B5 flanges (Figure 608).

1) Nicks, dents, and scratches.

a) All indications are permitted within the area defined by Figure 608 if S ≤ 0.025 in^2 (16.129 mm^2):

- - with S = axial length x radial length if the finding is on the edge
- - with S = depth x length if the finding is on the skin.

(h) Examine the B6 flange (Figure 608).

NOTE: The hand blending ratio must be minimum 12.5 between the depth and the length.

1) Nicks, dents, and scratches on Area A.

a) All indications are permitted if J x K ≤ 0.006 in^2 (3.871 mm^2).

2) Nicks, dents, and scratches on Area B.

a) All indications are permitted if J ≤ 0.020 in. (0.508 mm) J x K ≤ 0.006 in^2 (3.871 mm^2).

(i) Spot touch-up.

1) Do a spot touch-up of the oxide film coating on the inspected findings (TASK 70-10-04-380-801-F00).

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-080-001-F00

WARNING

MAKE SURE THERE ARE NO TOOLS OR OTHER OBJECTS IN THE INLET COWL OR EXHAUST. OBJECTS THAT GO INTO THE ENGINE WHEN IT OPERATES, CAN COME OUT OF THE ENGINE AT HIGH VELOCITIES. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Remove the protective mat, STD-585, from the inlet cowl.

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SUBTASK 72-24-01-410-001-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-24-01-080-002-F00

(3) Remove the DO-NOT-OPERATE tag from the applicable engine start switch.

SUBTASK 72-24-01-040-003-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

L45616 S0006582476_V2

Fan Inlet Case Inspection
Figure 601/72-24-01-990-801-F00

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MM-00240-00-B
436061 S0000141305_V2

Flange Elongated Holes
Figure 602/72-24-01-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:
ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

1921826 S0000360280_V4

Outer Skin Areas 1-6 Definition
Figure 603/72-24-01-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A-A

NOTE:
ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

3004569 S0000779829_V1

Outer Skin Flange Radii A1, B1, B2, B3, B4, B5, and B6 Definition
Figure 604/72-24-01-990-848-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A1 FLANGE
(VIEW IN THE AFT DIRECTION)

A

B0071801
2937192 S0000711778_V3

A1 Flange Definition
Figure 605/72-24-01-990-830-F00 (Sheet 1 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

C

B0046600
2937193 S0000711780_V2

A1 Flange Definition
Figure 605/72-24-01-990-830-F00 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F

J

DIA AS = 0.649 (16.5)
DIA AT = 1.015 (25.8)

DIA AU = 0.338 (8.6)
DIA AV = 0.551 (14.0)

DIA AW = 0.551 (14.0)
DIA AX = 0.390 (9.9)

G

H

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

3021774 S0000793913_V2

A1 Flange Definition
Figure 605/72-24-01-990-830-F00 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A1 FLANGE
CONFIGURATION 1
(VIEW IN THE FORWARD DIRECTION)

K

REPAIRABLE HOLES

- ● HOLE A: FAN INLET COWL BOLT HOLE
- ○ HOLE B: EQUIPMENT HOLE
- ✚ HOLE C: CENTERING PIN HOLE

3027307 S0000798550_V1

A1 Flange Definition
Figure 605/72-24-01-990-830-F00 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A1 FLANGE
CONFIGURATION 2 AND 3
(VIEW IN THE FORWARD DIRECTION)

K

REPAIRABLE HOLES

- ● HOLE A: FAN INLET COWL BOLT HOLE
- ○ HOLE B: EQUIPMENT HOLE
- ✚ HOLE C: CENTERING PIN HOLE

3027312 S0000798551_V1

A1 Flange Definition
Figure 605/72-24-01-990-830-F00 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B1 Flange Definition
Figure 606/72-24-01-990-831-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B2 FLANGE DIMENSIONS

B3 FLANGE DIMENSIONS

NICK, DENT, SCRATCH ON AN EDGE

NICK, DENT, SCRATCH ON SKIN

FLANGE	MIN. S	H
B2	0.5658 sq INCH (365.04 sq mm)	BY MEASUREMENT
B3	0.2121 sq INCH (136.85 sq mm)	0.4685 (11.9)

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

B0072101
2937196 S0000711784_V3

B2 and B3 Flanges Dimension
Figure 607/72-24-01-990-832-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

B0072201
2937197 S0000711787_V3

B4, B5 and B6 Flanges Definition
Figure 608/72-24-01-990-833-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-24-01-270-801-F00

3. Fan Inlet Case Erosion Inspection

(Figure 609)

A. General

(1) This procedure gives instructions to do an ultrasonic inspection of the remaining thickness of an eroded fan containment case.

(a) This procedure is applicable for erosion in Areas 4, 5 and 6 of the containment case. Measure the erosion in area 6 (the area with the most erosion).

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-24-01-040-005-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-040-006-F00

(2) Make sure that the start levers are in the CUTOFF position.

SUBTASK 72-24-01-040-007-F00

(3) Install a DO-NOT-OPERATE tag on the applicable start switch.

SUBTASK 72-24-01-010-003-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

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> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

SUBTASK 72-24-01-480-002-F00

> **CAUTION** MAKE SURE THAT YOU INSTALL THE MATS IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL. WITHOUT MATS, TOOLS, PARTS OR UNWANTED MATERIAL CAN CAUSE DAMAGE TO THE INLET COWL.

(5) Install a protective mat, STD-585 in the inlet cowl.

F. Fan Inlet Case Erosion Inspection

SUBTASK 72-24-01-270-001-F00

(1) Do the calibration of the ultrasonic probe (NDT 51-00-00, Part 4):

(a) Calibrate the ultrasonic probe with the A1 flange at the 4 o'clock position.

SUBTASK 72-24-01-270-002-F00

(2) Measure the thickness of the flange with the ultrasonic probe (NDT 51-00-00, Part 4):

(a) Measure from the outer side of the containment case to prevent disruption because of the condition of the inner surface.

(b) Measure the area (9 o'clock ALF) between the B5 flange and OGV bolt holes.

1) Three different thickness measurements must be done approximately 2.75 in. (70 mm) from B5 flange, radially spaced one to each other by 0.39 in. (10 mm).

(c) Minimum Serviceable Limit: 0.308 in. (7.8 mm) for the three measurements.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-080-003-F00

> **CAUTION** MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the inlet cowl.

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SUBTASK 72-24-01-410-003-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left thrust reverser:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Close the applicable left fan cowl panel (TASK 71-11-02-410-801-F00).

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-24-01-440-001-F00

(3) Remove the DO-NOT-OPERATE tag from the applicable engine start switch.

SUBTASK 72-24-01-440-002-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0045700

2214445 S0000493922_V2

Fan Inlet Case Erosion Inspection
Figure 609/72-24-01-990-804-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES)

S-M56-SM-28065-00-B
2214451 S0000493988_V2

Fan Inlet Case Erosion Inspection
Figure 609/72-24-01-990-804-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-24-01-220-801-F00

4. Fan Inlet Case Template Inspection

A. General

(1) This task gives instructions to perform a template inspection of the containment case.

(2) The template inspection is an alternative procedure to examine nicks, dents, and scratches for Areas 1, 2, 4, 5, and 6.

(3) This task finds the most impacted area.

(a) This area is delimited by a template.

(b) The control area takes into account indications of the inner and outer skins.

(c) Examine all combinations and turn the mask in many directions.

1) A combination is given by the depth and length of the indications on the inner and outer skins in the template.

(d) Measure the length and depth of each indication.

1) Record these parameters in a table to find the severity of each indication.

(e) The sum of the severities gives the serviceable limits of the containment case.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-858	Tag - DO NOT OPERATE

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Prepare for the Template Inspection

SUBTASK 72-24-01-040-008-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-040-009-F00

(2) Make sure that the start levers are in the CUTOFF position.

SUBTASK 72-24-01-040-010-F00

(3) Install a DO NOT OPERATE tag, STD-858, on the applicable start switch.

SUBTASK 72-24-01-010-004-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

SUBTASK 72-24-01-480-003-F00

CAUTION MAKE SURE THAT YOU INSTALL THE MATS IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL. WITHOUT MATS, TOOLS, PARTS OR UNWANTED MATERIAL CAN CAUSE DAMAGE TO THE INLET COWL.

(5) Install a protective mat, STD-585, in the inlet cowl.

F. Fan Inlet Case Template Inspection

SUBTASK 72-24-01-220-001-F00

(1) Remove the high metal (TASK 70-10-07-800-801-F00).

SUBTASK 72-24-01-220-007-F00

(2) Do a local swab etching before you examine the fan inlet case by Fluorescent Penetrant Inspection (FPI) (TASK 70-10-11-800-801-F00).

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SUBTASK 72-24-01-220-008-F00

(3) Do a FPI of the suspected areas (TASK 70-40-01-230-801-F00).

SUBTASK 72-24-01-220-009-F00

(4) Examine the fan inlet case for nicks, dents, and scratches (Figure 615).

(a) The template inspection is a 360-degree inspection.

1) Consider Areas 1 and 2, and Areas 4, 5, and 6 as one area to put the template on it.

2) Don't take into account the border between Areas 1 and 2, and Areas 4, 5, and 6.

(b) All the possible combinations must be considered (Figure 610 and Figure 611).

1) The combination with the worst severity is the one that gives the serviceability status of the fan containment case.

SUBTASK 72-24-01-220-002-F00

(5) Identify all the indications (nicks, dents, scratches) on the inner and outer skins that are more than 0.004 in. (0.1 mm) in depth.

SUBTASK 72-24-01-211-001-F00

(6) Identify the worst combination and try all the possible template positions (Figure 610 and Figure 611).

SUBTASK 72-24-01-970-001-F00

(7) For each combination, record the depth and length of the indications that are more than 0.004 in. (0.1 mm) in depth in the table (Figure 616).

(a) If an indication is not fully in the template, include the full length of the indication even if that part extends out of the template.

SUBTASK 72-24-01-970-004-F00

(8) For Areas 1 and 2 only, record the minimum distance from A1 flange and the maximum distance from A1 flange to use the multiplying factor to decrease the severity of each indication (Figure 612, Figure 613, and Figure 614).

(a) Make sure that for Areas 1 and 2 there are less than 10 indications with a depth of 0.004 in. (0.102 mm) or less in the template.

NOTE: If an indication cannot be measured because it is too small, do not take it into account.

(b) If such a combination is possible, this inspection procedure cannot be used.

SUBTASK 72-24-01-970-002-F00

(9) Define the severity of each indication with the example chart (Figure 617).

(a) Go out to the indication depth up to the length indication curve (Step A, Figure 617).

(b) Come back to the severity axis (Step B, Figure 617).

(c) Use the applicable chart to determine each severity (Figure 619 and Figure 620).

(d) Record the severity value in the table (Figure 614).

1) Use the table for combination 1 as an example (Figure 616).

(e) Find the multiplying factor for each indication for Areas 1 and 2 only, as follows (Figure 613):

1) To find the multiplying factor for the minimum distance from the A1 flange and maximum distance from the A1 flange, do these steps:

a) Project the distance from the A1 flange on the horizontal axis to the curve.

b) Project the distance from A1 flange on the curve to the vertical axis.

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c) Get value for the minimum distance from A1 flange.

d) Get value for the maximum distance from A1 flange.

e) Take into account only the highest multiplying factor for each indication.

2) Find the special severity of each indication on Areas 1 and 2.

a) Multiply the multiplying factor by the severity value.

3) Record this specific severity for Areas 1 and 2.

4) Do these steps for each combination.

(f) If it is necessary, use the following steps as an example of calculation (Figure 618):

1) Indications 1 and 2 in Figure 612 are located in the same combination and are as follows:

- Indication number 1: 24%
- Indication number 2: 60%
- Indication number 3: 20%.

2) Sum of these severities without the special severities is 104% > 100%.

a) The indications without the special severities isn't serviceable.

3) Take into account the distance of each indication from the A1 flange (Figure 612 and Figure 613).

4) Values for indications are, as follows:

- Indication number 1: minimum distance is 1.4 in. (36 mm) and maximum distance is 1.73 in. (44 mm)
- Indication number 2: minimum distance is 3.46 in. (88 mm) and maximum distance is 3.77 in. (96 mm)
- Indication number 3: minimum distance is 2.2 in. (56 mm) and maximum distance is 2.36 in. (60 mm).

5) Make a plot of these values on the multiplying factor curve (Figure 613).

6) Multiply the severities that you calculated before the multiplying factor:

- Indication number 1: MAX [0.36 and 0.42] => 0.42
- Indication number 2: MAX [0.60 and 0.72] => 0.72
- Indication number 3: MAX [0.78 and 0.98] => 0.98.

7) The corrected severities are, as follows:

- Indication number 1: 24% x 0.42 = 10.08%
- Indication number 2: 60% x 0.72 = 43.20%
- Indication number 3: 20% x 0.98 = 19.60%.

8) The sum of the special severities is 72.88%.

9) The indications are permitted with the correct severities.

SUBTASK 72-24-01-970-003-F00

(10) For addition of all the severities, do these steps:

(a) For a given combination add the special severities for the indications on Areas 1 and 2, and the severities for indications on Areas 4, 5, and 6.

1) Record the sum in the table (Figure 614).

2) The most impacted area is delimited by the template (Figure 621).

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a) For Areas 1 and 2:

<1> Dimension A - 2.79 in. (70.87 mm)

<2> Dimension B - 0.79 in. (20.07 mm).

b) For Areas 4, 5, and 6:

<1> Dimension A - 9.84 in. (249.94 mm)

<2> Dimension B - 9.84 in. (249.94 mm).

(b) If the combination of all the severities is less than or equal to 100 percent, the indications on the fan case are serviceable.

SUBTASK 72-24-01-390-002-F00

(11) Do a spot touch-up of the oxide film coating on the inspected areas (TASK 70-10-04-380-801-F00).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-080-004-F00

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585, from the inlet cowl.

SUBTASK 72-24-01-410-004-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left thrust reverser:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Close the applicable left fan cowl panel (TASK 71-11-02-410-801-F00).

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-24-01-440-003-F00

(3) Remove the DO NOT OPERATE tag, from the applicable engine start switch.

SUBTASK 72-24-01-440-004-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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NOTE:

SCALE OF INDICATIONS NOT OBEYED
FOR CLARITY PURPOSE.

ALL DIMENSIONS ARE IN INCHES

(MILLIMETERS ARE IN PARENTHESES)

1 LENGTH = 0.12 IN (3.00 mm)
DEPTH = 0.006 IN (0.150 mm)

2 LENGTH = 0.04 IN (1.00 mm)
DEPTH = 0.02 IN (0.50 mm)

3 LENGTH = 0.08 IN (2.00 mm)
DEPTH = 0.003 IN (0.080 mm)

B0046500
2214583 S0000493929_V3

Example of Indications in Areas 1 and 2
Figure 610/72-24-01-990-805-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

SCALE OF INDICATIONS NOT OBEYED
FOR CLARITY PURPOSE.

B0046600
2214590 S0000493931_V3

Example of Possible Combinations
Figure 611/72-24-01-990-812-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 INDICATION NUMBER 1
2 INDICATION NUMBER 2
3 INDICATION NUMBER 3

B0046700
2988890 S0000765985_V1

Minimum Distance and Maximum Distance from A1 Flange
Figure 612/72-24-01-990-813-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0046800
2988891 S0000765986_V1

Multiplying Factor Curve for Areas 1 and 2
Figure 613/72-24-01-990-814-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

DATE	ESN	TSN	CSN
AIRLINES	P/N	S/N	

CFM56-7B

USE ONE CHART PER COMBINATION

DATA FOR ALL AREAS				ADDITIONAL DATA FOR AREAS 1 AND 2 ONLY			
COMBINATION NUMBER	INDICATION NUMBER	LENGTH	DEPTH	INDICATION SEVERITY	MIN. D FROM THE A1 FLANGE	MAX. D FROM THE A1 FLANGE	MULTIPLYING FACTOR	INDICATION SPECIAL SEVERITY
				TOTAL 1				TOTAL 2
				FINAL SEVERITY				

COMBINATION STATUS = COMBINATION TOTAL SEVERITY IS LESS THAN OR EQUAL TO 100, INDICATIONS ARE SERVICEABLE

NOTE 1: IF TOTAL 1 > 100% FOR A COMBINATION IN AREAS 1 AND 2, USE "ADDITIONAL DATA FOR AREAS 1 AND 2 ONLY" AND REPLACE THE "TOTAL 1" BY THE "TOTAL 2".

NOTE 2: FINAL SEVERITY = "TOTAL 1" IF ADDITIONAL DATA ARE NOT USED AND "TOTAL 2" IF ADDITIONAL DATA ARE USED.

B0047000
2988892 S0000765992_V1

Chart to Record the Indication Data
Figure 614/72-24-01-990-815-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A-A

2988893 S0000765993_V1

Flowchart of Indication Evaluation
Figure 615/72-24-01-990-816-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

DATE	ESN	TSN	CSN
AIRLINES	P/N	S/N	

CFM56-7B

USE ONE CHART PER COMBINATION

COMBINATION NUMBER	DATA FOR ALL AREAS				ADDITIONAL DATA FOR AREAS 1 AND 2 ONLY			
	INDICATION NUMBER	LENGTH	DEPTH	INDICATION SEVERITY	MIN. D FROM THE A1 FLANGE	MAX. D FROM THE A1 FLANGE	MULTIPLYING FACTOR	INDICATION SPECIAL SEVERITY
1	2	0.12 (3)	0.006 (0.15)	8%				
	4	0.04 (1)	0.02 (0.5)	27%				
	3	1.42 (36)	0.005 (0.12)	61%				
							TOTAL 2	0
				TOTAL 1				
				96%				
				96%				
				FINAL SEVERITY				

EACH COMBINATION IS INDEPENDATLY SPECIFIED

THE SAME INDICATION CAN BE IN DIFFERENT COMBINATIONS

IN THIS EXAMPLE, TOTAL 1 < 100%.
=> NO NEED TO USE
"ADDITIONAL DATA FOR
AREAS 1 AND 2 ONLY"

COMBINATION STATUS = COMBINATION TOTAL SEVERITY IS LESS THAN OR EQUAL TO 100, INDICATIONS ARE SERVICEABLE

NOTE 1: IF TOTAL 1 > 100% FOR A COMBINATION IN AREAS 1 AND 2, USE "ADDITIONAL DATA FOR AREAS 1 AND 2 ONLY" AND REPLACE THE "TOTAL 1" BY THE "TOTAL 2".

NOTE 2: FINAL SEVERITY = "TOTAL 1" IF ADDITIONAL DATA ARE NOT USED AND "TOTAL 2" IF ADDITIONAL DATA ARE USED.

NOTE:
ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

B0042700
2988894 S0000766001_V1

Example Table for Combination 1
Figure 616/72-24-01-990-817-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

STEP A

INDICATIONS CHART FOR CONTAINMENT CASE 7B - AREAS 1 AND 2

LEGEND:

L = INDICATION LENGTH

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

B0046800
2988895 S0000766002_V1

Example Of Severity Definition for Combination 1 Indications
Figure 617/72-24-01-990-818-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

STEP B

INDICATIONS CHART FOR CONTAINMENT CASE 7B - AREAS 1 AND 2

LEGEND:

L = INDICATION LENGTH

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

B0046900
2214722 S0000493936_V2

Example Of Severity Definition for Combination 1 Indications
Figure 617/72-24-01-990-818-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 PROJECTION LINES FOR THE INDICATION NUMBER 1
2 PROJECTION LINES FOR THE INDICATION NUMBER 2
3 PROJECTION LINES FOR THE INDICATION NUMBER 3

2988683 S0000765803_V1

Example of Calculation of the Special Severity (For Areas 1 and 2 only)
Figure 618/72-24-01-990-834-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INDICATIONS CHART FOR CONTAINMENT CASE 7B - AREAS 1 AND 2

LEGEND:

L = INDICATION LENGTH

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

B0047100
2214728 S0000493949_V2

Chart for the Definition of Each Severity in Relation to its Depth and Length in Areas 1 and 2
Figure 619/72-24-01-990-835-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INDICATIONS CHART FOR CONTAINMENT CASE 7B - AREAS 4,5 AND 6

LEGEND:

L = INDICATION LENGTH

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

B0047200
2214744 S0000493951_V2

Chart for the Definition of Each Severity in Relation to its Depth and Length in Areas 4, 5 and 6
Figure 620/72-24-01-990-836-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FOR AREAS 1 AND 2
DIM. A: 2.79 (71)
DIM. B: 0.79 (20)

FOR AREAS 4, 5 AND 6
DIM. A: 9.84 (250)
DIM. B: 9.84 (250)

NOTE:

SCALE NOT OBEYED FOR CLARITY PURPOSE.

ALL DIMENSIONS ARE IN INCHES (mm).

S-M56-SM-26975-01-B
2214768 S0000493990_V2

Template Dimensions for all the Areas
Figure 621/72-24-01-990-837-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN INLET CASE - REPAIRS

1. **General**

A. This procedure contains these tasks:

(1) A replacement of Hi-Lite attachment of the mount fitting and/or of the handling bracket

(2) A removal of the corrosion in the self-locking nuts holes by drilling

(3) A removal of the corrosion in the self-locking nuts holes by bushing installation

(4) A removal of corrosion/fretting under and around gang channel nuts by blending

(5) A reconditioning of the attachment holes on flange A1 by bushing

(6) A reconditioning of the attachment holes on flange A1 by drilling

(7) A repair of flange A1 area G by blending

(8) A repair of the radii of flanges A1, B1, B2, B3, B4, B5, and B6 on the containment case by blending

(9) A reconditioning of the attachment holes on flange A1 by drilling or by bushing with fan case repair kit.

TASK 72-24-01-300-801-F00

2. **Replacement of Hi-Lite Attachment of the Mount Fitting and/or of the Handling Bracket**

Figure 801

A. General

(1) This task is a repair procedure to replace Hi-Lite attachment on the fan inlet case.

(2) You can use equivalent alternatives for tools, equipment, and consumable materials.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)

C. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Nut, hi-lite	72-23-00-04-070	LOM ALL
		72-23-00-04-072	LOM ALL
		72-23-00-04-095	LOM ALL
		72-23-00-04-097	LOM ALL
		72-23-00-04-125	LOM ALL
		72-23-00-04-127	LOM ALL
		72-23-00-04-185	LOM ALL
2	Nut, hi-lite	72-23-00-04-072	LOM ALL
		72-23-00-04-097	LOM ALL
		72-23-00-04-127	LOM ALL
		72-23-00-04-186	LOM ALL
3	Screw, Flat cheese head	72-23-00-04-060	LOM ALL
		72-23-00-04-085	LOM ALL
		72-23-00-04-115	LOM ALL

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
4	Screw, Flat cheese head	72-23-00-04-063	LOM ALL
		72-23-00-04-087	LOM ALL
		72-23-00-04-117	LOM ALL
5	Screw, Flat cheese head	72-23-00-04-063	LOM ALL
		72-23-00-04-087	LOM ALL
		72-23-00-04-117	LOM ALL
6	Washer, Flat	71-40-00-09-055	LOM ALL
		71-40-00-10-030	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-095	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-120	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-175	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-355	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-380	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-460	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-563	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-585	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-607	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-633	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-700	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-720	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-733	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-734	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-755	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-810	LOM 402, 404, 406, 407, 411, 416, 445
		71-40-00-10-900	LOM 402, 404, 406, 407, 411, 416, 445

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
6 (cont.)		71-40-00-10A-030	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-100	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-125	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-190	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-385	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-410	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-490	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-610	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-645	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-705	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-775	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-795	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-812	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-815	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-848	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
6 (cont.)		71-40-00-10A-904	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-10A-944	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
		71-40-00-11-065	LOM ALL
		72-00-00-01A-125	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-00-00-01B-068	LOM 402, 404, 406, 407, 411, 416, 445
		72-23-00-03-080	LOM ALL
		72-23-00-04-025	LOM ALL
		72-23-00-04-027	LOM ALL
		72-23-00-04-045	LOM ALL
		72-23-00-04-065	LOM ALL
		72-23-00-04-090	LOM ALL
		72-23-00-04-120	LOM ALL
		72-23-00-04-360	LOM ALL
		72-23-00-04-395	LOM ALL
		72-23-00-04-440	LOM ALL
		72-23-00-04-495	LOM ALL
		72-23-00-04-530	LOM ALL
		72-23-00-04-560	LOM ALL
		72-23-00-04-595	LOM ALL
		72-23-00-04-625	LOM ALL
		72-23-00-04-645	LOM ALL
		72-23-00-04-675	LOM ALL
		72-23-00-04-715	LOM ALL
		72-23-00-04-745	LOM ALL
		72-23-00-04-760	LOM ALL
		72-23-00-04-773	LOM ALL
		72-23-00-04-775	LOM 402, 404, 406, 407, 411, 412, 415, 416, 420, 422-426, 445
		72-23-00-04-810	LOM ALL
		72-23-00-04-830	LOM ALL
		72-23-00-04-880	LOM ALL
		79-11-01-01-020	LOM ALL
		79-11-01-01-055	LOM ALL

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
6 (cont.)		79-21-02-01-245	LOM 402, 404, 406, 407, 411, 416, 445
		79-21-02-01A-090	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Procedure

NOTE: You must replace the Hi-Lite attachments if you can get access to them.

SUBTASK 72-24-01-960-001-F00

(1) Replacement of the Hi-Lite attachment. Refer to Figure 801.

> **CAUTION** MAKE SURE THAT YOU INSTALL HI-LITE ATTACHMENTS AT THE INITIAL DIMENSION. YOU CAN NOT DRILL THE DIAMETER OF THE RECESS. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT CAN OCCUR.

> **CAUTION** REPLACE THE HI-LITE ATTACHMENTS ONE BY ONE. THIS IS TO MAKE SURE THAT THE MOUNT FITTINGS AND THE HANDLING BRACKETS STAY IN THE CORRECT POSITION. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Remove the Hi-Lite attachment. Refer to TASK 70-43-51-390-008 (70-43-51, Hi-Lok and Hi-Lite Bolt Rivet Assemblies) CFM Standard Practices Manual.

(b) Do a check of the recesses of the flat cheese head screws on flanges B4 and/or B5. Refer to TASK 70-43-51-390-008 (70-43-51, Hi-Lok and Hi-Lite Bolt Rivet Assemblies) CFM Standard Practices Manual.

(c) If necessary, do a spot touch-up of oxide film coating on aluminum alloys in the rivet holes (Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00).

(d) Installation of a new Hi-Lite attachment:

1) Select the Hi-Lite attachment that is necessary. Refer to TASK 70-43-51-390-008 (70-43-51, Hi-Lok and Hi-Lite Bolt Rivet Assemblies) CFM Standard Practices Manual.

2) Install new flat cheese head screw (Screw, Flat cheese head [3], or new Screw, Flat cheese head [4] or new Screw, Flat cheese head [5]), new flat washer (new Washer, Flat [6]) and new Hi-Lite nut (new nut, hi-lite [1]or new nut, hi-lite [2]). Refer to TASK 70-43-51-390-008 (70-43-51, Hi-Lok and Hi-Lite Bolt Rivet Assemblies) CFM Standard Practices Manual and to Figure 801.

(e) Do a final check of the position of the mount fittings and the handling brackets on the fan inlet case. Refer toFigure 801 and to the table of dimensional information that follows:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Dimensional Information

Description	Reference Dimension
Dim. J	10.5488 in. (267.94 mm)
Dim. P	33.1365 in. (841.67 mm)
Dim. Q	7.5646 in. (192.14 mm)
Dim. R	36.2787 in. (921.48 mm)
Dim. S	24.1641 in. (613.77 mm)

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Replacement of Hi-Lite Attachment
Figure 801/72-24-01-990-819-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Replacement of Hi-Lite Attachment
Figure 801/72-24-01-990-819-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(2 X 11) HIT-LITE ATTACHMENTS

L-L

(2 X 5) HIT-LITE ATTACHMENTS

K-K

(2 X 7) HIT-LITE ATTACHMENTS

M-M

MATERIAL:

1 : FAN INLET CASE : 6061 (AGSU T6)

2 : MOUNT FITTINGS : 6-4 (TA6V)

3 : MOUNT FITTINGS : 6-4 (TA6V)

4 : HANDLING BRACKET : 6-4 (TA6V)

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2901850 S0000693427_V1

Replacement of Hi-Lite Attachment
Figure 801/72-24-01-990-819-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-24-01-300-802-F00

3. **Removal of the Corrosion in the Self-Locking Nuts Holes by Drilling**

Figure 802

A. General

(1) This task is a repair procedure to remove corrosion in the hole on the riveted self-locking nuts.

(2) You can use equivalent alternatives for tools, equipment, and consumable materials.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)

C. Consumable Materials

Reference	Description	Specification
G51478 [S1096]	Etchant - Aluminum Alloy	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Procedure

SUBTASK 72-24-01-000-001-F00

NOTE: You must repair the holes if you can get access to them.

(1) If necessary, remove the hardware from the fan inlet case.

SUBTASK 72-24-01-120-001-F00

WARNING

METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(2) Remove the corrosion from the internal diameter. Do not remove more parent material than necessary. Refer to TASK 70-44-50-320-006 (70-44-50, Drilling) CFM Standard Practices Manual, to Figure 802 and to the table of dimensional information that follows:

Dimensional Information

Description	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dim. G			1.913 in. (48.6 mm)
Dia. S	0.2815 in. (7.15 mm)	0.3326 in. (8.45 mm)	
Angle H			3º56'53”
Position error of Dia. S in relation to Surf. A and Hole C		0.011 in. (0.3 mm)	

NOTE: Roughness of the repaired areas must be 125 microinches (3.2 micrometers).

(a) Clean the part. Refer to TASK 70-21-13-160-001 (70-21-13, Steam Cleaning) CFM Standard Practices Manual.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Do a locally swab etching of the repaired areas with aluminum alloy etchant, G51478 [S1096]. Refer to TASK 70-53-11-110-023 (70-53-11, Swab Etching) CFM Standard Practices Manual.

(c) Do a fluorescent penetrant inspection of the repaired areas. Refer to TASK 70-32-23-230-012 (70-32-23, Fluorescent Penetrant Inspection - Portable Post-Emuslifiable) CFM Standard Practices Manual. No indication is permitted.

NOTE: Indications with a maximum dimension of less than 0.012 in. (0.3 mm) are noninterpretable as indications.

(d) Do a spot touch-up of the oxide film coating on the repaired areas (Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00).

(e) Install the hardware on the fan inlet case if removed.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN INLET CASE

MATERIAL: 6061

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Removal of the Corrosion in the Self-Locking Nuts Holes by Drilling
Figure 802/72-24-01-990-820-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Removal of the Corrosion in the Self-Locking Nuts Holes by Drilling
Figure 802/72-24-01-990-820-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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2902391 S0000693453_V1

Removal of the Corrosion in the Self-Locking Nuts Holes by Drilling
Figure 802/72-24-01-990-820-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-24-01-300-803-F00

4. Removal of the Corrosion in the Self-Locking Nuts Holes by Bushing Installation

Figure 802

A. General

(1) This task is a repair procedure to remove corrosion in the hole on the riveted self-locking nuts by bushing installation.

(2) You can use equivalent alternatives for tools, equipment, and consumable materials.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A50490 [CP2243]	Sealant - Elastomer - PR 1750 Class B2	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	
D50334 [CP2723]	Paste - Barium Chromate	
G51478 [S1096]	Etchant - Aluminum Alloy	
G51491 [CP1067]	Nitrogen - Liquid	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Setup Information

SUBTASK 72-24-01-940-001-F00

(1) Setup Information. Refer to Figure 807 and to the table of configurations that follows:

Configurations

	Part Number
Configuration 1	340-059-815-0, 340-059-816-0, 340-059-817-0, 340-059-819-0, 340-059-820-0, 340-059-822-0, 340-059-823-0, 340-059-825-0, 340-059-826-0, 340-059-828-0, 340-059-829-0, 340-059-831-0, 340-059-832-0, 340-059-834-0, 340-059-835-0, 340-059-837-0, 340-059-838-0
Configuration 2	340-059-818-0, 340-059-821-0, 340-059-824-0, 340-059-827-0, 340-059-830-0, 340-059-833-0, 340-059-836-0, 340-059-839-0, 340-059-840-0, 340-059-841-0, 340-059-842-0, 340-059-843-0, 340-059-844-0, 340-059-845-0, 340-059-846-0, 340-059-847-0

F. Procedure

SUBTASK 72-24-01-000-002-F00

NOTE: You must repair the holes if you can get access to them.

(1) If necessary, remove the hardware from the fan inlet case.

(2) If necessary, remove the bushing.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-24-01-120-002-F00

WARNING

METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(3) Machine the attachment holes to remove the corrosion. Do not remove more material than necessary. Refer to TASK 70-44-50-320-006 (70-44-50, Drilling) CFM Standard Practices Manual, to Figure 804 and to the table of dimensional information that follow:

Dimensional Information

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Reference Dimension
Angle F			2º58'6”
Angle G			3º56'53”
Dim. H			1.913 in. (48.6 mm)
Dia P	0.3721 in. (9.45 mm)	0.4448 in. (11.30 mm)	
Dia Q	0.6016 in. (15.28 mm)	0.6094 in. (15.48 mm)	
Dim. R	0.0748 in. (1.90 mm)	0.0807 in. (2.05 mm)	
Chamfer S			0.020 in. (0.5 mm)

NOTE: Use a locally manufactured tool that obeys the dimensional information.

SUBTASK 72-24-01-200-001-F00

(4) Do a visual inspection of the repaired area and make sure that the indication is fully removed.

SUBTASK 72-24-01-100-001-F00

(5) Clean the part as follows:

(a) Alternative procedure available: Remove grease from the part. Refer to TASK 70-21-11-110- 002 (70-21-11, Solvent Degreasing of all Materials) CFM Standard Practices Manual.

(b) Alternative procedure: Remove grease from the part. Refer to TASK 70-21-18-160-003 (70- 21-18, Light Duty Aqueous Cleaning) CFM Standard Practices Manual.

SUBTASK 72-24-01-110-001-F00

(6) Do a locally swab etching of the repaired areas with Do a locally swab etching of the repaired areas with aluminum alloy etchant, G51478 [S1096]. Refer to TASK 70-53-11-110-023 (70-53-11, Swab Etching) CFM Standard Practices Manual.

SUBTASK 72-24-01-200-002-F00

(7) Do a fluorescent penetrant inspection of the repaired areas. Refer to TASK 70-32-23-230-012 (70-32-23, Fluorescent Penetrant Inspection - Portable Post-Emuslifiable) CFM Standard Practices Manual. No indication is permitted.

NOTE: Indications with a maximum dimension of less than 0.012 in. (0.3 mm) are noninterpretable as indications.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-24-01-320-001-F00

> **WARNING**
> METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(8) Make a locally manufactured bushing. Refer to TASK 70-44-00-320-001 (70-44-00, Machining - General) CFM Standard Practices Manual and to Figure 805.

SUBTASK 72-24-01-370-001-F00

(9) Do a spot touch-up of the oxide film coating on the repaired areas (Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00).

SUBTASK 72-24-01-110-002-F00

(10) Apply the barium chromate paste (BOLICONE 73, D50334 [CP2723]) as follows:

(a) Alternative procedure available: Remove the grease from the part. Refer to TASK 70-21-11- 110-002 (70-21-11, Solvent Degreasing of all Materials) CFM Standard Practices Manual.

(b) Alternative procedure: Remove the grease from the part. Refer to TASK 70-21-18-160-003 (70-21-18, Light Duty Aqueous Cleaning) CFM Standard Practices Manual.

(c) Alternative procedure available: Apply BOLICONE 73, D50334 [CP2723] to the part with a brush.

(d) Alternative procedure: Apply jointing compound, D50321 [CP2773] to the part with a brush.

NOTE: The layer applied on the part must be approximately 0.0039 to 0.0079 in. (0.1 to 0.2 mm) thick.

(e) After application, make sure that you applied the layer of paste to the full part and that you removed the unwanted paste.

SUBTASK 72-24-01-400-001-F00

(11) Installation of the bushing. Refer to Figure 806.

> **WARNING**
> MAKE SURE TO PREVENT ACETONE CONTACT WITH SKIN. ACETONE IRRITATES SKIN AND IS EXPLOSIVE. USE FUME CONTROL OR USE A RESPIRATOR TO PREVENT INJURY.

(a) Remove the grease from the repaired area with a clean cloth soaked in acetone solvent, B01058 [CP1039].

> **WARNING**
> USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

(b) Put the bushing fully into liquid nitrogen, G51491 [CP1067].

(c) Install the bushing in a maximum of 30 seconds.

SUBTASK 72-24-01-200-003-F00

(12) Do a check of the bushing location. Refer to Figure 806 and to the limits as follow:

(a) Dim. J

- Minimum Finish Dimension = 0.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

- Maximum Finish Dimension =0.0059 in. (0.15 mm).

SUBTASK 72-24-01-110-003-F00

(13) Apply elastomer sealant, A50490 [CP2243] on the lateral face between the bushing and the part. Refer to TASK 70-66-11-380-023 (70-66-11, Application of Polysulfide Elastomer Sealant) CFM Standard Practices Manual and to Figure 806.

SUBTASK 72-24-01-100-002-F00

(14) Clean the part as follows:

(a) Alternative procedure available: Remove grease from the part. Refer to TASK 70-21-11-110-002 (70-21-11, Solvent Degreasing of all Materials) CFM Standard Practices Manual.

(b) Alternative procedure: Remove grease from the part. Refer to TASK 70-21-18-160-003 (70-21-18, Light Duty Aqueous Cleaning) CFM Standard Practices Manual.

SUBTASK 72-24-01-400-002-F00

(15) Install the hardware on the fan inlet case if removed.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN INLET CASE

MATERIAL: 6061

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Fan Inlet Case
Figure 803/72-24-01-990-821-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Removal of the Corrosion in the Self-Locking Nuts Holes by Bushing Installation
Figure 804/72-24-01-990-826-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES
ROUGHESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESES.

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2902418 S0000693552_V1

Removal of the Corrosion in the Self-Locking Nuts Holes by Bushing Installation
Figure 804/72-24-01-990-826-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES
ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESES.

Removal of the Corrosion in the Self-Locking Nuts Holes by Bushing Installation
Figure 804/72-24-01-990-826-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

63 (1.6)

MATERIAL : A286 (E-Z6NCT25)

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES
ROUGHNESS IS IN MICROINCHES WITH
MICROMETERS IN PARENTHESES.

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Locally Manufactured Bushing
Figure 805/72-24-01-990-827-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Installation And Check Of The Bushing Location
Figure 806/72-24-01-990-828-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CONFIGURATION 1

SCHEMATICAL

Q

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES

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Setup Information
Figure 807/72-24-01-990-829-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CONFIGURATION 2

SCHEMATICAL

Q

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES

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2902726 S0000693561_V1

Setup Information
Figure 807/72-24-01-990-829-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-24-01-300-804-F01

5. Removal of Corrosion/Fretting Under and Around Gang Channel Nuts by Blending
(Figure 808)

A. General

(1) This task gives instructions to remove corrosion/fretting under and around gang channel nuts on the containment case by blending.

(2) The subsequent table gives a list of part numbers that are applicable to this repair.

NOTE: All part numbers are applicable to all paragraphs unless specified differently.

Table 801/72-24-01-993-823-F00

Part Number	Engine	Configuration
340-059-818-0	7B; 7BE	--
340-059-821-0	7B; 7BE	--
340-059-824-0	7B; 7BE	--
340-059-827-0	7B; 7BE	--
340-059-830-0	7B; 7BE	--
340-059-833-0	7B; 7BE	--
340-059-836-0	7B; 7BE	--
340-059-839-0	7B; 7BE	--
340-059-840-0	7B; 7BE	--
340-059-841-0	7B; 7BE	--
340-059-842-0	7B; 7BE	--
340-059-843-0	7B; 7BE	--
340-059-844-0	7B; 7BE	--
340-059-845-0	7B; 7BE	--
340-059-846-0	7B; 7BE	--
340-059-847-0	7B; 7BE	--

B. References

Reference	Title
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-21-00-100-802-F00	Hand Wipe Solvent Degreasing With Chemical Agent (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-40-01-910-801-F00	Fluorescent Penetrant Inspection (Water Washable) (P/B 201)
70-43-07-300-801-F00	Spot Touch Up of Sulfuric Anodizing (P/B 801)
70-43-42-300-802-F00	Blending Procedures - Hand Blending (P/B 201)
70-43-42-300-803-F00	Blending Procedures - Power Blending (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Title
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-122	Brush
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	
D50334 [CP2723]	Paste - Barium Chromate	
G51478 [S1096]	Etchant - Aluminum Alloy	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Repair

SUBTASK 72-24-01-860-021-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-022-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-010-012-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO NOT OPERATE tag, STD-858, on the applicable START switches.

SUBTASK 72-24-01-020-001-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels, do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

G. Removal of Corrosion/Fretting Under and Around Gang Channel Nuts by Blending

SUBTASK 72-24-01-020-002-F00

(1) For dimensional information refer to the table below:

Table 802/72-24-01-993-822-F00 Dimensional Information

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dim. B					1.9134 in. (48.60 mm)
Dia D					0.6055 in. (15.38 mm)
Dim. E				0.590 in. (15.0 mm)	
Dim. F				0.452 in. (11.5 mm)	
Radius G			0.036 in. (0.9 mm)	0.039 in. (1.0 mm)	
Radius H					2.36 in. (60 mm)
Dim. I				0.0393 in. (1.0 mm)	
Chamfer K			0.004 in. (0.1 mm)	0.015 in. (0.4 mm)	
Dia L			0.311 in. (7.9 mm)	0.318 in. (8.1 mm)	

SUBTASK 72-24-01-300-004-F00

(2) If there is corrosion in the self-locking nuts holes, do this task: Removal of the Corrosion in the Self-Locking Nuts Holes by Bushing Installation, TASK 72-24-01-300-803-F00.

(a) Remove the bushing, do this task: Removal of the Corrosion in the Self-Locking Nuts Holes by Bushing Installation, TASK 72-24-01-300-803-F00.

SUBTASK 72-24-01-020-003-F00

(3) If it is necessary, remove the hardware from the fan inlet case.

SUBTASK 72-24-01-020-004-F00

(4) Remove the gang channel nuts.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-24-01-300-006-F00

> **WARNING**
> METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(5) Remove the corrosion/fretting (Table 802, TASK 70-43-42-300-802-F00 or TASK 70-43-42-300-803-F00).

(a) Maximum blend depth: 0.039 in. (1.0 mm).

NOTE: Do not remove more material than necessary.

(b) Do a visual inspection of the repaired area.

1) Make sure that the corrosion/fretting is fully removed.

SUBTASK 72-24-01-100-006-F00

(6) Clean the part with one of the following:

> **WARNING**
> ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

(a) Clean the repaired area with acetone solvent, B01058 [CP1039], do this task: Hand Wipe Solvent Degreasing With Chemical Agent, TASK 70-21-00-100-802-F00

> **WARNING**
> ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE. USE PROTECTION EQUIPMENT. MAKE SURE THAT YOU USE ISOPROPYL ALCOHOL IN AN AREA WITH AIRFLOW. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

(b) Clean the repaired area with isopropyl alcohol, B00676 [CP1041], do this task: Hand Wipe Solvent Degreasing With Chemical Agent, TASK 70-21-00-100-802-F00.

SUBTASK 72-24-01-800-001-F00

(7) Do a local swab etching of the repaired areas with aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

SUBTASK 72-24-01-230-005-F00

(8) Do a Fluorescent Penetrant Inspection (FPI) of the repaired areas (TASK 70-40-01-230-801-F00 or TASK 70-40-01-910-801-F00).

(a) Sensibility S3.

(b) Indications of more than 0.0118 in. (0.30 mm) are not permitted.

(c) Linear indications are not permitted.

NOTE: Linear indications are indications that are at minimum four times longer than they are wide.

SUBTASK 72-24-01-300-007-F00

(9) Do a spot touch-up of the repaired area (TASK 70-43-07-300-801-F00).

SUBTASK 72-24-01-300-008-F00

(10) If bushing was removed, install it (TASK 72-24-01-300-803-F00).

SUBTASK 72-24-01-010-013-F00

(11) Make sure that the contact area between the containment case and rivet is at least 50% of the this area in the crown DIA L.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-24-01-010-014-F00

(12) Make sure that the contact area between the containment case and rivet does not have corrosion and fretting.

SUBTASK 72-24-01-110-007-F00

(13) Apply BOLICONE 73, D50334 [CP2723], between the containment case and gang nuts, do one of the following:

> **WARNING** ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

(a) Clean the repaired area with acetone solvent, B01058 [CP1039], do this task: Hand Wipe Solvent Degreasing With Chemical Agent, TASK 70-21-00-100-802-F00

> **WARNING** CA1010 MASTINOX CHROMATE FREE JOINTING COMPOUND IS POISONOUS AND FLAMMABLE. DO NOT LET THIS MATERIAL TOUCH YOU. DO NOT BREATHE THIS MATERIAL. USE PERSONAL PROTECTION EQUIPMENT. USE COMPOUND IN A GOOD AIRFLOW AREA. IF YOU DO NOT OBEY, INJURIES TO PERSONNEL CAN OCCUR.

1) Apply jointing compound, D50321 [CP2773], to the part with a brush, STD-122.
2) Apply BOLICONE 73, D50334 [CP2723], between the containment case and gang nuts
   a) Apply approximately 0.004 in. (0.1 mm) - 0.007 in. (0.2 mm) thick layer on the part.

> **WARNING** ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE. USE PROTECTION EQUIPMENT. MAKE SURE THAT YOU USE ISOPROPYL ALCOHOL IN AN AREA WITH AIRFLOW. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

(b) Clean the repaired area with isopropyl alcohol, B00676 [CP1041], do this task: Hand Wipe Solvent Degreasing With Chemical Agent, TASK 70-21-00-100-802-F00.

> **WARNING** CA1010 MASTINOX CHROMATE FREE JOINTING COMPOUND IS POISONOUS AND FLAMMABLE. DO NOT LET THIS MATERIAL TOUCH YOU. DO NOT BREATHE THIS MATERIAL. USE PERSONAL PROTECTION EQUIPMENT. USE COMPOUND IN A GOOD AIRFLOW AREA. IF YOU DO NOT OBEY, INJURIES TO PERSONNEL CAN OCCUR.

1) Apply jointing compound, D50321 [CP2773], to the part with a brush, STD-122.
2) Apply BOLICONE 73, D50334 [CP2723], to the part with a brush, STD-122.
   a) Apply approximately 0.004 in. (0.1 mm) - 0.007 in. (0.2 mm) thick layer on the part.

SUBTASK 72-24-01-211-002-F00

(14) Make sure that there is a layer of paste on the full part.

(a) Remove any unwanted paste.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-24-01-400-004-F00

(15) Install the gang channel nuts.

SUBTASK 72-24-01-400-005-F00

(16) If it is removed, install the hardware on the fan inlet case.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-010-015-F00

(1) Make sure that all tools, parts, and unwanted material are removed from the fan inlet case.

SUBTASK 72-24-01-410-010-F00

WARNING	OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safety close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-24-01-010-016-F00

(3) Remove the DO NOT OPERATE tag from the applicable START switches.

SUBTASK 72-24-01-860-023-F00

(4) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-024-F00

(5) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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MATERIAL: 6061

B0082701
3004595 S0000779815_V1

Blend Area of Containment Case
Figure 808/72-24-01-990-849-F00 (Sheet 1 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Blend Area of Containment Case
Figure 808/72-24-01-990-849-F00 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(BENDING BETWEEN 2 FIXING HOLES WITH A RIVET HOLE)

C

BLENDING AREA

CONTACT AREA BETWEEN THE CONTAINMENT CASE AND THE GANG CHANNEL NUTS

B0082901
3004614 S0000779817_V1

Blend Area of Containment Case
Figure 808/72-24-01-990-849-F00 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(BENDING BETWEEN 2 FIXING HOLES WITHOUT A RIVET HOLE)

C

BLENDING AREA

B0083001
3004619 S0000779818_V1

Blend Area of Containment Case
Figure 808/72-24-01-990-849-F00 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D

E

F

B0083101
3004627 S0000779819_V1

Blend Area of Containment Case
Figure 808/72-24-01-990-849-F00 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-24-01-300-806-F00

6. Reconditioning of the Attachment Holes on Flange A1 by Bushing

(Figure 809, Figure 810, and Figure 811)

A. General

(1) This task gives instructions to recondition the attachment holes on flange A1 by bushing.

(2) The table below gives a list of the part numbers that are applicable to this task:

NOTE: All part numbers are applicable to all paragraphs unless specified differently.

Table 803/72-24-01-993-816-F00

Configurations	Part Number
Configuration 1	340-059-816-0
Configuration 2	340-059-815-0, 340-059-817-0, 340-059-819-0, 340-059-820-0, 340-059-822-0, 340-059-823-0, 340-059-825-0, 340-059-826-0, 340-059-828-0, 340-059-829-0, 340-059-831-0, 340-059-832-0, 340-059-834-0, 340-059-835-0, 340-059-837-0, 340-059-838-0
Configuration 3	340-059-818-0, 340-059-821-0, 340-059-824-0, 340-059-827-0, 340-059-830-0, 340-059-833-0, 340-059-836-0, 340-059-839-0, 340-059-840-0, 340-059-841-0, 340-059-842-0, 340-059-843-0, 340-059-844-0, 340-059-845-0, 340-059-846-0, 340-059-847-0

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-08-320-801-F00	Machining (Material Removal) (P/B 201)
70-10-10-320-801-F00	Drilling (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-10-15-300-801-F00	Polysulfide Elastomer Sealant Application (Bond) (P/B 801)
70-21-00-100-802-F00	Hand Wipe Solvent Degreasing With Chemical Agent (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-43-42-300-802-F00	Blending Procedures - Hand Blending (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D. Consumable Materials

Reference	Description	Specification
A50490 [CP2243]	Sealant - Elastomer - PR 1750 Class B2	
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	
G01043	Cloth - Lint-free	
G02418	Water - De-ionized	
G51478 [S1096]	Etchant - Aluminum Alloy	
G51491 [CP1067]	Nitrogen - Liquid	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Repair

SUBTASK 72-24-01-860-005-F00

(1) For Engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-006-F00

(2) For Engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-040-012-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO NOT OPERATE tag, STD-858, on the START switches.

SUBTASK 72-24-01-010-006-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO REMOVE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right reversers (TASK 78-31-00-010-801-F00).

G. Reconditioning of the Attachment Holes on Flange A1 by Bushing

SUBTASK 72-24-01-970-005-F00

(1) Refer to the dimensional information for the repair application in the table below:

Table 804/72-24-01-993-817-F00 Repair Dimensional Information

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dia A			0.5197 in. (13.20 mm)	0.5303 in. (13.47 mm)	
Dia B			0.2717 in. (6.90 mm)	0.2803 in. (7.12 mm)	
Dia C			0.2717 in. (6.90 mm)	0.2803 in. (7.12 mm)	
Dim. D					2.55 in. (65 mm)
Dim. E					1.279 in. (32.5 mm)
Dia F					63.196 in. (1605.2 mm)
Angle G					7°
Angle H					26°30’
Angle J					100°30’
Angle K					41°30’
Angle L					56°30’
Angle M					71°30’
Angle N					86°30’
Angle P					103°15’
Angle Q					116°30’
Angle R					131°30’
Angle S					146°30’
Angle T					5°15’
Angle U					7°30’
Angle V					1°45’
Angle W					2°07’29’’
Dim. X			0.0768 in. (1.95 mm)	0.0807 in. (2.05 mm)	

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 804/72-24-01-993-817-F00 Repair Dimensional Information (Continued)

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dia Y			0.650 in. (16.5 mm)	0.653 in. (16.6 mm)	
Dia Z			1.016 in. (25.8 mm)	1.023 in. (26.0 mm)	
Radius AA			0.008 in. (0.2 mm)	0.011 in. (0.3 mm)	
Chamfer AB			0.016 in. (0.4 mm)	0.019 in. (0.5 mm)	
Dim. AC			0.040 in. (1.0 mm)	0.043 in. (1.1 mm)	
Dia AD			0.390 in. (9.9 mm)	0.393 in. (10.0 mm)	
Dia AE			0.552 in. (14.0 mm)	0.559 in. (14.2 mm)	
Dia AF			0.339 in. (8.6 mm)	0.342 in. (8.7 mm)	
Dim. AH			0.0020 in. (0.05 mm)	0.0039 in. (0.10 mm)	
Dia AI					63.519 in. (1613.4 mm)
Dia. AJ			0.0040 in. (0.10 mm)	0.0059 in. (0.15 mm)	
Dim. AK					0.460 in. (11.7 mm)
Dim. AL					0.224 in. (5.7 mm)
Dim. AX			0.119 in. (3.0 mm)	0.125 in. (3.2 mm)	
Dia AZ			0.5512 in. (14.00 mm)	0.5531 in. (14.05 mm)	

SUBTASK 72-24-01-320-003-F00

WARNING METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

CAUTION MAKE SURE THAT YOU APPLY MASKING TAPE AND PROTECTION TO THE AREAS AND PARTS OF THE FLANGE 1 THAT YOU WILL NOT REPAIR. IF YOU DO NOT PREVENT CONTAMINATION, DAMAGE TO THE AREAS AND PARTS CAN OCCUR.

CAUTION MAKE SURE THAT YOU REMOVE ALL FOD AND PARTICLES FROM THE FLANGE AREA AFTER YOU DRILL THE HOLES. IF YOU DO NOT REMOVE ALL FOD AND PARTICLES, DAMAGE TO THE AREA AND PARTS CAN OCCUR.

(2) Machine the attachment holes.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Do not remove more material than it is necessary.

(b) If it is necessary, remove the bushing (TASK 70-10-08-320-801-F00).

(c) Drill the attachment holes (Table 804, Figure 809 and Figure 810, TASK 70-10-10-320-801-F00).

(d) Do a visual inspection of the drilled areas.

1) Make sure that the indication is fully removed.

(e) Make sure that the edges of the drilled part are free of burrs or rolled metal.

1) If necessary, do a hand blending to remove burrs after machining (TASK 70-43-42-300-802-F00).

SUBTASK 72-24-01-110-004-F00

(3) Clean and examine the part.

WARNING ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

WARNING ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. USE PROTECTION EQUIPMENT. USE IN A WELL−VENTILATED AREA.

(a) Remove grease from the repair areas with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041] (TASK 70-21-00-100-802-F00).

(b) Do a local swab etching of the repair areas with aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

(c) Do a fluorescent penetrant inspection of the repair areas (TASK 70-40-01-230-801-F00).

1) Sensibility S3.

2) Indications less than 0.0118 in. (0.30 mm) are non-interpretable.

3) Indications more than 0.0118 in. (0.30 mm) are not permitted.

4) Linear indications are not permitted.

NOTE: Linear indications are indications that are at minimum four times longer than they are wide.

SUBTASK 72-24-01-380-001-F00

(4) Do a spot touch-up of oxide film coating on aluminum alloys on all repaired areas as follows (TASK 70-10-04-380-801-F00):

(a) Do not use 3M 425 Aluminum Foil Tape.

(b) Do the rinsing operations at room temperature by spraying or by wiping the touched-up surface with a clean lint-free cloth, G01043, soaked with de-ionized water, G02418.

(c) For the last rinsing operation, use de-ionized water, G02418, with conductivity ≤ 100 µS/cm for minimum one minute.

SUBTASK 72-24-01-320-004-F00

(5) Make a locally manufactured bushing (Figure 810, TASK 70-10-08-320-801-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **WARNING** METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(a) Machine the locally manufactured bushing.

(b) Make sure that the geometric tolerances of the locally manufactured bushing agree with the ones defined for the related hole (Figure 810, TASK 70-10-08-320-801-F00).

SUBTASK 72-24-01-400-003-F00

(6) Install the bushing (Figure 810 and Figure 811).

(a) Apply anticorrosion paste to the repaired areas on the fan containment case as follows:

> **WARNING** ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

> **WARNING** ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. USE PROTECTION EQUIPMENT. USE IN A WELL−VENTILATED AREA.

1) Remove grease from the repaired areas with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041] (TASK 70-21-00-100-802-F00).

2) Carefully dry the cleaned area with a dry clean cloth and dry clean air.

> **WARNING** CA1010 MASTINOX CHROMATE FREE JOINTING COMPOUND IS POISONOUS AND FLAMMABLE. DO NOT LET THIS MATERIAL TOUCH YOU. DO NOT BREATHE THIS MATERIAL. USE PERSONAL PROTECTION EQUIPMENT. USE COMPOUND IN A GOOD AIRFLOW AREA. IF YOU DO NOT OBEY, INJURIES TO PERSONNEL CAN OCCUR.

3) Apply jointing compound, D50321 [CP2773], paste with a brush.

a) Make sure that the thickness of the layer applied to the repaired areas is approximately to 0.004 in. (0.1 mm) - 0.0079 in. (0.2 mm).

(b) Make sure that the paste is applied to the full repaired areas and that there is no remaining coating.

(c) Clean the bushing, as follows:

1) Remove grease from the bushing (TASK 70-21-00-100-802-F00).

2) Put the bushing fully into liquid nitrogen, G51491 [CP1067].

3) Install the bushing.

4) Examine the bushing location (Figure 811).

5) Clean the unwanted of anticorrosion paste with a dry, clean cloth.

a) No remaining anticorrosion paste is permitted.

6) For equipment holes only, make sure that there is no overlap between the head of the bushing and the surface of the flange (DIA B, Figure 809).

a) Make sure that the bushing surface is flush with the flange.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

b) If there is an overlap between the surface of the bushing and the flange, remove the bushing and replace it with a new one.

SUBTASK 72-24-01-380-002-F00

(7) If it is necessary, do a spot touch-up of oxide film coating on aluminum alloys on all repaired areas (TASK 70-10-04-380-801-F00) as follows:

(a) Do not use 3M 425 Aluminum Foil Tape.

(b) Do the rinsing operations at room temperature by spraying or by wiping the touched-up surface with a clean lint-free cloth, G01043, soaked with de-ionized water, G02418.

(c) For the last rinsing operation, use de-ionized water, G02418, with conductivity ≤ 100 µS/cm for minimum one minute.

SUBTASK 72-24-01-110-005-F00

(8) Apply sealant, A50490 [CP2243], on the forward face and on the aft face between the bushing and the part (Figure 811, TASK 70-10-15-300-801-F00).

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-480-006-F00

(1) Make sure that you remove all tools, parts, and unwanted material from the fan frame shroud.

SUBTASK 72-24-01-480-007-F00

(2) Remove the DO NOT OPERATE tags from the START switches.

SUBTASK 72-24-01-860-007-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-008-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-410-006-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A

B

MATERIAL:
6061 (AGSU)
COATING:
SULFURIC ANODIZATION

2994294 S0000770592_V1

Reconditioning of the Attachment Holes on Flange A1
Figure 809/72-24-01-990-839-F00 (Sheet 1 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FLANGE A1
CONFIGURATION 1
(VIEW IN THE FORWARD DIRECTION)

C

REPAIRABLE HOLES

- ● DIA A
- ○ DIA B
- ✚ DIA C

2994295 S0000770594_V2

Reconditioning of the Attachment Holes on Flange A1
Figure 809/72-24-01-990-839-F00 (Sheet 2 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FLANGE A1
CONFIGURATION 2 AND 3
(VIEW IN THE FORWARD DIRECTION)

C

REPAIRABLE HOLES

- ● DIA A
- ○ DIA B
- ✚ DIA C

2994328 S0000770595_V2

Reconditioning of the Attachment Holes on Flange A1
Figure 809/72-24-01-990-839-F00 (Sheet 3 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

Reconditioning of the Attachment Holes on Flange A1
Figure 809/72-24-01-990-839-F00 (Sheet 4 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

2994335 S0000770597_V1

Reconditioning of the Attachment Holes on Flange A1
Figure 809/72-24-01-990-839-F00 (Sheet 5 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FLANGE A1
CONFIGURATION 2 AND 3
(VIEW IN THE FORWARD DIRECTION)

J

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

2994337 S0000770599_V1

Reconditioning of the Attachment Holes on Flange A1
Figure 809/72-24-01-990-839-F00 (Sheet 6 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

2994343 S0000770600_V2

Reconditioning of the Attachment Holes on Flange A1
Figure 809/72-24-01-990-839-F00 (Sheet 7 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

2994350 S0000770601_V2

Reconditioning of the Attachment Holes on Flange A1
Figure 809/72-24-01-990-839-F00 (Sheet 8 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A

B

MATERIAL:
6061 (AGSU)
COATING:
SULFURIC ANODIZATION

2994354 S0000771112_V1

Bushing Housing and Dimensions of Locally Manufactured Bushing
Figure 810/72-24-01-990-840-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

APPLICABLE TO REPAIRABLE HOLES ●

C

LOCALLY MANUFACTURED BUSHING

63 (1,6)

MATERIAL:
FAN INLET CASE: 6061 (AGSU)

BUSHING: A286 (E-Z6NCT25)

AMS5731 OR AMS5732 OR AMS5525

COATING:

SULFURIC ANODIZATION

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESES.

2994360 S0000770602_V2

Bushing Housing and Dimensions of Locally Manufactured Bushing
Figure 810/72-24-01-990-840-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

APPLICABLE TO REPAIRABLE HOLES ○

LOCALLY MANUFACTURED BUSHING

MATERIAL:

FAN INLET CASE: 6061 (AGSU)

BUSHING: A286 (E-Z6NCT25)

AMS5731 OR AMS5732 OR AMS5525

COATING:

SULFURIC ANODIZATION

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESES.

2994379 S0000770603_V2

Bushing Housing and Dimensions of Locally Manufactured Bushing
Figure 810/72-24-01-990-840-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

126 (3,2)

APPLICABLE TO REPAIRABLE HOLES ✚

C

63 (1,6)

LOCALLY MANUFACTURED BUSHING

MATERIAL:

FAN INLET CASE: 6061 (AGSU)

BUSHING: A286 (E-Z6NCT25)

AMS5731 OR AMS5732 OR AMS5525

COATING:

SULFURIC ANODIZATION

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESES.

2994382 S0000770604_V2

Bushing Housing and Dimensions of Locally Manufactured Bushing
Figure 810/72-24-01-990-840-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHING
APPLICABLE TO REPAIRABLE HOLES ●

1 THE BUSHING MUST BE FLUSH WITH THE FAN INLET CASE OR WITH A MAXIMUM OVERTAKE OF 0.007 (0.2)

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

2994386 S0000770606_V2

Installation and Check of the Bushing Location
Figure 811/72-24-01-990-841-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHING
APPLICABLE TO REPAIRABLE HOLES ◯

2 THE BUSHING MUST BE FLUSH WITH THE FAN INLET CASE

2994390 S0000770608_V2

Installation and Check of the Bushing Location
Figure 811/72-24-01-990-841-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHING
APPLICABLE TO REPAIRABLE HOLES ✚

3 THE BUSHING MUST BE FLUSH WITH THE FAN INLET CASE
A MAXIMUM RECESS OF 0.007 (0.2) IS PERMITTED

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

3021775 S0000794022_V1

Installation and Check of the Bushing Location
Figure 811/72-24-01-990-841-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-24-01-300-807-F00

7. Reconditioning of the Attachment Holes on Flange A1 by Drilling

(Figure 812)

A. General

(1) This task gives instructions to recondition the attachment holes on flange A1 by drilling.

(2) This task is not applicable on holes that have already been repaired by bushing. To replace the bushing, do this task: Reconditioning of the Attachment Holes on Flange A1 by Bushing, TASK 72-24-01-300-806-F00.

(3) The table below gives a list of the part numbers that are applicable to this task:

NOTE: All part numbers are applicable to all paragraphs unless specified differently.

Table 805/72-24-01-993-818-F00

Configurations	Part Number
Configuration 1	340-059-816-0
Configuration 2	340-059-815-0, 340-059-817-0, 340-059-819-0, 340-059-820-0, 340-059-822-0, 340-059-823-0, 340-059-825-0, 340-059-826-0, 340-059-828-0, 340-059-829-0, 340-059-831-0, 340-059-832-0, 340-059-834-0, 340-059-835-0, 340-059-837-0, 340-059-838-0
Configuration 3	340-059-818-0, 340-059-821-0, 340-059-824-0, 340-059-827-0, 340-059-830-0, 340-059-833-0, 340-059-836-0, 340-059-839-0, 340-059-840-0, 340-059-841-0, 340-059-842-0, 340-059-843-0, 340-059-844-0, 340-059-845-0, 340-059-846-0, 340-059-847-0

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-10-320-801-F00	Drilling (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-21-00-100-802-F00	Hand Wipe Solvent Degreasing With Chemical Agent (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-43-42-300-802-F00	Blending Procedures - Hand Blending (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G01043	Cloth - Lint-free	
G02418	Water - De-ionized	
G51478 [S1096]	Etchant - Aluminum Alloy	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Repair

SUBTASK 72-24-01-860-009-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-010-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-040-013-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO NOT OPERATE tag, STD-858, on the applicable START switch.

SUBTASK 72-24-01-010-007-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right reversers (TASK 78-31-00-010-801-F00).

G. Reconditioning of the Attachment Holes on Flange A1 by Drilling

SUBTASK 72-24-01-320-005-F00

WARNING METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

CAUTION MAKE SURE THAT YOU APPLY MASKING TAPE AND PROTECTION TO THE AREAS AND PARTS OF THE FLANGE 1 THAT YOU WILL NOT REPAIR. IF YOU DO NOT PREVENT CONTAMINATION, DAMAGE TO THE AREAS AND PARTS CAN OCCUR.

CAUTION MAKE SURE THAT YOU REMOVE ALL FOD AND PARTICLES FROM THE FLANGE AREA AFTER YOU DRILL THE HOLES. IF YOU DO NOT REMOVE ALL FOD AND PARTICLES, DAMAGE TO THE AREA AND PARTS CAN OCCUR.

(1) Machine the attachment holes to remove the indication (Figure 812, TASK 70-10-10-320-801-F00).

(a) Do not remove more material than it is necessary.

(b) For the dimensional information, refer to the table below:

Table 806/72-24-01-993-819-F00 Dimensional Information

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dia A			0.5197 in. (13.20 mm)	0.5303 in. (13.47 mm)	
Dia B			0.2717 in. (6.90 mm)	0.2803 in. (7.12 mm)	
Dia C					63.519 in. (1613.4 mm)
Dim. D					2.55 in. (65 mm)
Dim. E					1.279 in. (32.5 mm)
Dia F					63.196 in. (1605.2 mm)
Angle G					7°
Angle H					26°30’
Angle J					100°30’
Angle K					41°30’

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 806/72-24-01-993-819-F00 Dimensional Information (Continued)

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Angle L					56°30’
Angle M					71°30’
Angle N					86°30’
Angle P					103°15’
Angle Q					116°30’
Angle R					131°30’
Angle S					146°30’
Angle T					5°15’
Angle U					7°30’
Angle V					1°45’
Angle W					2°07’29’’

SUBTASK 72-24-01-100-004-F00

WARNING

ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

WARNING

ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE. USE PROTECTION EQUIPMENT. MAKE SURE THAT YOU USE ISOPROPYL ALCOHOL IN AN AREA WITH AIRFLOW. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

(2) Remove grease from the repaired areas with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041] (TASK 70-21-00-100-802-F00).

SUBTASK 72-24-01-210-006-F00

(3) Do a visual inspection of the repaired areas.

(a) Make sure that the indication is fully removed.

(b) Make sure that the edges of the drilled part are free of burrs or rolled metal.

1) If necessary, do a hand blending to remove burrs after machining (TASK 70-43-42-300-802-F00).

SUBTASK 72-24-01-300-002-F00

(4) Do a local swab etching of the repaired areas with aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

SUBTASK 72-24-01-230-002-F00

(5) Do a fluorescent penetrant inspection of the repaired areas (TASK 70-40-01-230-801-F00).

(a) Sensitivity level 3.

(b) Indications less than 0.0118 in. (0.30 mm) are non-interpretable.

(c) Indications of more than 0.0118 in. (0.30 mm) are not permitted.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(d) Linear indications are not permitted.

NOTE: Linear indications are indications that are at minimum four times longer than they are wide.

SUBTASK 72-24-01-350-002-F00

(6) Do a spot touch-up of oxide film coating on aluminum alloys on all repaired areas as follows (TASK 70-10-04-380-801-F00):

(a) Do not use 3M 425 Aluminum Foil Tape.

(b) Do the rinsing operations at room temperature by spraying or by wiping the touched-up surface with a clean lint-free cloth, G01043, soaked with de-ionized water, G02418.

(c) For the last rinsing operation, use de-ionized water, G02418, with conductivity ≤ 100 µS/cm for minimum one minute.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-480-008-F00

(1) Make sure that you remove all tools, parts, and unwanted material from the fan frame shroud.

SUBTASK 72-24-01-480-009-F00

(2) Remove the DO NOT OPERATE tag from the START switch.

SUBTASK 72-24-01-860-011-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-012-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-410-007-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:

6061 (AGSU)

COATING:

SULFURIC ANODIZATION

B

2993966 S0000770369_V1

Reconditioning of the Attachment Holes On Flange A1 By Drilling
Figure 812/72-24-01-990-842-F00 (Sheet 1 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CONFIGURATION 1
FLANGE A1
(VIEW IN THE FORWARD DIRECTION)

C

REPAIRABLE HOLES

- ● DIA A
- ○ DIA B

2993977 S0000770372_V2

Reconditioning of the Attachment Holes On Flange A1 By Drilling
Figure 812/72-24-01-990-842-F00 (Sheet 2 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CONFIGURATION 2 AND 3
FLANGE A1
(VIEW IN THE FORWARD DIRECTION)

C

REPAIRABLE HOLES

- ● DIA A
- ○ DIA B

2993981 S0000770375_V2

Reconditioning of the Attachment Holes On Flange A1 By Drilling
Figure 812/72-24-01-990-842-F00 (Sheet 3 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Reconditioning of the Attachment Holes On Flange A1 By Drilling
Figure 812/72-24-01-990-842-F00 (Sheet 4 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES

2994001 S0000770381_V1

Reconditioning of the Attachment Holes On Flange A1 By Drilling
Figure 812/72-24-01-990-842-F00 (Sheet 5 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES

2994002 S0000770382_V1

Reconditioning of the Attachment Holes On Flange A1 By Drilling
Figure 812/72-24-01-990-842-F00 (Sheet 6 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES

2994003 S0000770383_V2

Reconditioning of the Attachment Holes On Flange A1 By Drilling
Figure 812/72-24-01-990-842-F00 (Sheet 7 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES

2994004 S0000770384_V2

Reconditioning of the Attachment Holes On Flange A1 By Drilling
Figure 812/72-24-01-990-842-F00 (Sheet 8 of 8)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-24-01-300-808-F00

8. Repair of Flange A1 Area G by Blending

(Figure 813, Figure 814)

A. General

(1) This task gives instructions to repair nicks, dents, or scratches on flange A1 Area G by blending.

(2) Equivalent alternatives for tools, equipment, and consumable materials can be used.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-21-00-100-802-F00	Hand Wipe Solvent Degreasing With Chemical Agent (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-43-42-300-802-F00	Blending Procedures - Hand Blending (P/B 201)
70-43-42-300-803-F00	Blending Procedures - Power Blending (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G01043	Cloth - Lint-free	
G51412 [CP2721]	Cloth - Abrasive, Silicone Carbide - CS 333X	
G51478 [S1096]	Etchant - Aluminum Alloy	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Prepare for the Repair

SUBTASK 72-24-01-860-013-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-014-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-040-014-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO NOT OPERATE tag, STD-858, on the applicable START switch.

SUBTASK 72-24-01-010-008-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

G. Repair of Flange A1 Area G by Blending

SUBTASK 72-24-01-320-006-F00

> **WARNING** METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(1) Do the blending on the indication (TASK 70-43-42-300-802-F00 or TASK 70-43-42-300-803-F00).

(a) The total area to be blended must not be more than 50% of the area G corresponding to 0.274 in^2 (177 mm^2).

(b) If the hole was repaired before by bushing, the total area to be blended must not be more than 50% of the remaining area G corresponding to 0.213 in^2 (137 mm^2) (TASK 72-24-01-300-806-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) For the dimensional information refer to the table below:

Table 807/72-24-01-993-820-F00 Dimensional Information

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dia A					0.984 in. (25.0 mm)
Dim. B				0.0031 in. (0.08 mm)	
Dia C			0.51969 in. (13.2 mm)	0.53031 in. (13.470 mm)	
Dia D					63.519 in. (1613.4 mm)

SUBTASK 72-24-01-120-003-F00

(2) Do the polishing on the blended area, until a surface finish of 63 µin. (1.6 µm) is gotten.

(a) Use strips of abrasive cloth, G51412 [CP2721], grade 400 or 800.

SUBTASK 72-24-01-110-006-F00

WARNING ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

WARNING ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE. USE PROTECTION EQUIPMENT. MAKE SURE THAT YOU USE ISOPROPYL ALCOHOL IN AN AREA WITH AIRFLOW. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

(3) Clean the part with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041] (TASK 70-21-00-100-802-F00).

SUBTASK 72-24-01-350-003-F00

(4) Do a local swab etching of the blended areas, using aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

SUBTASK 72-24-01-230-003-F00

(5) Do a fluorescent penetrant inspection of the repair areas (TASK 70-40-01-230-801-F00).

(a) Sensibility S3.

(b) Indications less than 0.0118 in. (0.30 mm) are non-interpretable.

(c) Indications more than 0.0118 in. (0.30 mm) are not permitted.

(d) Linear indications are not permitted.

NOTE: Linear indications are indications that are at least four times longer than they are wide.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-24-01-390-003-F00

> **WARNING** TRICHLOROETHYLENE IS POISONOUS. DO NOT LET THIS MATERIAL TOUCH YOU. USE PERSONAL PROTECTION EQUIPMENT. USE FUME CONTROL OR A RESPIRATOR. IF YOU DO NOT OBEY, INJURY TO THE PERSON CAN OCCUR.

(6) Do a reconditioning of oxide film coating on aluminum alloys on all repaired areas as follows (TASK 70-10-04-380-801-F00):

(a) Apply the oxide film coating within 6 hours after surface preparation.

(b) Do not use 3M 425 Aluminum Foil Tape.

(c) Carry out the rinsing operations at room temperature, do this step:

1) Spray, immerse, or wipe the touched-up surface with a clean white lint-free cloth, G01043, soaked with deionized water.

(d) For the last rinsing bath, use the deionized water with conductivity ≤ 100 μS/cm for 1 minute minimum.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-010-009-F00

(1) Remove the DO NOT OPERATE tag from the START switch.

SUBTASK 72-24-01-010-010-F00

(2) Make sure that all tools, parts, and unwanted material are removed from the fan inlet case.

SUBTASK 72-24-01-860-015-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-016-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-410-008-F00

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safety close the left and right thrust reversers.

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:
6061 (AGSU)
COATING:
SULFURIC ANODIZATION

2993726 S0000770475_V1

Repair of Flange A1 Area G By Blending
Figure 813/72-24-01-990-843-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 AREA TO BE REPAIRED

2993733 S0000770476_V1

Repair of Flange A1 Area G By Blending
Figure 813/72-24-01-990-843-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FLANGE A1
(VIEW IN THE FORWARD DIRECTION)

A

MATERIAL:
6061 (AGSU)
COATING:
SULFURIC ANODIZATION

2993745 S0000770477_V1

Dimensional Information
Figure 814/72-24-01-990-847-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(AREA G NORMAL CONDITION)

B

(AREA G WITH HOLE RECONDITIONED)

B

BLENDED AREA

NOTE:

THE BLENDED SHAPES ARE NOT REPRESENTIVE,
ONLY THE SURFACE RESTRICTION MUST BE OBEYED

1 HOLE RECONDITIONED BY BUSHING

2993835 S0000770478_V1

Dimensional Information
Figure 814/72-24-01-990-847-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A-A

B-B

NOTE:

THE SCALE IS NOT REPRESENTATIVE

2 HOLE RECONDITIONED BY BUSHING

2993839 S0000770479_V1

Dimensional Information
Figure 814/72-24-01-990-847-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-24-01-300-809-F00

9. Repair of the Radii of Flanges A1, B1, B2, B3, B4, B5, and B6 on the Containment Case by Blending

(Figure 815, Figure 816)

A. General

(1) This task gives instructions to repair any nicks, dents, or scratches on the radii of flanges A1, B1, B2, B3, B4, B5, and B6 on the containment case.

(2) Equivalent alternatives for tools, equipment, and consumable materials can be used.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-21-00-100-802-F00	Hand Wipe Solvent Degreasing With Chemical Agent (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-43-42-300-802-F00	Blending Procedures - Hand Blending (P/B 201)
70-43-42-300-803-F00	Blending Procedures - Power Blending (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-24-01-200-801-F00	Fan Inlet Case Inspection (Detail) (P/B 601)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G01043	Cloth - Lint-free	
G51412 [CP2721]	Cloth - Abrasive, Silicone Carbide - CS 333X	
G51478 [S1096]	Etchant - Aluminum Alloy	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Prepare for the Repair

SUBTASK 72-24-01-860-017-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-018-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-040-015-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO NOT OPERATE tag, STD-858, on the applicable START switch.

SUBTASK 72-24-01-010-011-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

G. Repair of the Radii of Flanges A1, B1, B2, B3, B4, B5, and B6 on the Containment Case by Blending

SUBTASK 72-24-01-970-006-F00

(1) For the dimensional information for the repair application, refer to the table below (Figure 816):

Table 808/72-24-01-993-821-F00 Dimensional Information

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
For flange A1 (Figure 815 and Figure 816)					
Dim. A				0.0039 in. (0.10 mm)	
Circumferential length				1.57 in. (40 mm)	

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 808/72-24-01-993-821-F00 Dimensional Information (Continued)

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Distance between two blending sections			Not Applicable		
Length/depth ratio			20		
Blending section (circumferential length x depth)				0.004 in^2 (3 mm^2)	
For flange B1, Configuration 1 (Figure 815 and Figure 816)					
Dim. C11				0.0157 in. (0.40 mm)	
Dim. D11				0.0157 in. (0.40 mm)	
Circumferential length				1.57 in. (40 mm)	
Distance between two blending sections			5.51 in. (140.0 mm)		
Length/depth ratio			50		
Blending section (circumferential length x depth)				0.012 in^2 (8 mm^2)	
For flange B1, Configuration 2 (Figure 815 and Figure 816)					
Dim. C12				0.0078 in. (0.20 mm)	
Dim. D12				0.0078 in. (0.20 mm)	
Circumferential length				1.57 in. (40 mm)	
Distance between two blending sections			5.51 in. (140.0 mm)		
Length/depth ratio			50		
Blending section (circumferential length x depth)				0.006 in^2 (4 mm^2)	
For flange B2 (Figure 815 and Figure 816)					
Dim. C2				0.0078 in. (0.20 mm)	
Dim. D2				0.0078 in. (0.20 mm)	
Circumferential length				1.57 in. (40 mm)	
Distance between two blending sections			5.51 in. (140.0 mm)		
Length/depth ratio			20		

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 808/72-24-01-993-821-F00 Dimensional Information (Continued)

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Blending section (Circumferential length x depth)				0.004 in^2 (3 mm^2)	
For flange B3 (Figure 815 and Figure 816)					
Dim. C3				0.0078 in. (0.20 mm)	
Dim. D3				0.0078 in. (0.20 mm)	
Circumferential length				1.57 in. (40 mm)	
Distance between two blending sections			5.51 in. (140.0 mm)		
Length/depth ratio			20		
Blending section (circumferential length x depth)				0.004 in^2 (3 mm^2)	
For flange B4 (Figure 815 and Figure 816)					
Dim. C4				0.0039 in. (0.10 mm)	
Dim. D4				0.0039 in. (0.10 mm)	
Circumferential length				1.57 in. (40 mm)	
Distance between two blending sections			5.51 in. (140.0 mm)		
Length/depth ratio			20		
Blending section (circumferential length x depth)				0.004 in^2 (3 mm^2)	
For flange B5 (Figure 815 and Figure 816)					
Dim. C5				0.0039 in. (0.10 mm)	
Dim. D5				0.0039 in. (0.10 mm)	
Circumferential length				1.57 in. (40 mm)	
Distance between two blending sections			5.51 in. (140.0 mm)		
Length/depth ratio			20		
Blending section (circumferential length x depth)				0.004 in^2 (3 mm^2)	

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 808/72-24-01-993-821-F00 Dimensional Information (Continued)

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
For flange B6 (Figure 815 and Figure 816)					
Dim. E				0.0039 in. (0.10 mm)	
Circumferential length				1.57 in. (40 mm)	
Distance between two blending sections			5.51 in. (140.0 mm)		
Length/depth ratio			20		
Blending section (circumferential length x depth)				0.004 in^2 (3 mm^2)	

SUBTASK 72-24-01-320-007-F00

WARNING

METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(2) Do a blending on the indications (TASK 70-43-42-300-802-F00 or TASK 70-43-42-300-803-F00).

(a) For flange B1, configuration 1 is when there is no indication on the opposite radius of the flange (Figure 815).

(b) For flange B1, configuration 2 is when there is an indication on the opposite radius of the flange (Figure 815).

1) Indications are opposite when there is a minimum of one part of the blending section in direct opposition.

(c) For flanges B2, B3, B4, and B5 indication on the opposite radius of the flange is not permitted (Figure 815).

1) Indications are opposite when there is a minimum of one part of the blending section in direct opposition.

(d) Blending overtake on the flanges is not permitted.

(e) Blending overtake on the outer skin is permitted, if it is in limit (TASK 72-24-01-200-801-F00).

SUBTASK 72-24-01-320-008-F00

(3) Do the polishing on the blended area, until a surface finish of 63 µin. (1.6 µm) is gotten.

(a) Use strips of abrasive cloth, G51412 [CP2721], grade 400 or 800.

SUBTASK 72-24-01-100-005-F00

WARNING

ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(WARNING PRECEDES)

> **WARNING** ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE. USE PROTECTION EQUIPMENT. MAKE SURE THAT YOU USE ISOPROPYL ALCOHOL IN AN AREA WITH AIRFLOW. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

(4) Clean the part with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041] (TASK 70-21-00-100-802-F00).

SUBTASK 72-24-01-300-003-F00

(5) Do a local swab etching of the blended areas, using aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

SUBTASK 72-24-01-230-004-F00

(6) Do a fluorescent penetrant inspection of the repair areas (TASK 70-40-01-230-801-F00).

(a) Sensibility S3.

(b) Indications less than 0.0118 in. (0.30 mm) are non-interpretable.

(c) Indications more than 0.0118 in. (0.30 mm) are not permitted.

(d) Linear indications are not permitted.

NOTE: Linear indications are indications that are at least four times longer than they are wide.

SUBTASK 72-24-01-350-004-F00

> **WARNING** TRICHLOROETHYLENE IS POISONOUS. DO NOT LET THIS MATERIAL TOUCH YOU. USE PERSONAL PROTECTION EQUIPMENT. USE FUME CONTROL OR A RESPIRATOR. IF YOU DO NOT OBEY, INJURY TO THE PERSON CAN OCCUR.

(7) Do a reconditioning of oxide film coating on aluminum alloys on all repaired areas as follows (TASK 70-10-04-380-801-F00):

(a) Apply the oxide film coating within 6 hours after surface preparation.

(b) Do not use 3M 425 Aluminum Foil Tape.

(c) Carry out the rinsing operations at room temperature, do this step:

1) Spray, immerse, or wipe the touched-up surface with a clean white lint-free cloth, G01043, soaked with deionized water.

(d) For the last rinsing bath, use the deionized water with conductivity ≤ 100 μS/cm for 1 minute minimum.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-480-010-F00

(1) Make sure that all tools, parts, and unwanted material are removed from the fan frame shroud.

SUBTASK 72-24-01-480-011-F00

(2) Remove the DO NOT OPERATE tag from the START switch.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-24-01-860-019-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-020-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-410-009-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers.

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A-A

MATERIAL:

6061 (AGSU T6)

COATING:

SULFURIC ANODIZATION

LEGEND:

AREA THAT CAN BE REPAIRED

2993770 S0000770489_V2

Repair of the Radii of Flanges A1, B1, B2, B3, B4, B5, and B6 on the Containment Case by Blending
Figure 815/72-24-01-990-845-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(OPPOSITE FLANGE INDICATIONS)
(EXAMPLE)

A

(FOR FLANGES B2, B3, B4, AND B5)

A

1 OPPOSITE INDICATION ON FLANGES

3004420 S0000779804_V1

Repair of the Radii of Flanges A1, B1, B2, B3, B4, B5, and B6 on the Containment Case by Blending
Figure 815/72-24-01-990-845-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(OPPOSITE FLANGE INDICATIONS)
(EXAMPLE)

B

(FOR FLANGE B1 ONLY)

B

1 OPPOSITE INDICATION ON FLANGES
2 CONFIGURATION 1
3 CONFIGURATION 2

2993858 S0000770492_V2

Repair of the Radii of Flanges A1, B1, B2, B3, B4, B5, and B6 on the Containment Case by Blending
Figure 815/72-24-01-990-845-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Dimensional Information
Figure 816/72-24-01-990-846-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2993780 S0000770494_V1

Dimensional Information
Figure 816/72-24-01-990-846-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-24-01-300-810-F00

10. Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit

(Figure 817, Figure 818, Figure 819, and Figure 820)

A. General

(1) This task gives instructions to recondition the attachment holes on flange A1 by drilling or bushing with fan case repair kit, SPL-23266.

(2) This task is not applicable to holes that were repaired before by bushing. Task for bushing can be used (TASK 72-24-01-300-806-F00).

(3) This task contains the steps with restrictions on holes to repair. If this task is not applicable to holes to repair, task for drilling or task for bushing can be used (TASK 72-24-01-300-807-F00 or TASK 72-24-01-300-806-F00).

(4) The table below gives a list of the part numbers that are applicable to this task.

NOTE: All part numbers are applicable to all paragraphs unless specified differently.

Table 809/72-24-01-993-824-F00

Configurations	Part Number
Configuration 1	340-059-816-0
Configuration 2	340-059-815-0, 340-059-817-0, 340-059-819-0, 340-059-820-0, 340-059-822-0, 340-059-823-0, 340-059-825-0, 340-059-826-0, 340-059-828-0, 340-059-829-0, 340-059-831-0, 340-059-832-0, 340-059-834-0, 340-059-835-0, 340-059-837-0, 340-059-838-0
Configuration 3	340-059-818-0, 340-059-821-0, 340-059-824-0, 340-059-827-0, 340-059-830-0, 340-059-833-0, 340-059-836-0, 340-059-839-0, 340-059-840-0, 340-059-841-0, 340-059-842-0, 340-059-843-0, 340-059-844-0, 340-059-845-0, 340-059-846-0, 340-059-847-0

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-10-08-320-801-F00	Machining (Material Removal) (P/B 201)
70-10-10-320-801-F00	Drilling (P/B 201)
70-10-11-800-801-F00	Local Swab Etching - Maintenance Practices (P/B 201)
70-10-15-300-801-F00	Polysulfide Elastomer Sealant Application (Bond) (P/B 801)
70-21-00-100-802-F00	Hand Wipe Solvent Degreasing With Chemical Agent (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-43-42-300-802-F00	Blending Procedures - Hand Blending (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Title
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-23266	Repair Kit - Fan Case, A1 Flange Part #: 856A4708G01 Supplier: 58828
STD-858	Tag - DO NOT OPERATE
STD-6617	Equipment - Vibro-engraving

D. Consumable Materials

Reference	Description	Specification
A50490 [CP2243]	Sealant - Elastomer - PR 1750 Class B2	
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50321 [CP2773]	Compound - Jointing, Corrosion Inhibiting, Chromate Free, Mastinox CA1010	
G01043	Cloth - Lint-free	
G02418	Water - De-ionized	
G51478 [S1096]	Etchant - Aluminum Alloy	
G51491 [CP1067]	Nitrogen - Liquid	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Repair

SUBTASK 72-24-01-040-016-F00

(1) Make sure that the START switches are in the OFF position.

(a) Install a DO NOT OPERATE tag, STD-858, on the applicable START switch.

SUBTASK 72-24-01-860-025-F00

(2) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-026-F00

(3) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-24-01-010-017-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

G. Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit

SUBTASK 72-24-01-800-002-F00

(1) Refer to the dimensional information for the repair application in the table below:

Table 810/72-24-01-993-825-F00 Repair Dimensional Information

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dia B			0.2717 in. (6.90 mm)	0.2803 in. (7.12 mm)	
Dia C			0.2717 in. (6.90 mm)	0.2803 in. (7.12 mm)	
Dia D			0.5276 in. (13.40 mm)	0.5303 in. (13.47 mm)	
Dia E			1.000 in. (25.4 mm)	1.007 in. (25.6 mm)	
Dim. X			0.0768 in. (1.95 mm)	0.0807 in. (2.05 mm)	
Dia Y					0.6515 in. (16.55 mm)
Dia Z					1.019 in. (25.9 mm)
Dim. AC			0.040 in. (1.0 mm)	0.043 in. (1.1 mm)	
Dia AD					0.3917 in. (9.95 mm)
Dia AE					0.555 in. (14.1 mm)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 810/72-24-01-993-825-F00 Repair Dimensional Information (Continued)

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dia AF					0.3405 in. (8.65 mm)
Dim. AH			0.0020 in. (0.05 mm)	0.0039 in. (0.10 mm)	
Dim. AJ			0.0040 in. (0.10 mm)	0.0059 in. (0.15 mm)	
Dim. AK					0.460 in. (11.7 mm)
Dim. AL					0.224 in. (5.7 mm)
Dim. AX			0.119 in. (3.0 mm)	0.125 in. (3.2 mm)	
Dia AZ					0.55216 in. (14.025 mm)

SUBTASK 72-24-01-300-009-F00

(2) Make sure to obey the limits of the repair (Figure 817 and Figure 820).

(a) Do not repair Hole 1.

(b) Make sure that there is no mark on the flange above the hole to repair (Figure 820).

(c) Only one hole into the group of five holes 31, 32, 33, 34, and 35 can be repaired.

1) If there is a mark on the A1 flange above one of the holes into the group of holes 31-35, none of the holes is repairable with this task.

(d) Only one hole into the group of five holes 37, 38, 39, 40, and 41 can be repaired.

1) If there is a mark on the A1 flange above one of the holes into the group of holes 37-41, none of the holes is repairable with this task.

(e) Only one hole into the group of six holes 61, 62, 63, 64, 65, and 66 can be repaired.

1) If there is a mark on the A1 flange above one of the holes into the group of holes 61-66, none of the holes is repairable with this task.

(f) In the other case, if there is a mark above the hole to repair on the A1 flange, the hole cannot be repaired with this task.

(g) For the Fan Inlet Cowl bolt hole, if the indication is in the hole and the hole diameter is less than 0.5303 in. (13.47 mm), repair the A1 flange hole by drilling, follow the applicable section of this task.

(h) For the Centering pin hole, if the indication is in the hole and the hole diameter is less than 0.2803 in. (7.12 mm), repair the A1 flange hole by drilling, follow the applicable section of this task.

(i) For the Equipment hole, if the indication is in the hole and the hole diameter is less than 0.2803 in. (7.12 mm), repair the A1 flange hole by drilling, follow the applicable section of this task.

(j) If the indication is in the hole and around the hole, repair the A1 flange hole by bushing, follow the applicable section of this task.

SUBTASK 72-24-01-320-009-F00

(3) Repair the A1 flange hole by drilling.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

CAUTION MAKE SURE THAT YOU APPLY MASKING TAPE AND PROTECTION TO THE AREAS AND PARTS OF THE FLANGE 1 THAT YOU WILL NOT REPAIR. IF YOU DO NOT PREVENT CONTAMINATION, DAMAGE TO THE AREAS AND PARTS CAN OCCUR.

CAUTION MAKE SURE THAT YOU REMOVE ALL FOD AND PARTICLES FROM THE FLANGE AREA AFTER YOU DRILL THE HOLES. IF YOU DO NOT REMOVE ALL FOD AND PARTICLES, DAMAGE TO THE AREA AND PARTS CAN OCCUR.

(a) Use fan case repair kit, SPL-23266, to drill the attachment holes to remove the indication (TASK 70-10-10-320-801-F00).

(b) Do not remove tool for inspections.

WARNING ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

WARNING ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE. USE PROTECTION EQUIPMENT. MAKE SURE THAT YOU USE ISOPROPYL ALCOHOL IN AN AREA WITH AIRFLOW. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

(c) Remove grease from the repaired areas with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041] (TASK 70-21-00-100-802-F00).

(d) Do a visual inspection of the repaired areas and make sure that the indication is fully removed.

1) If there is remaining indication, repair the A1 flange hole by bushing, follow the applicable section of this task with tool installed.

2) If there is no remaining indication, remove the tool.

(e) Make sure that the edges of the drilled area have no burrs or rolled metal.

1) If it is necessary, do a hand blending to remove burrs after machining (TASK 70-43-42-300-802-F00).

(f) Do a local swab etching of the repaired areas with aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

(g) Do a fluorescent penetrant inspection of the repaired areas (TASK 70-40-01-230-801-F00):

1) Sensitivity level 3.

2) Indications less than 0.0118 in. (0.30 mm) are non-interpretable.

3) Indications more than 0.0118 in. (0.30 mm) are not permitted.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

4) Linear indications are not permitted.

NOTE: Linear indications are indications that are at minimum four times longer than they are wide.

(h) Do a spot touch-up of oxide film coating on aluminum alloys on all repaired areas (TASK 70-10-04-380-801-F00).

1) Do not use 3M 425 Aluminum Foil Tape.

2) Do a rinsing procedure at a room temperature by spraying or by wiping the touched-up surface with a clean, white lint-free cloth, G01043, soaked with de-ionized water, G02418.

3) For the last rinsing procedure, use a de-ionized water, G02418, with conductivity ≤ 100 µS/cm for 1 min minimum.

(i) Put a “R” mark on the part, follow the applicable section of this task.

SUBTASK 72-24-01-320-010-F00

(4) Repair the A1 flange hole by bushing.

WARNING METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

CAUTION MAKE SURE THAT YOU APPLY MASKING TAPE AND PROTECTION TO THE AREAS AND PARTS OF THE FLANGE 1 THAT YOU WILL NOT REPAIR. IF YOU DO NOT PREVENT CONTAMINATION, DAMAGE TO THE AREAS AND PARTS CAN OCCUR.

CAUTION MAKE SURE THAT YOU REMOVE ALL FOD AND PARTICLES FROM THE FLANGE AREA AFTER YOU DRILL THE HOLES. IF YOU DO NOT REMOVE ALL FOD AND PARTICLES, DAMAGE TO THE AREA AND PARTS CAN OCCUR.

(a) Use fan case repair kit, SPL-23266, to machine the attachment holes to install a bushing (TASK 70-10-10-320-801-F00).

(b) Do a visual inspection of the drilled areas and make sure that the indication is fully removed.

WARNING ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

WARNING ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE. USE PROTECTION EQUIPMENT. MAKE SURE THAT YOU USE ISOPROPYL ALCOHOL IN AN AREA WITH AIRFLOW. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

(c) Remove grease from the repaired areas with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041] (TASK 70-21-00-100-802-F00).

(d) Make sure that the edges of the drilled area have no burrs or rolled metal.

1) If it is necessary, do a hand blending to remove burrs after machining (TASK 70-43-42-300-802-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(e) Do a local swab etching of the repaired areas with aluminum alloy etchant, G51478 [S1096] (TASK 70-10-11-800-801-F00).

(f) Do a fluorescent penetrant inspection of the repaired areas (TASK 70-40-01-230-801-F00):

1) Sensitivity level 3.

2) Indications less than 0.0118 in. (0.30 mm) are non-interpretable.

3) Indications more than 0.0118 in. (0.30 mm) are not permitted.

4) Linear indications are not permitted.

NOTE: Linear indications are indications that are at minimum four times longer than they are wide.

(g) Do a spot touch-up of oxide film coating on aluminum alloys on all repaired areas (TASK 70-10-04-380-801-F00).

1) Do not use 3M 425 Aluminum Foil Tape.

2) Do a rinsing procedure at a room temperature by spraying or by wiping the touched-up surface with a clean, white lint-free cloth, G01043, soaked with de-ionized water, G02418.

3) For the last rinsing procedure, use a de-ionized water, G02418, with conductivity ≤ 100 µS/cm for 1 min minimum.

(h) Make a locally manufactured bushing (TASK 70-10-08-320-801-F00), (Figure 818).

WARNING METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

1) Machine the locally manufactured bushing (TASK 70-10-08-320-801-F00).

2) Make sure that the geometric tolerances of the locally manufactured bushing obey the instruction for installation into the related hole (Figure 818).

(i) Install the bushing (Figure 818 and Figure 819).

1) Apply an anticorrosion paste to the repaired areas on the fan inlet case as follows:

WARNING ACETONE IS AN EXPLOSIVE, AN IRRITANT, AN ALLERGEN, AND HAS POISONOUS DETERIORATION. USE VAPOR/FUME CONTROL OR USE A RESPIRATOR. IF YOU DO NOT, IT CAN CAUSE INJURY.

WARNING ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE. USE PROTECTION EQUIPMENT. MAKE SURE THAT YOU USE ISOPROPYL ALCOHOL IN AN AREA WITH AIRFLOW. IF YOU DO NOT OBEY, INJURY TO PERSONNEL CAN OCCUR.

a) Remove grease from the repaired areas with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041] (TASK 70-21-00-100-802-F00).

b) Carefully dry the cleaned area using a dry clean cloth and dry clean air.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING CA1010 MASTINOX CHROMATE FREE JOINTING COMPOUND IS POISONOUS AND FLAMMABLE. DO NOT LET THIS MATERIAL TOUCH YOU. DO NOT BREATHE THIS MATERIAL. USE PERSONAL PROTECTION EQUIPMENT. USE COMPOUND IN A GOOD AIRFLOW AREA. IF YOU DO NOT OBEY, INJURIES TO PERSONNEL CAN OCCUR.

c) Apply jointing compound, D50321 [CP2773], paste with a brush.

<1> Make sure that the layer applied to the contact area between the bushing and the Fan Inlet Case is approximately 0.004 in. (0.1 mm) - 0.007 in. (0.2 mm) thick.

2) Make sure that the paste is applied to the full repaired areas and that there is no remaining coating.

3) Clean the bushing, remove grease from the bushing (TASK 70-21-00-100-802-F00).

4) Put the bushing fully into liquid nitrogen, G51491 [CP1067].

5) Install the bushing.

6) Examine the bushing location (Figure 819).

7) Clean the unwanted anticorrosion paste with a dry, clean cloth.

a) Make sure that there is no anticorrosion paste remaining.

8) For equipment holes only (Hole B), make sure that there is no recess between the head of the bushing and the surface of the flange (Figure 817 and Figure 819).

NOTE: Bushing surface must be flush with the flange.

a) If there is a recess between the surfaces of the bushing and the flange, remove the bushing and replace it with a new one.

(j) Apply a sealant, A50490 [CP2243], to the forward face and to the aft face between the bushing and the part (TASK 70-10-15-300-801-F00), (Figure 819).

SUBTASK 72-24-01-930-001-F00

(5) Put a “R” mark on the part to identify the applied repair (Figure 820).

(a) Make sure that each hole repaired with this task has a mark on the upper face of A1 flange (Figure 820).

(b) Make sure that the area to be marked is clean and unobstructed.

(c) Start the marking tool and, if it is necessary, adjust stroke.

1) Use a vibro-engraving equipment, STD-6617.

2) Use a normograph or automatic process.

3) Make sure that character depth is 0.0020 in. (0.05 mm) - 0.0059 in. (0.15 mm).

4) Make sure that character height is 0.15 in. (4 mm).

5) Use tapered shape with profile of 60° and a radius of 0.0099 in. (0.25 mm) - 0.0137 in. (0.35 mm).

6) Make sure that minimum distance between any mark and an angle, a blending radius, or the edge of a part is 0.5 x height of characters.

(d) Carefully remove all projections made on the surface by the moved metal.

(e) Examine the mark for uniformity and legibility.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(f) If it is necessary, do a spot touch-up of oxide film coating on aluminum alloys on all marked areas (TASK 70-10-04-380-801-F00).

1) Do not use 3M 425 Aluminum Foil Tape.

2) Do a rinsing procedure at a room temperature by spraying or by wiping the touched-up surface with a clean, white lint-free cloth, G01043, soaked with de-ionized water, G02418.

3) For the last rinsing procedure, use a de-ionized water, G02418, with conductivity ≤ 100 μS/cm for 1 minute minimum.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-080-006-F00

(1) Make sure to remove all tools, parts, and unwanted material from the fan frame shroud.

SUBTASK 72-24-01-410-011-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-24-01-860-027-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-24-01-860-028-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-080-005-F00

(5) On the applicable engine, remove the DO-NOT-OPERATE tag from the START switch.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A

B

MATERIAL:
6061 (AGSU)
COATING:
SULFURIC ANODIZATION

3027267 S0000798457_V1

Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit
Figure 817/72-24-01-990-850-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A1 FLANGE
CONFIGURATION 1
(VIEW IN THE FORWARD DIRECTION)

C

REPAIRABLE HOLES

- ● HOLE A: FAN INLET COWL BOLT HOLE
- ○ HOLE B: EQUIPMENT HOLE
- ✚ HOLE C: CENTERING PIN HOLE

3027268 S0000798458_V1

Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit
Figure 817/72-24-01-990-850-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A1 FLANGE
CONFIGURATION 2 AND 3
(VIEW IN THE FORWARD DIRECTION)

C

REPAIRABLE HOLES

- ● HOLE A: FAN INLET COWL BOLT HOLE
- ○ HOLE B: EQUIPMENT HOLE
- ✚ HOLE C: CENTERING PIN HOLE

3027273 S0000798459_V1

Reconditioning of the Attachment Holes on Flange A1 by Drilling or by Bushing with Fan Case Repair Kit
Figure 817/72-24-01-990-850-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A

B

MATERIAL:
6061 (AGSU)
COATING:
SULFURIC ANODIZATION

3027267 S0000798457_V1

Bushing Housing and Dimensions of Locally Manufactured Bushing
Figure 818/72-24-01-990-851-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

126 (3,2)

APPLICABLE TO REPAIRABLE HOLES ●

C

LOCALLY MANUFACTURED BUSHING

63 (1,6)

MATERIAL:

FAN INLET CASE: 6061 (AGSU)

BUSHING: A286 (E-Z6NCT25) AMS5731 OR AMS5732 OR AMS5525

COATING:

FAN INLET CASE: SULFURIC ANODIZATION

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESES.

3027282 S0000798460_V1

Bushing Housing and Dimensions of Locally Manufactured Bushing
Figure 818/72-24-01-990-851-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

APPLICABLE TO REPAIRABLE HOLES ○

LOCALLY MANUFACTURED BUSHING

MATERIAL:

FAN INLET CASE: 6061 (AGSU)

BUSHING: A286 (E-Z6NCT25) AMS5731 OR AMS5732 OR AMS5525

COATING:

FAN INLET CASE: SULFURIC ANODIZATION

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESES.

3027287 S0000798461_V1

Bushing Housing and Dimensions of Locally Manufactured Bushing
Figure 818/72-24-01-990-851-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

APPLICABLE TO REPAIRABLE HOLES ✚

LOCALLY MANUFACTURED BUSHING

MATERIAL:

FAN INLET CASE: 6061 (AGSU)

BUSHING: A286 (E-Z6NCT25) AMS5731 OR AMS5732 OR AMS5525

COATING:

FAN INLET CASE: SULFURIC ANODIZATION

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESES.

3027288 S0000798462_V1

Bushing Housing and Dimensions of Locally Manufactured Bushing
Figure 818/72-24-01-990-851-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHING
APPLICABLE TO REPAIRABLE HOLES ●

1 THE BUSHING MUST BE FLUSH WITH THE FAN INLET CASE OR WITH A MAXIMUM OVERTAKE OF 0.007 (0.2)

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

2994386 S0000770606_V2

Installation and Check of the Bushing Location
Figure 819/72-24-01-990-852-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHING
APPLICABLE TO REPAIRABLE HOLES ◯

2 THE BUSHING MUST BE FLUSH WITH THE FAN INLET CASE

2994390 S0000770608_V2

Installation and Check of the Bushing Location
Figure 819/72-24-01-990-852-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHING
APPLICABLE TO REPAIRABLE HOLES ✚

3 THE BUSHING MUST BE FLUSH WITH THE FAN INLET CASE
A MAXIMUM RECESS OF 0.007 (0.2) IS PERMITTED

NOTE:

ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES).

3021775 S0000794022_V1

Installation and Check of the Bushing Location
Figure 819/72-24-01-990-852-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:
6061 (AGSU)
COATING:
SULFURIC ANODIZATION

3027267 S0000798457_V1

Marking of the Repair
Figure 820/72-24-01-990-853-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

APPLICABLE TO ALL REPAIRABLE HOLES

C

NOTE:

M: MARGIN (MINIMUM DISTANCE BETWEEN ANY MARK AND AN ANGLE, A BLENDING RADIUS OR THE EDGE OF A PART: 0.5 X HEIGHT OF CHARACTERS)

3027304 S0000798467_V1

Marking of the Repair
Figure 820/72-24-01-990-853-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ABRADABLE SHROUD - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) A detailed inspection of the abradable shroud.

TASK 72-24-02-200-801-F00

2. Abradable Shroud (Detail) - Inspection

(Figure 601)

A. General

(1) This task is the detailed inspection of the abradable shroud.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
72-24-02-200-802-F00	Recondition of the Abradable Shroud (P/B 801)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-858	Tag - DO NOT OPERATE

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For the Inspection

SUBTASK 72-24-02-040-001-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-02-040-002-F00

(2) Make sure that the start levers are in the CUTOFF position.

SUBTASK 72-24-02-040-006-F00

(3) Install a DO NOT OPERATE tag, STD-858, on the applicable start switch.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-24-02-480-001-F00

CAUTION	MAKE SURE THAT YOU INSTALL THE MATS IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL. WITHOUT MATS, TOOLS, PARTS OR UNWANTED MATERIAL CAN CAUSE DAMAGE TO THE INLET COWL.

(4) Install a protective mat, STD-585, in the inlet cowl.

F. Examine the Abradable Shroud

SUBTASK 72-24-02-210-001-F00

(1) Do a visual check of the abradable shroud for damage:

(a) If findings are more than these limits, do this task: Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00, unless you are given other instructions.

(b) Cracks.

1) There is no limit to the number of cracks.

(c) Craters (length < 5 X width) and impacts other than cracks, grooves, circumferential impacts, disbonding or rub marks.

1) All craters and impacts (other than cracks, grooves, circumferential impacts, disbonding or rub marks) are permitted with these limits:

a) The total of all impacted areas is not more than 160 in^2 (1032 cm^2).

b) Each impacted area is not more than 30 in^2 (194 cm^2).

c) Each impacted area is not more than 2.5 in. (63.5 mm) in axial width.

d) The minimum distance between impacted areas is equal to the maximum width of the nearest single impacted area.

e) The fan case parent metal does not show through.

2) If the fan case parent metal shows through, a Continue-In-Service limit of 50 flight cycles or 75 flight hours (whichever occurs first) is permitted if:

a) Craters and impacts are within dimensional limits.

b) There is no finding on the parent metal under visual check.

3) If the fan case parent metal shows through, protect the back of the affected area.

a) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

4) If the service extension limits are expired, do this task: Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00.

(d) Grooves (length > 5 X width and pointed within 0-80 degrees the engine axis).

1) All grooves are permitted with these limits:

a) The maximum width of one groove is not more than 0.32 in. (8 mm).

b) The total groove width is not more than 1.25 in. (32 mm) with a separation of not less than 0.1 in. (2.5 mm).

c) The fan case parent metal does not show through.

2) If the fan case parent metal shows through, a Continue-In-Service limit of 50 flight cycles or 75 flight hours (whichever occurs first) is permitted if:

a) Grooves are within dimensional limits.

b) There is no finding on the parent metal under visual check.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

3) If the fan case parent metal shows through, protect the back of the affected area.
   a) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.
4) If the service extension limits are expired, do this task: Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00.

(e) Circumferential impact (360 degrees or pointed within 80-90 degrees the engine axis)
1) All circumferential impacts are permitted with these limits:
   a) The maximum width of one or cumulative impact is not more than 1.5 in. (38.1 mm).
   b) The fan case parent metal does not show through.
2) If the maximum axial width of one or cumulative impact is not more than 2 in. (51 mm), a Continue-In-Service limit of 50 flight cycles or 75 flight hours (whichever occurs first) is permitted if:
   a) The parent metal does not show through.
3) If the fan case parent metal shows through, a Continue-In-Service limit of 50 flight cycles or 75 flight hours (whichever occurs first) is permitted if:
   a) The circumferential impacts are within dimensional limits.
   b) There is no finding on the parent metal under visual check.
4) If the fan case parent metal shows through, protect the back of the affected area.
   a) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.
5) If the service extension limits are expired, do this task: Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00.

(f) Disbonding (other than cracks, craters, grooves, circumferential impacts or rub marks), the fan case parent metal shows through.
1) A Continue-In-Service limit of 50 flight cycles or 75 flight hours (whichever occurs first) is permitted if:
   a) The cumulative of all impacted areas (including craters (length < 5 X width) and impacts other than cracks, grooves, circumferential impacts or rub marks) is not more than 160 in^2 (1032 cm^2).
   b) Each impacted area is not more than 30 in^2 (194 cm^2).
   c) Each impacted area is not more than 2.5 in. (63.5 mm) in axial width.
   d) The minimum distance between impacted areas is equal to the width of the nearest single impacted area.
   e) There is no finding on the parent metal under visual check.
2) If the fan case parent metal shows through, protect the back of the affected area.
   a) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.
3) Check every 10 flight cycles or 15 flight hours (whichever occurs first) that the above conditions are still fulfilled.
4) If the service extension limits are expired, do this task: Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00.

(g) Rear side strip erosion.

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1) The maximum permitted dimension is 2.756 in. (70 mm) in axial width from the aft side of the abradable and 0.138 in. (3.5 mm) in depth.

2) A Continue-In-Service limit of 50 flight cycles or 75 flight hours (whichever occurs first) is permitted if the maximum depth from the aft side of the abradable is not more than 0.157 in. (4 mm).

3) If the service extension limits are expired, do this task: Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00.

(h) Fan blade rubs.

1) There is no limit to the number of fan blade rubs.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-24-02-080-001-F00

WARNING

MAKE SURE THERE ARE NO TOOLS OR OTHER OBJECTS IN THE INLET COWL OR EXHAUST. OBJECTS THAT GO INTO THE ENGINE WHEN IT OPERATES, CAN COME OUT OF THE ENGINE AT HIGH VELOCITIES. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Remove the protective mat, STD-585, from the inlet cowl.

SUBTASK 72-24-02-080-002-F00

(2) Remove the DO NOT OPERATE tag, STD-858, from the applicable engine start switch.

SUBTASK 72-24-02-040-003-F00

(3) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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Abradable Shroud Inspection
Figure 601/72-24-02-990-802-F00 (Sheet 1 of 2)

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D

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Abradable Shroud Inspection
Figure 601/72-24-02-990-802-F00 (Sheet 2 of 2)

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ABRADABLE SHROUD - REPAIRS

1. General

A. This procedure has one task:

(1) The repair of the abradable shroud.

TASK 72-24-02-200-802-F00

2. Recondition of the Abradable Shroud

(Figure 801, Figure 802, Figure 803, Figure 804, Figure 805, Figure 806, Figure 807, Figure 808, Figure 809, Figure 810, Figure 811, Figure 812, Figure 813, and Figure 814)

A. General

(1) This task is an on-wing repair procedure for full or partial repair of the abradable epoxy liner on the containment case.

(a) You will fill these areas with a base and hardener mixture, and smooth to the initial contour.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
71-11-01-000-802-F00	Remove the Inlet Cowl (Sling and Overhead Hoist) (P/B 401)
71-11-01-000-803-F00	Remove the Inlet Cowl (Nose Cowl Dolly or Boom Hoist) (P/B 401)
71-11-01-400-802-F00	Install the Inlet Cowl (Sling and Overhead Hoist) (P/B 401)
71-11-01-400-803-F00	Install the Inlet Cowl (Nose Cowl Dolly or Boom Hoist) (P/B 401)
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-000-802-F00	Fan Blade Replacement (Blade Pair) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-15837	Cartridge - Film, Reconditioning Fixture, Fan Frame Abradable Part #: 856A3950G01 Supplier: 58828
SPL-15838	Fixture - Reconditioning, Fan Frame Abradable Part #: 856A3940G01 Supplier: 58828
SPL-15839	Fixture - Scouring, Abradable Strip, Fan Case Part #: 856A4624G02 Supplier: 58828
SPL-15840	Extension Beam - Lift Fixture, Variable CG Part #: 856A3515G03 Supplier: 58828
SPL-15841	Fixture - Lift, Variable CG, General Purpose Part #: 856A1394G03 Supplier: 58828

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(Continued)

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-3949	Scalpel - X-ACTO Knife
STD-14319	Portable Rockwell Hardness Tester

D. Consumable Materials

Reference	Description	Specification
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G02314	Air - Compressed, Breathing	BB-A-1034 Source I Grade A
G02499 [CP2364]	Filler, Edge Sealing And Void Filling - Scotchweld EC 3524B/A	
G50320 [912-0041]	Cloth - Process Cleaning Absorbent Wiper	
G51480 [CP2772]	Cloth - Abrasive, Alumina	
G51486 [CP2109]	Tape - Plastic, Colored - 3M No. 471	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Recondition the Abradable Shroud

SUBTASK 72-24-02-040-004-F00

> **CAUTION**
> MAKE SURE THAT YOU INSTALL THE MATS IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL. WITHOUT MATS, TOOLS, PARTS OR UNWANTED MATERIAL CAN CAUSE DAMAGE TO THE INLET COWL.

(1) Install the protective mat, STD-585, into the lower half of the inlet cowl.

SUBTASK 72-24-02-040-008-F00

(2) Alternative Procedure Available. Remove the fan blades to get access to the repair area, do this task: Fan Blade Removal (Complete Set), TASK 72-21-02-000-801-F00.

NOTE: This is for full reconditioning of the abradable liner.

SUBTASK 72-24-02-040-005-F00

(3) Alternative Procedure Available. Remove a sufficient number of fan blades to get access to the repair area, do this task: Fan Blade Replacement (Blade Pair), TASK 72-21-02-000-802-F00.

(a) Tie the fan rotor to the Outlet Guide Vane (OGV)'s, to prevent rotation.

SUBTASK 72-24-02-040-007-F00

(4) Alternative Procedure Available. Do these steps to remove fully the abradable liner of the containment case (Figure 802).

NOTE: This is for full reconditioning of the abradable liner.

(a) Do this task: Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

(b) Do this task: Remove the Inlet Cowl (Sling and Overhead Hoist), TASK 71-11-01-000-802-F00 or this task: Remove the Inlet Cowl (Nose Cowl Dolly or Boom Hoist), TASK 71-11-01-000-803-F00.

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(c) Remove the abradable liner by machining only if the remaining thickness of the abradable liner is more than 0.04 in. (1 mm), if it is less, then continue with the step (g) below.

(d) Do these steps to install the scouring fixture, SPL-15839:

1) Install the two parts of the protector on the fan and on the booster inlet.

2) Attach the two parts of the protector together with screws and nuts.

> **WARNING** ALWAYS USE APPROVED EQUIPMENT AND PROCEDURES TO LIFT PARTS. STAY OUT FROM BELOW LOADS. IF THE PARTS ACCIDENTALLY MOVE OR FALL, THEY CAN CAUSE AN INJURY OR KILL YOU.

3) Lift the scouring fixture, SPL-15839, with the CG adjustable lift fixture, SPL-15841, attached with the extension beam, SPL-15840.

4) Put the scouring fixture, SPL-15839, in front of the fan disk.

5) Remove the fingers from their storage position and install one in the fan disk front flange offset hole and the other in the opposite hole.

6) Make sure that the mobile table is in the most inner position. Make sure that the 6 clamps are turned in the inner position.

NOTE: The arrow on hand knobs gives the position of the clamps.

7) Remove the measuring arm protector.

8) Loosen the knurled screw and put the measuring arm in middle position.

9) Put the scouring fixture, SPL-15839, on the fan disk forward flange, using the offset finger.

10) Turn the 6 clamps in work position and safety with hand knobs.

11) Measure Dimension W at four locations with a depth gage.

12) Read dimensions engraved on related mark plates (tags) to make sure that the support correctly touches the fan disk.

13) Remove the CG adjustable lift fixture, SPL-15841, and the extension beam, SPL-15840.

> **WARNING** USE EYE PROTECTION WHEN YOU USE COMPRESSED AIR TO CLEAN, COOL, OR DRY PARTS OR TOOLS. PARTICLES CAN CAUSE AN INJURY TO YOUR EYES. DO NOT USE MORE THAN 30 PSIG (200 KPA). DO NOT POINT COMPRESSED AIR AT YOURSELF OR OTHER PERSONS.

14) Connect the pressurized air source to the nipple and the vacuum cleaner to the outlet of air conduct.

(e) Scouring of the abradable liner.

NOTE: Apply appropriate protections to make sure no abradable residues enter the engine flowpath during machining.

1) Preparation of tool:

NOTE: Do this preparation only for the first use of the tool or when you change the cutting tool.

a) Adjust the milling cutter angle as follows:

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<1> Loosen the nut.

<2> Turn the mobile table with screws to put the cutter in contact with the abradable material.

> **CAUTION**
> MAKE SURE THAT SCREWS AND NUT ARE TIGHTENED BEFORE YOU DO THE MACHINING PROCEDURE.

<3> Tighten the screws and nut.

2) Scour the abradable liner as follows:

a) Release the measuring arm with the knurled screw.

b) Turn the measuring arm to the gauge with the star end knob, until it touches the stop screw.

c) Set the dial indicators to Zero.

d) Turn the measuring arm back a quarter of a turn, until it touches the other stop screw.

e) Safety the measuring arm with the knurled screw.

f) Open the ball valve to start the pneumatic motor.

g) Turn the handle of the mobile table to put the milling cutter in contact with the abradable liner.

h) Turn the handle of the mobile table to remove 0.01 in. (0.25 mm) of material.

i) Turn the mobile part of the scouring fixture, SPL-15839, in clockwise direction, forward looking aft, smoothly with the handles located on the support, to remove material from the abradable liner.

j) After this first machining, put mark of the tool position on the mobile table and move the milling cutter back.

k) Read the measuring arm position on the dial indicators as follows:

<1> The measuring arm must touch the machined abradable liner.

<2> The dial indicators must give the same reading.

l) If not, do these steps:

<1> Set the dial indicator located near the mobile table to Zero.

<2> Record the difference between the 2 dial indicators.

<3> Set this value on the mobile table dial indicator; to do this, loosen nut, turn screws and do the above steps:

<a> "R" is the value read on the mobile table dial indicator.

<b> "A" is the value read on the dial indicator.

<c> "B" is the value read on the dial indicator.

<d> "C" is the correction to be done to "R".

<e> If "C" is positive, add this value to "R".

<f> If "C" is negative, subtract this value from "R".

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> **CAUTION** MAKE SURE THAT SCREWS AND NUTS USED TO SET THE MILLING CUTTER ANGLE ARE TIGHTENED BEFORE YOU DO THE MACHINING PROCEDURE.

<4> Tighten the screws and nut.

m) Turn the handle of the mobile table in clockwise direction, forward looking aft, to remove 0.01 in. (0.25 mm) of material.

n) Turn smoothly the mobile part of the tool with handles located on the support, in clockwise direction, forward looking aft, to remove material again.

o) Do a new check procedure after each machining.

p) Do the process until you have a correct machining angle.

NOTE: Machining is completed when the measuring arm dial indicator shows a Zero indication on a full turn.

q) Close the ball valve to stop the motor.

(f) Do these steps to remove the scouring fixture, SPL-15839:

1) Put the mobile table in the most inner position.

2) Loosen the knurled screw.

3) Put the measuring arm in the middle position.

4) Disconnect the pressurized air source and the vacuum cleaner.

5) Install the CG adjustable lift fixture, SPL-15841, fitted with the extension beam, SPL-15840, on the scouring fixture, SPL-15839.

6) Loosen the hand knobs.

7) Turn the 6 clamps in retracted position.

> **WARNING** ALWAYS USE APPROVED EQUIPMENT AND PROCEDURES TO LIFT PARTS. STAY OUT FROM BELOW LOADS. IF THE PARTS ACCIDENTALLY MOVE OR FALL, THEY CAN CAUSE AN INJURY OR KILL YOU.

8) Remove the scouring fixture, SPL-15839, from the fan disk front flange.

9) Remove the fingers from the fan disk front flange offset hole and the other finger from the opposite hole. Put them in their storage position.

10) Put the measuring arm on stop position.

11) Safety the measuring arm with the knurled screw.

12) Install the protector on the measuring arm.

(g) Remove the unbonded abradable to recondition with a cutter and a plastic spatula.

(h) Do a hand blending to remove the remaining abradable with abrasive cloth, G51480 [CP2772], until removing all the abradable. Refer to TASK 70-41-11-350-009 (70-41-11, Hand blending) CFMI Standard Practices Manual.

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> **WARNING** USE EYE PROTECTION WHEN YOU USE COMPRESSED AIR TO CLEAN, COOL, OR DRY PARTS OR TOOLS. PARTICLES CAN CAUSE AN INJURY TO YOUR EYES. DO NOT USE MORE THAN 30 PSIG (200 KPA). DO NOT POINT COMPRESSED AIR AT YOURSELF OR OTHER PERSONS.

(i) Blow the part with dry air, G02314.

(j) Remove the two parts of the protector of the scouring fixture, SPL-15839, from the engine inlet.

SUBTASK 72-24-02-120-001-F00

(5) Alternative Procedure Available. Remove partially the abradable liner of the containment case

NOTE: This is for partial reconditioning of the abradable liner.

NOTE: Apply appropriate protections to make sure no abradable residues enter the engine flowpath during blending and blowing.

(a) Remove the abradable to recondition as follows:

1) Remove the unbounded abradable to recondition with a X-ACTO knife scalpel, STD-3949.

NOTE: Do not remove the bounded abradable.

NOTE: Make sure that you pay close attention when you blend the abradable to prevent the damage of the containment case.

2) Smooth the interface between the remaining abradable and the area to recondition with abrasive cloth, G51480 [CP2772].

(b) If contamination is observed on the bounded abradable, remove it with abrasive cloth, G51480 [CP2772].

1) Make sure that the contamination has been removed.

2) Smooth the abradable in order to remove all the sharp edges with abrasive cloth, G51480 [CP2772].

> **WARNING** YOU MUST WEAR EYE GOGGLES WHEN YOU USE COMPRESSED AIR. IF YOU DO NOT, AN INJURY TO YOUR EYES CAN OCCUR.

(c) Blow the part with dry air, G02314.

NOTE: Do not use more than 30 psi (207 kPa). Do not point compressed air at yourself or other persons.

SUBTASK 72-24-02-480-003-F00

(6) If parent metal shows recondition the sulfuric anodizing in that area:

(a) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

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SUBTASK 72-24-02-120-002-F00

> **WARNING**
> DO NOT GET ACETONE IN YOUR EYES, IN YOUR MOUTH OR ON YOUR SKIN. USE GLOVES, EYE PROTECTION AND RESPIRATOR. WASH THE ACETONE AWAY WITH WATER. GET MEDICAL AID IMMEDIATELY. MAKE SURE THAT THE AREA HAS A GOOD FLOW OF AIR. ACETONE IS POISONOUS AND FLAMMABLE WHICH CAN CAUSE INJURY TO PERSONNEL AND DAMAGE EQUIPMENT.

(7) Clean the repaired area as follows:

(a) Clean the repair area with acetone solvent, B01058 [CP1039], and with a white cloth, G50320 [912-0041].

(b) Let the solvent fully evaporate at ambient temperature during at least one hour.

SUBTASK 72-24-02-480-004-F00

(8) Do these steps to prepare the Scotchweld EC 3524B/A filler, G02499 [CP2364], for the repair:

NOTE: If you do a full reconditioning of the abradable liner, go to step (9) below.

> **WARNING**
> PUT ON PROTECTIVE GLOVES WHEN YOU USE THE BASE AND HARDENER. IF YOU DO NOT OBEY THIS PRECAUTION, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Mix by weight, 100 parts of the base and 94 parts of the hardener.

NOTE: Proportions of the base and hardener are the same for Scotchweld EC 3524B/A BLACK and Scotchweld EC 3524B/A BLUE.

1) Use the compound in less than 30 minutes.

NOTE: Polymerization occurs at 86°F (30°C) after 30 minutes. Prepare the compound in small quantities.

(b) Mix the base and hardener by hand until it becomes a homogeneous material.

NOTE: For Scotchweld EC 3524B/A BLACK, mixed compound color should be grey. For Scotchweld EC 3524B/A BLUE, mixed compound color should be pale blue.

1) Mix the base and hardener slowly to prevent air bubbles in the mixture.

SUBTASK 72-24-02-350-002-F00

(9) Alternative Procedure Available. Do these steps to apply the abradable liner of the containment case.

NOTE: This is for full reconditioning of the abradable liner.

(a) Installation of the reconditioning fixture, SPL-15838.

1) Put the carter protector of the reconditioning fixture, SPL-15838, in position (Figure 803).

2) Apply 3M 471 tape, G51486 [CP2109], to the edges of the reconditioning area, to protect the edges of the containment case (Figure 804).

3) Make sure that the reconditioning fixture, SPL-15838, is clean. If necessary, clean with acetone solvent, B01058 [CP1039].

4) Manually make sure that the rolls and rollers turn correctly.

5) Make sure that the six clamps are turned out of the engine axle. They must not touch the fan disk (Figure 805).

NOTE: The white mark on the knurled buttons must point in.

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6) Make sure that the quantity of polyester film on the reconditioning fixture film cartridge, SPL-15837, is sufficient to do the repair. If necessary, replace the film cartridge.

NOTE: A new reconditioning fixture film cartridge, SPL-15837, contains a sufficient quantity of polyester film to do the full reconditioning of the abradable liner on the containment case.

7) Put the reconditioning fixture, SPL-15838, with reconditioning dolly in position (Figure 806).

CAUTION MAKE SURE THAT THE SCRAPING BLADE AND THE ROLLER SET ARE IN THE UPPER POSITION NOT TO TOUCH THE CONTAINMENT CASE.

a) Put the reconditioning fixture assembly in position on the fan disk or on the dummy fan disk.

b) With the handle, adjust the height of the tool to the height of the engine. Use the centering devices as a visual reference.

c) Carefully, move the reconditioning fixture assembly until it touches the fan disk or the dummy fan disk.

d) Unscrew the knobs. Turn the knurled buttons clockwise as far as they will go until the clamps touch the fan disk or the dummy fan disk. Screw the knobs in sequence (1 to 3) to attach reconditioning fixture to the fan disk or to the dummy fan disk (Figure 807).

NOTE: The white mark on the knurled buttons must point out.

8) Remove the reconditioning dolly (Figure 808).

a) Unscrew the two knobs and turn the two knurled buttons by 180 degrees counterclockwise.

b) Remove the reconditioning dolly by lightly lowering the slider with the handle.

NOTE: Lightly hold the tool until it finds equilibrium.

c) Now, the reconditioning fixture is held by the fan disk or by the dummy fan disk. Make sure that it can turn freely.

9) Put the lift handle in position (Figure 809).

10) Do the adjustment of the scraping blade and the roller set (Figure 810).

a) Adjustment of the scraping blade.

<1> Put the scraping support in lower position with the two knurled screws.

<2> Disengage the lift lever from its position to lower the scraping blade and roller set (Figure 809).

<3> Move the scraping support on the containment case in an area without abradable.

<4> Make sure that the two rollers of the scraping support touch the containment case.

<5> Adjust the clearance between the scraping blade and the containment case with the adjustment screws.

NOTE: The clearance must be 0.039 in. (1 mm).

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<6> Put the scraping blade and roller set in upper position with the lift lever and put the scraping support in upper position with the two knurled screws.

b) Adjustment of angle and height of the rolls.

NOTE: Make sure that the scraping support is in upper position.

<1> Disengage the lift lever from its position to lower the scraping blade and roller set (Figure 809).

<2> Make a full turn of reconditioning fixture, SPL-15838. Make sure that the rolls constantly touch the containment case.

<3> If not, do the adjustment as follows:

<a> Use the adjustment bolts to lift rolls No. 1 and No. 2. Roll No. 3 must still touch the containment case.

<b> Make a full turn reconditioning fixture, SPL-15838. Make sure that roll No. 3 constantly touches, on that two sides, the containment case. If not, adjust with the adjustment bolts.

<c> Adjust roll No. 2 with the adjustment bolts until roll No. 2 is held by a 0.002 in. (0.05 mm) shim on each side of the containment case. Do a check by turning reconditioning fixture, SPL-15838, by 360 degrees.

<d> Adjust roll No. 1 with the adjustment bolts until roll No. 1 is held by a 0.002 in. (0.05 mm) shim on each side of the containment case. Do a check by turning reconditioning fixture, SPL-15838, by 360 degrees.

<e> Make sure that roll No. 3 continues to touch the containment case.

c) Adjustment of the roller guide of the polyester film.

<1> Unwind the polyester film onto the containment case and make sure that it stays in the correct axis.

NOTE: The polyester film must be equally applied on each side of the containment case.

<2> If not, adjust with the adjustment nuts on the two sides of the roller guide and do a check again.

<3> Wind the polyester film back on the roller film.

d) Put the scraping blade and roller set in upper position.

CAUTION

MAKE SURE THAT THE SCRAPING SUPPORT IS IN THE UPPER POSITION NOT TO TOUCH THE CONTAINMENT CASE.

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(CAUTION PRECEDES)

> **CAUTION** YOU MUST QUICKLY APPLY THE ABRADABLE MATERIAL TO GET A CORRECT QUALITY OF FINISH WHEN YOU APPLY IT. IF NOT, THE SURFACE WILL BE ROUGH AND CAN CAUSE DAMAGE.

(b) Apply the abradable material as follows:

NOTE: The abradable material must be applied on minimum three sectors, one after the other, to prevent fast polymerization.

1) Do these steps to prepare the Scotchweld EC 3524B/A filler, G02499 [CP2364]:

> **WARNING** PUT ON PROTECTIVE GLOVES WHEN YOU USE THE BASE AND HARDENER. IF YOU DO NOT OBEY THIS PRECAUTION, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

a) Mix by weight, 100 parts of the base and 94 parts of the hardener.

<1> Use the compound in less than 30 minutes.

NOTE: Polymerization occurs at 86°F (30°C) after 30 minutes. Prepare the compound in small quantities.

b) Mix the base and hardener by hand until it becomes a pale blue homogeneous compound.

<1> Mix the base and hardener slowly to prevent air bubbles in the mixture.

2) Apply the abradable material to the reconditioning area.

a) Apply a thin layer of abradable in the radius of the reconditioning area with a spatula.

b) Apply a thin layer of abradable in the reconditioning area with a spatula.

NOTE: If the thin abradable layer does not bond to the case, remove and apply the thin abradable layer again.

c) Apply the abradable in the reconditioning area.

NOTE: If necessary, apply the abradable in multiple layers.

d) Make sure that there is no lack of abradable at the interface between the radius of the abradable liner and the case.

NOTE: Do not change the direction of abradable application.

(c) Scraping of the abradable material (Figure 811).

NOTE: The scraping tool and roller set is in upper position.

1) Put the scraping support in lower position with the two knurled buttons.

2) Put the scraping blade in position before the abradable to be reconditioned.

NOTE: Scraping is done in clockwise direction.

3) Disengage the lift lever from its position to lower the scraping tool and roller set (Figure 809).

NOTE: The scraping support touches the containment case with its two rollers.

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CAUTION

THE SPEED OF OPERATION MUST BE SUFFICIENTLY SLOW NOT TO PULL THE ABRADABLE MATERIAL AWAY AND CREATE HOLES.

4) Start scraping by turning the wheel to slowly rotate the tool.
   a) Regularly, remove abradable material from the scraping blade.
5) Repair areas with air bubbles by piercing them and adding abradable material.
6) Put the scraping support in upper position with the two knurled buttons.
7) Put the scraping tool and roller set in upper position with the lift lever (Figure 809).
8) Quickly remove the abradable material from the scraping blade with acetone solvent, B01058 [CP1039].

(d) Put the polyester film in position on the rolls.
1) Unwind the polyester film and put it under the three rolls. Keep the polyester film tensioned against the four rolls.
   a) Attach the polyester film to the scraping support with 3M 471 tape, G51486 [CP2109].

      NOTE: Make sure that the polyester film is kept tensioned.

(e) Do the smoothing of the abradable material (Figure 812).
1) Put the roller set in position in front of the area to be smoothed.

   NOTE: Smoothing is done in counterclockwise direction.

   NOTE: Never superimpose two layers of polyester film.
2) Disengage the lift lever from its position to lower the scraping tool and roller set (Figure 809).
3) Attach the polyester film to the containment case with a strip of 3M 471 tape, G51486 [CP2109], to make sure that the polyester film stays tensioned.
4) Move the roller set to a speed between 0.06-0.12 in./sec. (1.5-3 mm/s).

   NOTE: The speed must be slow to get a correct quality of flatness.
5) Make sure that there are no waves, no air bubbles and the edges are correctly cut. If not, do again the adjustment of the angle and height of the smoothing rolls. Do the step 2.F.(9)(a)10)b).

   NOTE: If you are at the end of the last sector, go to step 2.F.(9)(e)9).
6) Cut the polyester film with the locally manufactured set square after each sector when roll No. 3 is after the reconditioning area (Figure 813).
7) Put the scraping tool and roller set in upper position with the lift lever (Figure 809).
8) Do again steps 2.F.(9)(b) thru 2.F.(9)(e)7) for the other sectors or steps 2.F.(9)(b) thru 2.F.(9)(e)5) for the last sector.
9) At the end of the last sector, remove roll No. 1 and roll No. 2 to complete smoothing with roll No. 3 without smoothing the first sector again.
10) Cut the polyester film with the locally manufactured set square.
11) Put the scraping tool and roller set in upper position with the lift lever (Figure 809).
12) Wait for 12 hours minimum before you remove the polyester film and the colored plastic tape.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(f) Removal of reconditioning fixture (Figure 814).

1) Make sure that the scraping blade and the roller set are in the upper position.

2) Remove the lift handle and put it in stored position (Figure 809).

3) Put the reconditioning dolly in position. Make sure that it is at the correct height.

4) Make sure that the two knurled buttons of the reconditioning dolly point in.

5) Engage the reconditioning dolly into the reconditioning fixture.

6) Attach the reconditioning dolly into the reconditioning fixture with the two knobs.

a) Unscrew the two knobs.

b) Turn the two knurled buttons out.

c) Tighten the two knobs to tightly attach the reconditioning dolly to the reconditioning fixture.

7) Move up the slider with the handle to between 0.039 in. (1 mm) and 0.079 in. (2 mm) to lift the reconditioning fixture.

8) Loosen the six knobs of the reconditioning fixture to release the reconditioning fixture from the fan disk or from the dummy fan disk (Figure 814).

NOTE: Use the reverse sequence than for installation (3 to 1) (Figure 807).

9) Turn the six knurled buttons counterclockwise.

NOTE: The white mark on the knurled buttons must point in.

10) Remove the reconditioning fixture assembly with the reconditioning dolly.

(g) Reconditioning of the containment case.

1) Remove the carter protector of the reconditioning fixture, SPL-15838, by loosening the wing nuts and put it on the reconditioning dolly (Figure 803).

SUBTASK 72-24-02-350-001-F00

(10) Alternative Procedure Available. Do these steps to apply the compound to the repair area:

NOTE: Use cotton gloves during the abradable process. This will be free of talc or silicone in order to prevent contamination of the fan containment case or abradable compound.

(a) Apply the abradable material on the repaired area and the test specimen.

1) Apply a thin layer of abradable into the radius of the abradable liner.

2) Apply a thin layer of abradable into the abradable liner with a spatula.

NOTE: If the thin layer of abradable does not bond to the case, remove and apply it again.

3) Apply the abradable in the abradable liner.

NOTE: To ease the process, do not change the direction of abradable application and apply the abradable in multiple layers.

4) Make sure that there is no lack of abradable at the interface between the radius of the abradable liner and the fan containment case.

(b) Adjust the abradable with large spatula, flush to the flow path.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-24-02-480-006-F00

> **WARNING**
> USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

(11) Alternative Procedure Available. Polymerize the abradable and the test specimen during 5 hours between 122°F (50°C) and 140°F (60°C).

NOTE: Do not apply any solvent on the abradable before polymerization.

SUBTASK 72-24-02-480-007-F00

(12) Alternative Procedure Available. Polymerize the abradable and the test specimen during 24 hours at ambient temperature.

SUBTASK 72-24-02-210-002-F00

(13) Do a check on the hardness of the abradable material with a portable hardness tester, STD-14319.

(a) The hardness must be –140 < HR 15W < -75 or 40 < Shore D < 60.

SUBTASK 72-24-02-120-003-F00

(14) If it is necessary, blend the abradable to the final dimensions.

SUBTASK 72-24-02-210-003-F00

(15) Do an inspection of the abradable liner as follows:

NOTE: If the results are not satisfactory, do the repair procedure again.

(a) Do a visual inspection of the abradable liner for bubbles or missed areas.

1) Bubble or missed areas are not permitted.

(b) Control the dimension of the repair area with a template.

NOTE: The template has to be in contact in O1 and O2.

> **CAUTION**
> THE TEMPLATE MUST BE A TOOL, EXCLUSIVELY USED TO CONTROL THE DIMENSIONAL.

1) On the abradable, depressed areas less than 0.020 in. (0.508 mm) are acceptable.

2) On the abradable, bumped areas less than 0.010 in. (0.254 mm) are acceptable.

(c) Do a check of liner adherence with a mallet.

NOTE: A dull sound indicates that the liner is not correctly bonded.

SUBTASK 72-24-02-100-001-F00

(16) Clean the inlet area.

SUBTASK 72-24-02-100-002-F00

> **CAUTION**
> MAKE SURE THAT YOU RELEASE THE FAN ROTOR BEFORE THE SUBSEQUENT ENGINE START. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT COULD OCCUR.

(17) Free the fan rotor so that it can turn.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-24-02-410-001-F00

(18) Alternative Procedure Available. Do this task: Fan Blade Replacement (Blade Pair), TASK 72-21-02-000-802-F00.

SUBTASK 72-24-02-410-004-F00

(19) Alternative Procedure Available. Install the fan blades, do this task: Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

NOTE: This is for full reconditioning of the abradable liner.

SUBTASK 72-24-02-020-001-F00

(20) Remove the mats from the lower half of the inlet cowl.

CAUTION MAKE SURE THAT YOU REMOVE ALL TOOLS, EQUIPMENT, PARTS, AND UNWANTED MATERIAL. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT COULD OCCUR ON THE SUBSEQUENT START.

(a) Make sure that there are no tools or material in the inlet.

SUBTASK 72-24-02-410-003-F00

(21) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-24-02-410-002-F00

(22) Do this task: Install the Inlet Cowl (Sling and Overhead Hoist), TASK 71-11-01-400-802-F00 or Install the Inlet Cowl (Nose Cowl Dolly or Boom Hoist), TASK 71-11-01-400-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Abradable Shroud Repair
Figure 801/72-24-02-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795456 S0000636626_V1

Installation/Removal of the Scouring Fixture
Figure 802/72-24-02-990-807-F00 (Sheet 1 of 7)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795631 S0000636643_V1

Installation/Removal of the Scouring Fixture
Figure 802/72-24-02-990-807-F00 (Sheet 2 of 7)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795482 S0000636644_V1

Installation/Removal of the Scouring Fixture
Figure 802/72-24-02-990-807-F00 (Sheet 3 of 7)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795466 S0000636645_V1

Installation/Removal of the Scouring Fixture
Figure 802/72-24-02-990-807-F00 (Sheet 4 of 7)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F

A-A

2795457 S0000636646_V1

Installation/Removal of the Scouring Fixture
Figure 802/72-24-02-990-807-F00 (Sheet 5 of 7)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B-B

2795500 S0000636647_V1

Installation/Removal of the Scouring Fixture
Figure 802/72-24-02-990-807-F00 (Sheet 6 of 7)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795532 S0000636648_V1

Installation/Removal of the Scouring Fixture
Figure 802/72-24-02-990-807-F00 (Sheet 7 of 7)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795455 S0000636649_V1

Installation/Removal of the Carter protector
Figure 803/72-24-02-990-808-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795645 S0000636650_V1

Installation of the Colored Plastic Tape
Figure 804/72-24-02-990-809-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795439 S0000636651_V1

Locking/Unlocking of the reconditioning fixture on the fan disk of the Scouring Fixture
Figure 805/72-24-02-990-810-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795444 S0000636652_V1

Installation of the Reconditioning Fixture
Figure 806/72-24-02-990-811-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795435 S0000636635_V1

Installation of the Reconditioning Fixture
Figure 807/72-24-02-990-812-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795432 S0000636653_V1

Removal of the Reconditioning Dolly
Figure 808/72-24-02-990-813-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795651 S0000636636_V1

Installation/Removal of the Lift Handle
Figure 809/72-24-02-990-814-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795449 S0000636637_V1

Adjustment of the Scraping Blade and the Roller Set
Figure 810/72-24-02-990-815-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

2795430 S0000636638_V1

Adjustment of the Scraping Blade and the Roller Set
Figure 810/72-24-02-990-815-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795429 S0000636639_V1

Scraping of the Abradable Material
Figure 811/72-24-02-990-816-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2795428 S0000636640_V1

Scraping of the Abradable Material
Figure 812/72-24-02-990-817-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:

TRANSPARENT PLASTIC

ROUGHNESS: 126 (3.2)

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

ROUGHNESS IS IN MICROINCHES
WITH MICROMETERS IN PARENTHESES.

2795649 S0000636641_V1

Locally Manufactured Set Square
Figure 813/72-24-02-990-818-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Removal of the Reconditioning Fixture
Figure 814/72-24-02-990-819-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HIGH PRESSURE COMPRESSOR FRONT STATOR - INSPECTION/CHECK

1. General

A. This procedure has these tasks:

(1) High Pressure Compressor Front Stator Inspection

(2) High Pressure Compressor Front Stator Actuation Rings Inspection

(3) Check The HPC Variable Stator Vane (VSV) Resistance

(4) High Pressure Compressor Stage 4 Vane Trailing Edge Inspection.

TASK 72-32-00-200-801-F00

2. High Pressure Compressor Front Stator Inspection

(Figure 601)

A. General

(1) This task provides the instructions on how to do the inspection of the high pressure compressor front stator.

B. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
71-00-02-000-801-F00	Power Plant - Removal (P/B 401)
71-00-02-400-801-F00	Power Plant - Installation (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-32-00-900-801-F00	Replace the Actuation Ring Flanged Bushing (Stage 1 and 2) (P/B 801)
72-32-00-900-802-F00	Replace the Lever Arms and Bushings (IGV and Stage 3) (P/B 801)
72-32-00-900-805-F00	Variable Stator Vane (VSV) Bellcrank Assembly Removal and Installation (P/B 801)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-32-00-860-001-F00

(1) Make sure that the applicable start switch is off and install a DO NOT OPERATE tag, STD-858.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

(a) The AUTO position is off.

LOM ALL

SUBTASK 72-32-00-860-011-F00

(2) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-860-012-F00

(3) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-32-00-010-005-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

F. High Pressure Compressor Front Stator Inspection

SUBTASK 72-32-00-900-001-F00

(1) If you find damage that is not in the limits, replace the engine, unless you are given other instructions (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

SUBTASK 72-32-00-210-001-F00

(2) Look for damage to the Front Stator Case:

(a) Cracks

1) Cracks are not permitted.

2) A Continue-in-Service limit is 10 cycles or 25 hours, if the cracks in the skin are less than 0.17 inch (4.3 mm) in length and there are no cracks in the flanges.

(b) Nicks, pits, marks, and scratches

1) All nicks, pits, marks, and scratches are permitted if the damage is not more than 0.050 inch (1.3 mm) in depth.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) The Continue-in-Service limit is 10 cycles or 25 hours for nicks, pits, marks, and scratches that are more than the limit.

SUBTASK 72-32-00-210-002-F00

(3) Look for damage to the actuation rings:

(a) Cracks

1) Cracks are not permitted.

2) The Continue-in-Service limits are as follows:

a) Do an inspection again in or less than 200 cycles if a crack is found but does not extend into adjacent transition radius.

b) Replace actuation ring in or less than 200 cycles if a crack is found that connects 2 adjacent ring sides.

c) Replace actuation ring in or less than 5 cycles if a crack is found that connects 3 or more ring sides.

(b) Distortion, bends, or twists

1) Distortion, bends, or twists are not permitted.

2) A Continue-in-Service limit of 5 cycles is permitted, if there is no separation of the actuation rings.

(c) Separation

1) Separation is not permitted.

(d) Missing bushings on Stages 1 and 2

1) Up to three missing bushings for each stage permitted.

2) If four missing bushings for each stage are found, repair within 200 cycles (TASK 72-32-00-900-801-F00).

3) If five or more missing bushings for each stage are found, replace the actuation ring flange bushing (TASK 72-32-00-900-801-F00).

(e) Missing or broken bushing legs

1) Missing or broken bushing legs are permitted.

SUBTASK 72-32-00-210-003-F00

(4) Look for damage to the connecting links:

(a) Cracks in the connecting links on only one side of the engine

1) Cracks are not permitted.

2) A Continue-in-Service limit of 5 cycles is permitted, if the cracked connector link is replaced.

(b) Cracks in the connecting links on the two sides of the engine

1) Cracks are not permitted.

SUBTASK 72-32-00-220-001-F00

(5) Look for damage to the IGV and stage 3 lever arms:

(a) Broken IGV and stage 3 lever arms

1) Broken arms are not permitted.

2) A Continue-in-Service limit for the engine of 10 cycles or 25 hours is permitted, if you replace the broken lever arm.

(b) Lever arms that are not engaged in the actuation ring or connecting link

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) This condition is not permitted.

(c) Cracked, bent or twisted lever arms

1) Cracked, bent or twisted lever arms are not permitted.

2) Do these steps:

a) Remove the lever arm.

b) Compare the removed lever arm with a new lever arm in an optical comparator (P/N: 2202500) to find the angle of the bend or twist.

c) For a removed lever arm that has a bent or twisted angle of less than 4 degrees, install a new lever arm and put the engine back into service.

d) For a removed lever arm that has a bent or twisted angle of 4 degrees or more, install a new lever arm before you put the engine back into service and replace the engine before 10 cycles or 25 hours.

(d) Nicks, dents, and scratches

1) Replace the lever arm if the damage is more than the limits that follow.

2) Nicks, dents, and scratches in Area A are not permitted.

3) All nicks, dents, and scratches in Area B that are not more than 0.010 inch (0.25 mm) in depth are permitted after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

a) Sharp points at the bottom of the nicks, dents, and scratches are not permitted.

4) All nicks, pits, marks, and scratches in area C that are not more than 0.002 inch (0.05 mm) in depth are permitted after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

NOTE: The limits do not apply to the pin.

(e) Do a check for loose variable stator vanes.

1) There is no maximum limit of radial and side motion if the bushing is in place and if there is no metal-to-metal contact.

NOTE: Shake the vane stem. Listen for metal-to-metal contact.

a) Replace the bushing if it is missing (TASK 72-32-00-900-802-F00).

SUBTASK 72-32-00-220-002-F00

(6) Look for damage to the stage 1 and 2 lever arms:

(a) Cracked, broken, bent, or twisted lever arms

1) This condition is not permitted.

(b) Lever arms that are not engaged into the actuation ring or connector link

1) This condition is not permitted.

(c) Nicks, dents, and scratches in the lever arms

1) Replace the engine if these limits are more than permitted.

2) Nicks, dents, and scratches in Area A are not permitted.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

3) All nicks, dents, and scratches in Area B that are not more than 0.010 inch (0.25 mm) in depth are permitted after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

a) Sharp points at the bottom of the nicks, dents, and scratches are not permitted.

4) All nicks, pits, marks, and scratches in area C that are not more than 0.002 inch (0.05 mm) in depth are permitted after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

NOTE: The limits do not apply to the pin.

(d) Do a check for loose variable stator vanes.

1) There is no maximum limit of radial and side motion if the bushing is in place and if there is no metal-to-metal contact.

NOTE: Shake the vane stem. Listen for metal-to-metal contact.

2) If you hear metal-to-metal contact, replace the engine (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

3) A maximum service extension of 10 cycles or 25 hours is permitted if there is metal-to-metal contact on no more than 50% of the vanes.

SUBTASK 72-32-00-220-003-F00

(7) Examine the bellcrank assemblies (two locations):

(a) Cracks

1) Replace the Bellcrank Assembly, TASK 72-32-00-900-805-F00.

(b) Nicks, pits, scores, and scratches

1) All nicks, pits, scores, and scratches that are not more than 0.030 inch (0.80 mm) in depth are permitted after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

2) If there is damage found that is more than the limits, Replace the Bellcrank Assembly, TASK 72-32-00-900-805-F00.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-32-00-410-005-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-32-00-860-004-F00

(2) For the applicable engine, remove the DO NOT OPERATE tag, STD-858 on the engine START switch.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-32-00-860-013-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-860-014-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

GMM-1140866-00-A

G82562 S0006582487_V2

High Pressure Compressor Front Stator Inspection
Figure 601/72-32-00-990-801-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

STAGE 1 VSV LEVER ARM

B

STAGE 2 VSV LEVER ARM

C

IGV AND STAGE 3 VSV LEVER ARM

D

1146409-00-A
G90584 S0006582488_V2

High Pressure Compressor Front Stator Inspection
Figure 601/72-32-00-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-32-00-200-802-F00

3. High Pressure Compressor Front Stator Actuation Rings Inspection

(Figure 602)

A. General

(1) This task gives the instruction on how to do the inspection of the high pressure compressor front stator actuation rings.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-23-03-000-802-F00	Shroud Segments Removal (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828 Opt Part #: 856A1321P05 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-32-00-860-015-F00

(1) Make sure that the applicable START switch is off and install a DO-NOT-OPERATE tag.

SUBTASK 72-32-00-860-016-F00

(2) For Engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-32-00-860-017-F00

(3) For Engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-32-00-010-006-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

F. High Pressure Compressor Front Stator Actuation Rings Inspection/Check

SUBTASK 72-32-00-210-004-F00

(1) Do these steps to do a visual inspection of the upper and lower IGV actuation rings. Use a flexible borescope, COM-2196 and the light source, SPL-2197.

SUBTASK 72-32-00-210-005-F00

(2) If it is necessary, remove the shroud segments on the thrust reverser extension ring (inner) (TASK 72-23-03-000-802-F00).

SUBTASK 72-32-00-210-006-F00

(3) Do these steps to prepare the flexible borescope for the inspection.

(a) Connect the light source, SPL-2197 to a 110 Volt AC 60Hz ground power source and connect the ground.

(b) Connect the borescope, COM-2196 to the light source, SPL-2197.

(c) Turn the light source to ON.

SUBTASK 72-32-00-210-007-F00

(4) Do an inspection of the area between the end of the connecting link and the first rub button at the 2:00 o'clock and 8:00 o' clock positions, aft looking forward. Do the inspection on all sides of the IGV actuation ring. Refer to Figure 602.

(a) Use the serviceable limits of the actuation rings to do the inspection (TASK 72-32-00-200-801-F00).

NOTE: It is possible that the full inspection of the outboard side of the actuation ring cannot be accomplished because of minimal clearance with the VSV support plate.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-32-00-410-006-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-32-00-860-018-F00

(2) For the applicable engine, remove the DO-NOT-OPERATE tag on the engine START switch.

SUBTASK 72-32-00-860-019-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-860-020-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2552213 S0000607209_V1

High Pressure Compressor Front Stator Actuation Rings Inspection
Figure 602/72-32-00-990-804-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2552557 S0000607210_V1

High Pressure Compressor Front Stator Actuation Rings Inspection
Figure 602/72-32-00-990-804-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-32-00-200-803-F00

4. HPC Variable Stator Vane (VSV) Resistance Check

(Figure 603)

A. General

(1) This task provides instruction to do a Variable Stator Vane (VSV) resistance (force) check of the IGV, Stage 1, Stage 2 and Stage 3 VSVs.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-32-00-900-805-F00	Variable Stator Vane (VSV) Bellcrank Assembly Removal and Installation (P/B 801)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1822	Gauge - Digital Force, Push-Pull (100 Lb Capacity, 0.125 Lb Resolution or better) Part #: DFS3-100 Supplier: 11710 Part #: FDIX 100 Supplier: 0BFD9 Opt Part #: DFGS100 Supplier: 11710 Opt Part #: FDI 100 Supplier: 0BFD9 Opt Part #: FDV 100 Supplier: 0BFD9
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Resistance Check

SUBTASK 72-32-00-860-036-F00

(1) Make sure that the applicable start switch is off and install a DO NOT OPERATE tag, STD-858.

SUBTASK 72-32-00-860-037-F00

(2) For Engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-32-00-860-038-F00

(3) For Engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-32-00-010-009-F00

(4) Open the right and left fan cowl panels (TASK 71-11-02-010-801-F00).

SUBTASK 72-32-00-010-010-F00

WARNING OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Open the right and left thrust reversers (TASK 78-31-00-010-801-F00).

G. HPC Variable Stator Vane (VSV) Resistance Check

SUBTASK 72-32-00-000-001-F00

(1) Disconnect the tie-rods [28] from the actuation ring clevises (TASK 72-32-00-900-805-F00).

(a) On each VSV stage, remove the D-head bolts [70] and self-locking nuts [80] that attach the tie-rods [28] to the actuation rings on the left and right sides.

SUBTASK 72-32-00-200-001-F00

(2) Perform a VSV resistance (force) check for IGV, Stage 1, Stage 2, and Stage 3 as follows:

(a) For each VSV stage, attach a push-pull digital force gauge, COM-1822, or equivalent force indicator to the clevis of each actuation ring and pull the actuation ring to rotate the stage from open to closed, and then back to open.

(b) Record the value for each direction (open and closed), for each VSV stage.

(c) Make sure that each VSV stage requires not more than 100 lbf (445 N) to move the actuation ring.

SUBTASK 72-32-00-420-022-F00

(3) Connect the tie-rods [28] to the actuator ring clevis (TASK 72-32-00-900-805-F00) .

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET (SDS) FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(a) Lubricate the threads of the D-head bolts [70] with graphite mineral vaseline, D00601 [CP2101].

(b) Connect the tie-rods [28] to the clevises on the actuation rings with the D-head bolts [70] and self-locking nuts [80].

NOTE: The D-head bolts point aft for the IGV and forward for stages 1, 2, and 3.

(c) Tighten the self-locking nuts [80] to 62 in-lb (7.01 N·m) - 68 in-lb (7.68 N·m).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-32-00-410-009-F00

WARNING OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Close the right and left thrust reversers (TASK 78-31-00-010-804-F00).

SUBTASK 72-32-00-410-010-F00

(2) Close the right and left fan cowl panels (TASK 71-11-02-410-801-F00).

SUBTASK 72-32-00-860-039-F00

(3) For the applicable engine, remove the DO NOT OPERATE tag, STD-858, on the engine START switch.

SUBTASK 72-32-00-860-040-F00

(4) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-860-041-F00

(5) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(LEFT SIDE)

(RIGHT SIDE)

1116075-00

3023113 S0000795321_V1

VSV System Resistance Check (IGV, Stage 1, Stage 2, Stage 3)
Figure 603/72-32-00-990-807-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-32-00-200-804-F00

5. **High Pressure Compressor Stage 4 Vane Trailing Edge Inspection**
(Figure 604, Figure 605, Figure 606, and Figure 607)

A. **General**

(1) This task gives the instruction to do the inspection of the High Pressure Compressor (HPC) Stage 4 Vane Trailing Edge.

B. **References**

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-00-00-200-804-F00	HP Compressor Blades Borescope Inspection (P/B 601)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. **Tools/Equipment**

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828 Opt Part #: 856A1321P05 Supplier: 58828
COM-9899	Monitor - Resolution, Borescope Part #: MSE-64 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
STD-858	Tag - DO NOT OPERATE

D. **Consumable Materials**

Reference	Description	Specification
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G02495 [CP8002]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS5689

E. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. **Prepare for the Inspection/Check**

SUBTASK 72-32-00-860-048-F00

(1) Make sure that the applicable start switch is off and install a DO NOT OPERATE tag, STD-858.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-32-00-860-049-F00

(2) For Engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-860-050-F00

(3) For Engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-32-00-010-012-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

SUBTASK 72-32-00-010-013-F00

(5) To get access to the HPC stage 4 vane trailing edge, do the steps that follow:

(a) Do these steps to remove the upper left side air Low Pressure Turbine (LPT) cooling tube [100] (Figure 604).

1) Remove the retaining strap [105] and machine double hexagon head bolts [104] that attach the air LPT cooling tube [100] to the tube LPT cooling bracket [106].

2) Remove the retaining strap [102] and bolts [101] that attach the air LPT cooling tube [100] to the bracket [103] at the 10:30 o'clock position of flange R.

3) Remove the retaining strap [108] and bolts [109] that attach the air LPT cooling tube [100] to the bracket [107] at the 11:00 o'clock position of flange P.

4) Remove the air LPT cooling tube [100], metal ring seal [111], and bolts [110] from the combustion case at the 11:00 o'clock position.

LOM ALL PRE SB CFM56-7B-72-0117

5) Remove the air LPT cooling tube [100], metal gasket [114], LPT metering plate [115], ring seal [113], and bolts [112] from the HPC front stator at the 10:30 o'clock position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB CFM56-7B-72-0117

6) Remove air LPT cooling tube [100], ring seal [113] and bolts [112] from HPC front stator at the 10:30 o'clock position.

LOM ALL

G. High Pressure Compressor Stage 4 Vane Trailing Edge Inspection

SUBTASK 72-32-00-210-010-F00

(1) Do an inspection of the HPC stage 4 vane trailing edge:

(a) Do a borescope inspection (BSI) of the HPC airfoils and look for erosion of the airfoil corners and chord (TASK 72-00-00-200-804-F00).

(b) Do a special flexible BSI of the HPC stage 4 vane sector trailing edges for erosion as follows (Figure 605):

1) Use the borescope resolution monitor, COM-9899, to make sure that the fiber borescope, COM-2196, is serviceable.

2) Connect the fiber light cable to the fiber borescope, COM-2196.

3) Put the flexible light source, SPL-2197, into the LPT bleed port on the HPC front stator at the 10:30 o'clock position.

4) Put the flexible light source, SPL-2197, through the HPC stage 4 vane sector bleed slot.

NOTE: You can see five or six vane sector bleed slots through the LPT bleed port. It is recommended to do an inspection in at least two or three positions to get the best viewing angle of the vane sector trailing edge.

5) Articulate the scope to get a focus on the vane sector trailing edge.

6) Look for erosion on the HPC stage 4 vane sector trailing edge, especially near the outer platform (Figure 605, Figure 606, and Figure 607).

7) Re-inspection intervals depend on the amount of serviceable distress found.

a) If no erosion is found, then re-inspect before 4,800 cycles.

b) If the trailing edge is eroded but not axially past the start of the bleed slot, then re-inspect before 1,600 cycles (Figure 605).

c) If the trailing edge is eroded axially past the start of the bleed slot, then remove engine before 100 cycles.

8) Slowly pull the flexible light source, SPL-2197, back out of the port after you complete the inspection.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-32-00-410-012-F00

(1) Install the upper air LPT cooling tube [100] on the left side of the engine as follows (Figure 604):

(a) Install air LPT cooling tube [100], ring seal [111], and bolts [110] on the combustion case at the 11:00 o'clock position.

1) Tighten the bolts [110] to 62 in-lb (7 N·m) - 68 in-lb (7.7 N·m).

2) Install the safety wire, G02345 [CP8001], or safety wire, G02495 [CP8002], on the mounting bolts.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL PRE SB CFM56-7B-72-0117

(b) Install the air LPT cooling tube [100], gasket [114], metering plate [115], ring seal [113], and bolts [112] on the HPC front stator at the 10:30 o'clock position.

1) Tighten the bolts [112] to 62 in-lb (7 N·m) - 68 in-lb (7.7 N·m).

2) Install the safety wire, G02345 [CP8001], or safety wire, G02495 [CP8002], on the mounting bolts.

LOM ALL POST SB CFM56-7B-72-0117

(c) Install the air LPT cooling tube [100], ring seal [113], and bolts [112] on the HPC front stator at the 10:30 o'clock position.

1) Tighten the bolts [112] to 62 in-lb (7 N·m) - 68 in-lb (7.7 N·m).

2) Install the safety wire, G02345 [CP8001], or safety wire, G02495 [CP8002], on the mounting bolts.

LOM ALL

(d) Install the retaining strap [108] and bolts [109] to attach the air LPT cooling tube [100] to the bracket [107] at the 11:00 o'clock position of flange P.

1) Tighten the bolts [109] to 62 in-lb (7 N·m) - 68 in-lb (7.7 N·m).

(e) Install the retaining strap [102] and bolts [101] to attach the air LPT cooling tube [100] to the bracket [103] at the 10:30 o'clock position of flange R.

1) Tighten the bolts [101] to 62 in-lb (7 N·m) - 68 in-lb (7.7 N·m).

(f) Install retaining strap [105] and bolts [104] to attach the air LPT cooling tube [100] to the bracket [106].

1) Tighten the bolts [104] to 62 in-lb (7 N·m) - 68 in-lb (7.7 N·m).

SUBTASK 72-32-00-410-013-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-32-00-020-011-F00

(3) For the applicable engine, remove the DO NOT OPERATE tag, STD-858, on the engine START switch.

SUBTASK 72-32-00-860-052-F00

(4) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-32-00-860-051-F00

(5) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5051165-00
2934068 S0000709804_V1

High Pressure Compressor Stage 4 Vane Trailing Edge Inspection
Figure 604/72-32-00-990-809-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A

B

5051164-00
2932704 S0000709806_V1

High Pressure Compressor Stage 4 Vane Trailing Edge Inspection
Figure 604/72-32-00-990-809-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5051163-00
2932701 S0000709808_V1

High Pressure Compressor Stage 4 Vane Trailing Edge Inspection
Figure 604/72-32-00-990-809-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5051162-00
2932844 S0000709809_V1

HPC Stage 4 Vane Sector Trailing Edge Inspection
Figure 605/72-32-00-990-810-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

6012953-00
2932847 S0000709810_V1

Stage 4 HPC Vanes Erosion Limits
Figure 606/72-32-00-990-811-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5051160-00
2932696 S0000709811_V1

Stage 4 HPC Vanes Erosion Visible During BSI
Figure 607/72-32-00-990-812-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HIGH PRESSURE COMPRESSOR FRONT STATOR - REPAIRS

1. General

A. This procedure has these tasks:

(1) The replacement of the actuation ring flanged bushing (Stage 1 and 2)

(2) The replacement of the lever arms and bushings (IGV and Stage 3)

(3) High Pressure Compressor Front Stator Actuation Ring Connecting Links Replacement

(4) Variable Stator Vane (VSV) Bellcrank Assembly Removal and Installation

(5) Variable Stator Vane (VSV) Actuator System Hardware Repair.

TASK 72-32-00-900-801-F00

2. Replace the Actuation Ring Flanged Bushing (Stage 1 and 2)

A. General

(1) This task is to replace the actuation ring flanged bushings (stage 1 and 2) on the HPC front stator.

B. References

Reference	Title
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A00081	Adhesive - Silicone Rubber - RTV 106	BAC5010 Type 74

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Procedure

SUBTASK 72-32-00-860-007-F00

(1) Make sure that the applicable start switch is off and install a DO-NOT-OPERATE tag.

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

(a) The AUTO position is off.

LOM ALL

SUBTASK 72-32-00-865-001-F00

(2) For engine 1;

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-865-002-F00

(3) For engine 2;

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-32-00-010-002-F00

> **WARNING** OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

F. Procedure

SUBTASK 72-32-00-020-001-F00

> **CAUTION** DO NOT REMOVE THE LEVER ARMS TO DO THIS REPAIR. IF YOU REMOVE THE LEVER ARMS, THE VANE CAN TURN BEFORE YOU INSTALL THE LEVER ARMS AGAIN. IF THE VANE IS IN THE INCORRECT POSITION, IT CAN CAUSE AN IN-FLIGHT SHUTDOWN, AND ENGINE DAMAGE.

(1) If it is necessary, remove and clean the pieces of old bushing [1] from the actuation ring.

SUBTASK 72-32-00-420-001-F00

(2) Do these steps to install the new bushing [1]:

(a) Carefully break off the legs of the new bushing [1].

NOTE: The new bushing cannot be inserted on the lever arm with the legs attached.

NOTE: The actuation ring is assembled with different types of bushing. Make sure you select the correct bushing.

(b) Install the new bushing [1] from the outboard side of the actuation ring.

(c) Apply approximately 0.125 inch (3.18 mm) RTV 106 adhesive, A00081 to the outer flange of the bushing.

1) Permit the RTV to cure for not less than 24 hours before you operate the engine.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-32-00-410-002-F00

> **WARNING** OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-32-00-860-008-F00

(2) For the applicable engine, remove the DO-NOT-OPERATE tag on the engine START switch.

SUBTASK 72-32-00-865-003-F00

(3) For engine 1;

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-865-004-F00

(4) For engine 2;

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1239217-00
1307581 S0000225943_V3

Actuation Ring Flanged Bushing (Stage 1and 2)
Figure 801/72-32-00-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-32-00-900-802-F00

3. **Replace the Lever Arms and Bushings (IGV and Stage 3)**
(Figure 802)

A. General

(1) This procedure is for the lever arms and bushings to the inlet guide vane and the 3rd-stage stator vane.

(2) The removal of the actuation rings (which are not LRU's) is necessary for the removal of the lever arm for the 1st- and 2nd-stage stator vane.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-9071	Lever - Anti-Torque, HPC Stator Actuator Arm Part #: 856A1012G01 Supplier: 58828
SPL-9072	Puller - Lever Arm Part #: 856A1051G02 Supplier: 58828

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Procedure

SUBTASK 72-32-00-860-009-F00

(1) Make sure that the applicable start switch is off and install a DO-NOT-OPERATE tag.

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

(a) The AUTO position is off.

LOM ALL

SUBTASK 72-32-00-865-005-F00

(2) For engine 1;

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-865-006-F00

(3) For engine 2;

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-32-00-010-003-F00

(4) Open the right and left fan cowl panels (TASK 71-11-02-010-801-F00).

SUBTASK 72-32-00-010-004-F00

> **WARNING** OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Open the right and left thrust reversers (TASK 78-31-00-010-801-F00).

F. Procedure

SUBTASK 72-32-00-020-003-F00

(1) Remove the lever arm and bushing.

(a) Hold the lever arm with the anti-torque lever, SPL-9071 to make sure the vane does not turn.

(b) Remove the nut and washer from the vane stem.

(c) Use the lever arm puller, SPL-9072 to remove the lever arm from the vane.

(d) If it is necessary, remove the bushing from the stator case.

(e) If you install the shims, remove and discard the shims from the 3rd-stage vanes.

SUBTASK 72-32-00-420-002-F00

(2) Install the lever arm and bushing.

(a) If it is necessary, install a new bushing in the stator case.

(b) Install the lever arm as follows:

> **CAUTION** YOU MUST ALIGN THE ROUNDED END OF THE LEVER ARM SLOT WITH THE ROUNDED END OF THE VANE TRUNNION. IF YOU DO NOT ALIGN THE VANE CORRECTLY, ENGINE DAMAGE WILL OCCUR.

1) Align the rounded end of the lever arm slot with the rounded end of the vane stem.

a) If the vane stem has a witness mark, the lever arm is installed correctly when the mark is on the same side as the rounded end of the lever arm slot.

2) Put the lever arm on the vane stem.

3) Engage the lever arm pin in the actuation ring.

4) Make sure the lever arm fully engages with the vane stem tang.

(c) While you hold the lever arm with the anti-torque lever, SPL-9071 to make sure the vane does not turn, install the nut and washer from the vane stem.

1) Tighten the nut to 55-70 pound-inches (6.0-8.0 N.m).

(d) Make sure that two or three threads of the vane stem comes out of the nut.

1) Make sure the lever arm correctly engages the vane.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) If the lever arm does not engage the vane stem tang, do the removal and installation procedures again.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-32-00-410-003-F00

> **WARNING** OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Close the right and left thrust reversers (TASK 78-31-00-010-804-F00).

SUBTASK 72-32-00-410-004-F00

(2) Close the right and left fan cowl panels (TASK 71-11-02-410-801-F00).

SUBTASK 72-32-00-860-010-F00

(3) For the applicable engine, remove the DO-NOT-OPERATE tag on the engine START switch.

SUBTASK 72-32-00-865-007-F00

(4) For engine 1;

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-865-008-F00

(5) For engine 2;

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Stator Vane Lever Arm and Bushing Installation
Figure 802/72-32-00-990-803-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CORRECT

NOT CORRECT

**EXAMPLE OF VARIABLE STATOR VANE (VSV)
AND LEVER ARM ENGAGEMENT
(1ST-STAGE IS SHOWN)**

1261520-00
1485007 S0000270789_V3

**Stator Vane Lever Arm and Bushing Installation
Figure 802/72-32-00-990-803-F00 (Sheet 2 of 2)**

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-32-00-900-804-F00

4. High Pressure Compressor Front Stator Actuation Ring Connecting Links Replacement

Figure 803

A. General

(1) This task gives the instruction on how to do the replacement of the high pressure compressor front stator actuation ring connecting link [1].

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
A50138	Compound - Threadlocker - Wicking Action (Loctite 290)	MIL-S-46163 Type III
D00601 [CP2101]	Vaseline - Graphite Mineral	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Replacement

SUBTASK 72-32-00-860-030-F00

(1) Make sure that the applicable start switch is off and install a DO NOT OPERATE tag, STD-858.

SUBTASK 72-32-00-860-031-F00

(2) For engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-860-032-F00

(3) For engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-32-00-010-008-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO INSTALL THE THRUST REVERSER. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

G. Actuation Ring Connecting Link (to the VSV) Removal

SUBTASK 72-32-00-020-007-F00

> **WARNING** BE CAREFUL WHEN YOU DO WORK ON THE ENGINE PARTS AFTER THE ENGINE IS STOPPED. THE ENGINE PARTS CAN STAY HOT FOR ALMOST ONE HOUR. DO NOT TOUCH HOT PARTS WITHOUT APPLICABLE GLOVES. HOT PARTS CAN CAUSE INJURIES TO PERSONNEL.

> **CAUTION** DO NOT TURN, ADJUST OR DISASSEMBLE THE ADJUSTABLE LINK. IF YOU DO MOVE THE ADJUSTABLE LINK, YOU MUST ADJUST THE ADJUSTABLE LINK AGAIN. IF YOU DO NOT OBEY THIS PRECAUTION, INCORRECT ENGINE OPERATION CAN OCCUR.

(1) Disconnect the tie rod [7] from the clevis of the defective connecting link [1] as follows:

NOTE: Do not adjust tie rod.

(a) Remove the nut [6].

(b) Remove the D-head bolt [8].

SUBTASK 72-32-00-020-008-F00

(2) Cut and remove safety wire.

SUBTASK 72-32-00-020-009-F00

(3) Remove the bolts [2] that hold the connecting link [1] to the actuation ring [5].

NOTE: There is a locating pin at each end of the connecting link. The straight pin stays in the actuation ring segment. The pin with the head comes out with the connecting link.

H. Actuation Ring Connecting Link (to the VSV) Installation

SUBTASK 72-32-00-420-013-F00

(1) If the trapped straight pin [4] comes out with the connecting link [1], apply Compound, A50138 to the end of thetrapped straight pin [4] that goes in the actuation ring [5].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-32-00-420-014-F00

(2) Install the trapped straight pin [4] in the actuation ring [5].

NOTE: On the right side, the pin goes in the top segment of the actuation ring. On the left side, the pin goes in the lower segment of the actuation ring.

SUBTASK 72-32-00-420-015-F00

(3) Install the connecting link [1] to the actuation ring [5] segments.

(a) Make sure the trapped straight pin [4] fully engages the hole in the actuation ring [5].

NOTE: Make sure the lever arms are correctly installed in the connecting link bushings.

SUBTASK 72-32-00-420-016-F00

(4) Install the headed pin [3] in the connecting link [1] and actuation ring [5] segment.

SUBTASK 72-32-00-640-003-F00

(5) Apply graphite mineral vaseline, D00601 [CP2101] to the threads and friction surface of the bolt [2].

SUBTASK 72-32-00-420-017-F00

(6) Install the bolt [2].

(a) Tighten the bolt [2] between 55 in-lb (6.2 N·m) and 70 in-lb (7.9 N·m).

SUBTASK 72-32-00-420-018-F00

(7) Make sure that the trapped straight pin [4] is correctly installed in the actuation ring [5].

(a) Use safety wire through the inspection hole of the connecting link [1] to feel for the pin.

SUBTASK 72-32-00-210-009-F00

(8) Do a visual check:

CAUTION

BLADE DAMAGE CAN OCCUR IF YOU DO NOT ENGAGE THE LEVER ARMS CORRECTLY.

(a) Make sure all the lever arms are correctly installed in the connecting link [1] bushings.

SUBTASK 72-32-00-420-019-F00

(9) Safety wire the bolts [2]:

(a) Use safety wire, G02345 [CP8001].

SUBTASK 72-32-00-640-004-F00

CAUTION

MAKE SURE THAT YOU SEAT THE D-HEAD BOLT IN THE RECESS OF THE CONNECTING LINK. IF NOT, IT CAN CAUSE DAMAGE.

(10) Apply graphite mineral vaseline, D00601 [CP2101] to the threads of the D-head bolt [8].

SUBTASK 72-32-00-420-020-F00

(11) Install the tie rod [7] in the connecting link [1] with the D-head bolt [8] and nut [6].

NOTE: The bolt head goes aft for IGV and forward for stages 1, 2, and 3.

SUBTASK 72-32-00-420-021-F00

(12) Install the nut [6] and tighten between 105 in-lb (11.86 N·m) to 115 in-lb (12.99 N·m).

NOTE: Do not adjust the tie rod.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-32-00-410-008-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-32-00-860-033-F00

(2) For the applicable engine, remove the DO NOT OPERATE tag, STD-858 on the engine START switch.

SUBTASK 72-32-00-860-034-F00

(3) For Engine 1, Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-860-035-F00

(4) For Engine 2, Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Actuation Ring Connecting Link Installation
Figure 803/72-32-00-990-806-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-32-00-900-805-F00

5. Variable Stator Vane (VSV) Bellcrank Assembly Removal and Installation

(Figure 804)

A. General

(1) This task gives the instructions to remove and install the VSV Bellcrank Assembly.

B. References

Reference	Title
70-20-01-800-804-F00	Lockwire Installation (P/B 201)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
71-00-00-700-813-F00	Test 5 - Power Assurance Check (P/B 501)
72-32-00-200-803-F00	HPC Variable Stator Vane (VSV) Resistance Check (P/B 601)
73-21-00-700-802-F00	FADEC System Test (P/B 501)
75-31-00-790-801-F00	VSV Actuation System - Manual Operation (P/B 201)
75-31-01-000-801-F00	Left VSV Actuator Removal (P/B 401)
75-31-01-000-802-F00	Right VSV Actuator Removal (P/B 401)
75-31-01-400-801-F00	Left VSV Actuator Installation (P/B 401)
75-31-01-400-802-F00	Right VSV Actuator Installation (P/B 401)
75-31-01-790-801-F00	VSV Actuator Leak Test (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G02495 [CP8002]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS5689

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Procedure

SUBTASK 72-32-00-860-042-F00

(1) Make sure that the applicable start switch is off and install a DO NOT OPERATE tag, STD-858.

SUBTASK 72-32-00-860-043-F00

(2) For Engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-32-00-860-044-F00

(3) For Engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-32-00-010-011-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

G. Procedure

SUBTASK 72-32-00-000-002-F00

(1) Remove the left or right VSV actuator (TASK 75-31-01-000-801-F00 or TASK 75-31-01-000-802-F00).

SUBTASK 72-32-00-020-010-F00

(2) Do these steps to remove the VSV Bellcrank Assembly:

(a) Remove the D-head bolts [70] and self-locking nuts [80] that attach the rod-ends of the connecting links to the actuation ring clevises.

(b) Remove the bolt [20], bolt [21], washers [30], bolt [23], bolt [25], and washers [40] that attach the VSV bellcrank to the stator case.

(c) Remove the VSV bellcrank assembly from the engine.

NOTE: A check of the HPC VSV system resistance, as specified in TASK 72-32-00-200-803-F00 of the VSV Bellcrank Assembly, is required prior to return to service.

SUBTASK 72-32-00-300-001-F00

(3) Do the repair of the VSV actuator system hardware:

(a) Do this task: Variable Stator Vane (VSV) Actuator System Hardware Repair, TASK 72-32-00-900-806-F00.

SUBTASK 72-32-00-200-002-F00

(4) Do a resistance (force) check of the Variable Stator Vane (VSV) System for IGV, Stage 1, Stage 2, and Stage 3 (TASK 72-32-00-200-803-F00).

(a) Remove the engine if any stage requires more than 100 lbf (445 N) to move the actuation ring.

SUBTASK 72-32-00-420-023-F00

(5) Do these steps to install VSV Bellcrank Assembly:

(a) Clean the component interface and/or the adjacent area.

(b) Do a visual inspection of the component interface and/or the adjacent area.

(c) Install the VSV bellcrank assembly as follows:

1) Apply graphite mineral vaseline, D00601 [CP2101] to the bolt [20], bolt [21], bolt [23], and bolt [25].

2) Install the mounting sleeve [50] on the head-end side of the assembly.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

a) Put the sleeve [50] on the inboard side of the bellcrank mounting boss on the connecting link side.

b) Position the actuation assembly on the mounting boss and align the bolt holes.

3) Attach both mounting bosses, on the head-end side of the assembly, with two washers [30] and the bolt [20] and bolt [21].

4) Install the mounting sleeve [50] on the rod-end side of the actuator.

a) Put the sleeve [50] on the inboard side of the bellcrank mounting boss on the connecting link side.

b) Position the actuation assembly on the mounting boss and align the bolt holes.

5) Attach the mounting boss, on the rod-end and connecting link side of the assembly, with the washer [40] and bolt [23].

6) Attach the mounting boss, on the rod-end and actuator side of the assembly, with mounting spacer [60], washer [40], and bolt [25].

7) Tighten the two head-end bolt [20] and bolt [21] to between 110 in-lb (12.43 N·m) and 120 in-lb (13.56 N·m).

a) Install the safety wire, G02345 [CP8001] or safety wire, G02495 [CP8002] on the mounting bolts (TASK 70-20-01-800-804-F00).

8) Tighten the two rod-end bolt [23] and bolt [25] to between 215 in-lb (24.29 N·m) and 225 in-lb (25.42 N·m).

a) Install the safety wire, G02345 [CP8001] or safety wire, G02495 [CP8002] on the mounting bolts (TASK 70-20-01-800-804-F00).

9) Lubricate the threads of the D-head bolts [70] and self-locking nuts [80] with graphite mineral vaseline, D00601 [CP2101].

10) Install the rod-ends of the connecting links to the actuation ring clevises and secure with D-head bolts [70] and self-locking nuts [80].

NOTE: The bolt head goes aft for IGV and forward for stages 1, 2, and 3.

11) Tighten the self-locking nuts [80] to between 62 in-lb (7.01 N·m) and 68 in-lb (7.68 N·m).

SUBTASK 72-32-00-420-024-F00

(6) Install the left or right VSV actuator (TASK 75-31-01-400-801-F00 or TASK 75-31-01-400-802-F00).

H. Test Requirements

SUBTASK 72-32-00-700-001-F00

(1) Perform manual operation of VSV actuation (TASK 75-31-00-790-801-F00).

SUBTASK 72-32-00-700-002-F00

(2) Perform VSV actuator leak test (TASK 75-31-01-790-801-F00).

SUBTASK 72-32-00-700-003-F00

(3) Perform FADEC system test (TASK 73-21-00-700-802-F00).

SUBTASK 72-32-00-700-004-F00

(4) Perform minimum idle leak check (TASK 71-00-00-700-801-F00) to ensure that on the Flight Management Computer System (FMCS) Control Display Unit (CDU) no fault is shown related to the VSV system.

SUBTASK 72-32-00-700-005-F00

(5) Perform a Power Assurance test (TASK 71-00-00-700-813-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-32-00-410-011-F00

> **WARNING** OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-32-00-860-045-F00

(2) For the applicable engine, remove the DO NOT OPERATE tag, STD-858 tag on the engine START switch.

SUBTASK 72-32-00-860-046-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-860-047-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

VSV System Bellcrank Assembly Replacement
Figure 804/72-32-00-990-808-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-32-00-900-806-F00

6. Variable Stator Vane (VSV) Actuator System Hardware Repair

(Figure 805, Figure 806, Figure 807, Figure 808, and Figure 809)

A. General

(1) This task gives the instructions to disassemble, assemble, and do the repair of the VSV actuator assembly.

(2) This procedure requires the VSV actuator removed from the engine.

B. References

Reference	Title
72-00-00-100-805-F00	Clean the External Engine Surfaces (P/B 701)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Repair

SUBTASK 72-32-00-000-004-F00

(1) If not already done, do the applicable steps in this task to remove the VSV bellcrank assembly: Variable Stator Vane (VSV) Bellcrank Assembly Removal and Installation, TASK 72-32-00-900-805-F00.

F. Variable Stator Vane (VSV) Actuator System Hardware Repair

SUBTASK 72-32-00-020-013-F00

(1) Do these steps to disassemble the left or right VSV actuator support assembly (Figure 806 or Figure 807):

(a) Remove the nuts [11], washers [12], bolts [13], nut [14], washer [15], bolt [16], and bushing [17] that attach the master rod [19] to the bellcrank assemblies.

(b) Remove the master rod [19].

(c) Remove the nuts [1] and bolts [2] that attach the bellcranks to the support plates.

(d) Remove the upper support plate [4].

(e) Remove the bellcrank [7], bellcrank [8], bellcrank [9], and bellcrank [10].

(f) Remove the bushings [5] from each side of the bellcranks.

(g) Remove the sleeves [6] from the bellcranks.

(h) Remove the nuts [22] and bolts [23] that attach the tie rod assemblies to the bellcranks.

(i) Remove the tie rod [24], tie rod [25], tie rod [26], and tie rod [27].

SUBTASK 72-32-00-100-002-F00

(2) Do the steam clean of these parts: master rod, bellcranks, tie rod assemblies, support plates, links, and other VSV hardware (TASK 72-00-00-100-805-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-32-00-420-026-F00

CAUTION MAKE SURE THAT YOU INSTALL EACH TIE-ROD ASSEMBLY ON THE CORRECT BELLCRANK STAGE. IF YOU DO NOT INSTALL EACH TIE-ROD ASSEMBLY CORRECTLY, DAMAGE TO THE VSV ACTUATOR CAN OCCUR.

(3) Do these steps to assemble the left or right VSV actuator support assembly (Figure 806 or Figure 807):

(a) Attach the IGV, stage 1 and stage 2 bellcranks (bellcrank [7], bellcrank [8], and bellcrank [9]) to their respective tie-rod assembly (tie rod [24], tie rod [25], and tie rod [26]) with bolts [23] and nuts [22].

NOTE: The nuts must be installed with no lubricant and must have a minimum run-on torque of 5 in-lb (0.56 N·m).

1) The stage identification on the bellcrank goes up. The bolt goes up through the short end of the bellcrank (Figure 808).

(b) Tighten the nuts [22] to 55 in-lb (6 N·m) - 70 in-lb (8 N·m).

(c) Install the bolts [2] up through the lower support plate [3] in the stage 1 and 2 positions.

(d) Install the sleeves [6] in the lower support plate [3] at the IGV, stage 1, 2, and 3 positions.

(e) Install the bushings [5] on the sleeves [6].

1) The flange goes down.

(f) Install the bellcrank [7] on the bushings at the IGV position.

1) The stage identification on the bellcrank goes up.

(g) Install the stage 1-3 bellcranks (bellcrank [8], bellcrank [9], and bellcrank [10]).

(h) Install the upper support plate [4].

(i) Install the bolt [2] in the support assembly at the IGV position.

1) The head of the bolt goes up.

(j) Install the nuts [1].

NOTE: The nuts must be installed with no lubricant and must have a minimum run-on torque of 5 in-lb (0.56 N·m).

(k) Tighten the nuts [1] to 55 in-lb (6 N·m) - 70 in-lb (8 N·m).

(l) Apply graphite mineral vaseline, D00601 [CP2101] to the bearing surfaces of the master rod [19].

(m) Attach the master rod [19] to the IGV, stage 1 and stage 2 bellcranks with bolts [13], washers [12], and nuts [11].

1) The bolt head goes up at the IGV position and down at the stage 1 and 2 positions.

(n) Install the bushing [17] at the stage 3 position.

1) The flange goes down.

(o) Install the bolt [16] at the stage 3 position.

1) The bolt head goes down.

(p) Install the washer [15] and nut [14]

NOTE: The nut must be installed with no lubricant and must have a minimum run-on torque of 5 in-lb (0.56 N·m).

(q) Tighten the nut [14] to 55 in-lb (6 N·m) - 70 in-lb (8 N·m).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(r) Attach the stage 3 bellcrank [10] to the stage 3 tie rod [27] with bolt [23] and nut [22].

NOTE: The nut must be installed with no lubricant and must have a minimum run-on torque of 5 in-lb (0.56 N·m).

1) The stage identification on the bellcrank goes up. The bolt goes up through the short end of the bellcrank (Figure 808).

(s) Tighten the nut [22] to 55 in-lb (6 N·m) - 70 in-lb (8 N·m).

SUBTASK 72-32-00-220-005-F00

(4) Do these steps to examine the free play of the tie rod [24], tie rod [25], tie rod [26], and tie rod [27] (Figure 809):

(a) Put the VSV actuator assembly on a surface plate.

(b) Use C-clamps to hold the assembly to the angle plate.

(c) Install a dial indicator on the end of the IGV tie-rod bearing.

(d) With the master rod [19] restrained, try to move the tie-rod up and down by hand. Look at the indicator while you try to move the tie-rod.

1) The maximum free play permitted is 0.010 in. (0.254 mm).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

**(LEFT VSV ACTUATOR IS SHOWN,
RIGHT VSV ACTUATOR IS EQUIVALENT)**

6029850-00
2983443 S0000761157_V1

**VSV Actuator System Assembly
Figure 805/72-32-00-990-818-F00**

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LEGEND:

[1] NUT
[2] BOLT
[3] LOWER SUPPORT PLATE
[4] UPPER SUPPORT PLATE
[5] BUSHING
[6] SLEEVE
[7] BELLCRANK
[8] BELLCRANK
[9] BELLCRANK
[10] BELLCRANK

6029851-00
2983444 S0000761158_V2

Left VSV Actuator
Figure 806/72-32-00-990-819-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LEGEND:

[7] BELLCRANK
[8] BELLCRANK
[9] BELLCRANK
[10] BELLCRANK
[11] NUT
[12] WASHER
[13] BOLT
[14] NUT
[15] WASHER
[16] BOLT
[17] BUSHING
[19] MASTER ROD
[20] BUSHING
[21] BUSHING
[22] NUT
[23] BOLT
[24] TIE ROD
[25] TIE ROD
[26] TIE ROD
[27] TIE ROD

Left VSV Actuator
Figure 806/72-32-00-990-819-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LEGEND:

[1] NUT
[2] BOLT
[3] LOWER SUPPORT PLATE
[4] UPPER SUPPORT PLATE
[5] BUSHING
[6] SLEEVE
[7] BELLCRANK
[8] BELLCRANK
[9] BELLCRANK
[10] BELLCRANK

Right VSV Actuator
Figure 807/72-32-00-990-820-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LEGEND:

[7] BELLCRANK
[8] BELLCRANK
[9] BELLCRANK
[10] BELLCRANK
[11] NUT
[12] WASHER
[13] BOLT
[14] NUT
[15] WASHER
[16] BOLT
[17] BUSHING
[19] MASTER ROD
[20] BUSHING
[21] BUSHING
[22] NUT
[23] BOLT
[24] TIE ROD
[25] TIE ROD
[26] TIE ROD
[27] TIE ROD

2983447 S0000761161_V1

Right VSV Actuator
Figure 807/72-32-00-990-820-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

**TIE ROD/BELLCRANK INSTALLATION. STAGE 1,
(RIGHT SIDE IS SHOWN, LEFT IS OPPOSITE)
(EXAMPLE)**

6029855-00

2983449 S0000761162_V1

**Bellcrank Assembly
Figure 808/72-32-00-990-821-F00**

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 MEASURE THE END PLAY OF THE 4 TIE RODS

6029856-00

2983450 S0000761163_V1

Tie Rod End Play Measurement
Figure 809/72-32-00-990-822-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

COMBUSTION CASE - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) An inspection of the combustion case.

TASK 72-41-00-200-801-F00

2. Combustion Case Inspection

(Figure 601)

A. General

(1) This task gives you the instructions to visually examine the combustion case of the engine.

(2) The combustion case is at the center of the engine.

B. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
71-00-02-000-801-F00	Power Plant - Removal (P/B 401)
71-00-02-400-801-F00	Power Plant - Installation (P/B 401)
72-00-00-200-805-F00	Combustion Section Borescope Inspection (P/B 601)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Inspection

SUBTASK 72-41-00-860-001-F00

(1) For the applicable engine, install a DO-NOT-OPERATE tag on the engine start lever.

SUBTASK 72-41-00-860-002-F00

(2) For engine 1;

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-41-00-860-003-F00

(3) For engine 2;

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-41-00-010-001-F00

WARNING	DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THIS SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

E. Examine the Combustion Case for Damage

SUBTASK 72-41-00-900-001-F00

(1) If you find damage that is not in the limits, replace the engine, unless you are given other instructions.

These are the tasks:

Power Plant - Removal, TASK 71-00-02-000-801-F00,

Power Plant - Installation, TASK 71-00-02-400-801-F00.

SUBTASK 72-41-00-220-001-F00

(2) Look for damage on the outer case:

(a) Cracks

1) Not serviceable.

(b) Nicks, marks and scratches

1) There is no limit to the number of nicks, marks, and scratches which are permitted with these conditions:

a) Not more than 0.03 inch (0.8 mm) in depth, after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

(c) Dents

1) All dents with a maximum depth of 0.10 inch (2.5 mm) are permitted if they have a smooth contour.

(d) Bends, bulges, or distortion

1) Not permitted.

CAUTION	IF YOU FIND DISCOLORATION ON THE OUTER CASE, EXAMINE THE CONDITION OF THE INNER PART OF THE COMBUSTOR WITH A BORESCOPE. DISCOLORATION ON THE OUTER CASING IS AN INDICATION OF DAMAGE TO THE COMBUSTOR. IF YOU DO NOT OBEY, MORE DAMAGE TO THE ENGINE COULD OCCUR.

(e) Discoloration

1) Discoloration is permitted only if the metal is not crazed.

2) If you find hot spots in the outer case, then do the applicable task:

a) Do this task: Combustion Section Borescope Inspection, TASK 72-00-00-200-805-F00.

SUBTASK 72-41-00-220-002-F00

(3) Look for damage on the forward and aft flanges:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Cracks that extend from the bolt holes to the outer edge of the flange.

1) It is permitted to have only one crack from a bolt hole.

2) It is permitted to have not more than two cracks on each flange.

(b) Cracks that extend radially from the bolt holes into the case

1) Not serviceable.

2) A Continue-In-Service limit of 10 cycles is permitted.

SUBTASK 72-41-00-220-003-F00

(4) Look for damage to the midflange of the case:

(a) Broken bolts

1) All damage is permitted with these limits:

a) Not more than 10 damaged bolts.

b) Not more than two broken bolts, in a group of 20 bolts.

c) A minimum of 5 bolts that are not damaged on each side of the broken bolt.

d) A Continue-In-Service limit of 25 cycles is permitted for 10 damaged bolts, with a maximum of 4 broken bolts in a group of 20 bolts.

SUBTASK 72-41-00-220-004-F00

(5) Look for damage to the fuel nozzle pads (20 locations) when the fuel nozzles are removed for other maintenance:

(a) Damage to the threads

1) Chasing of the threads is permitted with this limit:

a) There must be more than 4 threads that were not damaged after you chased the threads.

(b) Damage to the sealing surface

1) Nicks, marks, scratches and pitting

a) There is no limit to the number of nicks, marks, scratches and pitting after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

b) The damage is not more than 0.03 inch (0.8 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

c) The damage must not be spread over more than 50 percent of the seal surface after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

(c) Particles on the sealing surface

1) Remove all of the particles.

SUBTASK 72-41-00-220-005-F00

(6) Look for damage to the igniter ports when the igniters are removed for other maintenance:

(a) Damage to the threads

1) Chasing of the threads is permitted with this limit:

a) There must be more than 3 threads that are not damaged after you chased the threads.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-41-00-220-006-F00

(7) Look for damage to the borescope ports when the borescope plugs are removed for other maintenance:

(a) Damage to the threads

1) Chasing of the threads is permitted with this limit:

a) There must be more than 3 threads that are not damaged after you chased the threads.

SUBTASK 72-41-00-220-007-F00

(8) Look for damage to the HPT shroud cooling air pad when the HPT shroud is removed for other maintenance:

(a) Damage to the sealing surface

1) Nicks, marks, scratches and pitting

a) There is no limit to the number of nicks, marks, scratches and pitting after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

b) The damage is not more than 0.03 inch (0.8 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

c) The damage must not be spread over more than 75 percent of the seal surface after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

(b) Cracks in the bolt holes

1) Not serviceable.

a) A Continue-In-Service limit of 10 cycles is permitted for one crack that is not more than 0.6 inch (1.5 mm) in length in each bolt hole.

SUBTASK 72-41-00-220-008-F00

(9) Look for damage to the CDP bleed pads when the CDP LRU is removed for other maintenance:

(a) Damage to the sealing surface

1) Nicks, marks, scratches and pitting

a) There is no limit to the number of nicks, marks, scratches and pitting after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

b) The damage is not more than 0.03 inch (0.8 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

c) The damage must not be spread over more than 75 percent of the seal surface after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

(b) Cracks in the bolt holes

1) Not serviceable.

a) A Continue-In-Service limit of 10 cycles is permitted for one crack no longer than 0.6 inch (1.5 mm) in length in each bolt hole.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-41-00-410-001-F00

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-41-00-860-004-F00

(2) For the applicable engine, remove the DO-NOT-OPERATE tag on the engine start lever.

SUBTASK 72-41-00-860-005-F00

(3) For engine 1;

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-41-00-860-006-F00

(4) For engine 2;

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1140865-00-A
G37503 S0006582493_V2

Combustion Case Inspection
Figure 601/72-41-00-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOW PRESSURE TURBINE CASE - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) An inspection of the low pressure turbine case.

TASK 72-54-00-200-801-F00

2. Low Pressure Turbine Case Inspection

(Figure 601, Figure 602, and Figure 603)

A. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
72-00-00-290-801-F00	Borescope Inspection of the Stage 1 Low-Pressure Turbine Nozzle Outer Air Duct Condition (P/B 601)
72-54-00-300-801-F00	Replacement of Broken Studs on the T49.5 Probe Bracket Assembly (P/B 801)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

C. Prepare for the Inspection

SUBTASK 72-54-00-010-001-F00

> **WARNING**
> DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THIS SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

D. Low Pressure Turbine Case Inspection

SUBTASK 72-54-00-210-001-F00

(1) Look for damage on the aft flange (Figure 601):

(a) Cracks that connect the bolt holes

1) Not serviceable.

a) A Continue-In-Service limit of 10 cycles is permitted for one crack, if the crack connects two bolt holes and does not go into the outer skin of the pressure vessel.

(b) Cracks that extend from the bolt holes to the outer edge of the flange

1) It is permitted to have 5 cracks with a minimum of 5 holes of separation between the cracks.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Cracks that extend from the bolt holes to the casing skin

1) Not serviceable.

a) A Continue-In-Service limit of 10 cycles is permitted for one crack that extends 0.4 inch (10.2 mm) into the skin.

(d) Cracks in other areas of the flange

1) It is permitted to have 5 cracks on each flange if they are not more than 0.25 inch (6.35 mm) in length with this condition:

a) A minimum of 5.0 inches (127.0 mm) of separation between all other cracks.

(e) Cracks in the skin radius of the flange and case

1) Not serviceable.

(f) Nicks, scores and scratches

1) There is no limit to the number of nicks, scores, scratches with these limits:

a) Not more than 1.0 inch (25.4 mm) long.

b) Not more than 0.01 inch (0.25 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

c) There is a minimum separation of 1.0 inch (25.4 mm) with other damage.

SUBTASK 72-54-00-210-002-F00

(2) Look for damage on the casing skin:

(a) Cracks in the parent metal

1) All cracks that are not more than 0.04 inch (1.0 mm) in length and have a minimum separation of 2.0 inches (50.8 mm).

a) A Continue-In-Service limit of 10 cycles is permitted for one crack which is not more than 0.4 inch (10.16 mm) in length.

(b) Nicks and scratches

1) All nicks and scratches 0.01 inch (0.25 mm) in depth are permitted after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

(c) Dents

1) All dents with a maximum depth of 0.02 inch (0.5 mm) are permitted if they have a smooth contour.

SUBTASK 72-54-00-210-003-F00

(3) Look for damage on all ports that have threads:

(a) Damage to the threads

1) No more than one complete thread can be removed or the total damage for all threads cannot be more than one thread, after you chase the threads.

SUBTASK 72-54-00-210-013-F00

(4) Look for indications on the cap assembly (Figure 603):

(a) Cracks

1) Not serviceable.

(b) Finding on threads

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Any amount not more than 1/2 full thread after removal of high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

(c) Defective spring

1) Not serviceable.

a) A Continue-In Service limit of 10 cycles is permitted.

SUBTASK 72-54-00-210-004-F00

(5) Look for damage on the ring sector support:

(a) Cracks

1) All cracks are permitted if all parts of the ring sector support are still attached by the rivets.

SUBTASK 72-54-00-210-005-F00

(6) Look for damage on the angle brackets:

(a) Broken bracket

1) Not serviceable.

a) A Continue-In-Service limit of 10 cycles or 10 hours is permitted.

(b) Cracks

1) All cracks are permitted if the cooling air tubes and the fasteners are not loose.

SUBTASK 72-54-00-210-009-F00

(7) Look for damage on the T49.5 probe thermocouple studs:

(a) Broken or missing stud

1) Not serviceable.

a) Do the repair of the broken stud (TASK 72-54-00-300-801-F00).

b) A continue in service limit of 20 cycles is permitted until the broken stud is repaired with these conditions:

<1> Damage is limited to one stud per T49.5 sensor.

NOTE: Each T49.5 sensor has two probes, each probe is attached to two studs on the LPT.

<2> A visual inspection of the area of the broken stud shows no indication of air leak.

<3> A visual check makes sure there is no obvious gap between the probe attachment flange and the LPT case.

SUBTASK 72-54-00-210-006-F00

(8) Look for damage on the cooling air manifold (Figure 602):

(a) Cracks in the forward mounting lug

1) One crack on each side of a lug is permitted.

(b) A broken forward mounting lug

1) Breakage on one side of a mounting lug is permitted.

2) Breakage or a crack on each side of a forward lug is permitted if the two adjacent cooling air tube supports are not broken or have a crack that is not more than 0.591 inch (15.0 mm) in length.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

3) If there is breakage or a crack on each side of a forward lug, and the two adjacent cooling air tube supports are broken or have a crack that is more than 0.591 inch (15.0 mm), these are the Continue-In-Service limits:

a) A Continue-In-Service limit of 10 hours or 10 cycles is permitted if one adjacent support is broken.

b) If one or two adjacent supports have a crack that is more than 0.591 inch (15.0 mm) long, examine the part at not more than 10 hours or 10 cycles to see if the crack length increases.

c) If you find that the crack length did not increase, then repeat the check at not more than 50 hours or 50 cycles, and then at each 100 hours or 100 cycles until the part is repaired or the crack length increases.

d) If you find that the crack length increases, a Continue-In-Service limit of 30 hours or 30 cycles is permitted.

(c) Cracks in the sheet metal

1) All cracks are permitted with these limits:

a) The cracks are not longer than 0.5 inch (12.7 mm).

b) The total length of all cracks is not longer than 3.0 inches (76.2 mm).

c) The cracks have a minimum separation of 1.0 inch (25.4 mm) between each crack.

(d) Dents on sleeve

1) All dents are permitted if they have a smooth contour and are not more than 0.03 inch (0.76 mm) in depth.

(e) Nick, scratch and chafing (wear) on tube external surface

1) Maximum finish depth after you make the defect smooth is 0.008 inch (0.20 mm).

a) Make the defect smooth by hand blending (CFMI CFM56 Standard Practices Manual 70-41-11) if necessary to remove sharp edges.

b) Make sure there is no crack. Do this task: Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

(f) Scratches and chafing on box

1) All scratches and chafing are permitted if they are not more than 0.004 in. (0.1 mm) in depth.

(g) Dents on box

1) All dents are permitted if they are without sharp edge and are not more than 0.118 in. (3.0 mm) in depth.

SUBTASK 72-54-00-210-007-F00

(9) Look for damage on the cooling air tubes:

(a) Cracks in tubes

1) All cracks are permitted if not longer than 2.0 inch (50.8 mm) and separated by at least one support member.

(b) Dents

1) All dents are permitted if they have a smooth contour and are not more than 20 percent of the tube outside diameter.

(c) Cracks in tube clamps

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) All cracks are permitted if the tubes are correctly attached.

SUBTASK 72-54-00-210-008-F00

(10) Look for damage on the tube supports for the cooling air:

(a) Cracks at the mounting flanges

1) All cracks are permitted if the supports are not loose.

(b) Cracks in all other areas

1) All cracks are permitted if the cooling air tubes and fasteners are not loose.

(c) Breakage of the forward mount lug

1) One broken lug is permitted for one-half of the distribution manifold.

SUBTASK 72-54-00-210-011-F00

(11) Look for damage on the LPTACC cooling air manifold:

(a) Cracks in the tubes

1) No cracks are permitted.

(b) Dents and collapse

1) All dents and collapse are permitted if depth is not more than 5 percent of the outer diameter of the tube.

(c) Flat area

1) All flat areas are permitted if contour change is not more than 5 percent of the tube.

SUBTASK 72-54-00-210-012-F00

(12) Look for damage on the LPTACC cooling air duct:

(a) Cracks in the tubes

1) No cracks are permitted.

(b) Dents and collapse

1) All dents and collapse are permitted if depth is not more than 5 percent of the outer diameter of the tube.

(c) Flat area

1) All flat areas are permitted if contour change is not more than 5 percent of the tube.

SUBTASK 72-54-00-290-001-F00

(13) If the visual inspection is not satisfactory, do the Borescope Inspection of the Stage 1 Low-Pressure Turbine Nozzle Outer Air Duct Condition, TASK 72-00-00-290-801-F00.

E. Put the Airplane Back to Its Usual Condition

SUBTASK 72-54-00-010-002-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Low Pressure Turbine Case Inspection
Figure 601/72-54-00-990-801-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

COOLING AIR MANIFOLD

B

S-M56-MM-03685-00-B
G11401 S0006582499_V2

Low Pressure Turbine Case Inspection
Figure 601/72-54-00-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H13358 S0006582500_V2

Mounting Lugs Inspection
Figure 602/72-54-00-990-802-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Mounting Lugs Inspection
Figure 602/72-54-00-990-802-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2443653 S0000568179_V1

Borescope Plugs Inspection
Figure 603/72-54-00-990-807-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOW PRESSURE TURBINE CASE - REPAIR

1. **General**

A. This procedure has one task:

(1) The replacement of the broken studs on the T49.5 probe bracket assembly.

TASK 72-54-00-300-801-F00

2. **Replacement of Broken Studs on the T49.5 Probe Bracket Assembly**

(Figure 801, Figure 802, Figure 803, Figure 804)

A. General

(1) This procedure contains one task: to replace the broken studs on the T49.5 Probe Bracket Assembly.

(2) If you find a broken stud on the bracket assembly, replace the broken stud if there is sufficient access.

NOTE: The replacement of the broken studs depend on accessibility.

NOTE: Make sure that free access is available for the drilling and tapping procedure.

NOTE: You must discard the repaired bracket assembly at the first LPT rotor/stator disassembly.

(3) The T49.5 probe (and thermocouple) bracket assemblies are installed on the LPT case at 2:00, 5:00, 7:30 and 10: 00 o'clock position and below the air cooling tubes.

B. References

Reference	Title
70-20-01-800-804-F00	Lockwire Installation (P/B 201)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
77-21-01-000-801-F00	T49.5 Probe Removal (P/B 401)
77-21-01-400-801-F00	T49.5 Probe Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D50068 [CP2544]	Lubricant - Molykote P37, Paste	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Procedure

SUBTASK 72-54-00-010-003-F00

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-54-00-010-004-F00

WARNING DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND OTHER EQUIPMENT FOR PROTECTION, OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

CAUTION DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

NOTE: The engine oil is poisonous. Use the personal protection equipment. Put the lubrication unit on the clean bench in a good ventilated area.

(2) Do this task: T49.5 Probe Removal, TASK 77-21-01-000-801-F00.

SUBTASK 72-54-00-010-005-F00

WARNING DO NOT BREATHE THE PARTICLES, OR GET THEM IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES AND OTHER EQUIPMENT FOR PROTECTION. THESE PARTICLES CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

WARNING USE EYE PROTECTION WHEN YOU USE COMPRESSED AIR TO CLEAN, COOL, OR DRY PARTS OR TOOLS. PARTICLES CAN CAUSE AN INJURY TO YOUR EYES. DO NOT USE MORE THAN 30 PSI (207 KPA). DO NOT POINT COMPRESSED AIR AT YOURSELF OR OTHER PERSONS.

(3) Use a square access to remove the nuts and the bulkheads.

NOTE: It is easier to use a square access to remove the nuts, with bulkheads removed.

SUBTASK 72-54-00-320-001-F00

(4) Do these steps to prepare for the broken stud drilling.

(a) Calculate the length of the remaining broken tack welded stud shank with the serviceable remaining tack welded stud.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Do these steps to install a locally manufactured tool on the serviceable remaining tack welded stud.

1) Make sure that you correctly engaged the center pin of the tooling in the bore of the T49.5 probe location.

2) Tighten the tooling to the LPT case with the original nut on the serviceable remaining tack welded stud.

3) Make sure that the tooling is correctly installed against the LPT case.

(c) Make a selection to get the correct drill guide sleeve for a 0.25 inch (6.35 mm) drill.

NOTE: You can identify the sleeve as the clearance guide.

(d) Install the retaining screw between the drill guide sleeve and the tooling.

(e) Do a check from the top of the drill guide sleeve to the T49.5 probe location of the LPT case.

SUBTASK 72-54-00-910-001-F00

NOTE: Do not drill into the stud head when you remove the broken stud shank. Refer to the Standard Practices Manual (Refer to CFMI SPM, Task 70-44-50-320-006) before you drill the hole into the stud head.

NOTE: When you do the drilling and tapping operation, use a minimum pressure to do these operations. If you put too much pressure, you can push the fitting away from the inside of the LPT case, as it is only safe tied by a good tack welded stud on one side.

(5) Do these steps to drill the broken stud shank.

(a) Calculate the necessary drill depth with the dimensions given in the above step and the dimensions shown in the figure to remove the broken stud shank.

(b) Make a selection to get the correct drilling stop ring for the 0.25 inch (6.35 mm) drill.

(c) Attach the stop ring to the 0.25 inch (6.35 mm) diameter drill.

1) Set it to the depth as calculated as in the above steps.

(d) Put the drill into the tooling sleeve.

(e) Drill to a depth permitted by the stop ring to remove the remaining broken stud shank.

SUBTASK 72-54-00-910-002-F00

(6) Do these steps to prepare for tack welded stud head drilling.

(a) Remove the drill guide sleeve (identified as “clearance guide”).

(b) Replace it with the other drill guide sleeve (identified as “tapping drill guide”) for a 0.211 inch (5.36 mm) drill.

(c) Do a check from the top of the drilling sleeve to the T49.5 probe location of the LPT case.

(d) Calculate the drill depth (use the dimensions given before and the dimensions shown in the Figure) to drill through the tack welded stud head and the back plate.

NOTE: You must be careful when you drill, and make sure that it does not break through the back plate.

SUBTASK 72-54-00-910-003-F00

NOTE: If you do an incorrect calculation of the drill depth and setting of the drill depth stop ring, you may have a risk to go through the insulation blanket. In this case, you must do the full disassembly of the LPT rotor/stator.

(7) Do these steps to drill the tack welded stud head.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Install a correct stop ring to drill a 0.211 inch (5.36 mm) diameter hole.

NOTE: The stop ring is identified with a drill size of 0.211 inch (5.36 mm).

NOTE: Set it to the depth specified as calculated in the “Drilling of the broken stud shank” as in the paragraph above.

(b) Put the drill into the tooling sleeve.

NOTE: When you perform the drilling operation, and if you find that you have too much depth, you go to drill through the insulation blanket.

(c) Drill to a depth permitted by the stop ring to drill the stud head and the back plate.

(d) Remove the drill guide sleeve (identified as “tapping drill guide”).

(e) Replace it with the other drill guide sleeve (identified as “clearance guide”).

SUBTASK 72-54-00-910-004-F00

(8) Do these steps to tap the tack welded stud head.

(a) Do a check from the top of the drill guide sleeve to the T49.5 probe location of the LPT case.

(b) Calculate the specified tap depth with the dimensions given before and the dimensions shown in the figure, to tap through the tack welded stud head and the back plate only.

(c) Set the 0.25 inch (6.35 mm) stop ring to the specified depth with the tap given in the tooling.

(d) Put the tap into the tooling sleeve.

(e) Tap the head of the tack welded stud and the back plate.

NOTE: Refer to CFMI SPM, Task 70-44-60-320-007.

(f) Make sure that you vacuum all the unwanted particles.

(g) Remove the nut.

(h) Remove the tooling.

SUBTASK 72-54-00-470-001-F00

(9) Do these steps to install the T49.5 probe on the reworked bracket.

(a) To identify the repair, write the bulletin number CFM 56-7B-72-0423 on the locally manufactured washer (Refer to CFMI SPM, Task 70-10-12-350-005).

(b) Do this task: T49.5 Probe Installation, TASK 77-21-01-400-801-F00.

(c) Install the locally manufactured washer with the lockwire hole below the nut at the location adjacent to the modified broken tack welded stud.

(d) Apply a light layer of the lubricant, D50068 [CP2544] on the remaining stud thread and on the new bolt thread.

(e) Install the bolt (GE part number J644P09B) on the modified tapped tack welded stud head.

NOTE: Make sure that you have the washer correctly located to the lockwire adjacent bolt.

(f) Tighten the nut and bolt to 100.0-110.0 Pound-inches (11.5-12.5 Newton-meters).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(g) Lock the bolt to the washer below the nut with a safety wire, G02345 [CP8001] or the cable, G50065 [CP8006] (Lockwire Installation, TASK 70-20-01-800-804-F00).

NOTE: If you have the second stud broken, in addition to the already replaced stud, you can do this repair to replace this second broken stud by a bolt. You must safety the bolts together with a lockwire in the head bolt holes. Keep the locally manufactured washer already installed on the first bolt to identify the repair.

(h) Do a check from the top of the T49.5 probe to the LPT case.

NOTE: You must not have lack of protrusion between the bolt end and the tapped stud head.

(i) Make sure that the value of the protrusion is correct.

NOTE: You must calculate the protrusion of the bolt thread through the modified tack welded stud head with the dimension used to find the bolt length in the figures.

SUBTASK 72-54-00-970-001-F00

(10) Record the Service Bulletin number on the applicable Log Book.

SUBTASK 72-54-00-210-010-F00

(11) Do the test that it listed in the T49.5 Probe Installation, TASK 77-21-01-400-801-F00.

SUBTASK 72-54-00-410-002-F00

(12) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-54-00-700-001-F00

(13) Do this task: Power Plant Test Reference Table, TASK 71-00-00-800-811-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1323126 S0000231522_V2

Replacement of the Defective Studs on LPT Case
Figure 801/72-54-00-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

1323655 S0000231523_V2

Dimensional Measures of Working of Studs and Back Plate
Figure 802/72-54-00-990-804-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1324165 S0000231524_V2

Locally Tooling for Replacement of the Defective Studs on LPT Case
Figure 803/72-54-00-990-805-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

1325543 S0000231529_V2

Lockwire of Bolt after Replacement of the Defective Studs on LPT Case
Figure 804/72-54-00-990-806-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOW PRESSURE TURBINE SHAFT - MAINTENANCE PRACTICES

1. General

A. This procedure has these tasks:

(1) The replacement of the LPT Shaft Plug O-ring (PRE-CFM-SB 72-0124).

(2) The Replacement of the LPT Shaft Plug O-ring (POST-CFM-SB 72-0921).

(3) The replacement of the O-rings and Damper Seals on the center vent tube (CVT).

TASK 72-55-00-941-801-F00

2. Replacement of the LPT Shaft Plug O-ring (PRE-CFM-SB 72–0124)

(Figure 201)

A. General

(1) This task is the replacement procedure for the LPT Shaft-Plug O-ring.

(2) ENGINES PRE-CFM-SB 72-0124;
This procedure is for engines without a removable forward CVT (center vent tube).

(3) The LPT Shaft-Plug is located in the front of the LPT Shaft.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-6180	Kit - Puller Adapter Part #: 856A2668G02 Supplier: 58828
SPL-11207	Puller - Adapter, Component Removal Part #: 856A2632G01 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
E50001	Solvent - Acetone	ASTM D 329 (Supersedes O-A-51)

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Prepare for the Removal

SUBTASK 72-55-00-040-003-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-55-00-040-001-F00

(2) Make sure the engine start lever is in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable engine start lever.

SUBTASK 72-55-00-010-001-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-55-00-010-002-F00

(4) Do this task: Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

G. LPT Shaft-Plug O-ring Replacement

SUBTASK 72-55-00-020-001-F00

WARNING DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND OTHER EQUIPMENT FOR PROTECTION, OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

CAUTION DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

(1) Do these steps to replace the LPT Shaft-Plug O-rings (3), (4) and (5).

(a) Remove the retaining ring (6) from forward end of the LPT shaft (1), with a scribe.

(b) Remove the LPT shaft plug (2) with the puller adapter, SPL-6180 or puller, SPL-11207.

(c) Remove and discard O-ring (3), (4) and (5) located in the forward/aft grooves of the LPT shaft-plug (2).

(d) Remove the puller adapter, SPL-6180 or puller, SPL-11207 from the LPT shaft-plug.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING

ACETONE IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN ACETONE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET ACETONE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

(e) Clean the oil stains on the plug grooves with acetone solvent, E50001

(f) Install the LPT shaft-plug (2) in the storage box.

WARNING

DO NOT LET THE ENGINE OIL STAY ON YOUR SKIN. ENGINE OIL IS POISONOUS. DO NOT BREATHE THE FUMES. USE ENGINE OIL IN AN AREA WITH GOOD AIRFLOW. DO NOT GET ENGINE OIL ON YOUR CLOTHES OR ON THE AIRPLANE. ENGINE OIL CAN CAUSE INJURIES.

CAUTION

MAKE SURE THAT YOU CORRECTLY INSTALL NEW O-RING IN THE SEAL GROOVES AT THE FORWARD END AND THE AFT END OF THE LPT SHAFT-PLUG. IF THE O-RING IS NOT CORRECTLY INSTALLED, DAMAGE TO THE ENGINE CAN OCCUR.

(g) Lightly coat new O-ring (3), (4), and (5) with oil, D00599 [CP2442] and install into the seal grooves of the LPT shaft-plug (2).

(h) Install the LPT shaft-plug (2) assembly into the forward end of the LPT shaft (1) and onto the center vent tube.

NOTE: Insert the lug of the LPT shaft-plug (2) in aligned slots of the LPT coupling nut and the LPT shaft.

(i) Install the retaining ring (6) onto the LPT shaft (1).

(j) Do a visual inspection to make sure the correct installation of the retaining ring (6).

SUBTASK 72-55-00-410-001-F00

(2) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-55-00-410-002-F00

(3) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-55-00-440-001-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

U41336 S0000194907_V2

LPT Shaft Plug O-Rings Replacement
Figure 201/72-55-00-990-801-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A-A

U42961 S0000194908_V2

LPT Shaft Plug O-Rings Replacement
Figure 201/72-55-00-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-55-00-960-801-F00

3. Replacement of the LPT Shaft Plug O-ring (POST-CFM-SB 72-0921)

(Figure 202)

A. General

(1) This task is the replacement procedure for the Low Pressure Turbine (LPT) shaft plug O-rings.

(2) ENGINES POST-CFM-SB 72-0921;
This procedure is for engines without a removable forward CVT (center vent tube).

(3) The LPT shaft plug is located in the front of the LPT shaft.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-6182	Pusher/Puller - CVT Part #: 856A3793G03 Supplier: 58828
SPL-6183	Ring - Protective Part #: 856A3907P02 Supplier: 58828 Opt Part #: 856A3907P01G Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
E50001	Solvent - Acetone	ASTM D 329 (Supersedes O-A-51)

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Removal

SUBTASK 72-55-00-040-005-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-55-00-040-006-F00

(2) Make sure the engine start lever is in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable engine start lever.

SUBTASK 72-55-00-010-011-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-55-00-010-012-F00

(4) Do this task: Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

G. LPT Shaft-Plug O-ring Replacement

SUBTASK 72-55-00-020-004-F00

WARNING DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND OTHER EQUIPMENT FOR PROTECTION, OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

CAUTION DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

(1) Do these steps to replace the LPT shaft plug O-ring [3] and O-ring [4].

(a) Install the protective ring, SPL-6183 in position in the fan disk hole.

(b) Remove the retaining ring [5] from forward end of the LPT shaft [1], with a scribe.

(c) Do these steps to install the pusher/puller, SPL-6182:

1) Screw the tube of the pusher/puller, SPL-6182 into the LPT shaft plug [2].

2) Install the support of the pusher/puller, SPL-6182 on the fan disk flange with screws.

3) Engage the plate of the pusher/puller, SPL-6182 in the slot of the screw and attach it with the knurled nut.

(d) Do these steps to remove the LPT shaft plug:

1) Manually turn clockwise the screw of fixture of the pusher/puller, SPL-6182 to disengage the LPT shaft plug from the LPT shaft.

NOTE: You can use a wrench if the counter torque is important.

2) Remove the support of the pusher/puller, SPL-6182 from the fan disk flange.

3) Remove the LPT shaft plug [2] equipped with the tube of the pusher/puller, SPL-6182 from the LPT shaft [1].

4) Remove the tube of the pusher/puller, SPL-6182 from the LPT shaft plug [2].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(e) Remove and discard O-ring [3] and O-ring [4] located in the forward/aft grooves of the LPT shaft plug [2].

(f) Remove the protective ring, SPL-6183 in position in the fan disk hole.

WARNING

ACETONE IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN ACETONE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET ACETONE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

(g) Clean the oil stains on the plug grooves with acetone solvent, E50001.

(h) Install the LPT shaft plug [2] in the storage box.

WARNING

DO NOT LET THE ENGINE OIL STAY ON YOUR SKIN. ENGINE OIL IS POISONOUS. DO NOT BREATHE THE FUMES. USE ENGINE OIL IN AN AREA WITH GOOD AIRFLOW. DO NOT GET ENGINE OIL ON YOUR CLOTHES OR ON THE AIRPLANE. ENGINE OIL CAN CAUSE INJURIES.

CAUTION

MAKE SURE THAT YOU CORRECTLY INSTALL NEW O-RING IN THE SEAL GROOVES AT THE FORWARD END AND THE AFT END OF THE LPT SHAFT-PLUG. IF THE O-RING IS NOT CORRECTLY INSTALLED, DAMAGE TO THE ENGINE CAN OCCUR.

(i) Lightly coat new O-ring [3] and new O-ring [4] with oil, D00599 [CP2442] and install into the seal grooves of the LPT shaft plug [2].

(j) Install the LPT shaft plug [2] assembly into the forward end of the LPT shaft [1] and onto the center vent tube.

NOTE: Insert the lug of the LPT shaft plug [2] in aligned slots of the LPT coupling nut and the LPT shaft.

(k) Install the retaining ring [5] onto the LPT shaft [1].

(l) Do a visual inspection to make sure the correct installation of the retaining ring [5].

SUBTASK 72-55-00-410-007-F00

(2) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-55-00-410-008-F00

(3) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-55-00-440-003-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2541203 S0000603186_V1

LPT Shaft Plug O-Rings Replacement (POST SB CFM56-7B-72-0921)
Figure 202/72-55-00-990-804-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2541205 S0000603187_V1

LPT Shaft Plug O-Rings Replacement (POST SB CFM56-7B-72-0921)
Figure 202/72-55-00-990-804-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-55-00-941-802-F00

4. Replacement of the CVT O-ring and Damper Seals

(Figure 203)

A. General

(1) This task is the replacement procedure for the O-ring and damper seals on the center vent tube (CVT).

(2) ENGINES POST-CFM-SB 72-0124 and PRE-CFM-SB 72-0921.

This procedure is for engines with a forward removable CVT. There is no LPT Shaft-plug in this configuration.

(3) The CVT goes into the LPT Shaft.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-21-01-000-801-F00	Spinner Cones - Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-6182	Pusher/Puller - CVT Part #: 856A3793G03 Supplier: 58828
SPL-6183	Ring - Protective Part #: 856A3907P02 Supplier: 58828 Opt Part #: 856A3907P01G Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G Rapid Plus	
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	
E50001	Solvent - Acetone	ASTM D 329 (Supersedes O-A-51)

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Prepare for the Removal

SUBTASK 72-55-00-040-002-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-55-00-040-004-F00

(2) Make sure the engine start lever is in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable engine start lever.

SUBTASK 72-55-00-010-003-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-55-00-010-004-F00

(4) Do this task: Spinner Cones - Removal, TASK 72-21-01-000-801-F00.

G. CVT O-rings and Damper Seals Replacement

SUBTASK 72-55-00-020-002-F00

WARNING DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND OTHER EQUIPMENT FOR PROTECTION, OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

CAUTION DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

CAUTION REPLACE THE O-RING AND DAMPER SEALS IN ENGINE WARM CONDITION IN LESS THAN TWO HOURS AFTER ENGINE SHUT DOWN. THE O-RING AND DAMPER SEALS REMOVAL ARE EASY WHEN THE ENGINE IS IN WARM CONDITION. IF YOU DO NOT, DAMAGE CAN OCCUR.

(1) Do these steps to replace the CVT O-rings (4) and damper seals (5).

(a) Install the protective ring, SPL-6183 in position in the fan disk hole.

(b) Remove the retaining ring (3) from the forward end of the LPT shaft (1) with a scribe.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Do these steps to install the pusher/puller, SPL-6182:

1) Screw the tube of the pusher/puller, SPL-6182 into the center vent tube (2).

2) Install the support of the pusher/puller, SPL-6182 on the fan disk flange with four knurled screws.

3) Engage the plate of the pusher/puller, SPL-6182 in the slot of the screw and attach it with the knurled nut.

(d) Do these steps to remove the center vent tube (2):

1) Manually turn clockwise the screw of fixture of the pusher/puller, SPL-6182 to disengage the center vent tube (2) from the LPT shaft (1).

NOTE: You can use a wrench if the counter torque is important.

2) Remove the support of the pusher/puller, SPL-6182 from the fan disk flange.

3) Remove the center vent tube (2) equipped with the tube of the pusher/puller, SPL-6182 from the LPT Shaft.

4) Remove the tube of the pusher/puller, SPL-6182 from the center vent tube (2).

(e) Remove and discard the O-rings (4) located in the forward/aft grooves of the center vent tube (2).

(f) Remove and discard the damper seals (5) located in the other grooves of the center vent tube (2).

(g) Remove the protective ring, SPL-6183 in position in the fan disk hole.

WARNING

ACETONE IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN ACETONE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET ACETONE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

(h) Clean the oil stains with acetone solvent, E50001 on the center vent tube (2), in the O-ring and damper seal grooves and in the inner diameter of the fan disk with a lint free cloth.

(i) Install the center vent tube (2) in the storage box.

WARNING

DO NOT LET THE ENGINE OIL STAY ON YOUR SKIN. ENGINE OIL IS POISONOUS. DO NOT BREATHE THE FUMES. USE ENGINE OIL IN AN AREA WITH GOOD AIRFLOW. DO NOT GET ENGINE OIL ON YOUR CLOTHES OR ON THE AIRPLANE. ENGINE OIL CAN CAUSE INJURIES.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(WARNING PRECEDES)

> **CAUTION** MAKE SURE THAT YOU CORRECTLY INSTALL NEW DAMPER SEALS IN THE SEAL GROOVES OF THE CENTER VENT TUBE. YOU MUST HAVE THE PLATE FACE OF THE DAMPER SEALS POINTED TO OUTER OF THE CENTER VENT TUBE. IF THE DAMPER SEALS ARE NOT CORRECTLY INSTALLED, DAMAGE TO THE ENGINE CAN OCCUR.

(j) Lightly coat new damper seals (5) with oil, D00599 [CP2442] and install into the seal grooves of the center vent tube (2).

> **WARNING** DO NOT LET THE ENGINE OIL STAY ON YOUR SKIN. ENGINE OIL IS POISONOUS. DO NOT BREATHE THE FUMES. USE ENGINE OIL IN AN AREA WITH GOOD AIRFLOW. DO NOT GET ENGINE OIL ON YOUR CLOTHES OR ON THE AIRPLANE. ENGINE OIL CAN CAUSE INJURIES.

> **CAUTION** MAKE SURE THAT YOU CORRECTLY INSTALL THE NEW O-RING IN THE SEAL GROOVE AT THE FORWARD END OF THE CENTER VENT TUBE. IF THE O-RING IS NOT CORRECTLY INSTALLED, DAMAGE TO THE ENGINE CAN OCCUR.

(k) Lubricate the mating face of the rear vent tube with Molykote G Rapid Plus lubricant, D00640 [CP2104] or Dow Corning 321 lubricant, D00641 [CP5062].

(l) Lightly coat new O-ring (4) with oil, D00599 [CP2442] and install into the seal grooves of the center vent tube (2).

(m) Install the protective ring, SPL-6183 in position in the fan disk hole.

(n) Do these steps to pre-install the center vent tube (2):

1) Screw the tube of the pusher/puller, SPL-6182 in the center vent tube (2).

> **CAUTION** BE CAREFUL WHEN YOU INSTALL THE CENTER VENT TUBE. IF YOU CAUSE DAMAGE TO THE LPT SHAFT INTERNAL SUPPORTS AND PAINT, DAMAGE TO THE ENGINE CAN OCCUR.

2) Align and install the center vent tube (2) into the LPT Shaft (1).

3) Align the lug of the center vent tube (2) with the aligned slots of the LPT Shaft (1) and the LPT coupling.

(o) Do these steps to install the pusher/puller and CVT:

1) Manually turn counter-clockwise the screw of fixture of the pusher/puller, SPL-6182 to engage the center vent tube (2) into the slot of the LPT Shaft (1).

NOTE: Be sure to stop turning the screw of the fixture of the pusher/puller before the lug of the Center Vent Tube (2) touches the slot of the LPT Shaft.

NOTE: You can use a wrench if the counter torque is important.

2) Remove the support of the pusher/puller, SPL-6182 from the fan disk flange.

3) Remove the tube of the pusher/puller, SPL-6182 from the center vent tube (2).

(p) Install the retaining ring (3) onto the LPT shaft (1).

(q) Remove the SPL protective ring, SPL-6183 from the fan disk hole.

(r) Do a visual inspection to make sure of the correct installation of retaining ring (3).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-55-00-410-003-F00

(2) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-55-00-410-004-F00

(3) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-55-00-440-002-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

U41931 S0000194909_V2

Center Vent Tube O-Rings and Damper Seals Replacement
Figure 203/72-55-00-990-802-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C

U42217 S0000194910_V2

Center Vent Tube O-Rings and Damper Seals Replacement
Figure 203/72-55-00-990-802-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D

INCORRECT INSTALLATION OF DAMPER SEAL

E

CORRECT INSTALLATION OF DAMPER SEAL

E

U42429 S0000194911_V2

Center Vent Tube O-Rings and Damper Seals Replacement
Figure 203/72-55-00-990-802-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOW PRESSURE TURBINE SHAFT - INSPECTION

1. General

A. This procedure has one task.

(1) The inspection of the air/oil separator.

TASK 72-55-00-200-801-F00

2. Low Pressure Turbine Shaft Assembly Inspection

(Figure 601)

A. General

(1) This task gives the instructions on how to examine the low pressure turbine shaft.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)
72-56-01-000-801-F00	Air/Oil Separator Removal (P/B 401)
72-56-01-400-801-F00	Air/Oil Separator Installation (P/B 401)
78-11-01-000-801-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-801-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-02-000-801-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-000-802-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-400-801-F00	Primary Plug Assembly Installation (P/B 401)
78-11-02-400-802-F00	Primary Plug Assembly Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the inspection

SUBTASK 72-55-00-010-009-F00

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

SUBTASK 72-55-00-010-006-F00

(2) Do this task:Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00 or Primary Nozzle Assembly Removal, TASK 78-11-01-000-801-F00.

SUBTASK 72-55-00-010-007-F00

(3) Do this task:Primary Plug Assembly Removal, TASK 78-11-02-000-802-F00 or Primary Plug Assembly Removal, TASK 78-11-02-000-801-F00.

SUBTASK 72-55-00-010-008-F00

(4) Do this task:Turbine Rear Frame (TRF) Oil Inlet Cover Removal, TASK 72-56-00-000-802-F00.

E. Low Pressure Turbine Shaft Assembly Inspection

SUBTASK 72-55-00-200-001-F00

(1) Examine the air/oil separator as follows:

(a) Examine all areas that you can see for:

1) Corrosion or pitting

a) All quantities permitted.

2) Cracks in the welds

a) Not permitted.

SUBTASK 72-55-00-900-001-F00

(2) If you find cracks, replace the air/oil separator, unless you are given other instructions (TASK 72-56-01-000-801-F00 and TASK 72-56-01-400-801-F00).

SUBTASK 72-55-00-211-001-F00

(3) Examine the seal teeth of the center vent tube rear extension duct.

(a) Seizure marks, scratches, nicks and dents.

1) Permitted, if the depth is not more than of 0.003 in. (0.076 mm).

(b) Bent seal tooth

1) All quantities permitted, if the cumulative length of the bent tooth is not more than 1/12 of the circumference.

(c) High metal

1) Not permitted.

(d) Waviness

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) All quantities permitted, if the amplitude of indication is not more than 0.015 in. (0.381 mm).

2) Cracks are not permitted.

(e) Crack or missing (worn away)

1) Not permitted.

(f) Worn outer diameter

1) All quantities permitted, if the seal tooth outer diameter is between 2.077 in. (52.756 mm) and 2.079 in. (52.807 mm).

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-55-00-010-010-F00

(1) Do this task: Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00.

SUBTASK 72-55-00-410-005-F00

(2) Do this task:Primary Plug Assembly Installation, TASK 78-11-02-400-802-F00 or Primary Plug Assembly Installation, TASK 78-11-02-400-801-F00.

SUBTASK 72-55-00-400-001-F00

(3) Do this task:Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00 or Primary Nozzle Assembly Installation, TASK 78-11-01-400-801-F00.

SUBTASK 72-55-00-020-003-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1738400 S0000314689_V2

Air/Oil Separator Exposed Areas Inspection
Figure 601/72-55-00-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TURBINE FRAME ASSEMBLY - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the Turbine Rear Frame (TRF) oil inlet cover.

(2) An installation of the TRF oil inlet cover.

TASK 72-56-00-000-802-F00

2. Turbine Rear Frame (TRF) Oil Inlet Cover Removal

(Figure 401)

A. General

(1) This task provides the instructions to remove the Turbine Rear Frame (TRF) oil inlet cover.

(2) The TRF oil inlet cover is referred to as oil inlet cover.

B. References

Reference	Title
71-00-00-800-806-F00	Engine Operation Limits (P/B 201)
72-56-00-000-801-F00	Oil Supply Line Cleaning (P/B 701)
72-56-00-200-801-F00	Turbine Frame Assembly Inspection (P/B 601)
78-11-01-000-801-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-02-000-801-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-000-802-F00	Primary Plug Assembly Removal (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8854	Adapter - Puller, Oil Inlet Cover Part #: 856A3419G02 Supplier: 58828

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Removal

SUBTASK 72-56-00-010-027-F00

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU OPEN THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-56-00-010-028-F00

(2) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00 or Primary Nozzle Assembly Removal, TASK 78-11-01-000-801-F00.

SUBTASK 72-56-00-010-029-F00

(3) Do this task: Primary Plug Assembly Removal, TASK 78-11-02-000-802-F00 or Primary Plug Assembly Removal, TASK 78-11-02-000-801-F00.

F. Turbine Rear Frame (TRF) Oil Inlet Cover Removal

SUBTASK 72-56-00-010-030-F00

(1) Do these steps to remove the flame arrestor [2]:

(a) Remove the six bolts [3] that attach the flame arrestor [2] to the flange assembly [1] and oil inlet cover [9].

(b) Remove the flame arrestor [2].

SUBTASK 72-56-00-210-003-F00

(2) Examine the flame arrestor [2] for filiform slivers:

(a) If you find filiform slivers in the flame arrestor [2], examine the condition of the oil inlet cover [9] abradable coating (TASK 72-56-00-200-801-F00).

(b) If you find loose parts, replace the oil inlet cover [9].

(c) If you do not find loose parts, remove all debris before you reinstall the flame arrestor [2].

(d) Make sure that the oil consumption is in the limits (TASK 71-00-00-800-806-F00).

LOM ALL PRE SB 737-CFM56-7B-72-0169 AND PRE SB 737-CFM56-7B-72-0254

SUBTASK 72-56-00-020-009-F00

(3) Do these steps to remove the sleeve [15]:

(a) Remove the three bolts [17] and three washers [16] which attach the sleeve [15] to the flange assembly [1].

(b) Remove the sleeve [15].

LOM ALL

SUBTASK 72-56-00-010-031-F00

(4) Do these steps to remove the flange assembly [1]:

LOM ALL PRE SB 737-CFM56-7B-72-0169 AND PRE SB 737-CFM56-7B-72-0254

(a) Remove the 32 bolts [4] that attach the flange assembly [1] to the TRF inner flange.

LOM ALL POST SB 737-CFM56-7B-72-0169 OR POST SB 737-CFM56-7B-72-0254

(b) Remove the 24 bolts [22] that attach the flange assembly [1] to the TRF middle flange.

LOM ALL POST SB 737-CFM56-7B-72-0676

(c) Remove the eight bolt-washers [23] that attach the flange assembly [1] to the TRF middle flange.

LOM ALL

(d) Remove the flange assembly [1] from the TRF.

(e) Do an inspection of the flange assembly for dents:

1) Dents are permitted if the ratio of the depth of the dent along the minimum length of the dent is 10% or less.

(f) Remove and discard the gasket seal [14].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-56-00-020-001-F00

(5) Do these steps to remove the oil inlet cover [9]:

> **CAUTION** USE TWO WRENCHES TO LOOSEN THE TUBE COUPLING NUTS. USE ONE WRENCH TO HOLD THE MATING PART, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(a) Remove the damping oil tube [12].

(b) Remove the oil supply tube [11].

(c) Remove the oil inlet cover [9]:

1) Remove the twelve bolts [8] that attach the oil inlet cover [9] to the No. 5 bearing support.

2) Install the oil inlet cover puller adapter, SPL-8854, on the rear face of the oil inlet cover [9].

3) Use the puller to remove the oil inlet cover [9].

4) Remove the oil inlet cover puller adapter, SPL-8854, from the oil inlet cover [9].

(d) Remove the O-ring [7] and gasket seal [6].

1) Discard the O-ring [7] and gasket seal [6].

(e) If it is necessary, examine and clean the sump area to make sure that there is no unwanted material.

NOTE: When you remove the oil inlet cover, some pieces of gasket seal may detach and fall into the sump.

1) Make sure that the sump is free of any unwanted material.

(f) Clean the mating faces of the oil inlet cover [9].

(g) Remove the nipple [10] and the O-ring [13] from the oil inlet cover [9].

1) Discard the O-ring [13].

(h) Remove the nipple [20] and the O-ring [21] from the rear face of No. 5 bearing support.

1) Discard the O-ring [21].

SUBTASK 72-56-00-110-007-F00

(6) If it is necessary, clean the removed parts of oil and coking deposits.

SUBTASK 72-56-00-212-001-F00

(7) If it is necessary, inspect the oil supply tube [11] in the TRF with a white light or borescope for coking deposits.

(a) Coking deposits are not permitted.

(b) If you find coking deposits, do this task: Oil Supply Line Cleaning, TASK 72-56-00-000-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Turbine Rear Frame (TRF) Oil Inlet Cover Installation
Figure 401/72-56-00-990-804-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

U66802 S0000212856_V7

Turbine Rear Frame (TRF) Oil Inlet Cover Installation
Figure 401/72-56-00-990-804-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

3046711 S0000813166_V2

Turbine Rear Frame (TRF) Oil Inlet Cover Installation
Figure 401/72-56-00-990-804-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LPT FRAME

B

MM-00173-00-B

U66805 S0000212857_V7

Turbine Rear Frame (TRF) Oil Inlet Cover Installation
Figure 401/72-56-00-990-804-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(VIEW IN THE FORWARD DIRECTION)

2435481 S0000564599_V1

Torque Sequence for Oil Inlet Cover Installation
Figure 402/72-56-00-990-804-F01

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2796368 S0000637262_V2

Oil Supply Tube Assembly
Figure 403/72-56-00-990-841-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A-A

2796369 S0000637263_V2

Oil Supply Tube Assembly
Figure 403/72-56-00-990-841-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-56-00-400-801-F00

3. Turbine Rear Frame (TRF) Oil Inlet Cover Installation

(Figure 401, Figure 402, Figure 403)

A. General

(1) This task provides the instructions on how to install the Turbine Rear Frame (TRF) oil inlet cover.

(2) The TRF oil inlet cover is referred to as oil inlet cover.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
72-56-00-300-801-F00	Oil Supply Tube Replacement (P/B 801)
78-11-01-400-801-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-02-400-801-F00	Primary Plug Assembly Installation (P/B 401)
78-11-02-400-802-F00	Primary Plug Assembly Installation (P/B 401)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-13625	Slide Hammer - Threaded Tip Part #: CJ93B Supplier: 55719 Opt Part #: CG240-8 Supplier: 55719 Opt Part #: CG240-9 Supplier: 5K761 Opt Part #: CJ125-6 Supplier: 55719 Opt Part #: CJ93-1 Supplier: 55719
SPL-8854	Adapter - Puller, Oil Inlet Cover Part #: 856A3419G02 Supplier: 58828
SPL-14685	Pin - Guide, No. 5 Bearing Outer Race Installation Part #: 856A3108G01 Supplier: 58828
STD-583	Mallet - Non-metallic
STD-664	Pliers - Teflon-jawed (or Equivalent Soft-Jawed)

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D00623 [CP5066]	Oil - Fuel System, Corrosion Preventive	MIL-PRF-6081, Grade 1010
D00672 [CP5070]	Vaseline - Pure Mineral	V V-P-236
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G02495 [CP8002]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS5689
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
6	Gasket seal	72-00-00-01A-550	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-00-00-01B-335	LOM 402, 404, 406, 407, 411, 416, 445
7	O-ring	72-00-00-01A-545	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-00-00-01B-330	LOM 402, 404, 406, 407, 411, 416, 445
9	Oil inlet cover	72-00-00-01A-535	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-00-00-01B-325	LOM 402, 404, 406, 407, 411, 416, 445
13	O-ring	72-00-00-01A-525	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-00-00-01B-315	LOM 402, 404, 406, 407, 411, 416, 445
14	Gasket seal	72-00-00-01A-490	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-00-00-01B-285	LOM 402, 404, 406, 407, 411, 416, 445
21	O-ring	72-00-00-01A-505	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-00-00-01B-300	LOM 402, 404, 406, 407, 411, 416, 445

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

G. Turbine Rear Frame (TRF) Oil Inlet Cover Installation

SUBTASK 72-56-00-420-001-F00

(1) Do these steps to install the oil inlet cover [9]:

(a) Install the oil nipple [20] on the rear face of No. 5 bearing support.

1) Lubricate a new O-ring [21] with oil, D00623 [CP5066].

2) Install the O-ring [21] on the nipple [20].

3) Install the nipple [20] on the rear face of the No. 5 bearing support.

a) Tighten the nipple [20] manually to seat.

b) Tighten the nipple [20] to 90 in-lb (10.2 N·m) - 100 in-lb (11.3 N·m).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Lubricate a new O-ring [7] with vaseline, D00672 [CP5070].

(c) Install the O-ring [7] on the oil inlet cover [9].

(d) Install a new gasket seal [6], on the No. 5 bearing support.

1) Use guide pin, SPL-14685, to hold the gasket seal [6] until the oil inlet cover [9] is attached.

(e) Install the oil inlet cover puller adapter, SPL-8854, on the rear flange of the oil inlet cover [9].

(f) Install the oil inlet cover [9] with the oil inlet cover puller adapter, SPL-8854, on the No. 5 bearing support.

1) Match the position of the cover flange with the oil supply and scavenge tube [5] that comes out at the bottom of the No. 5 bearing support.

(g) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101], on the threads of the twelve bolts [8].

(h) Install the twelve bolts [8] that attach the oil inlet cover [9] to the No. 5 bearing support.

1) Tighten the bolts [8] manually.

(i) With hand pressure on oil inlet cover [9], use a slide hammer, COM-13625, on oil inlet cover puller adapter, SPL-8854, or a non-metallic mallet, STD-583, to install the oil inlet cover flange against the No. 5 bearing support.

(j) Remove the oil inlet cover puller adapter, SPL-8854, from the oil inlet cover [9].

(k) Initially, tighten the bolts [8] to 35 in-lb (4 N·m) in a criss-cross pattern, for correct installation of the O-ring [7] (Figure 402).

(l) Tighten the bolts [8] to 70 in-lb (8 N·m) in a criss-cross pattern (Figure 402).

(m) Tighten the bolts [8] to 110.0 in-lb (12.4 N·m) - 120.0 in-lb (13.6 N·m) in a criss-cross pattern (Figure 402).

(n) Wait for 5 minutes minimum.

(o) Loosen all bolts [8] by approximately 180°.

(p) Tighten the bolts [8] to 110.0 in-lb (12.4 N·m) - 120.0 in-lb (13.6 N·m) in a criss-cross pattern (Figure 402).

(q) Wait for 5 minutes minimum.

(r) Loosen all bolts [8] by approximately 180°.

(s) Tighten the bolts [8] to 110.0 in-lb (12.4 N·m) - 120.0 in-lb (13.6 N·m) in a criss-cross pattern (Figure 402).

(t) Tighten the bolts [8] to 110.0 in-lb (12.4 N·m) - 120.0 in-lb (13.6 N·m) starting with bolt No. 1 clockwise.

(u) Do these steps to install the nipple [10] on the oil inlet cover [9]:

1) Lubricate a new O-ring [13] with oil, D00623 [CP5066].

2) Install the O-ring [13] on the nipple [10].

3) Install the nipple [10] on the oil inlet cover [9].

a) Tighten the nipple [10] manually to seat.

b) Tighten the nipple [10] to 180.0 in-lb (20 N·m) - 195.0 in-lb (22.0 N·m).

(v) Install the oil supply tube [11], and tighten the coupling nuts manually.

NOTE: You tighten the oil supply tube after you connect the damping oil tube.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(w) Install the damping oil tube [12].

1) Connect the damping oil tube [12] to nipple [20] and oil supply tube [11].

a) Tighten the coupling nuts manually.

> **CAUTION** USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

2) Make sure that the oil tubes are installed without strain.

3) Tighten the coupling nuts of oil supply tube [11] to 270.0 in-lb (30.5 N·m) - 300.0 in-lb (33.9 N·m).

4) Tighten the coupling nuts of damping oil tube [12] as follows:

> **CAUTION** DO NOT USE PLIERS WITH METAL JAWS TO DISCONNECT, OR CONNECT THE PARTS. THE METAL JAWS WILL CAUSE DAMAGE TO THE PARTS.

a) Hold the damping oil tube with soft nose pliers and tighten the damping oil tube [12] coupling nut connected to the No. 5 bearing support nipple [20] to 90.0 in-lb (10.2 N·m) - 100.0 in-lb (11.3 N·m).

b) Make sure that the damping oil tube [12] is installed without strain as follows:

<1> Loosen the coupling nut of the damping oil tube [12] connected on the oil supply tube [11].

<2> Make sure that the damping oil tube [12] is installed without strain, and aligned with the nipple of the oil supply tube [11].

<3> If it is necessary, bend the damping oil tube [12] in bent sections.

<a> Do not bend the tube near the end fittings.

c) Reconnect the coupling nut of the damping oil tube [12] to the oil supply tube [11].

<1> Tighten the coupling nut manually.

> **CAUTION** DO NOT USE PLIERS WITH METAL JAWS TO DISCONNECT, OR CONNECT THE PARTS. THE METAL JAWS WILL CAUSE DAMAGE TO THE PARTS.

d) Hold the damping oil tube [12] with teflon-jawed pliers, STD-664, and tighten the coupling nut of the damping oil tube [12] to 90.0 in-lb (10.2 N·m) - 100.0 in-lb (11.3 N·m).

(x) Do these steps to check the Dim. A:

1) Do a check of Dim. A in four equally spaced locations.

NOTE: Dim. A must be minimum 0.078 in. (2.0 mm) (Figure 403).

NOTE: The torquing step must not cause the oil supply line to move.

2) If the Dim. A criterion is less than 0.078 in. (2.0 mm), do these steps (Figure 403):

a) Do a visual inspection of the oil supply line.

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b) Do a torque check of the two coupling nuts of the oil supply tube [19].

c) Disconnect the oil supply tube [19].

d) Install the oil supply tube [19] again to get the Dim. A within the minimum criterion of 0.078 in. (2.0 mm).

3) Make sure that there is no perforation in the insulation blanket of the oil supply tube [19].

4) If the Dim. A criterion stays less than 0.078 in. (2.0 mm) or if there is perforation in the insulation blanket, replace the oil supply tube [19] (TASK 72-56-00-300-801-F00).

(y) Safety the oil inlet cover bolts, the nipples and coupling nuts of the tubes with safety wire, G02345 [CP8001], or safety wire, G02495 [CP8002], or cable, G50065 [CP8006].

SUBTASK 72-56-00-410-008-F00

(2) Do these steps to install the flange assembly [1]:

(a) Apply a thin layer of oil, D00623 [CP5066], on a new gasket seal [14] to be installed on the rear flange of the oil inlet cover [9].

(b) Install the gasket seal [14] on the rear flange of the oil inlet cover [9].

LOM ALL PRE SB 737-CFM56-7B-72-0169 AND PRE SB 737-CFM56-7B-72-0254

(c) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101], on the threads of the 32 bolts [4].

LOM ALL POST SB 737-CFM56-7B-72-0169 OR POST SB 737-CFM56-7B-72-0254

(d) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101], on the threads of the 24 bolts [22].

LOM ALL POST SB 737-CFM56-7B-72-0676

(e) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101], on the threads of the eight bolt-washers [23].

LOM ALL

(f) Put the flange assembly [1] in position on the TRF.

LOM ALL PRE SB 737-CFM56-7B-72-0169 AND PRE SB 737-CFM56-7B-72-0254

(g) Install the 32 bolts [4] that attach the flange assembly [1] to the TRF.

1) Tighten the bolts [4] manually.

2) Tighten all of the bolts [4] to 110.0 in-lb (12.4 N·m) - 120.0 in-lb (13.6 N·m).

(h) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101], on the threads of the bolts [17].

(i) Install the sleeve [15] in position on the flange assembly [1] with the three bolts [17] and three washers [16].

1) Tighten the bolts [17] manually.

2) Tighten the bolts [17] to 119.25 in-lb (13.47 N·m) - 120.75 in-lb (13.64 N·m)

LOM ALL POST SB 737-CFM56-7B-72-0169 OR POST SB 737-CFM56-7B-72-0254

(j) Install the 24 bolts [22] that attach the flange assembly [1] to the TRF.

1) Tighten the bolts [22] manually.

2) Tighten all of the bolts [22] to 110.0 in-lb (12.4 N·m) - 120.0 in-lb (13.6 N·m).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB 737-CFM56-7B-72-0676

(k) Install the eight bolt-washers [23] that attach the flange assembly [1] to the TRF.

1) Tighten the bolt-washers [23] manually.

2) Tighten all of the bolt-washers [23] to 110.0 in-lb (12.4 N·m) - 120.0 in-lb (13.6 N·m).

LOM ALL

SUBTASK 72-56-00-420-002-F00

(3) Do these steps to install the flame arrestor [2]:

(a) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101], on the threads of the bolts [3].

(b) Install the flame arrestor [2] in position on the flange assembly [1].

(c) Install the six bolts [3] that attach the flame arrestor [2] to the flange assembly [1].

1) Tighten the bolts [3] manually.

2) Tighten the bolts [3] to 110.0 in-lb (12.4 N·m) - 120.0 in-lb (13.6 N·m).

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-420-003-F00

(1) Do this task: Primary Plug Assembly Installation, TASK 78-11-02-400-802-F00 or Primary Plug Assembly Installation, TASK 78-11-02-400-801-F00.

SUBTASK 72-56-00-420-004-F00

(2) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00 or Primary Nozzle Assembly Installation, TASK 78-11-01-400-801-F00.

SUBTASK 72-56-00-410-009-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

I. Turbine Rear Frame (TRF) Oil Inlet Cover Test

SUBTASK 72-56-00-710-003-F00

(1) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Look for oil leaks at the turbine frame.

SUBTASK 72-56-00-612-004-F00

(2) Do a check of the engine oil quantity.

(a) If it is necessary, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TURBINE FRAME ASSEMBLY - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure contains two tasks:
      (1) Turbine Frame Assembly Inspection
      (2) Turbine Frame Assembly Engine Mounting Lugs Inspection.

TASK 72-56-00-200-801-F00

2. **Turbine Frame Assembly Inspection**
(Figure 601 and Figure 602)

A. General

(1) This task gives the instructions to examine the turbine frame assembly.

B. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-56-00-300-801-F00	Oil Supply Tube Replacement (P/B 801)
72-56-00-300-803-F00	Defective Studs on the AFT Face of the Inner Hub of the Turbine Frame Replacement (P/B 801)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)
78-11-01-000-801-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-801-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-02-000-801-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-000-802-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-400-801-F00	Primary Plug Assembly Installation (P/B 401)
78-11-02-400-802-F00	Primary Plug Assembly Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Inspection

SUBTASK 72-56-00-010-039-F00

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **WARNING** DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

> **WARNING** OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

SUBTASK 72-56-00-010-002-F00

(2) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00 or Primary Nozzle Assembly Removal, TASK 78-11-01-000-801-F00.

SUBTASK 72-56-00-010-003-F00

(3) Do this task: Primary Plug Assembly Removal, TASK 78-11-02-000-802-F00 or Primary Plug Assembly Removal, TASK 78-11-02-000-801-F00.

E. Turbine Frame Assembly Inspection

SUBTASK 72-56-00-200-001-F00

(1) Examine the forward outer flange and the aft outer flange for damage:

(a) Cracks that connect the bolt holes

1) Not permitted.

2) A continue-in-service limit of 10 cycles is permitted for one crack that connects two bolt holes.

(b) Cracks that extend from the bolt holes to the outer edge of the flange

1) One crack 0.20 in. (5.1 mm) in length from a bolt hole is permitted, with this limit:

a) There is a minimum separation of five holes between cracks.

(c) Cracks that extend from the bolt holes to the casing skin

1) Five axial cracks 0.20 in. (5.1 mm) in length on each flange are permitted with this limit:

a) There is a minimum separation of 10 holes between cracks.

2) No circumferential cracks are permitted.

(d) Cracks in other areas of the flange

1) Five cracks on each flange 0.20 in. (5.1 mm) in length are permitted with this limit:

a) There is a minimum separation of 5.0 in. (127 mm) between all other cracks.

(e) Nicks, scores and scratches

1) All damage is permitted with these limits:

a) It is permitted to have five nicks, scores or scratches that are not more than 1.0 in. (25.4 mm) long on each flange.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

b) Damage is not more than 0.020 in. (0.51 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).

c) There is a minimum separation of 1.0 in. (25.4 mm) between each nick, score or scratch.

SUBTASK 72-56-00-200-002-F00

(2) Examine the engine mounting lug area and strut attach points for this damage:

NOTE: Includes the adjacent welds and those heat affected areas.

(a) Cracks that extend from the bolt holes

1) Not permitted.

2) A continue-in-service limit of 10 cycles is permitted for one crack that goes out of one mounting lug bolt hole and is not more than 0.25 in. (6.35 mm) in length.

(b) Cracks in the areas of the engine mounting lugs (includes the welds):

1) Not permitted.

2) A continue-in-service limit of 10 cycles is permitted for one crack that is not more than 0.25 in. (6.35 mm) in length.

(c) Nicks, scores and scratches

1) There is no limit to the number of nicks, scores, and scratches which are permitted with these conditions:

a) Not more than 1.0 in. (25.4 mm) in length.

b) Not more than 0.020 in. (0.51 mm) in depth, after you remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).

c) Minimum separation of 1.0 in. (25.4 mm) between each nick, score, or scratch.

SUBTASK 72-56-00-200-003-F00

(3) Examine all other areas of outer casing skin for damage:

(a) Cracks

1) Not permitted.

2) A continue-in-service limit of 10 cycles is permitted for one crack that is not more than 0.25 in. (6.35 mm) in length.

(b) Nicks, scores, and scratches

1) There is no limit to the number of nicks, scores, and scratches which are permitted with these conditions:

a) Not more than 1.0 in. (25.4 mm) in length.

b) Not more than 0.020 in. (0.51 mm) in depth, after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

c) Minimum separation of 1.0 in. (25.4 mm) between each nick, score, or scratch.

SUBTASK 72-56-00-200-004-F00

(4) Examine the oil supply and scavenge tubes for damage:

(a) Cracks

1) Not permitted.

(b) Nicks, scores, and scratches

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) There is no limit to the number of nicks, scores, and scratches if each is not more than 0.01 in. (0.25 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).

(c) Dents

1) Two dents for each tube are permitted if they have a smooth contour and are not more than 0.05 in. (1.27 mm) in depth.

SUBTASK 72-56-00-200-005-F00

(5) Examine the struts for damage:

(a) Cracks in the parent metal

1) Not permitted.

(b) Cracks in the welds

1) Not permitted.

(c) Nicks, scores, and scratches

1) There is no limit to the number of nicks, scores, and scratches with no limit to length, with this condition:

a) Not more than 0.02 in. (0.51 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (TASK 70-10-07-800-801-F00).

(d) Dents

1) There is no limit to the number of dents with a maximum depth of 0.02 in. (0.51 mm), if they have a smooth contour.

(e) Broken stud on aft face or damaged threads

1) Not permitted. Replace the stud (TASK 72-56-00-300-803-F00).

(f) Oil mark on the No. 7 strut

1) Oil marks are permitted.

SUBTASK 72-56-00-200-006-F00

(6) Examine the flame arrestor for damage:

(a) All cracks are permitted in the flame arrestor and in the metal retaining strip.

(b) Missing retaining strips

1) Permitted, only if one strip stays.

(c) Honeycomb grid plug for clogging

1) Not more than 50 percent of clogging is permitted.

(d) Honeycomb missing

1) Not permitted, replace the flame arrestor within the next 10 cycles (TASK 72-56-00-300-801-F00).

SUBTASK 72-56-00-212-002-F00

(7) Examine the abradable coating of the inlet cover (if removed):

(a) Rub marks from the seal teeth

1) All quantities are permitted if the average is 0.01 in. (0.25 mm) in depth over the entire circumference.

SUBTASK 72-56-00-220-006-F00

(8) Examine the No. 5 bearing support (Figure 602):

(a) Cracks in area C (View B-B)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Permitted any amount.

LOM ALL POST SB 737-CFM56-7B-72-0676 OR POST SB 737-CFM56-7B-72-0169

SUBTASK 72-56-00-200-010-F00

(9) Examine the flange assembly for findings (Figure 601, View B):

(a) Look for cracks at hole locations on the intermediate flange.

1) Any amount of cracks if no missing material (not including stop drill), and no cracks between bolt holes are permitted.

2) A maximum service extension of 10 cycles or 25 hours is permitted for cracks with missing material or cracks between two bolt holes.

(b) Look for missing or broken bolts on the intermediate flange hole.

1) A maximum service extension of 25 cycles or 60 hours is permitted for maximum of two missing bolts, or two broken bolts, or one missing bolt and one broken bolt.

NOTE: If more than two missing or broken bolts, there is no service extension available.

2) If the service extension limit is expired, replace missing or broken bolts. Do this task: Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00.

LOM ALL

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-410-001-F00

(1) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00 or Primary Nozzle Assembly Installation, TASK 78-11-01-400-801-F00.

SUBTASK 72-56-00-410-002-F00

(2) Do this task: Primary Plug Assembly Installation, TASK 78-11-02-400-802-F00 or Primary Plug Assembly Installation, TASK 78-11-02-400-801-F00.

SUBTASK 72-56-00-410-023-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Turbine Frame Assembly Inspection
Figure 601/72-56-00-990-801-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 POST-SB 72-0676
2 POST-SB 72-0169

2203929 S0000491333_V2

Turbine Frame Assembly Inspection
Figure 601/72-56-00-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

No. 5 Bearing Support Inspection
Figure 602/72-56-00-990-822-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A-A

MM-00176-00-B

2275667 S0000513264_V2

No. 5 Bearing Support Inspection
Figure 602/72-56-00-990-822-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B-B

B0045800

2244144 S0000502267_V3

No. 5 Bearing Support Inspection
Figure 602/72-56-00-990-822-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-56-00-200-802-F00

3. Turbine Frame Assembly Engine Clevis Mounts Inspection

(Figure 603)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task gives the procedure to do a visual check of the engine clevis mounts on the turbine frame assembly.

(2) The turbine frame assembly is at the aft end of the engine.

B. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
72-56-00-300-802-F00	Bushings in the Clevis Mounts of the TRF Assembly Replacement (P/B 801)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-56-00-010-004-F00

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-56-00-200-007-F00

(2) Do a visual check of the engine clevis mounts for damage:

(a) Cracks that extend from the bolt holes

1) Not serviceable.

2) A Continue-In-Service limit of 10 cycles is permitted for one crack that goes out of one mounting lug bolt hole, not more than 0.25 inch (6.35 mm) in length.

(b) Cracks in the areas of the engine clevis mounts (includes the welds)

1) Not serviceable.

2) A Continue-In-Service limit of 10 cycles is permitted for one crack 0.25 inch (6.35 mm) in length.

(c) Nicks, scores, and scratches

1) There is no limit to the number of nicks, scores, and scratches which are permitted with these conditions:

a) Not more than 1.0 inch (25.4 mm) in length

ECCN 9E991 BOEING PROPRIETARY - See title page for details

b) Not more than 0.02 inch (0.51 mm) in depth, after you remove the high metal. Do this task Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00

c) Minimum separation of 1.0 inch (25.4 mm) between each nick, score or scratch.

(d) Disengaged, loose, or missing bushings in the clevis mount TRF:

1) On-Wing;

a) Disengaged bushings are serviceable

2) Off-Wing;

a) If the aft mount is removed, do the check for disengaged, loose or missing bushings (TASK 72-56-00-300-802-F00).

SUBTASK 72-56-00-410-004-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Turbine Frame Assembly Engine Clevis Mounts
Figure 603/72-56-00-990-840-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2916541 S0000701408_V2

Turbine Frame Assembly Engine Clevis Mounts
Figure 603/72-56-00-990-840-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TURBINE FRAME ASSEMBLY - CLEANING/PAINTING

1. General

A. This procedure has these tasks to clean oil coking deposits at the turbine frame:

(1) Oil Inlet Cover Cleaning

(2) Rear Sump Oil Supply Tube Cleaning

(3) Rear Sump Oil Scavenge Tube Cleaning

TASK 72-56-00-100-801-F00

2. Oil Inlet Cover Cleaning

A. General

(1) This task give the instructions to clean coking deposits from the oil inlet cover.

(2) It is necessary to remove the oil inlet cover to do this task.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Procedure

SUBTASK 72-56-00-020-002-F00

(1) Turbine Rear Frame (TRF) Oil Inlet Cover Removal, TASK 72-56-00-000-802-F00

(a) Make sure you remove the oil nipple from the oil inlet cover.

1) Loosen and remove the nipple from the oil inlet cover.

NOTE: Make sure that the nipple is clean. If not, keep the nipple for cleaning or replace the part.

2) Remove and discard O-ring from the nipple.

E. Oil Inlet Cover Cleaning

SUBTASK 72-56-00-110-015-F00

(1) Do one of these tasks to degrease the oil inlet cover:

NOTE: Make sure you obey the Warnings and Cautions in the applicable task.

(a) Do this task: Solvent degreasing of all materials, except Titanium Alloys CFMI SPM (70 21 11).

(b) Alternate task.

Do this task: Vapor degreasing CFM SPM (70 21 12).

SUBTASK 72-56-00-110-009-F00

(2) (1) To clean the oil inlet cover, do this task: Descalling ferrous alloys CFM SPM (70 21 31).

NOTE: Make sure you obey the Warnings and Cautions in the applicable task.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Make sure that there is no sign of oil coking on the oil inlet cover at the 6 o'clock position.

1) If it is necessary, do a mechanical cleaning of the oil inlet cover at this position to remove the particles/contamination.

SUBTASK 72-56-00-210-001-F00

(3) Do a visual inspection to make sure that the oil nozzle is clean and clear of unwanted material.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-420-005-F00

(1) Do this task: (Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00).

SUBTASK 72-56-00-710-001-F00

(2) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Look for oil leaks at the turbine frame.

SUBTASK 72-56-00-612-001-F00

(3) Do a check of the engine oil quantity, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

——— END OF TASK ———

TASK 72-56-00-000-801-F00

3. Oil Supply Line Cleaning

(Figure 702)

A. General

(1) This task give the instructions to clean coking deposits from the oil supply line at the turbine frame.

(a) The oil supply line includes the oil supply tube installed through the No. 10 turbine frame strut, the oil tube, the damping oil tube and the nipples.

LOM ALL PRE SB CFM56-7B-72-339 AND PRE SB 737-CFM56-7B-72-0169 AND PRE SB 737-CFM56-7B-72-0254

(b) Do a mechanical cleaning or a chemical cleaning with the non-removable oil supply tube.

NOTE: It is recommended to do a mechanical cleaning prior to the chemical cleaning for the non-removable oil supply tube.

LOM ALL POST SB 737-CFM56-7B-72-0169 OR POST SB 737-CFM56-7B-72-0254 OR POST SB CFM56-7B-72-339

(c) Do the removal of the removable oil supply tube before the cleaning.

LOM ALL

(d) For all removable oil supply tubes: do a chemical cleaning on the bench.

(2) It is necessary to remove the oil inlet cover to do this task.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8853	Fixture - Removal and Installation, Removable Retaining Ring Part #: 856A2677G01 Supplier: 58828
STD-1400	Fiberscope - Flexible Borescope
STD-6552	Cleaning Bath - Heated

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
B50041 [C04-099]	Acid - Oxalic acid, crystals	
C00174	Compound - Corrosion Preventive, Solvent Cutback, Cold Application	MIL-PRF-16173 (Supersedes MIL-C-16173)
D00139	Lubricant - Oil - WD-40	
D00623 [CP5066]	Oil - Fuel System, Corrosion Preventive	MIL-PRF-6081, Grade 1010
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G Rapid Plus	
G50611 [CP1065]	Kerosene	MIL-DTL-5624 (Supersedes MIL-T-5624)
G51056	Fuel - Standard Specification For Aviation Turbine Fuels (Jet A And Jet A-1)	ASTM D1655
G51455 [S1218]	Rust Remover - Alkaline	
G51456 [S1001, S1012, S1014, S1192, S1231, S1235]	Permanganate - Alkaline	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Procedure

SUBTASK 72-56-00-010-036-F00

(1) Do this task: Turbine Rear Frame (TRF) Oil Inlet Cover Removal, TASK 72-56-00-000-802-F00.

G. Oil Supply Line Cleaning

LOM ALL POST SB 737-CFM56-7B-72-0169 OR POST SB 737-CFM56-7B-72-0254 OR POST SB CFM56-7B-72-339

SUBTASK 72-56-00-010-009-F00

(1) Do these steps to remove the oil supply tube assembly from the TRF for cleaning on the bench (Figure 702):

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB 737-CFM56-7B-72-0169 OR POST SB 737-CFM56-7B-72-0254 OR POST SB CFM56-7B-72-339 (Continued)

(a) Remove the removable retaining ring from the coupling nut. Use the retaining ring removal and installation fixture, SPL-8853 to remove the retaining ring.

(b) Remove the coupling nut from the oil supply tube assembly.

(c) Disengage the guide bushing of oil supply tube from the boss of TRF No. 10 strut outer case.

(d) Remove the oil supply tube from the outer case of the TRF.

(e) Install the coupling nut on the oil supply tube.

(f) Insert the retaining ring in the coupling nut. Use the retaining ring removal and installation fixture, SPL-8853 to install the retaining ring.

1) Make sure that the retaining ring is fully inserted into the coupling nut.

2) Make sure that the coupling nut rotates freely after the installation of the retaining ring.

LOM ALL

SUBTASK 72-56-00-110-001-F00

WARNING

ACETONE IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN ACETONE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET ACETONE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING

KEROSENE IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN KEROSENE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET KEROSENE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

(2) If you use the old nipples, clean them with acetone solvent, B01058 [CP1039], kerosene, G50611 [CP1065] or aviation turbine fuel, G51056.

(a) Do an inspection of the nipples after cleaning to make sure that they are free of any particles/contamination before you use them again.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) No oil coked particles/contamination is permitted.
2) Repeat the cleaning task until nipples are free of particles/contamination.

SUBTASK 72-56-00-110-002-F00

(3) Do this task to clean each of these removed oil supply line tubes:

(a) The oil tube and damping oil tube.

LOM ALL POST SB 737-CFM56-7B-72-0169 OR POST SB 737-CFM56-7B-72-0254 OR POST SB CFM56-7B-72-339

(b) The oil supply tube.

LOM ALL

(c) Attach the steel tubing and the pump to the removed oil supply line tube.

NOTE: You must use steel tubing and an acceptable pump to do this procedure.

(d) Clean the internal oil tubes, refer to Cleaning Internal Lube Oil Tubes.

(e) Do a visual inspection of the cleaned oil tubes with a fiberscope, STD-1400 and a light source, after cleaning to make sure that they are free of any particles/contamination before re-installation.

1) No oil coked particles/contamination is permitted.
2) Repeat the cleaning task until the tubes are free of particles/contamination.

(f) Disconnect the cleaned tubes from the steel tubing and the pump.

LOM ALL POST SB 737-CFM56-7B-72-0169 OR POST SB 737-CFM56-7B-72-0254 OR POST SB CFM56-7B-72-339

(g) Do these steps to prepare the oil supply tube for re-installation.

1) Remove the retaining ring from the coupling nut of the removable oil supply tube with the retaining ring removal and installation fixture, SPL-8853.
2) Remove the coupling nut from the oil supply tube.
3) Lubricate all coupling nuts of the rear sump oil supply tubes with oil, D00623 [CP5066].

LOM ALL PRE SB CFM56-7B-72-339 AND PRE SB 737-CFM56-7B-72-0169 AND PRE SB 737-CFM56-7B-72-0254

SUBTASK 72-56-00-110-003-F00

(4) Do one of these tasks to clean the non-removable oil supply tube (Figure 703):

NOTE: It is recommended to do a mechanical cleaning prior to the chemical cleaning for the non-removable oil supply tube.

(a) Degreasing and chemical cleaning

1) Put protection on the No. 5 bearing to prevent any contamination by the material.

NOTE: Be careful to put protection equipment on the No. 5 bearing before you start a cleaning of the oil supply line.

2) Put protection on all the cavities and tube ends to prevent any contamination by the material.
3) Attach the steel tubing and the pump to the removed oil scavenge tube.

NOTE: You must use steel tubing and an acceptable pump to do this procedure.

4) Clean the internal oil tubes, refer to Cleaning Internal Lube Oil Tubes.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5) Do a visual inspection of the cleaned oil tubes with a fiberscope, STD-1400 and a light source, after cleaning to make sure that it is free of any particles/contamination before re-installation.
   a) No oil coked particles/contamination is permitted.
   b) Repeat the cleaning task until the tube is free of particles/contamination.
6) Disconnect the steel tubing and the pump from the cleaned tube.
7) Remove the protection from the No. 5 bearing and tubes.

(b) Mechanical cleaning

NOTE: This is a mechanical cleaning because the tube is non-removable.

1) Put protection on the No. 5 bearing to prevent any contamination by the material.

   NOTE: Be careful to put protection equipment on the No. 5 bearing before you start a mechanical cleaning of oil supply line.
2) Put protection on all the cavities and tube ends to prevent any contamination by the material.
3) Put a cap for the oil supply tube on the outer case side.
4) Put a sufficient quantity of WD-40 lubricant, D00139, penetrant corrosion inhibitor compound, C00174 to fill the tube and keep it to get effect on coking in the concerned area for a sufficient time.
5) Put a container under the tube to collect the penetrant corrosion inhibitor.
6) Remove the cap from the tube and collect the penetrant corrosion inhibitor.
7) Turn the tube in its position to get access to the ends of tube.
8) Introduce a cylinder-brush tool through the tube ends and move the tool to the coked area.
9) Put a small quantity of kerosene, G50611 [CP1065] or aviation turbine fuel, G51056 with a filler tool in the tube.

   NOTE: Do not permit the kerosene to touch your skin or clothes. Remove your clothes if the fuel touches them. Rinse your skin fully with water where the fuel touched you. Fuel can burn your skin.

   Kerosene is flammable, an irritant, an allergen, and has poisonous deterioration. Use personal protection equipment. Use vapor/fume control or respirator.
10) Do an alternative movement of rotation on the tool to break the coking contamination.
11) Extract the tool and use lint-free cloths to collect the coked particles.
12) Clean the cylinder-brush tool with kerosene, G50611 [CP1065] or aviation turbine fuel, G51056.
    a) Repeat the cleaning until tube is free of particles/contamination.

       NOTE: No oil coked particles/contamination is permitted.

       NOTE: Be careful to not introduce any particles/contamination to the internal side of bearing support to prevent bearing contamination. If not, you can cause damage to engine.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

13) Do a flushing of the tube with kerosene, G50611 [CP1065], alcohol, B00676 [CP1041] or aviation turbine fuel, G51056.

14) Dry the tube with a compressed clean air source or nitrogen source.

15) Do a visual inspection of the cleaned tube with a fiberscope, STD-1400 and a light source, after cleaning to make sure that it is free of any particles/contamination before you use it again.

16) Remove the protection from the No. 5 bearing and tubes.

LOM ALL POST SB 737-CFM56-7B-72-0169 OR POST SB 737-CFM56-7B-72-0254 OR POST SB CFM56-7B-72-339

SUBTASK 72-56-00-410-015-F00

(5) Do these steps to install the oil supply tube in the TRF strut No. 10 (Figure 702):

NOTE: This Subtask is necessary to install the removable oil supply tube assembly in the TRF strut after cleaning.

(a) Apply a thin layer of Molykote G Rapid Plus lubricant, D00640 [CP2104] with a spray gun on the guide bushing of oil supply tube.

(b) Install the oil supply tube in the TRF No. 10 strut at the 7 o'clock position.

(c) Engage the guide bushing of oil supply tube into the boss of the TRF outer case.

(d) Put in position the coupling nut on the oil supply tube. Make sure to align the groove on the tube and on the coupling nut.

(e) Insert a new retaining ring in the coupling nut. Use the retaining ring removal and installation fixture, SPL-8853 to install the retaining ring.

NOTE: Be careful to hold the coupling nut in place with a lock wrench when you engage and clamp the retaining ring with combination pliers.

NOTE: Make sure that the retaining ring is fully inserted into the coupling nut when its outer diameter base is in contact with nut.

Make sure that the coupling nut rotates freely after the installation of retaining ring.

LOM ALL

SUBTASK 72-56-00-410-016-F00

(6) Reconnect the oil supply line:

(a) The damping oil tube, oil tube, and the TRF outer case connection of the oil supply line are done in the task: Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00.

H. Cleaning Internal Lube Oil Tubes

SUBTASK 72-56-00-110-014-F00

(1) This cleaning method is effective for removal of coke from internal lube oil tubes where the tubes can be disconnected to permit flow through or plugged to permit a douche type of flushing. This solution is not to enter sumps or lube system components which cannot be thoroughly flushed and purged.

(a) Attach the steel tubing and a suitable pump to the lube tube to be cleaned, to supply cleaning solution to the tube and return it to the heated cleaning bath, STD-6552.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CAUTION

THIS CLEANING SOLUTION IS STRONGLY ALKALINE. VENT AREA AND WEAR FACE SHIELD AND PROTECTIVE CLOTHING. IF SOLUTION CONTACTS THE SKIN OR EYES, FLUSH EXPOSED AREAS THOROUGHLY WITH COOL WATER AND SEEK IMMEDIATE MEDICAL AID.

(b) Pump alkaline permanganate, G51456 [S1001, S1012, S1014, S1192, S1231, S1235] or alkaline rust remover, G51455 [S1218] through the tube and back into the heated cleaning bath, STD-6552 for 3 hours maximum. Soaking time is a function of the coke thickness.

NOTE: Solution flow rate is not critical but should be sufficient to maintain tube and cleaning solution operating temperature. Tubing may be rigid or flexible, however, length should be as short as possible to reduce heat losses. The pump packing should be non-oxidizable material such as Teflon.

(c) After cleaning, disconnect the lines and drain tube. Flush the tube with cold tap water until distinctive color of cleaning solution disappears.

CAUTION

DO NOT MIX CLEANING AGENT AND STAIN REMOVER. KEEP TANKS SEPARATED OR DAMAGE CAN OCCUR.

(d) To remove the cleaning solution stain on the internal surface of the tube when using one of the alkaline permanganate, G51456 [S1001, S1012, S1014, S1192, S1231, S1235] solutions, pump solution of oxalic acid, B50041 [C04-099] through the tube for 2 or 3 minutes at room temperature.

NOTE: Hoses may be used with the stain remover solution. Various plastics and elastomers are compatible with this material.

(e) Disconnect the lines and drain tube. Flush with the cold tap water until the effluent water has the same acidity as the inlet water (use indicator paper).

(f) Disconnect the lines, drain tube and dry with clean shop air.

(g) Procedure may be repeated.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-410-017-F00

(1) Do this task: Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00.

SUBTASK 72-56-00-790-001-F00

(2) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Look for oil leaks at the turbine frame.

SUBTASK 72-56-00-612-003-F00

(3) Do a check of the engine oil quantity, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Oil Supply Tube Cleaning
Figure 701/72-56-00-990-802-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

C

484438 S0000144616_V2

Oil Supply Tube Cleaning
Figure 701/72-56-00-990-802-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:

1 INCONEL 718 (NC19FeNB)

2 AISI 321 (Z10CNT18)

484452 S0000144575_V2

Oil Supply Line (Removable) Cleaning
Figure 702/72-56-00-990-805-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:

1 INCONEL 718 (NC19FeNB)

2 AISI 321 (Z10CNT18)

484784 S0000144580_V2

Oil Supply Line (Removable) Cleaning
Figure 702/72-56-00-990-805-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:

1 INCONEL 718 (NC19FeNB)

2 AISI 321 (Z10CNT18)

484474 S0000144579_V2

Oil Supply Line (Non-Removable) Cleaning
Figure 703/72-56-00-990-806-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Oil Scavenge Line Cleaning
Figure 704/72-56-00-990-807-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:

1 INCONEL 718 (NC19FeNB)

3 AISI 321 (Z10CNT18)

484816 S0000144583_V2

Oil Scavenge Line Cleaning
Figure 704/72-56-00-990-807-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:

4 AISI 321 (Z10CNT18)

5 17-4-PH (Z5CNU17)

484902 S0000144587_V2

Oil Inlet Cover
Figure 705/72-56-00-990-808-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:

6 AISI 321 (Z10CNT18)

7 AISI 321 (Z10CNT18)

484919 S0000144589_V3

Oil Tube, Damping Oil Tube and Nipple
Figure 706/72-56-00-990-809-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-56-00-100-802-F00

4. Oil Scavenge Line Cleaning

(Figure 704)

A. General

(1) This task give the instructions to clean coking deposits from the rear sump oil scavenge line and related parts.

(a) The scavenge line includes the rear sump scavenge tube installed through the No. 7 turbine frame strut, the rear sump oil scavenge tube and the No. 5 bearing support nipple.

(b) The scavenge tube installed through the No. 7 strut is not removable, do a mechanical cleaning of the scavenge tube (not removed).

(c) The rear sump oil scavenge tube is removable, if it is necessary, do a chemical cleaning of the removed tube.

(2) It is necessary to remove the oil inlet cover to do this task.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-4968	Wrench - Nipple Line, No. 5 Bearing Support (Post CFMI SB 72-0169/SB 72-0254 and Pre CFMI SB 72-0676) Part #: 856A3492G04 Supplier: 58828
SPL-21063	Wrench - Nipple Line, No. 5 Bearing Support (Post CFMI SB 72-0676) Part #: 856A3492G06 Supplier: 58828
STD-1400	Fiberscope - Flexible Borescope

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
D00139	Lubricant - Oil - WD-40	
D00599 [CP2442]	Oil - Engine	
D00623 [CP5066]	Oil - Fuel System, Corrosion Preventive	MIL-PRF-6081, Grade 1010
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G Rapid Plus	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Description	Specification
G50611 [CP1065]	Kerosene	MIL-DTL-5624 (Supersedes MIL-T-5624)
G51056	Fuel - Standard Specification For Aviation Turbine Fuels (Jet A And Jet A-1)	ASTM D1655

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Procedure

SUBTASK 72-56-00-010-032-F00

(1) Do this task: Turbine Rear Frame (TRF) Oil Inlet Cover Removal, TASK 72-56-00-000-802-F00.

G. Oil Scavenge Line Cleaning

SUBTASK 72-56-00-010-033-F00

> **CAUTION**
> USE TWO WRENCHES TO LOOSEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(1) At the No. 7 TRF strut, disconnect the rear sump oil scavenge tube from the oil scavenge tube.

SUBTASK 72-56-00-030-001-F00

(2) Disconnect the oil scavenge tube from the nipple of No. 5 bearing support (Figure 707).

(a) Cut and remove the safetywire between the nipple, at the 6 o'clock position of No. 5 bearing support nipple and the coupling nut of the oil scavenge tube.

LOM ALL POST SB 737-CFM56-7B-72-0676

> **CAUTION**
> USE THE COUNTER WRENCH TO LOOSEN THE TUBE COUPLING NUTS. OTHER WRENCHES CAN CAUSE DAMAGE TO THE HARDWARE.

(b) Install the counter wrench, SPL-21063, on the TRF flange.

1) Loosen the four counter wrench bolts.

2) Install the wrench on the No. 5 bearing support nipple.

3) Tighten the two support bolts on the turbine rear frame.

4) Do a clockwise rotation on the counter wrench to take up and tighten the four counter wrench bolts.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL PRE SB 737-CFM56-7B-72-0676

> **CAUTION**
> USE THE COUNTER WRENCH TO LOOSEN THE TUBE COUPLING NUTS. OTHER WRENCHES CAN CAUSE DAMAGE TO THE HARDWARE.

(c) Install the counter wrench, SPL-4968, on the TRF flange.

1) Loosen the four counter wrench bolts.
2) Install the wrench on the No. 5 bearing support nipple.
3) Tighten the two support bolts on the turbine rear frame.
4) Do a clockwise rotation on the counter wrench to take up and tighten the four counter wrench bolts.

LOM ALL

(d) Disconnect the oil scavenge tube from the nipple of No. 5 bearing support using the oil scavenge tube nut wrench.

(e) Remove the counter wrench from the TRF flange.

(f) Disengage the guide bushing of the oil scavenge tube from 5 o'clock boss of the TRF outer case to get access to oil scavenge tube upper end.

SUBTASK 72-56-00-290-001-F00

(3) Do a visual inspection of the oil scavenge tube with a fiberscope, STD-1400, and a light source.

(a) Make sure that it is free of any particles/contamination.

1) If you find any sign of oil coking, remove the oil scavenge tube to do a chemical cleaning.

SUBTASK 72-56-00-110-010-F00

(4) If the borescope check of the oil scavenge tube shows coking contamination, do these steps to degrease and clean the tube:

(a) Attach the steel tubing and pump to the removed oil scavenge tube.

NOTE: You must use steel tubing and an acceptable pump to do this procedure.

(b) Do this task : Clean Internal Oil Tubes (CFM SPM 70-21-17).

(c) Do a visual inspection of the cleaned oil scavenge tube with a fiberscope, STD-1400, and a light source.

1) No oil coked particles/contamination is permitted.
2) Repeat the cleaning task until the tube is free of particles/contamination.

(d) Disconnect the cleaned tube from the steel tubing and the pump.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-56-00-110-011-F00

WARNING

KEROSENE IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN KEROSENE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET KEROSENE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

(5) Do these steps to degrease and mechanically clean the oil scavenge tube (not removable):

NOTE: This is a mechanical cleaning because the tube is non-removable.

CAUTION

MAKE SURE TO PUT PROTECTION EQUIPMENT ON THE NO. 5 BEARING, BEFORE YOU START A MECHANICAL CLEANING OF THE OIL SCAVENGE LINE. IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE CAN OCCUR.

(a) Put protection on the No. 5 bearing to prevent any contamination by the material.

(b) Put protection on all the cavities and tube ends to prevent any contamination by the material.

(c) Put a cap for the oil scavenge tube on the outer case side.

(d) Put a sufficient quantity of WD-40 lubricant, D00139 (CP2554), to fill the tube and keep it to get effect on coking in the concerned area for a sufficient time.

(e) Put a container under the tube to collect the penetrant corrosion inhibitor.

(f) Remove the cap from the tube and collect the penetrant corrosion inhibitor.

(g) Turn the tube in its position to get access to the ends of tube.

(h) Introduce a cylinder-brush tool through the tube ends and move the tool to the coked area.

(i) Put a small quantity of kerosene, G50611 [CP1065], or aviation turbine fuel, G51056, with a filler tool in the tube.

(j) Do an alternative movement of rotation on the tool to break the coking contamination.

(k) Extract the tool and use lint-free cloths to collect the coked particle.

CAUTION

MAKE SURE THAT THERE ARE NO PARTICLES OR CONTAMINATION ON THE INTERNAL SIDE OF THE BEARING SUPPORT. IF YOU DO NOT OBEY, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(l) Clean the cylinder-brush tool with kerosene, G50611 [CP1065], or aviation turbine fuel, G51056.

1) No oil coked particles/contamination is permitted.

2) Repeat the cleaning until tube is free of particles/contamination.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(m) Do a flushing of the tube with kerosene, G50611 [CP1065], alcohol, B00676 [CP1041], or aviation turbine fuel, G51056.

(n) Dry the tube with a compressed clean air source or nitrogen source.

(o) Do a visual inspection of the cleaned tube with a fiberscope, STD-1400, and a light source.

1) Make sure that it is free of any particles/contamination.

(p) Do a mechanical cleaning of the nipple of the No. 5 bearing support at 6 o'clock position to remove any sign of oil coking.

(q) Dry and clean the nipple with a compressed air source or nitrogen source.

(r) Do a visual inspection of the cleaned nipple with a fiberscope, STD-1400, and a light source.

1) No oil coked particles/contamination is permitted.

2) Repeat the cleaning until nipple is free of particles/contamination.

SUBTASK 72-56-00-410-012-F00

(6) Reconnect the oil scavenge line.

(a) Remove the protection from the No. 5 bearing cavity and tube ends.

(b) Lubricate all coupling nuts of the rear sump oil supply tubes with oil, D00623 [CP5066].

(c) Apply a thin layer of Molykote G Rapid Plus lubricant, D00640 [CP2104], with a spray gun on the guide bushing of the oil scavenge tube.

(d) Engage the guide bushing of the oil scavenge tube into the boss of the TRF at 5 o'clock position.

(e) Connect the coupling nut of oil scavenge tube to the 6 o'clock nipple on the No. 5 bearing support.

1) Tighten the coupling nut by hand.

LOM ALL POST SB 737-CFM56-7B-72-0676

CAUTION	ALWAYS INSTALL THE COUNTER WRENCH ON THE NIPPLE OF THE NUMBER-5 BEARING SUPPORT. THEN LOOSEN OR TIGHTEN THE COUPLING NUT OF THE OIL SCAVENGE TUBE. THIS WILL HELP TO PREVENT DAMAGE TO THE NIPPLE.

(7) Install the counter wrench, SPL-21063, on the TRF flange.

(a) Loosen the four counter wrench bolts.

(b) Install the counter wrench on the No. 5 bearing support nipple.

(c) Tighten the two support bolts on the turbine rear frame.

(d) Do a clockwise rotation on the counter wrench to take up and tighten the four counter wrench bolts.

LOM ALL PRE SB 737-CFM56-7B-72-0676

CAUTION	ALWAYS INSTALL THE COUNTER WRENCH ON THE NIPPLE OF THE NUMBER-5 BEARING SUPPORT. THEN LOOSEN OR TIGHTEN THE COUPLING NUT OF THE OIL SCAVENGE TUBE. THIS WILL HELP TO PREVENT DAMAGE TO THE NIPPLE.

(8) Install the counter wrench, SPL-4968, on the TRF flange.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL PRE SB 737-CFM56-7B-72-0676 (Continued)

(a) Loosen the four counter wrench bolts.

(b) Install the counter wrench on the No. 5 bearing support nipple.

(c) Tighten the two support bolts on the turbine rear frame.

(d) Do a clockwise rotation on the counter wrench to take up and tighten the four counter wrench bolts.

LOM ALL

SUBTASK 72-56-00-860-001-F00

(9) Tighten the coupling nut of the oil scavenge tube to 443 in-lb (50 N·m) - 531 in-lb (60 N·m) with the oil scavenge tube nut wrench.

(a) Attach with safety wire, G02345 [CP8001], or cable, G50065 [CP8006].

SUBTASK 72-56-00-090-001-F00

(10) Remove the counter wrench from the TRF flange.

SUBTASK 72-56-00-430-001-F00

(11) Reconnect the rear sump oil scavenge tube to the oil scavenge tube (Figure 704).

WARNING DO NOT GET ENGINE OIL ON YOUR SKIN FOR A LONG TIME. FLUSH THE OIL FROM YOUR SKIN WITH WATER. THE OIL IS POISONOUS AND CAN GO THROUGH YOUR SKIN AND IN TO YOUR BODY.

(a) Apply a layer of engine oil, D00599 [CP2442], on the threads of the rear sump oil scavenge tube.

CAUTION USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(b) Tighten the coupling nuts to 900 in-lb (102 N·m)-1100 in-lb (124 N·m).

(c) Safety the coupling nut to the nipple with safety wire, G02345 [CP8001], or cable, G50065 [CP8006].

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-410-013-F00

(1) Do this task: Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00.

SUBTASK 72-56-00-710-002-F00

(2) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Look for oil leaks at the turbine frame.

SUBTASK 72-56-00-612-002-F00

(3) Check the engine oil quantity, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TURBINE REAR FRAME
(VIEW IN THE FORWARD DIRECTION)

J72898 S0000177061_V2

Oil Scavenge Tube Nut
Figure 707/72-56-00-990-813-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TURBINE REAR FRAME AT 6 O' CLOCK
(VIEW IN THE FORWARD DIRECTION)

B0030901
J72863 S0000177063_V3

Oil Scavenge Tube Nut
Figure 707/72-56-00-990-813-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TURBINE FRAME ASSEMBLY - REPAIRS

1. General

A. This procedure has these tasks:

(1) The replacement of oil supply tube at the turbine frame.

(2) The replacement of the bushings in the clevis mounts of the TRF assembly.

(3) The replacement of the defective studs on the aft face of the inner hub of the turbine frame.

TASK 72-56-00-300-801-F00

2. Oil Supply Tube Replacement

(Figure 801)

A. General

(1) This task is for Configuration 1 Post-CFMI-SB 72-0339 Engines that have non-symmetrical (twisted) struts and Configuration 2 that have symmetrical struts and straight tubes on the Turbine Rear Frame (TRF).

(a) The oil supply tube is installed in strut No. 10 of the TRF.

(b) The oil supply tube has a removable retaining ring.

(2) Do this task if the oil flow through the oil supply tube is blocked by oil coking.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)
78-11-01-000-801-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-801-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-02-000-801-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-000-802-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-400-801-F00	Primary Plug Assembly Installation (P/B 401)
78-11-02-400-802-F00	Primary Plug Assembly Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8853	Fixture - Removal and Installation, Removable Retaining Ring Part #: 856A2677G01 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	
D00623 [CP5066]	Oil - Fuel System, Corrosion Preventive	MIL-PRF-6081, Grade 1010
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G Rapid Plus	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G02495 [CP8002]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS5689
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Replacement

SUBTASK 72-56-00-010-016-F00

WARNING DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-56-00-010-017-F00

(2) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00 or Primary Nozzle Assembly Removal, TASK 78-11-01-000-801-F00.

SUBTASK 72-56-00-010-018-F00

(3) Do this task: Primary Plug Assembly Removal, TASK 78-11-02-000-802-F00 or Primary Plug Assembly Removal, TASK 78-11-02-000-801-F00.

SUBTASK 72-56-00-020-010-F00

(4) Remove the flame arrestor assembly [8] (TASK 72-56-00-000-802-F00).

SUBTASK 72-56-00-020-011-F00

(5) Remove the flange assembly [12] (TASK 72-56-00-000-802-F00).

G. Oil Supply Tube Replacement

SUBTASK 72-56-00-010-021-F00

(1) Disconnect the oil supply tube [6] from the rear sump oil supply tube [5].

WARNING DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(a) Put a container under the engine to collect the drained oil.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **CAUTION** USE TWO WRENCHES TO TIGHTEN THE COUPLING NUT. USE ONE TO HOLD THE FITTING, AND THE OTHER TO TURN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(b) Loosen the coupling nut [4] that attaches the rear sump oil supply tube [5] to the oil supply tube [6].

(c) Remove the bolt [1] and nut [22] that attach the clamp [2] and heat shield [3] to the TRF.

(d) Disconnect the coupling nut [4] that attaches the rear sump oil supply tube [5] to the oil supply tube [6].

SUBTASK 72-56-00-110-004-F00

(2) Remove the oil supply tube [6].

(a) Remove the lockwire from the coupling nuts.

(b) Loosen the coupling nut between the oil damping tube [10] and oil tube [11].

(c) Loosen the coupling nut between the oil supply tube [6] and oil tube [11].

(d) Loosen the coupling nut between the oil tube [11] and nipple [21] on the oil inlet cover [20].

(e) Disconnect and remove the oil tube [11].

(f) Pull and remove the removable retaining ring [17] from the coupling nut [18].

1) Use the retaining ring removal and installation fixture, SPL-8853, to remove the removable retaining ring [17].

(g) Remove the coupling nut [18] from the oil supply tube [6].

(h) Pull the oil supply tube [6] down through strut No. 10 to fully disengage the guide bushing from the boss.

(i) Remove the oil supply tube [6] from the TRF outer case.

SUBTASK 72-56-00-110-005-F00

(3) Clean the TRF inner hub area with a clean lint-free cloth.

SUBTASK 72-56-00-010-022-F00

(4) Install the oil supply tube [6].

(a) Apply a thin layer of Molykote G Rapid Plus lubricant, D00640 [CP2104], with a spray gun on the guide bushing of the oil supply tube [6].

(b) Insert the oil supply tube [6] into strut No. 10 of the TRF.

(c) Engage the guide bushing of the oil supply tube [6] in the boss.

(d) Put the coupling nut [18] on the oil supply tube [6].

1) Make sure that the grooves on the tube end and on the coupling nut [18] are aligned.

> **CAUTION** BE CAREFUL TO HOLD THE COUPLING NUT IN PLACE WITH A LOCK WRENCH WHEN YOU ENGAGE AND CLAMP THE RETAINING RING WITH A COMBINATION PLIERS. AN INCORRECT INSTALLATION CAN CAUSE OIL LEAKS. OIL LEAKS CAN CAUSE DAMAGE TO EQUIPMENT.

(e) Insert the removable retaining ring [17] in the coupling nut [18].

1) Use the retaining ring removal and installation fixture, SPL-8853, to install the removable retaining ring [17].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) Make sure that the removable retaining ring [17] is fully inserted into the coupling nut [18] when its outer diameter base is in contact with the nut.

3) Make sure that the coupling nut [18] rotates freely after the installation of the removable retaining ring [17].

SUBTASK 72-56-00-400-001-F00

> **CAUTION**
> MAKE SURE TO ADJUST ALL THE OIL TUBES WITH THE NIPPLES WITH YOUR HANDS BEFORE YOU TIGHTEN THE NUTS TO THE LAST TORQUE VALUE. THIS IS TO PREVENT STRAIN ON THE OIL TUBES WHEN THEIR INSTALLATION IS COMPLETED. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Install the oil tube [11] on the oil damping tube [10].

(a) Apply a thin layer of oil, D00599 [CP2442], on the nipple [21], on the oil inlet cover [20], and on the threads of the oil tube [11].

(b) Connect the oil tube [11] between the nipple [21] and oil supply tube [6].

1) Tighten the coupling nuts by hand.

(c) Connect the oil damping tube [10] to the oil tube [11].

1) Tighten the coupling nuts by hand.

2) Make sure that the installed tubes are unstrained.

(d) Connect the oil supply tube [6] to the oil tube [11].

1) Tighten the coupling nuts by hand.

> **CAUTION**
> USE TWO WRENCHES TO TIGHTEN THE COUPLING NUT. USE ONE TO HOLD THE FITTING, AND THE OTHER TO TURN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(e) Tighten the coupling nut of the oil damping tube [10] to 90 in-lb (10.2 N·m) – 100 in-lb (11.3 N·m).

1) Safety the coupling with safety wire, G02345 [CP8001], or safety wire, G02495 [CP8002], or cable, G50065 [CP8006].

(f) Tighten the coupling nut of the oil tube [11] to 270 in-lb (30.5 N·m) – 300 in-lb (33.9 N·m).

1) Safety the coupling with safety wire, G02345 [CP8001], or safety wire, G02495 [CP8002], or cable, G50065 [CP8006].

(g) Tighten the coupling nut of the oil supply tube [6] to 270 in-lb (30.5 N·m) – 300 in-lb (33.9 N·m).

1) Safety the coupling with safety wire, G02345 [CP8001], or safety wire, G02495 [CP8002], or cable, G50065 [CP8006].

(h) Make sure that the Dim. A more than 0.078 in. (2.0 mm) in four equally spaced locations.

SUBTASK 72-56-00-400-002-F00

(6) Install the oil supply tube [6] on the rear sump oil supply tube [5].

(a) Lubricate all the coupling nuts of the rear sump oil supply tubes with oil, D00623 [CP5066].

(b) Connect the rear sump oil supply tube [5] to the oil supply tube [6].

1) Tighten the coupling nut [4] by hand.

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2) Make sure that the rear sump oil supply tube [5] is unstrained.

(c) Tighten the coupling nut [4] to 270 in-lb (30.5 N·m) – 300 in-lb (33.9 N·m).

(d) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101], to the threads of the bolt [1].

(e) Attach the heat shield [3] on the rear sump oil supply tube [5] with the clamp [2], bolt [1], and nut [22].

1) Tighten the nut [22] to 62 in-lb (7.0 N·m) – 71 in-lb (8.0 N·m).

SUBTASK 72-56-00-700-001-F00

(7) Do these steps to check Dim. A (Figure 801):

(a) Make sure that the Dim. A more than 0.078 in. (2.0 mm) in four equally spaced locations.

NOTE: The torquing step must not cause the oil supply line to move.

(b) If the Dim. A criterion is less than 0.078 in. (2.0 mm), do these steps:

1) Do a visual inspection of the oil supply tube [6].

2) Do a torque check of the two coupling nuts of the oil supply tube [6].

3) Disconnect the oil supply tube [6].

4) Install the oil supply tube [6] again to get Dim. A within the minimum criterion of 0.078 in. (2.0 mm).

(c) Make sure that there is no perforation in the insulation blanket of the oil supply tube [6].

(d) If the Dim. A criterion stays less than 0.078 in. (2.0 mm) or if there is perforation in the insulation blanket, replace the oil supply tube [6].

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-420-010-F00

(1) Install the flange assembly [12] (TASK 72-56-00-400-801-F00).

SUBTASK 72-56-00-420-011-F00

(2) Install the flame arrestor assembly [8] (TASK 72-56-00-400-801-F00).

SUBTASK 72-56-00-410-007-F00

(3) Do this task: Primary Plug Assembly Installation, TASK 78-11-02-400-802-F00 or Primary Plug Assembly Installation, TASK 78-11-02-400-801-F00.

SUBTASK 72-56-00-010-025-F00

(4) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00 or Primary Nozzle Assembly Installation, TASK 78-11-01-400-801-F00.

SUBTASK 72-56-00-010-026-F00

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do this task: TASK 78-31-00-010-804-F00.

SUBTASK 72-56-00-790-002-F00

(6) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Look for oil leaks at the turbine frame.

SUBTASK 72-56-00-610-001-F00

(7) Check the engine oil quantity.

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(a) If it is necessary, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Oil Supply Tube Replacement
Figure 801/72-56-00-990-803-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

REAR SUMP OIL SUPPLY AND SCAVENGE TUBES

MM-00175-00-B
N89082 S0006582515_V4

Oil Supply Tube Replacement
Figure 801/72-56-00-990-803-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

N89175 S0006582516_V5

Oil Supply Tube Replacement
Figure 801/72-56-00-990-803-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-56-00-300-802-F00

3. Bushings in the Clevis Mounts of the TRF Assembly Replacement

(Figure 802, Figure 803 and Figure 804)

A. General

(1) You can use this procedure to replace the bushings in the clevis mounts on the engine assembly.

(2) This repair is permitted with special inspections, in particularly when you do the installation of locally manufactured bushings.

B. References

Reference	Title
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-40-01-910-801-F00	Fluorescent Penetrant Inspection (Water Washable) (P/B 201)
71-21-03-000-801-F00	Aft Engine Mount Removal (P/B 401)
71-21-03-400-801-F00	Aft Engine Mount Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8386	Re-engagement Tool - Bushing Part #: 856A3924G01 Supplier: 58828
SPL-8403	Tool - Bushing Puller Part #: 856A3925G01 Supplier: 58828
STD-618	Oven

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	
B00682 [CP2011]	Solvent - Stoddard	MIL-PRF-680 Type I, II or III
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G00262	Nitrogen - Liquid	A-A-59503 Type II, MIL-PRF-27401 Type II
G01043	Cloth - Lint-free	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Replacement

SUBTASK 72-56-00-010-037-F00

(1) Do this task: Aft Engine Mount Removal, TASK 71-21-03-000-801-F00.

SUBTASK 72-56-00-211-001-F00

(2) Examine the TRF clevis mount for disengaged, loose, or missing bushings and wear:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Disengaged bushings are not serviceable.

1) Re-engage the bushing with CFM bushing re-engagement tool, SPL-8386, or equivalent.

(b) Loose or missing bushings are not permitted.

1) Replace the loose or missing bushings, do the repair task in this procedure.

(c) Wear in the clevis mount TRF bushing ID is permitted with these limits Figure 802:

1) Dia W: Any amount with dia maximum serviceable limit: 1.254 in. (31.9 mm) as long as clearance between bushings ID and TRF mount pin OD does not exceed 0.006 in. (0.2 mm).

a) If you find dia or clearance that is more than these limits, do the repair task in this procedure.

2) Dia U: Any amount with dia maximum serviceable limit: 1.004 in. (25.5 mm) as long as clearance between bushings ID and TRF mount pin OD does not exceed 0.006 in. (0.2 mm).

a) If you find dia or clearance that is more than these limits, do the repair task in this procedure.

3) Dia T: Any amount within dimensional inspection limits: 0.8765 in. (22.26 mm) - 0.8775 in. (22.29 mm) as long as clearance between bushings ID and TRF mount pin OD does not exceed 0.006 in. (0.2 mm).

a) If you find dia or clearance that is more than these limits, do the repair task in this procedure.

G. Bushings in the Clevis Mounts of the TRF Assembly Replacement

SUBTASK 72-56-00-010-038-F00

(1) Remove the defective bushing or the defective locally manufactured bushing from the clevis mounts as follows:

(a) Install the applicable yoke with the applicable nut or the applicable pusher of the CFM bushing puller tool, SPL-8403, on the clevis mount of the bushing to be removed.

(b) Make sure that you have correctly engaged the nut or the pusher of the CFM bushing puller tool, SPL-8403, in the internal diameter of the bushing.

(c) Make sure that you have the yoke of the CFM bushing puller tool, SPL-8403, against the clevis mount of the bushing to be removed.

(d) Use the screw of the CFM bushing puller tool, SPL-8403, to remove the bushing from the clevis mount.

(e) Disengage the nut or the pusher and the screw from the clevis mount to remove the CFM bushing puller tool, SPL-8403.

SUBTASK 72-56-00-160-001-F00

WARNING HYDROCARBON SOLVENTS ARE FLAMMABLE AND TOXIC. AVOID PROLONGED CONTACT WITH THE SKIN AND OBSERVE PRECAUTIONS AGAINST FIRE.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(WARNING PRECEDES)

WARNING	DO NOT GET ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE GAS FROM ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN. KEEP ACETONE, ISOPROPYL ALCOHOL AND CLEANING SOLVENT DESOCLEAN AWAY FROM SPARKS, FLAME, AND HEAT. ACETONE, ISOPROPYL ALCOHOL AND CLEANING SOLVENT DESOCLEAN ARE POISONOUS AND FLAMMABLE SOLVENTS WHICH CAN CAUSE INJURY OR DAMAGE.

CAUTION	DO NOT USE HYDROCARBON SOLVENTS ON PLASTICS AND RUBBER-BASED MATERIALS. HYDROCARBON SOLVENTS CAN CAUSE DAMAGE TO PLASTICS AND RUBBER-BASED MATERIALS.

(2) Clean the surfaces and the internal diameter of the clevis mount as follows:

(a) Apply acetone solvent, B01058 [CP1039], solvent, B00682 [CP2011], or alcohol, B00676 [CP1041], with a hand spray bottle or use a soaked rag.

(b) Remove the accumulation with a soft cloth.

(c) Wipe the cleaned area dry with a clean cloth.

SUBTASK 72-56-00-230-001-F00

(3) Make sure that the clevis mount is not damaged, do this task: Fluorescent Penetrant Inspection (Water Washable), TASK 70-40-01-910-801-F00.

SUBTASK 72-56-00-220-001-F00

(4) Do a dimensional inspection of the clevis mount (Table 801) and (Figure 802):

(a) If the inner diameter of the clevis mount has scratches

1) Defects more than 0.0019 in. (0.05 mm) deep after blending are not permitted.

2) Inner diameter values more than the maximum in-process dimension limit after blending are not permitted (refer to paragraph below).

(b) Blend by hand the inner diameter to remove the defects.

(c) Do a dimensional inspection of the inner diameter repaired.

1) If the dimension of the inner diameter is more than the maximum in-process limit, replace the engine to remove the TRF for repair the clevis mount.

(d) If the inner diameter of the clevis mount has no scratches and it is in the maximum in-process dimension limit:

1) Make sure that the surfaces of the clevis mount are not damaged and clean.

2) Do the procedure of this task to machine a locally manufactured bushing.

(e) If the inner diameter of the clevis mount has not scratches and it is in the finish dimension:

1) Make sure that the surfaces of the clevis mount are not damaged and clean.

2) Do the procedure of this task to install a new bushing.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 801/72-56-00-993-801-F00 Repair Dimensions

Description	Type of Bushing	Minimum Finish Dimension	Maximum Finish Dimension	Maximum In-Process Dimension
DIA L	TYPE 1	1.44488 inch (36.700 mm)	1.44591 inch (36.726 mm)	1.51575 inch (38.100 mm)
DIA F	TYPE 2	1.19685 inch (30.400 mm)	1.19787 inch (30.426 mm)	1.25276 inch (31.820 mm)
DIA O	TYPE 3	1.07480 inch (27.300 mm)	1.07559 inch (27.320 mm)	1.12598 inch (28.600 mm)

SUBTASK 72-56-00-320-001-F00

WARNING DO NOT BREATHE THE PARTICLES, OR GET THEM IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES AND OTHER EQUIPMENT FOR PROTECTION. THESE PARTICLES CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

WARNING DO NOT GET ACETONE IN YOUR EYES, IN YOUR MOUTH OR ON YOUR SKIN. USE GLOVES, EYE PROTECTION AND RESPIRATOR. WASH THE ACETONE AWAY WITH WATER. GET MEDICAL AID IMMEDIATELY. MAKE SURE THAT THE AREA HAS A GOOD FLOW OF AIR. ACETONE IS POISONOUS AND FLAMMABLE WHICH CAN CAUSE INJURY TO PERSONNEL AND DAMAGE EQUIPMENT.

(5) Make a locally manufactured bushing (Figure 804):

(a) Find the dimensions and the type of the locally manufactured bushing to machine in (Table 802) and (Figure 802).

(b) Grind the locally manufactured bushing (CFM CFM56 Standard Practices Manual 70-44-30).

(c) Measure the inner diameter dimension of the clevis mount.

1) Record the value.

(d) Machine the outer diameter of the locally manufactured bushing to get an interference fit of 0.00016 in. (0.00406 mm) to 0.0012 in. (0.0305 mm) with the inner diameter of the clevis mount.

Table 802/72-56-00-993-802-F00 Repair Dimensions

DESCRIPTION	TYPE OF BUSHING	MINIMUM FINISH DIMENSION	MAXIMUM FINISH DIMENSION
DIA Y	TYPE 1	DIA L + 0.00008 inch (0.002 mm)	DIA L + 0.00118 inch (0.030 mm)
DIA W		1.25000 inch (31.750 mm)	1.25102 inch (31.776 mm)
DIA X	TYPE 2	DIA F + 0.00008 inch (0.002 mm)	DIA F + 0.00118 inch (0.030 mm)
DIA U		1.00000 inch (25.400 mm)	1.00102 inch (25.426 mm)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 802/72-56-00-993-802-F00 Repair Dimensions (Continued)

DESCRIPTION	TYPE OF BUSHING	MINIMUM FINISH DIMENSION	MAXIMUM FINISH DIMENSION
DIA Z	TYPE 3	DIA O + 0.00008 inch (0.002 mm)	DIA O + 0.00118 inch (0.03 mm)
DIA T		0.87650 inch (22.263 mm)	0.87752 inch (22.289 mm)

(e) Break sharp angles.

(f) Do a heat treatment of the locally manufactured bushing to 430 ± 14 °F (150 ± 5 °C) during 2 hours minimum, using an oven, STD-618.

(g) Do this task: Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

1) No cracks are permitted.

(h) Clean the bushing with lint-free cloth, G01043, soaked with alcohol, B00676 [CP1041], or acetone solvent, B01058 [CP1039].

SUBTASK 72-56-00-410-020-F00

(6) Install the new bushing or the locally manufactured bushing as follows:

(a) Put the bushing fully into nitrogen, G00262, liquid for 30 to 40 seconds.

(b) Engage the bushing in the inner diameter of the clevis mount by the internal face.

(c) Make sure that the bushing is fully engaged and is against the internal face of the clevis mount.

(d) Make sure that you can fully install the pawl pin in the two bushings.

(e) Make sure that you can remove the pawl pin without restrain.

SUBTASK 72-56-00-160-002-F00

WARNING HYDROCARBON SOLVENTS ARE FLAMMABLE AND TOXIC. AVOID PROLONGED CONTACT WITH THE SKIN AND OBSERVE PRECAUTIONS AGAINST FIRE.

WARNING DO NOT GET ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE GAS FROM ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN. KEEP ACETONE, ISOPROPYL ALCOHOL AND CLEANING SOLVENT DESOCLEAN AWAY FROM SPARKS, FLAME, AND HEAT. ACETONE, ISOPROPYL ALCOHOL AND CLEANING SOLVENT DESOCLEAN ARE POISONOUS AND FLAMMABLE SOLVENTS WHICH CAN CAUSE INJURY OR DAMAGE.

CAUTION DO NOT USE HYDROCARBON SOLVENTS ON PLASTICS AND RUBBER-BASED MATERIALS. HYDROCARBON SOLVENTS CAN CAUSE DAMAGE TO PLASTICS AND RUBBER-BASED MATERIALS.

(7) Clean the surfaces of the clevis mount and the bushing as follows:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Apply acetone solvent, B01058 [CP1039], solvent, B00682 [CP2011], or alcohol, B00676 [CP1041], with a hand spray bottle or use a soaked rag.

(b) Remove the accumulation with a soft cloth.

(c) Wipe the cleaned area dry with a clean cloth.

SUBTASK 72-56-00-220-002-F00

(8) Measure the distance between the internal surfaces of the bushings (Table 803) and (Figure 802).

Table 803/72-56-00-993-803-F00 Repair Dimensions

DESCRIPTION	TYPE OF BUSHING	MINIMUM FINISH DIMENSION	MAXIMUM FINISH DIMENSION
DIMENSION B	TYPE 1 (PRE CFMI SB 72-0169) (PRE CFMI SB 72-0254)	1.34228 inch (34.094 mm)	1.34827 inch (34.246 mm)
DIMENSION B	TYPE 1 (POST CFMI SB 72-0169) (POST CFMI SB 72-0254)	1.34937 inch (34.274 mm)	1.35929 inch (34.526 mm)
DIMENSION H	TYPE 2 (PRE CFMI SB 72-0169) (PRE CFMI SB 72-0254)	1.11000 inch (28.194 mm)	1.11598 inch (28.346 mm)
DIMENSION H	TYPE 2 (POST CFMI SB 72-0169) (POST CFMI SB 72-0254)	1.12024 inch (28.454 mm)	1.13016 inch (28.706 mm)
DIMENSION J	TYPE 3 (PRE CFMI SB 72-0169) (PRE CFMI SB 72-0254)	1.11000 inch (28.194 mm)	1.11598 inch (28.346 mm)
DIMENSION J	TYPE 3 (POST CFMI SB 72-0169) (POST CFMI SB 72-0254)	1.12024 inch (28.454 mm)	1.13016 inch (28.706 mm)

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-410-021-F00

(1) Do this task: Aft Engine Mount Installation, TASK 71-21-03-400-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1376848 S0000249833_V2

Bushing Installation
Figure 802/72-56-00-990-815-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHINGS TYPE 1

A-A

BUSHINGS REMOVED

A-A

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.
ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1376920 S0000249834_V2

Bushing Installation
Figure 802/72-56-00-990-815-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHINGS TYPE 2

B-B

BUSHINGS REMOVED

B-B

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS. ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1376985 S0000249835_V2

Bushing Installation
Figure 802/72-56-00-990-815-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHINGS TYPE 3

C-C

BUSHINGS REMOVED

C-C

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.
ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1376991 S0000249836_V2

Bushing Installation
Figure 802/72-56-00-990-815-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TOLL FOR AFT CLEVIS MOUNT

TOLL FOR FORWARD CLEVIS MOUNT

1377614 S0000249838_V2

Extraction of the Bushings
Figure 803/72-56-00-990-816-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHING TYPE 1

ROUGHNESS: 32 (0.8)
MATERIAL: INCONEL 718 (NC19FeNb)
HARDNESS: 346 to 450HB

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS. ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1378297 S0000249839_V2

Locally Manufactured Bushing
Figure 804/72-56-00-990-817-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHING TYPE 2

ROUGHNESS: 32 (0.8)
MATERIAL: INCONEL 718 (NC19FeNb)
HARDNESS: 346 to 450HB

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.
ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1378301 S0000249841_V2

Locally Manufactured Bushing
Figure 804/72-56-00-990-817-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

BUSHING TYPE 3

ROUGHNESS: 32 (0.8)
MATERIAL: INCONEL 718 (NC19FeNb)
HARDNESS: 346 to 450HB

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.
ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1378313 S0000249843_V2

Locally Manufactured Bushing
Figure 804/72-56-00-990-817-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-56-00-300-803-F00

4. Defective Studs on the AFT Face of the Inner Hub of the Turbine Frame Replacement

(Figure 805, Figure 806, Figure 807, Figure 808)

A. General

(1) This procedure is for Engines Post-CFMI-SB 72-0169 or Post-CFMI-SB 72-0254 or Post-CFMI- SB 72-0676, which have symmetrical struts on the Turbine Rear Frame (TRF).

(2) You can use this procedure to replace the defective studs on the aft face of the inner hub of the turbine frame only on wing, or on Low Pressure Turbine (LPT) major module.

B. References

Reference	Title
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)
78-11-01-000-801-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-801-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-02-000-801-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-000-802-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-400-801-F00	Primary Plug Assembly Installation (P/B 401)
78-11-02-400-802-F00	Primary Plug Assembly Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
412	Engine 1 - Nose Inlet Cowl

E. Prepare for the Procedure

SUBTASK 72-56-00-010-040-F00

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-56-00-010-041-F00

(2) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00 or Primary Nozzle Assembly Removal, TASK 78-11-01-000-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-56-00-010-042-F00

(3) Do this task: Primary Plug Assembly Removal, TASK 78-11-02-000-802-F00 or Primary Plug Assembly Removal, TASK 78-11-02-000-801-F00.

SUBTASK 72-56-00-010-043-F00

(4) Remove the flame arrestor [2]. Refer to TASK 72-56-00-000-802-F00.

SUBTASK 72-56-00-010-044-F00

(5) Remove the flange assembly [1]. Refer to TASK 72-56-00-000-802-F00.

F. Procedure

SUBTASK 72-56-00-010-045-F00

(1) Do these steps to remove the lock plate which is on the defective stud:

(a) Remove the bolts [6] that attach the lock plate [5] to the aft outer frame.

(b) Remove the lock plate [5].

SUBTASK 72-56-00-020-008-F00

(2) Do these steps to replace defective studs (Figure 805, Figure 806):

(a) If the pin was installed, replace it with a new pin.

WARNING	DO NOT BREATHE THE PARTICLES FROM GRINDING OR LET THE PARTICLES TOUCH YOU. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

CAUTION	BE CAREFUL NOT TO CUT INTO THE METAL OF THE FRAME WHEN YOU DO THE GRINDING. DAMAGE TO THE PART CAN OCCUR.

1) Do the counterboring of the stop pin with the locally manufactured tool.

2) Loosen and remove the stud. Discard it.

3) Do an inspection of the pin hole with a gage.

(b) If no pin was installed, remove the defective studs from the aft face of the inner hub as follows:

WARNING	DO NOT BREATHE THE PARTICLES FROM GRINDING OR LET THE PARTICLES TOUCH YOU. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

CAUTION	BE CAREFUL NOT TO CUT INTO THE METAL OF THE FRAME WHEN YOU DO THE GRINDING. DAMAGE TO THE PART CAN OCCUR.

1) Remove the tack weld which attaches the defective stud to the frame with the small narrow grinding wheel. Refer to TASK 70-41-12 (70-41-12, Power Blending) CFM Standard Practices Manual.

2) Loosen and remove the stud. Discard it.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

3) Complete the removal of the remaining tack weld material with a small manual grinding tool and grind the tack weld beads to have a continuous surface with the adjacent areas. Refer to TASK 70-41-12 (70-41-12, Power Blending) CFM Standard Practices Manual.

> **WARNING**
> USE EYE PROTECTION WHEN YOU USE COMPRESSED AIR TO CLEAN, COOL, OR DRY PARTS OR TOOLS. PARTICLES CAN CAUSE AN INJURY TO YOUR EYES. DO NOT USE MORE THAN 30 PSIG (200 KPA). DO NOT POINT COMPRESSED AIR AT YOURSELF OR OTHER PERSONS.

4) Blow the areas adjacent to the hole for the stud with shop air.

5) Do the Fluorescent-Penetrant Inspection of the machined area on the turbine frame. Refer to Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

a) Use S2 sensitivity.

b) Cracks are not permitted.

(c) Do an inspection of the tapped hole with a gage.

1) Indications are not permitted.

2) If there is any indication in the tapped hole, this repair is not applicable to the part.

(d) Install the new studs as follows:

1) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101] on the stud threads which go into the hole of the frame.

2) Tighten the new stud as follows:

a) Screw the new stud by hand on the turbine frame.

b) Tighten with the wrench to complete the installation. Refer to TASK 70-70-11 (70-70-11, Tightening Methods) CFM Standard Practices Manual.

c) Torque the stud to 925 in-lb (104.5 N·m)-1022 in-lb (115.5 N·m).

d) Loosen the stud.

e) Torque the stud a second time to 925 in-lb (104.5 N·m)-1022 in-lb (115.5 N·m).

> **WARNING**
> METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(e) Machine the pin hole with the locally manufactured tool. Refer to TASK 70-44-50 (70-44-50, Drilling) CFM Standard Practices Manual (Figure 806 and Figure 808).

(f) Machine the locally manufactured pin. Refer to TASK 70-44-00 (70-44-00, Machining General) CFM Standard Practices Manual (Figure 807).

NOTE: The pin must be machined in relation to the pin hole to have a tightening of 0.0008 in. (0.02 mm) to 0.0012 in. (0.03 mm) minimum.

(g) Install the pin and grind the pin flush with the flange of the stud with the locally manufactured tool (Figure 808).

NOTE: If there is a bushing, put the new stop pin at 0.394 in. (10.0 mm) minimum from the existing stop pin.

(3) Do these steps to install the lock plate which is on the new stud:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Install the lock plate [5] on the flow path fairing [7] flange.

(b) Apply a thin layer of graphite mineral vaseline, D00601 [CP2101] on the threads of the bolts [6].

(c) Install two bolts [6] at each end of the lock plate [5].

(d) Check that there is a minimum clearance of 0.024 in. (0.6 mm) all around between the flow path fairing and the struts of LPT frame.

(e) Install the remaining bolts [6] on the lock plate [5].

(f) Tighten all bolts [6] to 110 in-lb (12.5 Nm)–120 in-lb (13.5 Nm).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-410-024-F00

(1) Install the flange assembly [1]. Refer to TASK 72-56-00-400-801-F00.

SUBTASK 72-56-00-410-025-F00

(2) Install the flame arrestor [2]. Refer to TASK 72-56-00-400-801-F00.

SUBTASK 72-56-00-410-026-F00

(3) Do this task: Primary Plug Assembly Installation, TASK 78-11-02-400-802-F00 or Primary Plug Assembly Installation, TASK 78-11-02-400-801-F00.

SUBTASK 72-56-00-410-027-F00

(4) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00 or Primary Nozzle Assembly Installation, TASK 78-11-01-400-801-F00.

SUBTASK 72-56-00-410-028-F00

WARNING

OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2461248 S0000573038_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 1 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FLANGE ASSEMBLY

B 1

FLANGE ASSEMBLY

B 2

1 POST SB 72-0169 AND 72-0254

2 POST SB 72-0676

2461269 S0000573211_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 2 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2461519 S0000573212_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 3 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2461421 S0000573213_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 4 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(VIEW IN THE FORWARD DIRECTION)

E

CROSSING FOR PLUG CENTERING PIN

F

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES.

2461503 S0000573214_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 5 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

3 MATERIAL: INCONEL 718 (NC19FeNb)

4 2 TACKWELDS IN CIRCUMFERENTIAL POSITION

2461527 S0000573215_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 6 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES.

2461768 S0000573039_V1

Machining Of The Pin Hole
Figure 806/72-56-00-990-824-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(WITH BUSHING)

SECTION

A-A

ROUGHNESS: 63 (1,6)

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

2463996 S0000573216_V1

Machining Of The Pin Hole
Figure 806/72-56-00-990-824-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(WITHOUT BUSHING)

SECTION

A-A

ROUGHNESS: 63 (1,6)

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES.

2464289 S0000573217_V1

Machining Of The Pin Hole
Figure 806/72-56-00-990-824-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ROUGHNESS: 126 (3,2)

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES. ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESES.

1 MATERIAL : INCONEL 718 (NC19FeNb).

2 TO BE MACHINED IN RELATION TO THE PIN HOLE TO HAVE A TIGHTENING OF 0.0008 - 0.0012 (0.02 - 0.03).

2464291 S0000573040_V1

Locally Manufactured Pin
Figure 807/72-56-00-990-825-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES.

2464295 S0000573041_V1

Locally Manufactured Tool
Figure 808/72-56-00-990-826-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TURBINE FRAME AIR/OIL SEPARATOR - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) Air/oil separator removal

(2) Air/oil separator installation.

TASK 72-56-01-000-801-F00

2. Air/Oil Separator Removal

(Figure 401, Figure 402 and Figure 403)

A. General

(1) This task provides the instructions on how to remove the air/oil separator.

B. References

Reference	Title
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-13625	Slide Hammer - Threaded Tip Part #: CJ93B Supplier: 55719 Opt Part #: CG240-8 Supplier: 55719 Opt Part #: CG240-9 Supplier: 5K761 Opt Part #: CJ125-6 Supplier: 55719 Opt Part #: CJ93-1 Supplier: 55719
SPL-14016	Wrench - Torque Aft Rotating Air Oil Separator Part #: 856A3392G01 Supplier: 58828
SPL-14020	Puller - Aft Rotating Air Oil Separator Part #: 856A2661G01 Supplier: 58828

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Removal

SUBTASK 72-56-01-010-001-F00

(1) Do his task: Turbine Rear Frame (TRF) Oil Inlet Cover Removal, TASK 72-56-00-000-802-F00.

F. Air/Oil Separator Removal

SUBTASK 72-56-01-020-001-F00

(1) Remove the air/oil separator self -locking nut [2] with a wrench [3] (Wrench, SPL-14016) as follows:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CAUTION MAKE SURE THAT THE LUGS OF THE WRENCHES ENGAGE THE SELF-LOCKING NUT CORRECTLY. IF THE LUGS DO NOT ENGAGE THE SELF-LOCKING NUT, DAMAGE TO THE PARTS CAN OCCUR.

(a) Engage the guide in the center vent tube rear extension duct [8].

(b) At the same time, engage the wrench [3] and the countertorque wrench [4] into the slots of the self -locking nut [2] and of the center vent tube rear extension duct [8].

(c) Install the torque multiplier [5] on the countertorque wrench [4] and the lever arm of the torque multiplier [5] on the fork arm of the wrench [3].

(d) Remove the self -locking nut [2].

(e) Remove the countertorque wrench [4] and the torque multiplier [5].

SUBTASK 72-56-01-020-002-F00

(2) Remove the air/oil separator [1] with puller [6] (Puller, SPL-14020) as follows:

(a) Install the protector [9], detail of the tool, on the center vent tube rear extension duct seal teeth.

(b) Loosen the knurled knobs to retract the finger grips.

(c) Position the tool over the center vent tube rear extension duct against the air/oil separator [1].

(d) Tighten the knurled knobs to engage the finger grips into the rear flange of the air/oil separator [1].

(e) Install the slide hammer [7] (slide hammer, COM-13625) on the Puller, SPL-14020.

(f) Remove air/oil separator [1].

(g) Loosen the knurled knobs and remove the air/oil separator from the slide hammer, COM-13625.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0046100

2241846 S0000501960_V2

AFT Rotating Air/Oil Separator Nut Installation
Figure 401/72-56-01-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0046200

2241877 S0000501962_V2

Rotating Air/Oil Separator Installation
Figure 402/72-56-01-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CALCULATION OF AIR/OIL SEPARATOR SEATING DIMENSION: (A - B - C)

(CENTER VENT TUBE REAR EXTENSION DUCT) DIMENSION A=	
(AFT AIR/OIL SEPARATOR) DIMENSION B=	
DIMENSION CALCULATED C=	
ACTUAL DIMENSION C=	

	TORQUE
RUNNING	
FINAL	

(CONFIGURATION 1)

B0045900

2241904 S0000501964_V3

LPT Air/Oil Separator Assembly Installation
Figure 403/72-56-01-990-803-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CALCULATION OF AIR/OIL SEPARATOR SEATING DIMENSION: (A - B - C)

(CENTER VENT TUBE REAR EXTENSION DUCT) DIMENSION A=	
(AFT AIR/OIL SEPARATOR) DIMENSION B=	
DIMENSION CALCULATED C=	
ACTUAL DIMENSION C=	

	TORQUE
RUNNING	
FINAL	

(CONFIGURATION 2)

B0046000

2241906 S0000501965_V3

LPT Air/Oil Separator Assembly Installation
Figure 403/72-56-01-990-803-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-56-01-400-801-F00

3. Air/Oil Separator Installation

(Figure 401, Figure 402 and Figure 403)

A. General

(1) This task provides the instructions on how to install the air/oil separator.

B. References

Reference	Title
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-14016	Wrench - Torque Aft Rotating Air Oil Separator Part #: 856A3392G01 Supplier: 58828
SPL-14020	Puller - Aft Rotating Air Oil Separator Part #: 856A2661G01 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Air/Oil Separator Installation

SUBTASK 72-56-01-420-001-F00

(1) Install the air/oil separator [1] as follows:

(a) Remove protector [9] (856A3234P01) from the center vent tube rear extension duct [8].

(b) Install the protector (856A3234P05) of the puller [6] (Puller, SPL-14020) on the center vent tube rear extension duct seal teeth.

(c) Measure and record the values A and B.

> **WARNING**
> DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(d) Lightly coat the threads of the center vent tube rear extension duct [8] and the journal of the separator with engine oil, D00599 [CP2442].

(e) Lightly coat the mating surfaces of the center vent tube rear extension duct and of the separator with Dow Corning 321 lubricant, D00641 [CP5062].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING WHEN YOU DO WORK WITH DRY ICE, MAKE SURE YOU USE SAFETY GOGGLES AND INSULATED GLOVES. IF DRY ICE TOUCHES YOUR EYES OR SKIN, FROSTBITE CAN OCCUR.

(f) Chill the forward end of the air/oil separator [1] in dry ice for a minimum of five minutes.

WARNING WHEN YOU DO WORK WITH DRY ICE, MAKE SURE YOU USE SAFETY GOGGLES AND INSULATED GLOVES. IF DRY ICE TOUCHES YOUR EYES OR SKIN, FROSTBITE CAN OCCUR.

(g) Remove the air/oil separator [1] from the dry ice and install it over the center vent tube rear extension duct [8] as follows:

1) Engage the air/oil separator slots with the center vent tube lugs.

2) Turn the air/oil separator [1] by hand to make sure that the lugs engage in the slots.

NOTE: Engage the air/oil separator offset slot with the center vent tube offset lug. The air/oil separator offset slot and center vent tube offset lug have spherical indentation for identification.

3) Make sure that you fully seat the air/oil separator [1].

(h) Measure Dimension C.

1) Do this measurement at four equally-spaced locations and calculate the average of the four measurements.

(i) Calculate the air/oil separator seating dimension (A - B= Calculated Dimension C).

(j) If the difference between the calculated dimension C and the actual dimension C is more than 0.003 inch (0.075 mm), do these steps:

1) Remove the parts.

2) Find the cause for the difference.

SUBTASK 72-56-01-420-002-F00

(2) Install air/oil separator self -locking nut [2] as follows:

WARNING DO NOT LET THE ENGINE OIL STAY ON YOUR SKIN. ENGINE OIL IS POISONOUS. DO NOT BREATHE THE FUMES. USE ENGINE OIL IN AN AREA WITH GOOD AIRFLOW. DO NOT GET ENGINE OIL ON YOUR CLOTHES OR ON THE AIRPLANE. ENGINE OIL CAN CAUSE INJURIES.

(a) Lightly coat the threads of self-locking nut with engine oil, D00599 [CP2442].

1) Engage the self-locking nut with your hand.

(b) Remove the protector (856A3234P05) of the puller [6] from the center vent tube rear extension duct.

1) Engage the self-locking nut with your hand.

CAUTION MAKE SURE THAT THE LUGS OF THE WRENCHES ENGAGE THE SELF-LOCKING NUT CORRECTLY. IF THE LUGS DO NOT ENGAGE THE SELF-LOCKING NUT, DAMAGE TO THE PARTS CAN OCCUR.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(CAUTION PRECEDES)

CAUTION	EXERCISE EXTREME CARE WHEN USING TORQUE MULTIPLIER. IMPROPER USE CAN RESULT IN DAMAGE TO ENGINE OR TOOLS. DOUBLE CHECK ALL TORQUE CALCULATIONS. IF TORQUE SHOULD INCREASE SIGNIFICANTLY PRIOR TO FINAL SEATING, REMOVE ROTOR AND INSPECT FOR CAUSE OF TORQUE INCREASE.

(c) Install the wrench [3] (Wrench, SPL-14016) as follows:

1) Engage the guide in the center vent tube rear extension duct.

2) At the same time, engage the wrench [3] and the countertorque wrench [4] into these slots of the self -locking nut [2] and of the center vent tube rear extension duct [8]:

(d) Seat the self -locking nut [2].

1) Make sure that the self-locking torque value is between 245-830 lb inches. (28-93 N.m).

a) Record this self-locking torque value as value D.

(e) Tighten the self -locking nut [2] as follows:

1) Range of torque to be applied for the self locking nut: 856-940 lb inches (95-105 N.m).

a) This torque value is called value E.

2) Torque the air/oil separator nut to a torque value F=D+E.

3) Matchmark the self-locking nut position in relation to the shaft.

4) Loosen the self-locking nut, then tighten again to the same value as calculated in the step 3.F.(2)(e)2).

5) Examine the matchmarks as follows:

a) If the matchmark on the self-locking nut does not reach the mark on the shaft, disassemble the air/oil separator [1] and examine the condition of parts. Then, start the installation procedure again from step 3.F.(1)(c).

b) If the matchmark on the self-locking nut is in line or after the mark on the shaft, continue to the step 3.F.(2)(f).

(f) Remove the wrench [3] and the torque multiplier [5].

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-01-410-001-F00

(1) Do this task: Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00..

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ACCESSORY DRIVES - MAINTENANCE PRACTICES

1. **General**

A. This procedure has four tasks:

(1) To remove a magnetic seal

(2) To install a magnetic seal

(3) To remove a Sealol seal

(4) To install a Sealol seal.

B. The seals are installed on the accessory gearbox (AGB) at these accessory drives:

(1) fuel pump.

(2) hydraulic pump.

(3) integrated drive generator (IDG).

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(4) N2 rotor drive pad.

LOM ALL

C. The magnetic seals and Sealol seals of the fuel pump, hydraulic pump and IDG are interchangeable.

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

D. A Sealol seal is only installed on the N2 drive pad (behind the handcranking cover).

LOM ALL

TASK 72-60-00-000-801-F00

2. **Magnetic Seal Removal**

(Figure 201, Figure 202, Figure 203)

A. References

Reference	Title
24-11-11-000-801	Integrated Drive Generator (IDG) Removal (P/B 401)
29-11-11-000-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
73-11-01-000-801-F00	Fuel Pump Package Removal (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2262	Set - Tool, Jackscrew, Engine Disassembly Part #: 856A1130P12 Supplier: 58828
SPL-10797	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals (Commercial Only) Part #: 856A3576G02 Supplier: 58828

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for The Magnetic Seal Removal

SUBTASK 72-60-00-010-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-60-00-010-002-F00

(2) Do one of these applicable tasks to get access to the magnetic seal:

(a) Do this task: Fuel Pump Package Removal, TASK 73-11-01-000-801-F00.

(b) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal, TASK 29-11-11-000-801-001.

(c) Do this task: Integrated Drive Generator (IDG) Removal, TASK 24-11-11-000-801.

E. Magnetic Seal Removal

SUBTASK 72-60-00-010-003-F00

CAUTION

REPLACE ALL OF THE SEAL, IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. MAGNETIC SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(1) To remove the magnetic seal [1], do these steps (Figure 202):

(a) Remove the three nuts and washers.

(b) Remove the seal housing assembly with the tool set, SPL-2262.

1) Remove and discard the O-ring [2] from the outer diameter of the seal housing assembly.

(c) To remove the rotating ring (with the carbon seal), do these steps (Figure 203):

1) Do these steps to install the pusher/puller, SPL-10797:

a) Engage the claws of the pusher/puller behind the rotating ring.

b) Push and hold the pusher/puller sleeve against the front of the rotating ring.

c) Tighten the pusher/puller nut until the rotating ring is held tight by the claws.

d) Tighten the pusher/puller screw.

2) Attach the impact puller to the pusher/puller.

3) Operate the impact puller to remove the rotating ring.

4) Remove the rotating ring from the pusher/puller.

a) Loosen the pusher/puller nut and screw.

b) Remove and discard the O-ring [3].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0049000

G37578 S0006582521_V3

Accessory Drives
Figure 201/72-60-00-990-811-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0049100

G37583 S0006582522_V3

Magnetic Seal Installation
Figure 202/72-60-00-990-803-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2540156 S0000602651_V1

Magnetic Seal Installation
Figure 202/72-60-00-990-803-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0049200

G37630 S0006582524_V3

Magnetic or Sealol Seal Removal with Seal Pusher/Puller
Figure 203/72-60-00-990-804-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Magnetic or Sealol Seal Removal with Seal Pusher/Puller
Figure 203/72-60-00-990-804-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-60-00-400-801-F00

3. Magnetic Seal Installation

(Figure 201, Figure 202, Figure 203)

A. References

Reference	Title
24-11-11-400-801	Integrated Drive Generator (IDG) Installation (P/B 401)
29-11-11-400-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation (P/B 401)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
73-11-01-400-801-F00	Fuel Pump Package Installation (P/B 401)

B. Consumable Materials

Reference	Description	Specification
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
D00599 [CP2442]	Oil - Engine	
D00601 [CP2101]	Vaseline - Graphite Mineral	

C. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Magnetic seal	72-63-00-04-072	LOM ALL
		72-63-00-04-265	LOM ALL
2	O-ring	72-63-00-04-020	LOM ALL
3	O-ring	72-63-00-04-100	LOM ALL

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the installation

SUBTASK 72-60-00-100-001-F00

WARNING

DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE. IT CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Clean the area of the rotating ring in the gear area with solvent, B00062:

(a) Remove all of the oil solids that stay on the gear area.

NOTE: This will prevent possible damage to the O-ring when you install it.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Install the Magnetic Seal

SUBTASK 72-60-00-410-001-F00

> **CAUTION** USE CLEAN, LINT-FREE GLOVES WHEN YOU TOUCH THE MAGNETIC SEALS. THIS WILL PREVENT CONTAMINATION.

> **CAUTION** REPLACE ALL OF THE SEAL, IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. MAGNETIC SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(1) Do these steps to install the magnetic seal [1]:

(a) Install the new O-ring [2] and O-ring [3]:

1) Apply a light layer of clean oil, D00599 [CP2442] on the O-rings.

2) Install the new O-ring [2] on the seal housing assembly (OD).

3) Install the new O-ring [3] on the rotating ring (ID).

> **CAUTION** MAKE SURE THE POLISHED FACE OF THE SEAL CASE AND THE CARBON FACE OF THE ROTATING RING ARE CLEAN. LEAKS WILL RESULT IF PARTICLES, EVEN OF A VERY SMALL SIZE, ARE BETWEEN THESE PARTS DURING THE INSTALLATION.

(b) Apply a layer of clean oil, D00599 [CP2442] to the carbon seal face of the rotating ring and the polished face of the seal case.

(c) Carefully install the rotating ring on the seal housing assembly:

1) Make sure the carbon seal touches the polished surface of the seal case.

2) Align the rotating ring with the internal diameter of the seal housing assembly.

(d) Apply a light layer of clean oil, D00599 [CP2442] to the bearing surface of the gear shaft that will touch the rotating ring and the O-ring.

> **CAUTION** DO NOT HIT THE MAGNETIC SEAL INTO THE GEARBOX RECESS. THE ROTATING RING AND SEAL HOUSING ASSEMBLY CAN MOVE APART AND THE CARBON SEAL CAN BE DAMAGED.

> **CAUTION** INSTALL THE ROTATING RING AND THE SEAL HOUSING ASSEMBLY TOGETHER ONTO THE GEAR SHAFT, UNTIL THE SEAL HOUSING ASSEMBLY TOUCHES THE GEARBOX. DO NOT SEPARATELY SLIDE THE ROTATING PART OF THE SEAL ONTO THE SHAFT. IF YOU INSTALL THE ROTATING RING AND SEAL HOUSING ASSEMBLY SEPARATELY, OIL LEAKAGE COULD OCCUR.

(e) Put the magnetic seal on the gear shaft.

1) Make sure the outer O-ring of the seal housing assembly touches the gearbox bearing housing.

(f) Apply a light layer of graphite mineral vaseline, D00601 [CP2101] to the three gearbox studs.

(g) Install the nuts and washers on the studs:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Tighten the nuts with your fingers.
2) Make sure the washers touch the seal housing assembly.

(h) Tighten the nuts in a sequence until the seal housing assembly moves fully into its position in contact with the gearbox housing.

(i) Tighten the nuts to 29.2-32.7 pound-inches (3.3-3.7 Newton meters).

SUBTASK 72-60-00-410-002-F00

(2) Do the applicable installation task that follows:

(a) Do this task: Fuel Pump Package Installation, TASK 73-11-01-400-801-F00.

(b) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation, TASK 29-11-11-400-801-001.

(c) Do this task: Integrated Drive Generator (IDG) Installation, TASK 24-11-11-400-801.

SUBTASK 72-60-00-200-001-F00

(3) Do the tests that are listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

SUBTASK 72-60-00-010-004-F00

(4) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

END OF TASK

TASK 72-60-00-000-802-F00

4. Sealol Seal - Removal

(Figure 201, Figure 203, Figure 204, Figure 205, Figure 206, Figure 207, Figure 208)

A. References

Reference	Title
24-11-11-000-801	Integrated Drive Generator (IDG) Removal (P/B 401)
29-11-11-000-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
72-63-01-000-801-F00	Handcranking Drive Cover Removal (P/B 201)
73-11-01-000-801-F00	Fuel Pump Package Removal (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2191	Pusher/Puller - CFM56-3 Sealol and Magnetic Seals Part #: 856A3576G01 Supplier: 58828
SPL-2262	Set - Tool, Jackscrew, Engine Disassembly Part #: 856A1130P12 Supplier: 58828
SPL-10797	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals (Commercial Only) Part #: 856A3576G02 Supplier: 58828
SPL-11935	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals Part #: 856A2961G03 Supplier: 58828

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C. **Consumable Materials**

Reference	Description	Specification
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Sealol Seal Removal**

SUBTASK 72-60-00-400-002-F00

(1) Use the table below to identify applicable tasks.

NOTE: Tasks for removal and installation of N2 drive pad Sealol seals differ based on Accessory Gearbox part number. AC effectivity may not reflect installed AGB.

Table 201/72-60-00-993-802-F00

Accessory Gearbox P/N	Post SB	N2 Drive Sealol Seal Assy P/N	Oil Seal – *[1]Matched Parts P/N	Oil Seal P/N	Mating Ring P/N	AIPC 72-63-00-02	SUBTASK
340-046-503-0	base	N/A	-	-	-	N/A	N/A
340-046-504-0	72-0316	N/A	-	-	-	N/A	N/A
340-046-505-0	72-0689	N/A	-	-	-	N/A	N/A
340-046-508-0	72-0564	340-155-304-0	340-155-404-0	340-155-504-0	340-155-601-0	Item 270, 280, 290, 285	72-60-00-020-001-F00
340-046-509-0	72-0879	340-155-305-0	340-155-405-0	340-155-505-0	340-155-601-0	Item 270, 280, 290, 285	72-60-00-020-002-F00

*[1] Matched parts consist of 1 each Oil Seal, and 1 each Mating Ring

SUBTASK 72-60-00-010-005-F00

(2) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-60-00-010-006-F00

(3) Do one of these applicable tasks to get access to the Sealol seal:

(a) Do this task: Fuel Pump Package Removal, TASK 73-11-01-000-801-F00.

(b) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal, TASK 29-11-11-000-801-001.

(c) Do this task: Integrated Drive Generator (IDG) Removal, TASK 24-11-11-000-801.

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(d) Do this task: Handcranking Drive Cover Removal, TASK 72-63-01-000-801-F00.

LOM ALL

SUBTASK 72-60-00-010-007-F00

CAUTION

DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(4) Remove the sealol seal [11] (Except N2 Drive Pad).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Remove the three nuts and washers that attach the seal housing assembly in the drive pad on the accessory gearbox housing.

(b) Remove the seal housing assembly (with the carbon seal) with the tool set, SPL-2262.

1) Remove and discard the O-ring [12] from the outer diameter of the seal housing assembly.

(c) To remove the rotating ring, do these steps (Figure 203):

1) Install the seal pusher/puller, SPL-10797, or the pusher/puller, SPL-2191.
2) Push and hold the seal pusher/puller sleeve against the front of the rotating ring.
3) Engage the claws behind the rotating ring and move the sleeve against the rotating ring.
4) Tighten the seal pusher/puller nut until the rotating ring is held tight by the claws.
5) Tighten the seal pusher/puller screw.
6) Attach the impact puller to the seal pusher/puller.
7) Operate the impact puller to remove the rotating ring.
8) Remove the rotating ring from the tool

a) Loosen the pusher/puller nut and the screw.
b) Remove and discard the O-ring [13].

LOM ALL; CFM ALL, POST CFM SB 72-0564 AND PRE CFM SB 72-0879

SUBTASK 72-60-00-020-001-F00

CAUTION DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(5) Remove the sealol seal [21] from the N2 drive pad (Figure 205).

(a) Remove the two bolts that attach the seal housing assembly in the N2 drive pad.

(b) Remove the seal housing assembly (with the carbon seal) with the tool set, SPL-2262.

NOTE: You can feel resistance when you remove the seal housing assembly because of the silicone sealant.

1) Remove and discard the O-ring [22] from the outer diameter of the seal housing assembly.

(c) To remove the rotating ring, do these steps (Figure 206):

1) Install the centering guide from the pusher/puller, SPL-11935, on the N2 drive pad with the three bolts.
2) Loosen the knurled nut and the grip to put the claws in the open position.
3) Install the pusher/puller, SPL-11935, in the centering guide.
4) Push and hold the pusher/puller assembly against the front of the rotating ring.
5) Tighten the grip and the knurled nut until the rotating ring is held tight by the claws.
6) Tighten the sleeve to lock the rotating ring in the claws.
7) Attach the impact puller to the seal pusher/puller.
8) Operate the impact puller to remove the rotating ring.
9) Remove the rotating ring from the tool.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

a) Loosen the sleeve.

b) Loosen the knurled nut and the grip.

10) Remove and discard the O-ring [23] from the inner diameter of the rotating ring.

11) Loosen the three bolts to remove the centering guide from the N2 drive pad.

(d) Install a blanking tool (local manufacture) with two standard O-rings (non engine parts) on the gearshaft (Figure 207, Figure 208):

1) Push the blanking tool in contact with the gearshaft.

(e) Carefully remove the existing silicone sealant deposits from the N2 drive pad with a plastic spatula.

WARNING

DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(f) Clean the mating surface of the N2 drive pad with solvent, B00062.

1) Make sure that the silicone sealant is removed from the mating ring of the N2 drive pad.

(g) Remove the blanking tool from the gearshaft.

LOM ALL; CFM ALL, POST CFM SB 72-0879

SUBTASK 72-60-00-020-002-F00

CAUTION

DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(6) Remove the sealol seal [21] from the N2 drive pad (Figure 205).

(a) Remove the two bolts that attach the seal housing assembly in the N2 drive pad.

(b) Remove the seal housing assembly (with the carbon seal) with the tool set, SPL-2262.

1) Remove and discard the O-ring [24] and the O-ring [22] from the outer diameter of the seal housing assembly.

(c) To remove the rotating ring, do these steps (Figure 206):

1) Install the centering guide from the pusher/puller, SPL-11935, on the N2 drive pad with the three bolts.

2) Loosen the knurled nut and the grip to put the claws in the open position.

3) Install the pusher/puller, SPL-11935, in the centering guide.

4) Push and hold the pusher/puller assembly against the front of the rotating ring.

5) Tighten the grip and the knurled nut until the rotating ring is held tight by the claws.

6) Tighten the sleeve to lock the rotating ring in the claws.

7) Attach the impact puller to the seal pusher/puller.

8) Operate the impact puller to remove the rotating ring.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL; CFM ALL, POST CFM SB 72-0879 (Continued)

9) Remove the rotating ring from the tool.
   a) Loosen the sleeve.
   b) Loosen the knurled nut and the grip.
10) Remove and discard the O-ring [23] from the inner diameter of the rotating ring.
11) Loosen the three bolts to remove the centering guide from the N2 drive pad.

LOM ALL

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0049400
G37699 S0006582529_V4

Sealol Seal Installation at IDG, Fuel Pump and Hydraulic Pump Pads
Figure 204/72-60-00-990-805-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 PRE SB 72-0652

2 POST SB 72-0652

2540158 S0000602652_V1

Sealol Seal Installation at IDG, Fuel Pump and Hydraulic Pump Pads
Figure 204/72-60-00-990-805-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0049500

2337959 S0000532662_V2

Sealol Seal Installation at the N2 Drive Pad
Figure 205/72-60-00-990-807-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M5B-SB-04B12-00-B

2425931 S0000561171_V2

Sealol Seal Installation at the N2 Drive Pad
Figure 205/72-60-00-990-807-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 POST SB 72-0879

2540160 S0000604043_V3

Sealol Seal Installation at the N2 Drive Pad
Figure 205/72-60-00-990-807-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0049600

1931548 S0000365093_V3

Sealol Seal Rotating Ring of the N2 Drive Pad
Figure 206/72-60-00-990-806-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0049700
1931634 S0000365094_V3

Sealol Seal Rotating Ring of the N2 Drive Pad
Figure 206/72-60-00-990-806-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING:

HARD PLASTIC

NOTE:

DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

B0049800
2337962 S0000532663_V2

Local Manufacture Blanking Tool
Figure 207/72-60-00-990-808-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0049900
2337968 S0000532664_V2

Blanking Tool Installation
Figure 208/72-60-00-990-809-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

B0050000

2337969 S0000532665_V2

RTV Sealant Application
Figure 209/72-60-00-990-810-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-60-00-400-802-F00

5. Sealol Seal - Installation

(Figure 201, Figure 203, Figure 204, Figure 205, Figure 206, Figure 209)

A. References

Reference	Title
24-11-11-400-801	Integrated Drive Generator (IDG) Installation (P/B 401)
29-11-11-400-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation (P/B 401)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-63-01-400-801-F00	Handcranking Drive Cover Installation (P/B 201)
73-11-01-400-801-F00	Fuel Pump Package Installation (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2191	Pusher/Puller - CFM56-3 Sealol and Magnetic Seals Part #: 856A3576G01 Supplier: 58828
SPL-10797	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals (Commercial Only) Part #: 856A3576G02 Supplier: 58828
SPL-11935	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals Part #: 856A2961G03 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
A01077 [CP2266]	Adhesive - Silicone Rubber - RTV 102	
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D00599 [CP2442]	Oil - Engine	
D00601 [CP2101]	Vaseline - Graphite Mineral	
D00672 [CP5070]	Vaseline - Pure Mineral	V V-P-236

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
11	Sealol seal	72-63-00-03-090	LOM ALL
		72-63-00-04-025	LOM ALL
12	O-ring	72-63-00-04-020	LOM ALL
13	O-ring	72-63-00-04-030	LOM ALL
14	O-ring	72-63-00-04-032	LOM ALL
21	Sealol seal	72-63-00-02-270	LOM ALL
22	O-ring	72-63-00-02-098	LOM ALL
23	O-ring	72-63-00-02-275	LOM ALL

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
24	O-ring	72-63-00-02-099	LOM ALL
		72-63-00-03-085	LOM ALL
		72-63-00-04-020	LOM ALL
		72-63-00-04-260	LOM ALL

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Installation

SUBTASK 72-60-00-410-003-F00

> **WARNING**
> DO NOT GET SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. SOLVENT IS POISONOUS AND FLAMMABLE WHICH CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Clean the gear area, that will touch the rotating ring, with solvent, B00062.

(a) Remove all of the oil solids that stay on the gear area.

NOTE: This will prevent possible damage to the O-ring when you install it.

G. Sealol Seal Installation

SUBTASK 72-60-00-400-001-F00

(1) Use the table below to identify applicable tasks.

NOTE: Tasks for removal and installation of N2 drive pad Sealol seals differ based on Accessory Gearbox part number. AC effectivity may not reflect installed AGB.

Table 202/72-60-00-993-801-F00

Accessory Gearbox P/N	Post SB	N2 Drive Sealol Seal Assy P/N	Oil Seal – *[1]Matched Parts P/N	Oil Seal P/N	Mating Ring P/N	AIPC 72-63-00-02	SUBTASK
340-046-503-0	base	N/A	-	-	-	N/A	N/A
340-046-504-0	72-0316	N/A	-	-	-	N/A	N/A
340-046-505-0	72-0689	N/A	-	-	-	N/A	N/A
340-046-508-0	72-0564	340-155-304-0	340-155-404-0	340-155-504-0	340-155-601-0	Item 270, 280, 290, 285	72-60-00-420-001-F00
340-046-509-0	72-0879	340-155-305-0	340-155-405-0	340-155-505-0	340-155-601-0	Item 270, 280, 290, 285	72-60-00-420-002-F00

*[1] Matched parts consist of 1 each Oil Seal, and 1 each Mating Ring

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-60-00-410-004-F00

> **CAUTION** MAKE SURE THAT YOU USE CLEAN, LINT-FREE GLOVES WHEN YOU TOUCH THE SEALOL SEALS. THIS WILL PREVENT CONTAMINATION. CONTAMINATION CAN CAUSE DAMAGE TO THE SEALS.

> **CAUTION** DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(2) Do these steps to install the sealol seal [11] (Except N2 Drive Pad):

(a) Install the new O-rings:

1) Apply a light layer of clean oil, D00599 [CP2442], on the O-rings.

2) Install the new O-ring [12] in the grooves on the seal housing assembly (OD).

3) Install the new O-ring [13] or the new O-ring [14] in the grooves on the rotating ring (ID).

(b) Apply a light layer of clean oil, D00599 [CP2442], on bearing surfaces of the gear shaft:

1) Apply the oil on the bearing surfaces of the gear shaft which will touch the O-ring on the rotating ring.

> **CAUTION** MAKE SURE THAT THE POLISHED FACE OF THE ROTATING RING AND THE CARBON FACE OF THE SEAL HOUSING ARE CLEAN. LEAKS WILL OCCUR IF SMALL PARTICLES ARE BETWEEN THESE PARTS WHEN YOU INSTALL THEM.

(c) Apply a layer of clean oil, D00599 [CP2442] to the carbon seal face of the seal housing assembly.

(d) Install the rotating ring on the gear shaft with the pusher/puller, SPL-10797, or the pusher/puller, SPL-2191 (Figure 203):

1) Loosen the pusher/puller nut and screw.

2) Put the rotating ring on the tool and against the sleeve.

3) Tighten the pusher/puller screw, then tighten the pusher/puller nut to make sure the rotating ring will not turn in the sleeve.

4) Install the rotating ring on the gear shaft:

a) Turn the pusher/puller, with the handle, until the slots in the rotating ring align with the lugs in the bearing.

b) Turn the pusher/puller in each direction to make sure the rotating ring slots are engaged with the bearing lugs.

5) Loosen the pusher/puller screw and nut.

6) Remove the tool.

> **CAUTION** DO NOT TAP THE SEALOL SEAL INTO THE GEARBOX RECESS. THE ROTATING RING AND SEAL CASE CAN MOVE APART AND CAUSE DAMAGE TO THE CARBON SEAL.

(e) Put the seal housing assembly on the gear shaft (Figure 204).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Make sure the outer O-ring of the seal housing assembly touches the gearbox bearing housing.

(f) Apply a light layer of graphite mineral vaseline, D00601 [CP2101], to the three gearbox studs.

(g) Install the nuts and washers on the studs:

1) Tighten the nuts with your fingers.

2) Make sure the washers touch the seal housing assembly.

(h) Tighten the nuts in a sequence until the seal housing goes fully into its position in contact with the gearbox housing assembly.

(i) Torque the nuts to 29.2-32.7 pound-inches (3.3-3.7 Newton meters).

LOM ALL; CFM ALL, POST CFM SB 72-0564 AND PRE CFM SB 72-0879

SUBTASK 72-60-00-420-001-F00

CAUTION MAKE SURE THAT YOU USE CLEAN, LINT-FREE GLOVES WHEN YOU TOUCH THE SEALOL SEALS. THIS WILL PREVENT CONTAMINATION. CONTAMINATION CAN CAUSE DAMAGE TO THE SEALS.

CAUTION DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(3) Do these steps to install the sealol seal [21] on the N2 Drive Pad:

CAUTION MAKE SURE THAT THE POLISHED FACE OF THE ROTATING RING AND THE CARBON FACE OF THE SEAL HOUSING ARE CLEAN. LEAKS WILL OCCUR IF SMALL PARTICLES ARE BETWEEN THESE PARTS WHEN YOU INSTALL THEM.

(a) Clean the mating surface of the rotating ring and the carbon seal glazed surface of the seal housing assembly with acetone solvent, B01058 [CP1039].

(b) Clean the surfaces of the gear shaft which will touch the O-ring on the rotating ring with acetone solvent, B01058 [CP1039].

(c) Install the new O-ring [23] on the rotating ring:

1) Apply a light layer of vaseline, D00672 [CP5070], on the O-ring.

2) Install the O-ring in the groove on the rotating ring (ID).

(d) Apply a layer of clean oil, D00599 [CP2442], on the mating surface of the rotating ring.

(e) Apply a light layer of clean oil, D00599 [CP2442], on the bearing surface of the gear shaft:

1) Apply the oil on the bearing surfaces of the gear shaft which will touch the O-ring on the rotating ring.

(f) Install the rotating ring on the gear shaft with the pusher/puller, SPL-11935 (Figure 206):

1) Install the centering guide on the N2 drive pad with the three bolts.

2) Loosen the knurled nut and the grip.

3) Install the rotating ring on the claws of the grip.

4) Put the rotating ring on the tool and against the sleeve.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

5) Tighten the grip and the knurled nut. Make sure that the position of the rotating ring is correct in the claws of the grip.

6) Tighten the sleeve to lock the rotating ring in the claws.

7) Insert the pusher/puller assembly into the centering guide to install the rotating ring on the gear shaft.

8) Turn the pusher/puller until the lugs of the rotating ring engage into the slots of the ball bearing inner race.

9) Make sure that the rotating ring is correctly installed.

   a) Make sure that the bottom face of the sleeve window is in line with the AGB forward face.

10) Loosen the sleeve.

   a) Push the seal pusher/puller to make sure the rotating ring stays in place.

> **CAUTION** MAKE SURE THAT THE GRIP CLAWS ARE FULLY DISENGAGED. DO NOT PULL AND DISENGAGE THE ROTATING RING WITH THE SEAL PUSHER/PULLER. DAMAGE TO THE RING AND OIL LEAKAGE CAN OCCUR.

11) Loosen the knurled nut and the grip.

12) Remove the pusher/puller from the centering guide.

13) Loosen the three bolts and remove the centering guide from the N2 drive pad.

(g) Apply a light layer of oil, D00599 [CP2442], to the polished face of the rotating ring.

> **CAUTION** DO NOT TAP THE SEALOL SEAL INTO THE GEARBOX RECESS. THE ROTATING RING AND SEAL CASE CAN MOVE APART AND CAUSE DAMAGE TO THE CARBON SEAL.

(h) Prepare the seal housing assembly for installation (Figure 205, Figure 209):

1) Apply RTV 102 adhesive, A01077 [CP2266], to the oil seal assembly at the angle formed by the centering diameter and the mating face, and to the mating ring where there is no mating face.

   NOTE: This operation does not need any surface preparing, hand blending or primary coating application.

   a) Smooth the RTV 102 sealant on all the diameter with a 0.118 x 0.118 in (3 x 3 mm) plastic spatula, except in the area where there is no mating face.

2) Install the new O-ring [22] on the seal housing assembly:

   a) Apply a light layer of vaseline, D00672 [CP5070], to the O-ring.

   b) Install the O-ring in the groove on the seal housing assembly (OD).

(i) Install the seal housing assembly on the gear shaft.

1) Make sure that the outer O-ring of the seal housing assembly touches the gearbox bearing housing.

(j) Make sure that the seal housing assembly is correctly engaged with the centering pin on the N2 drive pad.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL; CFM ALL, POST CFM SB 72-0564 AND PRE CFM SB 72-0879 (Continued)

(k) Remove any unwanted RTV 102 adhesive, A01077 [CP2266], around the seal housing assembly with a dry cloth and a spatula (no solvent).

1) Examine the N2 Pad cover side to make sure that the drain cavity is not clogged by residual RTV 102 adhesive, A01077 [CP2266].

(l) Let the RTV 102 sealant cure for 3 hours before starting the engine.

(m) Apply a light layer of graphite mineral vaseline, D00601 [CP2101], to the threads of the two attaching bolts.

(n) Attach the seal housing assembly with the two bolts on the N2 drive pad.

(o) Make sure that the seal is correctly installed with the checking tool of the pusher/puller, SPL-11935.

(p) Torque the bolts to 49 in-lb (5.5 N·m) - 58 in-lb (6.5 N·m).

LOM ALL; CFM ALL, POST CFM SB 72-0879

SUBTASK 72-60-00-420-002-F00

CAUTION MAKE SURE THAT YOU USE CLEAN, LINT-FREE GLOVES WHEN YOU TOUCH THE SEALOL SEALS. THIS WILL PREVENT CONTAMINATION. CONTAMINATION CAN CAUSE DAMAGE TO THE SEALS.

CAUTION DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(4) Do these steps to install the sealol seal [21] on the N2 Drive Pad:

CAUTION MAKE SURE THAT THE POLISHED FACE OF THE ROTATING RING AND THE CARBON FACE OF THE SEAL HOUSING ARE CLEAN. LEAKS WILL OCCUR IF SMALL PARTICLES ARE BETWEEN THESE PARTS WHEN YOU INSTALL THEM.

(a) Clean the mating surface of the rotating ring and the carbon seal glazed surface of the seal housing assembly with acetone solvent, B01058 [CP1039].

(b) Clean the surfaces of the gear shaft which will touch the O-ring on the rotating ring with acetone solvent, B01058 [CP1039].

(c) Install the new O-ring [23] on the rotating ring:

1) Apply a light layer of vaseline, D00672 [CP5070], on the O-ring.

2) Install the O-ring in the groove on the rotating ring (ID).

(d) Apply a layer of clean oil, D00599 [CP2442], on the mating surface of the rotating ring.

(e) Apply a light layer of clean oil, D00599 [CP2442], on the bearing surface of the gear shaft:

1) Apply the oil on the bearing surfaces of the gear shaft which will touch the O-ring on the rotating ring.

(f) Install the rotating ring on the gear shaft with the pusher/puller, SPL-11935, (Figure 206):

1) Install the centering guide on the N2 drive pad with the three bolts.

2) Loosen the knurled nut and the grip.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL; CFM ALL, POST CFM SB 72-0879 (Continued)

3) Install the rotating ring on the claws of the grip.
4) Put the rotating ring on the tool and against the sleeve.
5) Tighten the grip and the knurled nut. Make sure that the position of the rotating ring is correct in the claws of the grip.
6) Tighten the sleeve to lock the rotating ring in the claws.
7) Insert the pusher/puller assembly into the centering guide to install the rotating ring on the gear shaft.
8) Turn the pusher/puller until the lugs of the rotating ring engage into the slots of the ball bearing inner race.
9) Make sure that the rotating ring is correctly installed.
   a) Make sure that the bottom face of the sleeve window is in line with the AGB forward face.
10) Loosen the sleeve.
   a) Push the seal pusher/puller to make sure the rotating ring stays in place.

CAUTION MAKE SURE THAT THE GRIP CLAWS ARE FULLY DISENGAGED. DO NOT PULL AND DISENGAGE THE ROTATING RING WITH THE SEAL PUSHER/PULLER. DAMAGE TO THE RING AND OIL LEAKAGE CAN OCCUR.

11) Loosen the knurled nut and the grip.
12) Remove the pusher/puller from the centering guide.
13) Loosen the three bolts and remove the centering guide from the N2 drive pad.

(g) Apply a light layer of oil, D00599 [CP2442], to the polished face of the rotating ring.

CAUTION DO NOT TAP THE SEALOL SEAL INTO THE GEARBOX RECESS. THE ROTATING RING AND SEAL CASE CAN MOVE APART AND CAUSE DAMAGE TO THE CARBON SEAL.

(h) Prepare the seal housing assembly for installation (Figure 205):
   1) Install the new O-ring [22] on the seal housing assembly:
      a) Apply a light layer of oil, D00599 [CP2442], to the O-ring.
      b) Install the O-ring in the groove on the seal housing assembly (OD).
   2) Install the new O-ring [24] on the seal housing assembly:
      a) Apply a light layer of oil, D00599 [CP2442], to the O-ring.
      b) Install the O-ring in the groove on the seal housing assembly (OD).

(i) Install the seal housing assembly on the gear shaft.
   1) Make sure that the outer O-ring of the seal housing assembly touches the gearbox bearing housing.

(j) Make sure that the seal housing assembly is correctly engaged with the centering pin on the N2 drive pad.

(k) Apply a light layer of graphite mineral vaseline, D00601 [CP2101], to the threads of the two attaching bolts.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL; CFM ALL, POST CFM SB 72-0879 (Continued)

(l) Attach the seal housing assembly with the two bolts on the N2 drive pad.

(m) Make sure that the seal is correctly installed with the checking tool of the pusher/puller, SPL-11935.

(n) Tighten the bolts to 49 in-lb (5.5 N·m) - 58 in-lb (6.5 N·m).

LOM ALL

SUBTASK 72-60-00-410-005-F00

(5) Do the applicable installation task that follows:

(a) Do this task: Fuel Pump Package Installation, TASK 73-11-01-400-801-F00.

(b) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation, TASK 29-11-11-400-801-001.

(c) Do this task: Integrated Drive Generator (IDG) Installation, TASK 24-11-11-400-801.

(d) Do this task: Handcranking Drive Cover Installation, TASK 72-63-01-400-801-F00.

SUBTASK 72-60-00-200-003-F00

(6) Do the tests that are listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

SUBTASK 72-60-00-010-008-F00

(7) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ACCESSORY DRIVES - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has two tasks:
      (1) A visual check of the mounts for the accessory gearbox and transfer gearbox
      (2) A visual check for oil leakage from the accessory gearbox, the transfer gearbox and the horizontal drive shaft.

TASK 72-60-00-200-801-F00

2. **Accessory Gearbox and Transfer Gearbox Mount Inspection**
(Figure 601 and Figure 602)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This is a visual check of the mounts on the transfer gearbox (TGB) housing and the accessory gearbox housing (AGB).

(2) The AGB is on the left side of the fan case and the TGB is at the 9:00 o'clock position on the fan frame.

B. References

Reference	Title
71-00-02-000-801-F00	Power Plant - Removal (P/B 401)
71-00-02-400-801-F00	Power Plant - Installation (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-62-00-000-801-F00	Transfer Gearbox Assembly Removal (P/B 401)
72-62-00-400-801-F00	Transfer Gearbox Assembly Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-60-00-210-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-60-00-210-002-F00

(2) Do a visual check of the AGB clevis mounts for damage (Figure 601):
   (a) If you find damage that is more than the limits, replace the engine, unless you are given other instructions.

   These are the tasks:

   Power Plant - Removal, TASK 71-00-02-000-801-F00,

   Power Plant - Installation, TASK 71-00-02-400-801-F00.

   (b) Cracks
      1) Not serviceable.
   (c) Loose bushing in the clevis mounts

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Not permitted.

(d) Loose mount pin

1) Not permitted.

a) Tighten the mount pin if it is loose.

SUBTASK 72-60-00-210-003-F00

(3) Do a visual check of the TGB mounts for damage (Figure 602):

(a) If you find damage that is more than the limits, replace the TGB, unless you are given other instructions.

These are the tasks:

Transfer Gearbox Assembly Removal, TASK 72-62-00-000-801-F00,

Transfer Gearbox Assembly Installation, TASK 72-62-00-400-801-F00.

(b) Cracks

1) Not serviceable.

(c) Loose attachment bolts

1) Not permitted.

a) Tighten the attachment nut (TASK 72-62-00-400-801-F00).

SUBTASK 72-60-00-210-004-F00

(4) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G28311 S0006582533_V2

Accessory Gearbox Inspection
Figure 601/72-60-00-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0018700
G28331 S0006582534_V3

Transfer Gearbox Inspection
Figure 602/72-60-00-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-60-00-200-802-F00

3. Accessory Gearbox, Transfer Gearbox, and Horizontal Drive Shaft - Oil Leakage Inspection

A. General

(1) This is a visual check for oil leaks from the transfer gearbox (TGB) housing, the accessory gearbox housing (AGB) and the horizontal drive shaft housing (HDS).

(2) The AGB is on the left side of the fan case and the TGB is at the 9:00 o'clock position on the fan frame.

(3) The HDS housing is between the AGB and the TGB.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-60-00-010-009-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-60-00-210-005-F00

(2) Do a visual check of the AGB for oil leakage.

SUBTASK 72-60-00-210-006-F00

(3) Do a visual check of the TGB for oil leakage.

SUBTASK 72-60-00-210-007-F00

(4) Do a visual check of the HDS housing for oil leakage.

SUBTASK 72-60-00-900-001-F00

(5) If you find evidence of oil leakage, repair or replace components as it is necessary to stop the leakage.

SUBTASK 72-60-00-410-006-F00

(6) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TRANSFER GEARBOX ASSEMBLY - MAINTENANCE PRACTICES

1. General

A. This procedure has three tasks:

(1) Replacement of the 32-tooth bevel gear oil nozzle O-rings.

(2) Replacement of the 31-tooth bevel gear oil nozzle O-rings.

(3) Replacement of the bevel gear oil nozzle O-rings.

TASK 72-62-00-960-801-F00

2. Replacement of the 32-Tooth Bevel Gear Oil Nozzle O-rings

(Figure 201, Figure 202)

A. General

(1) This task is the replacement procedure for the 32-Tooth Bevel Gear Oil Nozzle O-rings.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-6180	Kit - Puller Adapter Part #: 856A2668G02 Supplier: 58828
SPL-9874	Set - Seal Fittings Tool, AGB & TGB Oil Nipple - CFM56-3 Engine Part #: 856A3330G01 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D00599 [CP2442]	Oil - Engine	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	O-ring	72-62-00-01-145	LOM 402, 404, 406, 407, 411, 416, 445
		72-62-00-01A-195	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
2	O-ring	72-62-00-01-150	LOM 402, 404, 406, 407, 411, 416, 445
		72-62-00-01A-200	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
7	O-ring	72-62-00-01-115	LOM 402, 404, 406, 407, 411, 416, 445

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
7 (cont.)		72-62-00-01A-160	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

G. Prepare for the Removal

SUBTASK 72-62-00-860-001-F00

(1) Do this step:

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-62-00-020-008-F00

(2) Set the start levers to the CUTOFF position:

(a) Install DO-NOT-OPERATE tags on the start levers.

SUBTASK 72-62-00-010-002-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

H. Replacement of the 32-tooth bevel gear oil nozzle O-rings

SUBTASK 72-62-00-960-001-F00

WARNING DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND OTHER EQUIPMENT FOR PROTECTION, OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

WARNING DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(WARNING PRECEDES)

> **WARNING** ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(1) Do these steps to replace the 32-tooth bevel gear oil nozzle o-ring [1] and o-ring [2] (Figure 201, Figure 202).

(a) Remove the bolt [3] which attaches the oil nozzle plug [4] to the transfer gearbox (TGB) housing.

(b) Remove the plug [4] with the inner adapter P30 [5] of the puller adapters, SPL-6180 and impact puller [6].

(c) Remove the inner adapter P30 [5] of the puller adapter, SPL-6180.

(d) Remove and discard the o-ring [7].

(e) Remove the oil nozzle [8] with the inner adapter P32 [9] of the puller adapter, SPL-6180, and an impact puller [6].

(f) Remove the inner adapter P32 [9] of the puller adapter, SPL-6180.

(g) Remove and discard o-ring [1] and o-ring [2].

> **WARNING** MAKE SURE TO PREVENT ACETONE CONTACT WITH SKIN. ACETONE IRRITATES SKIN AND IS EXPLOSIVE. USE FUME CONTROL OR USE A RESPIRATOR TO PREVENT INJURY.

(h) Clean the oil nozzle [8] with acetone solvent, B01058 [CP1039].

> **WARNING** ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(i) Apply a layer of engine oil, D00599 [CP2442] on the new o-ring [1] and o-ring [2].

(j) Use the seal fittings tool set, SPL-9874 to install the new o-ring [1] on the oil nozzle [8] then manually install the new o-ring [2].

> **WARNING** ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(k) Install the new o-ring [7] with engine oil, D00599 [CP2442] on the plug [4].

> **WARNING** ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(l) Install the plug [4] with engine oil, D00599 [CP2442] into the oil nozzle [8].

(m) Attach the oil nozzle [8] to the TGB housing with the bolt [3].

1) Torque the bolt [3] to 95 in-lb (11 N·m) - 105 in-lb (12 N·m).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-62-00-410-004-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-62-00-860-002-F00

(2) Do this step:

Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-62-00-020-009-F00

(3) Remove the DO-NOT-OPERATE tags from the start levers.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2524848 S0000594910_V1

Transfer Gearbox Assembly
Figure 201/72-62-00-990-805-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

2524849 S0000594916_V1

Transfer Gearbox Assembly
Figure 201/72-62-00-990-805-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

PRE SB 72-0133

D

2524852 S0000594999_V1

Transfer Gearbox Assembly
Figure 201/72-62-00-990-805-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2524850 S0000594920_V1

Removal/Installation of the Oil Nozzles
Figure 202/72-62-00-990-806-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-62-00-960-804-F00

3. Replacement of the 31-Tooth Bevel Gear Oil Nozzle O-rings

(Figure 201, Figure 202)

A. General

(1) This task is the replacement procedure for the 31-Tooth Bevel Gear Oil Nozzle O-rings.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-6180	Kit - Puller Adapter Part #: 856A2668G02 Supplier: 58828
SPL-9874	Set - Seal Fittings Tool, AGB & TGB Oil Nipple - CFM56-3 Engine Part #: 856A3330G01 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D00599 [CP2442]	Oil - Engine	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
10	O-ring	72-62-00-01-145	LOM 402, 404, 406, 407, 411, 416, 445
		72-62-00-01A-195	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
11	O-ring	72-62-00-01-150	LOM 402, 404, 406, 407, 411, 416, 445
		72-62-00-01A-200	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
12	O-ring	72-62-00-01-115	LOM 402, 404, 406, 407, 411, 416, 445
		72-62-00-01A-160	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G. Prepare for the Removal

SUBTASK 72-62-00-860-004-F00

(1) Do this step:

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-62-00-980-001-F00

(2) Set the start levers in the CUTOFF position:

(a) Install DO-NOT-OPERATE tags on the start levers.

SUBTASK 72-62-00-010-003-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

H. Replacement of the 31-Tooth Bevel Gear Oil Nozzle O-rings

SUBTASK 72-62-00-960-004-F00

WARNING DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND OTHER EQUIPMENT FOR PROTECTION, OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

WARNING DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

WARNING ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(1) Do these steps to replace the 31-tooth bevel gear oil nozzle o-ring [10] and o-ring [11] (Figure 201, Figure 202).

(a) Remove the bolt [13] which attaches the oil nozzle plug [14] to the transfer gearbox (TGB) housing.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Remove the plug [14] with the inner adapter P30 [5] of the puller adapter, SPL-6180 and an impact puller [6].

(c) Remove the inner adapter P30 [5] of the puller adapter, SPL-6180.

(d) Remove and discard the o-ring [12].

(e) Remove the oil nozzle [15] with the inner adapter P32 [9] of the puller adapter, SPL-6180, and an impact puller [6].

(f) Remove the inner adapter P32 [9] of the puller adapters, SPL-6180.

(g) Remove and discard the o-ring [10] and o-ring [11].

WARNING MAKE SURE TO PREVENT ACETONE CONTACT WITH SKIN. ACETONE IRRITATES SKIN AND IS EXPLOSIVE. USE FUME CONTROL OR USE A RESPIRATOR TO PREVENT INJURY.

(h) Clean the oil nozzle [15] with acetone solvent, B01058 [CP1039].

WARNING ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(i) Apply a layer of oil, D00599 [CP2442] on the new o-ring [10] and the new o-ring [11].

(j) Use the seal fittings tool set, SPL-9874 to install the new o-ring [10] on the oil nozzle [15] then manually install the new o-ring [11].

WARNING ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(k) Install the new o-ring [12] with oil, D00599 [CP2442] on the plug [14].

WARNING ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(l) Install the plug [14] with engine oil, D00599 [CP2442] into the oil nozzle [15].

(m) Attach the oil nozzle [15] to the TGB housing with the bolt [13].

1) Torque the bolt [13] to 95 in-lb (11 N·m) - 105 in-lb (12 N·m).

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-62-00-410-005-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-62-00-860-003-F00

(2) Do this step:

Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-62-00-020-010-F00

(3) Remove the DO-NOT-OPERATE tags from the start levers.

——— END OF TASK ———

TASK 72-62-00-960-803-F00

4. Replacement of the Bevel Gear Oil Nozzle O-rings

(Figure 201, Figure 202, Figure 203, Figure 204)

A. General

(1) This task is the replacement procedure for the Bevel Gear Oil Nozzle O-rings.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-6180	Kit - Puller Adapter Part #: 856A2668G02 Supplier: 58828
SPL-9874	Set - Seal Fittings Tool, AGB & TGB Oil Nipple - CFM56-3 Engine Part #: 856A3330G01 Supplier: 58828
SPL-14939	Tool Set - Removal/Installation Transfer Gearbox Adapter and Nipple Restrictor Part #: 856A3551G01 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D00599 [CP2442]	Oil - Engine	
D00601 [CP2101]	Vaseline - Graphite Mineral	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
27	O-ring	72-62-00-01-120	LOM 402, 404, 406, 407, 411, 416, 445
		72-62-00-01A-165	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
30	O-ring	72-62-00-01-145	LOM 402, 404, 406, 407, 411, 416, 445

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
30 (cont.)		72-62-00-01A-195	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
31	O-ring	72-62-00-01-150	LOM 402, 404, 406, 407, 411, 416, 445
		72-62-00-01A-200	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

G. Prepare for the Removal

SUBTASK 72-62-00-860-005-F00

(1) Do this step:

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-62-00-980-002-F00

(2) Set the start levers to the CUTOFF position:

(a) Install DO-NOT-OPERATE tags on the start levers.

SUBTASK 72-62-00-010-004-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

H. Replacement of the Bevel Gear Oil Nozzle O-rings

SUBTASK 72-62-00-960-005-F00

WARNING DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(WARNING PRECEDES)

> **WARNING** DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND OTHER EQUIPMENT FOR PROTECTION, OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

> **WARNING** DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

> **WARNING** ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(1) Do these steps to disconnect the transfer gearbox (TGB) oil supply tube [16] (Figure 201, Figure 203).

LOM ALL PRE SB CFM56-7B-72-0133

(a) Remove the bolt [17], nut [18], clamp [19] and clamp [20].

NOTE: The clamps hold the TGB oil supply tube [16] and the vent tube [21] to the bracket [22] on the fan frame.

NOTE: Post SB 72-0133 engines do not have fitting hardware of the TGB oil supply tube [16].

LOM ALL

(b) Disconnect the TGB oil supply tube [16] from the forward oil supply tube.

(c) Disconnect the TGB oil supply tube [16] from the TGB nipple [23].

SUBTASK 72-62-00-960-003-F00

(2) Do these steps to replace the bevel gear oil nozzle O-rings (Figure 202, Figure 204).

(a) Remove the bolt [25] which attaches the TGB nipple [23] to the TGB housing.

(b) Remove the TGB nipple [23] with the extractor P02 [26] of the removal/installation tool set, SPL-14939 and impact puller [6].

(c) Remove the extractor P02 [26] of the removal/installation tool set, SPL-14939.

(d) Remove and discard the o-ring [27] from the TGB nipple [23].

(e) Remove the oil nozzle [28] with the inner adapter P32 [9] of the puller adapters, SPL-6180.

(f) Remove the inner adapter P32 [9] of the puller adapter, SPL-6180.

(g) Remove and discard the o-ring [30] and o-ring [31].

> **WARNING** MAKE SURE TO PREVENT ACETONE CONTACT WITH SKIN. ACETONE IRRITATES SKIN AND IS EXPLOSIVE. USE FUME CONTROL OR USE A RESPIRATOR TO PREVENT INJURY.

(h) Clean the oil nozzle [28] with acetone solvent, B01058 [CP1039].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(i) Apply a layer of engine oil, D00599 [CP2442] on the new o-ring [30] and o-ring [31].

(j) Use the seal fittings tool set, SPL-9874 to install the new o-ring [30] on the oil nozzle [28] then manually install the new o-ring [31].

WARNING ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(k) Apply a layer of engine oil, D00599 [CP2442] on the new o-ring [27].

(l) Use the seal fittings tool set, SPL-9874 to install the new o-ring [27] on the TGB nipple [23].

WARNING ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(m) Install the TGB nipple [23] with engine oil, D00599 [CP2442] into the oil nozzle [28].

(n) Attach the oil nozzle [28] to the TGB housing with the bolt [25].

1) Torque the bolt [25] to 95 in-lb (11 N·m) - 105 in-lb (12 N·m).

SUBTASK 72-62-00-410-003-F00

(3) Do these steps to connect the TGB oil supply tube [16] to the TGB (Figure 201, Figure 203).

WARNING ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(a) Lubricate the threads of the TGB nipple [23] with engine oil, D00599 [CP2442].

(b) Connect the TGB oil supply tube [16] to the TGB nipple [23].

1) Torque the coupling nut of the TGB oil supply tube [16] to 270 in-lb (31 N·m) - 300 in-lb (34 N·m).

(c) Connect the TGB oil supply tube [16] to the forward oil supply tube.

1) Torque the coupling nut of the TGB oil supply tube [16] to 270 in-lb (31 N·m) - 300 in-lb (34 N·m).

LOM ALL PRE SB CFM56-7B-72-0133

(d) Install the clamp [19], clamp [20] and lightly coat the threads of bolt [17] with graphite mineral vaseline, D00601 [CP2101].

(e) Attach tube clamps with bolt [17] and nut [18] to the fan frame bracket [22].

1) Torque the bolt [17] to 100.0 in-lb (11.3 N·m) - 110.0 in-lb (12.4 N·m).

LOM ALL

ECCN 9E991 BOEING PROPRIETARY - See title page for details

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-62-00-410-006-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-62-00-860-006-F00

(2) Do this step:

Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-62-00-020-011-F00

(3) Remove the DO-NOT-OPERATE tags from the start levers.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

PRE SB 72-0133

A

2535555 S0000601763_V1

Removal/Installation of the TGB Oil Supply Tube
Figure 203/72-62-00-990-807-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2524853 S0000595001_V1

Removal/Installation of the Oil Nozzle
Figure 204/72-62-00-990-809-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TRANSFER GEARBOX ASSEMBLY - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of the transfer gearbox

(2) The installation of the transfer gearbox.

TASK 72-62-00-000-801-F00

2. Transfer Gearbox Assembly Removal

(Figure 401, Figure 402)

A. General

(1) For this procedure, the transfer gearbox will be referred to as the TGB.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
72-63-01-000-801-F00	Handcranking Drive Cover Removal (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2192	Wrench - Horizontal Drive Shaft Nut Part #: 856A3604P01 Supplier: 58828
SPL-11931	Core Engine Sealing Plate and Locking Adapter Part #: 856A3728G01 Supplier: 58828
SPL-11934	Core Engine Sealing Plate and Locking Adapter Part #: 856A3728G02 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for Removal

SUBTASK 72-62-00-040-001-F00

(1) Do this step:

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-62-00-040-002-F00

(2) Set the start levers in the CUTOFF position:

(a) Install DO-NOT-OPERATE tags on the start levers.

SUBTASK 72-62-00-010-001-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

G. TGB Removal

SUBTASK 72-62-00-020-001-F00

(1) Do these steps to disconnect the top-mounted connections from the TGB (Figure 401):

LOM ALL PRE SB CFM56-7B-72-0133

(a) Remove the bolt [21], the nut [22], and the two clamp [23] and clamp [24].

NOTE: The clamps hold the oil supply tube [6] and the vent tube [7] to the bracket [20] on the fan frame.

LOM ALL POST SB CFM56-7B-72-0133

(b) Remove the bolt [21], the nut [22] and the clamp [23].

NOTE: The clamp holds the vent tube [7] to the bracket [20] on the fan frame.

LOM ALL

CAUTION USE TWO WRENCHES TO LOOSEN THE TUBE COUPLING NUTS. USE ONE WRENCH TO HOLD THE NIPPLE FITTING. USE THE OTHER WRENCH TO LOOSEN THE COUPLING NUT. IF THE NIPPLE FITTING TURNS, DAMAGE CAN OCCUR.

(c) Disconnect the TGB tubes as follows:

1) Disconnect the oil supply tube [6] from the TGB [11].

2) Disconnect the vent tube [7] from the TGB [11].

(d) Remove the two bolts [28] that attach the bracket [29] to the square flange of the vent nipple square flange [30].

SUBTASK 72-62-00-020-002-F00

(2) Do these steps to disconnect the bottom-mounted connections from the TGB:

(a) Remove the two bolts [12] that attach the bracket [13] to the TGB [11] housing.

(b) Do these steps to disconnect the oil return tube [15]:

1) Remove the four bolts [14] that attach the oil return tube [15] to the TGB [11].

2) Disconnect the oil return tube [15] from the TGB [11].

3) Keep the gasket [16] for the installation.

(c) Put blanking plugs and caps on the openings.

SUBTASK 72-62-00-480-001-F00

(3) Do these steps to lock the AGB [1]:

NOTE: This step is necessary to make sure the AGB does not turn.

(a) Do this task: Handcranking Drive Cover Removal, TASK 72-63-01-000-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

(b) Lock the AGB [1] with the Locking Adapter, SPL-11931.

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(c) Lock the AGB [1] with the locking adapter, SPL-11934.

LOM ALL

SUBTASK 72-62-00-020-003-F00

(4) Do these steps to disconnect the TGB [11] from the AGB [1]:

(a) Remove the V-clamp nut [3] on the V-clamp [2] (Figure 402).

(b) Remove the V-clamp [2] at the interface between the AGB [1] and the TGB [11].

(c) Lubricate the horizontal drive shaft housing [5] with oil, D00599 [CP2442].

(d) Put a container below the TGB and AGB interface.

WARNING DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE IS STOPPED. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND OTHER EQUIPMENT FOR PROTECTION, OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

WARNING DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

CAUTION DO NOT LET ALKALINE CLEANING FLUID GET IN THE ENGINE OIL. VERY SMALL QUANTITIES OF THIS FLUID CAN CHEMICALLY CHANGE THE OIL. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(e) Move the TGB sleeve [4] rearward on the horizontal drive shaft housing [5] to get access to the locking nut [25] on the horizontal drive shaft (Figure 402).

CAUTION THE HORIZONTAL DRIVE SHAFT LOCKING-NUT HAS LEFT-HAND THREADS. DO NOT APPLY A COUNTERCLOCKWISE TORQUE TO THE NUT. IF YOU DO, DAMAGE TO THE SHAFT CAN OCCUR.

(f) Use the wrench, SPL-2192 to loosen the locking nut [25].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(g) Disengage the horizontal drive shaft [26] from the AGB [1] and fully retract it in the TGB [11].

SUBTASK 72-62-00-020-004-F00

(5) Remove the TGB [11] from the engine as follows (Figure 401):

WARNING	BE CAREFUL WHEN YOU MOVE THE TGB. BECAUSE THE TGB WEIGHS APPROXIMATELY 44 POUNDS (20 KG), INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Remove the two nuts [19], the washers [18] and the bolts [17] that attach the TGB [11] to the fan frame.

(b) While you hold the TGB [11], remove the two nuts [10], the washers [9], and the bolts [8] that attach the TGB [11] to the fan frame.

(c) As you keep the TGB [11] in a horizontal position, remove it from the engine.

(d) Remove and discard the O-ring [27].

(e) Remove and discard the O-ring [31].

(f) Put blanking plugs and caps on the openings.

SUBTASK 72-62-00-020-005-F00

(6) Remove the outer radial drive shaft from the fan frame strut.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 AIRPLANES WITH SEMI-RIGID AIR TUBES (POST-CFMI-SB 72-133)

2 AIRPLANES WITH RIGID AIR TUBES (PRE-CFMI-SB 72-133)

F76662 S0006582540_V2

Transfer Gearbox Installation
Figure 401/72-62-00-990-802-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(VIEW IN THE FORWARD DIRECTION)

A-A

F76683 S0006582541_V3

Transfer Gearbox Installation
Figure 401/72-62-00-990-802-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Transfer Gearbox and Accessory Gearbox Coupling
Figure 402/72-62-00-990-803-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Transfer Gearbox and Accessory Gearbox Coupling
Figure 402/72-62-00-990-803-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-62-00-400-801-F00

3. Transfer Gearbox Assembly Installation

(Figure 401, Figure 402)

A. General

(1) For this procedure, the transfer gearbox will be referred to as the TGB.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-63-01-400-801-F00	Handcranking Drive Cover Installation (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2192	Wrench - Horizontal Drive Shaft Nut Part #: 856A3604P01 Supplier: 58828
SPL-11931	Core Engine Sealing Plate and Locking Adapter Part #: 856A3728G01 Supplier: 58828
SPL-11934	Core Engine Sealing Plate and Locking Adapter Part #: 856A3728G02 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00601 [CP2101]	Vaseline - Graphite Mineral	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
27	O-ring	72-62-00-01-060	LOM 402, 404, 406, 407, 411, 416, 445
		72-62-00-01A-105	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
31	O-ring	72-62-00-01-265	LOM 402, 404, 406, 407, 411, 416, 445
		72-62-00-01A-360	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G. Prepare for Installation

SUBTASK 72-62-00-420-001-F00

> **WARNING**
> DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

> **CAUTION**
> DO NOT LET ALKALINE CLEANING FLUID GET IN THE ENGINE OIL. VERY SMALL QUANTITIES OF THIS FLUID CAN CHEMICALLY CHANGE THE OIL. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(1) Do these steps to prepare the TGB for the installation:

(a) Lubricate a new O-ring [27] with oil, D00599 [CP2442] and install it in the sleeve groove (Figure 402).

(b) Lubricate a new O-ring [31] with oil, D00599 [CP2442] and install it in the groove of the adaptor [32] (Figure 401).

(c) Lubricate the horizontal drive shaft housing [5] with oil, D00599 [CP2442].

(d) Fully retract the TGB sleeve [4] on the horizontal drive shaft housing [5] and the horizontal drive shaft [26] in the TGB [11].

(e) Lubricate the radial drive shaft splines with oil, D00599 [CP2442] (Figure 401).

(f) Lubricate the threads of the bolts [8] and the bolts [17] that attach the TGB [11] to the engine with graphite mineral vaseline, D00601 [CP2101].

(g) Make sure that the ring on the TGB [11] is serviceable (View A-A).

(h) Make sure that the gasket [16] of the oil return tube is serviceable.

SUBTASK 72-62-00-420-009-F00

(2) Install the outer radial drive shaft into the fan frame strut.

SUBTASK 72-62-00-420-002-F00

(3) Do these steps to install the TGB [11] (Figure 401):

> **CAUTION**
> BE CAREFUL WHEN YOU ENGAGE THE OUTER RADIAL DRIVE SHAFT WITH THE INPUT BEVEL GEAR OF THE TGB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE SEALS AND SPLINES COULD OCCUR.

(a) Engage horizontally the outer radial drive shaft splines in the input bevel gear of the TGB [11]; put the TGB [11] in its position on the fan frame.

(b) While you hold the TGB [11] in its position, install the top two bolts [8], the washers [9], and the nuts [10] that attach the TGB [11] to the fan frame.

1) Tighten the nuts [10] but do not apply the final torque.

(c) Install the bottom bolts [17], the washers [18], and the nuts [19] that attach the TGB [11] to the fan frame.

1) Tighten the nuts [19] but do not apply the final torque.

SUBTASK 72-62-00-420-003-F00

(4) Engage the horizontal drive shaft [26] as follows (Figure 402):

(a) Lubricate the splines on the horizontal drive shaft with oil, D00599 [CP2442].

(b) Move the horizontal drive shaft [26] forward and carefully engage it in the AGB input gear.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) If the splines do not align, handcrank the AGB to match and engage the horizontal drive shaft splines with the AGB gear splines.

a) Remove the locking cover of the locking adapter to turn the AGB geartrain.

(c) Lubricate the threads of the AGB [1] input gear with oil, D00599 [CP2442].

(d) Install the locking nut [25] on the AGB input gear.

NOTE: The locking nut has left-hand threads.

1) Tighten the locking nut [25] with your hand.

(e) If you removed the locking cover from the locking adapter, re-install the locking cover before you do the subsequent step.

(f) Torque the nuts [10] and nuts [19] that attach the TGB [11] to the fan frame to 176-195 pound-inches (20-22 Newton meters).

(g) Torque the locking nut [25] of the horizontal drive shaft [26] to 1330-1590 pound-inches (150-180 Newton meters).

1) Use the wrench, SPL-2192.

CAUTION	MAKE SURE THAT THE RETAINING RING IS IN ITS CORRECT POSITION. IF THE RETAINING RING IS NOT IN ITS CORRECT POSITION, THE HORIZONTAL DRIVE SHAFT COULD DISENGAGE AND CAUSE AN ENGINE FLAME OUT.

(h) Use a mirror to look through the three visualization holes to make sure that the retaining ring is in its position in the locking nut groove.

SUBTASK 72-62-00-420-004-F00

(5) Install the TGB sleeve [4] as follows (Figure 402):

(a) Move the TGB sleeve [4] forward to its position on the AGB [1].

(b) Install the V-clamp [2].

(c) Install the V-clamp nut [3] and torque to 50-60 pound-inches (5.7-6.8 Newton meters).

SUBTASK 72-62-00-420-005-F00

CAUTION	USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUT. USE ONE TO HOLD THE NIPPLE, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBE AND NIPPLE CAN OCCUR.

(6) Do these steps to connect the tubes to the TGB (Figure 401):

(a) Lubricate the threads of the TGB nipples with oil, D00599 [CP2442].

(b) Connect the oil supply tube [6] to the TGB nipple.

1) Torque the coupling nut to 270-300 pound-inches (30-35 Newton meters).

(c) Connect the vent tube [7] to the TGB nipple.

1) Torque the coupling nut to 135-150 pound-inches (15.5-17 Newton meters).

(d) Lubricate the gasket [16] with oil, D00599 [CP2442].

(e) Lubricate the four bolts [14] that attach the oil return tube [15] to the TGB [11] with graphite mineral vaseline, D00601 [CP2101].

(f) Use the four bolts [14] to connect the oil return tube [15] with the gasket [16] to the TGB [11].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Torque the bolts [14] to 49-53 pound-inches (5.5-6 Newton meters).

SUBTASK 72-62-00-420-006-F00

(7) Do these steps to attach the oil supply tube [6] and the vent tube [7] (Figure 401):

(a) Lubricate the threads of the bolt [21] with graphite mineral vaseline, D00601 [CP2101].

LOM ALL PRE SB CFM56-7B-72-0133

(b) Attach the oil supply tube [6] and the vent tube [7] to the bracket [20] with the clamp [23] and clamp [24], the bolt [21] and the nut [22].

LOM ALL POST SB CFM56-7B-72-0133

(c) Attach the oil supply tube [6] and the vent tube [7] to the bracket [20] with the clamp [23], the bolt [21] and the nut [22].

LOM ALL

(d) Torque the bolt [21] to 98-110 pound-inches (11-12.5 Newton meters).

SUBTASK 72-62-00-420-007-F00

(8) Install the two bolts [28] that attach the bracket [29] to the vent nipple square flange [30] (Figure 401).

(a) Torque the two bolts [28] to 55-60 pound-inches (6.2-6.8 Newton meters).

SUBTASK 72-62-00-420-008-F00

(9) Do these steps to attach the bracket [13] to the TGB [11] (Figure 401):

(a) Lubricate the threads of the two bolts [12] with graphite mineral vaseline, D00601 [CP2101]

(b) Attach the bracket [13] to the TGB [11] with the bolts [12].

(c) Torque the bolts [12] to 98-110 pound-inches (11-12.5 Newton meters).

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

SUBTASK 72-62-00-080-001-F00

(10) Remove the Locking Adapter, SPL-11931 from the AGB [1].

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

SUBTASK 72-62-00-080-002-F00

(11) Remove the locking adapter, SPL-11934 from the AGB [1].

LOM ALL

SUBTASK 72-62-00-410-001-F00

(12) Do this task: Handcranking Drive Cover Installation, TASK 72-63-01-400-801-F00.

H. TGB Installation test

SUBTASK 72-62-00-160-001-F00

(1) Carefully clean the horizontal drive shaft housing of oil and other unwanted materials.

SUBTASK 72-62-00-790-001-F00

(2) Do the tests that are given in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

(a) Do a check for leaks in these areas:

1) The handcranking drive cover

2) The tubes connections

ECCN 9E991 BOEING PROPRIETARY - See title page for details

3) The TGB/AGB interface

4) The TGB/fan frame interface.

SUBTASK 72-62-00-610-001-F00

(3) Do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

I. Put the Airplane Back to its Usual Condition

SUBTASK 72-62-00-410-002-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-62-00-040-003-F00

(2) Do this step:

Close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-62-00-040-004-F00

(3) Remove the DO-NOT-OPERATE tags from the start levers.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TRANSFER GEARBOX - INSPECTION/CHECK

1. General

A. This procedure has two tasks:

(1) An inspection of the transfer gearbox (TGB) external surfaces.

(2) An inspection of the transfer gearbox (TGB) internal surfaces.

TASK 72-62-00-200-801-F00

2. Transfer Gearbox External Inspection

(Figure 601)

A. General

(1) This is a visual inspection of the TGB housing, its mounts, the horizontal drive shaft (HDS) housing, the HDS sleeve and lockwire.

(2) The TGB housing is aft of the accessory gearbox on the left side of the power plant at the 9:00 position.

B. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
70-20-01-800-804-F00	Lockwire Installation (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-62-00-000-801-F00	Transfer Gearbox Assembly Removal (P/B 401)
72-62-00-400-801-F00	Transfer Gearbox Assembly Installation (P/B 401)
72-62-00-960-801-F00	Replacement of the 32-Tooth Bevel Gear Oil Nozzle O-rings (P/B 201)
72-62-00-960-803-F00	Replacement of the Bevel Gear Oil Nozzle O-rings (P/B 201)
72-62-00-960-804-F00	Replacement of the 31-Tooth Bevel Gear Oil Nozzle O-rings (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-62-00-210-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-62-00-210-002-F00

(2) If you find damage that is more than the limits, replace the TGB, unless you are given other instructions.

These are the tasks:

Transfer Gearbox Assembly Removal, TASK 72-62-00-000-801-F00,

Transfer Gearbox Assembly Installation, TASK 72-62-00-400-801-F00.

SUBTASK 72-62-00-210-003-F00

(3) Do a visual check of the TGB housing for damage as follows:

(a) Cracks

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Not permitted.

(b) Nicks, dents, and scratches

1) All damage is permitted with these limits:

a) Not more than 0.035 inch (0.9 mm) in depth after you remove the high metal. Refer to General Removal of High Metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

(c) Leakage

1) Not permitted.

a) Tighten the fittings.

b) If this does not stop the leakage, replace the gaskets or seals.

c) If leakage is from TGB oil nozzles, replace oil nozzle O-rings. These are the tasks:

Replacement of the 32-Tooth Bevel Gear Oil Nozzle O-rings, TASK 72-62-00-960-801-F00 or/and

Replacement of the 31-Tooth Bevel Gear Oil Nozzle O-rings, TASK 72-62-00-960-804-F00 or/and

Replacement of the Bevel Gear Oil Nozzle O-rings, TASK 72-62-00-960-803-F00.

(d) Loose attach fittings.

1) Not permitted (refer to the installation task to tighten the attach fittings).

SUBTASK 72-62-00-210-004-F00

(4) Do a check of the TGB mounts as follows:

(a) Cracks

1) Not permitted.

(b) Loose bushings

1) Not permitted.

SUBTASK 72-62-00-210-007-F00

(5) Do a check of the HDS housing as follows:

(a) Nicks, dents, and scratches on non-machined surfaces

1) Any amount is permitted.

(b) Local bent surface on non-machined surfaces is not permitted.

SUBTASK 72-62-00-210-008-F00

(6) Do a check of the HDS sleeve as follows:

(a) Nicks, dents, and scratches on non-machined surfaces

1) Any amount is permitted.

(b) Local bent surface on non-machined surfaces is not permitted.

SUBTASK 72-62-00-210-005-F00

(7) Look for damage to the lockwire:

(a) Broken, missing or loose lockwire

1) Not permitted.

a) Do this task: Lockwire Installation, TASK 70-20-01-800-804-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-62-00-210-006-F00

(8) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Transfer Gearbox Inspection
Figure 601/72-62-00-990-801-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HORIZONTAL DRIVE SHAFT HOUSING

B

00188-00-B
W23054 S0006582548_V2

Transfer Gearbox Inspection
Figure 601/72-62-00-990-801-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HORIZONTAL DRIVE SHAFT HOUSING SLEEVE

C

00189-00-B

W11203 S0006582549_V2

Transfer Gearbox Inspection
Figure 601/72-62-00-990-801-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-62-00-200-802-F00

3. Transfer Gearbox Internal Inspection

A. General

(1) This inspection use a borescope to examine the internal surfaces of the Transfer Gearbox (TGB).

(2) If you find the metal bearing particles in the magnetic chips detectors, do the internal inspection. The borescope equipment will permit you to see if the rollers bearing for the input or output bevel gear is damaged.

B. References

Reference	Title
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-00-02-400-801-F00	Power Plant - Installation (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-62-00-400-801-F00	Transfer Gearbox Assembly Installation (P/B 401)
79-21-05-000-806-F00	Magnetic Chip Detector (MCD) Removal (P/B 401)
79-21-05-000-807-F00	Debris Monitoring System (DMS) Detector Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828 Opt Part #: 856A1321P05 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00601 [CP2101]	Vaseline - Graphite Mineral	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Procedure

SUBTASK 72-62-00-210-009-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-62-00-020-006-F00

(2) Do this task: Magnetic Chip Detector (MCD) Removal, TASK 79-21-05-000-806-F00 or Debris Monitoring System (DMS) Detector Removal, TASK 79-21-05-000-807-F00.

SUBTASK 72-62-00-240-002-F00

(3) Do a check of the AGB/TGB magnetic chip detector (MCD) for metal bearing particles.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) The inspection (that follows) looks for damage to the input bevel gear roller bearing.

(b) If the MCD inspection was done for a scheduled maintenance program, this is the continue-in-service limit before the TGB replacement.

1) A continue-in-service limit of 2 cycles is permitted if there were no pilot reports of vibration or abnormal noise.

SUBTASK 72-62-00-290-001-F00

(4) If you find the metal bearing particles, do a borescope inspection of the roller bearing for the input bevel gear as follows.

(a) Disconnect the vent air tube from the vent nipple on the TGB.

(b) Remove the four bolts that attach the vent nipple to the TGB housing.

1) Keep the gasket for the installation.

SUBTASK 72-62-00-020-007-F00

(5) Remove the five bolts that attach the N2 drive pad cover to the AGB.

(a) Remove the N2 drive pad cover.

1) Discard the o-rings.

SUBTASK 72-62-00-200-001-F00

(6) Examine the roller bearing for the input bevel gear as follows.

(a) Connect a light source, SPL-2197 to a 110 Volt AC 60 Hz ground power source and connect the ground.

(b) Connect the 0.24 inch (6.0 mm) flexible borescope to the borescope, COM-2196 and to the port on the light source, SPL-2197.

(c) Turn on the light source, SPL-2197.

1) Install the borescope, COM-2196 through the vent nipple port of the TGB.

(d) Manually turn the TGB.

1) Examine the roller bearing for the input bevel gear for the damage.

(e) If the roller bearing is damaged.

1) Do this task: Transfer Gearbox Assembly Installation, TASK 72-62-00-400-801-F00.

a) Replace the roller bearing.

2) See the continue-in-service limit above for the detail.

(f) If the roller bearing is not damage.

1) Do this task: Power Plant - Installation, TASK 71-00-02-400-801-F00.

a) Replace the engine.

SUBTASK 72-62-00-420-010-F00

(7) Install the gasket lubricated with the engine oil, D00599 [CP2442] on the vent nipple.

SUBTASK 72-62-00-640-001-F00

(8) Lubricate the four bolts with the graphite mineral vaseline, D00601 [CP2101].

(a) Install the vent nipple on the TGB housing.

SUBTASK 72-62-00-420-011-F00

(9) Tighten the bolts to 50 - 60 pound-inches (6 - 7 Newton-meters).

(a) Install the lockwire.

(b) Attach the lockwire to the bolts.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-62-00-640-002-F00

(10) Lubricate the threads of the vent nipple with the engine oil, D00599 [CP2442].

(a) Connect the air tube to the vent nipple.

SUBTASK 72-62-00-640-003-F00

(11) Lubricate the new o-ring with the engine oil, D00599 [CP2442].

(a) Install the new o-ring on the N2 pad drive cover.

SUBTASK 72-62-00-640-004-F00

(12) Lubricate the five bolts with the graphite mineral vaseline, D00601 [CP2101].

(a) Install the N2 drive pad cover on the AGB.

SUBTASK 72-62-00-420-012-F00

(13) Tighten the bolts to 95 - 105 Pound-inches (11 -12 Newton-meters).

(a) Install the lockwire to the bolts.

SUBTASK 72-62-00-290-002-F00

(14) If you find the metal bearing particles, do a borescope inspection of the roller bearing for the output bevel gear as follow.

(a) Remove the bolts that attach the plug and oil nozzle to the TGB housing.

(b) Remove the plug and oil nozzle.

1) Discard the o-rings.

SUBTASK 72-62-00-240-001-F00

(15) Examine the roller bearing for output bevel gear as follows.

(a) Connect a light source, SPL-2197 to a 110 Volt AC 60 Hz ground power source and connect the ground.

(b) Connect the 0.24 inch (6.0 mm) flexible borescope to the borescope, COM-2196 and to the port on the light source, SPL-2197.

(c) Turn on the light source, SPL-2197.

1) Install the borescope, COM-2196 through the vent nipple port of the TGB.

(d) Manually turn the TGB.

1) Examine the roller bearing for the output bevel gear for the damage.

(e) If the roller bearing is damaged.

1) Do this task: Transfer Gearbox Assembly Installation, TASK 72-62-00-400-801-F00.

a) Replace the roller bearing.

2) See the continue-in-service limit above for the detail.

(f) If the roller bearing is not damage.

1) Do this task: Power Plant - Installation, TASK 71-00-02-400-801-F00.

a) Replace the engine.

SUBTASK 72-62-00-420-013-F00

(16) Install the three o-rings on the plug and oil nozzle lubricated with the engine oil, D00599 [CP2442] on the TGB housing.

SUBTASK 72-62-00-640-005-F00

(17) Lubricate the bolts with the graphite mineral vaseline, D00601 [CP2101].

(a) Install the bolts on the TGB housing.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-62-00-420-014-F00

(18) Tighten the bolts to 95 - 105 Pound-inches (11 - 12 Newton-meters).

SUBTASK 72-62-00-210-010-F00

(19) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-62-00-790-002-F00

(20) Do this task: Power Plant Test Reference Table, TASK 71-00-00-800-811-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Transfer Gearbox Internal Inspection
Figure 602/72-62-00-990-804-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Transfer Gearbox Internal Inspection
Figure 602/72-62-00-990-804-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ACCESSORY GEARBOX - MAINTENANCE PRACTICES

1. General

A. This procedure contains these tasks:

(1) Axial link end dampers removal

(2) Axial link end dampers installation

(3) Axial link end or upper (lower) mount link removal

(4) Axial link end or upper (lower) mount link installation.

TASK 72-63-00-000-802-F00

2. Axial Link End Dampers Removal

(Figure 201)

A. General

(1) For this procedure the accessory gearbox is referred to as the AGB.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
73-11-06-000-801-F00	IDG Oil Cooler Removal (P/B 401)
73-11-07-000-801-F00	Servo Fuel Heater Removal (P/B 401)
79-21-01-000-801-F00	Lubrication Unit Removal (P/B 401)
79-21-02-000-801-F00	Main Oil/Fuel Heat Exchanger Removal (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 72-63-00-040-005-F00

(1) Do this step:

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-040-006-F00

(2) Make sure the applicable start lever is in the CUTOFF position.

(a) Install DO-NOT-OPERATE tags on the start lever.

SUBTASK 72-63-00-020-004-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Procedure

WARNING

DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING

DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING

DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION

DO NOT LET OIL GET ON THE ENGINE, OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE AREAS THAT OIL FALLS ON. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

CAUTION

DO NOT LET ALKALINE CLEANING FLUIDS TOUCH THE OIL WHICH WILL GO INTO THE ENGINE. VERY SMALL AMOUNTS OF ALKALINE CLEANING FLUIDS WILL DAMAGE THE ENGINE OIL.

DO NOT PUT THE OIL THAT IS DRAINED FROM THE ENGINE BACK INTO THE ENGINE.

SUBTASK 72-63-00-922-003-F00

(1) Obey the above warnings and cautions throughout this task.

(a) For the references, obey the warnings and cautions in those tasks.

SUBTASK 72-63-00-020-005-F00

CAUTION

DO NOT REMOVE THE TWO LINKS FROM THE ENGINE AT THE SAME TIME. THIS WILL CAUSE DAMAGE TO THE AGB MODULE.

(2) Do these steps to remove the dampers [12] on the end of the AGB upper mount link [1].

(a) Disconnect the lines from the servo fuel heater (TASK 73-11-07-000-801-F00).

(b) Remove the main oil/fuel heat exchanger with the servo fuel heater together (TASK 79-21-02-000-801-F00).

CAUTION

USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

(c) Remove the two cotter pins [4], two nuts [2] and two washers [3] to remove the two straight pin assemblies [5].

(d) Remove the AGB upper mount link [1] from the AGB upper clevis mount and the fan case clevis.

(e) Remove the dampers [12]

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SUBTASK 72-63-00-020-006-F00

> **CAUTION** DO NOT REMOVE THE TWO LINKS FROM THE ENGINE AT THE SAME TIME. THIS WILL CAUSE DAMAGE TO THE AGB MODULE.

(3) Do these steps to remove the dampers [10] on the end of the AGB lower mount link [11].

(a) Do this task: Lubrication Unit Removal, TASK 79-21-01-000-801-F00.

(b) Disconnect the fuel-in tube from the IDG oil cooler (TASK 73-11-06-000-801-F00).

> **CAUTION** USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

(c) Remove the two cotter pins [8], the two nuts [6] and the two washers [7] to remove the two straight pin assemblies [9].

(d) Remove the AGB lower mount link [11] from the AGB lower clevis mount and the fan case clevis.

(e) Remove the dampers [12].

SUBTASK 72-63-00-020-007-F00

> **CAUTION** DO NOT FULLY REMOVE THE AGB TURNBUCKLE FROM THE ENGINE. INSTALL THE FIRST END AGAIN BEFORE YOU REMOVE THE OTHER END FROM THE ENGINE. IF YOU DO NOT OBEY THIS INSTRUCTION, YOU WILL CAUSE DAMAGE TO THE ENGINE.

> **CAUTION** DO NOT CHANGE THE AGB TURNBUCKLE LENGTH DURING THE PROCEDURE, THIS CAN CAUSE DAMAGE TO THE CORRECT ALIGNMENT OF THE AGB MODULE.

> **CAUTION** USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

(4) Do these steps to remove the dampers [14] on the end of the AGB turnbuckle [16].

(a) Remove the cotter pin [20], nut [17] and washer [18] to remove the straight pin assembly [13] which attaches the left link [15] of the AGB turnbuckle [16] to the AGB clevis.

(b) Disconnect the left link [15] from the AGB clevis.

(c) Remove the cotter pin [20], nut [17] and washer [18] to remove the straight pin assembly [13] which attaches the right link [19] of the AGB turnbuckle [16] to the fan frame clevis.

(d) Disconnect the right link [19] from the fan frame clevis.

(e) Remove the dampers [14].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AGB Axial Link End Dampers Installation
Figure 201/72-63-00-990-805-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C

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AGB Axial Link End Dampers Installation
Figure 201/72-63-00-990-805-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-63-00-400-802-F00

3. Axial Link End Dampers Installation

(Figure 201)

A. General

(1) For this procedure the accessory gearbox is referred to as the AGB.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
73-11-06-400-801-F00	IDG Oil Cooler Installation (P/B 401)
73-11-07-400-801-F00	Servo Fuel Heater Installation (P/B 401)
79-21-01-400-801-F00	Lubrication Unit Installation (P/B 401)
79-21-02-400-801-F00	Main Oil/Fuel Heat Exchanger Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Installation

SUBTASK 72-63-00-922-004-F00

WARNING DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

CAUTION DO NOT LET ALKALINE CLEANING FLUID GET IN THE ENGINE OIL. VERY SMALL QUANTITIES OF THIS FLUID CAN CHEMICALLY CHANGE THE OIL. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(1) Obey the above warnings and cautions throughout this task.

(a) For the references, obey the warnings and cautions in those tasks.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-63-00-020-008-F00

CAUTION	IF YOU HAVE ALREADY REMOVED AN AXIAL LINK, DO NOT REMOVE THE OTHER BECAUSE YOU MUST DO THE INSTALLATION OF THE DAMPER SUCCESSIVELY ON EACH AXIAL LINK. THUS, DO NOT REMOVE THE TWO LINKS FROM THE ENGINE AT THE SAME TIME, IT CAN DAMAGE THE CORRECT ALIGNMENT OF THE AGB MODULE.

CAUTION	WHEN YOU INSTALL THE DAMPER ON THE LINK END, MAKE SURE THAT IT IS IN THE CORRECT POSITION. MAKE SURE THAT IT IS CENTERED AROUND THE BALL END OF THE LINK. IF YOU DO NOT ALIGN IT CORRECTLY, IT WILL CAUSE DAMAGE TO EQUIPMENT.

(2) Obey the above cautions for this task.

F. Procedure

SUBTASK 72-63-00-420-005-F00

(1) Do these steps to install the dampers [12] on the end of the AGB upper mount link [1].

(a) Install one damper [12] on each extremity of the AGB upper mount link [1].

(b) Install the AGB upper mount link [1] on the AGB upper clevis mount and the fan case clevis.

(c) Lubricate the threads of the two straight pin assemblies [5] that attach the AGB upper mount link [1] with the AGB upper clevis mount and the fan case clevis to the engine with graphite mineral vaseline, D00601 [CP2101].

(d) Install the two straight pin assemblies [5] that attach the AGB upper mount link [1] with the AGB upper clevis mount and the fan case clevis.

(e) Install the two washers [3] and the two nuts [2] that attach the straight pin assemblies [5] with the AGB upper mount link [1].

CAUTION	USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

(f) Tighten the two nuts [2] to 840 in-lb (95 N·m)-930 in-lb (105 N·m).

(g) Install the two cotter pins [4] on the straight pin assemblies [5].

(h) Install the main oil/fuel heat exchanger with the servo fuel heater together (TASK 79-21-02-400-801-F00).

(i) Reconnect the lines from the servo fuel heater (TASK 73-11-07-400-801-F00).

SUBTASK 72-63-00-420-006-F00

(2) Do these steps to install the dampers [10] on the end of the AGB lower mount link [11].

(a) Install one damper [10] on each extremity of the AGB lower mount link [11].

(b) Install the AGB lower mount link [11] on the AGB lower clevis mount and the fan case clevis.

(c) Lubricate the threads of the two straight pin assemblies [9] that attach the AGB lower mount link [11] with the AGB lower clevis mount and the fan case clevis to the engine with graphite mineral vaseline, D00601 [CP2101].

(d) Install the two straight pin assemblies [9] that attach the AGB lower mount link [11] with the AGB lower clevis mount and the fan case clevis.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(e) Install the two washers [7] and the nuts [6] that attach the straight pin assemblies [9] with the AGB lower mount link [11].

> **CAUTION** USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

(f) Tighten the nuts [6] to 840 in-lb (95 N·m)-930 in-lb (105 N·m).

(g) Install the two new cotter pins [8] on the straight pin assemblies [9].

(h) Reconnect the fuel-in tube to the IDG oil cooler (TASK 73-11-06-400-801-F00).

(i) Do this task: Lubrication Unit Installation, TASK 79-21-01-400-801-F00.

SUBTASK 72-63-00-420-007-F00

> **CAUTION** DO NOT FULLY REMOVE THE AGB TURNBUCKLE FROM THE ENGINE. INSTALL THE FIRST END AGAIN BEFORE YOU REMOVE THE OTHER END FROM THE ENGINE. IF YOU DO NOT OBEY THIS INSTRUCTION, YOU WILL CAUSE DAMAGE TO THE ENGINE.

> **CAUTION** DO NOT CHANGE THE AGB TURNBUCKLE LENGTH DURING THE PROCEDURE, THIS CAN CAUSE DAMAGE TO THE CORRECT ALIGNMENT OF THE AGB MODULE.

(3) Do these steps to install the damper [14] on the end of the AGB turnbuckle [16].

(a) Install one damper [14] on the left link [15] and on the right link [19].

(b) Install the left link [15] of the AGB turnbuckle [16] on the AGB clevis and the right link [19] of the AGB turnbuckle [16] on the fan frame clevis.

(c) Lubricate the threads of the two straight pin assemblies [13] that attach the left link [15] and right link [19] of the AGB turnbuckle [16] with the AGB clevis and the fan frame clevis to the engine with graphite mineral vaseline, D00601 [CP2101].

(d) Install the straight pin assemblies [13] that attach the left link [15] and right link [19] with the AGB clevis and the fan frame clevis.

(e) Install the two washers [18] and the nuts [17] that attach the straight pin assemblies [13] with the left link [15] and the right link [19].

> **CAUTION** USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

(f) Tighten the nuts [17] to 840 in-lb (95 N·m)-930 in-lb (105 N·m).

(g) Install the two new cotter pins [20] on the straight pin assemblies [13]straight pin assemblies [13].

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-63-00-410-003-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-63-00-040-007-F00

(2) Do this step:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-040-008-F00

(3) Remove the DO-NOT-OPERATE tag from the start lever.

H. AGB Installation Test

SUBTASK 72-63-00-790-002-F00

(1) Do a test of the AGB installation.

(a) Carefully clean the horizontal drive shaft housing of oil and other unwanted materials.

(b) Do the test given in the Power Plant Test Reference Table, TASK 71-00-00-800-811-F00.

1) Do a check for leaks in these areas:

a) The handcranking drive cover

b) The tubes connections

c) The TGB/AGB interface

d) The TGB/fan frame interface.

(c) If it is necessary, do this task:Replenish the Engine Oil, TASK 12-13-11-600-801.

——— END OF TASK ———

TASK 72-63-00-000-803-F00

4. Axial Link End or Upper (Lower) Mount Link Removal

A. General

(1) This procedure is to replace an axial link end or an upper (lower) mount link.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)

C. Consumable Materials

Reference	Description	Specification
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Removal

SUBTASK 72-63-00-020-013-F00

(1) Do this step:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-860-001-F00

(2) Make sure the applicable start lever in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the start lever.

SUBTASK 72-63-00-020-014-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

F. Procedure

SUBTASK 72-63-00-020-011-F00

(1) Do these steps to remove an upper or lower mount link.

(a) Do this task: Axial Link End Dampers Removal, TASK 72-63-00-000-802-F00.

NOTE: The same procedure above is applicable for the mount link ends without dampers.

(b) After the removal of the mount link, discard it.

SUBTASK 72-63-00-020-012-F00

(2) Do these steps to remove an axial link end.

(a) Do this task: Axial Link End Dampers Removal, TASK 72-63-00-000-802-F00.

NOTE: The same procedure above is applicable for the mount link ends without dampers.

(b) Cut the safety wire, G02345 [CP8001] or which safety the nuts of the axial link ends to the rod link.

(c) Loosen the nut and unscrew the axial link end to be replaced, if it is necessary.

NOTE: You must be careful when you loosen the nut . One link end has left hand threads.

(d) Remove the axial link end from the rod link and discard it.

(e) Remove the nut.

——— END OF TASK ———

TASK 72-63-00-400-803-F00

5. Axial Link End or Upper (Lower) Mount Link Installation

A. General

(1) This procedure is a replacement of an axial link end or an upper (lower) mount link.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)

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(Continued)

Reference	Title
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-63-00-400-804-F00	Accessory Gearbox Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Installation

SUBTASK 72-63-00-020-009-F00

> **CAUTION** IF YOU HAVE ALREADY REMOVED AN AXIAL LINK, DO NOT REMOVE THE OTHER BECAUSE YOU MUST DO THE INSTALLATION OF THE DAMPER SUCCESSIVELY ON EACH AXIAL LINK. THUS, DO NOT REMOVE THE TWO LINKS FROM THE ENGINE AT THE SAME TIME, IT CAN DAMAGE THE CORRECT ALIGNMENT OF THE AGB MODULE.

> **CAUTION** IF YOU HAVE ALREADY REMOVED AN AXIAL LINK, DO NOT REMOVE THE OTHER BECAUSE YOU MUST DO THE INSTALLATION OF THE DAMPER SUCCESSIVELY ON EACH AXIAL LINK. THUS, DO NOT REMOVE THE TWO LINKS FROM THE ENGINE AT THE SAME TIME, IT CAN DAMAGE THE CORRECT ALIGNMENT OF THE AGB MODULE.

(1) Obey the CAUTIONS above for this task.

F. Procedure

SUBTASK 72-63-00-420-008-F00

(1) Do these steps to install an upper or lower mount link.

(a) Lightly coat the link ends with graphite mineral vaseline, D00601 [CP2101].

> **CAUTION** WHEN YOU INSTALL THE DAMPER ON THE LINK END, MAKE SURE THAT IT IS IN THE CORRECT POSITION. MAKE SURE THAT IT IS CENTERED AROUND THE BALL END OF THE LINK. IF YOU DO NOT ALIGN IT CORRECTLY, IT WILL CAUSE DAMAGE TO EQUIPMENT.

(b) Do this task: Axial Link End Dampers Installation, TASK 72-63-00-400-802-F00.

NOTE: The same procedure above is applicable for the mount link end without dampers.

(c) Do the installation test after the adjustment of the AGB position.

SUBTASK 72-63-00-420-009-F00

(2) Do these steps to install an axial link end.

(a) Attach the nut on the new axial link end.

NOTE: You must be careful when you tighten the nut. One link end has left hand threads.

(b) Install the new axial link end on the rod link.

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1) Adjust the link end until the dimension of the link is equal to the removed link.

NOTE: The steps to torque and safety the nuts is done in the AGB position adjustment.

(c) Lightly coat the axial link ends with graphite mineral vaseline, D00601 [CP2101].

(d) Do this task: Axial Link End Dampers Installation, TASK 72-63-00-400-802-F00.

NOTE: The same procedure above is applicable for the mount link end without dampers.

(e) Do the installation test after the adjustment of the AGB position.

SUBTASK 72-63-00-820-002-F00

(3) Adjust the AGB position on the fan case, refer to this task Accessory Gearbox Installation, TASK 72-63-00-400-804-F00.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-63-00-410-006-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-63-00-440-005-F00

(2) Do this step:

Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-440-006-F00

(3) Remove the DO-NOT-OPERATE tag from the start lever.

H. AGB Installation Test

SUBTASK 72-63-00-790-005-F00

(1) Do a test of the AGB installation.

(a) Carefully clean the horizontal drive shaft housing of oil and other unwanted materials.

(b) Do the test given in the Power Plant Test Reference Table, TASK 71-00-00-800-811-F00.

1) Do a check for leaks in these areas:

a) The handcranking drive cover

b) The tubes connections

c) The TGB/AGB interface

d) The TGB/fan frame interface.

(c) If it is necessary, do this task:Replenish the Engine Oil, TASK 12-13-11-600-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ACCESSORY GEARBOX - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) The removal of the Accessory Gearbox.

(2) The installation of the Accessory Gearbox.

TASK 72-63-00-000-804-F00

2. Accessory Gearbox Removal

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, Figure 406 and Figure 407)

A. General

(1) For this procedure, the Accessory Gearbox is referred to as the AGB.

B. References

Reference	Title
24-11-11-000-801	Integrated Drive Generator (IDG) Removal (P/B 401)
29-11-11-000-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal (P/B 401)
71-11-01-000-801-F00	Remove the Inlet Cowl (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
72-62-00-000-801-F00	Transfer Gearbox Assembly Removal (P/B 401)
73-11-01-000-801-F00	Fuel Pump Package Removal (P/B 401)
73-11-06-000-801-F00	IDG Oil Cooler Removal (P/B 401)
73-21-06-000-801-F00	Fan Wiring Harness Removal (P/B 401)
73-21-08-000-801-F00	EEC Alternator and Alternator Rotor Removal (P/B 401)
77-11-02-000-801-F00	N2 Speed Sensor Removal (P/B 401)
79-21-01-000-801-F00	Lubrication Unit Removal (P/B 401)
79-21-04-000-801-F00	Scavenge Oil Filter Assembly Removal (P/B 401)
79-32-01-000-801-F00	Oil Pressure Sensor Removal (P/B 401)
80-11-01-000-801-F00	Starter Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-9144	Sling - 3-Leg, Accessory Gearbox Handling Part #: 856A3519G05 Supplier: 58828
SPL-9145	Cradle - Removal/Installation, Accessory Gearbox Part #: 856A3525G04 Supplier: 58828 Opt Part #: 856A3525G03 Supplier: 58828
SPL-9146	Container - Shipping, Accessory Gearbox Module Part #: 856A3588G01 Supplier: 58828
SPL-9147	Protector - Mounting Pin, Accessory Gearbox Part #: 856A3591G01 Supplier: 58828

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D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Removal

SUBTASK 72-63-00-922-001-F00

WARNING	DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.
WARNING	DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.
WARNING	DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.
CAUTION	DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.
CAUTION	DO NOT LET ALKALINE CLEANING FLUIDS TOUCH THE OIL WHICH WILL GO INTO THE ENGINE. VERY SMALL AMOUNTS OF ALKALINE CLEANING FLUIDS WILL DAMAGE THE ENGINE OIL. DO NOT PUT THE OIL THAT IS DRAINED FROM THE ENGINE BACK INTO THE ENGINE.

(1) Obey the above warnings and cautions throughout this procedure.

(a) For the references, obey the warnings and cautions in those tasks.

SUBTASK 72-63-00-040-009-F00

(2) Do this step:

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-040-010-F00

(3) Make sure the applicable start lever is in the CUTOFF position:

(a) Install DO-NOT-OPERATE tags on the start lever.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-63-00-010-003-F00

(4) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-63-00-010-004-F00

(5) Do this task: Remove the Inlet Cowl, TASK 71-11-01-000-801-F00.

SUBTASK 72-63-00-030-001-F00

(6) Remove the J5, J6, J7 and J8 Wiring Harnesses. Refer to this task: Fan Wiring Harness Removal, TASK 73-21-06-000-801-F00.

SUBTASK 72-63-00-030-002-F00

(7) Disconnect the Transfer Gearbox (TGB) assembly from the AGB. Refer to this task: Transfer Gearbox Assembly Removal, TASK 72-62-00-000-801-F00.

SUBTASK 72-63-00-030-003-F00

(8) Do this task: Integrated Drive Generator (IDG) Removal, TASK 24-11-11-000-801.

SUBTASK 72-63-00-030-004-F00

(9) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal, TASK 29-11-11-000-801-001.

SUBTASK 72-63-00-030-005-F00

(10) Do this task: Oil Pressure Sensor Removal, TASK 79-32-01-000-801-F00.

F. AGB Removal

SUBTASK 72-63-00-030-008-F00

(1) Do these steps to remove the bonding strap [36] from the fan frame (Figure 401):

(a) Remove the nut [45], washer [37], washer [44] and the bolt [38] that attach the bonding strap [36] at Flange B5, hole position No. 83.

(b) Remove the bonding strap [36] from the fan frame.

SUBTASK 72-63-00-030-009-F00

CAUTION

USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

CAUTION

DO NOT CHANGE THE AGB TURNBUCKLE LENGTH DURING THE PROCEDURE, THIS CAN CAUSE DAMAGE TO THE CORRECT ALIGNMENT OF THE AGB MODULE.

(2) Do these steps to remove the Accessory Gear Box (AGB) turnbuckle [4] (Figure 401):

(a) Remove and discard the cotter pin [5] and the cotter pin [8].

(b) Remove the nut [6], nut [9], washer [7] and washer [10].

(c) Remove the straight pin [1].

(d) Remove the straight pin [11].

(e) Remove the turnbuckle [4].

SUBTASK 72-63-00-030-010-F00

(3) Do this task: IDG Oil Cooler Removal, TASK 73-11-06-000-801-F00.

SUBTASK 72-63-00-020-017-F00

(4) Do this step to disconnect the oil return tube [64] (Figure 407):

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Remove the bolt [61] from the clamp [62] which attaches the oil return tube [64].

(b) Remove the four bolts [63] which attach the oil return tube [64] to the TGB [66].

(c) Remove the four bolts [68] which attach the oil return tube [64] to the AGB [65].

(d) Remove the oil return tube [64].

(e) Keep the gasket [60] and the gasket [67] for the installation.

SUBTASK 72-63-00-030-011-F00

(5) Do this task: Fuel Pump Package Removal, TASK 73-11-01-000-801-F00.

SUBTASK 72-63-00-030-012-F00

(6) Do this task: Scavenge Oil Filter Assembly Removal, TASK 79-21-04-000-801-F00.

SUBTASK 72-63-00-030-013-F00

(7) Do this task: Lubrication Unit Removal, TASK 79-21-01-000-801-F00.

SUBTASK 72-63-00-030-014-F00

(8) Do this task: EEC Alternator and Alternator Rotor Removal, TASK 73-21-08-000-801-F00.

SUBTASK 72-63-00-030-015-F00

(9) Do this task: Starter Removal, TASK 80-11-01-000-801-F00.

SUBTASK 72-63-00-030-016-F00

(10) Do this task: N2 Speed Sensor Removal, TASK 77-11-02-000-801-F00.

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

SUBTASK 72-63-00-020-016-F00

CAUTION	USE TWO WRENCHES TO LOOSEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(11) Remove the drain tube from the AGB (Figure 402):

(a) Loosen the coupling nut of the drain tube from the nipple.

(b) Remove the bolt [1] and the nut [2] which attach the clamp [3] on the bracket [4].

(c) Remove the two bolts [5] and the two nuts [6] which attach the two clamps [7] on the bracket [8].

(d) Remove the bolt [9] and the nut [10] which attach the clamp [11] on the bracket [12].

(e) Remove the drain tube [13].

(f) Remove the clamp [3], two clamps [7] and clamp [11] from the drain tube [13].

LOM ALL

SUBTASK 72-63-00-030-017-F00

(12) Do these steps to remove the brackets from the AGB (Figure 403):

(a) Remove the two bolts [6] which attach the bracket [7] on the Input AGB location.

(b) Remove the bracket [2] and bracket [3] on the Input AGB location.

1) Remove the two bolts [8] and washers [9] which attach the bracket [2].

2) Remove the three bolts [4]] and three nuts [1] which attach the bracket [3].

LOM ALL PRE SB 737-CFM56-7B-72-0316

(c) Remove the two bolts [32] which attach the bracket [31] on the Alternator Drive Pad.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB 737-CFM56-7B-72-0316

(d) Remove the three bolts [32] which attach the bracket [31] on the Alternator Drive Pad.

LOM ALL

(e) Remove the two bolts [12], washers [13], two bolts [11] which attach the bracket [10] on the Fuel Pump Drive Pad.

(f) Remove the two bolts [34] which attach the bracket [33] on the Starter Drive Pad.

(g) Remove the two bolts [21] which attach the bracket [22] on the Fuel Pump Drive Pad.

(h) Remove the two bolts [20] which attach the bracket [19] on the Fuel Pump Drive Pad.

(i) Remove the two bolts [16], washers [17], nuts [14] and the two bolts [15] which attach the bracket [18] on the Fuel Pump Drive Pad.

(j) Remove the two bolts [36] which attach the bracket [35] on the Starter Drive Pad.

(k) Remove the two bolts [23] which attach the bracket [24] on the Fuel Pump Drive Pad.

(l) Remove the two bolts [38], washers [37] and the two bolts [40] which attach the bracket [39] on the Hydraulic Pump Drive Pad.

(m) Remove the two bolts [27] which attach the bracket [28] on the Cover Filter.

(n) Remove the two bolts [25] which attach the bracket [26] on the Cover Filter.

(o) Remove the two bolts [29] which attach the bracket [30] on the Lubrication Unit Drive.

(p) Remove the two bolts [42] which attach the bracket [41] on the Hydraulic Pump Drive Pad.

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(q) Remove the four bolts [43] which attach the bracket [44] and the AGB tube [45] on the AGB housing.

(r) Remove the AGB tube [45].

(s) Remove and examine the gasket [46].

NOTE: Use the gasket if it is in good condition.

(t) Discard the gasket [46], if it is in unsatisfactory condition.

(u) Remove the two bolts [47] which attach the bracket [48] on the Hydraulic Pump Drive Pad.

(v) Remove the two bolts [49] which attach the bracket [50] on the Starter Drive Pad.

LOM ALL

SUBTASK 72-63-00-020-015-F00

(13) Do these steps to remove the AGB from the engine (Figure 404 and Figure 405):

(a) Install the accessory gearbox cradle, SPL-9145, on the AGB [1] as follows (Figure 404):

1) Set the adjustment rack of the cradle support to position 4 and attach a hoist to the support shackle.

2) Remove the assembly from the cradle mount support.

3) Put the cradle support on the AGB [1].

4) Engage the two end lock pins given which hold the cradle support to the AGB.

5) Install the third lock pin in the AGB. Adjust the yoke with the screw (Figure 405, Detail B).

6) Apply a slight tension to the hoist.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CAUTION USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

(b) Remove the upper rear link [16] and lower rear link [35] as follows (Figure 401):

1) Remove and discard the cotter pin [17] and cotter pin [22].
2) Remove the nut [18], nut [23], washer [19] and washer [24].
3) Remove the straight pin [14] and straight pin [20].
4) Remove the upper rear link [16] from the AGB and from the containment case.
5) Remove and discard the cotter pin [25] and cotter pin [30].
6) Remove the nut [26], nut [31], washer [27] and washer [32].
7) Remove the straight pin [28] and straight pin [33].
8) Remove the lower rear link [35] from the AGB and from the containment case.

CAUTION USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

(c) Remove the attachment hardware from the AGB as follows (Figure 401):

1) Remove and discard the cotter pin [39] and cotter pin [48].
2) Remove the nut [40], nut [49], washer [50] and special washer [42] with nut [43], bolt [41]and bonding strap [36].
3) Install the mounting pin protector, SPL-9147 on the straight pin [46].
4) Remove the straight pin [46] from the upper clevis mount.
5) Remove the pin protector from the straight pin [46].
6) Install the mounting pin protector, SPL-9147 on the straight pin [47].
7) Remove the straight pin [47] from the lower clevis mount.
8) Remove the pin protector from the straight pin [47] and store the pin protector in the container.

(d) Remove the AGB and the cradle support assembly from the engine (Figure 405).

(e) Install the assembly on the cradle mount support and hold it with the lock pins of the tool.

(f) Install the covers and caps for protection on all drive pads and equipment holes of the AGB.

SUBTASK 72-63-00-550-001-F00

(14) Do these steps to install the AGB in the storage position (Figure 405):

(a) Install the accessory gearbox sling, SPL-9144, as follows:

1) Install the two sectors at each end of the AGB and hold them with the two lockpins of the tool.
2) Attach a hoist to the 3-leg sling. Apply a slight tension to the hoist.

(b) Remove the three lock pins and remove the AGB from the cradle support. Disengage the yoke.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Install the AGB in the accessory gearbox shipping container, SPL-9146, and remove the 3-leg sling.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0036500
1508305 S0000276278_V2

AGB Upper and Lower Links Installation
Figure 401/72-63-00-990-806-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AGB Upper and Lower Links Installation
Figure 401/72-63-00-990-806-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AGB Upper and Lower Links Installation
Figure 401/72-63-00-990-806-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0036800
1508355 S0000276281_V2

AGB Upper and Lower Links Installation
Figure 401/72-63-00-990-806-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2421899 S0000559371_V1

Drain Tube Installation
Figure 402/72-63-00-990-811-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2422051 S0000559380_V1

Drain Tube Installation
Figure 402/72-63-00-990-811-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0035200
1508326 S0000276284_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 1 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0035300
1508208 S0000276285_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 2 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0035400

1508217 S0000276286_V3

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 3 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H0035500
1508222 S0000276287_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 4 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E

F

B0035600

1508240 S0000276288_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 5 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 6 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H0035800
1508257 S0000276291_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 7 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H0035900
1508267 S0000276293_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 8 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

J

2568582 S0000615434_V1

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 9 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

K

L

B0036000
1508285 S0000276295_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 10 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0036100
1508303 S0000276297_V3

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 11 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

N

B0036200
1508312 S0000276299_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 12 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2568584 S0000615435_V1

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 13 of 13)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0036300

1508277 S0000276300_V2

AGB Cradle Installation
Figure 404/72-63-00-990-808-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

C

B0036400
1508295 S0000276301_V2

AGB Cradle Installation
Figure 404/72-63-00-990-808-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0036900
1508286 S0000276302_V2

AGB Installation and Storage
Figure 405/72-63-00-990-809-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0037000
1508283 S0000276312_V2

AGB Installation and Storage
Figure 405/72-63-00-990-809-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AGB (on Fan Case) Adjustment
Figure 406/72-63-00-990-810-F01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AGB (on Fan Case) Adjustment
Figure 406/72-63-00-990-810-F01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Oil Return Tube Removal
Figure 407/72-63-00-990-819-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-63-00-400-804-F00

3. Accessory Gearbox Installation

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, Figure 406 and Figure 407)

A. General

(1) For this procedure, the Accessory Gearbox is referred to as the Accessory Gear Box (AGB).

B. References

Reference	Title
24-11-11-400-801	Integrated Drive Generator (IDG) Installation (P/B 401)
29-11-11-400-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation (P/B 401)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-01-400-801-F00	Install the Inlet Cowl (P/B 401)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-62-00-400-801-F00	Transfer Gearbox Assembly Installation (P/B 401)
73-11-01-400-801-F00	Fuel Pump Package Installation (P/B 401)
73-11-06-400-801-F00	IDG Oil Cooler Installation (P/B 401)
73-21-06-400-801-F00	Fan Wiring Harness Installation (P/B 401)
73-21-08-400-801-F00	EEC Alternator and Alternator Rotor Installation (P/B 401)
77-11-02-400-801-F00	N2 Speed Sensor Installation (P/B 401)
79-21-01-400-801-F00	Lubrication Unit Installation (P/B 401)
79-21-04-400-801-F00	Scavenge Oil Filter Assembly Installation (P/B 401)
79-32-01-400-801-F00	Oil Pressure Sensor Installation (P/B 401)
80-11-01-400-801-F00	Starter Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-9144	Sling - 3-Leg, Accessory Gearbox Handling Part #: 856A3519G05 Supplier: 58828
SPL-9145	Cradle - Removal/Installation, Accessory Gearbox Part #: 856A3525G04 Supplier: 58828 Opt Part #: 856A3525G03 Supplier: 58828
SPL-9146	Container - Shipping, Accessory Gearbox Module Part #: 856A3588G01 Supplier: 58828
SPL-9147	Protector - Mounting Pin, Accessory Gearbox Part #: 856A3591G01 Supplier: 58828
SPL-9148	Fixture - Alignment, Accessory Gearbox Part #: 856A3709G02 Supplier: 58828 Part #: 856A3709G03 Supplier: 58828
SPL-24658	Depth Gage (Included in 856A3709 Kit) Part #: 856A3709G02 Supplier: 58828 Part #: 856A3709G03 Supplier: 58828

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Description
SPL-24659	Guide Rail (Included in 856A3709 Kit) Part #: 856A3709G02 Supplier: 58828 Part #: 856A3709G03 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00601 [CP2101]	Vaseline - Graphite Mineral	
D00672 [CP5070]	Vaseline - Pure Mineral	V V-P-236
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
5	Cotter pin	72-60-00-01A-075	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-60-00-01B-035	LOM 402, 404, 406, 407, 411, 416, 445
8	Cotter pin	72-60-00-01A-075	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-60-00-01B-035	LOM 402, 404, 406, 407, 411, 416, 445
17	Cotter pin	72-60-00-01A-075	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-60-00-01B-035	LOM 402, 404, 406, 407, 411, 416, 445
22	Cotter pin	72-60-00-01A-075	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-60-00-01B-035	LOM 402, 404, 406, 407, 411, 416, 445
25	Cotter pin	72-60-00-01A-075	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-60-00-01B-035	LOM 402, 404, 406, 407, 411, 416, 445
30	Cotter pin	72-60-00-01A-075	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-60-00-01B-035	LOM 402, 404, 406, 407, 411, 416, 445

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
39	Cotter pin	72-60-00-01A-075	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-60-00-01B-035	LOM 402, 404, 406, 407, 411, 416, 445
48	Cotter pin	72-60-00-01A-075	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
		72-60-00-01B-035	LOM 402, 404, 406, 407, 411, 416, 445

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

G. Accessory Gearbox Installation

SUBTASK 72-63-00-922-002-F00

WARNING

DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION

DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

CAUTION

DO NOT LET ALKALINE CLEANING FLUIDS TOUCH THE OIL WHICH WILL GO INTO THE ENGINE. VERY SMALL AMOUNTS OF ALKALINE CLEANING FLUIDS WILL DAMAGE THE ENGINE OIL.

DO NOT PUT THE OIL THAT IS DRAINED FROM THE ENGINE BACK INTO THE ENGINE.

(1) Obey the above warnings and cautions throughout this procedure.

(a) For the references, obey the warnings and cautions in those tasks.

SUBTASK 72-63-00-490-001-F00

(2) Do these steps to remove the AGB from the storage position (Figure 405).

(a) Install the accessory gearbox sling, SPL-9144 on the AGB as follows:

1) Install the two sectors at each end of the AGB and hold them with the two lockpins of the tool.

2) Attach a hoist to the 3-leg sling.

3) Apply a slight tension to the hoist.

(b) Remove the AGB from the accessory gearbox shipping container, SPL-9146.

1) Remove the AGB above the accessory gearbox cradle, SPL-9145.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-63-00-420-013-F00

(3) Do these steps to install the AGB on the engine (Figure 404):

(a) Install the AGB [1] on the accessory gearbox cradle, SPL-9145 as follows:

1) Set the AGB [1] on the cradle with the cradle support.

2) Slowly lower the AGB [1] onto the cradle support.

3) Engage the two end lock pins of the tool which hold the cradle support to the AGB.

4) Install the third lock pin in the AGB. Adjust the yoke with the screw.

5) Set the adjustment rack of the cradle support to position 4 and attach a hoist to the support shackle.

(b) Remove the covers and caps from all drive pads and equipment holes of the AGB.

(c) Apply a slight tension to the hoist.

(d) Remove the AGB and the cradle support assembly from the cradle mount support.

(e) Install the AGB and the cradle support assembly on the engine (Figure 405 and Figure 401).

1) Align the upper and lower clevis mounts on the AGB and fan case.

CAUTION

USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

(f) Install the attachment hardware on the AGB as follows:

1) Lightly coat the straight pin [46] and the straight pin [47] with graphite mineral vaseline, D00601 [CP2101].

2) Install the mounting pin protector, SPL-9147 on the straight pin [47].

3) Install the straight pin [47] at the lower clevis mount.

4) Remove the pin protector from the straight pin [47].

5) Install the mounting pin protector, SPL-9147 on the straight pin [46].

6) Install the straight pin [46] at the upper clevis mount.

7) Remove the pin protector from the straight pin [46] and store the protector in the accessory gearbox shipping container, SPL-9146.

8) Install the nut [40], nut [49], washer [50] and special washer [42] with nut [43], bolt [41] and bonding strap [36].

9) Torque the nut [40] and nut [49] to 840 in-lb (95 N·m)-930 in-lb (105 N·m).

10) Install the new cotter pin [39] and new cotter pin [48].

CAUTION

USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

(g) Install the upper rear link [16] and lower rear link [35] as follows (Figure 401):

1) Lightly coat the straight pin [28] and the straight pin [33] with graphite mineral vaseline, D00601 [CP2101].

2) Install the lower rear link [35] on the AGB and on the containment case.

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3) Install the straight pin [28] and the straight pin [33].
4) Install the nut [26], nut [31], washer [27] and washer [32].
5) Torque the nut [26] and nut [31] to 840 in-lb (95 N·m)-930 in-lb (105 N·m).
6) Install the new cotter pin [25] and new cotter pin [30].
7) Lightly coat the straight pin [14] and the straight pin [20] with graphite mineral vaseline, D00601 [CP2101].
8) Install the upper rear link [16] on the AGB and on the containment case.
9) Install the straight pin [14] and the straight pin [20].
10) Install the nut [18], nut [23], washer [19] and washer [24].
11) Torque the nut [18] and nut [23] to 840 in-lb (95 N·m)-930 in-lb (105 N·m).
12) Install the new cotter pin [17] and new cotter pin [22].

(h) Remove the lock pins which hold the AGB cradle to the AGB.

(i) Remove the AGB cradle from the AGB (Figure 404).

SUBTASK 72-63-00-430-001-F00

(4) Do these steps to install the brackets on the AGB (Figure 403).

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

(a) Lightly coat the threads of the bolts [4], bolts [5], bolts [6], bolts [8], bolts [11], bolts [12], bolts [15], bolts [16], bolts [20], bolts [21], bolts [23], bolts [25], bolts [27], bolts [29], bolts [32], bolts [34], bolts [36], bolts [38], bolts [40] and bolts [42] with graphite mineral vaseline, D00601 [CP2101].

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(b) Lightly coat the threads of the bolts [4], bolts [5], bolts [6], bolts [8], bolts [11], bolts [12], bolts [15], bolts [16], bolts [20], bolts [21], bolts [23], bolts [25], bolts [27], bolts [29], bolts [32], bolts [34], bolts [36], bolts [38], bolts [40], bolts [42], bolts [43], bolts [47] and bolts [49] with graphite mineral vaseline, D00601 [CP2101].

(c) Install the bracket [50] on the Starter Drive Pad and attach with the two bolts [49].

(d) Install the bracket [48] on the Hydraulic Pump Drive Pad and attach with the two bolts [47].

(e) Install the gasket [46] on the AGB housing.

(f) Install the AGB tube [45] and the bracket [44] and attach with the four bolts [43].

LOM ALL

(g) Install the bracket [41] on the Hydraulic Pump Drive Pad and attach with the two bolts [42].

(h) Install the bracket [30] on the Lubrication Unit Drive and attach with the two bolts [29].

(i) Install the bracket [26] on the Cover Filter and attach with the two bolts [25].

(j) Install the bracket [28] on the Cover Filter and attach with the two bolts [27].

(k) Install the bracket [39] on the Hydraulic Pump Drive Pad and attach with the two bolts [38], washers [37] and the two bolts [40].

(l) Install the bracket [24] on the Fuel Pump Drive Pad and attach with the two bolts [23].

(m) Install the bracket [35] on the Starter Drive Pad and attach with the two bolts [36].

(n) Install the bracket [18] on the Fuel Pump Drive Pad and attach with the two bolts [16], washers [17], nuts [14] and the two bolts [15].

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(o) Install the bracket [19] on the Fuel Pump Drive Pad and attach with the two bolts [20].

(p) Install the bracket [22] on the Fuel Pump Drive Pad and attach with the two bolts [21].

(q) Install the bracket [33] on the Starter Drive Pad and attach with the two bolts [34].

(r) Install the bracket [10] on the Fuel Pump Drive Pad and attach with the two bolts [12], washers [13] and the two bolts [11].

(s) Install the bracket [2] and bracket [3] on the Input AGB location.

1) Attach the bracket [2] with the two bolts [8] and washers [9].

2) Attach the bracket [3] with the three bolts [4] and nuts [1].

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

(t) Install the bracket [31] on the Alternator Drive Pad and attach with the two bolts [32].

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(u) Install the bracket [31] on the Alternator Drive Pad and attach with the three bolts [32].

LOM ALL

(v) Install the bracket [7] on the Input AGB location and attach with the two bolts [6].

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

(w) Torque the bolts [4], bolts [5], bolts [6], bolts [8], bolts [11], bolts [12], bolts [15], bolts [16], bolts [20], bolts [21], bolts [23], bolts [25], bolts [27], bolts [29], bolts [32], bolts [34], bolts [36], bolts [38], bolts [40], bolts [42], nuts [1] and nuts [14] to 95 in-lb (11 N·m)-105 in-lb (12 N·m).

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(x) Torque the bolts [4], bolts [5], bolts [6], bolts [8], bolts [11], bolts [12], bolts [15], bolts [16], bolts [20], bolts [21], bolts [23], bolts [25], bolts [27], bolts [29], bolts [32], bolts [34], bolts [36], bolts [38], bolts [40], bolts [42], bolts [47] and bolts [49] to 95 in-lb (11 N·m)-105 in-lb (12 N·m).

(y) Torque the bolts [43] to 49 in-lb (5.5 N·m)-53 in-lb (6.0 N·m).

SUBTASK 72-63-00-420-014-F00

CAUTION	USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(5) Install the drain tube on the AGB (Figure 402).

(a) Lightly coat the threads of the nipple of the AGB with oil, D00599 [CP2442].

(b) Lightly coat the threads of the bolt [1], bolts [5] and bolt [9] with graphite mineral vaseline, D00601 [CP2101].

(c) Install the clamp [3], clamps [7] and clamp [11], on the drain tube [13].

(d) Tighten by hand the coupling nut of the drain tube [13] on the nipple.

(e) Tighten by hand the bolt [1] and the nut [2] to attach the clamp [3] on the bracket [4].

(f) Tighten by hand the two bolts [5] and the two nuts [6] to attach the two clamps [7] on the bracket [8].

(g) Tighten by hand the bolt [9] and the nut [10] to attach the clamp [11] on the bracket [12].

(h) Torque the bolt [1], bolts [5], bolt [9] to 63 in-lb (7 N·m)-72 in-lb (8 N·m).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(i) Make sure that the drain tube [13] is installed without strain.

(j) Torque the coupling nut of the drain tube [13] to 270 in-lb (31 N·m)-315 in-lb (36 N·m).

LOM ALL

SUBTASK 72-63-00-430-002-F00

(6) Do these steps to install the bonding strap on the fan frame (Figure 401).

(a) Put the bonding strap [36] on the fan frame.

(b) Install the bonding strap [36] on the Flange B5 at hole position No. 83 and attach with the nut [45], washer [37], washer [44], and the bolt [38].

(c) Torque the nut [45] to 95 in-lb (11 N·m)-105 in-lb (12 N·m).

SUBTASK 72-63-00-430-003-F00

CAUTION

USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

CAUTION

DO NOT CHANGE THE AGB TURNBUCKLE LENGTH DURING THE PROCEDURE, THIS CAN CAUSE DAMAGE TO THE CORRECT ALIGNMENT OF THE AGB MODULE.

(7) Do these steps to install the AGB turnbuckle [4] (Figure 401).

(a) Lightly coat the straight pin [1] and straight pin [11] with graphite mineral vaseline, D00601 [CP2101].

(b) Install the turnbuckle [4].

(c) Install the straight pin [11].

(d) Install the straight pin [1].

(e) Install the nut [6] and nut [9], washer [7] and washer [10].

(f) Torque the nut [6] and nut [9] to 840 in-lb (95 N·m)-930 in-lb (105 N·m).

(g) Install the new cotter pin [5] and new cotter pin [8].

SUBTASK 72-63-00-820-001-F00

(8) Do these steps to adjust the AGB position on the fan case (Figure 406).

(a) Install the base of the accessory gearbox alignment fixture, SPL-9148 on the fan case and attach it with the three knurled buttons.

(b) Install the depth gage, SPL-24658, in the guide rail, SPL-24659, of the AGB alignment fixture.

(c) Put the depth gage, SPL-24658, on the Integrated Drive Generator (IDG) pad (fan case side).

(d) Measure the dimension (DIM. A).

(e) Remove the depth gage, SPL-24658, and put it on the IDG pad (opposite side).

(f) Measure the dimension (DIM. B).

(g) For the correct alignment of the AGB, make sure that you have these dimensions:

1) Dimension (DIM. B) = Dimension (DIM. A) +/- 0.002 in. (0.05 mm).

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2) If not, adjust the dimensions (DIM. A) and (DIM. B) as follows:
   a) Cut the lockwire or the cable which safety the nuts of the axial links ends.
   b) Loosen the nuts of the axial link ends.
   c) Turn the link rod.
   d) Measure the dimensions (DIM. A) and (DIM. B) again.
      <1> Make sure that the dimensions are correct.
      <2> If it is necessary, adjust the dimensions again.
      <3> If the dimensions are correct, continue to the next step.
   e) Hold the link rod in position and tighten the nuts.
   f) Torque the nuts to 675 in-lb (76 N·m)-745 in-lb (84 N·m).

(h) Make sure that the dimensions (DIM. A) and (DIM. B) are not changed.
   1) If it is necessary, do the steps to adjust and measure the dimensions again.

(i) Safety the nuts of the turnbuckle with safety wire, G02345 [CP8001] or cable, G50065 [CP8006].

(j) Remove the AGB alignment fixture from the fan case.

SUBTASK 72-63-00-430-004-F00

(9) Do this task: N2 Speed Sensor Installation, TASK 77-11-02-400-801-F00.

SUBTASK 72-63-00-430-005-F00

(10) Do this task: Starter Installation, TASK 80-11-01-400-801-F00.

SUBTASK 72-63-00-430-006-F00

(11) Do this task: EEC Alternator and Alternator Rotor Installation, TASK 73-21-08-400-801-F00.

SUBTASK 72-63-00-430-007-F00

(12) Do this task: Lubrication Unit Installation, TASK 79-21-01-400-801-F00.

SUBTASK 72-63-00-430-008-F00

(13) Do this task: Scavenge Oil Filter Assembly Installation, TASK 79-21-04-400-801-F00.

SUBTASK 72-63-00-430-009-F00

(14) Do this task: Fuel Pump Package Installation, TASK 73-11-01-400-801-F00.

SUBTASK 72-63-00-420-015-F00

WARNING

ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

CAUTION

USE TWO WRENCHES TO REMOVE OR INSTALL THE TUBE COUPLING NUTS. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBE CAN OCCUR.

(15) Do these steps to connect the oil return tube [64] to the AGB [65] and TGB [66] (Figure 407).
   (a) Lightly coat gasket [60] and gasket [67] (if not damaged) with vaseline, D00672 [CP5070].
      1) Install the gasket [60] between the flange of the AGB [65] and the oil return tube [64].
      2) Install the gasket [67] between the flange of the TGB [66] and the oil return tube [64]

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(b) Lightly lubricate the threads of the four bolts [68] with graphite mineral vaseline, D00601 [CP2101].

1) Attach the oil return tube [64] to the AGB [65].

2) Torque the bolts [68] by hand.

(c) Lightly lubricate the threads of the four bolts [63] with graphite mineral vaseline, D00601 [CP2101].

1) Attach the oil return tube [64] to the TGB [66].

2) Torque the bolts [63] by hand.

(d) Make sure that there is no strain on the oil return tube [64] and torque the bolts [63] and bolts [68] to 49 in-lb (5.5 N·m)-53 in-lb (6.0 N·m).

(e) Install the clamp [62] on the oil return tube [64].

(f) Lightly lubricate the threads of the bolt [61] with graphite mineral vaseline, D00601 [CP2101] and torque the bolt to 62 in-lb (7 N·m)-71 in-lb (8 N·m).

SUBTASK 72-63-00-430-010-F00

(16) Do this task: IDG Oil Cooler Installation, TASK 73-11-06-400-801-F00.

SUBTASK 72-63-00-430-011-F00

(17) Do this task: Oil Pressure Sensor Installation, TASK 79-32-01-400-801-F00.

SUBTASK 72-63-00-430-014-F00

(18) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation, TASK 29-11-11-400-801-001.

SUBTASK 72-63-00-430-015-F00

(19) Do this task: Integrated Drive Generator (IDG) Installation, TASK 24-11-11-400-801.

SUBTASK 72-63-00-430-016-F00

(20) Connect the Transfer Gearbox (TGB) assembly to the AGB (TASK 72-62-00-400-801-F00).

SUBTASK 72-63-00-430-017-F00

(21) Install the J5, J6, J7 and J8 Wiring Harnesses (TASK 73-21-06-400-801-F00).

SUBTASK 72-63-00-410-004-F00

(22) Do this task: Install the Inlet Cowl, TASK 71-11-01-400-801-F00.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-63-00-440-003-F00

(1) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-440-004-F00

(2) Remove the DO-NOT-OPERATE tags from the start levers.

SUBTASK 72-63-00-410-005-F00

(3) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

I. Post-Installation Test

SUBTASK 72-63-00-790-003-F00

(1) Do the tests (fuel pump package and AGB) that are given in the Power Plant Test Reference Table, TASK 71-00-00-800-811-F00.

(a) Do a check for leaks in these areas:

1) The handcranking drive cover.
2) The tube connections.
3) The TGB/AGB interface.
4) The TGB/fan frame interface.
5) All connections with components, pads and cover.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ACCESSORY GEARBOX - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has one task:
      (1) The inspection of the AGB.

TASK 72-63-00-200-801-F00

2. **Accessory Gearbox Inspection**
(Figure 601 and Figure 603)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This is a visual inspection of the Accessory Gear Box (AGB) housing, clevis mounts, mount links, turnbuckle, and lockwire.

B. References

Reference	Title
70-10-07-800-801-F00	Hand Blending - Maintenance Practices (P/B 201)
70-20-01-800-804-F00	Lockwire Installation (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-63-00-000-802-F00	Axial Link End Dampers Removal (P/B 201)
72-63-00-000-803-F00	Axial Link End or Upper (Lower) Mount Link Removal (P/B 201)
72-63-00-000-804-F00	Accessory Gearbox Removal (P/B 401)
72-63-00-300-801-F00	Replacement of a Damper in the Mount Fitting (P/B 801)
72-63-00-400-802-F00	Axial Link End Dampers Installation (P/B 201)
72-63-00-400-803-F00	Axial Link End or Upper (Lower) Mount Link Installation (P/B 201)
72-63-00-400-804-F00	Accessory Gearbox Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-63-00-010-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-63-00-210-001-F00

(2) If you find damage that is more than the limits, replace the AGB, unless you are given other instructions.
   (a) These are the tasks: Accessory Gearbox Removal, TASK 72-63-00-000-804-F00, Accessory Gearbox Installation, TASK 72-63-00-400-804-F00.

SUBTASK 72-63-00-210-006-F00

(3) Visually examine the mount fittings on the fan frame (Figure 601, Sheet 3):
   (a) Cracks that extend from the bolt holes in the mount lugs

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Not serviceable.
2) A Continue-In-Service limit of 10 cycles is permitted for one crack that goes through one mounting lug bolt hole, not more than 0.25 inch (6.35 mm) in length.

(b) Cracks in the areas of the mount lugs
1) Not serviceable.
2) A Continue-In-Service limit of 10 cycles is permitted for one crack 0.25 in. (6.35 mm) in length.

(c) Nicks, marks, and scratches
1) There is no limit to the number of nicks, marks, and scratches which are permitted with these conditions:
a) Not more than 1.0 in. (25.4 mm) in length.
b) Not more than 0.02 in. (0.51 mm) in depth, after you remove the high metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).
c) Minimum separation of 1.0 in. (25.4 mm) between areas of damage.

SUBTASK 72-63-00-210-002-F00

(4) Examine the AGB housing for damage:

NOTE: If you find AGB displacement while working on any of the AGB mounted equipment, it is recommended to do an inspection of the AGB mounts and rod links within the next 200 hours or 100 cycles.

(a) If you find AGB displacement when you do work on the AGB mount equipment, do this step:
1) It is recommended to do an inspection of the AGB mounts and rod links in the subsequent 200 hours or 100 cycles.

(b) Cracks
1) Not serviceable.

(c) Nicks, dents, or scratches
1) All damage is permitted with this limit:
a) Not more than 0.035 in. (0.89 mm) in depth after you remove the high metal (Hand Blending - Maintenance Practices, TASK 70-10-07-800-801-F00).

SUBTASK 72-63-00-210-003-F00

(5) Examine the AGB clevis mounts for damage:

(a) Cracks
1) Not serviceable.

(b) Loose bushing in the clevis mounts
1) Not permitted.

(c) Loose mount pin
1) Not permitted.
a) Tighten the mount pin if it is necessary.

(d) Cracks or crazing in the AGB mount rubber are permitted.

(e) Eccentricity of the mounting pin axis relative to the axis of the outer bushing of the rubber damper

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1) Maximum Serviceable Limit: Maximum allowed eccentricity (half of the difference between the minimum and maximum clearances) is 0.06 in. (1.5 mm) (Figure 601, Sheet 4).

2) A Continue-In-Service limit of 10 cycles or 25 hours is permitted to replace the dampers (Replacement of a Damper in the Mount Fitting, TASK 72-63-00-300-801-F00), if there is no contact of metal against metal.

SUBTASK 72-63-00-210-005-F00

(6) Examine the AGB upper and lower mount links, turnbuckle, and associated clevis for damage (Figure 602):

(a) Axial and/or radial looseness of mount link or turnbuckle

1) Any amount is permitted if there is no contact between the mount links or turnbuckle extremity and associated clevis.

CAUTION	THE MOUNT LINKS OR TURNBUCKLES SURFACES MUST BE PARALLEL AS FAR AS POSSIBLE TO THE CLEVIS SURFACES DURING THE CLEARANCE CHECK. DO NOT ROTATE THE ROD LINK OR TURNBUCKLE. THE CLEARANCE CHECK MUST BE DONE AT THE EXTREMITY OF THE LINKS. AN INCORRECT CHECK CAN LEAD TO EQUIPMENT DAMAGE.

2) If a mount link or turnbuckle extremity is in contact with the AGB or engine clevis, a maximum In-Service extension of 500 operating cycles is permitted before you do the installation of a damper.

NOTE: On engine POST CFM56-7B-SB 72-0465, you already have a damper at each link end.

a) Do these tasks for each link to replace the dampers:

<1> Axial Link End Dampers Removal, TASK 72-63-00-000-802-F00.

<2> Axial Link End Dampers Installation, TASK 72-63-00-400-802-F00.

b) For the AGB and engine clevis of the mount links:

<1> Impacts, marks, wear or fretting

<a> Any amount permitted if less than 0.008 in. (0.2 mm) in depth.

c) For the AGB upper and lower mount links, turnbuckle (if removed during damper installation) (Figure 602, Sheet 2):

<1> Spherical bearing axial wear

<a> Dim. X = 0.1799 in. (4.57 mm) “max”.

<2> Spherical bearing radial wear

<a> Any amount.

<3> Ball groove and corrosion

<a> Any amount.

<4> External ring with missing lubricating lining

<a> Any amount.

<5> External ring tears

<a> Not serviceable.

<6> If you find damage that is more than the limits, replace the axial link end(s) or the mount link.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

<a> These are the tasks: Axial Link End or Upper (Lower) Mount Link Removal, TASK 72-63-00-000-803-F00 Axial Link End or Upper (Lower) Mount Link Installation, TASK 72-63-00-400-803-F00.

NOTE: This task includes an adjustment of the AGB position.

SUBTASK 72-63-00-212-001-F00

(7) Examine the axial link ends dampers for damage (Figure 602):

NOTE: You must do this procedure only for engine POST CFM56-7B-SB 72-0465.

(a) Tears, cut

1) Any amount is permitted.

(b) Missing dampers straps

1) Any amount is permitted.

SUBTASK 72-63-00-210-004-F00

(8) Look for damage to the lockwire:

(a) Broken, missing or loose lockwire

1) Not permitted.

a) Do this task: Lockwire Installation, TASK 70-20-01-800-804-F00.

SUBTASK 72-63-00-410-001-F00

(9) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Accessory Gearbox Inspection
Figure 601/72-63-00-990-801-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

C

MM-00191-00-B

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Accessory Gearbox Inspection
Figure 601/72-63-00-990-801-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(VIEW IN THE FORWARD DIRECTION)

D

484703 S0000144256_V2

Accessory Gearbox Inspection
Figure 601/72-63-00-990-801-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1507470 S0000275872_V2

Accessory Gearbox Inspection
Figure 601/72-63-00-990-801-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Accessory Gearbox Mounts Inspection
Figure 602/72-63-00-990-802-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Accessory Gearbox Mounts Inspection
Figure 602/72-63-00-990-802-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Oil Return Tube Installation
Figure 603/72-63-00-990-820-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ACCESSORY GEARBOX - REPAIRS

1. General

A. This procedure contains one task:

(1) Replacement of a damper in the mount fitting.

TASK 72-63-00-300-801-F00

2. Replacement of a Damper in the Mount Fitting

Figure 801

A. General

(1) This task is a repair procedure to replace a damper in the mount fitting. Refer to Figure 801.

(2) You can use equivalent alternatives for tools, equipment, and consumable materials.

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-18389	Puller - Damper Assy, AGB Mounts Part #: 856A5630G01 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
G51412 [CP2721]	Cloth - Abrasive, Silicone Carbide - CS 333X	

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Damper	72-23-00-04-075	LOM ALL
		72-23-00-04-100	LOM ALL

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Setup Information

SUBTASK 72-63-00-840-001-F00

(1) Setup Information. Refer to Figure 804.

G. Procedure

SUBTASK 72-63-00-000-001-F00

NOTE: You can do this repair if you can get access.

> **CAUTION**
> KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(1) Remove the damper [1] with puller, SPL-18389. Refer to Figure 803.

SUBTASK 72-63-00-200-001-F00

(2) Do a check of the surface condition of the inner diameter of the mount fitting.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 72-63-00-120-001-F00

> **WARNING**
> METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(3) If necessary, do a hand blending to remove scratch marks or pits with abrasive cloth, G51412 [CP2721]. Refer to TASK 70-41-11-350-009 (70-41-11, Hand Blending) CFM Standard Practices Manual and to the limits that follow:

(a) Dia A. Refer to Figure 802.

- Minimum Finish Dimension = 1.73228 in. (44.0 mm)
- Maximum Finish Dimension = 1.73326 in. (44.025 mm)

SUBTASK 72-63-00-110-001-F00

(4) Do a locally swab etching of the repaired area (for titanium material). Refer to TASK 70-53-11-110-023 (70-53-11, Swab Etching) CFM Standard Practices Manual.

SUBTASK 72-63-00-200-002-F00

(5) Do a fluorescent penetrant inspection of the repaired area. Refer to TASK 70-32-23-230-012 (70-32- 23, Fluorescent Penetrant Inspection - Portable Post-Emuslifiable) CFM Standard Practices Manual.

No indication is permitted.

NOTE: Indications with a maximum dimension of less than 0.012 in. (0.3 mm) are non-interpretable as indications.

SUBTASK 72-63-00-400-001-F00

(6) Install a new damper [1] as follows. Refer to Figure 801.

> **WARNING**
> USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

(a) Decrease the temperature of the damper to 14°F (-10°C) maximum.

(b) Put the damper in position in front of the mount fitting and align it with the center of the mount fitting with a 0.787 in. (20.0 mm) diameter pin installed in the second damper.

(c) Install the damper in the mount fitting with a wooden mallet.

(d) Make sure that the flange of the damper is in contact with the mount fitting.

SUBTASK 72-63-00-200-003-F00

(7) Final visual inspection.

(a) Make sure that the flange of the damper touches the mount fitting.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Replacement of a Damper in the Mount Fitting
Figure 801/72-63-00-990-812-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MATERIAL:

FAN INLET CASE: 6061 (AGSU)

MOUNT FITTING: 6-4 (TA6V)

B0068701.CGM

2903147 S0000693732_V1

Replacement of a Damper in the Mount Fitting
Figure 801/72-63-00-990-812-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ROUGHNESS IS IN MICROINCHES
WITH MICROMETERS IN PARENTHESES.

2903157 S0000693734_V1

Dimensional Information
Figure 802/72-63-00-990-816-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B0068901.CGM
2903163 S0000693735_V1

Removal of Damper
Figure 803/72-63-00-990-817-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:
ALL DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES

B0069001.CGM

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Setup Information
Figure 804/72-63-00-990-818-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HANDCRANKING DRIVE COVER - MAINTENANCE PRACTICES

1. General

A. This procedure has these tasks:

(1) The removal of the handcranking drive cover

(2) The installation of the handcranking drive cover.

TASK 72-63-01-000-801-F00

2. Handcranking Drive Cover Removal

(Figure 201)

A. General

(1) The handcranking drive cover (referred to as the cover) is on the forward side of the accessory gearbox, just below the EEC alternator.

(2) For this procedure the accessory gearbox will be referred to as the AGB.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for Removal

SUBTASK 72-63-01-010-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

E. Procedure

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

SUBTASK 72-63-01-020-001-F00

(1) Do these steps to remove the cover [3] from the drive pad:

(a) Remove the four bolts [1] and the four washers [2] that attach the cover [3] to the AGB [5].

(b) Install three of the removed bolts [1] in the three threaded holes of the cover [3].

1) Turn the three bolts [1] until you can remove the cover [3] from the AGB [5].

(c) Remove and discard the two O-rings [4].

(d) Move the cover [3] until it is away from the drive pad on the AGB [5].

NOTE: Do not remove the lanyard that attaches the cover [3] to the AGB [5].

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

SUBTASK 72-63-01-020-004-F00

(2) Do these steps to remove the cover [3] from the drive pad:

(a) Remove the three bolts [1] and three washers [2] that attach the cover [3] to the AGB [5].

NOTE: Do not remove the lanyard that attaches the cover [3] to the AGB [5].

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LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE (Continued)

(b) Remove and discard the O-ring [4].

LOM ALL

——— END OF TASK ———

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Handcranking Drive Cover Installation
Figure 201/72-63-01-990-801-F00 (Sheet 1 of 2)

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Handcranking Drive Cover Installation
Figure 201/72-63-01-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 72-63-01-400-801-F00

3. Handcranking Drive Cover Installation

(Figure 201)

A. General

(1) For this procedure, the accessory gearbox will be referred to as the AGB.

B. References

Reference	Title
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00601 [CP2101]	Vaseline - Graphite Mineral	

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
3	Handcranking drive cover	72-63-00-02-110	LOM ALL
		72-63-00-02-112	LOM ALL
4	O-ring	72-63-00-02-100	LOM ALL
		72-63-00-02-102	LOM ALL

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Procedure

LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

SUBTASK 72-63-01-420-001-F00

CAUTION

INSTALL THE COVER ON THE AGB. WITHOUT THE COVER, OIL LEAKS WILL OCCUR. THIS CAN CAUSE DAMAGE TO THE ENGINE.

CAUTION

INSTALL NEW O-RINGS ON THE COVER OF THE AGB. USED O-RINGS CAN CAUSE OIL LEAKS. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(1) Do these steps to attach the handcranking drive cover [3] to the handcranking drive pad of the AGB:

NOTE: Installation of the AGB hand-cranking cover must be classified as “flight safety sensitive maintenance”. An independent inspection of the correct installation of the hand-cranking cover must be carried out prior to release to service of the aircraft or the engine, as applicable.

(a) Lubricate two new o-rings [4] with oil, D00599 [CP2442].

(b) Put the two new o-rings [4] on the handcranking drive cover [3].

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LOM ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879 (Continued)

(c) Install the handcranking drive cover [3] on the handcranking drive pad of the AGB.

(d) Lightly lubricate the threads of the bolt [1] with graphite mineral vaseline, D00601 [CP2101].

(e) Install the four bolts [1] and four washers [2].

1) Tighten the bolts to 97-106 pound-inches (11-12 Newton meters).

LOM ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

SUBTASK 72-63-01-420-002-F00

CAUTION

INSTALL THE COVER ON THE AGB. WITHOUT THE COVER, OIL LEAKS WILL OCCUR. THIS CAN CAUSE DAMAGE TO THE ENGINE.

CAUTION

INSTALL NEW O-RINGS ON THE COVER OF THE AGB. USED O-RINGS CAN CAUSE OIL LEAKS. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(2) Do these steps to attach the handcranking drive cover [3] to the handcranking drive pad of the AGB:

(a) Lubricate the new o-ring [4] with oil, D00599 [CP2442].

(b) Put the new o-ring [4] on the handcranking drive cover [3].

(c) Install the handcranking drive cover [3] on the handcranking drive pad of the AGB.

(d) Lightly lubricate the threads of the bolts [1] with graphite mineral vaseline, D00601 [CP2101].

(e) Install the three bolts [1] and three washers [2].

1) Tighten the bolts [1] to 97-106 pound-inches (11-12 Newton meters).

LOM ALL

G. Handcranking Driver Cover Installation Test

SUBTASK 72-63-01-790-001-F00

(1) Do the test that is listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-63-01-410-001-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ENGINE MODULES - REMOVAL/INSTALLATION

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. These 15 tasks are for life limited components and modules to be removed and discarded at scheduled intervals.

TASK 72-99-99-000-801-F00

2. **Discard the Fan Disk**

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-020-001-F00

(1) Remove and discard the fan disk.

END OF TASK

TASK 72-99-99-000-802-F00

3. **Discard the Booster Spool**

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-020-002-F00

(1) Remove and discard the booster spool.

END OF TASK

TASK 72-99-99-000-803-F00

4. **Discard the Fan Shaft**

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-000-001-F00

(1) Remove and discard the fan shaft.

END OF TASK

TASK 72-99-99-000-804-F00

5. **Discard the Stages 1 and 2 Spool**

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-020-003-F00

(1) Remove and discard the stages 1 and stage 2 spool.

END OF TASK

TASK 72-99-99-000-805-F00

6. **Discard the Stage 3 Disk**

NOTE: This procedure is a scheduled maintenance task.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A. Procedure

SUBTASK 72-99-99-020-004-F00

(1) Remove and discard the stage 3 disk.

——— END OF TASK ———

TASK 72-99-99-000-806-F00

7. Discard the Stages 4 thru 9 Spools

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-020-005-F00

(1) Remove and discard the stages 4 thru 9 spools.

——— END OF TASK ———

TASK 72-99-99-000-807-F00

8. Discard the Front Shaft

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-020-006-F00

(1) Remove and discard the front shaft.

——— END OF TASK ———

TASK 72-99-99-000-808-F00

9. Discard the Rear Rotation (CDP) Seal

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-020-007-F00

(1) Remove and discard the rear rotating (CDP) seal.

——— END OF TASK ———

TASK 72-99-99-000-809-F00

10. Discard the HPT Front Shaft

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-020-008-F00

(1) Remove and discard the HPT front shaft.

——— END OF TASK ———

TASK 72-99-99-000-810-F00

11. Discard the HPT Front Rotating Air Seal

NOTE: This procedure is a scheduled maintenance task.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A. Procedure

SUBTASK 72-99-99-020-009-F00

(1) Remove and discard the HPT front rotating air seal.

END OF TASK

TASK 72-99-99-000-811-F00

12. Discard the HPT Disk

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-020-010-F00

(1) Remove and discard the HPT disk.

END OF TASK

TASK 72-99-99-000-812-F00

13. Discard the HPT Front and Rear Shafts

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-020-011-F00

(1) Remove and discard the HPT front and rear shafts.

END OF TASK

TASK 72-99-99-000-813-F00

14. Discard the LPT Rotor Support

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-000-002-F00

(1) Remove and discard the LPT rotor support.

END OF TASK

TASK 72-99-99-000-814-F00

15. Discard the LPT Shaft

NOTE: This procedure is a scheduled maintenance task.

A. Procedure

SUBTASK 72-99-99-000-003-F00

(1) Remove and discard the LPT shaft.

END OF TASK

TASK 72-99-99-000-815-F00

16. Discard the LPT Stage Disks

NOTE: This procedure is a scheduled maintenance task.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

A. Procedure

SUBTASK 72-99-99-000-004-F00

(1) Remove and discard the LPT stage 1 disk, the stage 2 disk, the stage 3 disk, and the stage 4 disk.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details