CHAPTER

71

POWER PLANT

(CFM56 ENGINES (CFM56-7))

737-600/700/800/900
AIRCRAFT MAINTENANCE MANUAL

CHAPTER 71
POWER PLANT

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292	Oct 15/2024	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

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POWER PLANT

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71-00-00		
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R 518	Feb 15/2025	
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O 598.10	Feb 15/2025	

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610	Oct 15/2020	
611	Jun 15/2020	

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R 405	Feb 15/2025	
R 406	Feb 15/2025	
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R 409	Feb 15/2025	
R 410	Feb 15/2025	
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R 467	Feb 15/2025	
O 468	Feb 15/2025	
R 469	Feb 15/2025	
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O 471	Feb 15/2025	
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O 476	Feb 15/2025	
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71-00-04		
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204	Oct 15/2017	

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207	Feb 15/2023	
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R 425	Feb 15/2025	
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402	Oct 15/2020	

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201	Oct 15/2014	
202	Jun 15/2016	
203	Oct 15/2014	
204	Oct 15/2014	
71-11-07		
R 401	Feb 15/2025	
R 402	Feb 15/2025	
R 403	Feb 15/2025	
R 404	Feb 15/2025	
71-11-07		
501	Oct 15/2014	
502	Oct 15/2014	
503	Jun 15/2016	
504	Jun 15/2016	
505	Oct 15/2014	
R 506	Feb 15/2025	
R 507	Feb 15/2025	
508	Jun 15/2016	
71-11-08		
401	Oct 15/2021	
402	Oct 15/2021	
71-11-08 (cont)		
403	Oct 15/2021	
404	Jun 15/2024	
405	Jun 15/2024	
406	BLANK	
71-11-09		
401	Oct 15/2021	
402	Oct 15/2021	
403	Oct 15/2021	
404	Oct 15/2021	
405	Oct 15/2021	
406	BLANK	
71-11-09		
801	Jun 15/2023	
802	Feb 15/2023	
803	Feb 15/2023	
804	Feb 15/2023	
805	Feb 15/2023	
806	BLANK	
71-21-00		
601	Jun 15/2015	
602	Jun 15/2016	
603	Jun 15/2015	
604	Jun 15/2016	
605	Oct 15/2014	
606	Oct 15/2014	
607	Jun 15/2016	
608	Oct 15/2014	
609	Oct 15/2014	
610	Jun 15/2016	
611	Jun 15/2016	
612	Jun 15/2016	
613	Oct 15/2014	
614	Oct 15/2014	
615	Jun 15/2016	
616	Oct 15/2014	
617	Oct 15/2014	
618	Oct 15/2014	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

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POWER PLANT

Subject/Page	Date	COC
71-21-00 (cont)		
619	Jun 15/2016	
620	Jun 15/2016	
71-21-01		
401	Oct 15/2021	
402	Oct 15/2014	
403	Jun 15/2016	
R 404	Feb 15/2025	
R 405	Feb 15/2025	
406	BLANK	
71-21-02		
401	Feb 15/2023	
402	Feb 15/2023	
403	Feb 15/2023	
404	Feb 15/2023	
405	Feb 15/2023	
R 406	Feb 15/2025	
R 407	Feb 15/2025	
408	Feb 15/2023	
71-21-02		
601	Oct 15/2014	
602	Oct 15/2014	
603	Jun 15/2016	
604	BLANK	
71-21-03		
401	Oct 15/2024	
402	Oct 15/2024	
403	Jun 15/2016	
404	Jun 15/2016	
R 405	Feb 15/2025	
406	Oct 15/2020	
407	Oct 15/2020	
408	BLANK	
71-51-03		
401	Jun 15/2015	
402	Oct 15/2014	
403	Oct 15/2014	
404	Jun 15/2016	
71-51-03 (cont)		
405	Jun 15/2016	
406	Jun 15/2016	
407	Jun 15/2016	
408	Jun 15/2018	
409	Jun 15/2016	
410	Oct 15/2024	
411	Oct 15/2024	
412	Jun 15/2023	
413	Jun 15/2023	
414	BLANK	
71-71-00		
R 601	Feb 15/2025	
O 602	Feb 15/2025	
O 603	Feb 15/2025	
O 604	Feb 15/2025	
O 605	Feb 15/2025	
O 606	Feb 15/2025	
O 607	Feb 15/2025	
R 608	Feb 15/2025	
R 609	Feb 15/2025	
R 610	Feb 15/2025	
611	Jun 15/2016	
612	Jun 15/2016	
613	Jun 15/2016	
614	Feb 15/2022	
615	Jun 15/2016	
616	Jun 15/2021	
617	Jun 15/2016	
618	Jun 15/2016	
619	Jun 15/2016	
620	Jun 15/2016	
621	Jun 15/2016	
622	Jun 15/2016	
623	Jun 15/2023	
624	Jun 15/2023	
625	Jun 15/2021	
71-71-00 (cont)		
626	Jun 15/2021	

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CHAPTER 71
POWER PLANT

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
POWER PLANT - MAINTENANCE PRACTICES (OPERATION PROCEDURES)	71-00-00		201	LOM ALL
Engine Ground Safety Precautions TASK 71-00-00-800-805-F00			201	LOM ALL
Engine Operation Limits TASK 71-00-00-800-806-F00			228	LOM ALL
Procedure to Prepare the Engine for Operation TASK 71-00-00-700-818-F00			238	LOM ALL
Start the Engine Procedure (Selection) TASK 71-00-00-800-807-F00			255	LOM ALL
Start the Engine Procedure (Normal Start) TASK 71-00-00-800-808-F00			255	LOM ALL
Start the Engine Procedure (Manual Override of the Engine Start Valve) TASK 71-00-00-800-809-F00			261	LOM ALL
Start the Engine Procedure (Engine Cross Bleed Start) TASK 71-00-00-800-810-F00			268	LOM ALL
Start the Engine Procedure (Battery Start) TASK 71-00-00-910-801-F01			269	LOM ALL
Stop the Engine Procedure (Usual Engine Stop) TASK 71-00-00-700-819-F00			276	LOM ALL
Stop the Engine Procedure (Emergency Engine Stop) TASK 71-00-00-700-820-F00			279	LOM ALL
Dry Motor the Engine TASK 71-00-00-700-821-F00			282	LOM ALL
Wet Motor the Engine TASK 71-00-00-700-822-F00			288	LOM ALL
POWER PLANT - ADJUSTMENT/TEST	71-00-00		501	LOM ALL
Power Plant Test Reference Table TASK 71-00-00-800-811-F00			502	LOM ALL
Test 1 - Pneumatic Leak Check TASK 71-00-00-700-809-F00			507	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Test 2 - Dry Motor Leak Test TASK 71-00-00-700-810-F00			513	LOM ALL
Test 3A - Idle-Power Leak Check TASK 71-00-00-700-801-F00			514	LOM ALL
Test 3B - Part-Power Leak Check TASK 71-00-00-700-823-F00			517	LOM ALL
Test 5 - Power Assurance Check TASK 71-00-00-700-813-F00			520	LOM ALL
Test 7 - Vibration Survey TASK 71-00-00-700-814-F00			544	LOM ALL
Test 8 - Acceleration Check TASK 71-00-00-700-824-F00			549	LOM ALL
Test 9 - Replacement Engine Test (Pretested) TASK 71-00-00-700-816-F00			553	LOM ALL
Test 10 - Replacement Engine Test (Untested) TASK 71-00-00-700-817-F00			556	LOM ALL
Test 12 - Actuators Test TASK 71-00-00-700-807-F00			559	LOM ALL
Test 13 - Engine Run - EEC BITE Check TASK 71-00-00-700-808-F00			565	LOM ALL
Test 14A - Fan Trim Balance (Three-Shot Plot Procedure) TASK 71-00-00-750-802-F00			566	LOM ALL
Test 14B - Fan Trim Balance (On Board Procedure - Vibro-meter AVM) TASK 71-00-00-750-803-F00			598.17	LOM ALL
Test 14C - Fan Trim Balance (Analyzer Procedure) TASK 71-00-00-750-805-F00			598.35	LOM ALL
Test 14D - Two-Plane Trim Balance TASK 71-00-00-750-806-F00			598.44	LOM ALL
Test 14E - Fan Trim Balance with Onboard Network System (ONS) (Optional) TASK 71-00-00-750-810-F00			598.62	LOM 445-447 PRE SB 737-46-1050 AND POST SB 737-46-1014; LOM 450, 453, 454, 457, 461-463 PRE SB 737-46-1050; LOM 455, 456 POST SB 737-46-1014 AND PRE SB 737-46-1050

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POWER PLANT

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
POWER PLANT - INSPECTION/CHECK	71-00-00		601	LOM ALL
Engine Foreign Object Damage and Birdstrike Inspection TASK 71-00-00-800-802-F00			601	LOM ALL
Inspection After an Engine Fire, Use of Fire Extinguishing Agents, or High Nacelle Temperature TASK 71-00-00-800-803-F00			607	LOM ALL
Inspection After Engine Operations Above the Limits and High Engine Stress TASK 71-00-00-800-804-F00			616	LOM ALL
Inspection of the Engine After an Engine Stall or Possible Engine Stall TASK 71-00-00-210-801-F00			630	LOM ALL
Inspection of the Engine After In-Flight Windmilling TASK 71-00-00-210-802-F00			631	LOM ALL
Inspection Of The Engine After A Hard Landing TASK 71-00-00-200-803-F00			632	LOM ALL
Inspection of the Engine After High G-Loads During Transportation TASK 71-00-00-210-803-F00			633	LOM ALL
Inspection of the Engine After Volcanic Ash, Dust or Sand Ingestion TASK 71-00-00-200-802-F00			634	LOM ALL
Engine Exceedance Page Check TASK 71-00-00-740-801-F00			636	LOM ALL
Nacelle Structure Hot Air Duct Rupture Conditional Inspection TASK 71-00-00-200-804-F00			639	LOM ALL
POWER PLANT - REMOVAL/INSTALLATION	71-00-02		401	LOM ALL
Power Plant - Removal TASK 71-00-02-000-801-F00			402	LOM ALL
Power Plant - Removal with the Bootstrap Equipment TASK 71-00-02-000-802-F00			443	LOM ALL

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POWER PLANT

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Power Plant - Removal with the Cobra Engine Change System TASK 71-00-02-000-803-F00			455	LOM ALL
Power Plant - Removal with the JacXson U70 TASK 71-00-02-000-804-F00			460	LOM ALL
Power Plant - Installation TASK 71-00-02-400-801-F00			465	LOM ALL
Power Plant - Installation with the Bootstrap Equipment TASK 71-00-02-400-802-F00			481	LOM ALL
Power Plant - Installation with the Cobra Engine Change System TASK 71-00-02-400-803-F00			491	LOM ALL
Power Plant - Installation with the JacXson U70 TASK 71-00-02-400-804-F00			498.1	LOM ALL
POWER PLANT - MAINTENANCE PRACTICES (PRESERVATION AND DEPRESERVATION)	71-00-03		201	LOM ALL
Dry-Out and Lubrication of the Engine TASK 71-00-03-600-801-F00			203	LOM ALL
Inlet Cowl Lipskin Protective Coating Procedure TASK 71-00-03-600-815-F00			216	LOM ALL
Preservation of An Engine On-Wing (Task Selection) TASK 71-00-03-600-802-F00			225	LOM ALL
Depreservation of an Engine On-Wing (Task Selection) TASK 71-00-03-600-803-F00			226	LOM ALL
Preservation of an Engine for Not More Than 10 Days (Engine On-Wing) TASK 71-00-03-600-804-F00			227	LOM ALL
Preservation Renewal of an Engine for Not More Than 10 Days (Engine On-Wing) TASK 71-00-03-600-805-F00			231	LOM ALL
Preservation of an Engine for Not More Than One Month (Engine On-Wing) TASK 71-00-03-600-806-F00			232	LOM ALL

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Preservation Renewal of an Engine for Not More Than One Month (Engine On-Wing) TASK 71-00-03-600-807-F00			237	LOM ALL
Depreservation of an Engine, which was Preserved for Not More Than One Month (Engine On-Wing) TASK 71-00-03-600-808-F00			238	LOM ALL
Preservation of an Engine for Not More Than Three Months (Engine On-Wing) TASK 71-00-03-600-809-F00			239	LOM ALL
Preservation Renewal of an Engine for Not More Than Three Months (Engine On-Wing) TASK 71-00-03-600-810-F00			247	LOM ALL
Depreservation of an Engine, which was Preserved for Not More Than Three Months (Engine On-Wing) TASK 71-00-03-600-816-F00			248	LOM ALL
Preservation of an Engine From One Month to One Year (Engine On-Wing) TASK 71-00-03-600-811-F00			249	LOM ALL
Preservation Renewal of an Engine From One Month to Not More Than One Year (Engine On-Wing) TASK 71-00-03-600-812-F00			270	LOM ALL
Depreservation of an Engine, which was Preserved From One Month to Not More Than One Year (Engine On-Wing) TASK 71-00-03-600-813-F00			271	LOM ALL
Preservation of an Engine for More Than the One Year Preservation Time Limit (Engine On-Wing) TASK 71-00-03-600-814-F00			272	LOM ALL
Desiccant Bags Inspection Procedure TASK 71-00-03-200-801-F00			273	LOM ALL
POWER PLANT - MAINTENANCE PRACTICES (ENGINE TRANSPORTATION)	71-00-04		201	LOM ALL
Engine Transportation TASK 71-00-04-500-801-F00			201	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
POWER PLANT (ENGINE INTERMIX) - MAINTENANCE PRACTICES	71-00-07	1	201	LOM ALL
INLET COWL - REMOVAL/INSTALLATION	71-11-01		401	LOM ALL
Remove the Inlet Cowl TASK 71-11-01-000-801-F00			401	LOM ALL
Install the Inlet Cowl TASK 71-11-01-400-801-F00			401	LOM ALL
Remove the Inlet Cowl (Sling and Overhead Hoist) TASK 71-11-01-000-802-F00			402	LOM ALL
Install the Inlet Cowl (Sling and Overhead Hoist) TASK 71-11-01-400-802-F00			411	LOM ALL
Remove the Inlet Cowl (Nose Cowl Dolly or Boom Hoist) TASK 71-11-01-000-803-F00			416	LOM ALL
Install the Inlet Cowl (Nose Cowl Dolly or Boom Hoist) TASK 71-11-01-400-803-F00			422	LOM ALL
INLET COWL - INSPECTION/CHECK	71-11-01		601	LOM ALL
Inlet Cowl Inspection TASK 71-11-01-200-801-F00			601	LOM ALL
Inlet Cowl Bolt Inspection TASK 71-11-01-200-802-F00			605	LOM ALL
Inlet Cowl Inner Surface Inspection TASK 71-11-01-200-803-F00			605	LOM ALL
INLET COWL - REPAIR	71-11-01		801	LOM ALL
Replace the Thermal Anti-Ice (TAI) Exhaust Duct TASK 71-11-01-300-801-F01			801	LOM ALL
FAN COWL PANELS - MAINTENANCE PRACTICES	71-11-02		201	LOM ALL
Open the Fan Cowl Panels TASK 71-11-02-010-801-F00			201	LOM ALL
Close the Fan Cowl Panels TASK 71-11-02-410-801-F00			208	LOM ALL

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FAN COWL PANEL - REMOVAL/INSTALLATION	71-11-02		401	LOM ALL
Fan Cowl Panel Removal (Selection) TASK 71-11-02-000-801-F00			401	LOM ALL
Fan Cowl Panel Installation (Selection) TASK 71-11-02-400-801-F00			401	LOM ALL
Fan Cowl Panel Removal (Manual Procedure) TASK 71-11-02-000-802-F00			402	LOM ALL
Fan Cowl Panel Installation (Manual Procedure) TASK 71-11-02-400-802-F00			406	LOM ALL
Fan Cowl Panel Removal (Sling Procedure) TASK 71-11-02-000-803-F00			408	LOM ALL
Fan Cowl Panel Installation (Sling Procedure) TASK 71-11-02-400-803-F00			413	LOM ALL
FAN COWL PANELS - INSPECTION/CHECK	71-11-02		601	LOM ALL
Fan Cowl Panels Inspection TASK 71-11-02-200-801-F00			601	LOM ALL
Fan Cowl Panels (Outer Surface) Inspection TASK 71-11-02-200-802-F00			604	LOM ALL
FAN COWL PANEL LATCH - REMOVAL/INSTALLATION	71-11-03		401	LOM ALL
Fan Cowl Panel Latch Removal TASK 71-11-03-000-801-F00			401	LOM ALL
Fan Cowl Panel Latch Installation TASK 71-11-03-400-801-F00			403	LOM ALL
Fan Cowl Panel Latch Keeper Removal TASK 71-11-03-000-802-F00			404	LOM ALL
Fan Cowl Panel Latch Keeper Installation TASK 71-11-03-400-802-F00			406	LOM ALL
FAN COWL PANEL LATCH - ADJUSTMENT/TEST	71-11-03		501	LOM ALL
Fan Cowl Panel Latch Adjustment TASK 71-11-03-700-801-F00			501	LOM ALL
IDG ACCESS DOOR - MAINTENANCE PRACTICES	71-11-04		201	LOM ALL
IDG Access Door Latch Removal TASK 71-11-04-900-801-F00			201	LOM ALL

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IDG Access Door Latch Installation TASK 71-11-04-400-802-F00			204	LOM ALL
IDG ACCESS DOOR - REMOVAL/INSTALLATION	71-11-04		401	LOM ALL
IDG Access Door Removal TASK 71-11-04-000-801-F00			401	LOM ALL
IDG Access Door Installation TASK 71-11-04-400-801-F00			404	LOM ALL
IDG ACCESS DOOR - ADJUSTMENT/TEST	71-11-04		501	LOM ALL
IDG Access Door Adjustment TASK 71-11-04-820-801-F00			501	LOM ALL
IDG Access Door Free Play Adjustment TASK 71-11-04-820-802-F00			505	LOM ALL
OIL TANK ACCESS DOOR - MAINTENANCE PRACTICES	71-11-05		201	LOM ALL
Oil Tank Access Door Latch Removal TASK 71-11-05-900-801-F00			201	LOM ALL
Oil Tank Access Door Latch Installation TASK 71-11-05-400-802-F00			204	LOM ALL
OIL TANK ACCESS DOOR - REMOVAL/INSTALLATION	71-11-05		401	LOM ALL
Oil Tank Access Door Removal TASK 71-11-05-000-801-F00			401	LOM ALL
Oil Tank Access Door Installation TASK 71-11-05-400-801-F00			404	LOM ALL
OIL TANK ACCESS DOOR - ADJUSTMENT/TEST	71-11-05		501	LOM ALL
Oil Tank Access Door Adjustment TASK 71-11-05-820-801-F00			501	LOM ALL
Oil Tank Access Door Free Play Adjustment TASK 71-11-05-820-802-F00			505	LOM ALL
T12 ACCESS/PRESSURE RELIEF DOOR - MAINTENANCE PRACTICES	71-11-06		201	LOM ALL
T12 Access/Pressure Relief Door Latch Removal TASK 71-11-06-900-801-F00			201	LOM ALL

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SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
T12 Access/Pressure Relief Door Latch Installation TASK 71-11-06-400-802-F00			203	LOM ALL
T12 ACCESS/PRESSURE RELIEF DOOR - REMOVAL/INSTALLATION	71-11-06		401	LOM ALL
T12 Access/Pressure Relief Door Removal TASK 71-11-06-000-801-F00			401	LOM ALL
T12 Access/Pressure Relief Door Installation TASK 71-11-06-400-801-F00			404	LOM ALL
T12 ACCESS/PRESSURE RELIEF DOOR - ADJUSTMENT/TEST	71-11-06		501	LOM ALL
T12 Access/Pressure Relief Door Adjustment TASK 71-11-06-820-801-F00			501	LOM ALL
T12 Access/Pressure Relief Door Free Play Adjustment TASK 71-11-06-820-802-F00			505	LOM ALL
T12 Access/Pressure Relief Door Latch Release Test TASK 71-11-06-820-803-F00			506	LOM ALL
CHIP DETECTOR ACCESS/PRESSURE RELIEF DOOR - MAINTENANCE PRACTICES	71-11-07		201	LOM ALL
Chip Detector Access/Pressure Relief Door Latch Removal TASK 71-11-07-000-802-F00			201	LOM ALL
Chip Detector Access/Pressure Relief Door Latch Installation TASK 71-11-07-400-802-F00			203	LOM ALL
CHIP DETECTOR ACCESS/PRESSURE RELIEF DOOR - REMOVAL/INSTALLATION	71-11-07		401	LOM ALL
Chip Detector Access/Pressure Relief Door Removal TASK 71-11-07-000-801-F00			401	LOM ALL
Chip Detector Access/Pressure Relief Door Installation TASK 71-11-07-400-801-F00			403	LOM ALL

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CHIP DETECTOR ACCESS/PRESSURE RELIEF DOOR - ADJUSTMENT/TEST	71-11-07		501	LOM ALL
Chip Detector Access/Pressure Relief Door Adjustment TASK 71-11-07-820-801-F00			501	LOM ALL
Chip Detector Access/Pressure Relief Door Free Play Adjustment TASK 71-11-07-820-802-F00			505	LOM ALL
Chip Detector Access/Pressure Relief Door Latch Release Test TASK 71-11-07-820-803-F00			506	LOM ALL
VORTEX CONTROL DEVICE - REMOVAL/INSTALLATION	71-11-08		401	LOM ALL
Vortex Control Device Removal TASK 71-11-08-000-801-F00			401	LOM ALL
Vortex Control Device Installation TASK 71-11-08-400-801-F00			404	LOM ALL
VORTEX CONTROL DEVICE SEAL - REMOVAL/INSTALLATION	71-11-09		401	LOM ALL
Vortex Control Device Seal Removal TASK 71-11-09-000-801-F01			401	LOM ALL
Vortex Control Device Seal Installation TASK 71-11-09-420-801-F01			404	LOM ALL
VORTEX CONTROL DEVICE SEAL - REPAIRS	71-11-09		801	LOM ALL
VCD Seal Repair TASK 71-11-09-300-801-F00			801	LOM ALL
ENGINE MOUNTS - INSPECTION/CHECK	71-21-00		601	LOM ALL
Forward Engine Mount Bolts Inspection (Engine Installed) TASK 71-21-00-200-801-F00			601	LOM ALL
Forward Engine Mount Inspection (Engine Installed) TASK 71-21-00-210-801-F00			603	LOM ALL
Forward Engine Mount Visual Inspection TASK 71-21-00-200-803-F00			605	LOM ALL

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Forward Engine Mount Detailed Inspection TASK 71-21-00-200-804-F00			608	LOM ALL
Aft Engine Mount Visual Inspection TASK 71-21-00-200-805-F00			613	LOM ALL
Aft Engine Mount Detailed Inspection TASK 71-21-00-200-806-F00			616	LOM ALL
FORWARD ENGINE MOUNT - REMOVAL/INSTALLATION	71-21-01		401	LOM ALL
Forward Engine Mount Removal TASK 71-21-01-000-801-F00			401	LOM ALL
Forward Engine Mount Installation TASK 71-21-01-400-801-F00			404	LOM ALL
THRUST LINK ASSEMBLY - REMOVAL/INSTALLATION	71-21-02		401	LOM ALL
Thrust Link Assembly Removal TASK 71-21-02-000-801-F00			401	LOM ALL
Thrust Link Assembly Installation TASK 71-21-02-400-801-F00			406	LOM ALL
THRUST LINK ASSEMBLY - INSPECTION/CHECK	71-21-02		601	LOM ALL
Thrust Links Visual Inspection TASK 71-21-02-210-802-F00			601	LOM ALL
Thrust Links Detailed Inspection TASK 71-21-02-210-803-F00			602	LOM ALL
AFT ENGINE MOUNT - REMOVAL/INSTALLATION	71-21-03		401	LOM ALL
Aft Engine Mount Removal TASK 71-21-03-000-801-F00			401	LOM ALL
Aft Engine Mount Installation TASK 71-21-03-400-801-F00			405	LOM ALL
NACELLE WIRING HARNESSES - REMOVAL/INSTALLATION	71-51-03		401	LOM ALL
Nacelle Wiring Harnesses Removal TASK 71-51-03-000-801-F00			401	LOM ALL
Nacelle Wiring Harnesses Installation TASK 71-51-03-400-801-F00			410	LOM ALL

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ENGINE VENTS AND DRAINS - INSPECTION/CHECK	71-71-00		601	LOM ALL
Engine Vents and Drains Inspection TASK 71-71-00-200-801-F00			601	LOM ALL
Drain Lines Inspection (Operational Check) TASK 71-71-00-700-801-F00			623	LOM ALL
Drain Lines Inspection (General Visual) TASK 71-71-00-200-802-F00			625	LOM ALL

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POWER PLANT - MAINTENANCE PRACTICES (OPERATION PROCEDURES)

1. General

A. This procedure has these tasks:

(1) The safety precautions for the power plant operation on the ground

(2) The operation limits for the power plant

(3) The procedure to prepare the engine for operation

(4) The start the engine procedure (Selection)

(5) The start the engine procedure (Normal Start)

(6) The start the engine procedure (Manual Override of the Engine Start Valve)

(7) The start the engine procedure (Engine Cross Bleed Start)

(8) The start the engine procedure (Battery Start)

(9) The stop the engine procedure (Usual)

(10) The stop the engine procedure (Emergency)

(11) The dry motor procedure

(12) The wet motor procedure.

TASK 71-00-00-800-805-F00

2. Engine Ground Safety Precautions

(Figure 201, Figure 202, Figure 203, Figure 204, Figure 205, Figure 206, Figure 207, Figure 208, Figure 209, Figure 210, and Figure 211)

A. General

(1) This task gives the safety precautions to obey when it is necessary to go near an engine that operates.

(2) Airplane handling precautions are also included to make sure that the airplane does not move during engine operation.

(3) For this task, the engine is defined as the basic CFM56-7B series engine while the power plant is defined as the engine with all cowls (inlet, fan, thrust reverser and exhaust) attached.

B. References

Reference	Title
71-00-00-800-803-F00	Inspection After an Engine Fire, Use of Fire Extinguishing Agents, or High Nacelle Temperature (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-1616	Meter - Sound Level Part #: CEL-240/K1 Supplier: 01RN5 Part #: SE-402-AC3 Supplier: 24575 Opt Part #: 2100-10 Supplier: 90435 Opt Part #: 2400-10 Supplier: 90435 Opt Part #: CEL-254/K1 Supplier: 01RN5

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(Continued)

Reference	Description
SPL-1531	Guard - Engine Inlet, Engine Run-Up Part #: C71034-1 Supplier: 81205 Opt Part #: C12001-35 Supplier: 81205 Opt Part #: C12001-38 Supplier: 81205
SPL-2109	Screen - Safety, Engine Inlet Part #: C71025-1 Supplier: 81205
SPL-10051	Lanyard - Personnel Safety, Engine Maintenance, CFM56-7 Part #: F80239-21 Supplier: 81205

D. The Air Inlet

SUBTASK 71-00-00-580-001-F00

WARNING	ALL PERSONS MUST STAY OUT OF THE IDENTIFIED DANGEROUS AREAS THAT ARE FORWARD AND TO THE SIDES OF THE INLET COWL. ALL PERSONS MUST ALSO STAY AWAY FROM THE ENGINE SAFETY BARRIER WHEN THE ENGINE IS IN OPERATION. DURING ENGINE OPERATION, THERE IS SUFFICIENT SUCTION AT THE INLET COWL TO PULL A PERSON INTO THE ENGINE INLET. IF YOU DO NOT OBEY, INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION	THE SUCTION NEAR THE INLET COWL CAN PULL HATS, GLASSES, LOOSE CLOTHING AND OTHER UNWANTED MATERIALS FROM YOUR POCKETS. ALL LOOSE OBJECTS MUST BE REMOVED BEFORE YOU WORK AROUND THE POWER PLANT. DAMAGE TO EQUIPMENT COULD OCCUR.

(1) When the engine operates, it makes a low air pressure area in the inlet.

NOTE: TAT, ALPHA VANE, AND CAPT, FO, AUX, and pitot probe heat will operate automatically when either or both engines are operated.

(a) This low pressure area causes a large quantity of air from the area forward of the inlet cowl to go in the engine.

(b) The air that is near to the inlet cowl moves at a much higher velocity than air that is farther from the inlet.

(c) The quantity of the engine suction does not increase slowly and continuously when person goes near the inlet cowl.

(d) The suction is small until person goes near the inlet, where the suction increases suddenly.

SUBTASK 71-00-00-580-002-F00

(2) Before the engine is operated, do these steps:

(a) Make sure that there are no tools, unwanted materials, or objects in the air inlet.

(b) Make sure that the area 40 feet to each side and forward of the power plant is clean.

(c) Make sure that the ground that is forward of the power plant is solid.

(d) Make sure that the suction of the engine will not pull unwanted material from the ground into the engine.

(e) Make sure that persons with loose objects (such as hats, eyeglasses, loose clothing, or rags) do not go in this area.

(f) When an engine is in operation, use an engine inlet guard.

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1) This will prevent the suction of persons and large objects into the inlet by the engine.

SUBTASK 71-00-00-580-003-F00

> **WARNING**
> KEEP ALL PERSONNEL AND EQUIPMENT AWAY FROM THE FRONT, SIDES AND REAR OF THE ENGINE WHILE IT OPERATES. THESE AREAS ARE DANGEROUS. IF YOU ARE TO THE FRONT OR THE SIDES, THERE IS SUFFICIENT SUCTION TO PULL PERSONNEL OR EQUIPMENT INTO THE ENGINE. IF YOU ARE BEHIND THE ENGINE, THE EXHAUST AND FAN AIR HAVE HIGH VELOCITY AND HEAT. THESE CONDITIONS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Obey the hazard areas near the air inlet that have dangerous air conditions.

(a) Inlet hazard areas are shown on the left and right fan cowl panels with stripes and placards.

1) There are red warning stripes, no entry placards, above idle hazard area placards and warning placards (Figure 206).

(b) Persons near the power plant during engine operation must know of the hazard areas that are aft of the inlet cowl lip.

1) This hazard area extends completely around the outer diameter and to the forward end of the power plant.

2) After the engine is stopped, make sure that you see the fan is stopped before you go near the air inlet.

(c) Make sure that all persons that do not know of the hazard areas around the air inlet do not go in these areas.

SUBTASK 71-00-00-580-020-F00

(4) It is recommended that ground persons stay outside of the inlet hazard areas for a minimum of 30 seconds after the engine start lever is put in the CUTOFF position.

E. Engine Exhaust and Fan Discharge Air

SUBTASK 71-00-00-580-005-F00

> **WARNING**
> YOU MUST STAY AWAY FROM THE FAN AND ENGINE EXHAUST AREAS WHEN THE ENGINE OPERATES. IF YOU DO NOT OBEY, THE FAN AND ENGINE EXHAUST CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Jet Velocity

(a) The engine exhaust and fan discharge air moves very fast at idle and much more at takeoff power.

(b) The air blown behind the engine can move loose stones and other material a long distance.

1) The airplane must be parked at an area where injury to persons or damage to equipment or other airplanes can be prevented.

2) Use a blast fence to deflect the thrust if the engine or engines are operated without sufficient space to decrease the fan discharge and engine exhaust velocity to zero.

(c) The hazard areas are shown for minimum idle power, breakaway power, and takeoff power (Figure 201, Figure 202, and Figure 203).

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SUBTASK 71-00-00-580-006-F00

(2) Jet Exhaust Temperature

(a) The engine exhaust temperature is very hot at idle and takeoff power.

(b) The high temperature exhaust can be found a long distance behind the engine.

(c) The exhaust temperature is sufficient to damage bituminous (asphalt) pavement.

1) Concrete is the recommended material for the area behind the engines.

SUBTASK 71-00-00-580-007-F00

(3) Toxicity

(a) Tests show that there is a small concentration of carbon monoxide in the jet exhaust.

(b) The exhaust gas is bad to breathe and can also cause injury to your eyes.

1) These gases will usually cause your eyes to water or burn.

2) The gases can cause irritation to your lungs.

(c) Stay away from all areas that do not have sufficient ventilation.

SUBTASK 71-00-00-580-008-F00

(4) When the engine is started, fuel that collected in the turbine exhaust sleeve can ignite.

(a) Long flames are blown out of the engine exhaust.

(b) All flammable materials must be kept away from the exhaust nozzle and sleeve.

SUBTASK 71-00-00-580-009-F00

(5) Thrust Reverser

(a) The thrust reverser is usually used during landing, but can also be used when the airplane is parked for maintenance checks of the thrust reverser.

(b) When the thrust reverser operates, the fan discharge air blows out of the sides of the power plant and goes forward.

(c) The hazard areas are shown for reverser minimum idle power, and breakaway-thrust power (Figure 204, Figure 205).

F. Entry Corridor

SUBTASK 71-00-00-580-010-F00

WARNING

DO NOT GO NEAR THE ENGINE WHEN THE ENGINE OPERATES ABOVE MINIMUM IDLE. THERE ARE NO SAFE AREAS AROUND AN ENGINE WHEN THE ENGINE SPEED IS ABOVE MINIMUM IDLE. SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT COULD OCCUR.

(1) If it is necessary to be near the engine during an engine operation (idle operation only, such as during an idle leak check or to disconnect the ground air cart), use the entry/exit corridor to enter and exit the fan case area.

(a) Use the given entry and exit corridors (Figure 207).

SUBTASK 71-00-00-580-011-F00

(2) A safety lanyard, SPL-10051, screen, SPL-2109, or guard, SPL-1531, is recommended for personnel safety.

(a) The lanyard, screen, and guard are not necessary to disconnect the ground air cart with the engines in operation.

1) Make sure that the engine(s) are at minimum idle and that you stay in the entry/exit corridor.

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SUBTASK 71-00-00-580-012-F00

(3) When the safety lanyard is used, attach the lanyard to the correct lanyard attach point on the fan case (Figure 207).

G. Engine Noise

SUBTASK 71-00-00-580-013-F00

WARNING MAKE SURE ALL PERSONS USE THE APPROVED SAFETY EQUIPMENT FOR THEIR EARS WHEN THEY ARE NEAR NOISE THAT IS MORE THAN 84 DB. THIS WILL HELP PREVENT INJURY TO PERSONS.

(1) The jet engines make sufficient noise to cause damage to your ears.

(a) See these noise graphs for the limits (Figure 209 and Figure 210).

(b) Noise can have an unwanted effect on the ears that will affect the ability to balance possible to be stable in one position or in the movement.

(c) High quantities of noise for a short time can cause temporary damage to the ears.

(d) High quantities of noise for a long time can cause permanent damage to the ears.

(e) Very high quantities of noise for a short time can cause permanent damage to the ears.

(f) Near an engine in operation, always use ear protection to decrease the quantity of sound to the ears.

1) A cup-type, earmuff, hearing protection are recommended.

SUBTASK 71-00-00-580-014-F00

(2) There are two graphs, the noise time limits and one engine operation noise contours.

(a) The noise contour graphs are guidelines for the amount of noise that is made by the engine at three defined power settings for the standard conditions shown on the graph.

(b) When the data from the noise contour graphs are used with the noise time limit chart, this shows the need for hearing protection for certain conditions.

(c) The noise time limits are from the standards of the Occupational Safety and Health Administration (OSHA), the International Organization for Standardization (ISO), and the European Union (EU).

1) Refer to the graph (Figure 209).

(d) For one engine operation, the noise contours are given for ground idle thrust, breakaway thrust, and takeoff thrust.

1) Refer to the graph (Figure 210).

2) This figure also give the values for the noise from the operation of more than one engine.

(e) To find the quantity of noise energy, use a sound level meter, COM-1616.

(f) For the distance and circumferential position from the engine, find the maximum noise from the applicable noise contour graph.

1) Compare this value with the noise time limits graph.

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(g) Speak to a noise safety person to help with the decision about the risk of noise damage to the ears.

NOTE: These noise contour graphs should not be used as a reliable basis for the prediction of noise in the surrounding community. These graphs are given to show the noise environment and to give guidance for hearing safety practices. Decisions about the risks of noise exposure should be made by a qualified, noise safety expert with the aid of a sound exposure dosimeter.

H. Engine Ignition Voltage

SUBTASK 71-00-00-580-015-F00

WARNING DO NOT TOUCH THE ENGINE IGNITION SYSTEM WHILE THE SYSTEM OPERATES. IGNITION VOLTAGE IS HIGH WHICH MAKES IT DANGEROUS. ELECTRICAL SHOCK CAN KILL, OR CAUSE INJURIES TO PERSONNEL.

(1) The engine ignition system supplies high energy and high voltage to start the engine.

(a) An electrical shock from this system can kill or cause injury to persons.

(b) Wait a minimum of five minutes after the ignition system is off before touch an ignition component.

(c) The ignition system operates when the engine starts, but the system can also be operated when the engine is not operational.

I. Hot Engine Parts

SUBTASK 71-00-00-580-016-F00

(1) After engine operation, it is necessary to be very careful about heat from the hot section and the exhaust areas of the engine.

J. Fuel and Oil

SUBTASK 71-00-00-580-017-F00

WARNING DO NOT GET FUEL OR OIL ON YOUR SKIN. REMOVE THE FUEL OR OIL FROM YOUR SKIN IMMEDIATELY. IF YOU LET FUEL OR OIL STAY ON YOUR SKIN, IT CAN CAUSE INJURIES TO YOUR SKIN.

(1) Engine fuel and oil can cause injuries if it stays on the skin for a long time.

(a) If the fuel or oil touches the skin, make sure that the fuel or oil is removed as soon as possible.

K. Pressurized Oil System

SUBTASK 71-00-00-580-018-F00

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.

(1) When it is necessary to open the oil service cap, do these steps:

(a) The oil pressure slowly decreases after the engine is stopped.

(b) Make sure that the cap is not removed from the engine oil tank for a minimum of 5 minutes after the engine is stopped.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

L. Deicing Fluid

SUBTASK 71-00-00-580-019-F00

> **CAUTION** DO NOT APPLY DEICING FLUID IN THE ENGINE INLET WHILE THE ENGINE OPERATES. CONTAMINATION OF THE AIRFOILS AND OTHER COMPONENTS WITH DEICING FLUID DECREASES ENGINE PERFORMANCE.

(1) The deicing fluid is applied to the airplane to remove and prevent ice on the wings, fuselage, and engine cowls.

(a) Make sure that the deicing fluid is not applied into the engine inlet or exhaust.

1) If there are traces of deicing fluid, wipe the fan blades with a clean cloth.

(b) To deice the engine, do this task: Procedure to Prepare the Engine for Operation, TASK 71-00-00-700-818-F00 (Prepare the Engine Before a Start in Cold Weather).

M. Thrust Lever Movement

SUBTASK 71-00-00-980-001-F00

> **CAUTION** YOU MUST MOVE THE THRUST LEVERS SLOWLY AND SMOOTHLY. IF YOU DO NOT OBEY THESE INSTRUCTIONS, DETERIORATION OF THE ENGINE PERFORMANCE CAN OCCUR.

(1) When it is possible, the thrust lever movements must be slow and smooth.

N. Wind Direction

SUBTASK 71-00-00-560-001-F00

(1) Wind direction and speed can cause stability problems for the engine.

SUBTASK 71-00-00-560-002-F00

(2) Put the airplane in a position to limit the amount of crosswind into the engine inlet.

NOTE: Preferred relative wind direction and wind velocity limits during low power engine runs are shown in (Figure 211).

> **CAUTION** IF ENGINE RUNS ARE DONE OUT OF THE PREFERRED LIMITS, MONITOR N1, N2 AND EGT. ENGINE OVERHEAT OR STALL CAN OCCUR AND CAUSE ENGINE DAMAGE.

(a) Wind limitations during engine ground operations.

1) Static ground operation of the engine is not permitted for these conditions:

a) Power settings that are more than 70%N1, and

b) Crosswinds that are more than 15 knots, or

c) All tailwinds that are more than 5 knots.

O. Dry Chemical Fire Extinguishing Agents

SUBTASK 71-00-00-800-002-F00

> **CAUTION** DO NOT USE THE DRY CHEMICAL FIRE EXTINGUISHING AGENTS ON THE ENGINE. THE DRY CHEMICAL FIRE EXTINGUISHING AGENTS CAN CAUSE CORROSION TO THE ENGINE PARTS.

(1) Dry chemical fire extinguishing agents are not recommended.

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SUBTASK 71-00-00-800-003-F00

(2) If fire extinguishing agents are used, do this step:

(a) Do this task: Inspection After an Engine Fire, Use of Fire Extinguishing Agents, or High Nacelle Temperature, TASK 71-00-00-800-803-F00.

SUBTASK 71-00-00-160-004-F00

CAUTION	DO NOT USE WATER TO REMOVE THE DRY CHEMICAL FIRE EXTINGUISHING AGENTS FROM THE ENGINE. IF YOU USE WATER TO REMOVE THE DRY CHEMICAL FIRE EXTINGUISHING AGENTS, IT CAN CAUSE DAMAGE TO ENGINE PARTS.

(3) Water is not recommended to remove the dry chemical fire extinguishing agents.

(a) These fire extinguishing agents are not water soluble.

(b) Water can cause the fire extinguishing agents to collect and bond to the engine parts.

(c) The engine performance can decrease and corrosion and more damage could occur if the engine is not cleaned correctly.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

EXHAUST HAZARD AREA

WARNING:

KEEP ALL PERSONS OUT OF THE DANGEROUS AREA DURING ENGINE OPERATION. IF THE SURFACE WIND IS MORE THAN 25 KNOTS, INCREASE THE DANGEROUS AREA AT THE ENGINE INLET BY 20 PERCENT.

CLEAN THE RAMP IF THERE IS SNOW, ICE, WATER, OIL OR OTHER CONTAMINATION, OR MOVE THE AIRPLANE TO A LOCATION THAT IS CLEAN.

MAKE SURE THAT ALL PERSONS ARE SAFE BEFORE YOU START THE ENGINE.

MAKE SURE THE PERSONS IN THE FLIGHT COMPARTMENT CAN SPEAK TO ALL PERSONS NEAR THE DANGEROUS AREA DURING ENGINE OPERATION.

OBEY ALL OF THE GROUND SAFETY PRECAUTIONS FOR THE ENGINES.

THE ENGINES CAN PULL PERSONS OR UNWANTED MATERIALS INTO THEM AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

G40602 S0006581714_V3

Minimum Idle - Power Hazard Area
Figure 201/71-00-00-990-805-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INLET HAZARD AREA

A

NOTE:

THE DANGEROUS AREA IS SHOWN FOR THE LEFT ENGINE ONLY. THE DANGEROUS AREA AROUND THE RIGHT ENGINE HAS THE SAME DIMENSIONS. WHEN YOU OPERATE TWO ENGINES, THE DANGEROUS AREA IS THE SUM OF THE LEFT AND RIGHT DANGEROUS AREAS.

G40774 S0006581716_V2

Minimum Idle - Power Hazard Area
Figure 201/71-00-00-990-805-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

EXHAUST HAZARD AREA

WARNING:

KEEP ALL PERSONS OUT OF THE DANGEROUS AREA DURING ENGINE OPERATION. IF THE SURFACE WIND IS MORE THAN 25 KNOTS, INCREASE THE DANGEROUS AREA AT THE ENGINE INLET BY 20 PERCENT.

CLEAN THE RAMP IF THERE IS SNOW, ICE, WATER, OIL OR OTHER CONTAMINATION, OR MOVE THE AIRPLANE TO A LOCATION THAT IS CLEAN.

MAKE SURE THAT ALL PERSONS ARE SAFE BEFORE YOU START THE ENGINE.

MAKE SURE THE PERSONS IN THE FLIGHT COMPARTMENT CAN SPEAK TO ALL PERSONS NEAR THE DANGEROUS AREA DURING ENGINE OPERATION.

OBEY ALL OF THE GROUND SAFETY PRECAUTIONS FOR THE ENGINES.

THE ENGINES CAN PULL PERSONS OR UNWANTED MATERIALS INTO THEM AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

G40656 S0006581717_V3

Breakaway Thrust - Power Hazard Area
Figure 202/71-00-00-990-806-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INLET HAZARD AREA

A

NOTE:

THE DANGEROUS AREA IS SHOWN FOR THE LEFT ENGINE ONLY. THE DANGEROUS AREA AROUND THE RIGHT ENGINE HAS THE SAME DIMENSIONS. WHEN YOU OPERATE TWO ENGINES, THE DANGEROUS AREA IS THE SUM OF THE LEFT AND RIGHT DANGEROUS AREAS.

G40784 S0006581719_V3

Breakaway Thrust - Power Hazard Area
Figure 202/71-00-00-990-806-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

EXHAUST HAZARD AREA

WARNING:

KEEP ALL PERSONS OUT OF THE DANGEROUS AREA DURING ENGINE OPERATION. IF THE SURFACE WIND IS MORE THAN 25 KNOTS, INCREASE THE DANGEROUS AREA AT THE ENGINE INLET BY 20 PERCENT.

CLEAN THE RAMP IF THERE IS SNOW, ICE, WATER, OIL OR OTHER CONTAMINATION, OR MOVE THE AIRPLANE TO A LOCATION THAT IS CLEAN.

MAKE SURE THAT ALL PERSONS ARE SAFE BEFORE YOU START THE ENGINE.

MAKE SURE THE PERSONS IN THE FLIGHT COMPARTMENT CAN SPEAK TO ALL PERSONS NEAR THE DANGEROUS AREA DURING ENGINE OPERATION.

OBEY ALL OF THE GROUND SAFETY PRECAUTIONS FOR THE ENGINES.

THE ENGINES CAN PULL PERSONS OR UNWANTED MATERIALS INTO THEM AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

G40680 S0006581720_V3

Takeoff Thrust - Power Hazard Area
Figure 203/71-00-00-990-807-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INLET HAZARD AREA

A

NOTE:

THE DANGEROUS AREA IS SHOWN FOR THE LEFT ENGINE ONLY. THE DANGEROUS AREA AROUND THE RIGHT ENGINE HAS THE SAME DIMENSIONS. WHEN YOU OPERATE TWO ENGINES, THE DANGEROUS AREA IS THE SUM OF THE LEFT AND RIGHT DANGEROUS AREAS.

G40793 S0006581722_V2

Takeoff Thrust - Power Hazard Area
Figure 203/71-00-00-990-807-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING:

MAKE SURE THAT ALL PERSONS ARE SAFE BEFORE YOU START THE ENGINE

MAKE SURE THE PERSONS IN THE FLIGHT COMPARTMENT CAN SPEAK TO ALL PERSONS NEAR THE DANGEROUS AREA DURING ENGINE OPERATION.

OBEY ALL OF THE GROUND SAFETY PRECAUTIONS FOR THE ENGINES.

THE ENGINES CAN PULL PERSONS OR UNWANTED MATERIALS INTO THEM AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

G40701 S0006581723_V2

Reverse Minimum Idle - Power Hazard Area
Figure 204/71-00-00-990-808-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING

MAKE SURE THAT ALL PERSONS ARE SAFE BEFORE YOU START THE ENGINE.

MAKE SURE THE PERSONS IN THE FLIGHT COMPARTMENT CAN SPEAK TO ALL PERSONS NEAR THE DANGEROUS AREA DURING ENGINE OPERATION.

OBEY ALL OF THE GROUND SAFETY PRECAUTIONS FOR THE ENGINES.

THE ENGINES CAN PULL PERSONS OR UNWANTED MATERIALS INTO THEM AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

G40803 S0006581725_V2

Reverse Breakaway - Power Hazard Area
Figure 205/71-00-00-990-809-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ENGINE 1 SHOWN,
ENGINE 2 EQUIVALENT.

G40917 S0006581727_V2

Engine Inlet Hazard Areas
Figure 206/71-00-00-990-810-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NO ENTRY PLACARD

C

HAZARD AREA PLACARD

D

WARNING:
STAND CLEAR OF
HAZARD AREAS WHILE
ENGINE IS RUNNING

WARNING PLACARD

E

G41035 S0006581728_V2

Engine Inlet Hazard Areas
Figure 206/71-00-00-990-810-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

WARNING:

ENTRY/EXIT CORRIDOR MUST BE USED ONLY UNDER THESE CONDITIONS:

1. DO NOT OPERATE THE ENGINE AT MORE THAN LOW IDLE RPM WHEN PERSONNEL ARE IN THE ENTRY/EXIT CORRIDOR.
2. POSITIVE COMMUNICATION BETWEEN PERSONNEL IN THE FLIGHT COMPARTMENT AND PERSONNEL USING THE ENTRY/EXIT CORRIDOR IS MANDATORY.
3. YOU MUST OBEY THE INLET AND EXHAUST HAZARD AREAS WHEN PERSONS ARE IN THE ENTRY/EXIT CORRIDOR.
4. USE OF SAFETY LANYARD IS RECOMMENDED (SEE SHEET 2 AND 3).

IF SURFACE WIND IS MORE THAN 25 KNOTS, INCREASE THE DISTANCE OF THE INLET BOUNDARY BY 20%. IF THE RAMP SURFACES ARE SLIPPERY, ADDITIONAL PRECAUTIONS SUCH AS CLEANING THE RAMP WILL BE NECESSARY TO GIVE PERSONNEL SAFETY.

ENTRY/EXIT CORRIDOR (LOW IDLE)

G40812 S0006581729_V2

Engine Maintenance Entry/Exit Corridors
Figure 207/71-00-00-990-811-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

BEFORE THE ENGINE OPERATES, YOU CAN PUT A PLUG-IN PERSONNEL INLET BARRIER OR AN ENGINE RUN-UP INLET GUARD AT THE ENGINE INLET AS AN ADDED PRECAUTION

1. TO APPROACH THE OUTBOARD SIDE OF ENGINE, ENTER THE FAN CASE AREA FROM THE AFT END OF THE FAN COWL PANEL.

B

2. TO GO NEAR THE INBOARD SIDE OF THE ENGINE, START FORWARD OF THE INLET HAZARD ZONE. WALK AFT WITH YOUR SHOULDER NEXT TO THE FUSELAGE, GO ACROSS TOWARD THE ENGINE AT A POINT JUST FORWARD OF THE LANDING GEAR, AND ENTER THE FAN CASE AREA FROM THE AFT END OF THE FAN COWL PANEL.

NOTE:

USE OF SAFETY LANYARD IS RECOMMENDED.

3. ATTACH A SAFETY LANYARD HOOK TO THE FORWARD ENGINE HANDLING MOUNT (SEE D FOR RIGHT SIDE LOCATION; E FOR LEFT SIDE LOCATION)

C

FWD

HOW TO APPROACH/EXIT THE FAN CASE AREA DURING AN ENGINE MAINTENANCE RUN

G40909 S0006581730_V3

Engine Maintenance Entry/Exit Corridors
Figure 207/71-00-00-990-811-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FORWARD ENGINE HANDLING MOUNT LOCATION (RIGHT SIDE)

D

FORWARD ENGINE HANDLING MOUNT LOCATION (LEFT SIDE)

E

4. TO EXIT FROM THE ENGINE, REVERSE THE APPROACH SEQUENCE. ALWAYS EXIT THE FAN CASE AREA THROUGH THE AFT END OF THE FAN COWL PANEL.

SAFETY LANYARD ASSEMBLY

F

HOW TO APPROACH/EXIT THE FAN CASE AREA DURING AN ENGINE MAINTENANCE RUN

G41479 S0006581731_V3

Engine Maintenance Entry/Exit Corridors
Figure 207/71-00-00-990-811-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

IDLE POWER

TAKEOFF POWER

WARNING:

EAR PROTECTION REQUIRED WITHIN THIS AREA.

WARNING:

PROLONGED EXPOSURE WITHIN THIS AREA OF MORE THAN SIX MINUTES, EVEN WITH EAR PROTECTION, CAN CAUSE EAR DAMAGE.

G41134 S0006581732_V2

Engine Noise Hazard Areas
Figure 208/71-00-00-990-812-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

434959 S0000141194_V2

Noise Time Limits
Figure 209/71-00-00-990-908-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SINGLE ENGINE OPERATING AT: GROUND IDLE THRUST
(ADD 3 dBA FOR TWO ENGINES) (837 LBS; N1C = 1,090 RPM)

- STATIC OPERATION, APU OFF, ECS PACKS OFF
- NOISE LEVELS OVER PAVED TERRAIN
  ACOUSTIC STANDARD DAY:
  TEMP. = 77 DEGREES F (25 DEGREES C);
  REL. HUMIDITY = 70%; 14.7 PSIA (760.2 mm Hg);
  ZERO WIND.
- ENGINE CENTERLINE HEIGHT = 9 FEET (2.7 METERS)
- RECEIVER HEIGHT = 5.25 FEET (1.60 METERS)
  (EAR HEIGHT)

ACCURACY OF THE CONTOURS DECREASES AS THE DISTANCE FROM THE ENGINE INCREASES AND IS ABOUT ±5 dBA AT 2000 FEET (600 METERS) FROM THE ENGINE. NON-IDEALIZED METEOROLOGICAL CONDITIONS WOULD INCREASE THE TOLERANCE. BLOCKAGE OR REFLECTION EFFECTS OF THE AIRPLANE BODY AND WING OR BUILDING WALLS ARE NOT INCLUDED.

CFM56-7B GROUND RUN-UP dBA NOISE CONTOURS

N1C1090_DBA
434974 S0000141195_V2

Engine Noise Contours
Figure 210/71-00-00-990-909-F00 (Sheet 1 of 3)

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SINGLE ENGINE OPERATING AT:
(ADD 3 dBA FOR TWO ENGINES)

BREAKAWAY THRUST
(2,291 LBS; N1C = 1,726 RPM; 174.2 KLB A/P)

- STATIC OPERATION, APU OFF, ECS PACKS OFF
- NOISE LEVELS OVER PAVED TERRAIN
  ACOUSTIC STANDARD DAY:
  TEMP. = 77 DEGREES F (25 DEGREES C);
  REL. HUMIDITY = 70%; 14.7 PSIA (760.2 mm Hg);
  ZERO WIND.
- ENGINE CENTERLINE HEIGHT = 9 FEET (2.7 METERS)
- RECEIVER HEIGHT = 5.25 FEET (1.60 METERS)
  (EAR HEIGHT)

ACCURACY OF THE CONTOURS DECREASES AS THE DISTANCE FROM THE ENGINE INCREASES AND IS ABOUT ±5 dBA AT 2000 FEET (600 METERS) FROM THE ENGINE. NON-IDEALIZED METEOROLOGICAL CONDITIONS WOULD INCREASE THE TOLERANCE. BLOCKAGE OR REFLECTION EFFECTS OF THE AIRPLANE BODY AND WING OR BUILDING WALLS ARE NOT INCLUDED.

CFM56-7B GROUND RUN-UP dBA NOISE CONTOURS

N1C1726_DBA
434976 S0000141196_V2

Engine Noise Contours
Figure 210/71-00-00-990-909-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SINGLE ENGINE OPERATING AT: TAKEOFF THRUST
(ADD 3 dBA FOR TWO ENGINES) (26,709 LBS; N1C = 5,127 RPM)

- STATIC OPERATION, APU OFF, ECS PACKS OFF
- NOISE LEVELS OVER PAVED TERRAIN
  ACOUSTIC STANDARD DAY:
  TEMP. = 77 DEGREES F (25 DEGREES C);
  REL. HUMIDITY = 70%; 14.7 PSIA (760.2 mm Hg);
  ZERO WIND.
- ENGINE CENTERLINE HEIGHT = 9 FEET (2.7 METERS)
- RECEIVER HEIGHT = 5.25 FEET (1.60 METERS)
  (EAR HEIGHT)

ACCURACY OF THE CONTOURS DECREASES AS THE DISTANCE FROM THE ENGINE INCREASES AND IS ABOUT ±5 dBA AT 2000 FEET (600 METERS) FROM THE ENGINE. NON-IDEALIZED METEOROLOGICAL CONDITIONS WOULD INCREASE THE TOLERANCE. BLOCKAGE OR REFLECTION EFFECTS OF THE AIRPLANE BODY AND WING OR BUILDING WALLS ARE NOT INCLUDED.

CFM56-7B GROUND RUN-UP dBA NOISE CONTOURS

N1C5127_DBA
434977 S0000141197_V2

Engine Noise Contours
Figure 210/71-00-00-990-909-F00 (Sheet 3 of 3)

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LEGEND:

⇨ RELATIVE WIND
PREFERRED WIND VELOCITY VARIATION IS 4 KNOTS OR LESS.

(17) PREFERRED MAXIMUM WIND VELOCITY IN KNOTS.
EXAMPLE: 17 KNOTS MAXIMUM VELOCITY AT 25‘ RELATIVE TO AIRPLANE HEADING.

CAUTION:

IF ENGINE RUNS ARE DONE OUT OF THE PREFERRED LIMITS, MONITOR ENGINE PARAMETERS N1, N2 AND EGT.
ENGINE OVERHEAT OR STALL CAN OCCUR AND CAUSE ENGINE DAMAGE

G41144 S0006581733_V2

Preferred Relative Wind Direction and Velocity Limitations During Low Power Engine Operation
Figure 211/71-00-00-990-813-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-800-806-F00

3. Engine Operation Limits

(Figure 212)

A. General

(1) This task gives the normal operation limits of the engine.

(2) If the engine operates above these limits, you must do the necessary maintenance for the engine.

(a) You can find the maintenance requirements in this task: POWER PLANT - INSPECTION/CHECK, PAGEBLOCK 71-00-00/601.

(b) If you do not know why the engine operated above the given limits, do the applicable fault isolation in the Fault Isolation Manual.

B. References

Reference	Title
71-00-00 P/B 601	POWER PLANT - INSPECTION/CHECK
71-00-00-210-801-F00	Inspection of the Engine After an Engine Stall or Possible Engine Stall (P/B 601)
71-00-00-800-804-F00	Inspection After Engine Operations Above the Limits and High Engine Stress (P/B 601)
71-71-00-200-801-F00	Engine Vents and Drains Inspection (P/B 601)

C. Starter Operation Limitations

SUBTASK 71-00-00-910-002-F00

(1) The starter air pressure during operation is approximately 25 psig (172 kPa) - 55 psig (379 kPa) with the engine start valve open.

SUBTASK 71-00-00-910-003-F00

(2) Usual starter cycles during engine starts:

(a) There is no limit to the number of engine starts that are permitted.

(b) The maximum time for each engine start must be less than 2 minutes.

(c) Wait a minimum of 10 seconds between each engine start.

SUBTASK 71-00-00-910-004-F00

(3) Extended starter operation limits:

NOTE: As an example, the extended starter operation is used during the wet and dry motor procedures that continue more than two minutes.

(a) For the first two extended starter operations, the maximum operation time must not be more than 15 minutes.

1) Wait a minimum of 2 minutes between each starter operation.

(b) After the two extended starter operations, the maximum time for each subsequent starter operation must not be more than 5 minutes.

1) Wait a minimum of 10 minutes between each subsequent engine start.

(c) If either of the first two extended starter operations is more than 15 minutes or if any of the subsequent starter operations is more than 5 minutes, the starter is not serviceable.

SUBTASK 71-00-00-910-005-F00

(4) Starter engagement speeds:

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> **CAUTION**
> DO NOT ENGAGE THE STARTER AGAIN WHEN THE ENGINE IS AT OR MORE THAN IDLE. DAMAGE TO THE STARTER CAN OCCUR.

(a) For usual operation, do not try to engage the starter when the engine is at or more than idle.

1) It is recommended that the starter be removed for inspection at the subsequent convenient opportunity if it was engaged at or more than idle for more than 30 seconds.

(b) Starter re-engagement up to 30% N2 is permitted to clear a fire or after an EGT exceedance condition.

D. Engine Thrust Levels

SUBTASK 71-00-00-910-006-F00

(1) Each thrust position is found at a specific low pressure rotor speed (N1). These thrust positions are given as follows:

(a) TAKEOFF

1) This is the maximum thrust that can be used and not overboost the engine.

a) This thrust can be used in takeoff for a maximum of 5 minutes.

b) This limit applies to all operations above the maximum continuous thrust.

c) This thrust can be used in engine-out conditions for a maximum of 10 minutes.

2) If the takeoff power is used for more than 5 minutes, do these steps:

a) Record the total time the engine was operated at the takeoff power.

b) Do this task: Inspection After Engine Operations Above the Limits and High Engine Stress, TASK 71-00-00-800-804-F00.

(b) MAXIMUM CONTINUOUS

1) This is the maximum thrust for continuous operation during an engine-out condition.

NOTE: This thrust is used only for emergency conditions and is the captain's decision.

(c) MAXIMUM CLIMB

1) This is the maximum thrust permitted for normal climb operation.

(d) MAXIMUM CRUISE

1) This is the maximum thrust permitted for normal cruise operation.

(e) IDLE

1) The engine has two idle mode selections; approach idle and minimum idle.

2) Automatic selection between the two modes is done by the full authority digital engine control (FADEC) system based on inputs from the aircraft.

3) The idle speed changes with altitude.

4) APPROACH IDLE

a) This is used in-flight to permit a fast acceleration to takeoff/go-around thrust.

b) To get this idle position, put the thrust levers in the idle position with the engine in the approach idle mode.

5) MINIMUM IDLE

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a) This is used for stable, minimum engine thrust level.

b) To get this idle position, put the thrust levers to the idle position with the engine in the minimum idle mode.

c) In-flight, the minimum idle can change as a function of these parameters; minimum compressor static discharge pressure, minimum N2, total bleed air, environmental control system, mach number, altitude and anti-ice selection.

E. Exhaust Gas Temperature (EGT) Limits

SUBTASK 71-00-00-910-007-F00

(1) At ground start, the engine EGT limit is 1337°F (725°C).

SUBTASK 71-00-00-910-008-F00

(2) At takeoff power, the engine EGT limit is 1742°F (950°C).

NOTE: Takeoff power is permitted for a total of 5 minutes.

SUBTASK 71-00-00-910-009-F00

(3) There is no time limit for EGT below 1697°F (925°C).

SUBTASK 71-00-00-910-010-F00

(4) A transient EGT indication to 1760°F (960°C) is permitted for a maximum of 20 seconds.

SUBTASK 71-00-00-910-011-F00

(5) An overtemperature condition occurs when the EGT goes above the limits.

(a) During engine operation, the indication that an overtemperature condition is or can occur is:

1) A fast increase in fuel flow

2) High engine speed, or

3) Engine temperatures that increase.

(b) When an overtemperature condition occurs or is about to occur, decrease the thrust to idle and stop the engine with the normal engine shutdown procedure.

NOTE: You must avoid the emergency stop procedure unless it is apparent that continued engine operation will cause additional engine damage.

(c) Use the Common Display System (CDS) to make a record of the time duration and maximum temperature for all engine overtemperature operations.

1) The temperature and the length of time will tell you what corrective action and inspection requirements are necessary.

2) Refer to this task: Engine Operation Above the Limits and High Engine Stress Inspection (TASK 71-00-00-800-804-F00).

F. Rotor Operation Speed Limits (Redline Speed Limits)

SUBTASK 71-00-00-910-012-F00

(1) The maximum N1 is 5382 rpm (104%).

SUBTASK 71-00-00-910-013-F00

(2) The maximum N2 is 15183 rpm (105%).

G. Fuel Specifications

SUBTASK 71-00-00-910-014-F00

(1) The fuels that agree with the specification that follow are authorized for use in this CFM56-7 engine (GE specification D50TF2) (Table 201).

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Table 201/71-00-00-993-946-F00

SPECIFICATION	U.S. MILITARY	U.S. A.S.T.M.
PRIMARY FUELS	MIL-T-5624G Grade JP-5 MIL-T-83133 Grade JP-8	D 1655 Grades JET A and JET A1

SUBTASK 71-00-00-910-015-F00

(2) The engine will operate satisfactorily with all or a mixture of the fuels in the table.

H. Oil Pressure Limits

SUBTASK 71-00-00-910-016-F00

(1) The minimum oil pressure is 13 psid (90 kPa) at minimum idle.

SUBTASK 71-00-00-910-018-F00

(2) Under some conditions as given below, the oil pressure can go higher than the normal operation limits:

(a) Cold-soak conditions

(b) Sub-zero engine starts and takeoffs.

SUBTASK 71-00-00-910-019-F00

(3) You must have a minimum of 13 psid (90 kPa) at minimum idle and the main oil pressure must stay in the normal operation limits as N2 increases.

SUBTASK 71-00-00-910-067-F00

(4) The maximum oil pressure is 60 psid (414 kPa) during cruise phase.

NOTE: The standard oil pressure range is 40 psid (276 kPa) to 50 psid (345 kPa) during cruise phase. Oil pressure can be above 60 psid (414 kPa) during takeoff and climb. The maximum oil pressure limit above applies only during stabilized cruise phase.

(a) If the oil pressure is above 60 psid (414 kPa) during cruise phase but not more than 70 psid (483 kPa), maintenance is required not later than next 100 flight cycles (FIM 79-05 task 802).

(b) If the oil pressure is above 70 psid (483 kPa) during cruise phase, maintenance is required not later than next 25 flight cycles (FIM 79-05 task 802).

SUBTASK 71-00-00-910-020-F00

(5) Use the given oil pressure limitations for the cruise phase (Figure 212).

I. Oil Temperature Limits

SUBTASK 71-00-00-910-021-F00

(1) The maximum continuous oil temperature is 284°F (140°C).

SUBTASK 71-00-00-910-022-F00

(2) A limit of 311°F (155°C) is permitted for 45 minutes for all power settings.

SUBTASK 71-00-00-910-053-F00

(3) The minimum oil temperature is -40°F (-40°C) (for Type II oils).

NOTE: Refer to CFMI SB 79-0001 for approved oil types and limits.

(a) Type I oils are permitted to -65°F (-54°C).

SUBTASK 71-00-00-910-023-F00

(4) After the engine has started, the oil temperature must show an increase in temperature before the takeoff thrust is set.

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J. Oil Specifications

SUBTASK 71-00-00-910-024-F00

> **CAUTION**
> ONLY USE TYPES AND BRANDS OF ENGINE OIL THAT ARE APPROVED BY THE CFM SB 79-0001. DAMAGE TO THE ENGINE CAN OCCUR IF YOU USE OIL THAT IS NOT APPROVED.

(1) See the CFMI Service Bulletin (SB 79-0001) for engine oil specifications.

K. Oil Consumption Guidelines

SUBTASK 71-00-00-910-025-F00

(1) Normal oil consumption is less than 0.4 US quart/hour or 0.1 US gallon/hour (0.38 liters/hour).

SUBTASK 71-00-00-910-026-F00

(2) You must use the Fault Isolation Manual (FIM) to find the cause for the oil consumption if one of the following conditions occur:

(a) The oil consumption shows a gradual increase.

(b) The oil consumption shows a sudden step increase.

(c) The oil consumption is more than 0.8 US quart/hour or 0.2 US gallon/hour (0.76 liters/hour).

SUBTASK 71-00-00-910-061-F00

Engine Oil Consumption AWL

(3) Use Table 202 to find the maximum permitted oil consumption guideline.

Table 202/71-00-00-993-945-F00

MODEL 737-	WINGLET INSTALLED	OIL CONSUMPTION GUIDELINE US QUARTS/HOUR (LITERS/HOUR)
800	NO YES	1.28 (1.21) 1.24 (1.17)

L. Vibration Guidelines

SUBTASK 71-00-00-910-046-F00

(1) The maximum serviceable vibration level limit for operation is 4.0 units as shown on the center DU.

SUBTASK 71-00-00-910-047-F00

(2) If the engine vibration is between 3.0 units and 4.0 units, refer to your airline's policy to find if it is necessary to identify and correct the cause of the vibration.

SUBTASK 71-00-00-910-048-F00

(3) If the engine vibration is 4.0 units or more on the LP rotor or 3.0 units or more on the HP rotor, use the Fault Isolation Manual to find the cause of the high vibration and do the corrective action.

M. Inlet Cowl Anti-Icing System Limits

SUBTASK 71-00-00-910-029-F00

(1) If the outside air temperature is more than 65°F (18°C), operate the engine anti-ice system for 30 seconds or less.

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SUBTASK 71-00-00-910-030-F00

(2) There is no time limit for operation of the cowl anti-icing system, when the temperature is at or less than 65°F (18°C).

N. Compressor Stall

SUBTASK 71-00-00-910-031-F00

(1) Compressor stalls are caused by an aerodynamic disruption of the usually smooth airflow through the compressor stages.

SUBTASK 71-00-00-910-032-F00

(2) The disruption of the airflow can be caused by these conditions:

(a) There is Foreign Object Damage (FOD).

(b) The airfoils are distorted.

(c) The Variable Stator Vane (VSV) are off-schedule.

SUBTASK 71-00-00-910-033-F00

(3) The indications that a compressor stall occurred or will occur are as follows:

(a) Unusual engine noises.

(b) Flames from the engine exhaust.

(c) In bad cases, flames from the engine inlet.

(d) Engine performance parameters that are not stable.

(e) Slow throttle response or no throttle response.

(f) High EGT, or a quick EGT increase when the throttle is advanced.

SUBTASK 71-00-00-910-034-F00

CAUTION DO NOT MOVE THE THRUST LEVER FORWARD, OR KEEP IT IN THE SAME POSITION ON AN ENGINE THAT HAD A SURGE (STALL). IF YOU DO NOT MOVE THE THRUST LEVER REARWARD, YOU CAN CAUSE DAMAGE TO THE ENGINE.

CAUTION USE CAUTION IF YOU CONTINUE TO OPERATE THE ENGINE. THE CONTINUE OPERATION OF AN ENGINE THAT HAD A BAD COMPRESSOR STALL (OR STALLS) CAN HAVE MORE COMPRESSOR STALLS OR ADDITIONAL ENGINE DAMAGE CAN OCCUR.

(4) If there is a compressor stall, do these steps:

(a) Quickly (in 1 or 2 seconds) move the forward thrust lever rearward to idle power to clear the compressor stall.

1) Make sure that the EGT and the N2 decrease to normal idle indications.

2) Make sure that the engine vibration levels are normal.

CAUTION STOP THE ENGINE FOR THESE CONDITIONS: HIGH EGT, EGT INCREASES QUICKLY DURING A SLOW THROTTLE MOVEMENT, OR VIBRATIONLEVEL IS HIGHER THAN PREVIOUS LEVELS. IF YOU DO NOT STOP THE ENGINE, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(b) Slowly move the forward thrust lever forward to find if the stall will occur again.

1) Make sure that the EGT, N1 and N2 indications follow the thrust lever movement and the vibration levels are satisfactory.

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(c) If the compressor stall does not occur again, and the EGT and N2 indications are normal, continue with the engine operation.

(d) If the compressor stall occurs again, or if the stall does not clear satisfactorily, operate the engine at low idle power for 3 minutes and then stop the engine.

1) Record the operational conditions of the engine at the time the stall occurred to help with the troubleshooting.

(e) Do this task: Inspection of the Engine After an Engine Stall or Possible Engine Stall, TASK 71-00-00-210-801-F00.

O. Leakage Limits

SUBTASK 71-00-00-910-035-F00

(1) For the permitted leakage from the engine vents and drains during all conditions, do this task: Engine Vents and Drains Inspection, TASK 71-71-00-200-801-F00.

P. Ignition Ground Use Limits

SUBTASK 71-00-00-910-036-F00

(1) The ignition must stay OFF during these conditions to prevent an overtemperature condition if there is a compressor stall:

(a) When the engine is in operation.

(b) After the engine is started.

Q. Thrust Reverser Limits

SUBTASK 71-00-00-910-037-F00

CAUTION	OBEY THE PRECAUTIONS FOR ENGINE OPERATION WHEN THE THRUST REVERSERS ARE IN OPERATION WITH THE AIRPLANE IN A STATIC CONDITION. IF YOU DO NOT, THE THRUST REVERSER COMPONENTS CAN BECOME TOO HOT. DAMAGE TO THE THRUST REVERSER CAN OCCUR.

(1) Obey these engine limits when the thrust reverser is extended:

(a) Maximum N1 is 40%.

(b) There is no time limit if you do not go above 40% N1.

R. Cowling Limitations

SUBTASK 71-00-00-910-038-F00

(1) Engine operation is usually done with the fan cowl panels and the thrust reversers closed and latched.

SUBTASK 71-00-00-910-039-F00

(2) Engine motoring with the engine cowling open is permitted with these conditions:

(a) Motor the engine:

1) The thrust reverser halves can be open to a maximum motoring speed of 24-32% N2 rpm.

2) The fan cowl panels can be open up to a maximum motoring speed of 24-32% N2 rpm.

(b) Engine Operation:

1) The fan cowl panels can be open during an idle leak check for these conditions:

a) Forward thrust only

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b) The engine is not operated at more than minimum idle rpm.

S. Start After Emergency Shutdown

SUBTASK 71-00-00-910-066-F00

(1) An emergency engine shutdown is an engine shutdown from the power levels that are more than the minimum idle because of a compressor stall or other emergency conditions.

(a) This procedure is only for an engine, which is started after an emergency engine shutdown, for a ground test of the engine during maintenance.

(b) This procedure is not for flight operations.

(c) The function of this procedure is to keep the damage to the tip seals at a minimum.

SUBTASK 71-00-00-860-213-F00

CAUTION	YOU MUST OBEY THE INSTRUCTIONS FOR THE START PROCEDURE AFTER AN EMERGENCY ENGINE SHUTDOWN. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE TIP SEALS OF THE TURBINE BLADES.

(2) If the EGT was not more than the limits and the two rotors move freely, you can start the engine again with the applicable step that follows:

(a) If you can start the engine not more than 15 minutes from the time of the engine shutdown:

1) Start the engine again.

2) Put the engine start lever to RUN or IDLE at the maximum speed you can motor the engine (20-25% N2).

3) Stay at minimum idle for a minimum of 15 minutes before you increase the speed to a higher power.

(b) If you cannot start the engine in 15 minutes from the time of the engine shutdown:

1) Stop for a minimum of 50 minutes from the time of the engine shutdown before you try to start the engine again.

2) After the 50 minutes, make sure the two rotors turn freely.

3) If the two rotors turn freely, motor the engine for approximately two minutes to permit the engine to become cool.

4) After you motor the engine, permit the engine to become cool for 5 minutes before you motor again.

5) After the engine becomes cool, motor the engine again for two minutes.

6) Start the engine again.

7) Put the engine start lever to RUN or IDLE at the maximum speed you can motor the engine (20-25% N2).

8) Stay at minimum idle for a minimum of 15 minutes before you increase the speed to a higher power.

T. Engine Test Data Nomenclature

SUBTASK 71-00-00-800-004-F00

(1) The abbreviations that follow are used for test data, engine stations and performance parameters. These parameters must be measured and examined during engine tests and calculations (Table 203).

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Table 203/71-00-00-993-943-F00 Engine Test Stations and Parameters

ABBREVIATIONS	TEST STATION OR PARAMETER DEFINITIONS
CDS	Common Display System
DU	Display Unit
EEC	Electronic Engine Control
EGT	Exhaust Gas Temperature
FADEC	Full Authority Digital Engine Control
FMV	Fuel Metering Valve
HMU	Hydromechanical Unit
HPSOV	High Pressure Shutoff Valve (Fuel)
LSK	Line Select Key
N1	LP System Rotor Speed
N2	HP System Rotor Speed
TRA	Thrust Lever Resolver Angle
P0	Ambient Pressure
PT25	HP Compressor Inlet Total Pressure
T25	HP Compressor Inlet Total Temperature
T3	HPC Discharge Total Temperature
VBV	Variable Bleed Valve
VSV	Variable Stator Vane
BSV	Burner Staging Valve
HPTACC	HP Turbine Active Clearance Control
LPTACC	LP Turbine Active Clearance Control
TBV	Transient Bleed Valve
OAT (TAT)	Outside Air Temperature (Total Air Temperature)
T2	Engine Inlet Total Temperature
T49.5	LPT Intermediate Total Temperature (EGT)
T5	LPT Discharge Total Temperature

END OF TASK

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CAUTION:

A. MAINTENANCE ACTION IS REQUIRED PRIOR TO NEXT FLIGHT IF ENGINE OIL PRESSURE LEVELS ARE REPORTED TO BE IN AREA 1.

B. MAINTENANCE ACTION IS REQUIRED WITHIN NEXT 100 FLIGHT CYCLES IF ENGINE OIL PRESSURE LEVELS ARE REPORTED TO BE IN AREA 3.

C. MAINTENANCE ACTION IS REQUIRED WITHIN NEXT 25 FLIGHT CYCLES IF ENGINE OIL PRESSURE LEVELS ARE REPORTED TO BE IN AREA 4.

D. OPERATION IN AREAS 1, 3 AND 4 REQUIRES CLOSE MONITORING OF OTHER OIL SYSTEM PARAMETERS.

C. DURING ("NEGATIVE g") OPERATING CONDITION OIL PRESSURE LESS THAN 13 PSID (90 kPa DIFF.) IS PERMITTED FOR A MAXIMUM OF 10 SECONDS.

S-M56-MM-04945-00
G41347 S0006581738_V4

Oil Pressure versus N2% RPM
Figure 212/71-00-00-990-814-F00

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TASK 71-00-00-700-818-F00

4. Procedure to Prepare the Engine for Operation

(Figure 213)

A. General

(1) This task has two paragraphs to help you prepare the engine for engine operation:

(a) Prepare for the Engine Operation

(b) Prepare the Engine Before a Start in Cold Weather.

(2) For maintenance, engine operation at high power can be necessary.

(a) One engine can be operated at high power to a limited power setting, and the other engine can be operated at TAKEOFF power.

NOTE: If it is operator policy, you can operate the first and second engines at TAKEOFF power. This is not recommended for normal operation, however.

(b) One engine can be operated with the second engine stopped.

(3) With the parking brakes ON and the wheel chocks installed at the nose and main landing gear wheels, engine operation at high thrust can move the airplane.

(a) The airplane could go over (jump) the wheel chocks.

(b) The airplane could move in a skid until the thrust is decreased.

NOTE: A skid is a sideways or a forward movement on the ground with the wheels locked. This movement can not be controlled.

(4) During cold weather, special procedures are necessary before you start the engine and after the engine is stopped.

(5) It is very important that you remove all loose objects from the air inlet and the area around the air inlet before you start the engine.

B. References

Reference	Title
12-11-00-650-802	Pressure Refuel Procedure (P/B 301)
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
12-13-21-200-801	IDG Oil Level Check (P/B 301)
12-13-21-600-801	IDG Servicing (Oil Fill) (P/B 301)
27-81-00-040-801	Leading Edge Flaps and Slats Deactivation (P/B 201)
27-81-00-860-804	Leading Edge Flaps and Slats Retraction (P/B 201)
32-00-01-480-801	Landing Gear Downlock Pins Installation (P/B 201)
36-00-00-860-801	Supply Pressure to the Pneumatic System (Selection) (P/B 201)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
80-11-01-610-801-F00	Starter Servicing (Oil Fill) (P/B 301)
80-11-01-680-801-F00	Starter Servicing (Oil Drain) (P/B 301)

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-1505	Chocks - Wheel Part #: 19CAL455 - Type 1 Supplier: $1329 Part #: 99-9028-6000 Supplier: 59603 Part #: AC6820-LR Supplier: 032T9 Part #: ALPHACHOCKS MAX Supplier: 6X2T3 Part #: W86 Supplier: 3XZM7 Part #: W88-RH Supplier: 3XZM7 Opt Part #: W88 Supplier: 3XZM7 Opt Part #: W92 Supplier: 9L752
STD-1122	Thermometer - Alcohol/Mercury (or equivalent meter meets task requirements)

D. Consumable Materials

Reference	Description	Specification
G50169 [CP2499]	Fluid - Deicing, Type I	AMS 1424 Type I or ISO 11075 Type I
G51462 [CP2930]	Fluid - Deicing, Type II	AMS 1428 Type II or ISO 11078 Type II

E. Access Panels

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

F. Prepare for the Engine Operation

SUBTASK 71-00-00-860-014-F00

(1) Find the airplane gross weight for the operation of an engine at high power.

(a) The airplane gross weight is the sum of the total empty weight of the airplane with the fuel load necessary to do the engine run, the weight of the crew, and if more weight is necessary, a load in the cargo compartment.

1) The fuel burnoff during the test must be subtracted from the airplane fuel load and credited as ballast.

2) You must subtract the weight of all equipment that is removed from the airplane (ie seats, interior panels, galleys).

3) The airplane must have a minimum fuel load and all other loads must be in the usual CG range of the airplane.

4) It is not always possible to use the fuel load to increase the gross weight because of operational considerations.

(b) Record the airplane gross weight.

SUBTASK 71-00-00-860-015-F00

(2) If the first engine is to be set at or near takeoff (T/O) power, do these steps to use the data (Table 204):

(a) Get the Center of Gravity (CG) location of the airplane.

NOTE: The calculations of the CG location depends on the location of the loads on the airplane. To get the CG, you must start with the empty weight and CG of the airplane, add the weight and CG of each load, and change the total weights and CG's into %MAC.

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1) The method for the calculation of the CG location in %MAC is given in the Weight and Balance Manual.

2) Your airline weights engineer has the Weight and Balance Manual.

(b) Use the applicable airplane model and engine thrust to find the minimum gross weight, the opposite engine thrust limit, and the CG limit.

1) If there is no CG limit, the data applies to CG's in the usual operating range of the airplane.

2) Record the minimum gross weight, N1 limit for the opposite engine (if used) and CG limit (if given).

a) The opposite engine can be operated at idle power for the 0 %N1 values.

3) Make sure that the airplane gross weight is more than this minimum gross weight.

4) Make sure that the CG of the airplane is in the CG limits.

(c) The data assumes friction coefficient for a damp ramp surface.

NOTE: A damp ramp surface is permitted. Water (standing), frost, ice, oil, grease, sand, or other contaminants are not permitted.

Table 204/71-00-00-993-881-F00

Minimum Gross Weight For Engine Operation (High Power)				
Airplane Model	Thrust		Minimum Gross Weight Lbs (Kgs)	CG (%MAC)
	Test Engine	Opposite Engine Percent N1		
737-800	7B24	0	136,000 (61,690)	<20
		0	117,500 (53,300)	<15
		55 %N1	92,000 (41,730)	<20
		62 %N1	95,000 (43,100)	<26
		68 %N1	98,000 (44,460)	<32
		Takeoff Power	122,000 (55,340)	-
	7B26	0	127,000 (57,610)	<15
		0	112,000 (50,810)	<10
		62 %N1	102,000 (46,270)	<24
		73 %N1	110,000 (49,990)	-
		Takeoff Power	132,000 (59,880)	-
	7B27	0	134,000 (60,790)	<15
		0	117,000 (53,070)	<10
		62 %N1	106,000 (48,080)	<23
		73 %N1	115,000 (52,510)	<33
		Takeoff Power	138,000 (62,600)	-

(d) If the engine(s) are to be operated at part power (not more than 75% N1), then use MGW and CG below (Table 205).

NOTE: An approximate Manufacturer's Empty Weight (MEW) is used.

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Table 205/71-00-00-993-891-F00

Minimum Gross Weight For Engine Operation (Part Power) One Or Two Engines Set To Not More Than 75% N1		
Airplane Model	**Minimum Gross Weight Lbs (Kgs)**	**CG (%MAC)**
737-800	85,000 (38,555)	<24

SUBTASK 71-00-00-080-001-F00

WARNING MAKE SURE THAT ALL ENGINE OPERATION AREAS ARE AS CLEAN AS POSSIBLE. IF ALL RAMPS, TAXIWAYS, RUNWAYS, AND OTHER OPERATIONS AREAS ARE NOT CLEAN, DAMAGE TO THE ENGINE, AIRPLANE AND INJURY TO PERSONS CAN OCCUR.

(3) Make sure that the airplane is parked in a clean area with the wheels on areas that do not have oil, grease, or other materials.

SUBTASK 71-00-00-080-002-F00

(4) Remove the air inlet and exhaust covers if they are installed.

SUBTASK 71-00-00-860-016-F00

CAUTION DO NOT OPERATE THE HYDRAULIC SYSTEMS UNLESS THE FUEL LEVEL IS HIGHER THAN THE HEAT EXCHANGERS. WITHOUT SUFFICIENT FUEL, THE HEAT EXCHANGER WILL BECOME TOO HOT. DAMAGE TO THE HYDRAULIC SYSTEM WILL OCCUR.

(5) Make sure that there is sufficient fuel in the Main Tank 1 and the Main Tank 2 to cover the heat exchangers for the hydraulic system.

(a) A minimum of 1675 lb (760 kg) in each of the Main Tank 1 and Main Tank 2 is necessary to cool the hydraulic system heat exchangers.

(b) Supply additional fuel above these limits in the applicable fuel tanks to operate the engine (TASK 12-11-00-650-802).

SUBTASK 71-00-00-560-004-F00

(6) Put the airplane in a position to limit the amount of crosswind into the engine inlet. Preferred relative wind direction and wind velocity limits during low power engine runs are shown in (Figure 211).

CAUTION IF ENGINE RUNS ARE DONE OUT OF THE PREFERRED LIMITS, MONITOR N1, N2 AND EGT. ENGINE OVERHEAT OR STALL CAN OCCUR AND CAUSE ENGINE DAMAGE.

(a) Wind Limitations During Engine Ground Operations:

1) Static ground operation of the engine is not permitted for these conditions:

a) Power settings that are more than 70%N1, and

b) Crosswinds that are more than 15 knots, or

c) All tailwinds that are more than 5 knots.

SUBTASK 71-00-00-860-018-F00

(7) Make sure that the nose landing gear is in the forward direction.

SUBTASK 71-00-00-860-019-F00

(8) Install the lock pins in the landing gear (TASK 32-00-01-480-801).

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SUBTASK 71-00-00-480-001-F00

> **WARNING** MAKE SURE THAT THE LANDING GEAR GROUND SAFETIES AND THE WHEEL CHOCKS ARE IN ITS POSITION. INJURIES TO PERSONNEL AND DAMAGE TO THE AIRCRAFT CAN OCCUR.

(9) Install the wheel chock, COM-1505, in front and to the rear of all the nose gear and main gear tires.

NOTE: For the engine idle run it is acceptable to install wheel chocks in the front and to the rear of the Main Landing Gear (MLG) wheels only if the landing gear brakes are applied.

(a) Make sure that the forward wheel chocks are 6 in. (152 mm) - 12 in. (305 mm) in front of the tires.

(b) Make sure that the aft wheel chocks are immediately behind the wheels, but do not touch the tires.

SUBTASK 71-00-00-210-054-F00

(10) Make sure that there are no covers on the pitot probe, AOA sensor, and TAT probe.

NOTE: Probe heat is automatically ON during the engine start for probe heat switches with the AUTO position.

NOTE: TAT, ALPHA VANE, AND CAPT, FO, AUX, and the pitot probe heat will operate automatically when either or both engines are operated.

SUBTASK 71-00-00-210-002-F00

(11) Make sure that all loose objects are removed from the air inlet and from the ground area around the air inlet.

(a) Examples of loose objects are:

1) Parts, lockwire and safety cable
2) Tools and equipment
3) Rags
4) Interphone equipment and cables.

SUBTASK 71-00-00-210-003-F00

(12) Do a visual check for damage or ice on the inlet cowl, the fan blades, the fan spinner, the T12 sensor, and the external cowl surfaces.

(a) Make sure that the thrust reverser is stowed.

(b) Make sure that the latch engagement for the fan cowl and thrust reverser latches is correct.

NOTE: The fan cowl panels can be open for engine operation with given conditions (TASK 71-00-00-800-806-F00).

(c) If you find ice on these parts, you must remove the ice from the engine with hot air (Prepare the Engine Before a Start in Cold Weather, TASK 71-00-00-700-818-F00).

SUBTASK 71-00-00-210-004-F00

(13) Do a visual check of the core exhaust (LPT), exhaust plug and primary nozzle for damage and unwanted material.

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SUBTASK 71-00-00-210-005-F00

(14) Examine the engine oil level indication in the flight compartment.

NOTE: The minimum indicated oil level necessary for airplane dispatch is 60% full plus the oil usage.

(a) If it is low, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

SUBTASK 71-00-00-210-006-F00

(15) Do this task: IDG Oil Level Check, TASK 12-13-21-200-801.

(a) If it is necessary, do this task: IDG Servicing (Oil Fill), TASK 12-13-21-600-801.

SUBTASK 71-00-00-860-020-F00

(16) Make sure that these levers are in the correct position (Figure 213).

(a) Make sure that the forward thrust levers are in the idle thrust position.

(b) Make sure that the reverse thrust levers are in the stow position.

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

(d) Make sure that the engine start switches, on the P5 overhead panel, are in the OFF position.

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

1) The AUTO position is off.

LOM ALL

SUBTASK 71-00-00-860-021-F00

(17) If you do not want the flight recorder to record the data for this engine operation, open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
C	9	C00109	FLIGHT RECORDER AC
C	10	C00468	FLIGHT RECORDER DC

SUBTASK 71-00-00-860-230-F00

WARNING

MAKE SURE THAT YOU OPEN THE CIRCUIT BREAKERS FOR THE WEATHER RADAR SYSTEM. THE FORWARD MOVEMENT OF A THRUST LEVER CAN CAUSE THE AUTOMATIC OPERATION OF THE SYSTEM. THE OPERATION OF THIS SYSTEM CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(18) Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
D	13	C00120	WEATHER RADAR RT

SUBTASK 71-00-00-860-022-F00

(19) Make sure that all circuit breakers on these panels are closed:

NOTE: Do not close the circuit breakers that have a DO-NOT-CLOSE tag or a INOP collar.

(a) Circuit Breaker Panel, P6

(b) Circuit Breaker Panel, P18.

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SUBTASK 71-00-00-860-023-F00

(20) Make sure that the applicable engine fire switch handle (DISCH 1 or DISCH 2) is in its usual (pushed in and locked) position.

NOTE: The engine fire switch handle (DISCH 1 or DISCH 2) is on the P8 panel of the control stand.

SUBTASK 71-00-00-860-024-F00

(21) Make sure that the parking brake lever on the control stand is pulled up in the ON position.

(a) Make sure that the red light for the parking brake light is on.

SUBTASK 71-00-00-860-025-F00

WARNING MAKE SURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR WHEN THE ENGINE IS POWERED. IF YOU DO NOT OBEY THESE INSTRUCTIONS, INJURY TO PERSONS AND DAMAGE TO THE AIRPLANE CAN OCCUR.

(22) Make sure that the airplane is clear and that there all persons are clear of the dangerous areas.

SUBTASK 71-00-00-970-054-F00

(23) Do this check of the Outside Air Temperature (OAT) in the Flight Management Computer System (FMCS).

(a) If you operate the engine at high power and the OAT is not set in the FMCS, you can get maintenance messages in the EEC BITE.

CAUTION DO NOT USE THE TOTAL AIR TEMPERATURE (TAT) INDICATION FROM THE AIRPLANE FOR THE AMBIENT AIR TEMPERATURE. IF YOU DO NOT OBEY, THE TAT CAN CAUSE AN INCORRECT N1 TARGET SELECTION.

CAUTION KEEP MERCURY THERMOMETERS AWAY FROM THE AIRPLANE. IF THE THERMOMETER BREAKS, MERCURY CAN CAUSE DAMAGE TO THE AIRPLANE COMPONENTS.

(b) Use a thermometer, STD-1122, to get the ambient air temperature (OAT) in the shade of the nose wheel well.

(c) Do these steps to get access to the TAKEOFF REF page to show the OAT in the FMCS Control Display Unit (CDU).

1) Push the INIT/REF key on the CDU.

2) Push these Line Select Key (LSK) on the CDU:

a) INDEX

b) TAKEOFF REF

c) If the OAT is not correct, push the applicable LSK and adjust the OAT.

d) Push the INDEX LSK to exit the TAKEOFF REF page.

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SUBTASK 71-00-00-860-175-F00

> **WARNING** KEEP PERSONNEL, AND EQUIPMENT AWAY FROM THE PITOT PROBES, TOTAL AIR TEMPERATURE PROBE, AND ANGLE-OF-ATTACK VANE. THESE COMPONENTS WILL BECOME VERY HOT. THEY CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(24) If you operate the engine at high power, make sure that the probe heat is on.

NOTE: For engine operation at high power, the EEC can go into Alternate Mode operation if neither pitot probe is heated.

LOM 404, 407, 420 PRE SB 737-30A1063

(a) Put the Probe Heat "A" and “B’’ switches, on the P5 overhead panel, to the ON 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

SUBTASK 71-00-00-860-747-F00

(25) If it is necessary, do this step when you operate the engine at low power:

NOTE: Deactivate probe heating when engines do not operate at high power to improve service life of the pitot probe. If performing low engine runs on ground, disconnect the pitot heater circuit breaker.

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

CAPT Electrical System Panel, P18-3

Row	Col	Number	Name
C	1	C00523	HEATERS CAPT PITOT
D	5	C00525	HEATERS F/O PITOT
D	6	C00524	HEATERS AUX PITOT

SUBTASK 71-00-00-860-026-F00

> **WARNING** IF YOU MUST RETRACT THE FLAPS, MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF THE LEADING EDGE, THE TRAILING EDGE FLAPS AND FLAP DRIVE MECHANISMS. SERIOUS INJURY AND DAMAGE TO EQUIPMENT COULD OCCUR.

> **CAUTION** IF THE FLAPS ARE EXTENDED FOR A LONG PERIOD OF TIME DURING HIGH POWERED OPERATION, THE ENGINE AIR FLOW CAN CAUSE DAMAGE TO THE FLAPS.

(26) If you operate the engine at high power, make sure that the flaps are fully retracted.

(a) If the flaps are not retracted, do this task: Leading Edge Flaps and Slats Retraction, TASK 27-81-00-860-804.

(b) Do this task: Leading Edge Flaps and Slats Deactivation, TASK 27-81-00-040-801.

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SUBTASK 71-00-00-780-001-F00

CAUTION	MAKE SURE THE ELECTRICAL POWER IS ON BEFORE YOU SUPPLY THE PNEUMATIC POWER AND REMOVE THE PNEUMATIC POWER BEFORE YOU REMOVE THE ELECTRICAL POWER. DAMAGE TO THE AIR CONDITIONING SYSTEM COULD OCCUR.

(27) Do this task: Supply Pressure to the Pneumatic System (Selection), TASK 36-00-00-860-801.

G. Prepare the Engine Before a Start in Cold Weather

SUBTASK 71-00-00-860-174-F00

(1) Make sure that the minimum oil temperature for the engine and the starter are in these limits:

(a) Engine Oil Type (CFM SB 79-001)

1) Type II oils are permitted to -40°F (-40°C)

2) Type I oils are permitted to -65°F (-54°C).

(b) Starters (GEAE part number 1851M36P04) are permitted to a minimum of -40°F (-40°C) with Type I or II engine oils because of possible damage to turbine seals.

1) If the oil in the starter is below the limit, do these steps:

a) To drain the cold oil in the starter, do this task: Starter Servicing (Oil Drain), TASK 80-11-01-680-801-F00.

b) To fill the starter with warm oil, do this task: Starter Servicing (Oil Fill), TASK 80-11-01-610-801-F00.

(c) Starters (GEAE part number 1851M36P05 and on) are permitted to minimum of -65°F (-54°C).

SUBTASK 71-00-00-860-027-F00

(2) It is usually not necessary to increase the temperature of the engine before you do a start in cold weather. The procedure to start the engine will usually be sufficient, but it is possible that heat will be necessary for the conditions that follow:

(a) The rotors are locked with ice.

(b) Ice and snow are on the inlet cowl, fan cowl, and the external surfaces and joints of the thrust reversers.

(c) Ice is on the acoustic liners of the inlet cowl, the fan blades and the primary nozzle.

(d) The airplane has cold-soaked at -40°F (-40°C) or colder for more than one hour.

1) Refer to the heating procedure for HMUs with fluorocarbon seals (TASK 71-00-00-700-818-F00).

SUBTASK 71-00-00-880-001-F00

(3) If snow or ice holds the fan cowl panels or the thrust reverser closed, apply heat to remove the snow and ice.

(a) Remove all snow and ice before you open the fan cowl panels or the thrust reversers.

SUBTASK 71-00-00-080-003-F00

(4) Remove the all covers from the engine.

SUBTASK 71-00-00-860-028-F00

(5) Before you start the engine, make sure that the N1 rotor turns freely.

(a) Make sure that there is no ice on the fan blades.

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SUBTASK 71-00-00-880-002-F00

> **CAUTION**
> DO NOT APPLY HEATER OUTLET AIR THAT IS MORE THAN 175°F (79°C) TO THE ENGINE. IF YOU APPLY MORE THAN THIS TEMPERATURE, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(6) If the N1 rotor will not turn freely, do these steps:

(a) Install a cover on the engine primary nozzle.

(b) Attach an applicable hot air duct from a heater to the engine.

(c) Apply heat to the engine gas path until the N1 rotor turns freely.

(d) Apply heat to the fan blades to remove the ice.

SUBTASK 71-00-00-660-001-F00

> **WARNING**
> DO NOT GET DEICING OR ANTI-ICING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. PUT ON GOGGLES, GLOVES, AND CLOTHING FOR PROTECTION WHEN YOU USE DEICING OR ANTI-ICING FLUID. KEEP THE FLUID AWAY FROM HEAT AND AN OPEN FLAME AND GIVE SUFFICIENT AIRFLOW. DEICING OR ANTI-ICING FLUID IS DANGEROUS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONNEL CAN OCCUR.

> **CAUTION**
> USE ONLY GLYCOL ALCOHOL AS A DEICING/ANTI-ICING MIXTURE. METHANOL CAN CAUSE CORROSION TO ENGINE PARTS MADE OF TITANIUM.

(7) If it is necessary, deice or anti-ice the fan blades with the deicing fluid, G50169 [CP2499], or deicing fluid, G51462 [CP2930], do one of the following:

(a) Deice or anti-ice the fan blades with deicing fluid, G50169 [CP2499].

1) Prepare deicing fluid, G50169 [CP2499], and water (Table 206):

NOTE: Hot water above 140°F (60°C) is more efficient.

2) Apply the deicing/anti-icing mixture using a soaked clean cloth on the frozen fan blades.

Table 206/71-00-00-993-899-F00

CONCENTRATION OF HEATED WATER/DEICER FLUID (VOL %)		
OUTSIDE AIR TEMPERATURE (OAT)	**DEICING**	**ANTI-ICING**
27°F (-3°C) AND ABOVE	WATER HEATED TO 140°F (60°C) MINIMUM OR HEATED MIX OF DEICER WITH WATER	50/50 WATER/DEICER
25°F (-4°C) TO 19°F (-7°C)	50/50 HEATED WATER/DEICER	50/50 WATER/DEICER
18°F (-8°C) TO 7°F (-14°C)	50/50 HEATED WATER/DEICER	25/75 WATER/DEICER
5°F (-15°C) TO 1°F (-17°C)	50/50 HEATED WATER/DEICER	100% DEICER
0°F (-18°C) TO -13°F (-25°C)	25/75 HEATED WATER/DEICER	100% DEICER

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Table 206/71-00-00-993-899-F00 (Continued)

CONCENTRATION OF HEATED WATER/DEICER FLUID (VOL %)		
OUTSIDE AIR TEMPERATURE (OAT)	**DEICING**	**ANTI-ICING**
-15°F (-26°C) AND BELOW	SAE TYPE II FLUIDS CAN BE USED AS DEICING/ANTI- ICING AGENTS, PROVIDED A 45 deg F (7 deg C) BUFFER IS MAINTAINED BETWEEN THE FREEZING POINT OF THE CONCENTRATED FLUID AND OAT. IN NO CASE SHALL THIS TEMPERATURE BE LOWER THAN THE LOWEST OPERATIONAL USE TEMPERATURE AS DEFINED BY THE AERODYNAMIC ACCEPTANCE TEST OF THE MANUFACTURER.	

(b) Deice or anti-ice the fan blades with deicing fluid, G51462 [CP2930].

1) Prepare the deicing fluid, G51462 [CP2930], and water mixture (Table 207):

NOTE: Hot water above 140°F (60°C) is more efficient.

2) Apply the deicing/anti-icing mixture using a soaked clean cloth on the frozen fan blades.

Table 207/71-00-00-993-941-F00

FLUID CONCENTRATION IN % VOLUME			
Outside Air Temperature (OAT)	**One-Step Procedure Deicing/Anti-icing**	**Two-Step Procedure**	
		First Step: Deicing	**Second Step: Anti-Icing**
32°F (0°C)	100/0, 75/25 or 50/50 HEATED FLUID/WATER MIXTURE	HEATED WATER OR A HEATED FLUID/WATER MIXTURE	100/0, 75/25 or 50/50 HEATED OR UNHEATED FLUID/WATER MIXTURE
32°F (0°C) to 27°F (-3°C)	100/0, 75/25 or 50/50 HEATED FLUID/WATER MIXTURE	HEATED FLUID/ WATER MIXTURE WITH A FREEZING POINT AT OAT OR BELOW	100/0, 75/25 or 50/50 HEATED OR UNHEATED FLUID/WATER MIXTURE
27°F (-3°C) to 7°F (-14°C)	100/0 or 75/25 HEATED FLUID/WATER MIXTURE	HEATED FLUID/ WATER MIXTURE WITH A FREEZING POINT AT OAT OR BELOW	100/0 or 75/25 HEATED OR UNHEATED FLUID/WATER MIXTURE
Below 7°F (-14°C) TO LOWEST OPERATIONAL USE TEMPERATURE	100/0 HEATED FLUID/WATER MIXTURE	HEATED FLUID/ WATER MIXTURE WITH A FREEZING POINT AT OAT OR BELOW	100/0 HEATED OR UNHEATED FLUID/WATER MIXTURE

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SUBTASK 71-00-00-860-029-F00

(8) If the N2 rotor does not turn freely or the START VLV OPEN maintenance message does not come ON after the start switch is put to the GRD position, apply external heat to the start valve or the engine (as given above) to remove all snow and ice.

SUBTASK 71-00-00-860-031-F00

(9) If the ambient temperature is less than -31°F (-35°C), let the engine run at the idle speed for a minimum of 2 minutes.

SUBTASK 71-00-00-860-032-F00

(10) If the oil pressure indication is slow to decrease, or the OIL FILTER BYPASS light does not go off, do these steps:

(a) Continue to operate the engine at the idle speed position until the oil pressure becomes normal and the OIL FILTER BYPASS light goes off.

(b) It can take some minutes for the oil pressure to become normal.

(c) If the oil pressure remains above the normal range after the oil temperature has stabilized within limits, shut down the engine.

1) Find and correct the cause per the FIM.

(d) More warm-up time for the display units can be necessary before engine indications correctly show changing values.

NOTE: The display units can show less bright than normal.

SUBTASK 71-00-00-860-033-F00

(11) If icing conditions occur or are about to occur, do these steps:

(a) Turn on the inlet cowl TAI system immediately after the engine starts.

1) Put the applicable ENG 1 ANTI-ICE or ENG 2 ANTI-ICE switch to the ON position.

(b) If the engine is to be run for a long time, increase the engine speed to 70% N1 for 15 seconds at 30 minute intervals.

NOTE: This will prevent ice accumulations.

(c) If you do some of the tests in the power plant test procedure, it can be necessary to turn off the engine anti-ice system (TASK 71-00-00-800-811-F00).

NOTE: Engine test data is done with no bleed air off-takes and no electrical loads.

SUBTASK 71-00-00-880-003-F00

(12) ENGINES POST-CFMI-SB 73-096 (HMU WITH FLUOROCARBON SEALS);

If the engines have been cold-soaked more than one hour at -40°F (-40°C) or below ambient temperature, do this engine/HMU heating procedure to prevent fuel leakage during the engine start:

(a) At the left fan cowl panel, use a flat blade screwdriver and do this step:

1) Open the applicable doors:

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

(b) Using a Firebird BT400-46 Portable Diesel Heater, or equivalent system, heat the engine.

NOTE: For this procedure, the recommended heater is the Firebird BT400-46 Portable Diesel Heater from Aerotech Herman Nelson Incorporated, though an equivalent system is acceptable.

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1) If it is necessary to preheat the heater, refer to manufacturer's operation manual.
2) With the heater at the engine, insert the flexible duct into the opening of the access door and secure in the opening.

> **CAUTION** DO NOT APPLY HEATER OUTLET AIR THAT IS MORE THAN 175°F (79°C) TO THE ENGINE. IF YOU APPLY MORE THAN THIS TEMPERATURE, DAMAGE TO THE EQUIPMENT CAN OCCUR.

3) Adjust the temperature setting of the heater outlet air to not more than 175°F (79.44°C). Operate the heater per the manufacturer's operation manual.

(c) From the flight compartment, monitor the applicable oil temperature indicator. When this temperature is 70.0°F (21.1°C) or more, (this should take approximately 5 to 10 minutes depending on outside temperature), stop and remove the heater.

1) Remove the flexible duct from the chip detector access opening.
2) Close the applicable doors:

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

(d) Do the heating procedure again for the other engine.

1) Start the engines as soon as possible after heating to make sure that the engine does not cool off to below -40°F (-40°C).

(e) It is recommended to run the engines at idle for no less than five minutes to make sure that the oil and fuel system are up to usual operating temperature.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Engine Start Controls/Displays in the Flight Compartment
Figure 213/71-00-00-990-815-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Engine Start Controls/Displays in the Flight Compartment
Figure 213/71-00-00-990-815-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FLIGHT COMPARTMENT

CONTROL STAND

A

B

L05208 S0006581745_V2

Engine Start Controls/Displays in the Flight Compartment
Figure 213/71-00-00-990-815-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FUEL PANEL (P5-2)

C

BLEED AIR CONTROL MODULE (P5-10)

D

NOTE:

ENGINE INDICATION IS FOR EXAMPLE ONLY.

CDS - ENGINE DISPLAYS

1 EXAMPLE OF THE CDS DISPLAY

E 1

L05211 S0006581746_V3

Engine Start Controls/Displays in the Flight Compartment
Figure 213/71-00-00-990-815-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-800-807-F00

5. Start the Engine Procedure (Selection)

A. General

(1) The purpose of this task is to permit the mechanics to select the applicable method to start the engine.

B. Procedure

SUBTASK 71-00-00-910-040-F00

(1) Do one of these tasks to start the engine:

(a) Do this task: Start the Engine Procedure (Normal Start), TASK 71-00-00-800-808-F00.

(b) Do this task: Start the Engine Procedure (Manual Override of the Engine Start Valve), TASK 71-00-00-800-809-F00.

(c) Do this task: Start the Engine Procedure (Engine Cross Bleed Start), TASK 71-00-00-800-810-F00.

——— END OF TASK ———

TASK 71-00-00-800-808-F00

6. Start the Engine Procedure (Normal Start)

A. General

(1) This procedure has the steps that are necessary to start the engine under normal weather conditions.

(a) During cold weather, additional procedures such as preheating can be necessary.

(b) If it is necessary to start the engine in cold weather, refer to this paragraph: Prepare the Engine Before a Start in Cold Weather.

(2) On this airplane, the Electronic Engine Control (EEC) (Full Authority Digital Engine Control (FADEC)) system controls the engine start operation as follows:

(a) In a normal start (enhanced manual mode), the EEC (FADEC) will automatically make the necessary corrections if there is an overtemperature, or if ignition does not occur. Control of the starter, ignition selection, and fuel-on is done with the flight deck switches or levers.

(b) The start monitoring function in the EEC will do these steps if an overtemperature condition occurred or is about to occur:

1) Cause the Exhaust Gas Temperature (EGT) display to show an overtemperature condition.

2) Turn the fuel flow off.

3) Turn the ignition off.

(c) If the engine does not start, the Engine Electronic Controller (EEC) will do these steps:

1) Turn the fuel flow off.

2) Turn the ignition off.

(3) You must monitor the other engine data during the start to make sure that they are in the limits.

(a) Monitor the oil pressure, N1 and N2 rotor speeds, and vibration during the start.

(4) You must stop the start procedure when the engine data is not satisfactory.

(5) During the start, keep the service air bleed inputs and accessory loads to a minimum.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(6) Do each step of the procedure in sequence. If you stop the engine start, you must do each of the steps in sequence again.

(7) If the engine did not start because there was not sufficient fuel, the engine fuel pump is operated without fuel and must be replaced.

NOTE: The engine fuel pump is fuel lubricated, zero fuel pressure can cause damage to the pump.

(a) Spar valve malfunction or not activated.

(b) Boost pump malfunction or not activated.

(c) Unconnected fuel hose between the tank and the engine fuel pump.

B. References

Reference	Title
36-00-00-860-802	Supply Pressure to the Pneumatic System with an External Ground Air Source (P/B 201)
36-00-00-860-806	Remove Pressure from the Pneumatic System (P/B 201)
49-11-00-860-801	APU Starting and Operation (P/B 201)

C. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right
410	Subzone - Engine 1
420	Subzone - Engine 2

D. Manual Start Procedure

SUBTASK 71-00-00-910-041-F00

(1) Do this task: Procedure to Prepare the Engine for Operation, TASK 71-00-00-700-818-F00.

SUBTASK 71-00-00-710-001-F00

(2) Do these steps to make sure that the engine fire detection system is operational:

(a) On the P8 panel, move the OVHT DET switches for Engine 1 and Engine 2 to the NORMAL position.

(b) On the P8 panel, move and hold the TEST switch to the OVHT/FIRE position.

(c) Make sure that these lights, on the P8 panel, come on:

1) The amber ENG 1 OVERHEAT light

2) The amber ENG 2 OVERHEAT light

3) The red Engine 1 fire handle

4) The red Engine 2 fire handle.

(d) Make sure that these lights, on the P7 glareshield panel, come on:

1) The amber MASTER CAUTION lights

2) The red FIRE WARN lights

3) The amber OVHT DET annunciator light.

(e) Release the TEST switch.

1) Make sure that all the above lights go off.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(f) Move and hold the TEST switch to the FAULT/INOP position.

NOTE: The FAULT/INOP test is not necessary if it is completed per TASK 49-11-00-860-801. The FAULT/INOP test is necessary if the TASK 36-00-00-860-802 is used.

1) Make sure that these lights, on the P8 panel, come on:

a) The amber FAULT light

b) The amber APU DET INOP light.

2) Make sure that these lights, on the P7 glareshield panel, come on:

a) The amber MASTER CAUTION lights

b) The amber OVHT/DET annunciator light.

(g) Release the TEST switch.

1) Make sure that all the above lights go off.

(h) On the P8 panel, move and hold the EXT TEST switch to the 1 position.

1) Make sure that the L and R lights come on.

(i) Move and hold the EXT TEST switch to the 2 position.

1) Make sure that the L and R lights, on the P8 panel, come on.

(j) Release the EXT/TEST switch.

1) Make sure that the L and R lights go off.

SUBTASK 71-00-00-860-034-F00

(3) On the P5 overhead panel, put these switches to the ON position:

(a) Make sure that you keep the pressure on the “A” and “B” hydraulic systems.

NOTE: This will make sure that you have full control of the nose gear steering and the main wheel brakes.

(b) HYD PUMPS A ENG 1

1) Make sure that the low pressure light stays on.

(c) HYD PUMPS A ELEC 2

1) Make sure that the low pressure light goes off.

(d) HYD PUMPS B ENG 2

1) Make sure that the low pressure light stays on.

(e) HYD PUMPS B ELEC 1

1) Make sure that the low pressure light goes off.

SUBTASK 71-00-00-860-035-F00

(4) Make sure that the L PACK and R PACK switches, on the P5-10 air conditioning panel, are in the OFF position.

SUBTASK 71-00-00-860-036-F00

(5) Make sure that the WING ANTI-ICE, ENG 1 ANTI-ICE, and ENG 2 ANTI-ICE, switches, on the P5 wing anti-ice panel, are in the OFF position.

SUBTASK 71-00-00-860-037-F00

(6) Make sure that the BLEED AIR ISOLATION VALVE switch, on the P5-10 air conditioning panel, is in the OPEN position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-038-F00

(7) Put the BLEED 1 and BLEED 2 switches, on the P5-10 air conditioning panel, to the applicable position as necessary.

SUBTASK 71-00-00-860-039-F00

(8) Make sure that the ENG 1 and ENG 2 EEC switches, on the P5 aft overhead panel, show ON.

SUBTASK 71-00-00-860-040-F00

(9) Make sure that the two VIBRATION indications, on the P9 panel, are zero.

NOTE: A blank vibration indication is a sign of a system malfunction.

SUBTASK 71-00-00-860-204-F00

WARNING	DO NOT OPERATE FUEL PUMPS IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL FUMES IN THE TANK CAN CAUSE IGNITION AND CAUSE A FIRE OR EXPLOSION. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL CAN OCCUR.

(10) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the applicable tank.

(a) Immediately set the applicable fuel pump switch(es) to OFF if the LOW PRESSURE light comes on and stays on.

SUBTASK 71-00-00-860-042-F00

(11) To start Engine 1, put the FUEL PUMP 1 FWD and FUEL PUMP 1 AFT switches, on the P5 fuel control panel, to the ON position.

(a) Make sure that the LOW PRESSURE lights do not come on.

SUBTASK 71-00-00-860-043-F00

(12) To start Engine 2, put the FUEL PUMP 2 FWD and FUEL PUMP 2 AFT switches, on the P5 fuel control panel, to the ON position.

(a) Make sure that the LOW PRESSURE lights do not come on.

SUBTASK 71-00-00-860-045-F00

(13) On the P5 overhead panel, put the GEN 1 and GEN 2 switches to the ON position.

NOTE: This step makes sure that the generator control relays and the generator fields are closed before the generators are applied to the buses.

SUBTASK 71-00-00-860-046-F00

(14) Move the ignition select switch to set the ignition source.

NOTE: You can use one or two igniters to start the engine. If one igniter is used, the subsequent start must be made with the other igniter.

NOTE: To start the engine with battery power only, put the ignition select switch to the R IGN position.

(a) Put the ignition select switch to the L IGN or R IGN position to start the engine with one igniter.

(b) Put the ignition select switch to the BOTH position to start the engine with the two igniters.

SUBTASK 71-00-00-860-248-F00

(15) Put the ENGINE START switch for the applicable engine to the GRD position and release.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-047-F00

(16) Make sure that these conditions occur:

NOTE: If you started the engine with battery power, only N1 and N2 indications will be available to help with the start. All other indications are available after 12-15% N2.

(a) On the center Display Unit (DU), the START VLV OPEN maintenance message comes on and you see the indications for N1 and N2.

(b) If the ground cart or the other engine supplies the pneumatic power, you see a decrease in the pneumatic manifold duct pressure.

(c) If the Auxiliary Power Unit (APU) supplies the pneumatic power, you see an increase in the pneumatic manifold duct pressure.

NOTE: The APU goes into the Main Engine Start (MES) mode which provides increased air flow and pressure. The MES mode operates when the start valve is selected open with the ENGINE START switch.

(d) The person on the ground sees that the N1 rotor starts to turn in the counterclockwise direction.

SUBTASK 71-00-00-860-238-F00

CAUTION

DO NOT MOVE THE START LEVER FORWARD UNTIL THE ENGINE IS AT 25% N2 OR THE MAXIMUM MOTORING SPEED, BUT NOT LESS THAN 20%. IF YOU DO, THE ENGINE CAN HAVE A HOT OR HUNG START. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(17) When the engine is at 25% N2 or the maximum motoring speed, move the engine start lever to the IDLE or RUN position.

(a) If the engine speed is less than 25% N2, you can move the engine start lever to the IDLE or RUN position when the engine is at its maximum motoring speed.

NOTE: The maximum motoring speed is defined as the speed when the rate of increase in N2 is less than 1% during a 5 second time period. The minimum maximum motoring speed is 20% N2.

(b) Make sure that you observe the starter limits (TASK 71-00-00-800-806-F00).

SUBTASK 71-00-00-860-049-F00

(18) Monitor the EGT and N2 carefully as the engine starts for all unusual conditions.

NOTE: Under normal conditions, the engine will start (EGT increases) in 10 seconds after the engine start lever is moved to the IDLE or RUN position. Also, the time from engine start to a stable idle must not take more than 120 seconds.

SUBTASK 71-00-00-860-050-F00

(19) If the engine does not start (no EGT increase) in 15 seconds, do these steps:

NOTE: If the engine does not start after 15 seconds, the EEC (FADEC) will automatically close the Fuel Metering Valve (FMV) and turn the ignition off.

(a) Move the engine start lever to the CUTOFF position.

(b) Continue to motor the engine for 60 seconds to remove all fuel from the engine.

1) Make sure that you observe the starter limits (TASK 71-00-00-800-806-F00).

(c) Put the start switch to the OFF position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

1) The AUTO position is off.

LOM ALL

SUBTASK 71-00-00-860-051-F00

(20) Monitor the EGT, fuel flow, N1 and engine oil indications as the engine accelerates to the idle speed.

(a) Make sure that the engine acceleration does not slow or stop before the idle speed.

SUBTASK 71-00-00-860-052-F00

(21) The usual engine parameters for a standard day engine start are as follows:

(a) N1: approximately 20%

(b) N2: approximately 59%

(c) EGT: approximately 770°F (410°C)

NOTE: The EGT can be between 608°F (320°C) and 968°F (520°C) with different outside air temperatures, bleed air configurations and other engine conditions.

(d) Fuel flow: approximately 600 lb/hr (272 kg/hr).

SUBTASK 71-00-00-860-053-F00

(22) On the center DU, make sure that the applicable LOW OIL PRESSURE maintenance message goes out.

SUBTASK 71-00-00-860-054-F00

(23) Make sure that the engine master caution light does not come on during the engine start.

SUBTASK 71-00-00-860-055-F00

(24) Make sure that these conditions occur:

(a) The starter cutout occurs at or before 55.3% N2.

NOTE: When the cutout occurs, the start switch will move from the GRD to the OFF position.

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

1) The AUTO position is off.

LOM ALL

(b) On the center DU, the START VLV OPEN maintenance message goes off.

(c) The manifold duct pressure at idle engine speed is 10 psi (69 kPa) - 25 psi (172 kPa).

SUBTASK 71-00-00-860-056-F00

(25) If the starter disengaged at more than 55.3% N2 or does not disengage, do these steps:

(a) Manually put the start switch to the OFF position.

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

1) The AUTO position is off.

LOM ALL

(b) Look at the center DU to see if the START VLV OPEN maintenance message goes out.

(c) If the START VLV OPEN maintenance message does not go out, do these steps:

1) Put the ISOLATION VALVE to the CLOSED position.

2) Do the applicable step to remove the pneumatic source:

a) Put the applicable BLEED 1 or 2 switch to the OFF position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

b) Put the APU BLEED switch to the OFF position.

3) Move the engine start lever to the CUTOFF position to stop the engine.

4) Disconnect the ground air source, if used.

5) Refer to the Fault Isolation Manual (FIM) to find the cause.

SUBTASK 71-00-00-860-057-F00

(26) On the P5 overhead panel, make sure that the applicable GENERATOR 1 DRIVE or GENERATOR 2 DRIVE light goes out.

SUBTASK 71-00-00-860-058-F00

CAUTION	IF THE ENGINE OIL PRESSURE IS LESS THAN 13 PSIG AFTER YOU STABILIZE THE ENGINE AT THE IDLE SPEED, STOP THE ENGINE. FIND THE CAUSE OF THE LOW OIL PRESSURE. DAMAGE TO THE ENGINE CAN OCCUR.

(27) Make sure that there is a minimum of 13 psi (90 kPa) oil pressure at the idle speed.

NOTE: Under cold weather conditions, the oil pressure can go above the normal operation limits for a short time due to high oil viscosity. As the engine temperature increases, the oil pressure will decrease.

SUBTASK 71-00-00-860-059-F00

(28) On the P5 overhead panel, move the APU BLEED switch to the OFF position.

SUBTASK 71-00-00-860-060-F00

(29) Let the engine run at the idle position for a minimum of 5 minutes before you accelerate the engine.

SUBTASK 71-00-00-860-181-F00

WARNING	MAKE SURE THAT YOU OBEY THE HAZARD AREAS WITH ONE ENGINE OR TWO ENGINES IN OPERATION. IF ENGINE 2 OPERATES AT MORE THAN A MINIMUM IDLE, DO NOT TRY TO DISCONNECT THE GROUND AIR CART FROM THE AIRPLANE. THE SERVICE CONNECTOR IS IN THE INLET HAZARD AREA FOR ENGINE 2. SERIOUS INJURY TO PERSONS OR DAMAGE TO EQUIPMENT COULD OCCUR.

(30) If it is not necessary, remove the pneumatic power, do this task: Remove Pressure from the Pneumatic System, TASK 36-00-00-860-806.

END OF TASK

TASK 71-00-00-800-809-F00

7. Start the Engine Procedure (Manual Override of the Engine Start Valve)

A. General

(1) This procedure has the steps that are necessary to manually override the engine start valve to start the engine.

(2) Start procedures that use the manual control of the engine start valve are very similar to the normal start procedures.

(3) You must stop the start during the manual override start procedure when the engine data is not satisfactory.

(4) Do each step of the procedure in sequence. If you stop the start, you must do each step of the sequence again.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(5) During the start, keep the service air bleed inputs and accessory loads to a minimum.

(6) The manual override start is done with the fan cowl panels and thrust reversers in the closed position.

B. Manual Override Start Procedure

SUBTASK 71-00-00-910-042-F00

(1) Do this task: Procedure to Prepare the Engine for Operation, TASK 71-00-00-700-818-F00.

SUBTASK 71-00-00-710-002-F00

(2) Do these steps to make sure that the engine fire detection system is operational:

(a) On the P8 panel, move the OVHT DET switches for Engine 1 and Engine 2 to the NORMAL position.

(b) On the P8 panel, move and hold the TEST switch to the OVHT/FIRE position.

(c) Make sure that these lights, on the P8 panel, come ON:

1) The amber ENG 1 OVERHEAT light

2) The amber ENG 2 OVERHEAT light

3) The red Engine 1 fire handle

4) The red Engine 2 fire handle

(d) Make sure that these lights, on the P7 lightshield panel, come ON:

1) The two amber MASTER CAUTION lights

2) The two red FIRE WARN lights

3) The amber OVHT DET annunciator light.

(e) Release the TEST switch.

1) Make sure that all the above lights go OFF.

SUBTASK 71-00-00-860-061-F00

(3) On the P5 overhead panel, put these switches to the ON position:

NOTE: Keep the pressure on the "A" and "B" hydraulic systems. This will make sure that you have full control of the nose gear steering and the main wheel brakes.

(a) HYD PUMPS A ENG 1

1) Make sure that the low pressure light stays ON.

(b) HYD PUMPS A ELEC 2

1) Make sure that the low pressure light goes OFF.

(c) HYD PUMPS B ENG 2

1) Make sure that the low pressure light stays ON.

(d) HYD PUMPS B ELEC 1

1) Make sure that the low pressure light goes OFF.

SUBTASK 71-00-00-860-062-F00

(4) Make sure that the L PACK and R PACK switches, on the P5 overhead panel, are in the OFF position.

SUBTASK 71-00-00-860-063-F00

(5) 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.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-064-F00

(6) Make sure that the BLEED AIR ISOLATION VALVE switch, on the P5 overhead panel, is in the AUTO position.

SUBTASK 71-00-00-860-065-F00

(7) Put the BLEED 1 and BLEED 2 switches, on the P5 overhead panel, to the applicable position as necessary.

SUBTASK 71-00-00-860-066-F00

(8) Make sure that the ENG 1 and ENG 2 EEC switches, on the P5 overhead panel, shows ON.

SUBTASK 71-00-00-860-067-F00

(9) Make sure that the two VIBRATION indications, on the P9 panel, are zero.

NOTE: A blank vibration indication is a sign of a system malfunction.

SUBTASK 71-00-00-860-205-F00

WARNING	DO NOT OPERATE A FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. THIS CONDITION CAN CAUSE THE IGNITION OF THE FUEL FUMES IN THE FUEL TANK. A FIRE OR AN EXPLOSION CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(10) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the applicable tank.

(a) If the LOW PRESSURE light comes ON and stays ON, immediately set the applicable fuel pump switch(es) to the OFF position.

SUBTASK 71-00-00-860-069-F00

(11) To start Engine 1, put these switches, on the P5 overhead panel, to the ON position:

(a) FUEL PUMP 1 FWD

1) Make sure that the LOW PRESSURE lights do not come ON.

(b) FUEL PUMP 1 AFT.

1) Make sure that the LOW PRESSURE lights do not come ON.

SUBTASK 71-00-00-860-070-F00

(12) To start Engine 2, put these switches, on the P5 overhead panel, to the ON position:

(a) FUEL PUMP 2 FWD

1) Make sure that the LOW PRESSURE lights do not come ON.

(b) FUEL PUMP 2 AFT.

1) Make sure that the LOW PRESSURE lights do not come ON.

SUBTASK 71-00-00-860-072-F00

(13) On the P5 overhead panel, put the GEN 1 and GEN 2 switches to the ON position:

NOTE: This step makes sure that the generator control relays and generator fields are closed before the generators are applied to the buses.

SUBTASK 71-00-00-860-073-F00

(14) Move the ignition select switch to set the ignition source.

NOTE: You can use one or two igniters to start the engine. If one igniter is used, the subsequent start must be made with the other igniter.

(a) Put the ignition select switch to the L IGN or R IGN position to start the engine with one igniter.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Put the ignition select switch to the BOTH position to start the engine with the two igniters.

(c) Put the ignition select switch to the R IGN position to start the engine with battery power only.

SUBTASK 71-00-00-860-074-F00

WARNING POSITIVE COMMUNICATION BETWEEN THE PERSONS IN THE FLIGHT COMPARTMENT AND THE GROUND MAINTENANCE PERSONS IS MANDATORY. IF POSITIVE COMMUNICATION IS NOT AVAILABLE, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT COULD OCCUR.

(15) Make sure that you have interphone communication between the persons on the ground and the persons in the flight compartment.

SUBTASK 71-00-00-860-075-F00

(16) Put the ENGINE START switch for the applicable engine to the GRD position and release.

SUBTASK 71-00-00-860-076-F00

WARNING OBEY THE HAZARD AREAS, ESPECIALLY THE ENTRY/EXIT CORRIDOR. MAKE SURE THAT YOUR BODY STAYS AFT OF THE FAN-COWL WARNING STRIPE. IT IS PERMITTED TO REACH FORWARD OF THE WARNING STRIPE WITH YOUR HAND, BUT ONLY TO MANUALLY TURN THE START VALVE. ENTRY INTO THE HAZARD AREA COULD CAUSE SERIOUS INJURY TO PERSONS OR POSSIBLE LOSS OF LIFE.

WARNING MAKE SURE THAT YOU WEAR GLOVES WHEN YOU TURN THE START VALVE. BLEED AIR CAN BE HOT AND CAUSE INJURIES TO PERSONNEL.

CAUTION MAKE SURE THAT THERE IS AIR PRESSURE IN THE DUCT. IF THERE IS NO AIR PRESSURE, DAMAGE TO THE START VALVE CAN OCCUR.

(17) Tell the person on the ground to manually open the start valve as follows (Figure 214):

(a) Push a 3/8-inch square drive extension through the guide port of the start valve manual override.

(b) Turn the valve 90 degrees clockwise to the OPEN position.

1) Keep the valve in this position until the person in the flight compartment tells you to release the valve.

SUBTASK 71-00-00-860-077-F00

(18) Make sure that these conditions occur:

NOTE: If you started the engine with battery power, only N1 and N2 indications will be available to help with the start. All other indications are available after 12-15% N2.

(a) On the center Display Unit (DU), you see the indications for N1 and N2.

(b) If the ground cart or other engine supplies the pneumatic power, you see a decrease in the pneumatic manifold duct pressure.

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(c) If the Auxiliary Power Unit (APU) supplies the pneumatic power, you see an increase in the pneumatic manifold duct pressure.

NOTE: The APU goes into the Main Engine Start (MES) mode that provides increased air flow and pressure. The MES mode operates when the start valve is selected OPEN with the ENGINE START switch (if this circuit is correct).

(d) The person on the ground sees that the N1 rotor starts to turn in the counterclockwise direction.

SUBTASK 71-00-00-860-078-F00

CAUTION

DO NOT MOVE THE START LEVER FORWARD UNTIL THE ENGINE IS AT 25% N2 OR THE MAXIMUM MOTORING SPEED, BUT NOT LESS THAN 20%. IF YOU DO, THE ENGINE CAN HAVE A HOT OR HUNG START. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(19) When the engine is at 25% N2 or maximum motoring speed, move the engine start lever to the IDLE or RUN position.

(a) If the engine speed is less than 25% N2, you can move the engine start lever forward to the IDLE or RUN position when the engine is at its maximum motoring speed.

NOTE: The maximum motoring speed is defined as the speed when the rate of increase in N2 is less than 1% during a 5 seconds time period. The minimum maximum motoring speed is 20% N2.

(b) Make sure that you observe the starter limits (TASK 71-00-00-800-806-F00).

SUBTASK 71-00-00-860-079-F00

(20) Monitor the Exhaust Gas Temperature (EGT) and N2 carefully as the engine starts for all unusual conditions.

NOTE: Under normal conditions, the engine will start in 10 seconds after the engine start lever is moved to the IDLE or RUN position. Also, the time from engine start to a stable idle must not take more than 120 seconds.

SUBTASK 71-00-00-860-080-F00

(21) If the engine does not start in 15 seconds, do these steps:

NOTE: If the engine does not start after 15 seconds, the Electronic Engine Control (EEC) (Full Authority Digital Engine Control (FADEC)) will automatically close the Fuel Metering Valve (FMV) and stop the ignition.

(a) Move the engine start lever to the CUTOFF position.

(b) Continue to motor the engine for 60 seconds to remove all fuel from the engine.

1) Make sure that you observe the starter limits (TASK 71-00-00-800-806-F00).

(c) Put the ENGINE START switch to the OFF position.

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

1) The AUTO position is OFF.

LOM ALL

SUBTASK 71-00-00-860-081-F00

(22) Monitor the EGT, fuel flow, N2, N1, and engine oil indications as the engine accelerates to the idle speed.

(a) Make sure that the engine acceleration does not slow or stop before the idle speed.

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SUBTASK 71-00-00-860-082-F00

(23) On the center DU, make sure that the applicable LOW OIL PRESSURE maintenance message goes out.

SUBTASK 71-00-00-860-083-F00

(24) Make sure that the engine master caution light does not come ON during the engine start.

SUBTASK 71-00-00-860-084-F00

(25) When you see 56% N2, tell the person on the ground to turn the start valve 90 degrees counterclockwise to the CLOSED position.

SUBTASK 71-00-00-020-004-F00

(26) Remove the 3/8-inch square drive extension.

SUBTASK 71-00-00-860-085-F00

(27) On the P5 overhead panel, make sure that the applicable GENERATOR 1 DRIVE or GENERATOR 2 DRIVE light goes out.

SUBTASK 71-00-00-860-086-F00

CAUTION	IF THE ENGINE OIL PRESSURE IS LESS THAN 13 PSIG AFTER YOU STABILIZE THE ENGINE AT THE IDLE SPEED, STOP THE ENGINE. FIND THE CAUSE OF THE LOW OIL PRESSURE. DAMAGE TO THE ENGINE CAN OCCUR.

(28) Make sure that there is approximately 13 psig (89.6 kPa) positive oil pressure at the idle speed.

NOTE: Under cold weather conditions, the oil pressure can go above the normal operation limits for a short time due to high oil viscosity. As the engine temperature increases, the oil pressure will decrease.

SUBTASK 71-00-00-860-087-F00

(29) The usual engine parameters for a standard day engine start are as follows:

(a) N1: approximately 20%

(b) N2: approximately 59%

(c) EGT: approximately 770°F (410°C)

NOTE: The EGT can be between 608°F (320°C) and 968°F (520°C) with different outside air temperatures, bleed air configurations, and other engine conditions.

(d) Fuel flow: approximately 600 lb/hr (272 kg/hr).

SUBTASK 71-00-00-860-088-F00

(30) On the P5 overhead panel, move the APU BLEED switch to the OFF position.

SUBTASK 71-00-00-860-089-F00

(31) Let the engine run at the idle position for a minimum of 5 minutes before you accelerate the engine.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Engine Start Valve Manual Override Location
Figure 214/71-00-00-990-816-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-800-810-F00

8. Start the Engine Procedure (Engine Cross Bleed Start)

A. General

(1) This procedure has the steps that are necessary to do the engine cross bleed start.

(2) You must monitor engine data for each engine during the start to make sure that they are in the limits.

(a) Monitor the EGT, engine oil pressure, N1 and N2 rotor speeds and the vibration during the start.

(3) The EEC (FADEC) will automatically stop the automatic start procedure if the EGT, N1, or N2 rpm and acceleration are not satisfactory.

(4) You can manually stop the start procedure at all times.

(5) Do each step of the procedure in sequence. If you stop the cross bleed start, you must do each step of the sequence again.

(6) During the cross bleed start, keep the service air bleed inputs and accessory loads to a minimum.

B. References

Reference	Title
49-11-00-860-802	APU Usual Shutdown (P/B 201)

C. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right
410	Subzone - Engine 1
420	Subzone - Engine 2

D. Engine Cross Bleed Start Procedure

SUBTASK 71-00-00-910-043-F00

(1) Do this task: Procedure to Prepare the Engine for Operation, TASK 71-00-00-700-818-F00.

SUBTASK 71-00-00-860-090-F00

(2) Start the opposite engine. Use one of these tasks:

(a) Do this task: Start the Engine Procedure (Normal Start), TASK 71-00-00-800-808-F00.

(b) Do this task: Start the Engine Procedure (Manual Override of the Engine Start Valve), TASK 71-00-00-800-809-F00.

SUBTASK 71-00-00-860-091-F00

(3) If the APU supplies pneumatic pressure, put the BLEED APU switch on the P5 panel to the OFF position.

SUBTASK 71-00-00-860-092-F00

(4) If the operation of the APU is no longer necessary, do this task: APU Usual Shutdown, TASK 49-11-00-860-802.

SUBTASK 71-00-00-860-093-F00

(5) For the engine used for the cross-start, move the forward thrust lever forward until the manifold duct pressure (as seen on the overhead panel, P5, shows a minimum of 30 psig (207 kPa).

SUBTASK 71-00-00-860-094-F00

(6) Start the other engine. Use one of these tasks:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Do this task: Start the Engine Procedure (Normal Start), TASK 71-00-00-800-808-F00.

(b) Do this task: Start the Engine Procedure (Manual Override of the Engine Start Valve), TASK 71-00-00-800-809-F00.

SUBTASK 71-00-00-860-095-F00

(7) After the engine operates at idle, decrease the power of the engine that was used for the cross-start to the idle position.

SUBTASK 71-00-00-860-096-F00

(8) On the overhead panel, P5, put the BLEED AIR ISOLATION VALVE switch to the AUTO position.

SUBTASK 71-00-00-860-097-F00

(9) On the overhead panel, P5, put the L PACK and R PACK switches to the AUTO position.

——— END OF TASK ———

TASK 71-00-00-910-801-F01

9. Start the Engine Procedure (Battery Start)

A. General

(1) This task gives the instructions to start the engine under normal weather conditions.

(a) During cold weather, heating the engine and other procedures can be necessary before the start.

(b) If it is necessary to start in cold weather, there are steps to prepare the engine for the start (TASK 71-00-00-700-818-F00).

(2) The Engine Electronic Controller (EEC) controls the engine start operation as follows:

(a) Control of the starter, ignition selection, and fuel-on after the start is initiated with the ENGINE START switch on the overhead panel, and START LEVER switch on the control stand.

(b) During a normal start (enhanced manual mode), the EEC automatically performs the necessary corrections, if one of these conditions occur:

1) Hot start
2) Overtemperature start
3) Rollback from idle
4) Hung start
5) No light-off
6) Start stall
7) Bowed rotor motoring speed exceedance
8) Locked fan rotor
9) Dual N2 sensor failure.

(3) You must monitor the other engine data during the start, to make sure that they are in the limits.

(a) Monitor the oil pressure, N1 and N2 rotor speeds and vibration during the start.

(4) You must stop the start procedure when the engine data is not satisfactory.

(5) During the start, keep the service air bleed inputs and accessory loads to a minimum.

(6) Do each step of the procedure in a sequence.

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(7) If you stop the engine start, you must do each of the steps in a sequence again.

B. References

Reference	Title
36-00-00-860-802	Supply Pressure to the Pneumatic System with an External Ground Air Source (P/B 201)
36-00-00-860-806	Remove Pressure from the Pneumatic System (P/B 201)

C. Location Zones

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

D. Start the Engine (Battery Start)

SUBTASK 71-00-00-860-705-F00

(1) Do this task: Procedure to Prepare the Engine for Operation, TASK 71-00-00-700-818-F00.

SUBTASK 71-00-00-860-706-F00

(2) Supply the air pressure to the pneumatic system (TASK 36-00-00-860-802).

SUBTASK 71-00-00-710-013-F00

(3) Do these steps to make sure that the fire detection system for the engine is serviceable:

(a) On the P8 panel, make sure that the OVHT DET switches for Engine 1 and Engine 2 are in the NORMAL position.

(b) On the P8 panel, move and hold the TEST switch to the FAULT/INOP position.

(c) On the P8 panel, move and hold the TEST switch to the OVHT/FIRE position.

(d) Make sure that these lights on the P8 panel, come on:

1) The amber ENG 1 OVERHEAT light

2) The amber ENG 2 OVERHEAT light

3) The red Engine 1 fire handle

4) The red Engine 2 fire handle.

(e) Make sure that these lights on the P7 lightshield panel, come on:

1) The two amber MASTER CAUTION lights

2) The two red FIRE WARN lights

3) The amber OVHT/DET annunciator light.

(f) Release the TEST switch.

1) Make sure that all the above lights go off.

(g) On the P8 panel, move and hold the EXT TEST switch to the 1 position.

1) Make sure that the Auxiliary Power Unit (APU), L, and R lights come on.

(h) Move and hold the EXT TEST switch to the 2 position.

1) Make sure that the APU, L, and R lights come on.

(i) Release the EXT/TEST switch.

1) Make sure that the APU, L, and R lights go off.

(j) On the P8 panel, make sure that the APU switch, is in the START position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-707-F00

(4) On the P5 overhead panel, do these steps:

NOTE: Keep the pressure on the "A" and "B" hydraulic systems. This will make sure that you have full control of the nose gear steering and the main wheel brakes.

(a) Move the HYD PUMPS A ENG 1 switch to ON.

1) Make sure that the low pressure light stays on.

(b) Move the HYD PUMPS A ELEC 2 switch to OFF.

1) Make sure that the low pressure light goes off.

(c) Move the HYD PUMPS B ENG 2 switch to ON.

1) Make sure that the low pressure light stays on.

(d) Move the HYD PUMPS B ELEC 1 to OFF.

1) Make sure the low pressure light goes off.

SUBTASK 71-00-00-860-708-F00

(5) Make sure that these switches, on the P5 overhead panel, are in the AUTO or HIGH position:

(a) L PACK

(b) R PACK.

SUBTASK 71-00-00-860-709-F00

(6) Make sure that the BLEED AIR ISOLATION VALVE switch, on the P5 aft overhead panel, is in the AUTO position.

SUBTASK 71-00-00-860-710-F01

(7) Make sure that the APU BLEED AIR switch, on the P5 overhead panel, is in the ON position.

SUBTASK 71-00-00-860-711-F00

(8) Make sure that these switches, on the overhead panel, are in the ON position:

(a) BLEED 1

(b) BLEED 2.

SUBTASK 71-00-00-860-712-F00

(9) Make sure that the SPEED BRAKE lever is in the DOWN position.

SUBTASK 71-00-00-860-713-F00

(10) Make sure that the reverse thrust levers for Engine 1 and Engine 2, are in the DOWN position.

SUBTASK 71-00-00-860-714-F00

(11) Make sure that the forward thrust levers for Engine 1 and Engine 2, are in the DOWN position.

SUBTASK 71-00-00-860-715-F01

(12) Make sure that the parking brake lever on the control stand, is pulled up in the ON position.

(a) Make sure that the red light for the parking brake light is on.

SUBTASK 71-00-00-860-716-F01

(13) Make sure that the engine start levers for Engine 1 and Engine 2, are in the CUTOFF position.

SUBTASK 71-00-00-860-717-F01

(14) Put these switches, on the P5-10 air conditioning panel, to the OFF position:

(a) L PACK

(b) R PACK.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-718-F01

(15) Put the ANTICOLLISION light switch to the ON position.

SUBTASK 71-00-00-860-719-F01

WARNING

DO NOT OPERATE FUEL PUMPS IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL FUMES IN THE TANK CAN CAUSE IGNITION AND CAUSE A FIRE OR EXPLOSION. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL CAN OCCUR.

(16) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the applicable tank.

(a) Immediately set the applicable fuel pump switch(es) to OFF if the LOW PRESSURE light comes on and stays on.

SUBTASK 71-00-00-860-720-F01

(17) To start Engine 1, put the FUEL PUMP 1 FWD and FUEL PUMP 1 AFT switches, on the P5 fuel control panel, to the ON position.

(a) Make sure that the LOW PRESSURE lights do not come on.

SUBTASK 71-00-00-860-721-F01

(18) To start Engine 2, put the FUEL PUMP 2 FWD and FUEL PUMP 2 AFT switches, on the P5 fuel control panel, to the ON position.

(a) Make sure that the LOW PRESSURE lights do not come on.

SUBTASK 71-00-00-860-722-F01

(19) Move the ignition select switch to the R IGN position.

SUBTASK 71-00-00-860-723-F01

(20) Put the ENGINE START switch for the applicable engine to the GRD position

NOTE: If you started the engine with battery power, only the N1, N2 and oil quantity indications will be displayed, until the EEC is powered.

SUBTASK 71-00-00-860-724-F01

(21) Put the applicable GEN switch, on the P5 overhead panel, to the ON position.

NOTE: This step makes sure that the generator control relays and the generator fields are closed before the generators are applied to the buses.

SUBTASK 71-00-00-860-725-F01

(22) On the P5 overhead panel, push the IRS MODE switch to OFF and then to NAV.

(a) Make sure that the ON DC and ALIGN lights illuminate.

SUBTASK 71-00-00-860-726-F01

(23) Make sure that the IRS position goes out on the FMC/CDU.

(a) Make sure you observe the starter limits in this task: (TASK 71-00-00-800-806-F00).

SUBTASK 71-00-00-860-727-F01

(24) Make sure that these conditions occur:

NOTE: If you started the engine with battery power, only N1 and N2 indications will be available to help with the start. All other indications are available after 12-15% N2.

(a) On the center Display Unit (DU), the START VLV OPEN maintenance message comes on and you see the indications for N1 and N2.

(b) If the ground cart or the other engine supplies the pneumatic power, you see a decrease in the pneumatic manifold duct pressure.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) If the APU supplies the pneumatic power, you see an increase in the pneumatic manifold duct pressure.

NOTE: The APU goes into the Main Engine Start (MES) mode which provides increased air flow and pressure. The MES mode operates when the start valve is selected open with the ENGINE START switch.

(d) The person on the ground sees that the N1 rotor starts to turn in the counterclockwise direction.

SUBTASK 71-00-00-860-729-F01

CAUTION	DO NOT MOVE THE START LEVER FORWARD UNTIL THE ENGINE IS AT 25% N2 OR THE MAXIMUM MOTORING SPEED, BUT NOT LESS THAN 20%. IF YOU DO, THE ENGINE CAN HAVE A HOT OR HUNG START. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(25) When the engine is at 25% N2 or the maximum motoring speed, move the engine start lever to the IDLE or RUN position.

(a) If the engine speed is less than 25% N2, you can move the engine start lever to the IDLE or RUN position when the engine is at its maximum motoring speed.

NOTE: The maximum motoring speed is defined as the speed when the rate of increase in N2 is less than 1% during a 5 second time period. The minimum maximum motoring speed is 20% N2.

(b) Make sure that you observe the starter limits (TASK 71-00-00-800-806-F00).

SUBTASK 71-00-00-860-730-F01

(26) Monitor the Exhaust Gas Temperature (EGT) and N2 carefully as the engine starts for all unusual conditions.

NOTE: Under normal conditions, the engine will start (EGT increases) in 10 seconds after the engine start lever is moved to the IDLE or RUN position. Also, the time from engine start to a stable idle must not take more than 120 seconds.

SUBTASK 71-00-00-860-731-F01

(27) If the engine does not start (no EGT increase) in 15 seconds, do these steps:

NOTE: If the engine does not start after 15 seconds, the Electronic Engine Control (EEC) (Full Authority Digital Engine Control (FADEC)) will automatically close the Fuel Metering Valve (FMV) and turn the ignition off.

(a) Move the engine start lever to the CUTOFF position.

(b) Continue to motor the engine for 60 seconds to remove all fuel from the engine.

1) Make sure that you observe the starter limits (TASK 71-00-00-800-806-F00).

(c) Put the start switch to the OFF position.

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

1) The AUTO position is off.

LOM ALL

SUBTASK 71-00-00-860-732-F00

(28) Monitor the EGT, fuel flow, N1 and engine oil indications as the engine accelerates to the idle speed.

(a) Make sure that the engine acceleration does not slow or stop before the idle speed.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-733-F00

(29) The usual engine parameters for a standard day engine start are as follows:

(a) N1: approximately 20%

(b) N2: approximately 59%

(c) EGT: approximately 770°F (410°C)

NOTE: The EGT can be between 608°F (320°C) and 968°F (520°C) with different outside air temperatures, bleed air configurations and other engine conditions.

(d) Fuel flow: approximately 600 lb/hr (272 kg/hr).

SUBTASK 71-00-00-860-734-F00

(30) On the center DU, make sure that the applicable LOW OIL PRESSURE maintenance message goes out.

SUBTASK 71-00-00-860-735-F01

(31) Make sure that the engine master caution light does not come on during the engine start.

SUBTASK 71-00-00-860-736-F00

(32) Make sure that these conditions occur:

(a) The starter cutout occurs at or before 55.3% N2.

NOTE: When the cutout occurs, the start switch will move from the GRD to the OFF position.

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

1) The AUTO position is off.

LOM ALL

(b) On the center DU, the START VLV OPEN maintenance message goes off.

(c) The manifold duct pressure at idle engine speed is 10 psi (69 kPa) - 25 psi (172 kPa).

SUBTASK 71-00-00-860-737-F00

(33) If the starter disengaged at more than 55.3% N2 or does not disengage, do these steps:

(a) Manually put the start switch to the OFF position.

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

1) The AUTO position is off.

LOM ALL

(b) Look at the center DU to see if the START VLV OPEN maintenance message goes out.

(c) If the START VLV OPEN maintenance message does not go out, do these steps:

1) Put the ISOLATION VALVE to the CLOSED position.

2) Do the applicable step to remove the pneumatic source:

a) Put the applicable BLEED 1 or 2 switch to the OFF position.

b) Put the APU BLEED switch to the OFF position.

3) Move the engine start lever to the CUTOFF position to stop the engine.

4) Disconnect the ground air source, if used.

5) Refer to the Fault Isolation Manual (FIM) to find the cause.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-738-F00

(34) On the P5 overhead panel, make sure that the applicable GENERATOR 1 DRIVE or GENERATOR 2 DRIVE light goes out.

SUBTASK 71-00-00-860-739-F00

CAUTION	IF THE ENGINE OIL PRESSURE IS LESS THAN 13 PSIG AFTER YOU STABILIZE THE ENGINE AT THE IDLE SPEED, STOP THE ENGINE. FIND THE CAUSE OF THE LOW OIL PRESSURE. DAMAGE TO THE ENGINE CAN OCCUR.

(35) Make sure that there is a minimum of 13 psi (90 kPa) oil pressure at the idle speed.

NOTE: Under cold weather conditions, the oil pressure can go above the normal operation limits for a short time due to high oil viscosity. As the engine temperature increases, the oil pressure will decrease.

SUBTASK 71-00-00-860-740-F00

(36) Make sure that the following lights are OFF:

(a) PSEU light

(b) GPS light

LOM 427-431, 439, 441, 446, 447, 450, 455, 456, 461-464

(c) ILS light

(d) GLS light

LOM ALL

(e) REVERSER lights

(f) ENGINE CONTROL light.

SUBTASK 71-00-00-860-741-F00

(37) If necessary, make sure that the SERVICE INTERPHONE switch, is in the OFF position.

SUBTASK 71-00-00-860-742-F00

(38) On the P5 overhead panel, push the EEC MODE switch to ALTN and then to ON position.

SUBTASK 71-00-00-860-743-F00

(39) Make sure that the landing gear indicator lights are on.

SUBTASK 71-00-00-860-744-F00

(40) On the P5 overhead panel, move the APU BLEED AIR switch, to the OFF position.

SUBTASK 71-00-00-860-745-F00

(41) Let the engine run at the idle for a minimum of 5 minutes before you accelerate the engine.

SUBTASK 71-00-00-860-746-F00

WARNING	DO NOT GO NEAR THE ENGINE WHEN THE ENGINE OPERATES ABOVE MINIMUM IDLE. THERE ARE NO SAFE AREAS AROUND AN ENGINE WHEN THE ENGINE SPEED IS ABOVE MINIMUM IDLE. SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT COULD OCCUR.

(42) Remove the pneumatic power, if it is not necessary (TASK 36-00-00-860-806).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Make sure that the engine is at minimum idle before you disconnect the ground air cart from the airplane.

NOTE: The connection for the pneumatic power is in the dangerous zone of the inlet area for the right engine.

——— END OF TASK ———

TASK 71-00-00-700-819-F00

10. Stop the Engine Procedure (Usual Engine Stop)

A. General

(1) This task gives the instructions to stop the engine.

(2) This task also gives instructions if it is necessary to stop the engine in cold weather.

(3) If during this usual engine stop procedure you see signs that an internal engine fire, external engine fire, engine failure or stall is or will occur, do this task: Stop the Engine Procedure (Emergency Engine Stop), TASK 71-00-00-700-820-F00.

B. References

Reference	Title
36-00-00-860-801	Supply Pressure to the Pneumatic System (Selection) (P/B 201)
36-00-00-860-806	Remove Pressure from the Pneumatic System (P/B 201)

C. Location Zones

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

D. Usual Engine Stop Procedure

SUBTASK 71-00-00-860-098-F00

(1) Move the thrust lever for the applicable engine to the minimum idle position.

NOTE: TAT, ALPHA VANE, AND CAPT, FO, AUX, and the pitot probe heat will operate automatically when either or both engines are operated.

SUBTASK 71-00-00-860-099-F00

CAUTION

DO NOT STOP THE ENGINE UNTIL THE ROTORS AND CASE TEMPERATURE IS COOL AND STABLE. IF YOU STOP THE ENGINE WITH A HIGH TEMPERATURE, THE ROTORS CAN LOCK. DAMAGE TO THE ENGINE CAN OCCUR.

(2) If you operated the engine at more than minimum idle, decrease the engine speed to idle and operate at idle as follows:

NOTE: This will also permit temperatures below the cowling to decrease and not overheat the core-mounted components.

(a) If the engine was operated at more than low idle, operate the engine at low idle for a minimum of 3 minutes before you stop the engine.

NOTE: Taxi time at or near the idle speed can be part of the three minute time limit to cool the engine.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-780-002-F00

> **CAUTION**: DO NOT STOP THE ENGINE WITHOUT A SOURCE OF PNEUMATIC POWER FOR ENGINE MOTORING. IF AN INTERNAL ENGINE FIRE OCCURS, YOU MUST DRY-MOTOR THE ENGINE. DAMAGE CAN OCCUR IF YOU CANNOT DRY-MOTOR THE ENGINE.

(3) If not already done, do this task: Supply Pressure to the Pneumatic System (Selection), TASK 36-00-00-860-801.

SUBTASK 71-00-00-860-100-F00

(4) Make sure these switches, on the P5 aft overhead panel, are in the correct position:

NOTE: This will make sure a second pneumatic source is available if an internal engine fire occurs.

(a) The APU, and if applicable, the BLEED 1 OR BLEED 2 switches are in the ON position.

(b) The ISOLATION VALVE switch is in the OPEN position.

SUBTASK 71-00-00-860-239-F00

> **CAUTION**: MONITOR EGT AND FUEL FLOW FOR SIGNS THAT THE EGT OR FUEL FLOW DECREASES TOO SLOWLY. THIS IS AN INDICATION OF AN INTERNAL ENGINE FIRE OR A TAILPIPE FIRE, OR THE ENGINE FUEL VALVE IS STILL OPEN.

(5) Set the applicable Engine Start Lever on the control stand to the CUTOFF position.

SUBTASK 71-00-00-210-007-F00

(6) Monitor the EGT, N1, N2, and fuel flow indication as the engine stops.

NOTE: When the engine temperature and rotor speed decrease, you know that the fuel flow to the engine is stopped.

SUBTASK 71-00-00-210-008-F00

(7) Look for indications of fire after the engine is stopped.

SUBTASK 71-00-00-210-009-F00

(8) If you see signs of a fire, immediately, do this task: Stop the Engine Procedure (Emergency Engine Stop), TASK 71-00-00-700-820-F00.

NOTE: When the engine is stopped and all rotation stops, the Exhaust Gas Temperature (EGT) will usually increase due to temperature soak back.

SUBTASK 71-00-00-860-102-F00

(9) Put the L PACK and R PACK switches, on the P5 overhead panel, to the OFF position.

SUBTASK 71-00-00-860-103-F00

(10) For Engine 1:

(a) Put these switches, on the P5 overhead panel, to the OFF position:

1) FUEL PUMP 1 FWD

2) FUEL PUMP 1 AFT.

SUBTASK 71-00-00-860-104-F00

(11) For Engine 2:

(a) Put these switches, on the P5 overhead panel, to the OFF position:

1) FUEL PUMP 2 FWD

2) FUEL PUMP 2 AFT.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-105-F00

(12) Make sure that the fuel LOW PRESSURE maintenance message for the applicable engine comes on.

E. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-860-233-F00

(1) 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

SUBTASK 71-00-00-860-107-F00

(2) If opened, remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
C	9	C00109	FLIGHT RECORDER AC
C	10	C00468	FLIGHT RECORDER DC

CAPT Electrical System Panel, P18-3

Row	Col	Number	Name
C	1	C00523	HEATERS CAPT PITOT
D	5	C00525	HEATERS F/O PITOT
D	6	C00524	HEATERS AUX PITOT

SUBTASK 71-00-00-860-179-F00

(3) Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
D	13	C00120	WEATHER RADAR RT

SUBTASK 71-00-00-860-108-F00

(4) If pneumatic power is not necessary, do this task: Remove Pressure from the Pneumatic System, TASK 36-00-00-860-806.

SUBTASK 71-00-00-080-004-F00

(5) When it is practical or operator policy, it is recommended that you install the engine inlet and exhaust covers on the engine.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Prepare the Engine After Shutdown in Cold Weather

SUBTASK 71-00-00-800-005-F00

(1) Make sure that you install the engine inlet and exhaust covers on the engine when the temperature of the engine is decreased sufficiently (usually two to four hours).

NOTE: Snow and rain can enter the engine and make ice when the engine is not in operation. Ice can lock the rotors to the stators. Ice can also cause the rotor system to be unbalanced.

END OF TASK

TASK 71-00-00-700-820-F00

11. Stop the Engine Procedure (Emergency Engine Stop)

A. General

(1) This procedure has the steps that are necessary to stop the engine in an emergency.

(2) An emergency can be an internal engine fire, external engine fire or an engine failure or stall.

(3) In an emergency the engine is to be immediately isolated from the airplane fuel supply.

(4) If an internal fire can not be extinguished by motoring the engine or if motoring is not possible, extinguish the fire with a portable fire extinguisher.

(5) The use of fire extinguishing agents to put out a fire must be reported for maintenance actions.

B. References

Reference	Title
71-00-00-800-803-F00	Inspection After an Engine Fire, Use of Fire Extinguishing Agents, or High Nacelle Temperature (P/B 601)

C. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right
410	Subzone - Engine 1
420	Subzone - Engine 2

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D. Emergency Engine Stop Procedure

SUBTASK 71-00-00-860-110-F00

> **CAUTION**: DO NOT USE A FIRE EXTINGUISHING AGENT UNLESS THE ENGINE DRY-MOTOR PROCEDURE DOES NOT STOP THE FIRE. IF YOU USE THE FIRE EXTINGUISHING AGENTS, THE ENGINE REMOVAL IS MANDATORY. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT CAN OCCUR.

(1) If an engine has an internal engine fire, do these steps:

NOTE: An internal engine fire during a start or shutdown can be heard and seen by ground personnel as smoke or fire from the primary nozzle.

NOTE: The EGT could or could not be above the redline limit. An EGT indication will not be available if the N2 speed is below 4%. A N2 speed above 4% is necessary to keep electrical power to the EEC (FADEC).

NOTE: The hot section of the engine can be resistant to very high temperatures. Usually, if the fire is permitted to burn until the engine can be dry motored, there will be less damage to the engine. There will be more damage to the engine if a fire extinguisher is used. The chemicals from the fire extinguisher could cause corrosion. The engine could be damaged because the components of the engine do not become cool equally.

(a) Move the thrust lever for the applicable engine to the idle position.

NOTE: TAT, ALPHA VANE, AND CAPT, FO, AUX, and the pitot probe heat will operate automatically when either or both engines are operated.

(b) Put the applicable engine start lever to the CUTOFF position.

(c) Monitor the EGT, N1, N2, and fuel flow on the center DU for indication of an engine shutdown.

(d) When the N2 speed decreases below 30%, do these steps:

> **CAUTION**: DO NOT ENGAGE THE STARTER AGAIN AT MORE THAN 30% N2. IF YOU ENGAGE THE STARTER AGAIN, YOU CAN CAUSE DAMAGE TO THE STARTER AND THE GEARBOX.

1) Set the applicable engine start switch, on the P5 overhead panel, to the GRD position.

   a) Make sure that the pneumatic air pressure is available to motor the engine.

2) Motor the engine for 30 seconds, or until the fire goes out.

   a) Do not obey the starter time limits if you have an internal engine fire.

(e) If the internal fire continues, use a fire extinguishing agent to put out the fire.

(f) After the fire is extinguished, do this task: Inspection After an Engine Fire, Use of Fire Extinguishing Agents, or High Nacelle Temperature, TASK 71-00-00-800-803-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-111-F00

(2) If the engine has an external engine fire (cowls open or closed), do these steps:

NOTE: In the event of a failure of the engine starting system, N2 speed will be low during motoring. Failure of the air turbine starter can trigger the engine overheat and fire indications.

NOTE: The engine fire extinguishing system will have a good effect on a fire on the external surface of the engine with the cowls closed because the system is discharged in an enclosed volume under the cowl.

NOTE: The engine fire extinguishing system will not have a good effect on a fire on the external surface of the engine with the cowls open because the system is discharged in the air around the engine.

(a) Move the forward thrust lever to the idle position.

(b) Set the engine start lever on the control stand to the CUTOFF position.

(c) Pull the applicable engine fire switch handle (DISCH 1 or 2) on the P8 panel of the control stand.

NOTE: This will put the engine fire switch handle (DISCH 1 or 2) in the ready position.

(d) For Engine 1, put these switches on the P5 overhead panel to the OFF position:

1) FUEL PUMP 1 FWD

2) FUEL PUMP 1 AFT.

(e) For Engine 2, put these switches on the P5 overhead panel to the OFF position:

1) FUEL PUMP 2 FWD

2) FUEL PUMP 2 AFT.

(f) Turn the applicable engine fire switch handle (DISCH 1 or 2) to the left or right and hold for 1 second.

NOTE: If you turn it to the left, you discharge the left fire extinguishing bottle. If you turn it to the right, you discharge the right fire extinguishing bottle.

(g) If after 30 seconds the engine fire switch light stays illuminated, do this step:

1) Turn the engine fire switch handle (DISCH 1 or 2) to the opposite position (left or right) and hold for 1 second.

(h) Report the use of fire extinguishing agents to identify the necessary correct maintenance actions.

SUBTASK 71-00-00-860-112-F00

(3) If the engine has a failure or stall, do these steps:

(a) Move the thrust lever to the minimum idle position.

NOTE: An increase in vibration levels with sudden changes in engine parameters, could indicate an engine failure. The engine is to be stopped and the cause of the vibration or parameters change corrected. Do not try to re-start an engine until the cause of the vibration and parameter changes is identified and corrected.

(b) Set the applicable engine start lever on the control stand to the CUTOFF position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Find the type of failure.

NOTE: If loud noises, such as bangs, bumps, etc, are heard, do not start the engine.

NOTE: An engine flameout will show an immediate decrease in EGT and N2 followed closely by a decrease in N1. Low oil pressure and abnormal electrical indications will also occur.

(d) If the flameout was not caused by an engine failure, do these steps:

NOTE: During a rapid engine shutdown, cooling air through the engine decreases quickly and stops as soon as the engine rotors stop. The sudden loss of cooling air can cause a turbine blade-to-shroud rub and the seizure of the low pressure turbine (LPT).

1) Dry motor the engine for 30 seconds or more to make sure the N1 and N2 rotors operate satisfactorily (TASK 71-00-00-700-821-F00).

a) Do not dry motor the engine longer than the starter time limits.

2) Start the engine to make sure that the N1, N2, and main oil pressure are satisfactory (TASK 71-00-00-800-807-F00).

(e) If the flameout was caused by an engine failure, do this step:

1) Correct the cause of the failure before you dry motor or start the engine.

END OF TASK

TASK 71-00-00-700-821-F00

12. Dry Motor the Engine

A. General

(1) This procedure motors the engine with the starter but without fuel to the combustion chamber.

(2) Use this procedure to remove the fuel that is not burned from the engine after wet motoring.

NOTE: An engine exhaust system consists of the exhaust plug and the exhaust sleeve.

NOTE: An oil puddle in the exhaust system is usual. After engine dry or wet motoring, a large oil puddle in the exhaust system can occur. If oil puddling is found, remove the oil from the primary plug (refer to subtask 72-00-00-100-016-F00).

(3) Use this procedure for all maintenance operation where it is necessary to motor the engine unless the wet motor procedure is specified.

(4) The fan cowl panels and the thrust reversers can be open when you do this procedure.

B. References

Reference	Title
71-00-03-600-811-F00	Preservation of an Engine From One Month to One Year (Engine On-Wing) (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)

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-1746	Pin - Lockout, L.E. Cruise Depressurization Valve Part #: C27038-6 Supplier: 81205

D. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right
410	Subzone - Engine 1
420	Subzone - Engine 2

E. Prepare for the Dry Motor Procedure

SUBTASK 71-00-00-860-113-F00

(1) Do this task: Procedure to Prepare the Engine for Operation, TASK 71-00-00-700-818-F00.

SUBTASK 71-00-00-010-011-F00

(2) If it is necessary, do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 71-00-00-010-012-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.

(3) If it is necessary, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 71-00-00-860-114-F00

(4) On the P5 overhead panel, make sure that the L PACK and R PACK switches are in the OFF position.

SUBTASK 71-00-00-860-115-F00

(5) On the P5 overhead panel, make sure that the WING ANTI-ICE, ENG 1 ANTI-ICE, and ENG 2 ANTI-ICE switches are in the OFF position.

SUBTASK 71-00-00-860-116-F00

(6) On the P5 overhead panel, make sure that the BLEED AIR ISOLATION VALVE switch is in the OPEN position.

SUBTASK 71-00-00-860-117-F00

(7) On the P5 overhead panel, make sure that the BLEED 1 and BLEED 2 switches are in the OFF position.

SUBTASK 71-00-00-860-214-F00

(8) If hydraulic pressure is not necessary, do this step for the applicable engine:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) On the P5 overhead panel, make sure that the HYD PUMPS A ENG 1 and HYD PUMPS B ENG 2 switches are in the OFF position.

NOTE: A leading edge device creep condition has been associated with a “lap assembly” tolerances or a combination of “lap assembly” tolerances and the use of the smaller 0.3125 in. (7.9375 mm) diameter, lockout pin, SPL-1746, that could be the cause of hydraulic pressure leakage through the older -1001 valve.

NOTE: The creep condition caused by the older -1001 leaking valve could permit movement of the leading edge devices that could cause damage to an open thrust reverser half and/or injury to personnel. On the other hand, the redesigned -1003 valve are not susceptible to creep.

SUBTASK 71-00-00-860-118-F00

(9) On the P5 overhead panel, make sure that the ENG 1 and ENG 2 EEC switches are in the ON position.

SUBTASK 71-00-00-860-119-F00

(10) Make sure that the two VIBRATION indications, on the P9 panel, are zero.

NOTE: A blank vibration indication is a sign of a system malfunction.

SUBTASK 71-00-00-860-231-F00

(11) For Engine 1, 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

SUBTASK 71-00-00-860-232-F00

(12) For Engine 2, open these circuit breakers and install safety tags:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT

SUBTASK 71-00-00-860-122-F00

(13) On the engine to be dry motored, open the SPAR valve as follows:

NOTE: This step is not required if you dry motor the engine for this procedure: Preservation of an Engine From One Month to One Year (Engine On-Wing) (TASK 71-00-03-600-811-F00). Because the engine fuel line is disconnected and capped, fuel boost pump pressure can cause the cap on the supply line to come off and fuel to spill on the engine.

(a) For Engine 1, make sure that this circuit breaker is closed:

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	4	C00359	FUEL SPAR VALVE ENG 1

(b) For Engine 2, make sure that this circuit breaker is closed:

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	3	C00360	FUEL SPAR VALVE ENG 2

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-250-F00

(14) Move the applicable engine start lever to the IDLE or RUN position.

SUBTASK 71-00-00-860-251-F00

(15) Make sure that the applicable SPAR VALVE CLOSED light, on the P5 overhead panel, comes on bright and then goes off.

NOTE: Spar valve light status: bright light means valve in transition or when the valve does not agree with the commanded position. Light off means spar valve is open.

NOTE: The applicable ENG VALVE CLOSED light will change to bright and not go off because engine fuel pump pressure (N2 turns) is necessary to open the valve.

SUBTASK 71-00-00-860-257-F00

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

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	4	C00359	FUEL SPAR VALVE ENG 1

SUBTASK 71-00-00-860-258-F00

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

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	3	C00360	FUEL SPAR VALVE ENG 2

SUBTASK 71-00-00-860-253-F00

(18) Move the applicable engine start lever to the CUTOFF position.

SUBTASK 71-00-00-860-254-F00

(19) Make sure that the applicable SPAR VALVE CLOSED light, on the P5 overhead panel, remains bright.

NOTE: When the start lever is in the CUTOFF position, a bright spar valve light indicates the spar valve is in the open position.

SUBTASK 71-00-00-860-206-F00

WARNING DO NOT OPERATE FUEL PUMPS IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL FUMES IN THE TANK CAN CAUSE IGNITION AND CAUSE A FIRE OR EXPLOSION. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL CAN OCCUR.

(20) On the engine to be dry motored, apply the two AFT and two FWD fuel pumps pressure to the main fuel pump inlet as follows:

(a) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and low pressure indication in the applicable tank.

(b) Immediately set the applicable fuel pump switch(es) to the OFF position if the LOW PRESSURE light comes on and stays on.

SUBTASK 71-00-00-860-255-F00

(21) For Engine 1, put these switches, on the P5 overhead panel, to the ON position:

(a) FUEL PUMP 1 FWD

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) FUEL PUMP 1 AFT.

NOTE: This step is not required if you dry motor the engine for this procedure: Preservation of an Engine From One Month to One Year (Engine On-Wing), TASK 71-00-03-600-811-F00.

SUBTASK 71-00-00-860-259-F00

(22) For Engine 2, put these switches, on the P5 overhead panel, to the ON position:

(a) FUEL PUMP 2 FWD

(b) FUEL PUMP 2 AFT.

NOTE: This step is not required if you dry motor the engine for this procedure: Preservation of an Engine From One Month to One Year (Engine On-Wing), TASK 71-00-03-600-811-F00.

SUBTASK 71-00-00-860-256-F00

(23) Make sure that the applicable four LOW PRESSURE light, on the P5 overhead panel, goes off.

F. Dry Motor Procedure

SUBTASK 71-00-00-860-126-F00

(1) Turn the applicable engine start switch to the GRD position.

SUBTASK 71-00-00-860-247-F00

(2) Make sure that these conditions occur:

(a) On the center Display Unit (DU), the START VLV OPEN maintenance message comes on.

(b) If the ground cart or the other engine supplies the pneumatic power, you see a decrease in the pneumatic manifold duct pressure.

(c) If the Auxiliary Power Unit (APU) supplies the pneumatic power, you see an increase in the pneumatic manifold duct pressure.

NOTE: The APU goes into the Main Engine Start (MES) mode which provides increased air flow and pressure. The MES mode operates when the start valve is selected OPEN with the ENGINE START switch (if this circuit is correct).

(d) On the center DU, you see an indication of N1 and N2.

(e) The person on the ground sees the N1 rotor starts to turn in the counterclockwise direction.

SUBTASK 71-00-00-860-127-F00

(3) As the engine turns, make sure that you see a positive oil pressure indication.

SUBTASK 71-00-00-860-128-F00

(4) On the center DU, make sure that the N2 speed becomes stable at 24 - 32%.

SUBTASK 71-00-00-910-044-F00

CAUTION

DO NOT OPERATE THE STARTER MORE THAN THE STARTER LIMITS. IF YOU OPERATED THE STARTER MORE THAN THE LIMITS, DAMAGE TO THE STARTER WILL OCCUR.

(5) As you motor the engine, make sure that you obey the starter operation limits (TASK 71-00-00-800-806-F00).

SUBTASK 71-00-00-860-129-F00

(6) Put the applicable engine start switch to the OFF position to stop the dry motor procedure.

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LOM 429-432; AIRPLANES WITH AUTO-IGNITION

(a) The AUTO position is off.

LOM ALL

(b) On the center DU, make sure that the START VLV OPEN maintenance message goes out.

SUBTASK 71-00-00-860-130-F00

(7) For Engine 1, put these switches, on the P5 overhead panel, to the OFF position:

(a) FUEL PUMP 1 FWD

(b) FUEL PUMP 1 AFT.

SUBTASK 71-00-00-860-131-F00

(8) For Engine 2, put these switches, on the P5 overhead panel, to the OFF position:

(a) FUEL PUMP 2 FWD

(b) FUEL PUMP 2 AFT.

SUBTASK 71-00-00-860-132-F00

(9) For Engine 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

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	4	C00359	FUEL SPAR VALVE ENG 1

SUBTASK 71-00-00-860-133-F00

(10) For Engine 2, remove the safety tags and close these circuit breakers:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	3	C00360	FUEL SPAR VALVE ENG 2

SUBTASK 71-00-00-860-249-F00

(11) Make sure that applicable SPAR VALVE CLOSED and ENG VALVE CLOSED lights illuminate dim, when the valve is closed.

SUBTASK 71-00-00-410-007-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.

(12) If the thrust reverser were opened, do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

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SUBTASK 71-00-00-410-008-F00

(13) If the fan cowl panels were opened, do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

——— END OF TASK ———

TASK 71-00-00-700-822-F00

13. Wet Motor the Engine

A. General

(1) This procedure motors the engine with the starter and fuel to the combustion chamber but without ignition.

(2) Only use this procedure for all maintenance operations that tell you to motor (wet motor procedure) the engine with fuel to the combustion chamber. Use the dry motor procedure for all other motor procedures.

NOTE: An engine exhaust system consists of the exhaust plug and the exhaust sleeve.

NOTE: An oil puddle in the exhaust system is usual. After engine dry or wet motoring, a large oil puddle in the exhaust system can occur. If oil puddling is found, remove the oil from the primary plug (refer to subtask 72–00–00–100–016–F00).

(3) This procedure can be used with the wet motor leak check.

(4) This procedure can be done with the fan cowl panels and the thrust reversers open.

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-1746	Pin - Lockout, L.E. Cruise Depressurization Valve Part #: C27038-6 Supplier: 81205

D. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right
410	Subzone - Engine 1
420	Subzone - Engine 2

E. Prepare for the Wet Motor Procedure

SUBTASK 71-00-00-860-134-F00

(1) Do this task: Procedure to Prepare the Engine for Operation, TASK 71-00-00-700-818-F00.

SUBTASK 71-00-00-010-013-F00

(2) If it is necessary, do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-010-014-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.

(3) If it is necessary, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 71-00-00-860-135-F00

(4) On the P5 overhead panel, make sure that the L PACK and R PACK switches are in the OFF position.

SUBTASK 71-00-00-860-136-F00

(5) On the P5 overhead panel, make sure that the WING ANTI-ICE, ENG 1 ANTI-ICE and ENG 2 ANTI-ICE switches are in the OFF position.

SUBTASK 71-00-00-860-137-F00

(6) On the P5 overhead panel, make sure that the BLEED AIR ISOLATION VALVE switch is in the OPEN position.

SUBTASK 71-00-00-860-138-F00

(7) On the P5 overhead panel, make sure that the BLEED 1 and BLEED 2 switches are in the OFF position.

SUBTASK 71-00-00-860-215-F00

(8) If hydraulic pressure is not necessary, do this step for the applicable engine:

(a) On the P5 overhead panel, make sure that the HYD PUMPS A ENG 1 and HYD PUMPS B ENG 2 switches are in the OFF position.

NOTE: A leading edge device creep condition has been associated with a “lap assembly” tolerances or a combination of “lap assembly” tolerances and the use of the smaller 0.3125 in. (7.9375 mm) diameter, lockout pin, SPL-1746, that could be the cause of hydraulic pressure leakage through the older -1001 valve.

NOTE: The creep condition caused by the older -1001 leaking valve could permit movement of the leading edge devices that could cause damage to an open thrust reverser half and/or injury to personnel. On the other hand, the redesigned -1003 valve are not susceptible to creep.

SUBTASK 71-00-00-860-139-F00

(9) On the P5 overhead panel, make sure that the ENG 1 and ENG 2 EEC switches show ON.

SUBTASK 71-00-00-860-140-F00

(10) Make sure that the two VIBRATION indications on the P9 panel are zero.

NOTE: A blank vibration indication is a sign of a system malfunction.

SUBTASK 71-00-00-860-142-F00

(11) For engine 1, 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

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-143-F00

(12) For engine 2, open these circuit breakers and install safety tags:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT

SUBTASK 71-00-00-860-207-F00

WARNING DO NOT OPERATE ANY FUEL PUMP IF THE AMBER LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION. IF YOU DO NOT OBEY, IT CAN CAUSE INJURY.

(13) To operate any of the fuel pumps, you must be in the flight compartment to continuously monitor the fuel quantity and the low pressure indication in the applicable tank.

(a) Immediately set the applicable fuel pump switch(es) to OFF if the LOW PRESSURE light comes on and stays on.

SUBTASK 71-00-00-860-144-F00

(14) For engine 1, put these switches, on the P5 overhead panel, to the ON position:

(a) FUEL PUMP 1 FWD

(b) FUEL PUMP 1 AFT.

SUBTASK 71-00-00-860-145-F00

(15) For engine 2, put these switches, on the P5 overhead panel, to the ON position:

(a) FUEL PUMP 2 FWD

(b) FUEL PUMP 2 AFT.

F. Wet Motor Procedure

SUBTASK 71-00-00-860-246-F00

CAUTION BEFORE YOU MOTOR THE ENGINE, MAKE SURE THAT THE FUEL SPAR VALVE IS IN THE OPEN POSITION. THEN APPLY FUEL BOOST PUMP PRESSURE TO THE FUEL PUMP INLET. THE FUEL WILL LUBRICATE THE FUEL PUMP AND THE HYDROMECHANICAL UNIT. IF YOU DO NOT OBEY, ZERO FUEL PRESSURE CAN CAUSE DAMAGE TO THE FUEL PUMP AND THE HYDROMECHANICAL UNIT.

(1) Move the applicable start lever to the IDLE or RUN position.

(a) Make sure that the SPAR VALVE CLOSED light, on the P5 overhead panel, comes on bright (valve in transition or when the valve does not agree with the commanded position) and then goes off (valve is open).

(b) Make sure that the ENG VALVE CLOSED light, on the P5 overhead panel, comes on bright (valve in transition or when the valve does not agree with the commanded position).

NOTE: The ENG VALVE CLOSED light will not transition to off at this time. The ENG VALVE CLOSED light will not extinguish until after the engine has started to turn and fuel pressure is supplied to the hydromechanical unit.

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SUBTASK 71-00-00-860-147-F00

(2) Turn the applicable engine start switch to the GRD position and make sure that these conditions occur:

(a) On the center DU, the START VLV OPEN maintenance message comes on.

(b) If the ground cart or the other engine supplies the pneumatic power, you see a decrease in the pneumatic manifold duct pressure.

(c) If the APU supplies the pneumatic power, you see an increase in the pneumatic manifold duct pressure.

NOTE: The APU goes into the Main Engine Start (MES) mode which provides increased air flow and pressure. The MES mode operates when the start valve is selected OPEN with the ENGINE START switch (if this circuit is correct).

(d) On the center DU, you see an indication of N1 and N2.

(e) The person on the ground sees that the N1 rotor starts to turn in the counterclockwise direction.

SUBTASK 71-00-00-860-148-F00

CAUTION

MAKE SURE THAT YOU DO NOT SEE AN EGT INCREASE. THIS IS AN INDICATION OF AN ENGINE INTERNAL OR TAILPIPE FIRE. IF THIS OCCURS, MOVE THE START LEVER TO THE CUT-OFF POSITION. DRY-MOTOR THE ENGINE TO EXTINGUISH THE FIRE. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT CAN OCCUR.

(3) At a minimum 20% N2, make sure that these conditions occur:

(a) The ENG VALVE CLOSED lights, on the P5 overhead panel, transitions from bright (valve in transition or when the valve does not agree with the commanded position) and goes off (valves are open).

(b) You see positive oil pressure and positive fuel flow indications.

SUBTASK 71-00-00-860-149-F00

(4) Motor the engine for a maximum of 15 seconds or until you can see fuel vapors from the primary nozzle.

SUBTASK 71-00-00-860-150-F00

(5) Put the applicable engine start lever to the CUTOFF position to stop the wet motor procedure.

SUBTASK 71-00-00-860-151-F00

(6) Continue to motor the engine for 60 seconds to remove all remaining fuel.

(a) On the center DU, make sure that the fuel flow indication decreases to zero.

SUBTASK 71-00-00-860-152-F00

(7) Put the applicable engine start switch to the OFF position.

LOM 429-432; AIRPLANES WITH AUTO-IGNITION

(a) The AUTO position is off.

LOM ALL

(b) On the center DU, make sure that the START VLV OPEN maintenance message goes out.

SUBTASK 71-00-00-860-153-F00

(8) For engine 1, put these switches, on the P5 overhead panel, to the OFF position:

(a) FUEL PUMP 1 FWD

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(b) FUEL PUMP 1 AFT.

SUBTASK 71-00-00-860-154-F00

(9) For engine 2, put these switches, on the P5 overhead panel, to the OFF position:

(a) FUEL PUMP 2 FWD

(b) FUEL PUMP 2 AFT.

SUBTASK 71-00-00-210-064-F00

(10) Make sure that applicable SPAR VALVE CLOSED and ENG VALVE CLOSED lights illuminate dim, when the valve is closed.

SUBTASK 71-00-00-860-155-F00

(11) For engine 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

SUBTASK 71-00-00-860-156-F00

(12) For engine 2, remove the safety tags and close these circuit breakers:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT

SUBTASK 71-00-00-410-009-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.

(13) If the thrust reversers were opened, do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 71-00-00-410-010-F00

(14) If the fan cowl panels were opened, 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

POWER PLANT - ADJUSTMENT/TEST

1. General

A. This procedure gives the necessary tests to make sure the engine operates correctly after components are repaired or replaced. The tests are given a number for positive identification. The steps that follows show the test numbers and the titles:

NOTE: Tests 4, 6, and 11 are not used.

(1) Test 1 - Pneumatic Leak Test

(2) Test 2 - Dry Motor Leak Check

(3) Test 3A - Idle-Power Leak Check

(4) Test 3B - Part-Power Leak Check

(5) Test 5 - Power Assurance Check

(6) Test 7 - Vibration Survey

(7) Test 8 - Acceleration Check

(8) Test 9 - Replacement Engine Test (Pretested)

(9) Test 10 - Replacement Engine Test (Untested)

(10) Test 12 - Actuators Test

(11) Test 13 - Engine Run - EEC BITE Check

(12) Test 14A - Fan Trim Balance (Three Shot Plot Procedure)

(13) Test 14B - Fan Trim Balance (On Board Procedure)

(14) Test 14C - Fan Trim Balance (Analyzer Procedure)

(15) Test 14D - Two-Plane Fan Trim Balance

LOM 445-447 PRE SB 737-46-1050 AND POST SB 737-46-1014; LOM 450, 453, 454, 457, 461-463 PRE SB 737-46-1050; LOM 455, 456 POST SB 737-46-1014 AND PRE SB 737-46-1050

(16) Test 14E - Fan Trim Balance with Onboard Network System (ONS) (Optional)

LOM ALL

(17) If you do the EEC BITE Igniters Test, the BITE screen for some EEC software packages shows an incorrect reference "DO PROCEDURE: IGNITERS TEST AMM 71-00-00/501". Do the step that follows:

(a) Do this task: Ignition System Audible Test, TASK 74-00-00-750-801-F00, which includes the prepare for test procedures.

B. To make this procedure easy to use, symbols are given to some engine data and components at internal and external locations on the engine. These symbols are shown below:

Table 501/71-00-00-993-801-F00

ABBR.	NOMENCLATURES
AGB	Accessory Gearbox
AVM	Airborne Vibration Monitoring
BSV	Burner Staging Valve
CDS	Common Display System
CDU/FMC	Center Display Unit/Flight Management Computer

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Table 501/71-00-00-993-801-F00 (Continued)

ABBR.	NOMENCLATURES
DEU	Display Electronic Unit
EDP	Engine Driven Pump (Hydraulic)
EEC	Electronic Engine Control (ECU)
EGT	Exhaust Gas Temperature
FADEC	Full Authority Digital Electronic Control
FFCC	Fan Frame Compressor Case (vibration sensor)
FMCS CDU	Flight Management Computer System Center Display Unit
HMU	Hydromechanical Unit
HPT	High Pressure Turbine
HPTACC	High Pressure Turbine Active Clearance Control
IDG	Integrated Drive Generator
LPT	Low Pressure Turbine
LPTACC	Low Pressure Turbine Active Clearance Control
LSK	Line Select Key
MPA	Maximum Power Assurance
MSG NBR	Message Number
N1	Low Pressure Rotor Speed
N2	High Pressure Rotor Speed
OAT(TAT)	Outside Air Temperature (Total Air Temperature)
QEC	Quick-Engine-Change
TBV	Transient Bleed Valve
TGB	Transfer Gearbox
VBV	Variable Bleed Valve
VSV	Variable Stator Vane

TASK 71-00-00-800-811-F00

2. Power Plant Test Reference Table

A. General

(1) This task gives the necessary tests that are to be done after the component is repaired or replaced.

B. References

Reference	Title
71-00-00-700-822-F00	Wet Motor the Engine (P/B 201)
71-00-00-800-806-F00	Engine Operation Limits (P/B 201)
73-11-01 P/B 601	FUEL PUMP PACKAGE - INSPECTION/CHECK
73-21-00-700-802-F00	FADEC System Test (P/B 501)

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(Continued)

Reference	Title
73-21-00-700-804-F00	EEC TEST (P/B 501)
73-21-00-700-808-F00	IDENT/CONFIG (P/B 501)
74-00-00-750-801-F00	Ignition System Audible Test (P/B 501)
77-31-00-710-801-F00	Airborne Vibration Monitoring (AVM) System - Operational Test (P/B 501)

C. Procedure

SUBTASK 71-00-00-800-001-F00

(1) The table that follows shows the necessary tests that are to be done after the applicable component is repaired or replaced. The power plant tests are written to keep the engine ground run to a minimum (Table 502).

(a) To get access to this data digitally, use the referenced task links below to go to the applicable test.

(b) Test 1 - Pneumatic Leak Check, TASK 71-00-00-700-809-F00

(c) Test 2 - Dry Motor Leak Test, TASK 71-00-00-700-810-F00

(d) Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00

(e) Test 3B - Part-Power Leak Check, TASK 71-00-00-700-823-F00

(f) Test 5 - Power Assurance Check, TASK 71-00-00-700-813-F00

(g) Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00

(h) Test 9 - Replacement Engine Test (Pretested), TASK 71-00-00-700-816-F00

(i) Test 10 - Replacement Engine Test (Untested), TASK 71-00-00-700-817-F00

(j) Test 12 - Actuators Test, TASK 71-00-00-700-807-F00

(k) Test 13 - Engine Run - EEC BITE Check, TASK 71-00-00-700-808-F00

(l) Footnote *[3], (IDENT/CONFIG, TASK 73-21-00-700-808-F00)

(m) Footnote *[4], (FADEC System Test, TASK 73-21-00-700-802-F00)

(n) Footnote *[5], ((Ignition System Audible Test, TASK 74-00-00-750-801-F00)

(o) Footnote *[6], (Airborne Vibration Monitoring (AVM) System - Operational Test, TASK 77-31-00-710-801-F00)

(p) Footnote *[7], (EEC TEST, TASK 73-21-00-700-804-F00)

(q) Footnote *[8], (Wet Motor the Engine, TASK 71-00-00-700-822-F00)

Table 502/71-00-00-993-939-F00 Power Plant Test Reference Table

Component Repaired or Replaced	Tests *[1]
Accessory Gearbox	3B
AGB Rotating Seals	3B
Burner Staging Valve	12, 3A
LOM ALL; ENGINES WITH MAGNETIC CHIP DETECTOR	
Chip Detectors	None
LOM ALL	
Clogging Indicator	3A

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Table 502/71-00-00-993-939-F00 Power Plant Test Reference Table (Continued)

Component Repaired or Replaced	Tests *[1]
LOM ALL; ENGINES WITH DEBRIS MONITORING SYSTEM	
Debris Monitoring System (DMS) Detectors	*[7]
Debris Monitoring System (DMS) Box	*[7]
LOM ALL	
EEC (FADEC)	*[4]
EEC Alternator	13, 3A (Do at the same time)
Engine (Pretested Engine)	9
Engine (Untested Engine)	10
Engine Driven Pump (Hydraulic)	2
Fan Blades	
Complete Set Replacement	7
Pair or Individual Blade	7 (Customer's Convenience)
Re-installation of blades in same position (Example: after blade re-lube)	None
FFCC Vibration Sensor	*[6]
Fuel Filter	3A
Fuel Filter Differential Pressure Switch	*[7], 3A
Fuel Flow Transmitter	13, 3A (Do at the same time)
Fuel Nozzles	3A
Fuel Nozzle Filter	3A
Fuel Pump Package	12, 13, 3A, or *[2], *[8], 13, 3A (Do 13,3A at same time)
Fuel System Pipes	3A
Handcranking Drive Cover	3A
HPSOV Switch	12,13
HPTACC Valve	12, 3A
LOM ALL POST SB 737-CFM56-7B-73-045	
HPTACC Valve Fuel Manifold	3A
LOM ALL	
Hydromechanical Unit (HMU)	12, 13, 3A, or *[8], 12, 13, 3A (Do 13, 3A at same time)
Identification Plug	*[7], *[3]
IDG	3A
IDG Air/Oil Cooler	3A
IDG Oil Cooler	3A

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Table 502/71-00-00-993-939-F00 Power Plant Test Reference Table (Continued)

Component Repaired or Replaced	Tests *[1]
Igniter Plug	*[5]
Ignition Exciter	*[5]
Ignition Lead	*[5]
LPTACC Valve	12 and 3A
Lubrication Unit	3A
Main Oil/Fuel Heat Exchanger	3A
N1 Speed Sensor	13, 3A (Do at the same time)
N2 Speed Sensor	13, 3A (Do at the same time)
Oil Anti-Leak Valve	3A
Scavenge Oil Filter Clogging Transmitter	*[7] and 3A
Oil Quantity Transmitter	3A
Oil Pressure Sensor	*[7] and 3A
Oil Scavenge Filter Assembly	*[7] and 3A
Oil Scavenge Filter Element	3A
Oil Supply Filter	3A
Oil System Pipes and Manifolds	3A
Oil Tank	3A
Oil Temperature Sensor	*[7] and 3A
Pneumatic Bleed Air Components and Tubes	1
PT25 Sensor	*[7]
Servo Fuel Heater	3A
Start Valve	1
Starter	1 and 3A
Starter Magnetic Plug Housing	3A
T12 Sensor	*[7]
T3 Sensor	*[7]
T49.5 Probe	*[7]
LOM 466-999	
T5 Sensor	*[7]
LOM ALL	
TCC Sensor	*[7]
Transfer Gearbox	3B
Transient Bleed Valve	12 and 3A
VBV Actuator	12 and 3A

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Table 502/71-00-00-993-939-F00 Power Plant Test Reference Table (Continued)

Component Repaired or Replaced	Tests *[1]
VBV Doors	12
VBV System (Manual Operation)	3A
VSV Actuator	12 and 3A
VSV System (Manual Operation)	3A
Wire Harnesses	*[7] and 12

*[1] Do the tests in the sequence that they are listed for each component.

*[2] Test 12 is not necessary after the inspection procedure (PAGEBLOCK 73-11-01/601) for the fuel pump assembly, but you must do *[8] before tests 13 and 3A.

*[3] To make sure the identification and configuration are correct, do this task: IDENT/CONFIG, TASK 73-21-00-700-808-F00.

*[4] Do this task: FADEC System Test, TASK 73-21-00-700-802-F00.

*[5] Do this task: Ignition System Audible Test, TASK 74-00-00-750-801-F00.

*[6] Do this task: Airborne Vibration Monitoring (AVM) System - Operational Test, TASK 77-31-00-710-801-F00.

*[7] Do this task: EEC TEST, TASK 73-21-00-700-804-F00.

*[8] Do this task: Wet Motor the Engine, TASK 71-00-00-700-822-F00. This TASK can be exempted based on airline policy OR when airport facilities limit the use of wet motoring.

NOTE: Proper application of the wet motor task is recommended to mitigate potential fuel pump and hydromechanical unit damage that can occur if the fuel spar valve is not in the open position or fuel boost pump pressure is not applied to the fuel pump inlet during subsequent engine motoring. The fuel pump and the hydromechanical unit are fuel lubricated, zero fuel pressure can cause damage to the fuel pump and the hydromechanical unit.

SUBTASK 71-00-00-970-001-F00

(2) Prepare a data sheet to write the applicable engine data during the performance of the necessary engine tests (Table 503).

Table 503/71-00-00-993-940-F00 Engine Data and Record Sheet

AIRPLANE DATA					
AIRPLANE NO.	FUEL TYPE	ENGINE MODEL	ENGINE S/N		EEC P/N
TANK	FUEL QUANTITY				
NO. 1					
NO. 2					
CTR					
TOTAL					

ENGINE START DATA

ENG POS	START LEVER ADV.		STARTER CUTOUT (%N2)	MAX. EGT (°C)	MAX. FF			VIBRATION (UNITS)
	%N2	MOTORING TIME (SEC)				TEMP	PRESS	

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Table 503/71-00-00-993-940-F00 Engine Data and Record Sheet (Continued)

1									
2									
HYDRAULICS									
HYD SYS	HYD QTY	HYD SYS PRESS							
		EMDP	EDP						
A									
B									
TEST NO. 5 - POWER ASSURANCE CHECK									
ENG POS	OAT	TARGET (%N1)	RECORDED VALUES						
			%N1	%N2					
1									
2									

AIRPLANE NO:	

TEST NO. 7 - VIBRATION SURVEY

ENG POS	STATIC T.O. TARGET (%N1)	TAKEOFF MODE	ACCELERATION			DECELERATION		
			MAX VIB	N1%	N2%	MAX VIB	N1%	N2%
1								
2								

REMARKS, DISCREPANCIES:

SUBTASK 71-00-00-910-001-F00

(3) While you operate the engine, obey the safety precautions and limits for the correct engine operation (TASK 71-00-00-800-806-F00).

SUBTASK 71-00-00-730-003-F00

(4) If you do the igniters test per footnote *[5], the Built-In-Test Equipment (BITE) screen for some Electronic Engine Control (EEC) software packages shows an incorrect reference "DO PROCEDURE: IGNITERS TEST AMM 71-00-00/501". Do this task: Ignition System Audible Test, TASK 74-00-00-750-801-F00, which includes the prepare for test procedures.

END OF TASK

TASK 71-00-00-700-809-F00

3. Test 1 - Pneumatic Leak Check

(Figure 501)

A. General

(1) This test motors the engine to do a check for air leaks in the pneumatic system ducts and joints.

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B. References

Reference	Title
71-00-00-700-821-F00	Dry Motor the Engine (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. Location Zones

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

D. Prepare for the Pneumatic Leak Check

SUBTASK 71-00-00-860-157-F00

(1) On the overhead panel, P5, make sure the applicable BLEED 1 or BLEED 2 switch is in the OFF position.

NOTE: This will close the applicable PRSOV.

SUBTASK 71-00-00-860-158-F00

(2) On the overhead panel, P5, make sure the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch is in the OFF position.

NOTE: This will close the applicable inlet cowl TAI valve.

SUBTASK 71-00-00-010-015-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 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.

E. Pneumatic Leak Check

SUBTASK 71-00-00-790-007-F00

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

(a) As you do the dry motor procedure, carefully look at these ducts, joints and sense lines for leaks:

1) The starter duct (from the starter to the start valve and from the start valve to the strut interface).

2) The stages 5 and 9 pneumatic ducts (from the engine interfaces to the PRSOV and from the intersection manifold to the 12 o'clock location on the engine fan frame).

3) The inlet cowl TAI duct (from the 12 o'clock location on the engine fan frame to the inlet cowl TAI valve).

4) Make sure that there is no leakage in the downstream sense line connections to the PRSOV.

5) Make sure that there is no leakage in the reverse flow sense line to the high stage regulator.

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(b) It is permitted to have a small leakage around the couplings. A jet of air is not permitted.

1) If you find leakage that is not permitted, repair the ducts and couplings.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-410-011-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.

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

——— END OF TASK ———

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Engine Pneumatic Duct Locations
Figure 501/71-00-00-990-804-F00 (Sheet 1 of 3)

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Engine Pneumatic Duct Locations
Figure 501/71-00-00-990-804-F00 (Sheet 2 of 3)

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Engine Pneumatic Duct Locations
Figure 501/71-00-00-990-804-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-700-810-F00

4. Test 2 - Dry Motor Leak Test

A. General

(1) This check is to find leaks in some oil system components.

B. References

Reference	Title
71-00-00-700-821-F00	Dry Motor the Engine (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)

C. Consumable Materials

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)

D. Location Zones

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

E. Prepare for the Procedure

SUBTASK 71-00-00-790-002-F00

CAUTION

DO NOT REPLACE AN IDLE POWER LEAK CHECK WITH THIS DRY MOTOR LEAK CHECK. YOU CANNOT USE THIS PROCEDURE TO FIND POSSIBLE ENGINE OIL AND FUEL LEAKS. IF YOU USE THIS PROCEDURE AS AN ALTERNATE TO THE IDLE POWER LEAK CHECK WHERE IT IS INDICATED, DAMAGE TO THE ENGINE CAN OCCUR.

(1) Obey this CAUTION when you do this task.

SUBTASK 71-00-00-010-001-F00

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

SUBTASK 71-00-00-010-002-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 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) To examine the areas of the engine below the thrust reverser, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00

for the applicable thrust reverser or thrust reversers.

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SUBTASK 71-00-00-160-001-F00

(4) Clean the areas to be examined with a cotton wiper, G00034.

F. Dry Motor Leak Check Procedure

SUBTASK 71-00-00-860-001-F00

> **CAUTION** DO NOT OPERATE THE STARTER MORE THAN THE STARTER LIMITS. IF YOU OPERATE THE STARTER MORE THAN THE LIMITS, DAMAGE TO THE STARTER COULD OCCUR.

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

SUBTASK 71-00-00-790-003-F00

(2) Examine the applicable component or system while you motor the engine and after you stop the engine.

NOTE: An engine exhaust system consists of the exhaust plug and the exhaust sleeve.

NOTE: When engine operates, some oil leak can occur at the aft sump rotating seal. After operation, an oil puddle in the exhaust system is usual. When engine operations are done one after the other, it can cause a large oil puddle in the exhaust system.

(a) If you find leakage, repair or replace the tubes, tube flanges, the fittings or components as it is necessary.

(b) Do the leak check again after you replace or repair the tubes, tube flanges, fittings or components.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-410-001-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 71-00-00-410-002-F00

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

——— END OF TASK ———

TASK 71-00-00-700-801-F00

5. Test 3A - Idle-Power Leak Check

A. General

(1) This check is used to examine the engine components or system for leakage when the engine operates at the idle-power position.

(2) If the engine component or system is on the engine core area, you must close the thrust reversers before the engine operates. If the engine component or system is on the engine fan case, it is permitted to keep the fan cowl panels open when the engine operates.

(3) Make sure you obey the engine hazard areas and the open cowl limits in this task: (TASK 71-00-00-800-806-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B. References

Reference	Title
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-806-F00	Engine Operation Limits (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (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)

C. Consumable Materials

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)

D. Prepare for the Procedure

SUBTASK 71-00-00-010-005-F00

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

SUBTASK 71-00-00-010-006-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 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.

(2) To examine the areas of the engine below the thrust reverser, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00

SUBTASK 71-00-00-160-003-F00

(3) Clean the areas to be examined with a cotton wiper, G00034.

SUBTASK 71-00-00-010-007-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.

(4) If you opened the thrust reversers, do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

NOTE: The fan cowl panels can be kept in the open position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Idle-Power Leak Check Procedure

SUBTASK 71-00-00-860-003-F00

> **WARNING** MAKE SURE THAT YOU OBEY ALL THE INSTRUCTIONS AND PRECAUTIONS WHEN YOU OPERATE AN ENGINE AT HIGH POWER. IF YOU DO NOT OBEY THE INSTRUCTIONS AND PRECAUTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

(a) Let the engine become stable at the minimum idle thrust for five minutes.

(b) Make sure the engine operates in the operation limits (TASK 71-00-00-800-806-F00).

SUBTASK 71-00-00-860-004-F00

(2) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 71-00-00-010-008-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 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) If it is necessary, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 71-00-00-790-006-F00

(4) Examine the applicable component or system for signs of fluid leakage.

(a) If you find leakage, repair or replace the tubes, tube flanges, the fittings or components as it is necessary.

(b) Look at the inside surfaces of the fan cowl panels or thrust reverser as applicable for new fuel, oil or hydraulic stains.

(c) Do the leak check again after you replace or repair the tubes, tube flanges, fittings or components.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-410-005-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) If it is necessary, do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 71-00-00-410-006-F00

(2) 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

TASK 71-00-00-700-823-F00

6. Test 3B - Part-Power Leak Check

A. General

(1) Some components of the engine do not have sufficient pressure when you do a leak check at idle power. This check will operate the engine at 70% N1 and do a leak check of these components.

(2) To do this check, you must close the fan cowl panels, and if applicable, the thrust reversers.

B. References

Reference	Title
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-806-F00	Engine Operation Limits (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (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)

C. Consumable Materials

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)

D. Prepare for the Part-Power Leak Check

SUBTASK 71-00-00-010-016-F00

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

SUBTASK 71-00-00-010-017-F00

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE FLAPS AND SLATS, DEACTIVATE THE LEADING EDGE FLAPS AND SLATS, DEACTIVATE THE THRUST REVERSER (FOR GROUND MAINTENANCE) AND OPEN THE FAN COWL PANEL. FAILURE TO OBEY THE ABOVE SEQUENCE MAY RESULT IN INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(2) To examine the areas of the engine below the thrust reverser, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00 for the applicable thrust reverser or thrust reversers.

SUBTASK 71-00-00-160-005-F00

(3) Clean the areas to be examined with a cotton wiper, G00034.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-010-018-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) If you opened the thrust reversers, do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 71-00-00-410-012-F00

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

E. Part-Power Leak Check

SUBTASK 71-00-00-860-159-F00

> **WARNING** MAKE SURE THAT YOU OBEY ALL THE INSTRUCTIONS AND PRECAUTIONS WHEN YOU OPERATE AN ENGINE AT HIGH POWER. IF YOU DO NOT OBEY THE INSTRUCTIONS AND PRECAUTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

(a) Let the engine become stable at the minimum idle thrust for five minutes.

(b) Make sure that the engine operates in the operation limits (TASK 71-00-00-800-806-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 pilot 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 pilot probe is heated.

LOM ALL

SUBTASK 71-00-00-910-049-F00

(2) Do these steps to operate the engine at the 70% N1 power position:

(a) Slowly move the applicable forward thrust lever to the 70% N1 position.

1) Let the engine become stable at this speed for 2 minutes.

(b) Slowly move the thrust lever to the idle-power position.

1) Let the engine become stable at this speed for 3 minutes.

SUBTASK 71-00-00-860-234-F00

(3) 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.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM 402, 406, 411, 412, 415, 416, 422-434, 437-447, 450-999; LOM 404, 407, 420 POST SB 737-30A1063

(b) Make sure that the Probe Heat "A" and "B" switches, on the P5 overhead panel, are in the AUTO position.

LOM ALL

SUBTASK 71-00-00-860-160-F00

CAUTION	MAKE SURE YOU OBEY THE INSTRUCTIONS IN THE PROCEDURE WHEN YOU STOP AN ENGINE THAT OPERATES AT HIGH POWER. IF YOU DO NOT, DAMAGE TO THE ENGINE CAN OCCUR.

(4) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 71-00-00-860-161-F00

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

SUBTASK 71-00-00-010-019-F00

WARNING	DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE FLAPS AND SLATS, DEACTIVATE THE LEADING EDGE FLAPS AND SLATS, DEACTIVATE THE THRUST REVERSER (FOR GROUND MAINTENANCE) AND OPEN THE FAN COWL PANEL. FAILURE TO OBEY THE ABOVE SEQUENCE MAY RESULT IN INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(6) If it is necessary, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 71-00-00-790-008-F00

(7) Examine the applicable component or system for signs of fluid leakage.

(a) If you find leakage, repair or replace the tubes, tube flanges, the fittings or components as it is necessary.

(b) Look at the inside surfaces of the fan cowl panels or thrust reverser as applicable for new fuel, oil or hydraulic stains.

(c) Do the leak check again after you replace or repair the tubes, tube flanges, fittings or components.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-410-013-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.

(1) If they were opened, do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 71-00-00-410-014-F00

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

END OF TASK

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TASK 71-00-00-700-813-F00

7. Test 5 - Power Assurance Check

(Figure 502, Figure 503, and Figure 504)

A. General

(1) The Power Assurance Check is not a good test for performance analysis of the engine. Do not use only the Power Assurance Check to accept or reject an engine. The power assurance run is usually not sufficiently stable to accurately calculate the engine's health. You can get a more reliable performance analysis by doing a test cell operation or on-wing performance trend monitoring.

(2) Do this test to make sure the engine will get takeoff power without the EGT or N2 at redline limits.

(3) For a specific %N1, this check will calculate the maximum EGT and the %N2 target values.

(4) This check can be done at one of three different N1 speeds; 65%, 70% or 75%. It is recommended that the initial check be done at 65% N1. If that test fails; or, if it is operator policy, then do a subsequent test at the higher N1 speeds.

(5) This procedure will also give the steps to adjust the EGT limit (make an altitude correction of the maximum EGT) when you operate the airplane at an airport above sea level. The actual EGT margin is based on the airplane route structure.

B. References

Reference	Title
24-22-00-860-811	Supply Electrical Power (P/B 201)
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (P/B 201)
73-21-00-700-808-F00	IDENT/CONFIG (P/B 501)
73-21-00-740-803-F00	EEC BITE TEST - RECENT FAULTS (P/B 501)

C. Tools/Equipment

Reference	Description
STD-1122	Thermometer - Alcohol/Mercury (or equivalent meter meets task requirements)

D. Power Assurance Check

SUBTASK 71-00-00-970-005-F00

CAUTION

DO NOT USE THE TOTAL AIR TEMPERATURE (TAT) INDICATION FROM THE AIRPLANE FOR THE AMBIENT AIR TEMPERATURE. IF YOU DO NOT OBEY, THE TAT CAN CAUSE AN INCORRECT N1 TARGET SELECTION.

CAUTION

DO NOT USE THE MERCURY THERMOMETER ON THE AIRPLANE. MERCURY (FROM A BROKEN THERMOMETER) CAN CAUSE DAMAGE TO THE AIRPLANE COMPONENTS.

(1) Use a thermometer, STD-1122, to get the ambient air temperature (OAT) in the shade of the nose wheel well.

(a) Record the OAT on the data sheet.

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SUBTASK 71-00-00-970-006-F00

(2) Use the OAT to get the %N1 Target speed, the Max EGT and Max %N2 for the applicable engine model and thrust rating (Figure 502, Figure 503, and Figure 504).

NOTE: The 7B26 and 7B26/B1 engine models are equivalent in thrust rating. The 7B27 and 7B27/B3 engine models are equivalent in thrust rating.

(a) Record the %N1 Target, Max EGT and Max %N2 on the data sheet.

(b) To do a check of the thrust rating, refer to the Ident/Config page, do this task: IDENT/CONFIG, TASK 73-21-00-700-808-F00

1) Record the trim level for the N1 Modifier Adjustment used in the Test Results.

SUBTASK 71-00-00-860-008-F00

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

SUBTASK 71-00-00-860-009-F00

WARNING	MAKE SURE THAT YOU OBEY ALL THE INSTRUCTIONS AND PRECAUTIONS WHEN YOU OPERATE AN ENGINE AT HIGH POWER. IF YOU DO NOT OBEY THE INSTRUCTIONS AND PRECAUTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

(a) Make sure that the BLEED 1 and BLEED 2 switches are in the OFF position.

(b) Set the applicable GEN switch to the OFF position and release.

NOTE: This will remove the load from the IDG, if it is not already removed.

1) Make sure that the applicable GEN OFF BUS light comes on.

(c) Let the engine become stable at the idle-power position for five minutes.

SUBTASK 71-00-00-860-010-F00

(5) Make sure that the applicable switches, on the P5 overhead panel, are in the OFF position:

(a) WING ANTI-ICE

(b) ENG ANTI-ICE 1 or 2.

LOM 404, 407, 420 PRE SB 737-30A1063

SUBTASK 71-00-00-860-176-F00

(6) Make sure 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 pilot probe is heated.

LOM 402, 406, 411, 412, 415, 416, 422-434, 437-447, 450-999; LOM 404, 407, 420 POST SB 737-30A1063

SUBTASK 71-00-00-860-749-F00

(7) Make sure 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 pilot probe is heated.

LOM ALL

SUBTASK 71-00-00-860-011-F00

(8) Monitor all engine parameters.

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(a) Carefully monitor the EGT and N2 indications.

SUBTASK 71-00-00-860-165-F00

(9) Slowly move the applicable forward thrust lever to the N1 target speed that you got for the applicable MPA power level: 65%, 70% or 75%.

(a) It is recommended that the initial check be done at 65% N1. If that test fails, or if it is operator policy, then do a subsequent test at the higher N1 speeds.

(b) If this is a subsequent check at a higher speed, make sure the engine runs at the idle-power position for a minimum of 10 minutes before you increase the engine speed again.

SUBTASK 71-00-00-970-034-F00

(10) Let the engine become stable at this power assurance target for a minimum of three minutes.

SUBTASK 71-00-00-970-035-F00

(11) Record the %N1, %N2, and EGT parameters from the power assurance target on the data sheet.

SUBTASK 71-00-00-860-166-F00

(12) Slowly move the applicable forward thrust lever to the idle-power position.

SUBTASK 71-00-00-970-036-F00

(13) When this check is complete, make a decision if an additional check is necessary as follows:

(a) If the test was satisfactory, you can do one of these steps:

1) Do the above check again at the higher N1 speed; or,

2) Continue to the steps to stop the engine.

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) Make sure that the Probe Heat "A" and "B" switches, on the P5 overhead panel, are in the AUTO position.

LOM ALL

c) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

(b) If the test is not satisfactory, do the above check again at the higher N1 speed.

E. Test Results

SUBTASK 71-00-00-860-012-F00

(1) If there is a difference between the N1 target and the N1 record, do these steps to adjust the N2 and EGT indications:

(a) Use these steps to find if there is a positive or negative difference between the N1 target and the N1 record:

1) If the N1 target is more than the N1 record, there is a positive difference.

2) If the N1 target is less than the N1 record, there is a negative difference.

(b) For each 0.1% of positive difference in N1, 0.8 degrees C must be added to the EGT, and 0.03% must be added to the N2 value that you recorded during the test.

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(c) For each 0.1% of negative difference in N1, 0.8 degrees C must be subtracted from the EGT, and 0.03% must be subtracted from the N2 value that you recorded during the test.

Table 504/71-00-00-993-925-F00 Adjustments for Difference between N1 Target and N1 Record

Parameter	Correction Value/0.1 %N1
EGT	0.8 Degrees C
N2	0.03%

(d) If the engine has been configured with 7.B.U.1 or higher version of the EEC software, use the data for the applicable rating in the table below to adjust the N2 margin (Table 505).

NOTE: For higher thrust ratings not in the table, there is no N2 margin adjustment.

Table 505/71-00-00-993-932-F00

Rating	N2 Margin Adjustment *[1] *[2]
7B24 or 7B24/3	1.2%
7B22/B1 or 7B22/3B1	1.3%
7B22 or 7B22/3	1.5%
7B20 or 7B20/3	1.7%

*[1] The adjustment is applicable to SAC and DAC engines.

*[2] N2 Margin (Adjusted) = Calculated N2 Margin - N2 Margin Adjustment

(e) This is an Example Calculation for the MPA Test Table - 70% N1 of the 7B20 engine for an OAT of 10 degrees C (Figure 503):

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Table 506/71-00-00-993-908-F00

FROM MPA TEST TABLE - 70% N1, OAT OF 10 DEG C
N1 TARGET = 69.4%, EGT MAX =726 DEG C, N2 MAX = 91.8%
TEST DATA RECORDS, N1 RECORD = 69.7%, EGT RECORD = 695 DEG C N2 RECORD = 81%
N1 TARGET < N1 RECORD, A NEGATIVE DIFFERENCE
N1 DIFF = N1 RECORD - N1 TARGET = 69.7 - 69.4 = 0.3
EGT ADJ = EGT RECORD - (0.8/0.1)(N1 DIFF) = 695 - (0.8/0.1)(0.3) = 692.6 DEG C
N2 ADJ = N2 RECORD - (0.03/0.1)(N1 DIFF) = 81% - (0.03/0.1)(0.3) = 80.9%
FIND EGT AND N2 MARGINS WITH THE VALUES OF EGT ADJ AND N2 ADJ
EGT MARGIN = EGT MAX - EGT ADJ = 726 - 692.6 = 33.4 DEG C
N2 MARGIN = N2 MAX - N2 ADJ = 91.8 - 80.9 = 10.9%
N2 Margin (Adjusted) =
10.9% (Calculated N2 Margin) - 1.7% (N2 Margin Adjustment) = 9.2%. *[1]*[2]

*[1] Get the N2 margin adjustment from Table 505

*[2] Adjust the N2 margin for engines configured with 7.B.U.1 or higher software.

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SUBTASK 71-00-00-970-037-F00

(2) To adjust the EGT margin for altitude, do these steps:

(a) Find the Altitude Correction Adjustment for the applicable engine and altitude in the table.

1) Use the highest altitude on the airplane's route structure.

2) The EGT corrections shown are for takeoff worst case flight condition and includes ambient temperature and altitude effects.

3) Linear interpolation is necessary for altitudes between the table values.

(b) Subtract the altitude adjustment value from the calculated EGT margin.

Table 507/71-00-00-993-911-F00 Altitude Adjustment Factors

ALTITUDE FEET	ENGINE MODEL *[1]								
	7B20	7B22	7B22/B1	7B24	7B24/B1	7B26 7B26/B1	7B26/B2	7B27 7B27/B3	7B27/B1
<0	24	0	0	0	5	7	0	0	0
0	24	0	0	0	5	7	0	0	0
1000	24	0	0	0	6	7	0	2	0
2000	24	0	0	0	7	8	0	3	0
3000	24	0	0	0	7	8	0	5	0
4000	24	0	0	0	8	6	0	5	0
5000	24	0	0	0	5	4	0	0	0
6000	18	0	0	0	3	0	0	0	0
7000	12	0	0	0	0	0	0	0	0
8000	6	0	0	0	0	0	0	0	0
9000	0	0	0	0	0	0	0	0	0
>9000	0	0	0	0	0	0	0	0	0

*[1] APPLICABLE TO ALL /3 , /3F, AND -7BE RATINGS

(c) To continue the same Example Calculation for altitude adjustment, assume the highest airport is at 4000 ft (1219.2 m).

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Table 508/71-00-00-993-912-F00

F0R A 7B20, 4000 FT ALTITUDE, ALTITUDE ADJUSTMENT FACTOR = 24
EGT MARGIN ALT = EGT MARGIN - ALTITUDE ADJUSTMENT FACTOR
= 33.4 - 24
= 9.4 DEG C

LOM ALL

SUBTASK 71-00-00-970-055-F00

(3) To adjust the EGT margin for N1 modifiers, do these steps:

(a) Find the N1 Modifier Adjustment for the applicable engine model and trim level.

1) To find the trim level, do this task: IDENT/CONFIG, TASK 73-21-00-700-808-F00.

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(b) Add the adjustment to the calculated EGT margin.

Table 509/71-00-00-993-909-F00 N1 Modifier Adjustments

TRIM LEVEL	ENGINE MODEL *[1]							
	7B20	7B22	7B22/B1	7B24	7B24/B1	7B26 7B26/B1 7B26/B2	7B27 7B27/B3	7B27/B1
0	0	0	0	0	0	0	0	0
1	2	2	2	1	1	6	3	3
2	3	3	3	3	3	8	6	5
3	4	5	5	5	5	10	9	8
4	6	6	7	7	7	12	12	11
5	7	8	8	8	8	14	14	15
6	8	9	10	10	10	15	17	18
7	10	11	11	11	12	17	19	20

*[1] APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

(c) To continue the same Example Calculation for N1 Modifier, assume the trim level is 4.

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Table 510/71-00-00-993-910-F00

F0R A 7B20 WITH TRIM LEVEL OF 4, N1 MODIFIER ADJUSTMENT = 6
EGT MARGIN MODIFIED = EGT MARGIN ALT + N1 MODIFIER ADJUSTMENT
= 9.4 + 6
= 15.4 DEG C

LOM ALL

SUBTASK 71-00-00-970-038-F00

(4) If the 65% N1 power assurance check is not satisfactory, do the test again at 70% N1.

(a) If the 70% N1 power assurance check is not satisfactory, do the test again at 75% N1.

1) If the 75% N1 power assurance check is not satisfactory, do this task: EEC BITE TEST - RECENT FAULTS, TASK 73-21-00-740-803-F00.

a) If you find and correct the cause, do the test again at the first power level that failed.

b) If you do not find the cause, use your airline policy to make the decision if the engine must be replaced.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX EGT - °C							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
-40	-40	58.6	443	442	461	465	501	503	524	553
-38	-39	58.7	446	445	464	468	504	506	527	556
-36	-38	58.8	450	449	468	472	508	510	531	560
-35	-37	58.9	453	452	471	475	511	513	534	563
-33	-36	59.1	456	455	474	478	514	516	537	566
-31	-35	59.2	460	459	478	482	518	520	541	570
-29	-34	59.3	463	462	481	485	521	523	544	573
-27	-33	59.4	466	465	484	488	524	526	547	576
-26	-32	59.5	470	469	488	492	528	530	551	580
-24	-31	59.7	473	472	491	495	531	533	554	583
-22	-30	59.8	476	475	494	498	534	536	557	586
-20	-29	59.9	480	479	498	502	538	540	561	590
-18	-28	60.0	483	482	501	505	541	543	564	593
-17	-27	60.2	486	485	504	508	544	546	567	596
-15	-26	60.3	490	489	508	512	548	550	571	600
-13	-25	60.4	493	492	511	515	551	553	574	603
-11	-24	60.5	496	495	514	518	554	556	577	606
-9	-23	60.6	498	497	516	520	556	558	579	608
-8	-22	60.7	501	500	519	523	559	561	582	611
-6	-21	60.9	503	502	521	525	561	563	584	613
-4	-20	61.0	506	505	524	528	564	566	587	616
-2	-19	61.1	508	507	526	530	566	568	589	618
0	-18	61.2	511	510	529	533	569	571	592	621
1	-17	61.3	513	512	531	535	571	573	594	623
3	-16	61.5	516	515	534	538	574	576	597	626
5	-15	61.6	518	517	536	540	576	578	599	628
7	-14	61.7	521	520	539	543	579	581	602	631
9	-13	61.8	524	523	542	546	582	584	605	634
10	-12	61.9	526	525	544	548	584	586	607	636
12	-11	62.0	528	527	546	550	586	588	609	638
14	-10	62.2	531	530	549	553	589	591	612	641
16	-9	62.3	533	532	551	555	591	593	614	643
18	-8	62.4	536	535	554	558	594	596	617	646
19	-7	62.5	538	537	556	560	596	598	619	648
21	-6	62.6	541	540	559	563	599	601	622	651
23	-5	62.7	543	542	561	565	601	603	624	653
25	-4	62.9	546	545	564	568	604	606	627	656

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

GMM-1156640-00-A (MOD)

G84819 S0006581785_V4

MPA Test Table (65 Percent N1 Corrected Fan Speed)
Figure 502/71-00-00-990-820-F00 (Sheet 1 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX EGT - °C							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
27	-3	63.0	548	547	566	570	606	608	629	658
28	-2	63.1	550	549	568	572	608	610	631	660
30	-1	63.2	552	551	570	574	610	612	633	662
32	0	63.3	555	554	573	577	613	615	636	665
34	1	63.4	557	556	575	579	615	617	638	667
36	2	63.5	559	558	577	581	617	619	640	669
37	3	63.7	561	560	579	583	619	621	642	671
39	4	63.8	563	562	581	585	621	623	644	673
41	5	63.9	565	564	583	587	623	625	646	675
43	6	64.0	567	566	585	589	625	627	648	677
45	7	64.1	570	569	588	592	628	630	651	680
46	8	64.2	572	571	590	594	630	632	653	682
48	9	64.3	574	573	592	596	632	634	655	684
50	10	64.4	576	575	594	598	634	636	657	686
52	11	64.6	578	577	596	600	636	638	659	688
54	12	64.7	579	578	597	601	637	639	660	689
55	13	64.8	581	580	599	603	639	641	662	691
57	14	64.9	583	582	601	605	641	643	664	693
59	15	65.0	585	584	603	607	643	645	666	695
61	16	65.1	586	585	604	608	644	646	667	696
63	17	65.2	588	587	606	610	646	648	669	698
64	18	65.3	590	589	608	612	648	650	671	700
66	19	65.4	592	591	610	614	650	652	673	702
68	20	65.6	594	593	612	616	652	654	675	704
70	21	65.7	596	595	614	618	654	656	677	706
72	22	65.8	598	597	616	620	656	658	679	708
73	23	65.9	600	599	618	622	658	660	681	710
75	24	66.0	602	601	620	624	660	662	683	712
77	25	66.1	604	603	622	626	662	664	685	714
79	26	66.2	606	605	624	628	664	666	687	716
81	27	66.3	608	607	626	630	666	668	689	718
82	28	66.4	611	610	629	633	669	671	692	721
84	29	66.5	613	612	631	635	671	673	694	723
86	30	66.6	615	614	633	637	673	675	696	725
88	31	66.8	617	616	635	639	675	677	698	727
90	32	66.9	619	618	637	641	677	679	700	729
91	33	67.0	621	620	639	643	679	681	702	731

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

GMM-1156641-00-A (MOD)

G84837 S0006581786_V4

MPA Test Table (65 Percent N1 Corrected Fan Speed)
Figure 502/71-00-00-990-820-F00 (Sheet 2 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX EGT - °C							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
93	34	67.1	623	622	641	645	681	683	704	733
95	35	67.2	625	624	643	647	683	685	706	735
97	36	67.3	628	627	646	650	686	688	709	738
99	37	67.4	630	629	648	652	688	690	711	740
100	38	67.5	632	631	650	654	690	692	713	742
102	39	67.6	634	633	652	656	692	694	715	744
104	40	67.7	637	636	655	659	695	697	718	747
106	41	67.8	639	638	657	661	697	699	720	749
108	42	67.9	641	640	659	663	699	701	722	751
109	43	68.0	643	642	661	665	701	703	724	753
111	44	68.1	645	644	663	667	703	705	726	755
113	45	68.2	647	646	665	669	705	707	728	757
115	46	68.4	649	648	667	671	707	709	730	759
117	47	68.5	651	650	669	673	709	711	732	761
118	48	68.6	653	652	671	675	711	713	734	763
120	49	68.7	655	654	673	677	713	715	736	765
122	50	68.8	657	656	675	679	715	717	738	767

GMM-1156641-00-A

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

G86614 S0006581787_V4

MPA Test Table (65 Percent N1 Corrected Fan Speed)
Figure 502/71-00-00-990-820-F00 (Sheet 3 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX %N2							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
-40	-40	58.6	79.8	79.8	79.7	80.3	80.9	81.5	81.6	81.9
-38	-39	58.7	80.0	80.0	79.9	80.5	81.1	81.7	81.8	82.1
-36	-38	58.8	80.1	80.1	80.0	80.6	81.2	81.8	81.9	82.2
-35	-37	58.9	80.3	80.3	80.2	80.8	81.4	82.0	82.1	82.4
-33	-36	59.1	80.5	80.5	80.4	81.0	81.6	82.2	82.3	82.6
-31	-35	59.2	80.6	80.6	80.5	81.1	81.7	82.3	82.4	82.7
-29	-34	59.3	80.8	80.8	80.7	81.3	81.9	82.5	82.6	82.9
-27	-33	59.4	80.9	80.9	80.8	81.4	82.0	82.6	82.7	83.0
-26	-32	59.5	81.1	81.1	81.0	81.6	82.2	82.8	82.9	83.2
-24	-31	59.7	81.3	81.3	81.2	81.8	82.4	83.0	83.1	83.4
-22	-30	59.8	81.4	81.4	81.3	81.9	82.5	83.1	83.2	83.5
-20	-29	59.9	81.6	81.6	81.5	82.1	82.7	83.3	83.4	83.7
-18	-28	60.0	81.7	81.7	81.6	82.2	82.8	83.4	83.5	83.8
-17	-27	60.2	81.9	81.9	81.8	82.4	83.0	83.6	83.7	84.0
-15	-26	60.3	82.0	82.0	81.9	82.5	83.1	83.7	83.8	84.1
-13	-25	60.4	82.2	82.2	82.1	82.7	83.3	83.9	84.0	84.3
-11	-24	60.5	82.4	82.4	82.3	82.9	83.5	84.1	84.2	84.5
-9	-23	60.6	82.5	82.5	82.4	83.0	83.6	84.2	84.3	84.6
-8	-22	60.7	82.7	82.7	82.6	83.2	83.8	84.4	84.5	84.8
-6	-21	60.9	82.8	82.8	82.7	83.3	83.9	84.5	84.6	84.9
-4	-20	61.0	83.0	83.0	82.9	83.5	84.1	84.7	84.8	85.1
-2	-19	61.1	83.2	83.2	83.1	83.7	84.3	84.9	85.0	85.3
0	-18	61.2	83.3	83.3	83.2	83.8	84.4	85.0	85.1	85.4
1	-17	61.3	83.5	83.5	83.4	84.0	84.6	85.2	85.3	85.6
3	-16	61.5	83.7	83.7	83.6	84.2	84.8	85.4	85.5	85.8
5	-15	61.6	83.8	83.8	83.7	84.3	84.9	85.5	85.6	85.9
7	-14	61.7	84.0	84.0	83.9	84.5	85.1	85.7	85.8	86.1
9	-13	61.8	84.2	84.2	84.1	84.7	85.3	85.9	86.0	86.3
10	-12	61.9	84.3	84.3	84.2	84.8	85.4	86.0	86.1	86.4
12	-11	62.0	84.5	84.5	84.4	85.0	85.6	86.2	86.3	86.6
14	-10	62.2	84.6	84.6	84.5	85.1	85.7	86.3	86.4	86.7
16	-9	62.3	84.8	84.8	84.7	85.3	85.9	86.5	86.6	86.9
18	-8	62.4	85.0	85.0	84.9	85.5	86.1	86.7	86.8	87.1
19	-7	62.5	85.1	85.1	85.0	85.6	86.2	86.8	86.9	87.2
21	-6	62.6	85.3	85.3	85.2	85.8	86.4	87.0	87.1	87.4
23	-5	62.7	85.5	85.5	85.4	86.0	86.6	87.2	87.3	87.6
25	-4	62.9	85.6	85.6	85.5	86.1	86.7	87.3	87.4	87.7

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

GMM-1156642-00-A (MOD)

H48528 S0006581788_V4

MPA Test Table (65 Percent N1 Corrected Fan Speed)
Figure 502/71-00-00-990-820-F00 (Sheet 4 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX %N2							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
27	-3	63.0	85.8	85.8	85.7	86.3	86.9	87.5	87.6	87.9
28	-2	63.1	86.0	86.0	85.9	86.5	87.1	87.7	87.8	88.1
30	-1	63.2	86.1	86.1	86.0	86.6	87.2	87.8	87.9	88.2
32	0	63.3	86.3	86.3	86.2	86.8	87.4	88.0	88.1	88.4
34	1	63.4	86.5	86.5	86.4	87.0	87.6	88.2	88.3	88.6
36	2	63.5	86.6	86.6	86.5	87.1	87.7	88.3	88.4	88.7
37	3	63.7	86.8	86.8	86.7	87.3	87.9	88.5	88.6	88.9
39	4	63.8	87.0	87.0	86.9	87.5	88.1	88.7	88.8	89.1
41	5	63.9	87.1	87.1	87.0	87.6	88.2	88.8	88.9	89.2
43	6	64.0	87.3	87.3	87.2	87.8	88.4	89.0	89.1	89.4
45	7	64.1	87.4	87.4	87.3	87.9	88.5	89.1	89.2	89.5
46	8	64.2	87.6	87.6	87.5	88.1	88.7	89.3	89.4	89.7
48	9	64.3	87.8	87.8	87.7	88.3	88.9	89.5	89.6	89.9
50	10	64.4	87.9	87.9	87.8	88.4	89.0	89.6	89.7	90.0
52	11	64.6	88.1	88.1	88.0	88.6	89.2	89.8	89.9	90.2
54	12	64.7	88.3	88.3	88.2	88.8	89.4	90.0	90.1	90.4
55	13	64.8	88.4	88.4	88.3	88.9	89.5	90.1	90.2	90.5
57	14	64.9	88.6	88.6	88.5	89.1	89.7	90.3	90.4	90.7
59	15	65.0	88.8	88.8	88.7	89.3	89.9	90.5	90.6	90.9
61	16	65.1	88.9	88.9	88.8	89.4	90.0	90.6	90.7	91.0
63	17	65.2	89.1	89.1	89.0	89.6	90.2	90.8	90.9	91.2
64	18	65.3	89.2	89.2	89.1	89.7	90.3	90.9	91.0	91.3
66	19	65.4	89.4	89.4	89.3	89.9	90.5	91.1	91.2	91.5
68	20	65.6	89.6	89.6	89.5	90.1	90.7	91.3	91.4	91.7
70	21	65.7	89.7	89.7	89.6	90.2	90.8	91.4	91.5	91.8
72	22	65.8	89.9	89.9	89.8	90.4	91.0	91.6	91.7	92.0
73	23	65.9	90.0	90.0	89.9	90.5	91.1	91.7	91.8	92.1
75	24	66.0	90.2	90.2	90.1	90.7	91.3	91.9	92.0	92.3
77	25	66.1	90.3	90.3	90.2	90.8	91.4	92.0	92.1	92.4
79	26	66.2	90.5	90.5	90.4	91.0	91.6	92.2	92.3	92.6
81	27	66.3	90.6	90.6	90.5	91.1	91.7	92.3	92.4	92.7
82	28	66.4	90.8	90.8	90.7	91.3	91.9	92.5	92.6	92.9
84	29	66.5	90.9	90.9	90.8	91.4	92.0	92.6	92.7	93.0
86	30	66.6	91.1	91.1	91.0	91.6	92.2	92.8	92.9	93.2
88	31	66.8	91.3	91.3	91.2	91.8	92.4	93.0	93.1	93.4
90	32	66.9	91.4	91.4	91.3	91.9	92.5	93.1	93.2	93.5
91	33	67.0	91.6	91.6	91.5	92.1	92.7	93.3	93.4	93.7

1 APPLICABLE TO ALL /3, /3F AND -7BE RATINGS

GMM-1156642-00-A (MOD)
H48571 S0006581789_V4

MPA Test Table (65 Percent N1 Corrected Fan Speed)
Figure 502/71-00-00-990-820-F00 (Sheet 5 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX %N2							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
93	34	67.1	91.7	91.7	91.6	92.2	92.8	93.4	93.5	93.8
95	35	67.2	91.9	91.9	91.8	92.4	93.0	93.6	93.7	94.0
97	36	67.3	92.0	92.0	91.9	92.5	93.1	93.7	93.8	94.1
99	37	67.4	92.2	92.2	92.1	92.7	93.3	93.9	94.0	94.3
100	38	67.5	92.3	92.3	92.2	92.8	93.4	94.0	94.1	94.4
102	39	67.6	92.5	92.5	92.4	93.0	93.6	94.2	94.3	94.6
104	40	67.7	92.6	92.6	92.5	93.1	93.7	94.3	94.4	94.7
106	41	67.8	92.8	92.8	92.7	93.3	93.9	94.5	94.6	94.9
108	42	67.9	92.9	92.9	92.8	93.4	94.0	94.6	94.7	95.0
109	43	68.0	93.1	93.1	93.0	93.6	94.2	94.8	94.9	95.2
111	44	68.1	93.2	93.2	93.1	93.7	94.3	94.9	95.0	95.3
113	45	68.2	93.4	93.4	93.3	93.9	94.5	95.1	95.2	95.5
115	46	68.4	93.5	93.5	93.4	94.0	94.6	95.2	95.3	95.6
117	47	68.5	93.7	93.7	93.6	94.2	94.8	95.4	95.5	95.8
118	48	68.6	93.8	93.8	93.7	94.3	94.9	95.5	95.6	95.9
120	49	68.7	94.0	94.0	93.9	94.5	95.1	95.7	95.8	96.1
122	50	68.8	94.1	94.1	94.0	94.6	95.2	95.8	95.9	96.2

GMM-1156644-00-A (MOD)

1 APPLICABLE TO ALL /3, /3F AND -7BE RATINGS

H48587 S0006581790_V4

MPA Test Table (65 Percent N1 Corrected Fan Speed)
Figure 502/71-00-00-990-820-F00 (Sheet 6 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX EGT - °C							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
-40	-40	63.1	485	484	503	507	543	545	566	595
-38	-39	63.2	489	488	507	511	547	549	570	599
-36	-38	63.4	493	492	511	515	551	553	574	603
-35	-37	63.5	496	495	514	518	554	556	577	606
-33	-36	63.6	500	499	518	522	558	560	581	610
-31	-35	63.7	503	502	521	525	561	563	584	613
-29	-34	63.9	506	505	524	528	564	566	587	616
-27	-33	64.0	509	508	527	531	567	569	590	619
-26	-32	64.1	511	510	529	533	569	571	592	621
-24	-31	64.3	514	513	532	536	572	574	595	624
-22	-30	64.4	517	516	535	539	575	577	598	627
-20	-29	64.5	519	518	537	541	577	579	600	629
-18	-28	64.7	522	521	540	544	580	582	603	632
-17	-27	64.8	525	524	543	547	583	585	606	635
-15	-26	64.9	528	527	546	550	586	588	609	638
-13	-25	65.0	530	529	548	552	588	590	611	640
-11	-24	65.2	533	532	551	555	591	593	614	643
-9	-23	65.3	536	535	554	558	594	596	617	646
-8	-22	65.4	538	537	556	560	596	598	619	648
-6	-21	65.6	541	540	559	563	599	601	622	651
-4	-20	65.7	543	542	561	565	601	603	624	653
-2	-19	65.8	546	545	564	568	604	606	627	656
0	-18	65.9	549	548	567	571	607	609	630	659
1	-17	66.1	551	550	569	573	609	611	632	661
3	-16	66.2	554	553	572	576	612	614	635	664
5	-15	66.3	557	556	575	579	615	617	638	667
7	-14	66.4	559	558	577	581	617	619	640	669
9	-13	66.6	561	560	579	583	619	621	642	671
10	-12	66.7	564	563	582	586	622	624	645	674
12	-11	66.8	566	565	584	588	624	626	647	676
14	-10	66.9	569	568	587	591	627	629	650	679
16	-9	67.1	571	570	589	593	629	631	652	681
18	-8	67.2	574	573	592	596	632	634	655	684
19	-7	67.3	576	575	594	598	634	636	657	686
21	-6	67.4	579	578	597	601	637	639	660	689
23	-5	67.6	581	580	599	603	639	641	662	691
25	-4	67.7	584	583	602	606	642	644	665	694

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

GMM-1156645-00-A (MOD)
G85094 S0006581791_V4

MPA Test Table (70 Percent N1 Corrected Fan Speed)
Figure 503/71-00-00-990-821-F00 (Sheet 1 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX EGT - °C							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
27	-3	67.8	586	585	604	608	644	646	667	696
28	-2	67.9	588	587	606	610	646	648	669	698
30	-1	68.1	591	590	609	613	649	651	672	701
32	0	68.2	593	592	611	615	651	653	674	703
34	1	68.3	595	594	613	617	653	655	676	705
36	2	68.4	598	597	616	620	656	658	679	708
37	3	68.6	600	599	618	622	658	660	681	710
39	4	68.7	602	601	620	624	660	662	683	712
41	5	68.8	605	604	623	627	663	665	686	715
43	6	68.9	607	606	625	629	665	667	688	717
45	7	69.0	609	608	627	631	667	669	690	719
46	8	69.2	611	610	629	633	669	671	692	721
48	9	69.3	613	612	631	635	671	673	694	723
50	10	69.4	616	615	634	638	674	676	697	726
52	11	69.5	618	617	636	640	676	678	699	728
54	12	69.6	621	620	639	643	679	681	702	731
55	13	69.8	623	622	641	645	681	683	704	733
57	14	69.9	625	624	643	647	683	685	706	735
59	15	70.0	627	626	645	649	685	687	708	737
61	16	70.1	630	629	648	652	688	690	711	740
63	17	70.2	632	631	650	654	690	692	713	742
64	18	70.4	634	633	652	656	692	694	715	744
66	19	70.5	637	636	655	659	695	697	718	747
68	20	70.6	639	638	657	661	697	699	720	749
70	21	70.7	641	640	659	663	699	701	722	751
72	22	70.8	644	643	662	666	702	704	725	754
73	23	70.9	646	645	664	668	704	706	727	756
75	24	71.1	648	647	666	670	706	708	729	758
77	25	71.2	651	650	669	673	709	711	732	761
79	26	71.3	653	652	671	675	711	713	734	763
81	27	71.4	655	654	673	677	713	715	736	765
82	28	71.5	657	656	675	679	715	717	738	767
84	29	71.7	660	659	678	682	718	720	741	770
86	30	71.8	662	661	680	684	720	722	743	772
88	31	71.9	664	663	682	686	722	724	745	774
90	32	72.0	666	665	684	688	724	726	747	776
91	33	72.1	668	667	686	690	726	728	749	778

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

GMM-1156645-00-A (MOD)

G85123 S0006581792_V4

MPA Test Table (70 Percent N1 Corrected Fan Speed)
Figure 503/71-00-00-990-821-F00 (Sheet 2 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX EGT - °C							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
93	34	72.2	670	669	688	692	728	730	751	780
95	35	72.3	673	672	691	695	731	733	754	783
97	36	72.5	675	674	693	697	733	735	756	785
99	37	72.6	677	676	695	699	735	737	758	787
100	38	72.7	679	678	697	701	737	739	760	789
102	39	72.8	681	680	699	703	739	741	762	791
104	40	72.9	684	683	702	706	742	744	765	794
106	41	73.0	686	685	704	708	744	746	767	796
108	42	73.1	688	687	706	710	746	748	769	798
109	43	73.3	690	689	708	712	748	750	771	800
111	44	73.4	692	691	710	714	750	752	773	802
113	45	73.5	695	694	713	717	753	755	776	805
115	46	73.6	697	696	715	719	755	757	778	807
117	47	73.7	699	698	717	721	757	759	780	809
118	48	73.8	701	700	719	723	759	761	782	811
120	49	73.9	703	702	721	725	761	763	784	813
122	50	74.1	705	704	723	727	763	765	786	815

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

GMM-1156646-00-A (MOD)
G86652 S0006581793_V4

MPA Test Table (70 Percent N1 Corrected Fan Speed)
Figure 503/71-00-00-990-821-F00 (Sheet 3 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX %N2							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
-40	-40	63.1	81.3	81.3	81.2	81.8	82.4	83.0	83.1	83.4
-38	-39	63.2	81.5	81.5	81.4	82.0	82.6	83.2	83.3	83.6
-36	-38	63.4	81.7	81.7	81.6	82.2	82.8	83.4	83.5	83.8
-35	-37	63.5	81.8	81.8	81.7	82.3	82.9	83.5	83.6	83.9
-33	-36	63.6	82.0	82.0	81.9	82.5	83.1	83.7	83.8	84.1
-31	-35	63.7	82.1	82.1	82.0	82.6	83.2	83.8	83.9	84.2
-29	-34	63.9	82.3	82.3	82.2	82.8	83.4	84.0	84.1	84.4
-27	-33	64.0	82.5	82.5	82.4	83.0	83.6	84.2	84.3	84.6
-26	-32	64.1	82.7	82.7	82.6	83.2	83.8	84.4	84.5	84.8
-24	-31	64.3	82.8	82.8	82.7	83.3	83.9	84.5	84.6	84.9
-22	-30	64.4	83.0	83.0	82.9	83.5	84.1	84.7	84.8	85.1
-20	-29	64.5	83.2	83.2	83.1	83.7	84.3	84.9	85.0	85.3
-18	-28	64.7	83.3	83.3	83.2	83.8	84.4	85.0	85.1	85.4
-17	-27	64.8	83.5	83.5	83.4	84.0	84.6	85.2	85.3	85.6
-15	-26	64.9	83.7	83.7	83.6	84.2	84.8	85.4	85.5	85.8
-13	-25	65.0	83.8	83.8	83.7	84.3	84.9	85.5	85.6	85.9
-11	-24	65.2	84.0	84.0	83.9	84.5	85.1	85.7	85.8	86.1
-9	-23	65.3	84.2	84.2	84.1	84.7	85.3	85.9	86.0	86.3
-8	-22	65.4	84.3	84.3	84.2	84.8	85.4	86.0	86.1	86.4
-6	-21	65.6	84.5	84.5	84.4	85.0	85.6	86.2	86.3	86.6
-4	-20	65.7	84.7	84.7	84.6	85.2	85.8	86.4	86.5	86.8
-2	-19	65.8	84.8	84.8	84.7	85.3	85.9	86.5	86.6	86.9
0	-18	65.9	85.0	85.0	84.9	85.5	86.1	86.7	86.8	87.1
1	-17	66.1	85.2	85.2	85.1	85.7	86.3	86.9	87.0	87.3
3	-16	66.2	85.3	85.3	85.2	85.8	86.4	87.0	87.1	87.4
5	-15	66.3	85.5	85.5	85.4	86.0	86.6	87.2	87.3	87.6
7	-14	66.4	85.7	85.7	85.6	86.2	84.8	87.4	87.5	87.8
9	-13	66.6	85.9	85.9	85.8	86.4	87.0	87.6	87.7	88.0
10	-12	66.7	86.0	86.0	85.9	86.5	87.1	87.7	87.8	88.1
12	-11	66.8	86.2	86.2	86.1	86.7	87.3	87.9	88.0	88.3
14	-10	66.9	86.4	86.4	86.3	86.9	87.5	88.1	88.2	88.5
16	-9	67.1	86.5	86.5	86.4	87.0	87.6	88.2	88.3	88.6
18	-8	67.2	86.7	86.7	86.6	87.2	87.8	88.4	88.5	88.8
19	-7	67.3	86.9	86.9	86.8	87.4	88.0	88.6	88.7	89.0
21	-6	67.4	87.0	87.0	86.9	87.5	88.1	88.7	88.8	89.1
23	-5	67.6	87.2	87.2	87.1	87.7	88.3	88.9	89.0	89.3
25	-4	67.7	87.4	87.4	87.3	87.9	88.5	89.1	89.2	89.5

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

GMM-1156645-00-A (MOD)
H49572 S0006581794_V4

MPA Test Table (70 Percent N1 Corrected Fan Speed)
Figure 503/71-00-00-990-821-F00 (Sheet 4 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX %N2							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
27	-3	67.8	87.5	87.5	87.4	88.0	88.6	89.2	89.3	89.6
28	-2	67.9	87.7	87.7	87.6	88.2	88.8	89.4	89.5	89.8
30	-1	68.1	87.9	87.9	87.8	88.4	89.0	89.6	89.7	90.0
32	0	68.2	88.0	88.0	87.9	88.5	89.1	89.7	89.8	90.1
34	1	68.3	88.2	88.2	88.1	88.7	89.3	89.9	90.0	90.3
36	2	68.4	88.4	88.4	88.3	88.9	89.5	90.1	90.2	90.5
37	3	68.6	88.5	88.5	88.4	89.0	89.6	90.2	90.3	90.6
39	4	68.7	88.7	88.7	88.6	89.2	89.8	90.4	90.5	90.8
41	5	68.8	88.9	88.9	88.8	89.4	90.0	90.6	90.7	91.0
43	6	68.9	89.1	89.1	89.0	89.6	90.2	90.8	90.9	91.2
45	7	69.0	89.2	89.2	89.1	89.7	90.3	90.9	91.0	91.3
46	8	69.2	89.4	89.4	89.3	89.9	90.5	91.1	91.2	91.5
48	9	69.3	89.6	89.6	89.5	90.1	90.7	91.3	91.4	91.7
50	10	69.4	89.7	89.7	89.6	90.2	90.8	91.4	91.5	91.8
52	11	69.5	89.9	89.9	89.8	90.4	91.0	91.6	91.7	92.0
54	12	69.6	90.1	90.1	90.0	90.6	91.2	91.8	91.9	92.2
55	13	69.8	90.2	90.2	90.1	90.7	91.3	91.9	92.0	92.3
57	14	69.9	90.4	90.4	90.3	90.9	91.5	92.1	92.2	92.5
59	15	70.0	90.5	90.5	90.4	91.0	91.6	92.2	92.3	92.6
61	16	70.1	90.7	90.7	90.6	91.2	91.8	92.4	92.5	92.8
63	17	70.2	90.9	90.9	90.8	91.4	92.0	92.6	92.7	93.0
64	18	70.4	91.0	91.0	90.9	91.5	92.1	92.7	92.8	93.1
66	19	70.5	91.2	91.2	91.1	91.7	92.3	92.9	93.0	93.3
68	20	70.6	91.4	91.4	91.3	91.9	92.5	93.1	93.2	93.5
70	21	70.7	91.5	91.5	91.4	92.0	92.6	93.2	93.3	93.6
72	22	70.8	91.7	91.7	91.6	92.2	92.8	93.4	93.5	93.8
73	23	70.9	91.8	91.8	91.7	92.3	92.9	93.5	93.6	93.9
75	24	71.1	92.0	92.0	91.9	92.5	93.1	93.7	93.8	94.1
77	25	71.2	92.2	92.2	92.1	92.7	93.3	93.9	94.0	94.3
79	26	71.3	92.3	92.3	92.2	92.8	93.4	94.0	94.1	94.4
81	27	71.4	92.5	92.5	92.4	93.0	93.6	94.2	94.3	94.6
82	28	71.5	92.6	92.6	92.5	93.1	93.7	94.3	94.4	94.7
84	29	71.7	92.8	92.8	92.7	93.3	93.9	94.5	94.6	94.9
86	30	71.8	92.9	92.9	92.8	93.4	94.0	94.6	94.7	95.0
88	31	71.9	93.1	93.1	93.0	93.6	94.2	94.8	94.9	95.2
90	32	72.0	93.3	93.3	93.2	93.8	94.4	95.0	95.1	95.4
91	33	72.1	93.4	93.4	93.3	93.9	94.5	95.1	95.2	95.5

GMM-1156648-00-A (MOD)

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

H49591 S0006581795_V4

MPA Test Table (70 Percent N1 Corrected Fan Speed)
Figure 503/71-00-00-990-821-F00 (Sheet 5 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX %N2							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
93	34	72.2	93.6	93.6	93.5	94.1	94.7	95.3	95.4	95.7
95	35	72.3	93.7	93.7	93.6	94.2	94.8	95.4	95.5	95.8
97	36	72.5	93.9	93.9	93.8	94.4	95.0	95.6	95.7	96.0
99	37	72.6	94.0	94.0	93.9	94.5	95.1	95.7	95.8	96.1
100	38	72.7	94.2	94.2	94.1	94.7	95.3	95.9	96.0	96.3
102	39	72.8	94.4	94.4	94.3	94.9	95.5	96.1	96.2	96.5
104	40	72.9	94.5	94.5	94.4	95.0	95.6	96.2	96.3	96.6
106	41	73.0	94.7	94.7	94.6	95.2	95.8	96.4	96.5	96.8
108	42	73.1	94.8	94.8	94.7	95.3	95.9	96.5	96.6	96.9
109	43	73.3	95.0	95.0	94.9	95.5	96.1	96.7	96.8	97.1
111	44	73.4	95.1	95.1	95.0	95.6	96.2	96.8	96.9	97.2
113	45	73.5	95.3	95.3	95.2	95.8	96.4	97.0	97.1	97.4
115	46	73.6	95.4	95.4	95.3	95.9	96.5	97.1	97.2	97.5
117	47	73.7	95.6	95.6	95.5	96.1	96.7	97.3	97.4	97.7
118	48	73.8	95.8	95.8	95.7	96.3	96.9	97.5	97.6	97.9
120	49	73.9	95.9	95.9	95.8	96.4	97.0	97.6	97.7	98.0
122	50	74.1	96.1	96.1	96.0	96.6	97.2	97.8	97.9	98.2

GMM-1156648-00-A (MOD)

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

H49601 S0006581796_V4

MPA Test Table (70 Percent N1 Corrected Fan Speed)
Figure 503/71-00-00-990-821-F00 (Sheet 6 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX EGT - °C							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
-40	-40	67.6	516	515	534	538	574	576	597	626
-38	-39	67.8	519	518	537	541	577	579	600	629
-36	-38	67.9	522	521	540	544	580	582	603	632
-35	-37	68.0	525	524	543	547	583	585	606	635
-33	-36	68.2	527	526	545	549	585	587	608	637
-31	-35	68.3	530	529	548	552	588	590	611	640
-29	-34	68.5	533	532	551	555	591	593	614	643
-27	-33	68.6	536	535	554	558	594	596	617	646
-26	-32	68.7	538	537	556	560	596	598	619	648
-24	-31	68.9	541	540	559	563	599	601	622	651
-22	-30	69.0	544	543	562	566	602	604	625	654
-20	-29	69.2	547	546	565	569	605	607	628	657
-18	-28	69.3	549	548	567	571	607	609	630	659
-17	-27	69.4	552	551	570	574	610	612	633	662
-15	-26	69.6	555	554	573	577	613	615	636	665
-13	-25	69.7	558	557	576	580	616	618	639	668
-11	-24	69.8	560	559	578	582	618	620	641	670
-9	-23	70.0	563	562	581	585	621	623	644	673
-8	-22	70.1	565	564	583	587	623	625	646	675
-6	-21	70.3	568	567	586	590	626	628	649	678
-4	-20	70.4	570	569	588	592	628	630	651	680
-2	-19	70.5	573	572	591	595	631	633	654	683
0	-18	70.7	575	574	593	597	633	635	656	685
1	-17	70.8	578	577	596	600	636	638	659	688
3	-16	70.9	580	579	598	602	638	640	661	690
5	-15	71.1	583	582	601	605	641	643	664	693
7	-14	71.2	585	584	603	607	643	645	666	695
9	-13	71.3	588	587	606	610	646	648	669	698
10	-12	71.5	590	589	608	612	648	650	671	700
12	-11	71.6	593	592	611	615	651	653	674	703
14	-10	71.7	595	594	613	617	653	655	676	705
16	-9	71.9	598	597	616	620	656	658	679	708
18	-8	72.0	600	599	618	622	658	660	681	710
19	-7	72.1	603	602	621	625	661	663	684	713
21	-6	72.3	605	604	623	627	663	665	686	715
23	-5	72.4	608	607	626	630	666	668	689	718
25	-4	72.5	610	609	628	632	668	670	691	720

GMM-1156649-00-A (MOD)

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

G85150 S0006581797_V4

MPA Test Table (75 Percent N1 Corrected Fan Speed)
Figure 504/71-00-00-990-822-F00 (Sheet 1 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX EGT - °C							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
27	-3	72.7	613	612	631	635	671	673	694	723
28	-2	72.8	615	614	633	637	673	675	696	725
30	-1	72.9	617	616	635	639	675	677	698	727
32	0	73.1	620	619	638	642	678	680	701	730
34	1	73.2	622	621	640	644	680	682	703	732
36	2	73.3	625	624	643	647	683	685	706	735
37	3	73.5	628	627	646	650	686	688	709	738
39	4	73.6	630	629	648	652	688	690	711	740
41	5	73.7	633	632	651	655	691	693	714	743
43	6	73.8	635	634	653	657	693	695	716	745
45	7	74.0	638	637	656	660	696	698	719	748
46	8	74.1	640	639	658	662	698	700	721	750
48	9	74.2	643	642	661	665	701	703	724	753
50	10	74.4	645	644	663	667	703	705	726	755
52	11	74.5	648	647	666	670	706	708	729	758
54	12	74.6	650	649	668	672	708	710	731	760
55	13	74.7	653	652	671	675	711	713	734	763
57	14	74.9	655	654	673	677	713	715	736	765
59	15	75.0	658	657	676	680	716	718	739	768
61	16	75.1	660	659	678	682	718	720	741	770
63	17	75.3	662	661	680	684	720	722	743	772
64	18	75.4	665	664	683	687	723	725	746	775
66	19	75.5	667	666	685	689	725	727	748	777
68	20	75.6	670	669	688	692	728	730	751	780
70	21	75.8	672	671	690	694	730	732	753	782
72	22	75.9	675	674	693	697	733	735	756	785
73	23	76.0	677	676	695	699	735	737	758	787
75	24	76.1	680	679	698	702	738	740	761	790
77	25	76.3	682	681	700	704	740	742	763	792
79	26	76.4	685	684	703	707	743	745	766	795
81	27	76.5	687	686	705	709	745	747	768	797
82	28	76.6	689	688	707	711	747	749	770	799
84	29	76.8	692	691	710	714	750	752	773	802
86	30	76.9	694	693	712	716	752	754	775	804
88	31	77.0	696	695	714	718	754	756	777	806
90	32	77.1	699	698	717	721	757	759	780	809

GMM-1156649-00-A (MOD)
GMM-1156650-00-A (MOD)

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

G85186 S0006581798_V4

MPA Test Table (75 Percent N1 Corrected Fan Speed)
Figure 504/71-00-00-990-822-F00 (Sheet 2 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX EGT - °C							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
91	33	77.3	701	700	719	723	759	761	782	811
93	34	77.4	703	702	721	725	761	763	784	813
95	35	77.5	706	705	724	728	764	766	787	816
97	36	77.6	708	707	726	730	766	768	789	818
99	37	77.8	710	709	728	732	768	770	791	820
100	38	77.9	712	711	730	734	770	772	793	822
102	39	78.0	715	714	733	737	773	775	796	825
104	40	78.1	717	716	735	739	775	777	798	827
106	41	78.2	720	719	738	742	778	780	801	830
108	42	78.4	722	721	740	744	780	782	803	832
109	43	78.5	724	723	742	746	782	784	805	834
111	44	78.6	726	725	744	748	784	786	807	836
113	45	78.7	729	728	747	751	787	789	810	839
115	46	78.8	731	730	749	753	789	791	812	841
117	47	79.0	733	732	751	755	791	793	814	843
118	48	79.1	735	734	753	757	793	795	816	845
120	49	79.2	737	736	755	759	795	797	818	847
122	50	79.3	739	738	757	761	797	799	820	849

GMM-1156650-00-A (MOD)

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

G86703 S0006581799_V4

MPA Test Table (75 Percent N1 Corrected Fan Speed)
Figure 504/71-00-00-990-822-F00 (Sheet 3 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX %N2							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
-40	-40	67.6	82.7	82.7	82.6	83.2	83.8	84.4	84.5	84.8
-38	-39	67.8	82.9	82.9	82.8	83.4	84.0	84.6	84.7	85.0
-36	-38	67.9	83.1	83.1	83.0	83.6	84.2	84.8	84.9	85.2
-35	-37	68.0	83.2	83.2	83.1	83.7	84.3	84.9	85.0	85.3
-33	-36	68.2	83.4	83.4	83.3	83.9	84.5	85.1	85.2	85.5
-31	-35	68.3	83.6	83.6	83.5	84.1	84.7	85.3	85.4	85.7
-29	-34	68.5	83.7	83.7	83.6	84.2	84.8	85.4	85.5	85.8
-27	-33	68.6	83.9	83.9	83.8	84.4	85.0	85.6	85.7	86.0
-26	-32	68.7	84.1	84.1	84.0	84.6	85.2	85.8	85.9	86.2
-24	-31	68.9	84.3	84.3	84.2	84.8	85.4	86.0	86.1	86.4
-22	-30	69.0	84.4	84.4	84.3	84.9	85.5	86.1	86.2	86.5
-20	-29	69.2	84.6	84.6	84.5	85.1	85.7	86.3	86.4	86.7
-18	-28	69.3	84.8	84.8	84.7	85.3	85.9	86.5	86.6	86.9
-17	-27	69.4	85.0	85.0	84.9	85.5	86.1	86.7	86.8	87.1
-15	-26	69.6	85.1	85.1	85.0	85.6	86.2	86.8	86.9	87.2
-13	-25	69.7	85.3	85.3	85.2	85.8	86.4	87.0	87.1	87.4
-11	-24	69.8	85.5	85.5	85.4	86.0	86.6	87.2	87.3	87.6
-9	-23	70.0	85.7	85.7	85.6	86.2	86.8	87.4	87.5	87.8
-8	-22	70.1	85.8	85.8	85.7	86.3	86.9	87.5	87.6	87.9
-6	-21	70.3	86.0	86.0	85.9	86.5	87.1	87.7	87.8	88.1
-4	-20	70.4	86.2	86.2	86.1	86.7	87.3	87.9	88.0	88.3
-2	-19	70.5	86.3	86.3	86.2	86.8	87.4	88.0	88.1	88.4
0	-18	70.7	86.5	86.5	86.4	87.0	87.6	88.2	88.3	88.6
1	-17	70.8	83.7	86.7	86.6	87.2	87.8	88.4	88.5	88.8
3	-16	70.9	86.9	86.9	86.8	87.4	88.0	88.6	88.7	89.0
5	-15	71.1	87.0	87.0	86.9	87.5	88.1	88.7	88.8	89.1
7	-14	71.2	87.2	87.2	87.1	87.7	88.3	88.9	89.0	89.3
9	-13	71.3	87.4	87.4	87.3	87.9	88.5	89.1	89.2	89.5
10	-12	71.5	87.5	87.5	87.4	88.0	88.6	89.2	89.3	89.6
12	-11	71.6	87.7	87.7	87.6	88.2	88.8	89.4	89.5	89.8
14	-10	71.7	87.9	87.9	87.8	88.4	89.0	89.6	89.7	90.0
16	-9	71.9	88.1	88.1	88.0	88.6	89.2	89.8	89.9	90.2
18	-8	72.0	88.2	88.2	88.1	88.7	89.3	89.9	90.0	90.3
19	-7	72.1	88.4	88.4	88.3	88.9	89.5	90.1	90.2	90.5
21	-6	72.3	88.6	88.6	88.5	89.1	89.7	90.3	90.4	90.7
23	-5	72.4	88.7	88.7	88.6	89.2	89.8	90.4	90.5	90.8
25	-4	72.5	88.9	88.9	88.8	89.4	90.0	90.6	90.7	91.0

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

GMM-1156651-00-A (MOD)
H49125 S0006581800_V4

MPA Test Table (75 Percent N1 Corrected Fan Speed)
Figure 504/71-00-00-990-822-F00 (Sheet 4 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX %N2							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
27	-3	72.7	89.1	89.1	89.0	89.6	90.2	90.8	90.9	91.2
28	-2	72.8	89.3	89.3	89.2	89.8	90.4	91.0	91.1	91.4
30	-1	72.9	89.4	89.4	89.3	89.9	90.5	91.1	91.2	91.5
32	0	73.1	89.6	89.6	89.5	90.1	90.7	91.3	91.4	91.7
34	1	73.2	89.8	89.8	89.7	90.3	90.9	91.5	91.6	91.9
36	2	73.3	89.9	89.9	89.9	90.4	91.0	91.6	91.7	92.0
37	3	73.5	90.1	90.1	90.0	90.6	91.2	91.8	91.9	92.2
39	4	73.6	90.3	90.3	90.2	90.8	91.4	92.0	92.1	92.4
41	5	73.7	90.4	90.4	90.3	90.9	91.5	92.1	92.2	92.5
43	6	73.8	90.6	90.6	90.5	91.1	91.7	92.3	92.4	92.7
45	7	74.0	90.8	90.8	90.7	91.3	91.9	92.5	92.6	92.9
46	8	74.1	90.9	90.9	90.8	91.4	92.0	92.6	92.7	93.0
48	9	74.2	91.1	91.1	91.0	91.6	92.2	92.8	92.9	93.2
50	10	74.4	91.3	91.3	91.2	91.8	92.4	93.0	93.1	93.4
52	11	74.5	91.4	91.4	91.3	91.9	92.5	93.1	93.2	93.5
54	12	74.6	91.6	91.6	91.5	92.1	92.7	93.3	93.4	93.7
55	13	74.7	91.8	91.8	91.7	92.3	92.9	93.5	93.6	93.9
57	14	74.9	91.9	91.9	91.8	92.4	93.0	93.6	93.7	94.0
59	15	75.0	92.1	92.1	92.0	92.6	93.2	93.8	93.9	94.2
61	16	75.1	92.3	92.3	92.2	92.8	93.4	94.0	94.1	94.4
63	17	75.3	92.4	92.4	92.3	92.9	93.5	94.1	94.2	94.5
64	18	75.4	92.6	92.6	92.5	93.1	93.7	94.3	94.4	94.7
66	19	75.5	92.8	92.8	92.7	93.3	93.9	94.5	94.6	94.9
68	20	75.6	92.9	92.9	92.8	93.4	94.0	94.6	94.7	95.0
70	21	75.8	93.1	93.1	93.0	93.6	94.2	94.8	94.9	95.2
72	22	75.9	93.2	93.2	93.1	93.7	94.3	94.9	95.0	95.3
73	23	76.0	93.4	93.4	93.3	93.9	94.5	95.1	95.2	95.5
75	24	76.1	93.6	93.6	93.5	94.1	94.7	95.3	95.4	95.7
77	25	76.3	93.7	93.7	93.6	94.2	94.8	95.4	95.5	95.8
79	26	76.4	93.9	93.9	93.8	94.4	95.0	95.6	95.7	96.0
81	27	76.5	94.1	94.1	94.0	94.6	95.2	95.8	95.9	96.2
82	28	76.6	94.2	94.2	94.1	94.7	95.3	95.9	96.0	96.3
84	29	76.8	94.4	94.4	94.3	94.9	95.5	96.1	96.2	96.5
86	30	76.9	94.5	94.5	94.4	95.0	95.6	96.2	96.3	96.6
88	31	77.0	94.7	94.7	94.6	95.2	95.8	96.4	96.5	96.8
90	32	77.1	94.9	94.9	94.8	95.4	96.0	96.6	96.7	97.0

GMM-1156651-00-A (MOD)
GMM-1156652-00-A (MOD)

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

H49245 S0006581801_V5

MPA Test Table (75 Percent N1 Corrected Fan Speed)
Figure 504/71-00-00-990-822-F00 (Sheet 5 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OAT		%N1 TARGET	MAX %N2							
			ENGINE MODEL 1							
°F	°C	±0.5%	7B27/B1	7B27 7B27/B3	7B26 7B26/B1 7B26/B2	7B24/B1	7B24	7B22/B1	7B22	7B20
91	33	77.3	95.0	95.0	94.9	95.5	96.1	96.7	96.8	97.1
93	34	77.4	95.2	95.2	95.1	95.7	96.3	96.9	97.0	97.3
95	35	77.5	95.3	95.3	95.2	95.8	96.4	97.0	97.1	97.4
97	36	77.6	95.5	95.5	95.4	96.0	96.6	97.2	97.3	97.6
99	37	77.8	95.7	95.7	95.6	96.2	96.8	97.4	97.5	97.8
100	38	77.9	95.8	95.8	95.7	96.3	96.9	97.5	97.6	97.9
102	39	78.0	96.0	96.0	95.9	96.5	97.1	97.7	97.8	98.1
104	40	78.1	96.1	96.1	96.0	96.6	97.2	97.8	97.9	98.2
106	41	78.2	96.3	96.3	96.2	96.8	97.4	98.0	98.1	98.4
108	42	78.4	96.4	96.4	96.3	96.9	97.5	98.1	98.2	98.5
109	43	78.5	96.6	96.6	96.5	97.1	97.7	98.3	98.4	98.7
111	44	78.6	96.7	96.7	96.6	97.2	97.8	98.4	98.5	98.8
113	45	78.7	96.9	96.9	96.8	97.4	98.0	98.6	98.7	99.0
115	46	78.8	97.1	97.1	97.0	97.6	98.2	98.8	98.9	99.2
117	47	79.0	97.2	97.2	97.1	97.7	98.3	98.9	99.0	99.3
118	48	79.1	97.4	97.4	97.3	97.9	98.5	99.1	99.2	99.5
120	49	79.2	97.6	97.6	97.5	98.1	98.7	99.3	99.4	99.7
122	50	79.3	97.7	97.7	97.6	98.2	98.8	99.4	99.5	99.8

1 APPLICABLE TO ALL /3, /3F, AND -7BE RATINGS

GMM-1156652-00-A (MOD)

H49254 S0006581802_V5

MPA Test Table (75 Percent N1 Corrected Fan Speed)
Figure 504/71-00-00-990-822-F00 (Sheet 6 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-700-814-F00

8. Test 7 - Vibration Survey

A. General

(1) This test gives the necessary data to make sure that the engine vibration is in the permitted levels.

(2) If the vibration levels are above the permitted levels, install the test equipment or use the Airborne Vibration Monitor (AVM) flight history to isolate the source of the vibration as part of FIM 71-05 TASK 808.

(3) Use the vibration survey for fault isolation as part of FIM 71-05 TASK 808.

(4) This test should also be performed when a non-pre-tested engine is installed or after a component replacement as it is specified in the Power Plant Test Reference Table.

(5) For engine vibration above 1.0 units, use operator policy for engine vibration management.

(a) Engine vibration in the 1.5-2.5 units can result in cabin and flight deck reports of engine related noise or vibration.

(6) For this procedure, the airborne vibration monitoring signal conditioner will be referred to as the AVM.

(7) For on-board fan trim balance vibration data requirements, refer to (TASK 71-00-00-750-802-F00 or TASK 71-00-00-750-806-F00 or TASK 71-00-00-750-805-F00 or TASK 71-00-00-750-803-F00).

B. References

Reference	Title
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (P/B 201)
77-31-00-910-801-F00	ARINC 429 Data Bus Charts (P/B 201)
FIM 71-05 TASK 808	Engine Vibration, Vibration High - 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-1562	Analyzer - Data Bus, ARINC 429 Part #: 01-1001-05 Supplier: 0Z3C6 Part #: 01-1001-12 Supplier: 0Z3C6 Part #: 403557 Supplier: CG603 Part #: 800-0630 Supplier: 1JSZ6 Part #: DT400H-01 Supplier: 0Z3C6 Part #: UA1410 Supplier: 0H231 Opt Part #: 01-1001-10 Supplier: 0Z3C6 Opt Part #: 01-1404-00 Supplier: 41364 Opt Part #: 1116-4000-21 Supplier: A0197 Opt Part #: 429EBP Supplier: 41364 Opt Part #: 429EX Supplier: 41364 Opt Part #: 702125-01 Supplier: CG603 Opt Part #: DT400H Supplier: 0Z3C6 Opt Part #: MODEL 429HBA Supplier: 5J927 Opt Part #: TYPE 030/026 Supplier: $0494

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(Continued)

Reference	Description
COM-3932	System - Portable Engine Balancing Part #: PBS-4100 Supplier: 26741
SPL-2415	Test Box - Generic AVM Interface Part #: C77004-10 Supplier: 81205

D. Consumable Materials

Reference	Description	Specification
G00270	Tape - Scotch Flatback Masking 250	ASTM D6123 (Supersedes A-A-883)

E. Location Zones

Zone	Area
117	Electrical and Electronics Compartment - Left
118	Electrical and Electronics Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Access Panels

Number	Name/Location
117A	Electronic Equipment Access Door

G. Prepare for the Test

SUBTASK 71-00-00-970-027-F00

(1) Find and record these conditions:

> **CAUTION** DO NOT USE THE TOTAL AIR TEMPERATURE (TAT) INDICATION FROM THE AIRPLANE FOR THE AMBIENT AIR TEMPERATURE. IF YOU DO NOT OBEY, THE TAT CAN CAUSE AN INCORRECT N1 TARGET SELECTION.

> **CAUTION** DO NOT USE THE MERCURY THERMOMETER ON THE AIRPLANE. MERCURY (FROM A BROKEN THERMOMETER) CAN CAUSE DAMAGE TO THE AIRPLANE COMPONENTS.

(a) Record the ambient air temperature (outside air temperature) in the shade of the wheel well for the nose gear.

(b) Use the OAT to find the N1 Takeoff (TO) speed:

1) Enter the OAT on the FMC N1 Limits Page.

a) Enter a slash (/) before you enter the number.

2) Select TO or alternately TO-B if available.

3) Find the N1 speed on the FMC Takeoff Ref Page and record on the data sheet.

4) Make sure that the Thrust Mode Display shows TO.

5) Make sure that the outer knob of the N1 Set Control, on the P2 panel, is in the AUTO position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

6) Make sure that the Reference N1 Bug agrees with the N1 takeoff speed.

SUBTASK 71-00-00-010-021-F00

(2) If it is necessary to know individual rotor vibration values, do these steps to install the analyzer, COM-1562:

NOTE: If you will use the AVM flight history, continue to the next subtask to examine the balance weights in the AVM memory.

(a) Refer to FIM 71-05 TASK 808 for the vibration data requirements for high vibration fault isolation and troubleshooting.

(b) Open this access panel:

Number	Name/Location
117A	Electronic Equipment Access Door

(c) Connect the test box, SPL-2415, to the front panel of the AVM signal conditioner.

(d) Put the test box, SPL-2415, outside and below the flight compartment.

(e) Put the analyzer, COM-1562, in the flight compartment.

(f) Open the right flight compartment window and put the test box, SPL-2415, in the flight compartment.

(g) Use Scotch Flatback Masking Tape 250, G00270, to temporarily attach the cable to the side of the airplane.

(h) Connect the analyzer, COM-1562, to the test box, SPL-2415.

(i) For an alternate analyzer, you can use the portable engine balancing system, COM-3932

1) To install this analyzer, refer to the task, Test 14C - Fan Trim Balance (Analyzer Procedure), TASK 71-00-00-750-805-F00.

SUBTASK 71-00-00-970-087-F00

(3) If the test is to get vibration data for an on-board fan trim balance, make sure the balance weights installed on the engine agree with the AVM (TASK 71-00-00-750-802-F00 or TASK 71-00-00-750-806-F00 or TASK 71-00-00-750-805-F00 or TASK 71-00-00-750-803-F00).

H. Vibration Survey

SUBTASK 71-00-00-860-163-F00

(1) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

NOTE: Make sure to avoid or limit a crosswind condition in the Engine Ground Safety Precautions.

(a) Let the engine become stable at the idle position for a minimum of 2 minutes.

(b) Make sure that all the pneumatic bleeds and electrical loads are off.

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 pilot probe is heated.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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 pilot probe is heated.

LOM ALL

(e) Make sure that all engine indications are normal.

SUBTASK 71-00-00-970-028-F00

CAUTION

MAKE SURE THAT YOU DO NOT GO MORE THAN THE 4 UNITS (10 MILS) VIBRATION LIMIT FOR THE N1 ROTOR. IF YOU DO NOT OBEY, ENGINE DAMAGE CAN OCCUR.

(2) Slowly move the forward thrust lever (in not less than 20 seconds) to the 80 ±2% N1 position.

(a) Let the engine become stable at this speed for a minimum of 5 minutes.

NOTE: This lets the engine become thermally stable and makes sure the vibration indications are accurate.

SUBTASK 71-00-00-970-029-F00

(3) Move the forward thrust lever (in not less than 20 seconds) to the 50 ±2% N1 position.

(a) Let the engine become stable at this speed for a minimum of 30 seconds.

SUBTASK 71-00-00-860-212-F00

(4) Move the forward thrust lever to the idle position.

(a) Let the engine become stable at this speed for a minimum of 15 seconds.

SUBTASK 71-00-00-970-030-F00

(5) Do a slow acceleration of the engine from the minimum idle position to the Takeoff Power (TOP) N1 speed. Do step (5)(b) to get fan balance data necessary for Test 14B – Fan Trim Balance (On Board Procedure – Vibrometer AVM), TASK 71-00-00-750-803-F00. If not, do step (5)(a) and skip step (5)(b).

CAUTION

DO NOT GO MORE THAN THE TAKEOFF POWER SPEED FOR THE CURRENT CONDITIONS, ENGINE DAMAGE CAN OCCUR.

(a) Alternative procedure available. 2-Minute Slow Acceleration Procedure

1) Do a slow acceleration with pauses at the lower fan speeds as follows:

a) Do a 2 minute acceleration of the engine from the minimum idle position to TOP N1 speed.

b) During the acceleration, monitor the applicable engine vibration indications.

c) Record the N1 percent and the N2 percent where the maximum vibrations occur (if more than one).

d) Let the engine become stable at TOP speed for a minimum of 15 seconds.

e) Go to SUBTASK 71–00–00–970–031–F00.

(b) Alternative procedure. Alternative Acceleration Procedure

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Accelerate the engine from the minimum idle position to the Takeoff Power (TOP) N1 speed. During the acceleration, pause for 1 to 2 minutes at each of the applicable fan speeds ±1 percent N1. Do not use the fan speeds that are more than the TOP speed.

NOTE: The N1 and vibration levels must be stable for at least 30 seconds to get data with N1 stable within 1 percent, and vibration stable less than 0.1 units.

a) 64.0 percent N1

b) 81.5 percent N1

c) 86.5 percent N1

d) 91.0 percent N1

e) 94.5 - 97.4 percent N1

2) During the acceleration, monitor the applicable engine vibration indications.

3) Record the N1 percent and the N2 percent where the maximum vibrations occur (if more than one).

4) Let the engine become stable at TOP speed for a minimum of 15 seconds.

SUBTASK 71-00-00-970-031-F00

(6) Do a 2-minute deceleration of the engine from the TOP speed to the minimum idle position.

(a) During the deceleration, monitor the applicable engine vibration indications.

(b) Record the N1% and the N2% where all the maximum vibrations occur (if more than one).

(c) Let the engine become stable at the idle speed for a minimum of 15 seconds. If vibration is not high go to SUBTASK 71-00-00-980-003-F00.

SUBTASK 71-00-00-970-032-F00

(7) If there is high vibration, do these steps to find the source of the vibration:

(a) Move the forward thrust lever for the applicable engine to the speed where the first maximum vibration indication occurred.

1) Let the engine become stable at this speed for 2 minutes.

(b) Use the analyzer, COM-1562, to record the vibration indication data from the No.1 bearing vibration sensor first and then the FFCC vibration sensor.

NOTE: To find the ARINC 429 labels for the vibration data refer to this task: ARINC 429 Data Bus Charts (TASK 77-31-00-910-801-F00).

NOTE: The display on the CDS shows a maximum vibration indication only. This maximum vibration can be from the No.1 bearing sensor or the FFCC vibration sensor. If you use the analyzer, COM-1562, you can get the N1 and N2 rotor vibration data from each sensor.

(c) If installed, use the portable engine balancing system, COM-3932, to find and record the vibration indication data from the No.1 bearing vibration sensor first and then the FFCC vibration sensor.

SUBTASK 71-00-00-970-033-F00

(8) Do the above step again for all of the high vibration points that you found (if there is more than one) during the engine acceleration.

SUBTASK 71-00-00-980-003-F00

(9) If the forward thrust lever is not at idle, slowly move the forward thrust lever to the idle position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Let the engine become stable at this speed for 3 minutes.

LOM 404, 407, 420 PRE SB 737-30A1063

(b) 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

(c) Make sure that the Probe Heat "A" and "B" switches, on the P5 overhead panel, are in the AUTO position.

LOM ALL

SUBTASK 71-00-00-860-164-F00

(10) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 71-00-00-970-088-F00

(11) If the test is to get vibration data for an on-board fan trim balance, view the flight history data (TASK 71-00-00-750-802-F00 or TASK 71-00-00-750-806-F00 or TASK 71-00-00-750-805-F00 or TASK 71-00-00-750-803-F00).

SUBTASK 71-00-00-810-001-F00

(12) If the vibration indications for the fan and low pressure turbine rotor (N1) is more than 4.0 units or is less than 4.0 units with engine noise or rumble, do the fault isolation procedure for high engine vibration FIM 71-05 TASK 808.

SUBTASK 71-00-00-810-002-F00

(13) If the vibration indications for the high pressure compressor and turbine (N2) is more than 3.0 units, do the fault isolation procedure for high engine vibration FIM 71-05 TASK 808.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-080-008-F00

(1) If you installed the portable engine balancing system, COM-3932, remove the analyzer.

SUBTASK 71-00-00-010-022-F00

(2) If you installed the analyzer, COM-1562, do these steps to remove the analyzer:

(a) Disconnect the analyzer, COM-1562, from the test box, SPL-2415.

(b) Remove the test box, SPL-2415, from the flight compartment window and close the window.

(c) Disconnect the test box, SPL-2415, from the front panel of the AVM signal conditioner.

(d) Remove the analyzer, COM-1562, from the flight compartment.

(e) Close this access panel:

Number	Name/Location
117A	Electronic Equipment Access Door

END OF TASK

TASK 71-00-00-700-824-F00

9. Test 8 - Acceleration Check

A. General

(1) The acceleration check is a good test for transient performance analysis of the engine.

(a) Do not use the test by itself to accept or reject an engine.

(2) Do this test to make sure that the engine has usual acceleration performance.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B. References

Reference	Title
24-22-00-860-811	Supply Electrical Power (P/B 201)
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (P/B 201)
73-21-00-740-803-F00	EEC BITE TEST - RECENT FAULTS (P/B 501)
FIM 73-05 TASK 814	Engine is Slow to Accelerate - Fault Isolation

C. Tools/Equipment

Reference	Description
STD-1122	Thermometer - Alcohol/Mercury (or equivalent meter meets task requirements)
STD-1139	Timer - stopwatch, accurate to within 1 second

D. Location Zones

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

E. Acceleration Check

SUBTASK 71-00-00-970-056-F00

CAUTION DO NOT USE THE TOTAL AIR TEMPERATURE (TAT) INDICATION FROM THE AIRPLANE FOR THE AMBIENT AIR TEMPERATURE. IF YOU DO NOT OBEY, THE TAT CAN CAUSE AN INCORRECT N1 TARGET SELECTION.

CAUTION DO NOT USE THE MERCURY THERMOMETER ON THE AIRPLANE. MERCURY (FROM A BROKEN THERMOMETER) CAN CAUSE DAMAGE TO THE AIRPLANE COMPONENTS.

(1) Use a thermometer, STD-1122, to get the ambient air temperature (OAT) in the shade of the nose wheel well.

(a) Record the OAT on the data sheet.

SUBTASK 71-00-00-970-057-F00

(2) Use the OAT to get the N1 target speed and the N2 starting point:

(a) For N1, use the MPA Test Table - 70% N1 Corrected Fan Speed (Figure 503).

(b) For N2, use the (Table 511).

(c) Record the N1 and N2 speeds for the OAT on the data sheet.

SUBTASK 71-00-00-860-182-F00

(3) If not already done, do this task: Supply Electrical Power, TASK 24-22-00-860-811.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-860-183-F00

WARNING	MAKE SURE THAT YOU OBEY ALL THE INSTRUCTIONS AND PRECAUTIONS WHEN YOU OPERATE AN ENGINE AT HIGH POWER. IF YOU DO NOT OBEY THE INSTRUCTIONS AND PRECAUTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

(a) Make sure that the BLEED 1 and BLEED 2 switches are in the OFF position.

(b) Set the applicable GEN switch to the OFF position and release.

NOTE: This will remove the load from the IDG, if it is not already removed.

1) Make sure that the applicable GEN OFF BUS light comes on.

(c) Let the engine become stable at the idle-power position for five minutes.

SUBTASK 71-00-00-860-184-F00

(5) Make sure that the applicable switches, on the P5 overhead panel, are in the OFF position:

(a) WING ANTI-ICE

(b) ENG ANTI-ICE 1 or 2.

LOM 404, 407, 420 PRE SB 737-30A1063

SUBTASK 71-00-00-860-185-F00

(6) 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

SUBTASK 71-00-00-860-748-F00

(7) 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

SUBTASK 71-00-00-860-186-F00

(8) Monitor all engine parameters.

(a) Carefully monitor the EGT and N2 indications.

SUBTASK 71-00-00-700-001-F00

(9) To do the acceleration check with the N1 and N2 speeds, use a stopwatch, STD-1139, and do these thrust lever movements:

(a) Slowly move the applicable forward thrust lever to 5% N1 speed more than the N1 target speed that you got from the MPA Test Table (70% N1) (Figure 503).

(b) Mark the thrust lever position (control stand) with a piece of tape or pencil.

1) Minimize the amount of time spent at more than idle.

(c) To decelerate, slowly move the applicable forward thrust lever back to the N2 starting point +/-0.3% (Table 511).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(d) When the engine parameters are stable, quickly move the thrust lever to the marked position.

(e) Start the stopwatch at the initial thrust lever movement.

(f) Stop the stopwatch when N1 is at the N1 MPA target speed (not target + 5%).

(g) Slowly move the applicable thrust lever back to the idle position.

(h) Record the acceleration time on the data sheet.

(i) If the test is performed above sea level, subtract 0.25 seconds for each 1000 ft (304.8 m) altitude from the recorded acceleration time.

1) Record the adjusted acceleration time on the data sheet.

(j) Make sure the adjusted acceleration time is less than 6.3 seconds.

(k) If the adjusted acceleration time is not in the limits, do this task: Engine is Slow to Accelerate - Fault Isolation, FIM 73-05 TASK 814.

SUBTASK 71-00-00-860-187-F00

(10) When the acceleration check is complete, do these tasks:

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) Make sure that the Probe Heat "A" and "B" switches, on the P5 overhead panel, are in the AUTO position.

LOM ALL

(c) Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 71-00-00-860-188-F00

(11) Do this task: EEC BITE TEST - RECENT FAULTS, TASK 73-21-00-740-803-F00.

SUBTASK 71-00-00-860-189-F00

(12) The table below shows the N2/OAT Acceleration Test data (Table 511):

Table 511/71-00-00-993-882-F00

OAT Deg F (C)	%N2	OAT Deg F (C)	%N2	OAT Deg F (C)	%N2	OAT Deg F (C)	%N2
-40 (-40)	65.0	1 (-17)	68.1	43 (6)	71.1	84 (29)	74.0
-38 (-39)	65.1	3 (-16)	68.3	45 (7)	71.3	86 (30)	74.2
-36 (-38)	65.3	5 (-15)	68.4	46 (8)	71.4	88 (31)	74.3
-35 (-37)	65.4	7 (-14)	68.6	48 (9)	71.5	90 (32)	74.4
-33 (-36)	65.5	9 (-13)	68.7	50 (10)	71.7	91 (33)	74.5
-31 (-35)	65.7	10 (-12)	68.8	52 (11)	71.8	93 (34)	74.6
-29 (-34)	65.8	12 (-11)	69.0	54 (12)	71.9	95 (35)	74.8
-27 (-33)	66.0	14 (-10)	69.1	55 (13)	72.0	97 (36)	74.9
-26 (-32)	66.1	16 (-9)	69.2	57 (14)	72.2	99 (37)	75.0
-24 (-31)	66.2	18 (-8)	69.4	59 (15)	72.3	100 (38)	75.1
-22 (-30)	66.4	19 (-7)	69.5	61 (16)	72.4	102 (39)	75.3

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Table 511/71-00-00-993-882-F00 (Continued)

OAT Deg F (C)	%N2	OAT Deg F (C)	%N2	OAT Deg F (C)	%N2	OAT Deg F (C)	%N2
-20 (-29)	66.5	21 (-6)	69.6	63 (17)	72.6	104 (40)	75.4
-18 (-28)	66.7	23 (-5)	69.7	64 (18)	72.7	106 (41)	75.5
-17 (-27)	66.8	25 (-4)	69.9	66 (19)	72.8	108 (42)	75.6
-15 (-26)	66.9	27 (-3)	70.0	68 (20)	72.9	109 (43)	75.7
-13 (-25)	67.1	28 (-2)	70.1	70 (21)	73.0	111 (44)	75.9
-11 (-24)	67.2	30 (-1)	70.3	72 (22)	73.2	113 (45)	76.0
-9 (-23)	67.4	32 (0)	70.4	73 (23)	73.3	115 (46)	76.1
-8 (-22)	67.5	34 (1)	70.5	75 (24)	73.4	117 (47)	76.2
-6 (-21)	67.6	36 (2)	70.6	77 (25)	73.5	118 (48)	76.3
-4 (-20)	67.8	37 (3)	70.8	79 (26)	73.7	120 (49)	76.5
-2 (-19)	67.9	39 (4)	70.9	81 (27)	73.8	122 (50)	76.6
0 (-18)	68.0	41 (5)	71.0	82 (28)	73.9		

END OF TASK

TASK 71-00-00-700-816-F00

10. Test 9 - Replacement Engine Test (Pretested)

A. General

(1) This test does the checks that are necessary when a new pretested engine is installed on an airplane.

(2) A pretested engine is a complete engine, with or without the Boeing quick-engine-change (QEC) parts, that was operated satisfactorily in an approved test cell or if engine was previously removed for convenience or time staggering.

(3) If the replacement engine was not pretested, do this procedure: Test 10 - Replacement Engine Test (Untested) to do a check of the engine installation and operation.

(4) This procedure will do all the necessary checks for the Boeing QEC components on the engine.

B. References

Reference	Title
24-11-00-700-802	Number 1 IDG - Operational Test (P/B 501)
24-11-00-700-803	Number 2 IDG - Operational Test (P/B 501)
26-11-00-710-801	Engine Fire Detection - Operational Test (P/B 501)
29-11-00-860-804	Hydraulic System A or B Pressurization with an Engine-Driven Pump (EDP) (P/B 201)
30-21-00-710-801	Engine Cowl Anti-Icing - Operational Test (P/B 501)
36-00-00-860-801	Supply Pressure to the Pneumatic System (Selection) (P/B 201)
36-11-04-400-801	PRSOV Installation (P/B 401)
71-00-03-600-803-F00	Depreservation of an Engine On-Wing (Task Selection) (P/B 201)
71-71-00-200-801-F00	Engine Vents and Drains Inspection (P/B 601)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Title
73-21-00-700-804-F00	EEC TEST (P/B 501)
73-21-00-700-808-F00	IDENT/CONFIG (P/B 501)
73-21-00-700-809-F00	EEC Discretes Test (P/B 501)
73-21-00-740-803-F00	EEC BITE TEST - RECENT FAULTS (P/B 501)
73-21-00-800-801-F00	Erase All EEC Faults (P/B 501)
79-00-00-710-806-F00	DMS Operational Check (P/B 601)

C. Location Zones

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

D. Replacement Engine Test (Pretested)

SUBTASK 71-00-00-630-001-F00

(1) If the replacement engine was preserved, do this task: Depreservation of an Engine On-Wing (Task Selection), TASK 71-00-03-600-803-F00.

SUBTASK 71-00-00-740-005-F00

(2) Do this task: Erase All EEC Faults, TASK 73-21-00-800-801-F00.

SUBTASK 71-00-00-740-001-F00

(3) Do this task: EEC TEST, TASK 73-21-00-700-804-F00.

SUBTASK 71-00-00-740-002-F00

(4) Do this task: IDENT/CONFIG, TASK 73-21-00-700-808-F00.

(a) Make sure the engine rating and airplane model are correct.

(b) Make sure the engine serial number is correct for the applicable engine.

1) If the engine serial number is different, enter the correct engine serial number.

(c) Get access to the IDENT/CONFIG screen for the other engine and make sure the engine rating as shown on the screen is the same.

SUBTASK 71-00-00-740-010-F00

(5) Do this task: EEC Discretes Test, TASK 73-21-00-700-809-F00.

SUBTASK 71-00-00-710-004-F00

(6) Do this task: Engine Fire Detection - Operational Test, TASK 26-11-00-710-801.

SUBTASK 71-00-00-710-005-F00

(7) Do this leak check of the bleed air regulator and PRSOV (TASK 36-11-04-400-801).

NOTE: This check can be done after the Idle-Power Leak Check.

(a) With the APU or external ground source, do this task: Supply Pressure to the Pneumatic System (Selection), TASK 36-00-00-860-801.

(b) Open the PRSOV.

(c) Make sure there is no leakage at the sense line connections of the bleed air regulator and PRSOV.

SUBTASK 71-00-00-720-002-F00

(8) Do this task: Test 12 - Actuators Test, TASK 71-00-00-700-807-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) During the dry motor, make sure there is no leakage around the high stage valve, high stage regulator and precooler sense lines.

NOTE: This check can be done after the Idle-Power Leak Check.

LOM ALL; ENGINES WITH DEBRIS MONITORING SYSTEM

SUBTASK 71-00-00-710-009-F00

(9) If the engine has a Debris Monitoring System (DMS).

(a) Do this task: DMS Operational Check, TASK 79-00-00-710-806-F00.

LOM ALL

SUBTASK 71-00-00-860-167-F00

(10) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) During engine operation, make sure the pressure of the high stage valve is more than 10 psig.

(b) Make sure there is no fuel leakage from the fuel inlet hose.

(c) Do this task: Hydraulic System A or B Pressurization with an Engine-Driven Pump (EDP), TASK 29-11-00-860-804.

1) Make sure there are no hydraulic leaks from the hydraulic supply, hydraulic pressure or the case drain lines.

(d) For engine 1, do this task: Number 1 IDG - Operational Test, TASK 24-11-00-700-802

1) Do the steps to re-connect the IDG after the engine is stopped in the steps that follow.

(e) For engine 2, do this task: Number 2 IDG - Operational Test, TASK 24-11-00-700-803

1) Do the steps to re-connect the IDG after the engine is stopped in the steps that follow.

(f) Do this task: Engine Cowl Anti-Icing - Operational Test, TASK 30-21-00-710-801.

1) Follow the steps in the test to stop the engine, and then complete the remaining steps.

(g) After the engine is stopped, examine the engine drains for signs of leakage.

1) If you find signs of leakage, do this task: Engine Vents and Drains Inspection, TASK 71-71-00-200-801-F00.

(h) Re-connect the IDG.

SUBTASK 71-00-00-740-006-F00

(11) Do this task: EEC BITE TEST - RECENT FAULTS, TASK 73-21-00-740-803-F00.

(a) Look for maintenance messages in Flight Leg 0 in all dispatch categories.

NOTE: Flight Leg 0 will show the faults that occur during the most recent ground run of the engine. If the engine is started and stopped more than once, the data from previous ground runs is erased or replaced.

(b) Do the corrective action for all of the maintenance messages that you find.

SUBTASK 71-00-00-910-054-F00

(12) If you found and corrected maintenance messages or other problems, then do the applicable sections of the Replacement Engine Test again.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-700-817-F00

11. Test 10 - Replacement Engine Test (Untested)

A. General

(1) This test does the checks that are necessary when an untested engine is installed on an airplane.

(2) A untested engine is a complete engine, with or without the Boeing Quick Engine Change (QEC) parts, that was not tested in an approved test cell after these maintenance actions:

(a) Separation of a major module-to-major module flange (Fan Module, Core Module, LPT Module).

(b) Separation of a minor module flange (HPC Top or Bottom Case, Fan and Booster Module, No.1/2 Bearing Support Assembly, Inlet Gearbox, LPF Frame).

NOTE: Test 10 is not necessary on removed engines that were previously tested in an approved test cell or removed for convenience or time staggering.

(3) If the replacement engine was pretested, do this task: Test 9 - Replacement Engine Test (Pretested), TASK 71-00-00-700-816-F00.

(4) This task will do all the necessary checks for the Boeing QEC components on the engine.

B. References

Reference	Title
24-11-00-700-802	Number 1 IDG - Operational Test (P/B 501)
24-11-00-700-803	Number 2 IDG - Operational Test (P/B 501)
26-11-00-710-801	Engine Fire Detection - Operational Test (P/B 501)
29-11-00-860-804	Hydraulic System A or B Pressurization with an Engine-Driven Pump (EDP) (P/B 201)
30-21-00-710-801	Engine Cowl Anti-Icing - Operational Test (P/B 501)
36-00-00-860-801	Supply Pressure to the Pneumatic System (Selection) (P/B 201)
36-11-04-400-801	PRSOV Installation (P/B 401)
71-00-00-700-822-F00	Wet Motor the Engine (P/B 201)
71-00-03-600-803-F00	Depreservation of an Engine On-Wing (Task Selection) (P/B 201)
71-71-00-200-801-F00	Engine Vents and Drains Inspection (P/B 601)
73-11-02-000-801-F00	Fuel Filter - Removal (P/B 401)
73-11-02-400-801-F00	Fuel Filter - Installation (P/B 401)
73-21-00-700-804-F00	EEC TEST (P/B 501)
73-21-00-700-808-F00	IDENT/CONFIG (P/B 501)
73-21-00-700-809-F00	EEC Discretes Test (P/B 501)
73-21-00-740-803-F00	EEC BITE TEST - RECENT FAULTS (P/B 501)
73-21-00-800-801-F00	Erase All EEC Faults (P/B 501)
79-00-00-200-804-F00	Chip Detectors and Scavenge Screens - Inspection (P/B 601)
79-00-00-710-806-F00	DMS Operational Check (P/B 601)
79-21-06-000-801-F00	Scavenge Oil Filter Element Removal (P/B 401)
79-21-06-400-801-F00	Scavenge Oil Filter Element Installation (P/B 401)
80-11-01-200-801-F00	Starter Magnetic Plug Inspection (P/B 601)
80-11-01-200-802-F00	Starter Inspection (P/B 601)

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C. Location Zones

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

D. Replacement Engine Test (Untested)

SUBTASK 71-00-00-630-002-F00

(1) If the replacement engine was preserved, do this task: Depreservation of an Engine On-Wing (Task Selection), TASK 71-00-03-600-803-F00.

SUBTASK 71-00-00-740-007-F00

(2) Do this task: Erase All EEC Faults, TASK 73-21-00-800-801-F00.

SUBTASK 71-00-00-740-003-F00

(3) Do this task: EEC TEST, TASK 73-21-00-700-804-F00.

SUBTASK 71-00-00-740-004-F00

(4) Do this task: IDENT/CONFIG, TASK 73-21-00-700-808-F00.

(a) Make sure that the engine rating and airplane model are correct.

(b) Make sure that the engine serial number is correct for the applicable engine.

1) If the engine serial number is different, enter the correct engine serial number.

(c) Get access to the IDENT/CONFIG screen for the other engine.

1) Make sure that the engine rating as shown on the screen is the same.

SUBTASK 71-00-00-740-011-F00

(5) Do this task: EEC Discretes Test, TASK 73-21-00-700-809-F00.

SUBTASK 71-00-00-710-006-F00

(6) Do this task: Engine Fire Detection - Operational Test, TASK 26-11-00-710-801.

SUBTASK 71-00-00-710-007-F00

(7) Do this leak check of the bleed air regulator and PRSOV (TASK 36-11-04-400-801).

NOTE: This check can be done after the Idle-Power Leak Check.

(a) With the Auxiliary Power Unit (APU) or external ground source, do this task: Supply Pressure to the Pneumatic System (Selection), TASK 36-00-00-860-801.

(b) Open the PRSOV.

(c) Make sure that there is no leakage at the sense line connections of the bleed air regulator and PRSOV.

SUBTASK 71-00-00-860-168-F00

(8) Do this task: Wet Motor the Engine, TASK 71-00-00-700-822-F00.

(a) Make sure that there are no leaks from the fuel filter, fuel inlet line, and all other fuel tubes and hoses.

SUBTASK 71-00-00-720-003-F00

(9) Do this task: Test 12 - Actuators Test, TASK 71-00-00-700-807-F00.

(a) During the dry motor, make sure that there is no leakage around the high stage valve, high stage regulator, and precooler sense lines.

NOTE: This check can be done after the Idle-Power Leak Check.

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SUBTASK 71-00-00-210-046-F00

(10) During each of the tests that follow, look for the OIL FILTER BYP message and the fuel FILTER BY PASS light.

(a) The OIL FILTER BYP message is found on the P2 CDS Panel, above the Oil Pressure Displays.

(b) The fuel FILTER BY PASS light is found on the P5 Fuel Panel.

(c) Look for other indications, messages, or lights (temperature, pressure, and etc.) that might indicate a possible engine problem.

SUBTASK 71-00-00-740-008-F00

(11) After each of the tests that follow, do these steps:

(a) Do this task: EEC BITE TEST - RECENT FAULTS, TASK 73-21-00-740-803-F00.

(b) Look for maintenance messages in Flight Leg 0 in all dispatch categories.

NOTE: Flight Leg 0 will show the faults that occur during the most recent ground run of the engine. If the engine is started and stopped more than once, the data from previous ground runs is erased or replaced.

(c) Do the corrective action for all of the maintenance messages that you find, after each engine shutdown.

SUBTASK 71-00-00-860-169-F00

(12) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) During engine operation, make sure that the pressure of the high stage valve is more than 10 psig (69 kPa).

(b) Do this task: Hydraulic System A or B Pressurization with an Engine-Driven Pump (EDP), TASK 29-11-00-860-804.

1) Make sure that there are no hydraulic leaks from the hydraulic supply, hydraulic pressure or the case drain lines.

(c) For engine 1, do this task: Number 1 IDG - Operational Test, TASK 24-11-00-700-802.

1) Do the steps to re-connect the Integrated Drive Generator (IDG) after the engine is stopped in the steps that follow.

(d) For engine 2, do this task: Number 2 IDG - Operational Test, TASK 24-11-00-700-803.

1) Do the steps to re-connect the IDG after the engine is stopped in the steps that follow.

(e) Do this task: Engine Cowl Anti-Icing - Operational Test, TASK 30-21-00-710-801.

1) Do the steps in the referenced test to stop the engine, and then complete the remaining steps in the test.

(f) After the engine is stopped, examine the engine drains for signs of leakage.

1) If you find signs of leakage, do this task: Engine Vents and Drains Inspection, TASK 71-71-00-200-801-F00.

(g) Re-connect the IDG.

SUBTASK 71-00-00-720-004-F00

(13) Do this task: Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00.

SUBTASK 71-00-00-720-005-F00

(14) Do this task: Test 5 - Power Assurance Check, TASK 71-00-00-700-813-F00.

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SUBTASK 71-00-00-220-002-F00

(15) Do this task: Chip Detectors and Scavenge Screens - Inspection, TASK 79-00-00-200-804-F00.

LOM ALL; ENGINES WITH DEBRIS MONITORING SYSTEM

SUBTASK 71-00-00-710-010-F00

(16) If the engine has a Debris Monitoring System (DMS), do this task: DMS Operational Check, TASK 79-00-00-710-806-F00.

LOM ALL

SUBTASK 71-00-00-220-003-F00

(17) Examine the scavenge oil filter element, do these tasks:

- Scavenge Oil Filter Element Removal, TASK 79-21-06-000-801-F00
- Scavenge Oil Filter Element Installation, TASK 79-21-06-400-801-F00.

(a) The scavenge oil filter element should be new and installed at the shop level.

SUBTASK 71-00-00-220-005-F00

(18) Examine the fuel filter element, do these tasks:

- Fuel Filter - Removal, TASK 73-11-02-000-801-F00
- Fuel Filter - Installation, TASK 73-11-02-400-801-F00.

(a) The fuel filter element should be new and installed at the shop level.

SUBTASK 71-00-00-220-006-F00

(19) Do this task: Starter Inspection, TASK 80-11-01-200-802-F00.

SUBTASK 71-00-00-220-007-F00

(20) Do this task: Starter Magnetic Plug Inspection, TASK 80-11-01-200-801-F00.

END OF TASK

TASK 71-00-00-700-807-F00

12. Test 12 - Actuators Test

A. General

(1) In this actuators test, the two channels of the Engine Electronic Controller (EEC) examine the hydraulic and electrical control loops.

(a) A control loop is defined as the path from the EEC to a monitored engine component and back to the EEC.

(2) During the test each channel of the EEC will cycle the control loops to the minimum and maximum positions.

(3) If a problem is found during the test, the Control Display Unit (CDU) will show the applicable faults at the end of the test.

B. References

Reference	Title
24-22-00-860-811	Supply Electrical Power (P/B 201)
71-00-00-700-821-F00	Dry Motor the Engine (P/B 201)
71-00-00-800-806-F00	Engine Operation Limits (P/B 201)
FIM 73-05 TASK 803	CH A (B) EEC DATA NOT AVAILABLE - Fault Isolation

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C. **Location Zones**

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right

D. **Actuators Test**

SUBTASK 71-00-00-840-001-F00

(1) Do these steps to prepare for the test:

(a) Make sure that the airplane has electrical power.

1) If it is necessary, do this task: Supply Electrical Power, TASK 24-22-00-860-811.

(b) Do the Prepare For The Dry Motor Procedure (TASK 71-00-00-700-821-F00).

1) If the fuel was drained at the fuel filter on the fuel pump, make sure that you provide boost pump pressure at the fuel pump inlet.

2) For correct application of boost pump pressure make sure that all steps of the dry motor procedures are done.

NOTE: If you do not provide boost pump pressure at the fuel pump inlet before the start of the test sequence, the Actuators Test can fail and show maintenance messages (TASK 71-00-00-700-821-F00).

3) Do not motor the engine at this time.

(c) For engine 1, do this step:

1) Make sure that these circuit breakers are closed:

CAPT Electrical System Panel, P18-1

Row	Col	Number	Name
E	5	C01009	ADIRU LEFT DC
E	7	C01007	ADIRU LEFT AC

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
A	6	C01017	FMCS CMPTR 1
LOM 404, 426			
A	7	C01018	FMCS CDU 1
LOM ALL			
D	2	C01372	DISPLAY CTR UPR
D	5	C01359	DISPLAY DEU 1 PRI
E	8	C00425	ADIRU LEFT EXC

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
C	14	C01008	ADIRU RIGHT AC
C	15	C00426	ADIRU RIGHT EXC
C	17	C01010	ADIRU RIGHT DC
D	9	C01362	DISPLAY DEU 2 HOLDUP
D	10	C01361	DISPLAY DEU 1 HOLDUP
D	11	C01360	DISPLAY DEU 2 PRI

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(Continued)

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
LOM 426; LOM 404 PRE SB 737-23-1484			
D	15	C01050	FMCS CDU 2

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
LOM ALL			
F	13	C01179	INDICATOR MASTER DIM SECT 7

(d) For engine 2, do this step:

1) Make sure that these circuit breakers are closed:

CAPT Electrical System Panel, P18-1

Row	Col	Number	Name
E	5	C01009	ADIRU LEFT DC
E	7	C01007	ADIRU LEFT AC

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	6	C01017	FMCS CMPTR 1
LOM 404, 426			
A	7	C01018	FMCS CDU 1
LOM ALL			
D	2	C01372	DISPLAY CTR UPR
D	5	C01359	DISPLAY DEU 1 PRI
E	8	C00425	ADIRU LEFT EXC

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
C	14	C01008	ADIRU RIGHT AC
C	15	C00426	ADIRU RIGHT EXC
C	17	C01010	ADIRU RIGHT DC
D	9	C01362	DISPLAY DEU 2 HOLDUP
D	10	C01361	DISPLAY DEU 1 HOLDUP
D	11	C01360	DISPLAY DEU 2 PRI
LOM 426; LOM 404 PRE SB 737-23-1484			
D	15	C01050	FMCS CDU 2

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
LOM ALL			
D	7	C01391	ENGINE 2 ALTN PWR CHAN B
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

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F/O Electrical System Panel, P6-3

Row	Col	Number	Name
F	13	C01179	INDICATOR MASTER DIM SECT 7

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

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

(g) Make sure that the forward thrust levers are at the IDLE position.

(h) Make sure that the thrust reversers are in the retracted (stowed) position.

SUBTASK 71-00-00-730-001-F00

(2) Do these steps to do the actuators test:

NOTE: It takes two persons to do this test. One person operates the Flight Management Computer System (FMCS) CDU and engine controls, and other makes sure that no one is injured when surfaces move and also monitors the engine.

NOTE: An engine exhaust system consists of the exhaust plug and exhaust sleeve.

NOTE: When engine operates, some oil leak can occur at the aft sump rotating seal. After operation, an oil puddle in the exhaust system is usual. When engine operations are done one after the other, it can cause a large oil puddle in the exhaust system.

(a) Make sure that all people and equipment are on a safe distance from the engine before you start the test.

(b) If the CDU is not active from other engine ground tests, do these steps:

1) Get access to the CDU in the flight compartment.

2) Press 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.

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.

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.

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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 system will show this problem.

g) If the FOR CH A ONLY or FOR CH B ONLY screen continues to show, do this task: CH A (B) EEC DATA NOT AVAILABLE - Fault Isolation, FIM 73-05 TASK 803.

(c) Push the ACTUATORS TEST LSK.

NOTE: This will cause screen 1 of the ACTUATORS TEST to show. The screen contains a WARNING about the operation of the engine during this test.

(d) Push the START TEST LSK.

NOTE: You can stop the test at this time if you push the ABORT LSK. The screen will show the test is not completed because ABORT was selected.

(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 test screen.

(i) Do these steps to do the dry motor procedure:

CAUTION	DO NOT DRY-MOTOR THE ENGINE BEFORE YOU MAKE SURE THAT THE SPAR-VALVE CLOSED LIGHT (ON THE P5 OVERHEAD PANEL) STAYS BRIGHT. IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION	MAKE SURE THAT THE APPLICABLE FOUR LOW PRESSURE LIGHTS ON THE P5 OVERHEAD PANEL ARE OFF. IF YOU DRY-MOTOR THE ENGINE AND APPLICABLE LOW PRESSURE LIGHTS ARE ON, DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION	DO NOT DRY-MOTOR THE ENGINE BEFORE YOU MAKE SURE THAT THERE IS FUEL PRESSURE TO THE FUEL PUMP INLET. THE FUEL PUMP AND HYDRO MECHANICAL UNIT ARE FUEL LUBRICATED. ZERO FUEL PRESSURE CAN CAUSE DAMAGE TO THE FUEL PUMP AND HYDRO MECHANICAL UNIT.

1) Turn the ENGINE START switch to the GRD position at the same time that you push the clock start button to measure the time.

NOTE: You must know the time limit for starter operation. Refer to the Engine Operation Limits (TASK 71-00-00-800-806-F00).

2) Make sure that the N2 speed becomes stable and is equal to or greater than the motor speed that shows on the CDU screen.

3) Push the CONTINUE LSK.

4) The test screen will show the time to do the test.

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5) Make sure to observe that N2 did not go less than 20 percent at any time during the test.

a) If this occurs, you must do the test again.

NOTE: If it is necessary, decrease the pneumatic load before you do the test again.

LOM 402, 404, 406, 407, 411, 412, 415, 416, 420, 422-428, 433, 434, 437-447, 450-999

6) Turn the ENGINE START switch to the OFF position when the test screen indication shows START SWITCH : OFF.

NOTE: The test screen will change at the end of the test to indicate when to turn the start switch to the OFF position.

LOM 429-432

7) Turn the ENGINE START switch to the AUTO position when the test screen indication shows START SWITCH : AUTO.

NOTE: The test screen will change at the end of the test to indicate when to turn the start switch to the AUTO position.

LOM ALL

8) Push the TEST RESULTS LSK.

(j) If faults are found, the test screen will show ACTUATORS TEST, the maintenance message number (MSG NBR) and short description of the fault.

NOTE: If there is more than one fault, the page you are on and total number of pages will show on the screen. Example: 1/2 shows you are on page 1 of 2 pages.

1) Do the corrective action in the Fault Isolation Manual (FIM) for the fault that shows.

a) The actuators test is usually the repair confirmation.

(k) If it is necessary to do the actuators test again, do these steps:

1) Use the interphone to tell the person at the engine that the actuators test will begin again.

2) Stop for one minute for all faults to clear, and push the REPEAT TEST LSK.

3) Follow the instructions on the test screen again.

(l) If no faults are found, the test screen will show ACTUATORS TEST PASSED NO ACTUATORS TEST FAULTS.

(m) If you want to end the actuators test, push the END TEST LSK.

1) If the EEC was in dual channel operation, the test screen will show TEST COMPLETE, RETURN AIRPLANE TO NORMAL CONDITION.

2) If the EEC was in single channel operation, the test screen will show TEST COMPLETE, RETURN AIRPLANE TO NORMAL CONDITION, CH (A or B) INOP.

a) To make sure that the test results are accurate, it is necessary to do all EEC BITE Ground tests in dual channel operation.

NOTE: If you are in single channel operation, as soon as the GROUND TESTS Menu is selected, the test screen will show this condition.

3) If the single channel message is displayed, correct the single channel problem first.

a) Do the actuators test again.

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(n) If you wish to do other tests, push the INDEX LSK several times until the correct menu shows.

(o) If no other tests will be done, push the INIT REF key to go back to the PERF INIT screen.

SUBTASK 71-00-00-860-177-F00

(3) Do the Put The Airplane Back To Its Usual Condition Procedure (TASK 71-00-00-700-821-F00).

——— END OF TASK ———

TASK 71-00-00-700-808-F00

13. Test 13 - Engine Run - EEC BITE Check

A. General

(1) This procedure does a check of the control loops that are monitored by the EEC.

(a) A control loop is defined as the path from the EEC to a monitored engine component and back to the EEC.

(2) This check makes sure the wiring, connectors and monitored engine components are installed and operate correctly.

(3) To do this procedure, it is necessary to operate the engine.

B. References

Reference	Title
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (P/B 201)
73-21-00-740-803-F00	EEC BITE TEST - RECENT FAULTS (P/B 501)

C. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right

D. Engine Run - EEC BITE Check

SUBTASK 71-00-00-730-002-F00

(1) Do these steps for the engine run test:

(a) For the applicable engine, do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

1) Let the engine become stable at the idle position for 2 minutes.

(b) Make sure that the ENGINE CONTROL light, on the overhead panel, P5, is OFF.

(c) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

(d) Make sure that the N2 display on the DEU goes to 0.0% before you continue with the procedure.

(e) Do this task: EEC BITE TEST - RECENT FAULTS, TASK 73-21-00-740-803-F00.

(f) Look for faults in Flight Leg 0.

NOTE: Flight Leg 0 is the most recent engine ground run.

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1) If you do the Engine Run BITE Test after an HMU replacement, then maintenance messages 73-31161 or 73-31162 can show.

NOTE: The messages can be caused by air that gets into the HMU during the replacement. Once the system is operated, then the air is removed and the HMU should operate correctly.

a) If you find maintenance messages 73-31161 or 73-31162 after an HMU replacement, then do the Engine Run BITE Test again.

b) If the messages show after the second Engine Run BITE Test, then do the corrective action for the applicable message

2) Do the corrective action for the faults that you find.

END OF TASK

TASK 71-00-00-750-802-F00

14. Test 14A - Fan Trim Balance (Three-Shot Plot Procedure)

A. General

(1) This trim balance procedure is done for these conditions:

(a) To decrease the fan or LPT vibration levels when they are equal to or more than 8.0 mils DA (double amplitude).

(b) When, after the replacement or the repair of a fan blade, the correction is more than 236 gram-inches (600 g-cm).

(2) The trim balance procedures will decrease the vibration levels of the fan and the LPT to less than 1.8 units on the airborne vibration monitor (AVM) during a ground operation at all engine operation speeds.

(3) For the calculation of the imbalance correction, the trim balance procedure uses the ground data recording of the vibrations from the No. 1 bearing and the FFCC (Fan Frame Compressor Case) vibration sensors.

(4) When an engine is installed on the wing, after an overhaul or after a replacement of a significant number of fan blades because of foreign object damage (FOD), it is recommended that you first do a vibration survey (TASK 71-00-00-700-814-F00).

(a) If the result of this vibration survey is not satisfactory, you may do Test 14A to balance the engine.

(b) Or Test 14B (TASK 71-00-00-750-802-F00 or TASK 71-00-00-750-806-F00 or TASK 71-00-00-750-805-F00 or TASK 71-00-00-750-803-F00).

(5) The three-shot plot procedure can be used when there is no equipment available to find the phase angle of the imbalance. This method has the steps that follow:

(a) Use an engine run to find the quantity of the initial imbalance.

NOTE: When you do an engine run, you will operate the engine at 6 different speeds. The AVM front panel will not display while the engine is running. After the engine is shutdown, record the quantity of imbalance for each of the six speeds from the front panel of the airborne vibration monitor AVM signal conditioner.

NOTE: For some ambient conditions, the higher speeds may not be reached. In this case, do the trim balance with a minimum of three speeds.

(b) Then use three engine runs to compare the initial imbalance with the quantities of the imbalances that are caused by three test weights which are put at three locations, 120 degrees apart. Each engine run consists of six individual speeds.

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(c) Out of the six total engine speeds for each run, choose the three speeds that correspond to the three highest imbalances for the No. 1 bearing sensor and the three speeds that correspond to the three highest imbalances for the FFCC vibration sensor.

(d) For each of the six highest imbalance speeds (three from the No. 1 bearing and three from the FFCC vibration sensor), make a polar graph to find a resultant vector R1 and an angle X. Use this data to calculate the vector W6 and its sensitivity S.

(e) Put all six W6 vectors on a seventh polar graph, and use these points to find the final imbalance vector W7.

(f) The W7 vector tells you the necessary balance weight(s) and their locations.

(6) Definition of Terms and Symbols.

(a) Symbols (Table 512)

Table 512/71-00-00-993-846-F00

Symbol	Definition
A	Phase angle
dP1	Calculated vector (used to calculate W7)
FFCC	Fan Frame Compressor Case (vibration sensor)
P1, P2	Imbalance points (used to calculate W7)
R, W	Resultants
S	Sensitivity (The ratio of the imbalance weight (g-cm) to the vibration amplitude (mils DA) caused by a given imbalance weight for a given speed and sensor.)
SP1, SP2	Sensitivity for imbalance points P1, P2 (used to calculate W7)
U	Vibration amplitude or displacement vector
W6	Balance correction weights for each of the six highest imbalance speeds
W7	Final balance correction weight (gives balance weight and location)
X	Angle

(b) Terms

1) Displacement vector - The displacement vector (U) is given in mils Double Amplitude (DA). The angular direction is given by the phase angle (A) expressed in degrees.

2) Balance Weights - Screws of different lengths, attached radially on the spinner rear cone.

3) Engine run - The operation of the engine at six different engine speeds, which are done to find the imbalance quantities.

B. References

Reference	Title
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (P/B 201)

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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
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
117	Electrical and Electronics Compartment - Left
118	Electrical and Electronics Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Do the Trim Balance Procedure

SUBTASK 71-00-00-720-001-F00

(1) If during an engine runs with the test weights installed and the vibration levels are below of 1.8 units (recommended level), stop the trim balance procedure.

NOTE: The fan and LPT vibration levels at the different speeds become lower than the recommended level of (1.8) units, there is no need to continue to do the trim balance procedure if you are satisfied with it. The test weights can stay installed, and the airplane is put back to its usual condition.

SUBTASK 71-00-00-970-009-F00

(2) Use the applicable table to get the correct vibration units:

(a) For “B” Scale AVMs (Table 513)

Table 513/71-00-00-993-937-F01 B - Scale AVM

Parameter	AVM
No. 1 BRG LP VIB	1 UNIT = 2.5 MILS DA (BELOW 3.0 UNITS) *[1]
No. 1 BRG HP VIB	1 UNIT = 1.30 IPS (BELOW 1.0 UNIT) *[2]
FFCCV LP VIB	1 UNIT = 2.5 MILS DA (BELOW 3.0 UNIT) *[1]
FFCCV HP VIB	1 UNIT = 1.60 IPS (BELOW 1.0 UNITS) *[3]
N1	10 - 120%
N2	5 - 115%
TIME	TENTHS OF HOURS

*[1] FOR UNITS > 3.0; MILS = 7.5 + (UNITS - 3.0) X 6.25

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*[2] FOR 3.0 > UNITS > 1.0; IPS = 1.30 + (UNITS - 1.0) X 0.205
FOR 5.0 > UNITS > 3.0; IPS = 1.71 + (UNITS - 3.0) X 0.57

*[3] FOR 3.0 > UNITS > 1.0; IPS = 1.60 + (UNITS - 1.0) X 0.175
FOR 5.0 > UNITS > 3.0; IPS = 1.95 + (UNITS - 3.0) X 0.65

SUBTASK 71-00-00-970-010-F00

(3) If the vibration sensor for the No. 1 bearing does not operate, use the FFCC vibration sensor.

SUBTASK 71-00-00-970-011-F00

(4) Do these steps to record the initial balance screws:

> **CAUTION**
> MAKE SURE THAT YOU PUT A MAT ON THE LOWER SURFACE OF THE INLET COWL. DAMAGE TO THE INLET COWL SURFACES CAN OCCUR.

(a) Put the protective mat, STD-585, on the inner lower half of the inlet cowl.

(b) Record the type and location of the balance screws that are installed radially in the spinner rear cone (Figure 505, Figure 506).

> **CAUTION**
> MAKE SURE THERE ARE NO TOOLS, PARTS OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THIS INSTRUCTION YOU CAN CAUSE DAMAGE TO THE ENGINE.

(c) Remove the protective mat, STD-585, and all the other unwanted material from the inlet cowl.

SUBTASK 71-00-00-970-012-F00

(5) Find and record the conditions that follow:

> **CAUTION**
> DO NOT USE THE TOTAL AIR TEMPERATURE (TAT) INDICATION FROM THE AIRPLANE FOR THE AMBIENT AIR TEMPERATURE. IF YOU DO NOT OBEY, THE TAT CAN CAUSE AN INCORRECT N1 TARGET SELECTION.

> **CAUTION**
> KEEP MERCURY THERMOMETERS AWAY FROM THE AIRPLANE. IF THE THERMOMETER BREAKS, MERCURY CAN CAUSE DAMAGE TO THE AIRPLANE COMPONENTS.

(a) Get the ambient air temperature (outside air temperature (OAT)) in the shade of the wheel well of the nose gear.

(b) Make sure that the OAT agrees with the OAT on the TAKEOFF REF Page in the FMCS.

SUBTASK 71-00-00-970-014-F00

> **CAUTION**
> YOU MUST HAVE COMMUNICATION WITH THE PERSON IN THE ELECTRONIC EQUIPMENT COMPARTMENT WHEN YOU DO THIS PROCEDURE. IF YOU DO NOT OBEY, THE RESULTS OF THIS PROCEDURE WILL NOT BE ACCURATE.

(6) Get access to the AVM front panel display in the electronic equipment compartment.

NOTE: As you run the engine at different speeds, one person will use the AVM front panel display to record the vibration indications.

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SUBTASK 71-00-00-970-015-F00

(7) Do the initial engine run as follows (Figure 507):

NOTE: For some ambient conditions, the higher speeds may not be reached. In this case, do the trim balance with a minimum of three speeds.

WARNING	MAKE SURE THAT YOU OBEY ALL THE INSTRUCTIONS AND PRECAUTIONS WHEN YOU OPERATE AN ENGINE AT HIGH POWER. IF YOU DO NOT OBEY THE INSTRUCTIONS AND PRECAUTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

1) Let the engine operate at the idle speed for 5 minutes.

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2) 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

3) Make sure that the PROBE HEAT "A" or "A" 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

(b) Increase the speed of the engine slowly during a time of 20-30 seconds, until the speed is 80 ±2% N1 rpm.

1) Let the engine operate at this speed for a minimum of 5 minutes to make the temperature of the engine stable.

NOTE: The time to make the temperature stable can be decreased to a minimum of 3 minutes if the engine was operated less than 15 minutes before this procedure.

(c) Increase the speed of the engine slowly to the 95% N1.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U0) on a three-shot plot worksheet (Figure 507).

(d) If the vibration level is more than 1.8 units, do these steps:

1) As you monitor the No. 1 bearing and FFCC vibration indications, decrease the speed of the engine slowly and continuously until the vibration levels are at 1.8 units or lower.

NOTE: This will make sure that the vibration levels are not more than 6.0 mils during the balance procedure.

(e) Decrease the speed of the engine slowly to the second N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indication (U0) on a three-shot plot worksheet.

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(f) Decrease the speed of the engine slowly to the third N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U0) on a three-shot plot worksheet.

(g) Decrease the speed of the engine slowly to the fourth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U0) on a three-shot plot worksheet.

(h) Decrease the speed of the engine slowly to the fifth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U0) on a three-shot plot worksheet.

(i) Decrease the speed of the engine slowly to the sixth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U0) on a three-shot plot worksheet.

(j) Decrease the speed to the idle power position.

1) Let the engine operate at the idle speed for 3 minutes.

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2) 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

3) Make sure that the Probe Heat "A" and "B" switches, on the P5 overhead panel, are in the AUTO position.

LOM ALL

(k) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 71-00-00-970-016-F00

(8) Use the chart of the installed balance screws you recorded above (other than P07).

NOTE: If no balance weights are installed at a bolt hole, the bolt size is P07.

SUBTASK 71-00-00-970-017-F00

(9) Find three locations, that are 120 degrees apart, where the installed P07 balance screws can be removed and replaced with the P05 balance screws (Figure 505).

NOTE: As an example: Holes 2, 1, and 36 (at 0 degrees); holes 24, 25, and 26 (at 120 degrees); and holes 12, 13, and 14 (at 240 degrees).

SUBTASK 71-00-00-480-002-F00

(10) Install the balance screws at the first location as follows:

NOTE: In the above example, this would be at holes 2, 1, and 36 (at the 0 degree location).

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> **CAUTION**
> MAKE SURE THAT YOU PUT A MAT ON THE LOWER SURFACE OF THE INLET COWL. DAMAGE TO THE INLET COWL SURFACES CAN OCCUR.

(a) Put the protective mat, STD-585, on the inner lower half of the inlet cowl.

(b) Remove the three P07 balance screws.

(c) Lubricate the three P05 balance screws with Molykote G-n Plus lubricant, D50019 [CP2444], or Lubricant, D50308 [CP 2171], and install them at the first location.

1) Tighten the screws to 68 in-lb (7.7 N·m) - 74 in-lb (8.4 N·m).

> **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.

(d) Remove the protective mat, STD-585, and all other remaining unwanted material from the inlet cowl.

SUBTASK 71-00-00-970-018-F00

(11) Do the first engine run with the three P05 test balance screws added as follows (Figure 507):

NOTE: For some ambient conditions, the higher speeds may not be reached. In this case, do the trim balance with a minimum of three speeds.

> **WARNING**
> MAKE SURE THAT YOU OBEY ALL THE INSTRUCTIONS AND PRECAUTIONS WHEN YOU OPERATE AN ENGINE AT HIGH POWER. IF YOU DO NOT OBEY THE INSTRUCTIONS AND PRECAUTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

1) Let the engine operate at the idle speed for 3 minutes.

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2) 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.

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3) Make sure that the PROBE HEAT "A" or "B" switch, on the P5 overhead panel, are 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

(b) Increase the speed of the engine slowly during a time of 20-30 seconds, until the speed is 80 ±2% N1 rpm.

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1) Let the engine operate at this speed for a minimum of 5 minutes to make the temperature of the engine stable.

NOTE: The time to make the temperature stable can be decreased to a minimum of 3 minutes if the engine was operated less than 15 minutes before this procedure.

(c) Increase the speed of the engine slowly to 95% N1.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U1) on a three-shot plot worksheet.

(d) If the vibration level is more than 1.8 units, do these steps:

1) As you monitor the No. 1 bearing and FFCC vibration indications, decrease the speed of the engine slowly and continuously until the vibration levels are at 1.8 units or lower.

NOTE: This will make sure that the vibration levels are not more than 6.0 mils DA during the balance procedure.

(e) Decrease the speed of the engine slowly to the second N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U1) on a three-shot plot worksheet.

(f) Decrease the speed of the engine slowly to the third N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U1) on a three-shot plot worksheet.

(g) Decrease the speed of the engine slowly to the fourth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U1) on a three-shot plot worksheet.

(h) Decrease the speed of the engine slowly to the fifth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U1) on a three-shot plot worksheet.

(i) Decrease the speed of the engine slowly to the sixth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U1) on a three-shot plot worksheet.

(j) Decrease the speed to the idle power position.

1) Let the engine operate at the idle speed for 3 minutes.

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2) Put the Probe Heat "A" and "B" switches, on the P5 overhead panel, to the OFF position.

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3) Make sure that the Probe Heat "A" and "B" switches, on the P5 overhead panel, are in the AUTO position.

LOM ALL

(k) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 71-00-00-080-005-F00

(12) Remove the P05 balance screws from the first location as follows:

NOTE: In the above example, this would be at holes 2, 1 and 36 (at the 0 degree location).

(a) Put the protective mat, STD-585, on the inner lower half of the inlet cowl.

(b) Remove the three P05 balance screws.

(c) Lubricate the initial P07 balance screws with Molykote G-n Plus lubricant, D50019 [CP2444], or Lubricant, D50308 [CP 2171], and install them again.

1) Tighten the screws to 68 in-lb (7.7 N·m) - 74 in-lb (8.4 N·m).

SUBTASK 71-00-00-480-003-F00

(13) Do these steps to install the P05 balance screws at the second location:

NOTE: In the above example, this would be at holes 24, 25 and 26 (at the 120 degree location).

(a) Remove the three P07 balance screws.

(b) Lubricate and the three P05 balance screws with Molykote G-n Plus lubricant, D50019 [CP2444], or Lubricant, D50308 [CP 2171], and install them at this location.

1) Tighten the screws to 68 in-lb (7.7 N·m) - 74 in-lb (8.4 N·m).

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.

(c) Remove the protective mat, STD-585, and all other unwanted material from the inlet cowl.

SUBTASK 71-00-00-970-019-F00

(14) Do the second engine run with the three P05 at 120 degrees apart as follows (Figure 507):

WARNING MAKE SURE THAT YOU OBEY ALL THE INSTRUCTIONS AND PRECAUTIONS WHEN YOU OPERATE AN ENGINE AT HIGH POWER. IF YOU DO NOT OBEY THE INSTRUCTIONS AND PRECAUTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

1) Let the engine operate at the idle speed for 3 minutes.

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2) 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.

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LOM 402, 406, 411, 412, 415, 416, 422-434, 437-447, 450-999; LOM 404, 407, 420 POST SB 737-30A1063

3) 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

(b) Increase the speed of the engine slowly during a time of 20-30 seconds, until the speed is 80 ±2% N1 rpm.

1) Let the engine operate at this speed for a minimum of 5 minutes to make the temperature of the engine stable.

NOTE: The time to make the temperature stable can be decreased to a minimum of 3 minutes if the engine was operated less than 15 minutes before this procedure.

(c) Increase the speed of the engine slowly to 95% N1.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U2) on a three-shot plot worksheet.

(d) If the vibration level is more than 1.8 units, do these steps:

1) As you monitor the No. 1 bearing and FFCC vibration indications, decrease the speed of the engine slowly and continuously until the vibration levels are at 1.8 units or lower.

NOTE: This will make sure that the vibration levels are not more than 6.0 mils during the balance procedure.

(e) Decrease the speed of the engine slowly to the second N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U2) on a three-shot plot worksheet.

(f) Decrease the speed of the engine slowly to the third N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U2) on a three-shot plot worksheet.

(g) Decrease the speed of the engine slowly to the fourth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U2) on a three-shot plot worksheet.

(h) Decrease the speed of the engine slowly to the fifth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U2) on a three-shot plot worksheet.

(i) Decrease the speed to the idle power position.

1) Let the engine operate at the idle speed for 3 minutes.

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2) Put the Probe Heat "A" and "B" switches, on the P5 overhead panel, to the OFF position.

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3) Make sure that the Probe Heat "A" and "B" switches, on the P5 overhead panel, are in the AUTO position.

LOM ALL

(j) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 71-00-00-080-006-F00

(15) Remove the P05 balance screws from the second location as follows:

NOTE: In the above example, this would be at holes 24, 25 and 26 (at the 120 degree location).

(a) Put the protective mat, STD-585, on the inner lower half of the inlet cowl.

(b) Remove the three P05 balance screws.

(c) Lubricate the initial P07 balance screws with Molykote G-n Plus lubricant, D50019 [CP2444], or Lubricant, D50308 [CP 2171], and install them again.

1) Tighten the screws to 68 in-lb (7.7 N·m) - 74 in-lb (8.4 N·m).

SUBTASK 71-00-00-480-004-F00

(16) Install the P05 balance screws at the third location as follows:

NOTE: In the above example, this would be at holes 12, 13 and 14 (at the 240 degree location).

(a) Remove the three P07 balance screws.

(b) Lubricate and the three P05 balance screws with Molykote G-n Plus lubricant, D50019 [CP2444], or Lubricant, D50308 [CP 2171], and install them at this location.

1) Tighten the screws to 68 in-lb (7.7 N·m) - 74 in-lb (8.4 N·m).

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.

(c) Remove the protective mat, STD-585, and all other unwanted material from the inlet cowl.

SUBTASK 71-00-00-970-020-F00

(17) Do the third engine run as follows (Figure 507):

WARNING

MAKE SURE THAT YOU OBEY ALL THE INSTRUCTIONS AND PRECAUTIONS WHEN YOU OPERATE AN ENGINE AT HIGH POWER. IF YOU DO NOT OBEY THE INSTRUCTIONS AND PRECAUTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

1) Let the engine operate at the idle speed for 3 minutes.

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2) 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 probe is heated.

LOM 402, 406, 411, 412, 415, 416, 422-434, 437-447, 450-999; LOM 404, 407, 420 POST SB 737-30A1063

3) 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 probe is heated.

LOM ALL

(b) Increase the speed of the engine slowly during a time of 20-30 seconds, until the speed is 80 ±2% N1 rpm.

1) Let the engine operate at this speed for a minimum of 5 minutes to make the temperature of the engine stable.

NOTE: The time to make the temperature stable can be decreased to a minimum of 3 minutes if the engine was operated less than 15 minutes before this procedure. Also, the 5 minute time is not necessary if the trim balance procedure is started less than 5 minutes after the engine was operated at high power and was not stopped.

(c) Increase the speed of the engine slowly to 95% N1.

1) Let the engine operate at this speed for 2 minutes.

2) Record the No. 1 bearing and FFCC vibration indications (U3) on a three-shot plot worksheet.

(d) If the vibration level is more than 1.8 units, do these steps:

1) As you monitor the No. 1 bearing and FFCC vibration indications, decrease the speed of the engine slowly and continuously until the vibration levels are at 1.8 units or lower.

NOTE: This will make sure that the vibration levels are not more than 6.0 mils during the balance procedure.

(e) Decrease the speed of the engine slowly to the second N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U3) on a three-shot plot worksheet.

(f) Decrease the speed of the engine slowly to the third N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U3) on a three-shot plot worksheet.

(g) Decrease the speed of the engine slowly to the fourth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U3) on a three-shot plot worksheet.

(h) Decrease the speed of the engine slowly to the fifth N1 speed.

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1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indications (U3) on a three-shot plot worksheet.

(i) Decrease the speed to the idle power position.

1) Let the engine operate at the idle speed for 3 minutes.

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2) Put the Probe Heat "A" and "B" switches, on the P5 overhead panel, to the OFF position.

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3) Make sure that the Probe Heat "A" and "B" switches, on the P5 overhead panel, are in the AUTO position.

LOM ALL

(j) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 71-00-00-970-021-F00

(18) To start the calculation for the final balance weight W7, do these steps to calculate the balance weights, W6, and their sensitivities S as follows:

NOTE: To calculate the balance weight W7, you must make six polar graphs, one for each of the three highest No. 1 bearing vibration imbalances and the three highest FFCC vibration sensor vibration imbalances recorded during the initial engine run U0. For each vibration imbalance (at a given engine speed), you will use the U0, U1, U2 and U3 values to find the resultant vector R1 and its angle X. Then, you will convert the resultant vector R1 and angle X to a balance weight W6 and a sensitivity S. Finally, you will use the balance weight W6 and the sensitivity S to make a seventh polar graph to find the final balance weight W7 and its angle on the spinner.

(a) From the initial engine run U0, choose only the three out of the six total N1 speeds that gave the highest indications for the No. 1 bearing.

(b) From the initial engine run U0, choose only the three out of the six total N1 speeds that gave the highest indications for the FFCC vibration sensor.

(c) For each of the six vibration indications (U0) you got from the above step, give each a letter A through F.

NOTE: As an example, the highest No. 1 bearing vibration indication U0 is A, the second-highest is B and the third-highest is C. For the FFCC vibration indication, the highest is D, the second-highest is E and the third-highest is F.

(d) Write each of the six vibration indications (A through F) on the worksheet under the correct data point index (Figure 508).

(e) Do these steps to write each of the six vibration indications (U0) on a polar graph:

1) For A, use an applicable graduation, on a polar graph such that U0 will use approximately 1/2 of the graph (Figure 509).

2) Draw a circle, with the center at the origin and with a radius that is equal to U0 (Figure 510).

3) Draw an arc for U1 on the polar graph as follows (Figure 511):

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a) For U1, the center of the arc is the intersection of the U0 circle and the angle of the first P05 balance weights.

NOTE: In the above example, the angle for U1 is 0 degrees (the balance weights were put at holes 2, 1, and 36).

b) The radius of the circle is U1.

4) Draw an arc for U2 on the polar graph as follows (Figure 512):

a) For U2, the center of the arc is the intersection of the U0 circle and the angle of the second P05 balance weights.

NOTE: In the above example, the angle for U2 is 120 degrees (the balance weights were put at holes 24, 25, and 26).

b) The radius of the circle is U2.

5) Draw an arc for U3 on the polar graph as follows (Figure 513):

a) For U3, the center of the arc is the intersection of the U0 circle and the angle of the third P05 balance weights.

NOTE: In the above example, the angle for U3 is 240 degrees (the balance weights were put at holes 12, 13, and 14).

b) The radius of the circle is U3.

(f) Do these steps to find the vector R1 (Figure 514):

NOTE: R1 is the resultant vector R for the first vibration indication.

1) Make a vector, R1, from the origin of the graph to the intersection made by the three circles (U1, U2 and U3).

NOTE: If the three circles do not go through one point, use a point that is approximately in the center of the triangle made by the intersections of the three circles.

2) Measure the length of R1.

3) Measure clockwise the angle (X) from the 0-degree radial line to the vector R1.

4) Record the length of R1 and the angle X on the worksheet (Figure 508).

(g) Calculate the balance weight W6 as follows:

NOTE: The weight of the three P05 screws is 831.8 grams.

Table 514/71-00-00-993-921-F00

$$W6 = \frac{831.8 \times U0}{R1}$$

1) Write the balance weight, W6, on the worksheet (Figure 508).

2) Calculate the sensitivity as follows:

Table 515/71-00-00-993-922-F00

$$S = \frac{831.8}{R1}$$

3) Write the sensitivity, S, on the worksheet.

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(h) Do the above steps again to find R1, X, W6 and S for the index points B through F.

NOTE: You will make a polar graph for each index point.

SUBTASK 71-00-00-970-022-F00

(19) Do these steps to find the final balance weight W7 and its location:

(a) Use an applicable graduation, on a polar graph that will include all of the balance weights (W6) that you calculated above (Figure 509).

(b) Put the six balance weights W6 (for the index points A through F) and their angles X on the polar graph.

NOTE: When you are done, you will have six points on the graph that correspond to the six index points. Each point was found by the angle X from the origin and the length of W6.

(c) Make a line (vector) between each point as it is shown on the illustration (Figure 515).

NOTE: As an example, A-B, A-C, A-D, etc.

NOTE: Each vector connects two points. These two points are identified as P1 and P2. As an example, for the A-C vector, A is P1 and C is P2.

(d) From the data on the worksheet (Figure 508), record the sensitivity of the index points P1 and P2 for each vector (Figure 515).

NOTE: As an example for AB: sensitivity of A (P1) = SP1, and the sensitivity of B (P2) = SP2.

(e) Add the two sensitivities for each vector (SP1 + SP2) and record them on the worksheet.

(f) Use the equation below to calculate the amplitude (U) of each vector. Record each amplitude on the worksheet (Figure 515).

Table 516/71-00-00-993-923-F00

Length of Vector P1-P2 U = ---------- SP1 + SP2

(g) Identify the vector with the largest amplitude U.

(h) For this vector, calculate the distance dP1.

Table 517/71-00-00-993-924-F00

dP1 = U x (SP1)

(i) Record the value, dP1, on the worksheet (Figure 515).

(j) Start at point P1 of this vector and draw the value dP1 as a line on top of the vector P1-P2 (Figure 509).

(k) Draw a vector from the origin (the center of the graph) to the end of dP1 on P1-P2.

NOTE: This vector is W7.

(l) Measure and record the length (the imbalance weight (g-cm)) and the phase angle (A7) of W7 (Figure 515).

NOTE: To measure the phase angle, start at the 0 degree line and go clockwise.

SUBTASK 71-00-00-970-023-F00

(20) Make a selection of the balance screws as follows:

(a) Use the imbalance weight W7 to identify the balance screws that are necessary to balance the engine (Figure 516).

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(b) Use the phase angle A7 to see if the center of the balance weight is on or between the screw holes (Figure 516).

1) Get the part number(s) of the balance screw(s) from the applicable sheets of (Figure 517) for the balance weight centers on the screw holes, or (Figure 518) for balance weight centers between the screw holes.

(c) Write the balance screw(s) and location(s) on a balance screw location chart (See (Table 503)).

SUBTASK 71-00-00-970-024-F00

(21) Do these steps to remove the P05 balance screws that were installed at 240 degrees:

CAUTION

MAKE SURE THAT YOU PUT A MAT ON THE LOWER SURFACE OF THE INLET COWL. DAMAGE TO THE INLET COWL SURFACES CAN OCCUR.

(a) Put the protective mat, STD-585, on the inner lower half of the inlet cowl.

(b) Remove the three P05 test weights.

(c) Lubricate the initial P07 balance screws with Molykote G-n Plus lubricant, D50019 [CP2444], or Lubricant, D50308 [CP 2171], and install them again.

1) Tighten the screws to 68 in-lb (7.7 N·m) - 74 in-lb (8.4 N·m).

SUBTASK 71-00-00-970-025-F00

(22) Install the new balance screws as follows:

(a) Lubricate the new balance screw(s) W7 with Molykote G-n Plus lubricant, D50019 [CP2444], or Lubricant, D50308 [CP 2171], and install on the spinner.

1) Tighten the screws to 68 in-lb (7.7 N·m) - 74 in-lb (8.4 N·m).

(b) Remove the protective mat, STD-585, and all the other remaining unwanted material from the inlet cowl.

SUBTASK 71-00-00-970-026-F00

(23) Do the last engine run as follows (Figure 507):

(a) Do a check to make sure that the AVM system operates correctly (Ref TDF).

WARNING

MAKE SURE THAT YOU OBEY ALL THE INSTRUCTIONS AND PRECAUTIONS WHEN YOU OPERATE AN ENGINE AT HIGH POWER. IF YOU DO NOT OBEY THE INSTRUCTIONS AND PRECAUTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(b) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

1) Let the engine operate at the idle speed for 3 minutes.

LOM 404, 407, 420 PRE SB 737-30A1063

2) 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.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM 402, 406, 411, 412, 415, 416, 422-434, 437-447, 450-999; LOM 404, 407, 420 POST SB 737-30A1063

3) 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

(c) Increase the speed of the engine slowly during a time of 20-30 seconds, until the speed is 80 ±2% N1 rpm.

1) Let the engine operate at this speed for a minimum of 5 minutes to make the temperature of the engine stable.

NOTE: The time to make the temperature stable can be decreased to a minimum of 3 minutes if the engine was operated less than 15 minutes before this procedure.

(d) Increase the speed of the engine slowly to 95% N1.

1) Let the engine operate at this speed for 2 minutes.

2) Tell the person in the electronic equipment compartment to record the No. 1 bearing and FFCC vibration indication (U0) on a three-shot plot worksheet.

(e) If the vibration levels of the No. 1 bearing are more than 3.5 mils DA or the levels of the FFCC vibration sensor are more than 4.0 mils DA, do these steps:

1) Slowly decrease the speed to the idle power position.

a) Let the engine operate at the idle speed for 3 minutes.

LOM 404, 407, 420 PRE SB 737-30A1063

b) 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

c) Make sure that the Probe Heat "A" and "B" switches, on the P5 overhead panel, are in the AUTO position.

LOM ALL

2) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

3) Examine all of the data from the engine runs to make sure that the calculations were done correctly.

4) Do a check of the fan blades for sufficient lubrication.

5) Examine the condition of all AVM system connectors.

NOTE: Dirty or wet connectors can cause incorrect vibration indications.

6) Do a check for accelerometer mounting brackets that are loose.

7) Make sure that all of the leads are correctly attached (with clamps, tape, or other attachment means) at locations that are not less than 6 in. (15 cm) apart.

NOTE: Leads that are free to move or shake can cause incorrect vibration signals.

8) Install the initial balance screws again (Figure 505).

9) Do a second initial engine run again.

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10) Compare the amplitude and phase angle indications of this second initial engine run with the results of the first initial engine run.

(f) Decrease the speed of the engine slowly to the second N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Record the No. 1 bearing and FFCC vibration indication (U0) on a three-shot plot worksheet.

(g) Decrease the speed of the engine slowly to the third N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Record the No. 1 bearing and FFCC vibration indications (U0) on a three-shot plot worksheet.

(h) Decrease the speed of the engine slowly to the fourth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Record the No. 1 bearing and FFCC vibration indications (U0) on a three-shot plot worksheet.

(i) Decrease the speed of the engine slowly to the fifth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Record the No. 1 bearing and FFCC vibration indications (U0) on a three-shot plot worksheet.

(j) Decrease the speed of the engine slowly to the sixth N1 speed.

1) Let the engine operate at this speed for 2 minutes.

2) Record the No. 1 bearing and FFCC vibration indications (U0) on a three-shot plot worksheet.

(k) Decrease the speed to the idle power position.

1) Let the engine operate at the idle speed for 3 minutes.

(l) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 71-00-00-710-003-F00

(24) See if the vibration levels of the No. 1 bearing are not more than 3.5 mils DA and the levels of the FFCC vibration sensor are not more than 4.0 mils DA.

(a) If the vibration levels are not more than the limits, the trim balance procedure is completed.

1) Do the steps below to put the airplane back to its usual condition.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-010-020-F00

(1) Remove the access from the electronic equipment compartment.

SUBTASK 71-00-00-860-162-F00

(2) During a subsequent engine operation, do a check of the N1 and AVM indications to make sure that they operate correctly.

END OF TASK

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(VIEW IN THE AFT DIRECTION)

S-M56-MM-03715-00-B

G52292 S0006581826_V2

Initial Balance Screw Location Chart
Figure 505/71-00-00-990-832-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

P07 = INITIAL BALANCE SCREWS

BALANCE SCREW

P0#	(**)	TOTAL LENGTH IN.	TOTAL LENGTH MM	WEIGHT GRAMS	M.W.* GR-CM
P07	(P14)	0.8	20.3	6.6	0.0
P01	(P08)	1.3	33.0	10.0	65.0
P02	(P09)	1.8	45.7	13.4	125.7
P03	(P10)	2.3	58.4	16.8	183.8
P04	(P11)	2.8	71.1	20.2	237.5
P05	(P12)	3.3	83.8	23.6	280.1
P06	(P13)	3.8	96.5	27.4	318.8

* MOMENT WEIGHT RESULT (THE MOMENT WEIGHT OF EACH SCREW MINUS THE MOMENT WEIGHT OF SCREW P07)

** EQUIVALENT BALANCE SCREW

S-M56-MM-03716-00-B

G52326 S0006581827_V3

Balance Screw Specifications
Figure 506/71-00-00-990-833-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

VIBRATION SENSOR	N1 SPEED		INITIAL ENGINE RUN U0 (INITIAL WEIGHT)	FIRST ENGINE RUN U1 WITH 3 P05 ADDED	SECOND ENGINE RUN U2 WITH 3 P05 ADDED 120˚ APART	THIRD ENGINE RUN U3 WITH 3 P05 ADDED 240˚ APART	LAST ENGINE RUN WITH WEIGHT W7
	%	RPM					
NO. 1 BEARING	95.0	4916					
	90.0	4657					
	87.0	4502					
	84.0	4347					
	76.0	3933					
	58.0	3001					
FFCCV	95.0	4916					
	90.0	4657					
	87.0	4502					
	84.0	4347					
	76.0	3933					
	58.0	3001					

S-M56-MM-03717-00-B

CFM56-7 TRIM BALANCE
3-SHOT PLOT - WORKSHEET

G51484 S0006581828_V2

3-Shot Plot Worksheet
Figure 507/71-00-00-990-834-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

DATA POINT INDEX	A	B	C	D	E	F
INITIAL IMBALANCE UO MILS D.A.						
RESULTANT R MILS D.A.						
ANGLE X DEGREES						
BALANCE WEIGHT W6 = $831.8 \times \frac{UO}{R1}$ G-CM						
SENSITIVITY $S = \frac{831.8}{R1}$						

S-M56-MM-03718-00-B

G51492 S0006581829_V1

3-Shot Plot Analysis Worksheet
Figure 508/71-00-00-990-835-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03719-00-B
G52344 S0006581830_V1

Polar Graph for the Trim Balance
Figure 509/71-00-00-990-836-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03720-00-B
G52364 S0006581831_V1

Plot for the Initial Engine Run (Example)
Figure 510/71-00-00-990-837-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03721-00-B

G52371 S0006581832_V1

Plot for the First Engine Run (Example)
Figure 511/71-00-00-990-838-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03722-00-B
G52383 S0006581833_V1

Plot for the Second Engine Run (Example)
Figure 512/71-00-00-990-839-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03723-00-B

G52399 S0006581834_V1

Plot for the Third Engine Run (Example)
Figure 513/71-00-00-990-840-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03724-00-B
G52400 S0006581835_V1

Calculation of the Vector R
Figure 514/71-00-00-990-841-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

VECTOR INDEX P1-P2	VECTOR LENGTH (G-CM)	VECTOR SENSITIVITY			AMPLITUDE (U) LENGTH P1-P2 / SP1+SP2 (MILS DA)	DISTANCE FROM P1 dP1= U x SP1 (G-CM)
		SENSIT SP1	SENSIT SP2	SP1+SP2		
A B						
A C						
A D						
A E						
A F						
B C						
B D						
B E						
B F						
C D						
C E						
C F						
D E						
D F						
E F						

S-M56-MM-03725-00-B

VECTOR	IMBALANCE WEIGHT (G-CM)	PHASE ANGLE A7
W7		

G51495 S0006581836_V1

One Shot Initial Engine Run - Maximum Result Worksheet
Figure 515/71-00-00-990-842-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CALCULATED PHASE ANGLE (A)	LOCATION TO PUT THE CORRECTION WEIGHTS	CALCULATED PHASE ANGLE (A)	LOCATION TO PUT THE CORRECTION WEIGHTS
3-7	36-1	93-97	27-28
8-12	36	98-102	27
13-17	35-36	103-107	26-27
18-22	35	108-112	26
23-27	34-35	113-117	25-26
28-32	34	118-122	25
33-37	33-34	123-127	24-25
38-47	33	128-132	24
43-47	32-33	133-137	23-24
48-52	32	138-142	23
53-57	31-32	143-147	22-23
58-62	31	148-152	22
63-67	30-31	153-157	21-22
68-72	30	158-162	21
73-77	29-30	163-167	20-21
78-82	29	168-172	20
83-87	28-29	173-177	19-20
88-92	28	178-182	19

S-M56-MM-03726-00-B

G51513 S0006581837_V1

Correction Weights and Their Location
Figure 516/71-00-00-990-843-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CALCULATED PHASE ANGLE (A)	LOCATION TO PUT THE CORRECTION WEIGHTS	CALCULATED PHASE ANGLE (A)	LOCATION TO PUT THE CORRECTION WEIGHTS
182-187	18-19	273-277	9-10
188-192	18	278-282	9
193-197	17-18	283-287	8-9
198-202	17	288-292	8
203-207	16-17	293-297	7-8
208-212	16	298-302	7
213-217	15-16	303-307	6-7
218-222	15	308-312	6
223-227	14-15	313-317	5-6
228-232	14	318-322	5
233-237	13-14	323-327	4-5
238-242	13	328-332	4
243-247	12-13	333-337	3-4
248-252	12	338-342	3
253-257	11-12	343-347	2-3
258-262	11	348-352	2
263-267	10-11	353-357	1-2
268-272	10	358-2	1

S-M56-MM-03727-00-B

G51516 S0006581838_V1

Correction Weights and Their Location
Figure 516/71-00-00-990-843-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE 7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	SCREW QUANTITY
44	P01														P01	2
65								P01								1
65		P01												P01		2
84			P01										P01			2
86	P02														P02	2
100				P01								P01				2
113					P01						P01					2
122						P01				P01						2
125	P03														P03	2
126								P02								1
126		P02												P02		2
128							P01		P01							2
157	P01				P01						P01				P01	4
162			P02										P02			2
162	P04														P04	2
178					P01			P01			P01					3
183								P03								1
183		P03												P03		2

G51563 S0006581839_V1

Balance Weights with the Center of Mass on One Screw
Figure 517/71-00-00-990-844-F00 (Sheet 1 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	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
248							P02		P02							2
248		P01						P03						P01		3
267			P01					P03					P01			3
280								P05								1
280				P03								P03				2
280		P05												P05		2
288			P02					P02					P02			3
305			P04										P04			2

G51576 S0006581840_V1

Balance Weights with the Center of Mass on One Screw
Figure 517/71-00-00-990-844-F00 (Sheet 2 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE 7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	SCREW QUANTITY
305						P01		P03		P01						3
317					P03						P03					2
319								P06								1
319		P06												P06		2
324	P01			P03								P03			P01	4
344						P03				P03						2
360							P03		P03							2
360			P05										P05			2
364				P04								P04				2
374							P02	P02	P02							3
382					P03			P01			P03					3
401					P02			P03			P02					3
408							P01	P05	P01							3
410			P06										P06			2
411					P04						P04					2
420						P02		P03		P02						3
430				P05								P05				2
439					P03	P01				P01	P03					4

G51585 S0006581841_V1

Balance Weights with the Center of Mass on One Screw
Figure 517/71-00-00-990-844-F00 (Sheet 3 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE 7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	SCREW QUANTITY
441						P01		P06		P01						3
446						P04				P04						2
468							P04		P04							2
472.5			P03					P04					P03			3
481			P02					P06					P02			3
485					P05						P05					2
485.5							P02	P04	P02							3
489				P06								P06				2
526						P05				P05						2
528							P02	P05	P02							3
547				P04				P03				P04				3
551							P05		P05							2
553					P06						P06					2
554			P03					P06					P03			3
592						P03	P02		P02	P03						4
597							P02	P06	P02							3
600						P06				P06						2
601.5				P04				P04				P04				3

G51593 S0006581842_V1

Balance Weights with the Center of Mass on One Screw
Figure 517/71-00-00-990-844-F00 (Sheet 4 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE 7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	SCREW QUANTITY
602	P05		P06										P06		P05	4
628							P06		P06							2
640							P03	P05	P03							3
652						P05		P02		P05						3
681			P03			P04				P04			P03			4
691					P04			P05			P04					3
705.5							P04	P04	P04							3
709						P05		P03		P05						3
715			P02		P06						P06		P02			4
737				P06			P02		P02			P06				4
748							P04	P05	P04							3
763.5						P05		P04		P05						3
774			P06	P04								P04	P06			4
810				P04		P04				P04		P04				4
811							P06	P03	P06							3
832				P04			P04		P04			P04				4
843					P03	P05				P05	P03					4
845						P05		P06		P05						3

G51597 S0006581843_V1

Balance Weights with the Center of Mass on One Screw
Figure 517/71-00-00-990-844-F00 (Sheet 5 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE 7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	SCREW QUANTITY
865						P02	P06		P06	P02						4
870							P05	P06	P05							3
880				P03		P06				P06		P03				4
913			P05		P06						P06		P05			4
915				P04			P05		P05			P04				4
933			P04				P06		P06				P04			4
947							P06	P06	P06							3
960						P06	P03		P03	P06						4
981				P05			P05		P05			P05				4
992				P04			P06		P06			P04				4
1011					P04	P06				P06	P04					4
1036					P05		P05		P05		P05					4
1045				P06		P02		P06		P02		P06				5
1048						P02	P06	P03	P06	P02						5
1082					P03	P04		P06		P04	P03					5
1093						P05	P02	P06	P02	P05						5
1107.5		P04					P05	P06	P05					P04		5
1109	P04						P06	P06	P06						P04	5

G51600 S0006581844_V1

Balance Weights with the Center of Mass on One Screw
Figure 517/71-00-00-990-844-F00 (Sheet 6 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE 7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	SCREW QUANTITY
1125						P04	P03	P06	P03	P04						5
1130		P03					P06	P06	P06					P03		5
1175						P03	P05	P05	P05	P03						5
1175			P06			P04		P06		P04			P06			5
1184.5		P04					P06	P06	P06					P04		5
1199		P05				P06		P06		P06				P05		5
1205						P05	P03	P06	P03	P05						5
1234				P05	P05			P06			P05	P05				5
1240						P06	P03	P06	P03	P06						5
1261				P05			P05	P05	P05			P05				5
1264					P03		P06	P06	P06		P03					5
1266		P06					P06	P06	P06					P06		5
1279						P06	P03	P06	P03	P06						5
1290			P06			P06		P05		P06			P06			5
1320				P06			P05	P05	P05			P06				5
1340					P06		P04	P06	P04		P06					5
1349				P05		P06		P06		P06		P05				5
1357						P05	P05	P05	P05	P05						5

G51602 S0006581845_V1

Balance Weights with the Center of Mass on One Screw
Figure 517/71-00-00-990-844-F00 (Sheet 7 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE 7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	SCREW QUANTITY
1357			P06				P06	P06	P06				P06			5
1393						P04	P06	P06	P06	P04						5
1404					P05	P06		P06		P06	P05					5
1423					P06		P05	P06	P05		P06					5
1431						P06	P05	P05	P05	P06						5
1463			P02	P05			P05	P06	P05			P05	P02			7
1470			P04		P02		P06	P06	P06		P02		P04			7
1508						P06	P06	P05	P06	P06						5
1547						P06	P06	P06	P06	P06						5
1688					P04	P04	P05	P05	P05	P04	P04					7
1727					P04	P04	P05	P06	P05	P04	P04					7
1748					P03	P06	P05	P05	P05	P06	P03					7
1842					P05	P05	P05	P05	P05	P05	P05					7
1881					P04	P06	P05	P06	P05	P06	P04					7
1910					P06	P05	P05	P05	P05	P05	P06					7
2032					P05	P06	P06	P06	P06	P06	P05					7
2100					P06	P06	P06	P06	P06	P06	P06					7
2216				P05	P06	P04	P04	P06	P04	P04	P06	P05				7

G51818 S0006581846_V1

Balance Weights with the Center of Mass on One Screw
Figure 517/71-00-00-990-844-F00 (Sheet 8 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE															SCREW QUANTITY
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	
2254				P06	P02	P06	P06	P06	P06	P06	P02	P06				9
2333				P06	P06	P03	P06	P06	P06	P03	P06	P06				9
2396				P06	P06	P06	P06	P02	P06	P06	P06	P06				9
2453				P06	P06	P06	P06	P03	P06	P06	P06	P06				9
2507.5				P06	P06	P06	P06	P04	P06	P06	P06	P06				9
2550				P06	P06	P06	P06	P05	P06	P06	P06	P06				9
2589				P06	P06	P06	P06	P06	P06	P06	P06	P06				9
2701			P04	P06	P06	P06	P06	P02	P06	P06	P06	P06	P04			11
2806			P06	P06	P06	P06	P06	P02	P06	P06	P06	P06	P06			11
2910			P05	P06	P06	P06	P06	P05	P06	P06	P06	P06	P05			11
2999			P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06			11
3100.5		P04	P06	P06	P06	P06	P06	P03	P06	P06	P06	P06	P06	P04		13
3197.5		P04	P06	P06	P06	P06	P06	P05	P06	P06	P06	P06	P06	P04		13
3318		P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06		13
3400	P06	P06	P06	P06	P06	P06	P06	P03	P06	P06	P06	P06	P06	P06	P06	15
3497	P06	P06	P06	P06	P06	P06	P06	P05	P06	P06	P06	P06	P06	P06	P06	15

G51824 S0006581847_V1

Balance Weights with the Center of Mass on One Screw
Figure 517/71-00-00-990-844-F00 (Sheet 9 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE 7	6	5	4	3	2	1	1	2	3	4	5	6	7	SCREW QUANTITY
55	P01													P01	2
75		P01											P01		2
92			P01									P01			2
106				P01							P01				2
106	P02													P02	2
118					P01					P01					2
126						P01			P01						2
130							P01	P01							2
145		P02											P02		2
156	P03													P03	2
173	P01				P01					P01				P01	4
178			P02									P02			2
190							P01	P02							2
193		P01			P01					P01			P01		4
201	P04													P04	2
206				P02							P02				2
211		P03											P03		2
229					P02					P02					2

G51855 S0006581848_V1

Balance Weights with the Center of Mass between Two Screws
Figure 518/71-00-00-990-845-F00 (Sheet 1 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	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	P03							2
321		P05											P05		2
326		P01					P02	P02					P01		4
334					P03					P03					2
336			P04									P04			2
343			P01				P02	P02				P01			4
355						P03			P03						2
366			P03	P01							P01	P03			4
367							P03	P03							2
367		P06											P06		2

G51895 S0006581849_V1

Balance Weights with the Center of Mass between Two Screws
Figure 518/71-00-00-990-845-F00 (Sheet 2 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE 7	6	5	4	3	2	1	1	2	3	4	5	6	7	SCREW QUANTITY
384			P02	P02							P02	P02			4
389				P04							P04				2
396			P05									P05			2
405		P02	P03									P03	P02		4
420							P04	P03							2
422			P02			P02			P02			P02			4
430					P04					P04					2
440				P01	P03					P03	P01				4
453			P06									P06			2
459						P04			P04						2
459				P05							P05				2
461				P01		P03			P03		P01				4
473							P04	P04							2
500				P01		P03			P03		P01				4
502	P02		P05									P05		P02	4
508					P05					P05					2
516							P04	P05							2
524				P06							P06				2

G51904 S0006581850_V1

Balance Weights with the Center of Mass between Two Screws
Figure 518/71-00-00-990-845-F00 (Sheet 3 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	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		P01					P04	P04					P01		4
558							P05	P05							2
580					P06					P06					2
596					P02		P03	P03		P02					4
597							P05	P06							2
619						P06			P06						2
627		P04				P03			P03				P04		4
638							P06	P06							2
660	P04					P04			P04					P04	4
689					P03	P03			P03	P03					4
702					P02		P04	P04		P02					4
713		P01					P06	P06					P01		4
717						P02	P04	P04	P02						4
723				P04	P03					P03	P04				4
747				P02		P05			P05		P02				4
768			P03		P05					P05		P03			4

G51918 S0006581851_V2

Balance Weights with the Center of Mass between Two Screws
Figure 518/71-00-00-990-845-F00 (Sheet 4 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE 7	6	5	4	3	2	1	1	2	3	4	5	6	7	SCREW QUANTITY
787					P02		P05	P05		P02					4
791		P03			P06					P06			P03		4
792						P05	P02	P02	P05						4
820			P06				P03	P03				P06			4
826						P04	P03	P03	P04						4
848				P04		P04			P04		P04				4
848					P02	P06			P06	P02					4
867					P02		P06	P06		P02					4
870						P06	P02	P02	P06						4
882						P02	P06	P06	P02						4
889	P06					P06			P06					P06	4
891				P06			P03	P03			P06				4
926			P06				P04	P04				P06			4
932						P04	P04	P04	P04						4
947					P06		P03	P03		P06					4
971					P04	P05			P05	P04					4
988					P04		P05	P05		P04					4
1011		P06					P05	P05					P06		4

G51922 S0006581852_V1

Balance Weights with the Center of Mass between Two Screws
Figure 518/71-00-00-990-845-F00 (Sheet 5 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE 7	6	5	4	3	2	1	1	2	3	4	5	6	7	SCREW QUANTITY
1014						P05	P04	P04	P05						4
1017						P04	P05	P05	P04						4
1053					P06		P04	P04		P06					4
1067			P03		P03		P04	P04		P03		P03			6
1068					P04		P06	P06		P04					4
1077		P02				P04	P04	P04	P04				P02		6
1082				P06			P05	P05			P06				4
1099						P05	P05	P05	P05						4
1126		P02			P05		P04	P04		P05			P02		6
1138					P06		P05	P05		P06					4
1143				P06		P06			P06		P06				4
1162					P03	P03	P04	P04	P03	P03					6
1162				P06			P06	P06			P06				4
1179						P05	P06	P06	P05						4
1199					P06	P06			P06	P06					4
1220				P02		P05	P04	P04	P05		P02				6
1244		P04			P03		P06	P06		P03			P04		6
1257						P06	P06	P06	P06						4

G51925 S0006581853_V1

Balance Weights with the Center of Mass between Two Screws
Figure 518/71-00-00-990-845-F00 (Sheet 6 of 9)

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TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE														SCREW QUANTITY
	7	6	5	4	3	2	1	1	2	3	4	5	6	7	
1279		P03			P04		P06	P06		P04			P03		6
1305				P02		P05	P05	P05	P05		P02				6
1314		P06		P04			P05	P05			P04		P06		6
1320			P06		P02		P06	P06		P02		P06			6
1320			P03			P04	P06	P06	P04			P03			6
1329					P06	P06	P01	P01	P06	P06					6
1349			P01			P06	P06	P06	P06			P01			6
1400				P03		P05	P05	P05	P05		P03				6
1406					P02	P06	P05	P05	P06	P02					6
1416					P05	P05	P03	P03	P05	P05					6
1428			P04			P06	P04	P04	P06			P04			6
1445			P05		P05	P05			P05	P05		P05			6
1450					P06	P06	P02	P02	P06	P06					6
1457			P04		P06	P05			P05	P06		P04			6
1463				P02		P06	P06	P06	P06		P02				6
1527					P04	P04	P06	P06	P04	P04					6
1597					P06	P04	P05	P05	P04	P06					6
1672					P06	P06	P04	P04	P06	P06					6

G51927 S0006581854_V1

Balance Weights with the Center of Mass between Two Screws
Figure 518/71-00-00-990-845-F00 (Sheet 7 of 9)

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TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE														SCREW QUANTITY
	7	6	5	4	3	2	1	1	2	3	4	5	6	7	
1761				P04	P06	P05	P02	P02	P05	P06	P04				8
1831				P05	P06	P05	P02	P02	P05	P06	P05				8
1908				P03	P04	P06	P05	P05	P06	P04	P03				8
1981				P05	P05	P05	P04	P04	P05	P05	P05				8
1988				P03	P04	P06	P06	P06	P06	P04	P03				8
2066				P05	P04	P06	P05	P05	P06	P04	P05				8
2129				P06	P04	P05	P06	P05	P05	P04	P06				8
2131				P06	P04	P06	P05	P05	P06	P04	P06				8
2281				P06	P06	P06	P05	P05	P06	P06	P06				8
2361			P06	P03	P04	P06	P05	P05	P06	P04	P03	P06			10
2441			P06	P03	P04	P06	P06	P06	P06	P04	P03	P06			10
2519			P06	P05	P04	P06	P05	P05	P06	P04	P05	P06			10
2584			P06	P06	P04	P06	P05	P05	P06	P04	P06	P06			10
2692			P05	P05	P06	P06	P06	P06	P06	P06	P05	P05			10
2814			P06	P06	P06	P06	P06	P06	P06	P06	P06	P06			10
2907		P06	P05	P05	P05	P06	P05	P05	P06	P05	P05	P05	P06		12
3013		P05	P05	P05	P06	P06	P06	P06	P06	P06	P05	P05	P05		12
3101		P06	P06	P06	P06	P06	P05	P05	P06	P06	P06	P06	P06		12

G51928 S0006581855_V1

Balance Weights with the Center of Mass between Two Screws
Figure 518/71-00-00-990-845-F00 (Sheet 8 of 9)

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TARGET BALANCE WEIGHT GRAM-CM	SCREW TYPE														SCREW QUANTITY
	7	6	5	4	3	2	1	1	2	3	4	5	6	7	
3181		P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06		12
3301	P06	P06	P06	P06	P04	P06	P06	P06	P06	P04	P06	P06	P06	P06	14
3405	P06	P05	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	P05	P06	14
3451	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	P06	14

G51929 S0006581856_V1

Balance Weights with the Center of Mass between Two Screws
Figure 518/71-00-00-990-845-F00 (Sheet 9 of 9)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-750-803-F00

15. Test 14B - Fan Trim Balance (On Board Procedure - Vibro-meter AVM)

A. General

(1) This trim balance procedure is done for the following conditions:

(a) To decrease the fan or LPT vibration levels when they are equal to or more than 8 mils DA (double amplitude).

(b) When, after the replacement or the repair of a fan blade, the correction is more than 236 gram-inches (600 g-cm).

(2) The trim balance procedure should decrease the vibration levels of the fan and the LPT to less than 4.0 units on the Airborne Vibration Monitor (AVM) during a ground operation at all engine operation speeds.

(3) This trim balance procedure uses the imbalance data recorded and calculated by the AVM during the last six flights from the No. 1 bearing and the FFCC (Fan Frame Compressor Case) vibration sensors.

(4) You can get this data from the front panel display of the AVM:

(a) The current imbalance data

(b) The current configuration of the balance weights and their installed locations (fan)

(c) The results of a calculation of a 1-plane balance (fan only)

(d) Also, you can enter the new weight values (if they have changed) for the fan.

(5) When an engine is installed on the wing, after an overhaul or after a replacement of a significant number of fan blades, it is recommended that you first do a vibration survey (TASK 71-00-00-700-814-F00).

(a) If the result of this vibration survey is not satisfactory, you can do this procedure to balance the engine:

1) You can also do one of the other Fan Trim Balance procedures, or

2) Do a 3-shot plot trim balance procedure to decrease the engine vibration level (TASK 71-00-00-750-802-F00).

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

C. Consumable Materials

Reference	Description	Specification
D50019 [CP2444]	Lubricant - Molydisulfide Solid Film, Paste - Molykote G-n Plus	
D50308 [CP 2171]	Lubricant - MOS2 Solid	MIL-L-8937
G02061	Marker - Permanent, Felt Tip Pen	

D. Location Zones

Zone	Area
117	Electrical and Electronics Compartment - Left
118	Electrical and Electronics Compartment - Right
211	Flight Compartment - Left

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(Continued)

Zone	Area
212	Flight Compartment - Right
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Access Panels

Number	Name/Location
117A	Electronic Equipment Access Door

F. Prepare for the Trim Balance Procedure

SUBTASK 71-00-00-860-170-F00

(1) Make sure that this circuit breaker is closed:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
A	2	C01076	ENGINE VIB MON

SUBTASK 71-00-00-010-025-F00

(2) Open this access panel:

Number	Name/Location
117A	Electronic Equipment Access Door

SUBTASK 71-00-00-210-050-F01

(3) It is recommended to do a check of the balance weights installed on the engine and stored in the AVM.

(a) Record the balance weights installed on the engine.

(b) Use the Trim Balance Procedure to see the balance screw data in the AVM.

1) If it is necessary, change the balance weights in the AVM to agree with the installed weights on the engine.

LOM ALL; AIRPLANES WITH S362A001 AVM

G. Trim Balance Procedure

SUBTASK 71-00-00-970-070-F00

(1) Do the following steps to get to the fan balancing menu on the AVM front panel:

(a) Push and release one of the four buttons to show SELF TEST? on the front panel display.

1) Look at the AVM Balance Menu and do the balance procedure (Figure 520 or Figure 521 or Figure 522).

(b) Push and release the NO button three times until the BALANCE? option shows.

(c) Push and release the YES button to go to the balance menu.

(d) Push and release the YES button. This causes the BALANCE ENGINE 1? screen to show.

(e) To get the balance data for engine 1, push and release the YES button. This causes the IMBAL DATA READ? screen to show.

(f) To get the balance data for engine 2, do the following steps:

1) Push and release the NO button. This causes the BALANCE ENGINE 2? screen to show.

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2) Push and release the YES button. This causes the IMBAL DATA READ? screen to show.

SUBTASK 71-00-00-970-071-F00

(2) If you must look at historical balance data for other flights or trim balance runs, do the following steps to go into the IMBAL DATA READ? menu to read the balance data:

NOTE: This menu item is not necessary for the trim balance calculation. This menu only shows the balance history for the last 6 flights or trim balance runs.

(a) Push and release the YES button. This causes the X FLIGHTS DISPLAY? screen to show.

NOTE: The X refers to the total number of flights in memory, and can be 1 through 6. If NO IMBAL DATA shows, there is no stored balance data in the AVM. If you push and release the NO button, the WEIGHTS CONFIG? screen will show.

(b) Push and release the YES button. This causes the FLIGHT X? screen to show.

NOTE: The X refers to the flight number, and can be 0 through 5, where 0 is the last flight. Use the UP and DOWN ARROW buttons to make a selection of the flight that you want to see the imbalance history on.

NOTE: Use only flight data recorded by this AVM unit while installed on this airplane.

(c) Push and release the YES button. The screen that shows gives the highest imbalance data for the selected flight that was recorded (Table 518).

NOTE: The definitions of the screen are given below.

NOTE: Use the UP and DOWN ARROW buttons to get one of the five other highest imbalance histories that was recorded during each flight.

Table 518/71-00-00-993-884-F00

AVM Front Panel Display
E x x x . x %
n . n n / y y y
m . m m / z z z

1) Ex - Engine number
2) xx.x - N1 rotor speed in percent
3) n.nn - the fan displacement in mils DA
4) m.mm - the LPT displacement in mils DA
5) yyy - the phase angle for the fan in degrees
6) zzz - the phase angle for the LPT in degrees.

SUBTASK 71-00-00-860-200-F00

(3) If NO IMBAL DATA screen shows (no stored AVM data), you can do the following steps to get the imbalance data:

(a) Do this task: Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00.

1) Make sure to use the alternate acceleration procedure to get the imbalance data.
2) Pause for 1-2 minutes at each of the speed ranges shown.

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LOM ALL; AIRPLANES WITH S362A001 AVM (Continued)

SUBTASK 71-00-00-970-072-F00

(4) If it is necessary to read or change the balance screw data, do the following steps to go into the WEIGHTS CONFIG? menu (Figure 519):

NOTE: This menu item is not necessary for the trim balance calculation. However, if you change the balance screw data to agree with the installed weights, then you can re-calculate new balance data. This menu item only shows the current balance weights installed. Also, if the installed weights change, you can change the balance weight data in the AVM.

(a) Use this menu to make sure the weights installed on the engine agree with the weights in the AVM memory.

1) If you can't read the part number on the balance screw, use the weight or length of the screw (Figure 506).

2) If the weights agree, then you can use the balance history to balance the fan.

(b) From the IMBAL DATA READ? screen, push and release the NO button. This causes the WEIGHTS CONFIG? screen to show.

(c) Follow the following steps to read the installed balance weights that are stored in the AVM:

1) Push and release the YES button. This causes the READ ACTUAL CONFIG? screen to show.

NOTE: If you push and release the NO button, the RESET ACTUAL CONFIG? screen will show. The definition of this screen is given later.

2) Push and release the YES button. This causes the screen below to show (Table 519).

NOTE: This screen gives the imbalance weight installed at each hole. Only holes that have weight screws other than P14 are shown. The definitions of the screen are given below.

NOTE: If all holes have P14 balance screws, the Ex ALL LOC ARE P14 screen will show. P14 and P07 screws are equivalent.

Table 519/71-00-00-993-885-F00

AVM Front Panel Display
E x F A N
L o c x x
x x x x x x x

a) xx - the location number

b) xxxxxxxx - the actual weight configuration.

3) Use the UP and DOWN ARROW buttons to get the balance weight data at all other holes which do not have P14 screws.

NOTE: There are 36 holes on the fan spinner. P14 and P07 screws are equivalent.

(d) If you must change most of the balance screws to P14, follow the following steps to reset all balance weights to P14:

1) Push and release the YES button. This causes the READ ACTUAL CONFIG? screen to show.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL; AIRPLANES WITH S362A001 AVM (Continued)

2) Push and release the NO button. This causes the RESET ACTUAL CONFIG? screen to show.

3) Push and release the YES button. This causes the SAVE NEW CONFIG? screen to show.

4) Push and release the YES button.

NOTE: If you do not want to reset the weight configuration, push and release the NO button.

NOTE: After the NO or YES buttons are pushed and released, the MODIFY ACTUAL CONFIG? screen will show.

(e) Do the following steps to change the balance weights in the AVM:

1) Push and release the YES button. This causes the READ ACTUAL CONFIG? screen to show.

2) Push and release the NO button. This causes the RESET ACTUAL CONFIG? screen to show.

3) Push and release the NO button. This causes the MODIFY ACTUAL CONFIG? screen to show.

4) Push and release the YES button. This causes the LOC. xx yyyyyyyy MODIFY? screen to show.

NOTE: The xx is the location number and the yyyyyyy is the installed balance screw.

5) Use the UP and DOWN ARROW buttons to get the balance weight data at the location you want. There are 36 holes on the fan spinner.

6) Push and release the YES button. This causes the LOC. xx MODXXX SAVE? screen to show.

7) Use the UP and DOWN ARROW buttons to change the screw weight (MODXXX).

NOTE: The UP ARROW increases the weight and the DOWN ARROW decreases the weight.

8) Push and release the YES button to keep the new balance weight in the AVM. This causes the LOC xx yyyyyyyy MODIFY? screen for the subsequent location to show.

a) If you do not want to keep the new balance weight, push and release the NO button. This causes the LOC xx yyyyyyy MODIFY? screen for the subsequent location to show.

9) Repeat the above steps to change the other weights.

10) To exit the MODIFY ACTUAL CONFIG? menu, push and release the NO button when the LOC xx yyyyyyy MODIFY? screen shows.

SUBTASK 71-00-00-970-073-F00

(5) To go into the BALANCE 1 PLANE COMPUTE? menu to calculate a 1-plane (fan) balance solution, do the following steps:

NOTE: This menu will do a 1-plane trim balance calculation.

(a) From the IMBAL DATA READ? screen, push and release the NO button two times. This causes the BALANCE 1 PLANE COMPUTE? screen to show.

(b) Push and release the YES button. This causes the BXX GENERIC COEFFS? screen to show.

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LOM ALL; AIRPLANES WITH S362A001 AVM (Continued)

(c) Push and release the YES button. This causes the COMPUTE IN PROGRESS screen to show.

(d) When the computation is completed, the X FLIGHTS DISPLAY? screen shows.

NOTE: The X refers to the total number of flights or trim balance runs in memory, and is 1 through 6.

NOTE: If NO IMBAL DATA shows, there is no stored balance data in the AVM. If you push and release the NO button twice after the NO IMBAL DATA or X FLIGHTS DISPLAY? screens shows, the BALANCE ENGINE 2? screen will show (if the engine 1 menu was on) or the display will go off (if the engine 2 menu was on).

1) Push and release the YES button. This causes the FLIGHT 0? screen to show.

NOTE: Use the UP and DOWN ARROW buttons to select X Flight. Use only flight data recorded on this airplane.

NOTE: If performing more than once within 6 flights, do not use the same flight data selection as a previous fan trim balance run. This will give the same results.

(e) Push and release the YES button. This causes the screen below to show (Table 520).

NOTE: This screen gives the imbalance solution for each flight or trim balance run. The definitions of the screen are given below.

NOTE: Use the UP and DOWN ARROW buttons to get the imbalance solutions for each of the last 6 flights or trim balance runs that was recorded in the AVM.

Table 520/71-00-00-993-886-F00

AVM Front Panel Display
n n n n / y y y X / 6 F x ?

1) nnnn - the fan balance weight solution (in gm-cm)

2) yyy - the fan balance weight position (in degrees)

3) X/6 - the number of speed ranges with valid data (0 to 6)

4) Fx - the flight number (0 to 5, with 0 the last flight or trim balance run).

(f) Push and release the YES button. This causes the COMPUTE IN PROGRESS screen to show.

NOTE: If you push and release the NO button twice, the BALANCE ENGINE 2? screen will show (if the engine 1 menu was on) or the main menu will show (if the engine 2 menu was on).

(g) After a short time, one of the following four screens will show on the display. The screen that is shown depends on the solution found.

1) If the SOLUTION FOUND DISPLAY? screen shows, there is a balance solution to balance the fan.

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LOM ALL; AIRPLANES WITH S362A001 AVM (Continued)

2) If the WEIGHT LIMIT EXCEEDED screen shows, the balance solution value calculated is too large to install on the fan.

NOTE: To exit this menu, push and release the NO button twice. The BALANCE ENGINE 2? screen will show (if the engine 1 menu was on) or the main menu will show (if the engine 2 menu was on).

3) If the NO CHANGE REQUIRED screen shows, the balance solution that is currently installed is satisfactory.

NOTE: To exit this menu, push and release the NO button. The BAL FOR ENGINE 2? screen will show (if the engine 1 menu was on) or the display will go off (if the engine 2 menu was on).

4) If the NO IMBAL DATA ACQUIRED screen shows, there was a problem and the balance solution was not calculated.

NOTE: To exit this menu, push and release the NO button twice. The BALANCE ENGINE 2? screen will show (if the engine 1 menu was on) or the main menu will show (if the engine 2 menu was on).

(h) Push and release the YES button. This causes this screen below to show (Table 521).

NOTE: The screen that shows gives the balance weight and its location that are necessary to balance the fan. The definitions of the screen are given below.

NOTE: Use the UP and DOWN ARROW buttons to get the imbalance weights that are necessary for the other holes on the fan (1 to 36). To exit this screen, push and release the NO button and the DISPLAY SOLUTION AGAIN? screen will show.

Table 521/71-00-00-993-887-F00

AVM Front Panel Display
E x L o c . X X R e m o v e y y y y y y y y

1) XX - the location number (1 to 36)

2) yyyyyyyy - the actual weight that must be removed (installed).

NOTE: For a weight installation, the display shows Install instead of Remove.

(i) Record each new balance weight and its location on the fan spinner.

(j) After you use the DOWN ARROW button to show the last hole, the DISPLAY SOLUTION AGAIN? screen will show. To see the solution again, push and release the YES button.

(k) Push and release the NO button. This causes the SAVE NEW CONFIG? screen to show.

(l) Push and release the YES button to keep the new balance weight solution.

NOTE: After the YES button is pushed, the balance history in the AVM is erased. No balance solutions can be calculated.

1) If you do not want to keep the new balance weight solution, push and release the NO button. Do this if you want to calculate a solution for other flights.

(m) If the YES button is pushed, the BALANCE ENGINE 2? screen will show (if the engine 1 menu was on) or the main menu will show (if the engine 2 menu was on).

(n) If the NO button is pushed, the X FLIGHTS DISPLAY? screen will show.

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LOM ALL; AIRPLANES WITH S362A001 AVM (Continued)

(o) Push the NO button until TURN OFF DISPLAY? shows and then push the YES button.

(p) Install the new balance screws as follow (Figure 519):

NOTE: Do not remove non-P14 weights if they were not listed in the above solution.

> **CAUTION** MAKE SURE THAT YOU PUT A MAT ON THE LOWER SURFACE OF THE INLET COWL. DAMAGE TO THE INLET COWL SURFACES CAN OCCUR.

1) Put the protective mat, STD-585 on the inner lower half of the inlet cowl.
2) Find the number one weight location. This location is immediately to the left (CCW) of the machined dimple on the fan rear spinner cone.
   a) Use a marker, G02061, to put a mark on this hole location to identify it as the number one weight location.
3) At the first hole where you will install a new balance screw, remove the installed balance screw.
4) Lubricate the new balance screw with Molykote G-n Plus lubricant, D50019 [CP2444] or Lubricant, D50308 [CP 2171], and install on the spinner.
   a) Tighten the screw to 68-74 pound-inches (7.6-8.4 Newton meters).
5) Repeat the above steps to install all other balance screws.
6) Remove the protective mat, STD-585, and all the other unwanted material from the inlet cowl.

(q) Do the trim balance test at the end of this procedure.

LOM ALL; AIRPLANES WITH S360N021-113 OR -114 AVM

H. Trim Balance Procedure

SUBTASK 71-00-00-970-042-F00

(1) Get to the fan balancing menu on the AVM front panel:
   (a) Look at the AVM Balance Menu and do the balance procedure (Figure 520 or Figure 521 or Figure 522).

SUBTASK 71-00-00-970-086-F00

(2) Push and release one of the four buttons to show SELF TEST? on the front panel display.

(3) Push and release the NO button three times until the BALANCE option shows.

(4) Push and release the YES button to go to the balance menu. This causes the BOEING GENERIC BXX (where XX = 01 to 99) screen to show.

(5) Push and release the YES button. This causes the BAL FOR ENGINE 1? screen to show.

(6) To get the balance data for engine 1, push and release the YES button. This causes the IMBAL DATA READ? screen to show.

(7) To get the balance data for engine 2, do the following steps:
   (a) Push and release the NO button. This causes the BAL FOR ENGINE 2? screen to show.
   (b) Push and release the YES button. This causes the IMBAL DATA READ? screen to show.

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LOM ALL; AIRPLANES WITH S360N021-113 OR -114 AVM (Continued)

SUBTASK 71-00-00-970-043-F00

(8) If you must look at historical balance data for other flights or trim balance runs, do the following steps to go into the IMBAL DATA READ? menu to read the balance data:

NOTE: This menu item is not necessary for the trim balance calculation. This menu only shows the balance history for the last 6 flights or trim balance runs.

(a) Push and release the YES button. This causes the X FLIGHTS DISPLAY? screen to show.

NOTE: The X refers to the total number of flights in memory, and can be 1 through 6. If NO IMBAL DATA shows, there is no stored balance data in the AVM. If you push and release the NO button, the HOLE CONFIG? screen will show.

(b) Push and release the YES button. This causes the FLIGHT X? screen to show.

NOTE: The X refers to the flight number, and can be 0 through 5, where 0 is the last flight. Use the UP and DOWN ARROW buttons to make a selection of the flight that you want to see the imbalance history on.

(c) Push and release the YES button. The screen that shows gives the highest imbalance data for the selected flight that was recorded (Table 522).

NOTE: The definitions of the screen are given below.

NOTE: Use the UP and DOWN ARROW buttons to get one of the five other highest imbalance histories that was recorded during each flight.

Table 522/71-00-00-993-862-F00

AVM Front Panel Display
E 1 x x . x %
n . n n / y y y
m . m m / z z z

1) xxx - N1 rotor speed in percent
2) nnn - the fan displacement in mils
3) mmm - the LPT displacement in mils
4) yyy - the phase angle for the fan in degrees
5) zzz - the phase angle for the LPT in degrees.

SUBTASK 71-00-00-860-198-F00

(9) If the NO IMBAL DATA screen shows (no stored AVM data), you can do the following steps to get the imbalance data:

(a) Do this task: Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00.

1) Make sure to use the alternate acceleration procedure to get the imbalance data.
2) Pause for 1-2 minutes at each of the speed ranges shown.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL; AIRPLANES WITH S360N021-113 OR -114 AVM (Continued)

SUBTASK 71-00-00-970-044-F00

(10) If it is necessary to read or change the balance screw data, do the following steps to go into the HOLE CONFIG? menu (Figure 519):

NOTE: This menu item is not necessary for the trim balance calculation. However, if you change the balance screw data to agree with the installed weights, then you can re-calculate new balance data. This menu item only shows the current balance weights installed. Also, if the installed weights change, you can change the balance weight data in the AVM.

(a) Use this menu to make sure the weights installed on the engine agree with the weights in the AVM memory.

1) If you can't read the part number on the balance screw, use the weight or length of the screw (Figure 506).

2) If the weights agree, then you can use the balance history to balance the fan.

(b) From the IMBAL DATA READ? screen, push and release the NO button. This causes the HOLE CONFIG? screen to show.

(c) Do the following steps to read the installed balance weights that are stored in the AVM:

1) Push and release the YES button. This causes the READ CONFIG DATA? screen to show.

NOTE: If you push and release the NO button, the RESET ACTUAL CONFIG? screen will show. The definition of this screen is given later.

2) Push and release the YES button. This causes the screen below to show (Table 523).

NOTE: This screen gives the imbalance weight installed at each hole. Only holes that have weight screws other than P07 are shown. The definitions of the screen are given below.

NOTE: If all holes have P07 balance screws, the E1 ALL HOLES ARE P07 screen will show.

Table 523/71-00-00-993-863-F00

AVM Front Panel Display
E 1 F A N
H o l e x x
P 0 X

a) xx - the hole number

b) P0X - the actual weight configuration.

3) Use the UP and DOWN ARROW buttons to get the balance weight data at all other holes which do not have P07 screws.

NOTE: There are 36 holes on the fan spinner.

(d) If you must change most of the balance screws to P07, do the following steps to reset all balance weights to P07:

1) Push and release the YES button. This causes the READ CONFIG DATA? screen to show.

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2) Push and release the NO button. This causes the RESET ACTUAL CONFIG? screen to show.

3) Push and release the YES button. This causes the SAVE NEW CONFIG? screen to show.

4) Push and release the YES button.

NOTE: If you do not want to reset the weight configuration, push and release the NO button.

NOTE: After the NO or YES buttons are pushed and released, the MODIFY ACTUAL CONFIG? screen will show.

(e) Do the following steps to change the balance weights in the AVM:

1) Push and release the YES button. This causes the READ CONFIG DATA? screen to show.

2) Push and release the NO button. This causes the RESET ACTUAL CONFIG? screen to show.

3) Push and release the NO button. This causes the MODIFY ACTUAL CONFIG? screen to show.

4) Push and release the YES button. This causes the HOLE XX P0X MODIFY? screen to show.

NOTE: The XX is the hole number and the P0X is the installed balance screw.

NOTE: Use the UP and DOWN ARROW buttons to get the balance weight data at the hole you want. There are 36 holes on the fan spinner.

5) Push and release the YES button. This causes the HOLE XX MOD P0X SAVE? screen to show.

6) Use the UP and DOWN ARROW buttons to change the screw weight.

NOTE: The UP ARROW increases the weight and the DOWN ARROW decreases the weight.

7) Push and release the YES button to keep the new balance weight in the AVM. This causes the HOLE XX P0X MODIFY? screen for the subsequent hole to show.

a) If you do not want to keep the new balance weight, push and release the NO button. This causes the HOLE XX P0X MODIFY? screen for the subsequent hole to show.

8) Repeat the above steps to change the other weights.

9) To exit the MODIFY ACTUAL CONFIG? menu, push and release the NO button when the HOLE XX P07 MODIFY? screen shows.

SUBTASK 71-00-00-970-045-F00

(11) To go into the BALANCE 1 PLANE COMPUTE? menu to calculate a 1-plane (fan) balance solution, follow the following steps:

NOTE: This menu will do a 1-plane trim balance calculation.

(a) From the IMBAL DATA READ? screen, push and release the NO button two times. This causes the BALANCE 1 PLANE COMPUTE? screen to show.

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LOM ALL; AIRPLANES WITH S360N021-113 OR -114 AVM (Continued)

(b) Push and release the YES button. This causes the X FLIGHTS DISPLAY? screen to show.

NOTE: The X refers to the total number of flights or trim balance runs in memory, and is 1 through 6.

NOTE: If NO IMBAL DATA shows, there is no stored balance data in the AVM. If you push and release the NO button after the NO IMBAL DATA or X FLIGHTS DISPLAY? screens shows, the BAL FOR ENGINE 2? screen will show (if the engine 1 menu was on) or the display will go off (if the engine 2 menu was on).

1) Push and release the YES button. This causes the FLIGHT 0? screen to show.

NOTE: Use the UP and DOWN ARROW buttons to select X Flight. Use only flight data recorded on this airplane.

NOTE: If performing more than once within 6 flights, do not use the same flight data selection as a previous fan trim balance run. This will give the same results.

(c) Push and release the YES button. This causes the screen below to show (Table 524).

NOTE: This screen gives the imbalance solution for each flight or trim balance run. The definitions of the screen are given below.

NOTE: Use the UP and DOWN ARROW buttons to get the imbalance solutions for each of the last 6 flights or trim balance runs that was recorded in the AVM.

Table 524/71-00-00-993-864-F00

AVM Front Panel Display
n n n n / y y y A A A F x ?

1) nnnn - the fan balance weight solution (in gm-cm)
2) yyy - the fan balance weight position (in degrees)
3) AAA - the identifier of the uploadable parameter set (B00 to B99)
4) Fx - the flight number (0 to 5, with 0 the last flight or trim balance run).

(d) Push and release the YES button. This causes the BALANCE IN PROGRESS screen to show.

NOTE: If you push and release the NO button, the BAL FOR ENGINE 2? screen will show (if the engine 1 menu was on) or the display will go off (if the engine 2 menu was on).

(e) After a short time, one of the following four screens will show on the display. The screen that is shown depends on the solution found.

1) If the SOLUTION FOUND DISPLAY? screen shows, there is a balance solution to balance the fan.

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2) If the WEIGHT LIMIT EXCEEDED screen shows, the balance solution value calculated is too large to install on the fan.

NOTE: To exit this menu, push and release the NO button. The BAL FOR ENGINE 2? screen will show (if the engine 1 menu was on) or the display will go off (if the engine 2 menu was on).

3) If the NO CHANGE REQUIRED screen shows, the balance solution that is currently installed is satisfactory.

NOTE: To exit this menu, push and release the NO button. The BAL FOR ENGINE 2? screen will show (if the engine 1 menu was on) or the display will go off (if the engine 2 menu was on).

4) If the NO IMBAL DATA ACQUIRED screen shows, there was a problem and the balance solution was not calculated.

NOTE: To exit this menu, push and release the NO button. The BAL FOR ENGINE 2? screen will show (if the engine 1 menu was on) or the display will go off (if the engine 2 menu was on).

(f) Push and release the YES button. This causes this screen below to show (Table 525).

NOTE: The screen that shows gives the balance weight and its location that are necessary to balance the fan. The definitions of the screen are given below.

NOTE: Use the UP and DOWN ARROW buttons to get the imbalance weights that are necessary for the other holes on the fan (1 to 36). To exit this screen, push and release the NO button and the DISPLAY SOLUTION AGAIN? screen will show.

Table 525/71-00-00-993-865-F00

AVM Front Panel Display
E 1 H o l e X X
R e m P 0 X
I n s t P 0 Y

1) XX - the hole number (1 to 36)

2) P0X - the actual weight that must be removed

3) P0Y - the new weight that must be installed.

(g) Record each new balance screw and its location on the fan spinner.

(h) After you use the DOWN ARROW button to show the last hole, the DISPLAY SOLUTION AGAIN? screen will show. To see the solution again, push and release the YES button.

(i) Push and release the NO button. This causes the SAVE NEW CONFIG? screen to show.

(j) Push and release the YES button to keep the new balance weight solution.

NOTE: After the YES button is pushed, the balance history in the AVM is erased. No more balance solutions can be calculated.

1) If you do not want to keep the new balance weight solution, push and release the NO button. Do this if you want to calculate solutions for other flights.

(k) After the YES or NO button was pushed, the BAL FOR ENGINE 2? screen will show (if the engine 1 menu was on) or the display will go off (if the engine 2 menu was on).

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LOM ALL; AIRPLANES WITH S360N021-113 OR -114 AVM (Continued)

(l) Install the new balance screws as follows (Figure 519):

NOTE: Do not remove non-P07 weights if they were not listed in the above solution.

> **CAUTION** MAKE SURE THAT YOU PUT A MAT ON THE LOWER SURFACE OF THE INLET COWL. DAMAGE TO THE INLET COWL SURFACES CAN OCCUR.

1) Put the protective mat, STD-585, on the inner lower half of the inlet cowl.
2) Find the number one hole.

   NOTE: This hole is immediately left (CCW) of the machined dimple on the fan rear spinner cone.

   a) Use a marker, G02061, to put a mark on this hole to identify it as the number one weight location.
3) At the first hole where you will install a new balance screw, remove the installed balance screw.
4) Lubricate the new balance screw with Molykote G-n Plus lubricant, D50019 [CP2444] or Lubricant, D50308 [CP 2171], and install on the spinner.

   a) Tighten the screw to 68-74 pound-inches (7.6-8.4 Newton meters).
5) Repeat the above steps to install all other balance screws.
6) Remove the protective mat, STD-585, and all the other unwanted material from the inlet cowl.

(m) Do the trim balance test at the end of this procedure.

LOM ALL

I. Trim Balance Test

SUBTASK 71-00-00-720-006-F00

(1) Do this task: Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00.

(a) This test is not necessary if the cause for the trim balance (initial imbalance) is less than 4.0 units. If engine vibrations are between 3.0 and 4.0 units after this test, refer to your airline's policy to decrease again vibration level if necessary.

(b) Monitor the vibration levels on subsequent engine operation.

1) If the vibration level does not change much, you can stop the monitoring.
2) If the vibration level changes significantly, apply CFMI CESM No.7 to decrease and control the vibration.

J. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-010-026-F00

(1) Close this access panel:

Number	Name/Location
117A	Electronic Equipment Access Door

SUBTASK 71-00-00-860-171-F00

(2) During a subsequent engine operation, do a check of the N1 and AVM indications to make sure they operate correctly.

END OF TASK

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(VIEW IN THE AFT DIRECTION)

S-M56-MM-03715-00-B
G90267 S0006581869_V2

Initial Balance Screw Location Chart
Figure 519/71-00-00-990-856-F00

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N49866 S0006581876_V1

AVM Trim Balance Quick Reference Guide
Figure 520/71-00-00-990-893-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

N50210 S0006581877_V1

AVM Trim Balance Quick Reference Guide
Figure 521/71-00-00-990-894-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AVM Trim Balance Quick Reference Guide
Figure 522/71-00-00-990-895-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-750-805-F00

16. Test 14C - Fan Trim Balance (Analyzer Procedure)

A. General

(1) This procedure uses an engine run with parallel acquisition system for Airborne Vibration Monitor (AVM) data to balance the fan.

(2) The vibration analyzer monitors the No. 1 Bearing and FFCCV vibration sensors continuously during the engine run and stores up to seven balance data points based on speed ranges and stability criteria.

(3) Specific N1 speed ranges must be used during the dynamic test.

(4) Stored balance data is available during the computation on balance menu and stored data menu.

B. References

Reference	Title
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (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-3932	System - Portable Engine Balancing Part #: PBS-4100 Supplier: 26741
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
D50019 [CP2444]	Lubricant - Molydisulfide Solid Film, Paste - Molykote G-n Plus	
D50308 [CP 2171]	Lubricant - MOS2 Solid	MIL-L-8937
G02061	Marker - Permanent, Felt Tip Pen	

E. Location Zones

Zone	Area
117	Electrical and Electronics Compartment - Left
118	Electrical and Electronics Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Access Panels

Number	Name/Location
117A	Electronic Equipment Access Door

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G. Prepare for the Trim Balance

SUBTASK 71-00-00-480-005-F00

(1) Install the test equipment.

NOTE: Keep the AVM system available to monitor vibration in the flight compartment during the test in parallel with the vibration tracking system (analyzer).

(a) Use the vibration analyzer user manual of the manufacturer.

(b) Any vibration tracking system (analyzer) with the following functions and specifications for a correct calculation is permitted:

1) Vibration level measurement and display

2) In broad band (BB) and/or narrow band (NB) with tracking filter controlled by the engine speeds of N1 and/or N2

3) Units and Kinetic Functions

a) NB N1 displacement in mils peak to peak

b) NB N2 speed in inch per sec peak.

4) Rotational speed measurement and display

a) In % or in RPM (N1 or N2).

5) Imbalance measurement and display.

a) For correct calculation, the measurement is done clockwise when forward looking aft (FLA)

b) The measurement unit in degrees from 12 o'clock position, 12:00 (FLA) is zero degrees and 3:00 (FLA) is 90 degrees.

(c) Example Ground Support Equipment includes:

1) The portable engine balancing system, COM-3932

2) Trim Balance Software, CFMI 856A2678P01.

H. Fan Trim Balance

SUBTASK 71-00-00-970-079-F00

(1) Find and record these conditions:

CAUTION DO NOT USE THE TOTAL AIR TEMPERATURE (TAT) INDICATION FROM THE AIRPLANE FOR THE AMBIENT AIR TEMPERATURE. IF YOU DO NOT OBEY, THE TAT CAN CAUSE AN INCORRECT N1 TARGET SELECTION.

CAUTION DO NOT USE A MERCURY SOURCE NEAR THE AIRPLANE. MERCURY CAN CAUSE STRUCTURAL DAMAGE IF IT TOUCHES THE AIRPLANE STRUCTURE.

(a) Record the ambient air temperature Outside Air Temperature (OAT) in the shade of the wheel well for the nose gear.

(b) Record the barometric pressure.

(c) Use the OAT to find the N1 Takeoff (TO) speed:

1) Enter the OAT on the FMC N1 Limits Page.

a) Enter a slash (/) before you enter the number.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) Select TO or alternately TO-B if available.

3) Find the N1 speed on the FMC Takeoff Ref Page and record on the data sheet.

4) Make sure that the Thrust Mode Display shows TO.

5) Make sure that the outer knob of the N1 Set Control is in the AUTO position on the P2 panel.

6) Make sure that the Reference N1 Bug agrees with the N1 takeoff speed.

SUBTASK 71-00-00-860-201-F00

WARNING	MAKE SURE THAT YOU OBEY ALL THE INSTRUCTIONS AND PRECAUTIONS WHEN YOU OPERATE AN ENGINE AT HIGH POWER. IF YOU DO NOT OBEY THE INSTRUCTIONS AND PRECAUTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

(a) Let the engine become stable at the idle position for a minimum of 2 minutes.

(b) Make sure that all the pneumatic bleeds and electrical loads are off.

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) Make sure that all engine indications are normal.

SUBTASK 71-00-00-970-074-F00

CAUTION	MAKE SURE THAT YOU DO NOT GO MORE THAN THE 4 UNITS (10 MILS) VIBRATION LIMIT FOR THE N1 ROTOR. IF YOU DO NOT OBEY, ENGINE DAMAGE CAN OCCUR.

(3) Slowly move the forward thrust lever (in not less than 20 seconds) to the 80 ±2% N1 position.

(a) Let the engine become stable at this speed for a minimum of 5 minutes.

NOTE: This lets the engine become thermally stable and makes sure the vibration indications are accurate.

(b) Do a check of the vibration analyzer for correct operation.

(c) Slowly move the forward thrust lever (in not less than 20 seconds) to the idle position.

1) Let the engine become stable at this speed for a minimum of 30 seconds.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-00-970-075-F00

CAUTION

DO NOT GO MORE THAN THE TAKEOFF POWER SPEED FOR THE CURRENT CONDITIONS, ENGINE DAMAGE CAN OCCUR.

(4) Do a 2-minute acceleration of the engine from the minimum idle position to the Takeoff Power (TOP) N1 speed.

(a) Let the engine become stable at this speed for a minimum of 15 seconds.

SUBTASK 71-00-00-970-076-F00

(5) Do a 3-minute deceleration of the engine from the TOP to the minimum idle position as follows:

(a) Let the engine become stable at each speed for a minimum of 30 seconds to acquire vibration data and record the data (+/- 30 rpm of N1 target) (Table 526).

(b) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 95% (4,916 rpm).

(c) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 90% (4,657 rpm).

(d) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 87% (4,502 rpm).

(e) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 84% (4,347 rpm).

(f) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 76% (3,933 rpm).

(g) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 58% (3,001 rpm).

(h) Continue the slow deceleration to idle and let the engine become stable for 3 minutes.

LOM 404, 407, 420 PRE SB 737-30A1063

(i) 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

(j) Make sure that the Probe Heat "A" and "B" switches, on the P5 overhead panel, are in the AUTO position.

LOM ALL

(k) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 526/71-00-00-993-896-F00 Vibration Analyzer Data

VIBE SENSOR	N1 SPEED		AMPLITUDE (MILS DA)	SENSITIVITY (MULTIPLY BY)	BALANCE WEIGHT (GR-CM)	ANGLE (DEG)	PHASE LAG (DEG)	CALCULATE ANGLE (DEG)
	%	RPM	A	[1]	A v 1mF	B	D	B + D
NO.1 BEARING	T/O							
	95			303			180	
	90			313			181	
	87			345			185	
	84			370			195	
	76			345			231	
	58			286			225	
FFCCV	T/O							
	95			179			217	
	90			200			207	
	87			204			200	
	84			222			208	
	76			270			227	
	58			714			215	

SUBTASK 71-00-00-970-077-F00

(6) Do these steps for the imbalance calculations (Software Method):

NOTE: Use the GSEM -15 to do the trim balance with the software.

(a) The Software Method uses the CFMI Trim Balance Software, 856A2678P01 with the vibration analyzer. The software can be used with any ground analyzer to calculate weight correction.

NOTE: This procedure which will correct most of the imbalance is not subject of only one trial.

It is not possible to make only one phase angle matrix to apply to all systems because each trim balance system operates differently and has different related phase angles. One shot run followed by one vectorial run can be necessary to locate weight correction.

(b) Examine the current weights location.

1) Record the weights location in the software.

(c) Enter the vibration data from the (Table 526) to the software data (Table 527).

(d) The software gives the balance screw set to install.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 527/71-00-00-993-897-F00 Trim Balance Software Data

N1 SPEED %	N1 SPEED RPM	NO. 1 BEARING SENSOR				FFCCV SENSOR			
		AMPL	PHASE	LAG	SENS	AMPL	PHASE	LAG	SENS
T/O									
95	4916			180	303			217	179
90	4657			181	313			207	200
87	4502			185	345			200	204
84	4347			195	370			208	222
76	3933			231	286			227	270
58	3001			225	286			215	714

SUBTASK 71-00-00-970-078-F00

(7) Do the imbalance calculations with the Hand Calculation Method (One Speed, One Sensor):

(a) The Hand Calculation Method uses the worksheet (Table 528).

NOTE: This procedure which will correct most of the imbalance is not subject of only one trial.

It is not possible to make only one phase angle matrix to apply to all systems because each trim balance system operates differently and has different related phase angles. One shot run followed by one vectorial run can be necessary to locate weight correction.

(b) Examine the Current Weights Location.

1) Record the weights location in the worksheet Area 1.

2) Use Figure 517 or Figure 518 to find the total weight (F) and the location (Figure 509).

a) If you can't read the part number on the balance screw, use the weight or length of the screw (Figure 506).

(c) Examine the vibration data and find the maximum vibration and Fan Balance Coefficient.

1) Record the %N1, sensor, vibration (A) and phase angle (B) from the maximum vibration in the worksheet Area 2.

2) Record the sensitivity (C) for the sensor and the coefficient phase (D) from the maximum vibration in the worksheet Area 3.

(d) Do the Weight Calculation for the fan imbalance

1) Multiply the amplitude of the vibration (Area 2) with the sensitivity (Area 3) and record in Area 4.

(e) Do the Angular Location

1) Add the location of the current weights (Area 1) with the coefficient phase (Area 3) and record in Area 5.

(f) Find the applicable balance screw set to install for the Total Weight Calculation.

1) Find the applicable holes to install the calculated imbalance (Figure 517 or Figure 518).

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2) If the current balance screw configuration is all P07, install the imbalance weight calculated above.

3) If the current balance screw configuration is not all P07, do a vector calculation with the current weight configuration (F) and the calculated imbalance weight (E).

4) Use polar graph paper to add vectors E and F (Figure 509).

5) With the Total Weight Calculation, find the applicable screw set (Figure 517 or Figure 518).

Table 528/71-00-00-993-898-F00 Hand Calculation Worksheet

AREA	TASK	
1	EXAMINE CURRENT WEIGHT LOCATION P0__ at ____ , ____ , ____ P0__ at ____ , ____ , ____ P0__ at ____ , ____ , ____ P0__ at ____ , ____ , ____ P0__ at ____ , ____ , ____ P0__ at ____ , ____ , ____ P07 at all other locations	 = ____ gr-cm = (F) at ____ deg
2	VIBRATION DATA RECORDED %N1 = _____ Sensor (No.1 Bearing/FFCCV) _____ Vib = _____ mils Phase = _____ Deg = (A) = (B)	
3	FAN BALANCE COEFFICIENT Sensitivity = _____ gr-cm/mils Coefficient Phase = _____ Deg = (C) = (D)	
4	WEIGHT CALCULATION Weight To Add = (A) x (C) = _____ gr-cm = (E)	
5	ANGULAR LOCATION Weight Location = (B) + (D) = _____ Deg	
6	HOLES Use Angular Location to center the weights around the applicable hole. The tolerance is about 100 gr-cm/5 Deg	
7	TOTAL WEIGHT CALCULATION If the current weight location is all P07, the new weights to install = (E) gr-cm If the current weight location is not all P07, the new weights to install = (E) + (F) gr-cm	

SUBTASK 71-00-00-860-202-F00

(8) Install the new balance screws as follows (Figure 523):

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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.

(a) Put the protective mat, STD-585, on the inner lower half of the inlet cowl.

(b) Find the number one fan blade. This blade is immediately above the offset hole (machined dimple) on the fan disk bolt flange.

1) Use a marker, G02061, to put a mark on this blade to identify it as the number one blade.

(c) At the first hole where you will install a new balance screw, remove the installed balance screw.

(d) Lubricate the new balance screw with Molykote G-n Plus lubricant, D50019 [CP2444], or Lubricant, D50308 [CP 2171], and install on the spinner.

1) Tighten the screw to 68 in-lb (7.7 N·m) - 74 in-lb (8.4 N·m).

(e) Install all other balance screws.

(f) Remove the protective mat, STD-585, and all the other unwanted material from the inlet cowl.

(g) Do the trim balance test at the end of this procedure.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-080-007-F00

(1) Remove the vibration analyzer equipment.

SUBTASK 71-00-00-410-022-F00

(2) Close this access panel:

Number	Name/Location
117A	Electronic Equipment Access Door

J. Trim Balance Test

SUBTASK 71-00-00-720-008-F00

(1) Do this task: Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00.

(a) This test is not necessary if the cause for the trim balance (initial imbalance) is less than 4.0 units.

(b) Monitor the vibration levels on subsequent engine operation.

1) If the vibration level does not change much, you can stop the monitoring.

2) If the vibration level changes significantly, apply CFMI CESM No. 7 to decrease and control the vibration.

SUBTASK 71-00-00-860-203-F00

(2) During a subsequent engine operation, do a check of the N1 and AVM indications to make sure that they operate correctly.

END OF TASK

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(VIEW IN THE AFT DIRECTION)

S-M56-MM-03715-00-B
G90267 S0006581869_V2

Initial Balance Screw Location Chart
Figure 523/71-00-00-990-905-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-750-806-F00

17. Test 14D - Two-Plane Trim Balance

A. General

(1) The function of this procedure is to reduce the vibration level of the Turbine Rear Frame (TRF). However, most of the engines are correctly balanced with the fan trim balance procedure only.

(a) After the fan trim balance procedure, it is optional and anticipated extremely rare that this procedure be tried to reduce airplane interior audible and tactile perceived vibration or noise reported during flight main phases of cruise or climb.

(2) This procedure uses a temporary TRF accelerometer and vibration analyzer to install clips on the last Low Pressure Turbine (LPT) stage blades (4th stage).

(3) This procedure can be applied in the following cases:

(a) A fan trim balance procedure has been done and cabin noise has been reported during the subsequent flight.

(b) LPT imbalance can be a possible cause of excitation transmitted to the airplane structure at the same time with low indicated vibration levels (1.0 Unit or less).

B. References

Reference	Title
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (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
COM-3932	System - Portable Engine Balancing Part #: PBS-4100 Supplier: 26741
SPL-4054	Pliers - Set, Install/Remove, LPT Balance Clips Part #: 856A3786G04 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
G02061	Marker - Permanent, Felt Tip Pen	

E. Location Zones

Zone	Area
117	Electrical and Electronics Compartment - Left
118	Electrical and Electronics Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
411	Engine 1 - Engine
421	Engine 2 - Engine

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F. Prepare for the Two-Plane Trim Balance

SUBTASK 71-00-00-700-002-F00

(1) If the last result of a fan trim balance procedure is not satisfactory, you must balance the fan again to the lowest vibration level on the No. 1 bearing (or FFCCV) sensor.

NOTE: Do not try to balance the LPT if the fan was not balanced to approximately 1.5 mils (cockpit indication 0.6 Units) or less. When you balance the LPT, fan vibration levels will not change more.

SUBTASK 71-00-00-010-029-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.

(2) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 71-00-00-480-006-F00

(3) Once the fan vibration level is at the lowest level, install the TRF vibration sensor (Figure 524).

(a) Install the slave TRF vibration sensor, 856A2681G01 on the aft side of the TRF on bolt holes 44-45.

NOTE: The slave sensor is an accelerometer with integral lead (mesh shield) and an extension cable.

(b) Make sure the cable is connected correctly to the TRF sensor.

(c) Route the TRF sensor cable toward the FFCCV sensor.

1) Tie down the cable every 8 in. (20.3 cm).

(d) Remove the connector DP1101 from the FFCCV vibration sensor and install a protective cap on the FFCCV sensor.

(e) Install the FFCCV connector DP1101 to the TRF extension cable and secure this connection to the engine.

(f) Note this data on the two-plane trim balance and the TRF sensor:

1) Because of sensor sensitivity differences (TRF 50 pC/G, FFCCV 100 pC/G), the indicated vibration amplitude levels of the TRF is one-half of the real or actual levels but the phase values are identical.

2) No correction for the amplitude levels by the operator is necessary with this procedure. The operator uses the indicated or recorded values directly.

3) The trim balance coefficients account for the sensitivity differences and automatically does the correction.

4) Hole No. 1 is the first hole (Clockwise) aft looking forward (ALF) from the 12 o'clock TRF mark.

SUBTASK 71-00-00-480-007-F00

(4) Install the vibration analyzer portable engine balancing system, COM-3932, 856A2679 to the Airborne Vibration Monitor (AVM) front panel with the breakout cable (Figure 525).

NOTE: Keep the AVM system available to monitor vibration in the flight compartment during the test in parallel with the vibration tracking system (analyzer).

(a) Use the vibration analyzer user manual of the manufacturer.

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SUBTASK 71-00-00-410-017-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 this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

G. Two-plane Trim Balance

SUBTASK 71-00-00-970-080-F00

(1) Find and record these conditions:

> **CAUTION** DO NOT USE THE TOTAL AIR TEMPERATURE (TAT) INDICATION FROM THE AIRPLANE FOR THE AMBIENT AIR TEMPERATURE. IF YOU DO NOT OBEY, THE TAT CAN CAUSE AN INCORRECT N1 TARGET SELECTION.

> **CAUTION** DO NOT USE THE MERCURY THERMOMETER ON THE AIRPLANE. MERCURY (FROM A BROKEN THERMOMETER) CAN CAUSE DAMAGE TO THE AIRPLANE COMPONENTS.

(a) Record the ambient air temperature (outside air temperature) in the shade of the wheel well for the nose gear.

(b) Record the barometric pressure.

(c) Use the OAT to find the N1 Takeoff (TO) speed:

1) Enter the OAT on the FMC N1 Limits Page.

a) Enter a slash (/) before you enter the number.

2) Select TO or alternately TO-B if available.

3) Find the N1 speed on the Flight Management Computer (FMC) Takeoff Ref Page and record on the data sheet.

4) Make sure that the Thrust Mode Display shows TO.

5) Make sure that the outer knob of the N1 Set Control, on the P2 panel, is in the AUTO position.

6) Make sure that the Reference N1 Bug agrees with the N1 takeoff speed.

SUBTASK 71-00-00-860-208-F00

> **WARNING** MAKE SURE THAT YOU OBEY ALL THE INSTRUCTIONS AND PRECAUTIONS WHEN YOU OPERATE AN ENGINE AT HIGH POWER. IF YOU DO NOT OBEY THE INSTRUCTIONS AND PRECAUTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

(a) Let the engine become stable at the idle position for a minimum of two minutes.

(b) Make sure that all the pneumatic bleeds and electrical loads are off.

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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) Make sure that all engine indications are normal.

SUBTASK 71-00-00-970-081-F00

CAUTION

MAKE SURE THAT YOU DO NOT GO MORE THAN THE 4 UNITS (10 MILS) VIBRATION LIMIT FOR THE N1 ROTOR. IF YOU DO NOT OBEY, ENGINE DAMAGE CAN OCCUR.

(3) Slowly move the forward thrust lever (in not less than 20 seconds) to the 80 ±2% N1 position.

(a) Let the engine become stable at this speed for a minimum of five minutes.

NOTE: This lets the engine become thermally stable and makes sure the vibration indications are accurate.

(b) Do a check of the vibration anlayzer for correct operation.

(c) Slowly move the forward thrust lever (in not less than 20 seconds) to the idle position.

1) Let the engine become stable at this speed for a minimum of 30 seconds.

SUBTASK 71-00-00-970-082-F00

CAUTION

DO NOT GO MORE THAN THE TAKEOFF POWER SPEED FOR THE CURRENT CONDITIONS, ENGINE DAMAGE CAN OCCUR.

(4) Do a two-minute acceleration of the engine from the minimum idle position to the Takeoff Power (TOP) N1 speed.

(a) Let the engine become stable at this speed for a minimum of 15 seconds.

SUBTASK 71-00-00-970-083-F00

(5) Do this deceleration of the engine from the TOP to the minimum idle position as follows:

(a) Let the engine become stable at each speed for a minimum of 30 seconds to acquire vibration data and record the data.

1) Record the vibration data [amplitude and angle] at each of the speeds.

NOTE: The PBS4100 and CFMI analyzer automatically acquires the amplitude and phases of the vibration at each N1 speed.

2) Use (Table 529) or (Table 530) for the applicable analyzer.

(b) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 95% (4750 RPM).

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(c) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 92% (4700 RPM).

(d) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 90% (4500 RPM).

(e) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 87% (4350 RPM).

(f) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 85% (4250 RPM).

(g) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 82% (4100 RPM).

(h) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 80% (4000 RPM).

(i) Decrease the speed of the engine slowly and continuously to the subsequent lower N1 speed 60% (3000 RPM).

(j) Continue the slow decel to idle and let the engine become stable for three minutes.

(k) Make sure that the vibration analyzer has acquired several data points at each of the N1 speeds. If not, do the engine operation for the decel sequence again.

LOM 404, 407, 420 PRE SB 737-30A1063

(l) After satisfactory data acquisition, 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

(m) After satisfactory data acquisition, make sure that the Probe Heat "A" and "B" switches, on the P5 overhead panel, are in the AUTO position.

LOM ALL

(n) After satisfactory data acquisition, stop the engine. do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00

Table 529/71-00-00-993-905-F00 LPT One-Shot Trim Balance - PBS4100

VIB SENSOR	N1 SPEED		AMPLITUDE (MILS DA)	SENSITIVITY (MULTIPLY BY)	BALANCE WEIGHT	ANGLE (DEG)	PHASE LAG (DEG)	CALCULATE ANGLE (DEG)
	%	RPM						
TRF	T/O							
	95	4750		969			106	
	92	4600		982			106	
	90	4500		978			112	
	87	4350		971			123	
	85	4200		989			131	
	82	4100		1013			143	
	80	4000		1031			151	
	60	3000		1165			184	
	T/O							

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 529/71-00-00-993-905-F00 LPT One-Shot Trim Balance - PBS4100 (Continued)

VIB SENSOR	N1 SPEED		AMPLITUDE (MILS DA)	SENSITIVITY (MULTIPLY BY)	BALANCE WEIGHT	ANGLE (DEG)	PHASE LAG (DEG)	CALCULATE ANGLE (DEG)
	%	RPM						
NO.1 BEARING	95	4750						
	92	4600						
	90	4500						
	87	4300						
	85	4250						
	82	4100						
	80	4000						
	60	3000						

Table 530/71-00-00-993-906-F00 LPT One-Shot Trim Balance - CFMI Analyzer

VIB SENSOR	N1 SPEED		AMPLITUDE (MILS DA)	SENSITIVITY (MULTIPLY BY)	BALANCE WEIGHT	ANGLE (DEG)	PHASE LAG (DEG)	CALCULATE ANGLE (DEG)
	%	RPM						
TRF	100	5000		704			282	
	TOP							
	92	4600		398			289	
	68	3400		463			39	
	64	3200		791			46	
	60	3000		586			62	
NO.1 BEARING	100	5000		1233			121	
	TOP							
	92	4600		844			310	
	68	3400		1422			247	
	62	3400		1744			350	
	60	3000		869			236	

SUBTASK 71-00-00-970-084-F00

(6) Examine the fan vibration level for the No. 1 Bearing sensor; if the maximum fan vibration is more than 1.5 mils DA, do these steps:

(a) Stop the two-plane trim balance procedure.

(b) Remove the TRF sensor and re-connect the FFCCV vibration sensor.

(c) Do a fan trim balance to reduce the fan vibration level.

(d) If the maximum fan vibration is less than 1.5 mils DA, then continue with the two-plane trim balance to the next step.

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SUBTASK 71-00-00-970-085-F00

(7) Calculate the LPT single trim or two-plane trim balance with the No. 1 Bearing and TRF sensor data per the manufacturer's procedure.

NOTE: For the CFMI analyzer, use the GSEM-17 manual to do the trim balance with the software.

(a) Issue the "trim balance" report.

(b) This procedure does not show the LPT or two-plane balance hand calculation resolution and assumes the operator knows the single plane or two-plane balance.

(c) There are several softwares available to calculate more easily the trim balance solution using the recorded data. Refer to CFMI for further assistance for LPT single plane or two-plane calculations.

(d) For the calculation, do not forget to account for the LPT clips installed on the engine during the data acquisition.

(e) If it is necessary, do these steps to find the number of consecutive LPT clips to install:

1) Find the imbalance weight of the balance solution.

2) Use the imbalance and (Table 531) to find the number of LPT clips.

NOTE: It is permitted to install a maximum of 20 LPT clips on the whole 4th-stage LPT.

a) Record the number of clips to install.

(f) If it is necessary, do these steps to find the target angle where to center the LPT clips:

1) Find the target angle of the balance solution.

2) Find the LPT blade position (Figure 526) which matches the target angle.

a) The LPT blade No. 1 is aligned with zero degrees fan trim balance reference. The LPT blade No. 1 and fan blade No. 1 are roughly aligned.

b) Count the LPT blades in the engine rotation clockwise when you look at the 4th-stage LPT from the aft.

c) Record the LPT blade position for the target angle.

3) Alternate LPT angle locator:

a) Locate the fan trim balance screw on the fan spinner cone which agrees with the target angle. Don't use the fan blade, use the balance screw (36).

b) Turn the fan rotor to put the this balance screw at the 6 o'clock position.

c) At the LPT, the blade located at the 6 o'clock position is at the target angle.

Table 531/71-00-00-993-907-F00 4th Stage LPT Clip Weights

CONSECUTIVE CLIPS	IMBALANCE cm.g	CONSECUTIVE CLIPS	IMBALANCE cm.g
1	62	11	675
2	124	12	734
3	186	13	794
4	248	14	853
5	309	15	911
6	371	16	969

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Table 531/71-00-00-993-907-F00 4th Stage LPT Clip Weights (Continued)

CONSECUTIVE CLIPS	IMBALANCE cm.g	CONSECUTIVE CLIPS	IMBALANCE cm.g
7	432	17	1026
8	493	18	1083
9	554	19	1140
10	614	20	1195

SUBTASK 71-00-00-860-209-F00

(8) If the engine had LPT balance clips installed before the trim balance, do these steps to remove the LPT clips (Figure 527):

NOTE: Remove the LPT clips that are not part of the balance solution. A maximum of twenty clips is permitted on the whole 4th-stage LPT. For convenience, any installed clips can be removed before you start the two-plane balance.

WARNING MAKE SURE THAT THE NOZZLE AND PLUG ARE SUFFICIENTLY COOL BEFORE YOU DO THE FOLLOWING STEPS. IF THEY ARE TOO HOT, INJURIES TO PERSONS CAN OCCUR.

(a) Put the LPT blade with the clip to the 6 o'clock position.

(b) Use the LPT balance clip pliers, SPL-4054, and engage the tool head over the blade tip shroud on the forward side of the clip.

(c) Engage the rear tool head onto the clip and safety the clip.

(d) Remove the tool with the clip from the LPT.

SUBTASK 71-00-00-860-210-F00

(9) Install the number of clips on all target LPT blades as follows (Figure 528):

(a) Find the No. 1 fan blade. This blade is immediately above the offset hole (machined dimple) on the fan disk bolt flange.

CAUTION USE ONLY APPROVED MARKING MATERIALS ON THE FAN BLADES. IF YOU DO NOT USE APPROVED MARKING MATERIALS, DAMAGE CAN OCCUR.

1) Use a marker, G02061, to put a mark on this blade to identify it as the No. 1 fan blade.

(b) Turn the No. 1 fan blade until its leading edge is aligned with the fan case drain hole located at 6 o'clock position.

(c) Find the No. 1 LPT blade. This blade is most closely aligned to the 6 o'clock engine weld line of the TRF.

1) Use a marker, G02061 to put a mark on this LPT blade to identify it as the No. 1 LPT blade.

2) Mark the LPT blade which agrees with the LPT target angle.

(d) Mark the LPT blades where to install the consecutive clips.

(e) Put the first LPT blade tip on which you will put a clip to the 6 o'clock position.

(f) Prepare the clip and holding tool of the LPT balance clip pliers, SPL-4054, as follows:

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1) Engage the clip holding wire into the holding rod and turn the rod end fitting until the clip holding wire is held by the holding rod.
2) Use your two hands to twist the clip holding wire down and to the right.

   NOTE: Make sure the axis of the holding rod and the clip are parallel.

> **CAUTION**
> WHEN YOU DO THE FOLLOWING STEPS, BE CAREFUL NOT TO BREAK THE WIRE WELD. IF THE WIRE WELD BREAKS, THE CLIP CAN FALL INTO THE TURBINE. DAMAGE TO EQUIPMENT CAN OCCUR.

(g) Put the clip in position on the blade tip shroud as follows:
1) With the clip holding tool, engage the clip vertically between the two blades to cover two blade tip shrouds.
2) To move the bent end of the clip over the front edge of the blade tip shroud, push the rod forward, then pull the rod back.
3) Make the rear edge of the clip touch the rear edge of the blade tip shroud and move the clip down until it engages on the shroud.

(h) Crimp the clip with the LPT balance clip pliers, SPL-4054, as follows:

> **CAUTION**
> HOLD THE CRIMPING PLIERS PERPENDICULAR TO THE BLADE TIP SHROUD TO MAKE SURE IT IS IN THE CORRECT POSITION. DAMAGE TO EQUIPMENT CAN OCCUR.

1) Engage the head jaws of the crimping jaws between the two blades and let the jaws rest on the clip.
2) Push the crimping pliers forward and up against the blade.
3) Put the pliers on the engine centerline and let the pliers jaws come down around the clip.
4) Press the trigger of the tool handle to crimp the clip.
5) Remove the crimping pliers as follows:
   a) Release the trigger to open the pliers jaws.
   b) Lift the pliers handle to disengage the tool head rear jaw from the clip, then push forward to disengage the front jaw.
   c) Lift the pliers head and pull back to remove the tool.
6) Make sure the clip is installed correctly with the rear end of the balance clip fully bent on the blade platform.
7) If the balance clip is installed correctly, move the clip holding wire up and down to break it off at the weld point.
   a) Make sure that the removal of the holding wire is satisfactory.
8) If the installation of the balance clip or the removal of the holding wire is not satisfactory, replace the balance clip as follows:
   a) Move the blade tips that have balance clips installed to the 6 o'clock position.

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> **CAUTION** BE CAREFUL WHEN YOU REMOVE THE BALANCE CLIPS. IF YOU ARE NOT CAREFUL, DAMAGE TO BLADE TIP AND EQUIPMENT CAN OCCUR.

b) Engage the tool head over the blade tip shroud on the right side of the clip.

c) Move the tool head left and engage the clip retaining pin of the tool between the clip and rear of the blade tip shroud.

d) Engage the rear end of the clip in the window of the tool head lower jaw.

e) Press the trigger of the tool handle to unlock the anti-rotation plate.

f) Push the tool rod forward and slightly up to tilt the tool end fitting and uncrimp the clip.

> **CAUTION** MAKE SURE THAT YOU TURN THE TOOL CLOCKWISE WHEN YOU REMOVE THE TOOL AND THE CLIP. THE CLIP CAN FALL INTO THE TURBINE IF YOU TURN THE TOOL COUNTERCLOCKWISE. DAMAGE TO EQUIPMENT CAN OCCUR

g) Turn the tool clockwise a quarter of a turn and pull it back together with the clip.

h) Remove the balance clip.

H. Trim Balance Test

SUBTASK 71-00-00-720-009-F00

(1) Do the engine operation again from the Two-Plane Trim Balance Procedure.

(a) Record the values of vibration amplitudes and phase angle for the No. 1 Bearing and TRF sensors.

(b) If the trim balance is satisfactory, Put The Airplane Back To Its Usual Condition.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-010-030-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.

SUBTASK 71-00-00-010-031-F00

(2) Do these steps to remove the test equipment:

(a) Remove the vibration analyzer equipment.

(b) Do these steps to remove the TRF sensor:

1) Disconnect the FFCCV connector DP1001 from the TRF sensor cable.

2) Remove the protective cap from the FFCCV sensor.

3) Connect the FFCCV connector DP1001 to the FFCCV.

4) Remove the TRF sensor and cable from the TRF.

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5) It is not permitted to put the engine back in service for these conditions:

a) The TRF sensor and cables are installed on the engine.

b) The FFCCV sensor is disconnected.

SUBTASK 71-00-00-410-018-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.

SUBTASK 71-00-00-860-211-F00

(4) During a subsequent engine operation, do a check of the N1 and AVM indications to make sure they operate correctly.

END OF TASK

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W05502 S0006581900_V2

TRF Accelerometer Installation
Figure 524/71-00-00-990-900-F00 (Sheet 1 of 3)

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B

MM-00163-00
W06143 S0006581901_V2

TRF Accelerometer Installation
Figure 524/71-00-00-990-900-F00 (Sheet 2 of 3)

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HOLES 44 AND 45 ON TURBINE FRAME
(AFT VIEW)

C

TRF ACCELEROMETER LOCATION
(AFT VIEW)

D

MM-00165-00-B
W06179 S0006581902_V2

TRF Accelerometer Installation
Figure 524/71-00-00-990-900-F00 (Sheet 3 of 3)

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AVM CONNECTION IN THE MAIN EQUIPMENT CENTER

MM-00166-00-B
W06228 S0006581903_V3

Trim Balance Kit Installation
Figure 525/71-00-00-990-901-F00

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LPT BLADE POSITION	ANGLE	LPT BLADE POSITION	ANGLE	LPT BLADE POSITION	ANGLE	LPT BLADE POSITION	ANGLE
1	0.0	45	241.8	89	123.6	133	5.4
2	357.3	46	239.1	90	120.9	134	2.7
3	354.6	47	236.4	91	118.2		
4	351.9	48	233.7	92	115.5		
5	349.3	49	231.0	93	112.8		
6	346.6	50	228.4	94	110.1		
7	343.9	51	225.7	95	107.5		
8	341.2	52	223.0	96	104.8		
9	338.5	53	220.3	97	102.1		
10	335.8	54	217.6	98	99.4		
11	333.1	55	214.9	99	96.7		
12	330.4	56	212.2	100	94.0		
13	327.8	57	209.6	101	91.3		
14	325.1	58	206.9	102	88.7		
15	322.4	59	204.2	103	86.0		
16	319.7	60	201.5	104	83.3		
17	317.0	61	198.8	105	80.6		
18	314.3	62	196.1	106	77.9		
19	311.6	63	193.4	107	75.2		
20	309.0	64	190.7	108	72.5		
21	306.3	65	188.1	109	69.9		
22	303.6	66	185.4	110	67.2		
23	300.9	67	182.7	111	64.5		
24	298.2	68	180.0	112	61.8		
25	295.5	69	177.3	113	59.1		
26	292.8	70	174.6	114	56.4		
27	290.1	71	171.9	115	53.7		
28	287.5	72	169.3	116	51.0		
29	284.8	73	166.6	117	48.4		
30	282.1	74	163.9	118	45.7		
31	279.4	75	161.2	119	43.0		
32	276.7	76	158.5	120	40.3		
33	274.0	77	155.8	121	37.6		
34	271.3	78	153.1	122	34.9		
35	268.7	79	150.4	123	32.2		
36	266.0	80	147.8	124	29.6		
37	263.3	81	145.1	125	26.9		
38	260.6	82	142.4	126	24.2		
39	257.9	83	139.7	127	21.5		
40	255.2	84	137.0	128	18.8		
41	252.5	85	134.3	129	16.1		
42	249.9	86	131.6	130	13.4		
43	247.2	87	129.0	131	10.7		
44	244.5	88	126.3	132	8.1		

W05499 S0006581904_V1

Two-Plane Trim Balance LPT Angle
Figure 526/71-00-00-990-902-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LPT Clip Removal
Figure 527/71-00-00-990-903-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 INSTALL THE CLIP ON THE HOLDING ROD

2 ENGAGE THE HOLDING ROD UP TO THE BLADE AND INSTALL THE CLIP

3 INSTALL THE HEAD JAWS ON THE CLIP AND CRIMP IT

S-M56-MM-02462-00-B

W06083 S0006581906_V2

LPT Clip Installation
Figure 528/71-00-00-990-904-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-750-810-F00

18. Test 14E - Fan Trim Balance with Onboard Network System (ONS) (Optional)

(Figure 529, Figure 530, Figure 531, Figure 532, Figure 533, Figure 534, Figure 535, Figure 536, Figure 537, Figure 538, Figure 539, Figure 540, Figure 541, Figure 542, and Figure 543)

A. General

(1) This task is fan trim balance test with Onboard Network System (ONS).

NOTE: This procedure is an optional fan trim balance through ONS.

(2) The engine trim balance is part of the ONS.

(3) You use the Maintenance Laptop (ML) to control the engine trim balance function.

(4) The ONS engine trim balance program stores vibration data and uses the data to calculate a balance solution. It also stores generic balance coefficients, an engine weight table for display on the ML, and peak vibration history.

(a) The weight table display on the ML shows the location and part number of the balance weights as they are installed on the engine.

NOTE: See Figure 537 for the differences between ONS block point 5 and ONS block point 6 ETB Flight History button naming convention.

(b) If you install, remove, or move a weight on the engine, you must update the weight map in both AVM and ETB applications.

(5) The engine trim balance (ETB) application uses the engine weight configuration and flight history data to review and calculate engine balance solution.

(6) The new balance solutions are calculated based on the data from selected flight legs or for an average of several recent flights.

(7) When acceptance of a new balance solution, the ETB will delete the past flight vibrations data.

(8) The engine balance is attained by installing selected weight screws into the calculated configuration about the 36 possible engine locations.

B. References

Reference	Title
46-13-00-720-801	Onboard Network System NFS Message Check (P/B 201)
46-13-00-720-803	Onboard Network System Configuration Check (P/B 201)
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)

C. Location Zones

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

D. Prepare for the Test

SUBTASK 71-00-00-700-005-F00

(1) Do this task: Onboard Network System NFS Message Check, TASK 46-13-00-720-801.

SUBTASK 71-00-00-700-006-F00

(2) Do this task: Onboard Network System Configuration Check, TASK 46-13-00-720-803.

SUBTASK 71-00-00-480-009-F00

(3) Connect the Airborne Vibration Monitoring (AVM) ARINC 429 output to ONS.

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SUBTASK 71-00-00-480-010-F00

(4) Connect the AVM ARINC 429 input from ONS.

SUBTASK 71-00-00-470-001-F00

(5) Make sure that you see good communication or connection between the ETB and the Network File Server (NFS).

(a) The “Communication Lost” window pop-up, if there is a problem with ETB and NFS communication (Figure 543).

1) If the communication or connection has been lost, the ETB must be restarted when communication is re-established with the NFS.

SUBTASK 71-00-00-710-011-F00

(6) Make sure that the engine is stopped (TASK 71-00-00-700-819-F00).

E. Fan Trim Balance with Onboard Network System (ONS)

SUBTASK 71-00-00-470-002-F00

(1) Do these steps to do the engine trim balance (ETB) on the ML (Figure 529):

(a) On the ML desktop, click to open and execute the ONS application.

NOTE: The ONS Maintenance icon is displayed on the desktop.

(b) Double click on the ONS Maintenance desktop icon, or use your browser and input this URL: http://ms.ons.pnet.

1) Make sure that the ONS Maintenance main menu shows.

(c) On the ONS main menu, select “Other Functions”.

(d) On the “Other Functions” screen, select “Engine Trim Balance”.

1) The “Engine Trim Balance” window is displayed.

2) If the ETB application has encounter an unexpected error, a “Application Failure” window pop-up is displayed (Figure 543).

3) Make sure that NFS is function correctly and connected correctly before launch ETB again.

(e) On the “Engine Trim Balance” screen, select “Engine 1 or Engine 2” under the Validate Weights area on the left screen (Figure 530).

NOTE: If the engine selected is not available, a lock symbol appears over the picture of the airplane engine. The lock symbol is due to an engine runs or another user session on this engine. You will notice a “Engine Data Connection Error” window pop-up is display due to the session is in used (Figure 535).

1) The main functional area displays and airplane image on the right side identify a target engine with a table balance weights.

2) A pop up “Validation Balance Weights” window is displayed, select OK button to continue.

3) To add a new weight to the balance weight table, select “Add” button (Figure 531).

a) Make sure that the installed weight is matched with the recorded in the ETB application.

4) A pop up “Add Balance Weight” window is displayed, enter “Position” and the “Part Number” fields.

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a) The balance bolts have their part number stamped into their heads.

b) You can identify the balance bolt part number without removing the bolt from the fan rotor spinner.

NOTE: The position field is the location from fan No. 1 to 36.

NOTE: The part number field is the part number corresponds to the balance weight, for example: P02.

5) Click Add button to add the balance weight.

6) To edit a balance weight for engine, in the left navigation pane under Validate Weights, click the select the target engine (Figure 532).

NOTE: The “Confirmation Engine Configuration” window pop-up to confirm the balance weight configuration on the target engine before you use the ETB application to calculate the new balance solution.

7) Click OK button on the Validate Balance Weight Confirmation window pop-up.

NOTE: The validate weights screen appears with the target engine selected (denoted with a blue circle), and the balance weight data listed in the Balance Weights table.

8) In the Balance Weights table, click to select the corresponding row you want to edit the balance weight.

NOTE: The ONS ETB application will not update the weights in the AVM. The weight can be updated with AVM.

a) The selected row is highlighted and the Edit and Delete buttons appears.

b) Click “Edit” button to edit the fan location and the part number.

<1> Make change to the Position or Part Numbers field if necessary, then click “Update” button to confirm these changes.

<2> You will notice that change occurred immediately in the Balance Weights table after you click “Update” button.

<3> Click “Continue” button to continue.

c) Or click the “Delete” button to delete the balance weight from the table (Figure 533).

<1> A “Confirmation Delete” window pop-up is displayed.

<2> Select “Confirm” button to confirm the deletion of the balance weight.

<3> Click “Continue” button to continue.

SUBTASK 71-00-00-470-003-F00

(2) Do these steps to validate the balance weights as neutral (Figure 534):

(a) Select ”Engine 1 or Engine 2” under the Validate Weights area on the left screen.

(b) Check the “All Weights Neutral” checkbox on the Balance Weight pane on the right screen.

(c) Click “Continue” button to continue.

NOTE: All weights are neutral and indicate that no balance weights are needed.

SUBTASK 71-00-00-470-004-F00

(3) Do these steps to validate the flight history (Figure 536 and Figure 537):

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(a) Select ”Engine 1 or Engine 2” under the Validate Weights area on the left screen.

(b) Select the “Select Flight History” section on the left navigation pane.

(c) Select one of the flight history F0 to F5 or an Average from the option under the Select Flight History.

NOTE: F0 is the most recent flight history and F5 is the oldest flight history.

NOTE: The average is value of all flight history.

(d) The “Flight History” data is displayed by default, or by select the “Flight History” button on the right screen.

1) The “Flight History” elements are display as follows:

a) Date - Date of the flight.

b) Flight Leg - Departure and arrival airport codes.

c) Start Time - The flight leg start time.

d) Duration - The flight leg duration.

e) Collected Data Points - The number of data points collected during flight leg.

NOTE: The collected data points is the total number of data points collected during the entire flight history.

2) The “Fan” elements are displayed as follows:

a) Speed Range - Display up to 6 flight history speed range.

b) %N1 - N1 speed.

c) mils DA - Vibration value.

(e) To display the peak vibration, do the steps that follow:

1) Click “Peak Vibrations” button on the right pane.

a) The “Peak Vibrations” elements are displayed as follows:

<1> Name - Fan, HPC, LPT, and HPT.

<2> Value - Peak vibration value in flight deck units.

<3> %N1 - N1 speed.

<4> %N2 - N2 speed.

<5> Time - Elapsed time in flight since the start of engine.

(f) To display the Average Flight History, do the steps that follow (Figure 537):

1) Click “Average” under “Select Flight History” on the left navigation pane.

2) Click “Flight History” button on the right navigation pane, and the “Flight History” elements are displayed as follows:

a) Flights - Described flight number from the most recent to the oldest flight history that make up the average.

b) Date - Described the date of each flight.

c) Flight Leg - Described the departure and arrival airport codes for each flight.

d) Start Time - Described the start time of each flight.

e) Duration - Described the duration of each flight.

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f) Collected Data Points - Described the number of data points collected for each flight.

NOTE: The collected data points is the total number of data points collected during the entire flight history.

3) Click “Download” button to download the flight history data for the desired flight, and specify a location to save the file.

NOTE: If you need to save a record of the data, select the download and save the data. The file data format contains format which cannot be easily read.

4) Or click “Calculate Solution” to begin a new solution calculation based on the selected flight or flight average.

a) A “Trim Balance Solution” pop-up window is displayed.

b) When calculating a new balance solution, if the balance solution exceeds the weight limitations, the Flight History screen displays a “Balance Weight Limits Exceeds” message at the bottom of the screen.

SUBTASK 71-00-00-470-005-F00

(4) Do these steps to review and calculate the new balance solution (Figure 538):

(a) On the “Engine Trim Balance” screen, select “Engine 1 or Engine 2” under the Validate Weights area on the left screen.

(b) On the “Select Flight History” screen, select one of the flight history F0 to F5 or an Average in the main functional area on the left navigation pane.

(c) Click “Flight History” button on the right navigation pane.

(d) Click “Calculate Solution” button at the bottom of the screen.

(e) A “Review Solution” screen is displayed in the left navigation pane.

(f) Click “Balance Solution” under the “Review Solution” screen.

(g) A “Balance Solution” screen display “Changes” and “All” on the right navigation pane.

1) The “Balance Solution” elements are displayed as follows:

a) Changes - Described the balance solution table to display only the engine location where the weight changes are identified for the current balance solution.

b) All - Described the balance solution table to display all 36 engine locations including those where the weight changes are identified for the current balance solution as well as those where no changes are identified.

2) The “Reject Solution” button, rejects the new balance solution and returns user to the “Select Flight History” (Figure 541).

3) The “Accept Solution” button, accept the new balance solution and open a pop-up window “New Engine Trim Balance Solution” (Figure 539).

a) Click ”Accept” to accept the new balance solution, and then click “OK” button.

b) If the balance solution is accepted, update the AVM with the new weights.

NOTE: If the next balance solution is done at a location without ML, the AVM will be updated with the correct weights. However, if not you can still change the weights and calculate a balance solution using existing data.

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4) Click “Download” button, to download the new balance solution and specify a location to save the file (Figure 540).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2322042 S0000526501_V2

Onboard Network System Main Menu
Figure 529/71-00-00-990-916-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323097 S0000526502_V2

Engine Trim Balance (Validate Weights)
Figure 530/71-00-00-990-917-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323098 S0000526504_V2

Engine Trim Balance (Validate Weights)
Figure 530/71-00-00-990-917-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323232 S0000526503_V2

Engine Trim Balance (Add Balance Weights)
Figure 531/71-00-00-990-918-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323233 S0000526506_V2

Engine Trim Balance (Add Balance Weights)
Figure 531/71-00-00-990-918-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323234 S0000526517_V2

Engine Trim Balance (Add Balance Weights)
Figure 531/71-00-00-990-918-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323235 S0000526518_V2

Engine Trim Balance (Edit Balance Weights)
Figure 532/71-00-00-990-919-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323238 S0000526519_V2

Engine Trim Balance (Edit Balance Weights)
Figure 532/71-00-00-990-919-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323239 S0000526520_V2

Engine Trim Balance (Edit Balance Weights)
Figure 532/71-00-00-990-919-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323240 S0000526521_V2

Engine Trim Balance (Delete Balance Weights)
Figure 533/71-00-00-990-920-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323241 S0000526522_V2

Engine Trim Balance (Delete Balance Weights)
Figure 533/71-00-00-990-920-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323242 S0000526523_V2

Engine Trim Balance (Delete Balance Weights)
Figure 533/71-00-00-990-920-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323243 S0000526525_V2

Engine Trim Balance (All Balance Weights Neutral)
Figure 534/71-00-00-990-921-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323245 S0000526527_V2

Engine Trim Balance (All Balance Weights Neutral)
Figure 534/71-00-00-990-921-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323249 S0000526529_V2

Engine Trim Balance (Engine Lock)
Figure 535/71-00-00-990-922-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323250 S0000526532_V2

Engine Trim Balance (Engine Lock)
Figure 535/71-00-00-990-922-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323251 S0000526535_V2

Engine Trim Balance (Engine Lock)
Figure 535/71-00-00-990-922-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323256 S0000526536_V2

Engine Trim Balance (Flight History)
Figure 536/71-00-00-990-923-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 ONS BLOCK POINT 5 ETB TITLE WILL BE "BALANCE SOLUTION"
1 ONS BLOCK POINT 6 ETB TITLE WILL BE "PEAK VIBRATIONS"

2323257 S0000526537_V2

Engine Trim Balance (Review Flight History)
Figure 537/71-00-00-990-924-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Name	Value	%N1	%N2	Time
Fan	1.29	98	N/A	0.6
HPC	0.11	N/A	96	0.6
LPT	1.25	99	N/A	0.6
HPT	0.16	N/A	95	0.6

2323258 S0000526538_V2

Engine Trim Balance (Review Flight History)
Figure 537/71-00-00-990-924-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323259 S0000526539_V2

Engine Trim Balance (Review Flight History)
Figure 537/71-00-00-990-924-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323261 S0000526540_V2

Engine Trim Balance (Calculate and Review New Balance Solution)
Figure 538/71-00-00-990-925-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323262 S0000526541_V2

Engine Trim Balance (Calculate and Review New Balance Solution)
Figure 538/71-00-00-990-925-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323263 S0000526542_V2

Engine Trim Balance (Calculate and Review New Balance Solution)
Figure 538/71-00-00-990-925-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323264 S0000526543_V2

Engine Trim Balance (Accept New Balance Solution)
Figure 539/71-00-00-990-926-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323265 S0000526544_V2

Engine Trim Balance (Accept New Balance Solution)
Figure 539/71-00-00-990-926-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323266 S0000526545_V2

Engine Trim Balance (Accept New Balance Solution)
Figure 539/71-00-00-990-926-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323268 S0000526546_V2

Engine Trim Balance (Accept New Balance Solution)
Figure 539/71-00-00-990-926-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323272 S0000526547_V2

Engine Trim Balance (Download New Balance Solution)
Figure 540/71-00-00-990-927-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323273 S0000526550_V2

Engine Trim Balance (Reject New Balance Solution)
Figure 541/71-00-00-990-928-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323274 S0000526551_V2

Engine Trim Balance (Reject New Balance Solution)
Figure 541/71-00-00-990-928-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323277 S0000526554_V2

Engine Trim Balance (Balance Solution Weight Exceeds Limits)
Figure 542/71-00-00-990-929-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323278 S0000526556_V2

Engine Trim Balance (Balance Solution Weight Exceeds Limits)
Figure 542/71-00-00-990-929-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323281 S0000526557_V2

Engine Trim Balance (Balance Solution Weight Exceeds Limits)
Figure 542/71-00-00-990-929-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323283 S0000526558_V2

Engine Trim Balance (Balance Solution Weight Exceeds Limits)
Figure 542/71-00-00-990-929-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323285 S0000526560_V2

Engine Trim Balance (Communication Errors)
Figure 543/71-00-00-990-930-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323286 S0000526561_V2

Engine Trim Balance (Communication Errors)
Figure 543/71-00-00-990-930-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323290 S0000526562_V2

Engine Trim Balance (Communication Errors)
Figure 543/71-00-00-990-930-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2323291 S0000526563_V2

Engine Trim Balance (Communication Errors)
Figure 543/71-00-00-990-930-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

POWER PLANT - INSPECTION/CHECK

1. **General**

A. This procedure has these tasks:

(1) An inspection of the engine foreign object damage and birdstrike

(2) An inspection of the engine after an engine fire, use of fire extinquishing agents, or high nacelle temperature

(3) An inspection of the engine after engine operations above the limits and high engine stress

(a) N1 and N2 overspeeds

(b) EGT overtemperature

(c) Low or zero oil pressure

(d) High oil consumption

(e) High oil temperature.

(4) An inspection of the engine after engine stall or possible engine stall

(5) An inspection of the engine after in-flight windmilling

(6) An inspection of the engine after hard landing

(7) An inspection of the engine after high G-loads during transportation

(8) An inspection of the engine after volcanic ash, dust, or sand ingestion

(9) A check of the engine exceedances page

(10) An inspection of the nacelle structure hot air duct rupture condition.

B. Refer to PAGEBLOCK 72-00-00/601 for the borescope inspection of the engine.

TASK 71-00-00-800-802-F00

2. **Engine Foreign Object Damage and Birdstrike Inspection**

A. General

(1) This task gives the instructions to do an inspection of the engine for damage after a birdstrike or Foreign Object Damage (FOD).

(2) You must do a visual inspection when foreign objects go into the engine. A borescope inspection can be necessary.

(3) A borescope inspection is necessary in the following conditions:

(a) FOD with normal engine parameters:

1) The FOD caused the removal of material from the fan blades, or

2) There are signs of unwanted material in the booster inlet.

(b) FOD with abnormal engine parameters.

(4) After a birdstrike, do the visual inspection, gaspath inspection (see if a borescope inspection is necessary), and birdstrike inspection.

B. References

Reference	Title
24-11-21-000-801	Integrated Drive Generator (IDG) Air/Oil Cooler - Removal (P/B 401)
24-11-21-200-801	Integrated Drive Generator (IDG) Air/Oil Cooler - Inspection/Check (P/B 201)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

Reference	Title
24-11-21-400-801	Integrated Drive Generator (IDG) Air/Oil Cooler - Installation (P/B 401)
71-00-00-700-813-F00	Test 5 - Power Assurance Check (P/B 501)
71-00-00-700-814-F00	Test 7 - Vibration Survey (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)
71-11-01-200-801-F00	Inlet Cowl Inspection (P/B 601)
71-11-02-200-801-F00	Fan Cowl Panels Inspection (P/B 601)
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)
72-00-00-200-805-F00	Combustion Section Borescope Inspection (P/B 601)
72-00-00-200-808-F00	Stage 1-3 LPT Blades Borescope Inspection (P/B 601)
72-00-00-200-809-F00	Stage 4 LPT Blades Borescope Inspection (P/B 601)
72-21-01-200-801-F00	Spinner Cone and Retaining Flange Inspection (P/B 601)
72-21-02-200-801-F00	Fan Module Inspection (P/B 601)
72-21-03-200-801-F00	Stage 1 Booster Vane Assembly Inspection (Visual) (P/B 601)
72-23-01-200-801-F00	Outlet Guide Vanes (OGV) Inspection (P/B 601)
72-24-02-200-801-F00	Abradable Shroud (Detail) - Inspection (P/B 601)
73-21-05-200-801-F00	T12 Sensor Inspection/Check (P/B 601)
78-11-00-210-802-F00	Primary Nozzle Assembly and Primary Plug Assembly 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. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE
STD-1136	Facepiece (Mask) - Particulate Filtering, Disposable (NIOSH N95 approved)
STD-1425	Gloves
STD-3904	Goggles - Safety

D. Consumable Materials

Reference	Description	Specification
B00679 [C04-035]	Alcohol - Isopropyl	
B50302 [CP2711]	Solution - Cleaning, Calla 7127	
B50303 [CP2712]	Solution - Cleaning, NetBioKem DSAM	
B50304 [CP2713]	Solution - Cleaning, RTU	
G00624	Bag - Plastic, General Purpose	
G01043	Cloth - Lint-free	
G50140	Gloves - Protective, Latex or Nitrile	
G50230	Glove - Vinyl	
G51352	Respirator - Particulate/Face Mask FSP2, 3M 8810	

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E. Location Zones

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

F. Prepare for the Inspection

SUBTASK 71-00-00-840-002-F00

(1) Do these steps to make sure that the ENGINE START switch and START LEVER switch are not operated:

LOM 402, 404, 406, 407, 411, 412, 415, 416, 420, 422-428, 433, 434, 437-447, 450-999

(a) On the P5 overhead panel, make sure that the applicable ENGINE START switch is in the OFF position.

LOM 429-432

(b) On the P5 overhead panel, make sure that the applicable ENGINE START switch is in the AUTO position.

LOM ALL

(c) On the P10 control stand, make sure that the applicable START LEVER switch is in the CUTOFF position.

(d) Put the DO NOT OPERATE tags, STD-858, on the applicable ENGINE START switch and START LEVER switch.

G. Engine Foreign Object Damage and Birdstrike Inspection

SUBTASK 71-00-00-100-001-F00

(1) If you find signs of a birdstrike, do these steps:

> **WARNING** DO NOT LET THE BIRD CARCASS OR OTHER PIECES OF THE BIRD TOUCH YOUR SKIN. DISCARD THE BIRD PIECES IN A PLASTIC DISPOSAL BAG. THE BIRD PIECES CAN CONTAIN INFECTIOUS MATERIALS (BACTERIA AND VIRUSES). THEY CAN CAUSE ILLNESSES, AND INJURIES TO PERSONNEL.

(a) Before you touch the bird remains, do these steps:

1) Put on vinyl gloves, G50230, or protective gloves, G50140.
2) Put on the usual cut-resistant gloves, STD-1425.
3) Put on disposable face mask, G51352 (FSP2 type), or filtering facepiece, STD-1136.
4) Put on safety goggles, STD-3904.
5) If there is the possibility of contact with the bird carcass, wear a disposable coverall.

(b) Remove the bird pieces and put them in plastic bag, G00624, or hermetically sealed plastic bag.

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1) Clean the area with lint-free cloth, G01043, moist with alcohol, B00679 [C04-035].

NOTE: You can use these cleaning solutions as alternative products to the isopropyl alcohol: Calla 7127 solution, B50302 [CP2711], NetBioKem DSAM solution, B50303 [CP2712], RTU solution, B50304 [CP2713].

NOTE: Do not use pressurized air or water to clean the engine parts.

2) If you will use tools to remove the organic debris, clean the tools with alcohol, B00679 [C04-035].

3) Remove the gloves and disposable coveralls and put them in the same plastic bag.

NOTE: Do not touch your face, eyes, nose, etc., with your gloves.

4) Carefully wash with disinfectant soap and water and fully dry your hands.

(c) Contact the local medical authorities to get more data and direction on how to discard the organic debris.

NOTE: The operators and maintenance personnel must obey the directions of the local medical authorities. The requirements of the medical authority are above the engine manufacturer guidelines in these matters, and their advice must be sought.

SUBTASK 71-00-00-210-010-F00

(2) Do a visual inspection of the engine inlet and engine exhaust areas as follows:

(a) Look for obvious signs of severe engine damage or failure.

NOTE: These signs can include missing or broken blades in the inlet area and metal splatter, missing or broken blades and loose metal pieces in the exhaust area.

(b) If you find indications of severe engine damage or failure, replace the engine (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

SUBTASK 71-00-00-210-012-F00

(3) Examine the external areas of the spinner front and rear cones (not removed) for damage.

(a) If you find damage, use the limits from the Spinner Cone and Retaining Flange Inspection (TASK 72-21-01-200-801-F00).

SUBTASK 71-00-00-210-013-F00

(4) Examine the external areas of the fan blades that are not removed for these types of damage:

(a) Leading edge distortion

(b) Bends

(c) Cracks

(d) If you find damage, use the limits from the Fan Module Inspection (TASK 72-21-02-200-801-F00).

SUBTASK 71-00-00-210-051-F01

(5) Examine the external areas of the fan blade platforms that are not removed and look for these types of damages (TASK 72-21-02-200-801-F00):

(a) Tears

(b) Distortion

(c) Cracks.

LOM ALL POST SB CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

SUBTASK 71-00-00-900-002-F00

(6) If you find damage, do these steps:

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(a) Remove the fan blades adjacent to the damaged platforms.

(b) Look for signs of tear.

1) Tear is not permitted.

LOM ALL

SUBTASK 71-00-00-210-014-F00

(7) Examine the fan inlet case for wear on the abradable material (TASK 72-24-02-200-801-F00).

SUBTASK 71-00-00-210-015-F00

(8) Examine the splitter fairing and inlet guide vanes of the booster for damage (TASK 72-21-03-200-801-F00).

SUBTASK 71-00-00-010-023-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.

(9) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 71-00-00-210-011-F00

(10) Examine the Integrated Drive Generator (IDG) air/oil cooler for damage.

(a) Look for oil stains that come from the cooler.

1) If you find stains, replace the cooler (TASK 24-11-21-000-801 and TASK 24-11-21-400-801).

(b) Examine the cooler for damage (TASK 24-11-21-200-801).

1) It is permitted to have small dents in the fins if there is no oil leakage.

2) If you find large dents and broken fins, replace the cooler (TASK 24-11-21-000-801 and TASK 24-11-21-400-801).

3) If it is possible, remove unwanted material from the cooler (TASK 24-11-21-200-801).

SUBTASK 71-00-00-210-016-F00

(11) Examine the fan outlet guide vanes (OGV) and seals of the fan OGV inner shroud for damage (TASK 72-23-01-200-801-F00).

SUBTASK 71-00-00-210-017-F00

(12) Examine the T12 sensor probe for damage (TASK 73-21-05-200-801-F00).

SUBTASK 71-00-00-220-001-F00

(13) Do a gaspath inspection.

(a) FOD with normal engine parameters.

NOTE: It is normal to have fluctuations of the engine parameters (such as N1, N2, EGT, or transient vibrations) because of the impact of the bird, ice, or other FOD in the engine flow path. These fluctuations are normal engine parameters if there were no engine exceedances and if these fluctuations are shown for a short time.

1) Do these steps if one or more of these conditions apply:

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a) The FOD caused the removal of material from the fan blades.

b) There are signs that show that unwanted material went into the booster inlet.

NOTE: To find if unwanted material went into the booster inlet, look for damage or unwanted material on the spinner front or rear cones, the Stage 1 booster vane or splitter fairing.

NOTE: For a single engine condition, the borescope inspection can be deferred for 25 flight hours or 10 cycles (use the first limit to occur) if the FOD did not cause the removal of material from the fan blades. The service extension is only permitted on one engine if the airplane had a dual-engine FOD.

NOTE: For a dual engine condition, it is necessary to do a borescope inspection of both engines if one or more of the above conditions apply on both engines. One of the two engines can be deferred for 25 flight hours or 10 cycles (use the first limit to occur), at the operators discretion, if the FOD did not cause the removal of the material from the fan blades.

NOTE: If the preceding conditions do not apply, the borescope inspections that follows are not required.

2) Do a borescope inspection of the Stages 1, 4, and 8 HPC blades (TASK 72-00-00-200-804-F00).

NOTE: If gas path damage that was documented before is unchanged after the time the ingestion event occurred, it is not necessary to do an additional borescope inspection.

a) If you find damage, do a borescope inspection of the remaining HPC blades (TASK 72-00-00-200-804-F00).

LOM ALL; AIRPLANES WITH SINGLE ANNULAR COMBUSTOR (SAC) ENGINES

3) Do this task: Combustion Section Borescope Inspection, TASK 72-00-00-200-805-F00.

NOTE: If gas path damage that was documented before is unchanged after the time the ingestion event occurred, it is not necessary to do an additional borescope inspection.

a) If you find damage, do a borescope inspection of the Stages 1-4 LPT blades (TASK 72-00-00-200-808-F00 and TASK 72-00-00-200-809-F00).

LOM ALL

(b) FOD with abnormal engine parameters.

1) If, along with the FOD, there was a surge, stall, or flameout, do these steps:

a) Do a borescope inspection of the fan booster (TASK 72-00-00-200-803-F00).

b) Do a borescope inspection of the Stages 1, 4, and 8 HPC blades (TASK 72-00-00-200-804-F00).

NOTE: If gas path damage that was documented before is unchanged after the time the ingestion event occurred, it is not necessary to do an additional borescope inspection.

c) If you find damage, do a borescope inspection of the remaining HPC blades (TASK 72-00-00-200-804-F00).

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LOM ALL; AIRPLANES WITH SINGLE ANNULAR COMBUSTOR (SAC) ENGINES

> **CAUTION** DO THE FOD COMBUSTOR INSPECTION IN THE AMM. BIRD-STRIKE FOD DAMAGE CAN CAUSE MISALIGNMENT OF THE FUEL NOZZLE AND SUBSEQUENT CDN CASE BURN-THROUGH.

d) Do this task: Combustion Section Borescope Inspection, TASK 72-00-00-200-805-F00.

LOM ALL

e) If you find damage, do a borescope inspection of the Stages 1-4 LPT blades (TASK 72-00-00-200-808-F00 and TASK 72-00-00-200-809-F00).

f) Do this task: Test 5 - Power Assurance Check, TASK 71-00-00-700-813-F00.

SUBTASK 71-00-00-210-019-F00

(14) Do the birdstrike inspection as follows:

(a) Examine the inlet cowl at the location where the bird hit (TASK 71-11-01-200-801-F00).

(b) Examine the fan cowl panels for damage (TASK 71-11-02-200-801-F00).

(c) If there is an indication of a subsequent engine imbalance, examine the exhaust nozzle and plug for signs of damage.

1) If you see damage, do this task: Primary Nozzle Assembly and Primary Plug Assembly Inspection, TASK 78-11-00-210-802-F00.

(d) If there are indications that the engine is not balanced, do this task: Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-010-024-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 71-00-00-020-002-F00

(2) Remove the DO NOT OPERATE tags from the applicable ENGINE START switch and START LEVER switch.

END OF TASK

TASK 71-00-00-800-803-F00

3. Inspection After an Engine Fire, Use of Fire Extinguishing Agents, or High Nacelle Temperature (Figure 601)

A. General

(1) This procedure gives the data for these inspections:

(a) The inspection after an engine fire

(b) The inspection that follows the use of fire extinguishing agents on the engine

(c) The inspection after the nacelle temperature was above the limits.

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B. References

Reference	Title
12-13-11-100-801	Flush the Engine Oil System (P/B 301)
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
12-13-11-600-803	Drain the Engine Oil (P/B 301)
29-11-11-000-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal (P/B 401)
29-11-11-400-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation (P/B 401)
29-11-51-000-801	EDP Case Drain Filter Element Removal (P/B 401)
29-11-51-400-801	EDP Case Drain Filter Element Installation (P/B 401)
71-00-00-700-809-F00	Test 1 - Pneumatic Leak Check (P/B 501)
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)
71-00-02-000-801-F00	Power Plant - Removal (P/B 401)
71-00-02-400-801-F00	Power Plant - Installation (P/B 401)
72-00-00-100-803-F00	Clean the Engine Gas-Path with Pure Water (P/B 701)
72-00-00-100-804-F00	Clean the Engine Gas-Path with Cleaning Solution (P/B 701)
72-00-00-200-805-F00	Combustion Section Borescope Inspection (P/B 601)
72-00-00-200-807-F00	HPT Blades Borescope Inspection (P/B 601)
72-00-00-200-808-F00	Stage 1-3 LPT Blades Borescope Inspection (P/B 601)
72-00-00-200-812-F00	Stage 2-4 LPT Nozzle Guide Vanes Inspection (P/B 601)
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)
73-11-04-200-801-F00	Fuel Nozzle and Fuel Manifold Leak Check (P/B 601)
73-11-07-000-801-F00	Servo Fuel Heater Removal (P/B 401)
73-11-07-400-801-F00	Servo Fuel Heater Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
79-21-02-000-801-F00	Main Oil/Fuel Heat Exchanger Removal (P/B 401)
79-21-02-400-801-F00	Main Oil/Fuel Heat Exchanger 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-7517	Test Kit - Oil Condition Part #: MODEL V3A Supplier: 96009 Opt Part #: MODEL V-3 Supplier: 96009
STD-1068	Vacuum - High Capacity
STD-1280	Source - Air, Regulated, Dry Filtered, 0-30 PSIG

D. Consumable Materials

Reference	Description	Specification
B01023	Cleaner - Primary - Ardrox 6025	

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E. Location Zones

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

F. Procedure

SUBTASK 71-00-00-210-020-F00

> **CAUTION** MAKE SURE YOU EXAMINE THE ENGINE-DRIVEN HYDRAULIC PUMP WHEN YOU THINK THE ENGINE HAS DRY-MOTORED FOR MORE THAN 5 MINUTES AFTER THE APPLICABLE FIRE HANDLE HAS BEEN PULLED. IF YOU DO NOT, DAMAGE TO THE PUMP CAN OCCUR.

(1) If the engine motors for more than 5 minutes after the fire switches have been closed, do these steps to make an inspection of the engine driven hydraulic pump (EDP) for damage:

(a) Do this task: EDP Case Drain Filter Element Removal, TASK 29-11-51-000-801.

(b) Look for metallic particles in the filter element.

(c) If you find metallic particles, replace the engine-driven pump (TASK 29-11-11-000-801-001 and TASK 29-11-11-400-801-001).

(d) If you do not find metallic particles, do this task: EDP Case Drain Filter Element Installation, TASK 29-11-51-400-801.

SUBTASK 71-00-00-210-021-F00

(2) Examine the engine for the cause of the engine fire or an engine that becomes too hot.

(a) If you find that the fire/smoke was located inside the exhaust plug of the engine, do the steps that follow:

NOTE: This condition is described as a kind of candle fire phenomena due to oil accumulation into the exhaust plug cavity.

1) Do a visual inspection of the flame arrestor.

a) If the honeycomb is present and not deteriorated, the engine is serviceable.

b) If the honeycomb is deteriorated or missing, do these steps:

<1> Remove the oil inlet cover (TASK 72-56-00-000-802-F00).

<2> Do a visual inspection of the oil inlet cover, air/oil separator and N5 bearing support for overheat discoloration.

<3> If there is sign of overheat, replace the engine (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

<4> If there is no sign of overheat, install the oil inlet cover that you removed with a new flame arrestor (TASK 72-56-00-400-801-F00).

(b) If you find that there was a fire in turbine exhaust area, do the inspection that follows:

NOTE: If a wet motoring operation had been performed just prior to the fire incident, the fire may have resulted from residual fuel in the LPT module. Engine dry motoring is required before you can do a new engine start sequence.

1) Do a borescope inspection of the engine modules that follows:

a) Combustion Section Borescope Inspection (TASK 72-00-00-200-805-F00)

b) HPT Blades Borescope Inspection (TASK 72-00-00-200-807-F00)

c) Stage 2-4 LPT Nozzle Guide Vanes Inspection (TASK 72-00-00-200-812-F00).

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2) Fuel Nozzle and Fuel Manifold Leak Check (TASK 73-11-04-200-801-F00).

3) Do a check for the presence of fuel in the oil as follows:

a) Use the oil condition test kit, COM-7517, to examine the oil.

<1> If the viscometer is not available, use a gas detector or do a flash point check of the oil to look for fuel.

<2> If the viscosity test is incorrect then fuel is found, do these steps:

<a> Replace the main oil/fuel heat exchanger (TASK 79-21-02-000-801-F00 and TASK 79-21-02-400-801-F00).

<b> Replace the servo fuel heater (TASK 73-11-07-000-801-F00 and TASK 73-11-07-400-801-F00).

<c> Do this task: Flush the Engine Oil System, TASK 12-13-11-100-801.

<3> If the viscosity test is correct, no fuel is found.

(c) If you find external damage to the engine, replace the engine (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

1) Use the CFMI Engine Shop Manual to do a full inspection of the removed engine.

(d) If you do not find external damage to the engine, refer to the Fault Isolation Manual for the fire detection system to find the cause of the high temperature indication.

1) If the fire detection system operates correctly, do this task: Test 1 - Pneumatic Leak Check, TASK 71-00-00-700-809-F00.

SUBTASK 71-00-00-210-022-F00

(3) Use the applicable procedure given below after a fire extinguishing agent was used on the external areas of the engine (Figure 601):

(a) If carbon dioxide (CO2) gas was used:

1) On areas of the engine that were cold, no subsequent procedure is necessary.

2) On areas of the engine that were hot, you must replace the engine components.

NOTE: Use the CFMI Engine Shop Manual to examine the removed components for damage.

(b) If foam was used:

CAUTION

DO NOT ALLOW FOAM TO ENTER ANY ENGINE CAVITIES. FOAM RESIDUE MAY CAUSE CORROSION DAMAGE.

1) Clean the areas of the engine where the foam was used with clean water.

2) Use a brush to remove all the foam.

(c) If dry chemical powders were used:

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> **CAUTION** DO NOT USE WATER TO REMOVE THE POWDER FROM THE ENGINE. THE DRY AGENTS MIX WITH WATER AND MAKE A COMPOUND THAT CAN CAUSE CORROSION. DO NOT LET THE AGENTS GO INTO HOLES ON THE ENGINE. COMPOUNDS THAT REMAIN CAN CAUSE CORROSION IN THE ENGINE.

1) If it is necessary, use a high capacity vacuum, STD-1068, and 0-30 psig dry filtered regulated air source, STD-1280, to remove all the powder from the engine.

2) If the powder turned to a glaze due to the high temperatures, clean the areas with Ardrox 6025 cleaner, B01023.

(d) If halogen, or equivalent, materials were used:

1) In-flight use of the fire extinguishing system in the nacelle is permitted without special cleaning.

(e) If halogen, or equivalent, materials were used on the ground:

> **WARNING** DO NOT BREATHE THE FUMES FROM THE FIRE EXTINGUISHING AGENT IN THE APU COMPARTMENT AFTER THE SYSTEM RELEASES ITS CONTENTS. DO NOT LET THE FIRE EXTINGUISHING AGENT TOUCH YOUR SKIN. MAKE SURE THAT THERE IS GOOD AIRFLOW IN THE AREA. FIRE EXTINGUISHING AGENT CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

> **CAUTION** DO NOT LET TITANIUM COMPONENTS TOUCH MATERIALS THAT CONTAIN HALOGEN OR EQUIVALENT CHEMICALS. DAMAGE TO THE TITANIUM PARTS CAN OCCUR.

1) If the agent was used with the engine cowls closed, you must do this task immediately to open the thrust reversers and the fan cowl panels to remove all halogen gases:

> **CAUTION** RETRACT THE LEADING EDGE FLAPS, AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THESE PRECAUTIONS, THE FAN COWL PANELS WILL HIT THE FLAPS. DAMAGE WILL OCCUR.

a) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

2) If the engine was operated at or above the maximum continuous power at the time the agent was used, do these steps:

> **CAUTION** RETRACT THE LEADING EDGE FLAPS, AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THESE PRECAUTIONS, THE FAN COWL PANELS WILL HIT THE FLAPS. DAMAGE WILL OCCUR.

a) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

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b) Clean the external areas of the engine with clean water from the combustion case to the aft end.

SUBTASK 71-00-00-210-023-F00

(4) Do these steps to examine the engine for damage and to find the cause of the internal engine fire:

(a) If you see fire damage in the engine inlet, replace the engine.

Do these tasks:

Power Plant - Removal, TASK 71-00-02-000-801-F00

Power Plant - Installation, TASK 71-00-02-400-801-F00.

(b) If the fire was contained in the exhaust area, use the EGT overtemperature limits.

1) If the temperature is in area A:

a) Use the Fault Isolation Manual to find the cause of the internal engine fire.

2) If the temperature is in areas B, C or D:

a) Do this task: HPT Blades Borescope Inspection, TASK 72-00-00-200-807-F00.

b) Do an inspection of the Stage 1 LPT blades. To do this inspection, do this task: Stage 1-3 LPT Blades Borescope Inspection, TASK 72-00-00-200-808-F00.

c) Use the Fault Isolation Manual to find the cause of the internal engine fire.

SUBTASK 71-00-00-210-024-F00

(5) Do one of the procedures given below after the fire extinguishing agents have been used on the internal area of the engine:

(a) If carbon dioxide (CO2) gas was used:

1) Replace the engine.

Do these tasks:

Power Plant - Removal, TASK 71-00-02-000-801-F00

Power Plant - Installation, TASK 71-00-02-400-801-F00.

NOTE: Use the CFMI Engine Shop Manual to do an inspection of the areas where the carbon dioxide gas was used on the removed engine.

(b) If foam was used:

1) Clean the engine gas path with warm water. To clean it, do this task: Clean the Engine Gas-Path with Pure Water, TASK 72-00-00-100-803-F00.

2) Dry motor the engine until all the unwanted material is removed and the engine is dry. To dry motor the engine, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

3) Replace the engine.

Do these tasks:

Power Plant - Removal, TASK 71-00-02-000-801-F00

Power Plant - Installation, TASK 71-00-02-400-801-F00.

NOTE: Use the CFMI Engine Shop Manual to do an inspection of the removed engine.

(c) If dry powders were used:

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CAUTION DO A BORESCOPE INSPECTION OF ALL ENGINE AREAS TO MAKE SURE THAT THERE IS NO CHEMICAL FIRE EXTINGUISHING AGENTS. IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE OR ITS COMPONENTS CAN OCCUR.

1) Where it is possible, remove the loose powder with a high capacity vacuum, STD-1068 and 0-30 psig dry filtered regulated air source, STD-1280.

   NOTE: Dry motoring the engine may remove excess powder but may cause powder to fall onto adjacent parts. Airline policy and procedures may be used to evaluate if dry motoring is beneficial to remove powders.

CAUTION MAKE SURE THAT YOU REMOVE DRY POWDER ON THE ENGINE AND ITS ADJACENT COMPONENTS BEFORE DRY MOTOR OPERATION. DRY CHEMICAL FIRE EXTINGUISHING AGENTS CAN GO INTO THE ENGINE. IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE CAN OCCUR.

2) If the powder turned to a glaze due to the high temperatures, clean the areas with Ardrox 6025 cleaner, B01023.

3) Replace the engine.

   Do these tasks:

   Power Plant - Removal, TASK 71-00-02-000-801-F00

   Power Plant - Installation, TASK 71-00-02-400-801-F00.

   NOTE: Use the CFMI Engine Shop Manual to do an inspection of the removed engine.

(d) If halogen, or equivalent, materials were used:

1) If you can operate the engine within 3 hours, do these steps:

   a) Dry motor the engine for 5 minutes. To dry motor the engine, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

   b) Stop the engine for 5-10 minutes.

   c) Dry motor the engine again for 5 minutes. To dry motor the engine, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

   d) Clean the engine. To clean it, do this task: Clean the Engine Gas-Path with Cleaning Solution, TASK 72-00-00-100-804-F00.

   e) Change the engine oil.

      Do these tasks:

      Drain the Engine Oil, TASK 12-13-11-600-803

      Replenish the Engine Oil, TASK 12-13-11-600-801.

   f) Before the subsequent three hours, operate the engine at idle-power for a minimum of 10 minutes. To start the engine, do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

2) If you can not operate the engine before the subsequent 3 hours, replace the engine.

   Do these tasks:

   Power Plant - Removal, TASK 71-00-02-000-801-F00

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Power Plant - Installation, TASK 71-00-02-400-801-F00.

NOTE: Use the CFMI Engine Shop Manual to clean and do an inspection of the removed engine.

END OF TASK

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Engine Core Interior and Engine Core Exterior Areas
Figure 601/71-00-00-990-931-F00

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TASK 71-00-00-800-804-F00

4. **Inspection After Engine Operations Above the Limits and High Engine Stress**
(Figure 602, Figure 603, Figure 604, Figure 605)

A. **General**

(1) This task gives the necessary inspections then these conditions occur:

(a) N1 and N2 Overspeeds

(b) Overtemperature

(c) Low or zero oil pressure

(d) High oil pressure

(e) Oil consumption that is more than the limits

(f) High oil temperature.

B. **References**

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
12-13-11-600-803	Drain the Engine Oil (P/B 301)
71-00-00-700-813-F00	Test 5 - Power Assurance Check (P/B 501)
71-00-00-800-806-F00	Engine Operation Limits (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)
72-00-00-200-803-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)
72-00-00-200-807-F00	HPT Blades Borescope Inspection (P/B 601)
72-00-00-200-808-F00	Stage 1-3 LPT Blades Borescope Inspection (P/B 601)
72-00-00-200-809-F00	Stage 4 LPT Blades Borescope Inspection (P/B 601)
72-24-02-200-801-F00	Abradable Shroud (Detail) - Inspection (P/B 601)
79-00-00-200-804-F00	Chip Detectors and Scavenge Screens - Inspection (P/B 601)
79-21-03-000-802-F00	Oil Supply Filter Removal (P/B 401)
79-21-03-400-801-F00	Oil Supply Filter Installation (P/B 401)
79-21-04-000-801-F00	Scavenge Oil Filter Assembly Removal (P/B 401)
79-21-04-400-801-F00	Scavenge Oil Filter Assembly Installation (P/B 401)
FIM 71-06 TASK 801	Engine Overspeed, N1 Over Redline - Fault Isolation
FIM 71-06 TASK 802	Engine Overspeed, N2 Over Redline - Fault Isolation
FIM 71-06 TASK 805	Engine Overtemperature, EGT Over Redline (Not During Engine Start), No Engine Surge or Stall - Fault Isolation
FIM 79-05 TASK 802	Engine Oil Pressure is High - Fault Isolation
FIM 80-05 TASK 802	Engine Start - Engine Overtemperature, EGT Red, Engine Had An Automatic Shutdown - Fault Isolation
FIM 80-05 TASK 807	Engine Start - Engine Overtemperature, EGT Red, Engine Did Not Have An Automatic Shutdown - Fault Isolation

C. **Location Zones**

Zone	Area
411	Engine 1 - Engine

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(Continued)

Zone	Area
421	Engine 2 - Engine

D. Overspeed

SUBTASK 71-00-00-210-025-F00

(1) N1 Overspeed

(a) If you do not have the excedance data, refer to the applicable fault isolation task for N1 overspeed in the Fault Isolation Manual, do this task: Engine Overspeed, N1 Over Redline - Fault Isolation, FIM 71-06 TASK 801.

1) If the N1 overspeed was between 104 and 105.8 percent, do a visual inspection of the engine inlet and the engine exhaust areas.

a) Look for obvious signs of severe engine damage or failure.

NOTE: These signs can include missing or broken blades in the inlet area and metal splatter, missing or broken blades and loose pieces in the exhaust area.

b) If you find indications of severe engine damage or failure, replace the engine, do these tasks:

- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

2) Do this task: Stage 4 LPT Blades Borescope Inspection, TASK 72-00-00-200-809-F00.

3) Examine the N1 rotor for free movement as follows:

WARNING BE CAREFUL WHEN YOU TURN THE FAN BLADES. MAKE SURE THAT YOU ARE IN A STABLE POSITION. YOU MUST WEAR HEAVY PROTECTIVE GLOVES TO PREVENT DAMAGE TO YOUR HANDS. IF YOU DO NOT OBEY THESE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

a) Turn the fan blades with your hand.

b) If the bearings are rough, if there are unusual noises, or if the rotor does not turn smoothly, replace the engine, do these tasks:

- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

NOTE: It is permitted to have light rub marks on the seals and shrouds.

c) Examine the abradable shroud material on the fan case. If you find damage, do this task: Abradable Shroud (Detail) - Inspection, TASK 72-24-02-200-801-F00.

4) Do a borescope inspection of the Stage 4 booster blades, do this task: Stages 2-4 Booster Blades and Vanes Borescope Inspection, TASK 72-00-00-200-803-F00.

5) Do an inspection of the Stage 1 LPT blades, do this task: Stage 1-3 LPT Blades Borescope Inspection, TASK 72-00-00-200-808-F00.

6) Refer to the Fault Isolation Manual to find and correct the cause of the N1 overspeed.

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(b) If the N1 overspeed was more than 105.8 percent, replace the engine, do these tasks:
- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

SUBTASK 71-00-00-210-026-F00

(2) N2 Overspeed

(a) If you do not have the exceedance data, refer to the applicable fault isolation task for N2 overspeed in the Fault Isolation Manual, do this task: Engine Overspeed, N2 Over Redline - Fault Isolation, FIM 71-06 TASK 802.

1) If the N2 overspeed is between 105 and 105.8 percent, do a visual inspection of the engine inlet and the engine exhaust areas.

a) Look for obvious signs of severe engine damage or failure.

NOTE: These signs can include missing or broken blades in the inlet area and metal splatter, missing or broken blades and loose pieces in the exhaust area.

b) If you find indications of severe engine damage or failure, replace the engine, do these tasks:
- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

2) Do a borescope inspection of the Stages 1, 4, and 8 HPC blades, do this task: HP Compressor Blades Borescope Inspection, TASK 72-00-00-200-804-F00.

3) Do this task: HPT Blades Borescope Inspection, TASK 72-00-00-200-807-F00.

4) Refer to the Fault Isolation Manual to find and correct the cause of the N2 overspeed.

(b) If the N2 overspeed was more than 105.8 percent, replace the engine, do these tasks:
- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

E. Engine Overtemperature (Starting)

SUBTASK 71-00-00-970-039-F00

(1) If you do not have the exceedance data, refer to the applicable fault isolation task for Exhaust Gas Temperature (EGT) overtemperature in the Fault Isolation Manual, do this task: Engine Start - Engine Overtemperature, EGT Red, Engine Did Not Have An Automatic Shutdown - Fault Isolation, FIM 80-05 TASK 807 or Engine Start - Engine Overtemperature, EGT Red, Engine Had An Automatic Shutdown - Fault Isolation, FIM 80-05 TASK 802.

SUBTASK 71-00-00-210-027-F00

(2) Record a point that corresponds to the maximum EGT and the time the EGT was over the limit on the chart (Figure 602).

SUBTASK 71-00-00-210-028-F00

(3) If the point is in area A, do the corrective action as follows:

(a) Use the Fault Isolation Manual to find and correct the cause of the hot start before the subsequent flight.

(b) If you find that the N1 rotor stopped during the hot start, do a borescope inspection for the Stage 1 LPT blades, do this task: Stage 1-3 LPT Blades Borescope Inspection, TASK 72-00-00-200-808-F00.

(c) A maximum service extension of one start is permitted.

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1) If that start is satisfactory, one cycle is permitted before you should find and correct the problem.

SUBTASK 71-00-00-210-029-F00

(4) If the point is in area B, do the corrective action as follows:

(a) Do these tasks to do a borescope inspection of the HPT blades and the Stage 1 LPT blades.

1) Do this task: HPT Blades Borescope Inspection, TASK 72-00-00-200-807-F00.

2) Do this task: Stage 1-3 LPT Blades Borescope Inspection, TASK 72-00-00-200-808-F00.

(b) Use the Fault Isolation Manual to find and correct the cause of the hot start before the subsequent flight.

(c) A maximum service extension of one start is permitted.

1) If that start is satisfactory, one cycle is permitted before you should find and correct the problem.

SUBTASK 71-00-00-210-030-F00

(5) If the point is in area C, do the corrective action as follows before the next flight:

(a) Do these tasks to do a borescope inspection of the HPT blades and the Stage 1 LPT blades:

1) Do this task: HPT Blades Borescope Inspection, TASK 72-00-00-200-807-F00.

2) Do this task: Stage 1-3 LPT Blades Borescope Inspection, TASK 72-00-00-200-808-F00.

(b) Use the Fault Isolation Manual to find and correct the cause of the hot start.

F. Engine Overtemperature (Takeoff, Climb, Cruise, Max Continuous)

SUBTASK 71-00-00-800-006-F00

(1) There are many causes for an EGT overtemperature, some examples are given below:

(a) N1 overspeed

(b) Too much bleed air

(c) Deterioration of the engine

(d) A temperature inversion during a takeoff

(e) A engine warm-up time that is not sufficient before the takeoff

(f) EGT indicating system.

SUBTASK 71-00-00-970-040-F00

(2) If you do not have the exceedance data, refer to the applicable fault isolation task for EGT Overtemperature in the Fault Isolation Manual, do this task: Engine Overtemperature, EGT Over Redline (Not During Engine Start), No Engine Surge or Stall - Fault Isolation, FIM 71-06 TASK 805.

SUBTASK 71-00-00-970-100-F00

(3) If you think that the EGT Indicating System is the cause of the exceedance, refer to the applicable fault isolation task for EGT Overtemperature in the Fault Isolation Manual to confirm.

(a) Do this task: Engine Overtemperature, EGT Over Redline (Not During Engine Start), No Engine Surge or Stall - Fault Isolation, FIM 71-06 TASK 805.

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SUBTASK 71-00-00-210-031-F00

(4) Follow these instructions for the applicable power range where the engine overtemperature occurred:

(a) Takeoff - Put points on the graph to show the maximum EGT and the total cumulative time the EGT was over the 1742°F (950°C) redline limit (Figure 603).

1) Find if there was an Area A, B, C or D takeoff exceedance.

NOTE: If Takeoff EGT redline limit is exceeded and Primary Engine Display for EGT is boxed in RED, the Control Display Unit (CDU) Engine Exceedance Page check will display time of the exceedance and the exceedance peak. Use this Exceedance Page data to plot the point on Figure 603. Any transient allowance has already been accounted for by the reporting system.

(b) Climb, Cruise, or Max Continuous - Put points on the graph to show the maximum EGT and the total cumulative time the EGT was over the 1697°F (925°C) limit (Figure 603, Figure 604).

NOTE: If the flight crew has logged an EGT indication above the 1697°F (925°C) climb, cruise, or max continuous power limit, maintenance personnel should be concerned with the total time the engine was at 1697°F (925°C) or above regardless of the time that has elapsed since takeoff power was reduced to climb, cruise, or max continuous power.

NOTE: If the temperature was between 1697°F (925°C) and 1742°F (950°C) for less than five minutes no exceedance has occurred, and no maintenance action is necessary.

NOTE: If the temperature was between 1697°F (925°C) and 1742°F (950°C) for at least than five minutes but less than ten minutes, an Area A exceedance has occurred, and the maintenance action for Area A is recommended.

NOTE: If the climb, cruise, or max continuous power EGT was greater than 1742°F (950°C) for any amount of time or if it was greater than 1697°F (925°C) for more than ten minutes, an Area D exceedance has occurred, and the engine should be removed unless the cause of the exceedance is due to an EGT indication system issue.

SUBTASK 71-00-00-210-032-F00

(5) If the point is in area A, do the corrective action as follows:

(a) Do a visual inspection of the engine inlet and engine exhaust before the subsequent flight.

(b) Identify and correct the cause for the EGT overtemperature at the first available opportunity.

1) Refer to the Fault Isolation Manual to find the cause.

2) If a second overtemperature occurs and you have not found the cause for the first overtemperature, you must find, and if possible, correct the cause for the overtemperature before the subsequent flight.

3) If you have found, but not corrected, the cause for the first or second overtemperatures, you can have a maximum of 10 overtemperatures in area A and B before you must correct the cause.

(c) If you cannot correct the cause for the EGT overtemperature on-wing (this includes engine deterioration), do the next step.

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(d) You can have a maximum of 10 EGT overtemperatures in areas A and B together before you should remove the engine for an EGT overtemperature inspection, do these tasks:

NOTE: The EGT overtemperatures caused by the EGT indication system in the area A and B should not be included in the exceedance count limit.

- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

NOTE: Use the CFMI Engine Shop Manual to do an inspection of the removed engine.

SUBTASK 71-00-00-210-033-F00

(6) If the point is in area B, do the corrective action as follows:

(a) Do a visual inspection of the engine inlet and the engine exhaust before the subsequent flight.

(b) Identify and correct the cause for the EGT overtemperature at the first available opportunity.

1) Refer to the Fault Isolation Manual to find the cause.

2) If a second EGT overtemperature occurs and you have not found the cause for the first overtemperature, you must find, and if possible, correct the cause for the overtemperature before the subsequent flight.

3) If you have found, but not corrected, the cause for the first or second EGT overtemperatures, you can have a maximum of 10 overtemperatures in areas A and B before you must correct the cause of the overtemperature.

(c) If you cannot find the cause for the overtemperature, do these steps before the subsequent flight:

1) Do this task: HPT Blades Borescope Inspection, TASK 72-00-00-200-807-F00.

2) Do an inspection of the Stage 1 LPT blades, do this task: Stage 1-3 LPT Blades Borescope Inspection, TASK 72-00-00-200-808-F00.

3) You can defer the borescope inspections for up to 10 cycles if no more overtemperatures occur.

4) Do this task: Test 5 - Power Assurance Check, TASK 71-00-00-700-813-F00.

5) If you have found, but not corrected, the cause for the first or second EGT overtemperatures, you can have a maximum of 10 overtemperatures in areas A and B before you should correct the cause of the overtemperature.

(d) If you cannot correct the cause for the EGT overtemperature on-wing (this includes engine deterioration), do the next step.

(e) You can have a maximum of 10 EGT overtemperatures in areas A and B together before you should remove the engine for an EGT overtemperature inspection, do these tasks:

NOTE: The EGT overtemperatures caused by the EGT indication system in the area A and B should not be included in the exceedance count limit.

- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

NOTE: Use the CFMI Engine Shop Manual to do an inspection of the removed engine.

SUBTASK 71-00-00-210-034-F00

(7) If the point is in area C, do the corrective action as follows:

(a) Do a visual inspection of the engine inlet and the engine exhaust.

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(b) Refer to the Fault Isolation Manual to find and correct the cause of the EGT overtemperature before the subsequent flight.

(c) If you found and corrected the cause for the EGT overtemperature or the cause of the EGT overtemperature was because of the EGT indicating system, do these steps before the subsequent flight:

1) If the EGT overtemperature time in area C was less than 5 seconds, use the limits for area B in SUBTASK 71-00-00-210-033-F00, if you obey these steps:

a) You find and correct the cause of the EGT overtemperature before the subsequent flight.

b) Before the subsequent 10 cycles, do this task: HPT Blades Borescope Inspection, TASK 72-00-00-200-807-F00.

c) Before the subsequent 10 cycles, do a borescope inspection of the Stage 1 LPT blades, do this task: Stage 1-3 LPT Blades Borescope Inspection, TASK 72-00-00-200-808-F00.

d) You have a successful Power Assurance Check before the engine goes in service again.

2) If the EGT overtemperature time in area C was more than 5 seconds, and the cause of the EGT overtemperature was not because of the EGT indicating system, you should remove the engine for an overtemperature inspection before the subsequent 15 cycles, do these tasks:

- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

a) If one more EGT overtemperature occurs before the 15 cycle limit, follow the overtemperature instructions given for area D.

(d) If you cannot find the cause, do these steps before the subsequent flight:

1) Do this task: HPT Blades Borescope Inspection, TASK 72-00-00-200-807-F00.

2) Do a borescope inspection of the Stage 1 LPT blades, do this task: Stage 1-3 LPT Blades Borescope Inspection, TASK 72-00-00-200-808-F00.

3) Do this task: Test 5 - Power Assurance Check, TASK 71-00-00-700-813-F00.

4) If the EGT overtemperature time in area C was more than 5 seconds, replace the engine before the subsequent 15 cycles, do these tasks:

- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

a) If one more EGT overtemperature occurs before the 15 cycle limit, follow the overtemperature instructions given for area D.

SUBTASK 71-00-00-210-035-F00

(8) If the point is in area D, do the corrective action before the subsequent flight as follows:

NOTE: You should remove the engine if you have an EGT overtemperature in area D and the cause of the exceedance is not because of an EGT indication system issue. Use the steps below for instructions on the one non-revenue flight allowance, or to continue in service with an Area D exceedance that is because of an EGT indication system issue.

(a) Do a visual inspection of the engine inlet and the engine exhaust.

(b) Identify and correct the cause for the EGT overtemperature (if possible).

1) Refer to the Fault Isolation Manual to find the cause.

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(c) Even if the cause of the overtemperature is from an EGT indication system issue, do these steps:

1) Do this task: HPT Blades Borescope Inspection, TASK 72-00-00-200-807-F00.

2) Do an inspection of the Stage 1 LPT blades, do this task: Stage 1-3 LPT Blades Borescope Inspection, TASK 72-00-00-200-808-F00.

3) Do this task: Test 5 - Power Assurance Check, TASK 71-00-00-700-813-F00.

4) If the damage from the borescope inspection is more than the limits, replace the engine, do these tasks:

- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

NOTE: Use the CFMI Engine Shop Manual to do an inspection of the removed engine.

5) If the damage from the borescope inspection is in the limits and the cause of the exceedance is not an EGT indication system issue, one non-revenue flight is permitted before you should replace the engine.

6) If the cause of the exceedance is confirmed as an EGT indication system issue and both borescope inspection and Power Assurance Check are satisfactory, continue in service.

G. Takeoff Power Kept for More than 5 Minutes

SUBTASK 71-00-00-210-036-F00

(1) There is no inspection necessary if the EGT limits are obeyed.

(a) Refer to Figure 603 for the EGT limits.

H. Low or Zero Oil Pressure

SUBTASK 71-00-00-210-037-F00

(1) The oil pressure is in zone A less than 13 psid (90 kPa) (Figure 605):

NOTE: During negative g conditions, an oil pressure of less than 13 psid (90 kPa) is permitted for a maximum of 10 seconds.

(a) At cruise or takeoff power for more than 10 seconds, replace the engine, do these tasks:

- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

NOTE: If the cause of the low or zero oil pressure is confirmed as an oil pressure indication issue, continue in service.

(b) At idle power for more than 30 seconds, replace the engine, do these tasks:

- Power Plant - Removal, TASK 71-00-02-000-801-F00
- Power Plant - Installation, TASK 71-00-02-400-801-F00.

NOTE: If the cause of the low or zero oil pressure is confirmed as an oil pressure indication issue, continue in service.

(c) If the engine was operated within the above time limits with zero oil pressure or very low oil pressure, do these steps:

1) Do this task: Chip Detectors and Scavenge Screens - Inspection, TASK 79-00-00-200-804-F00.

2) If unwanted material is found, do these steps:

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a) Replace the oil supply filter, do these tasks:
- Oil Supply Filter Removal, TASK 79-21-03-000-802-F00
- Oil Supply Filter Installation, TASK 79-21-03-400-801-F00.

b) Replace the scavenge oil filter assembly, do these steps:
- Scavenge Oil Filter Assembly Removal, TASK 79-21-04-000-801-F00
- Scavenge Oil Filter Assembly Installation, TASK 79-21-04-400-801-F00.

3) Refer to the Fault Isolation Manual to find and correct the cause of the low oil pressure.

SUBTASK 71-00-00-210-038-F00

(2) If the pressure is in zone B, do these steps:

(a) Refer to the Fault Isolation Manual to find and correct the cause of the low oil pressure.

(b) Monitor the oil temperature and the pressure.

I. High Oil Pressure

SUBTASK 71-00-00-210-059-F00

(1) If the pressure is in zone D (oil pressure is more than 60 psid (414 kPa) during cruise phase but not more than 70 psid (483 kPa)), do this step (Figure 605):

NOTE: The standard oil pressure range is 40 psid (276 kPa) to 50 psid (345 kPa) during cruise phase. Oil pressure can be more than 60 psid (414 kPa) during takeoff and climb. The maximum oil pressure limit above applies only during stabilized cruise phase.

(a) Use the Fault Isolation Manual to find and correct the cause of the high oil pressure in the next 100 flight cycles, do this task: Engine Oil Pressure is High - Fault Isolation, FIM 79-05 TASK 802.

SUBTASK 71-00-00-210-060-F00

(2) If the pressure is in zone E (oil pressure is above 70 psid (483 kPa) during cruise phase), do this step (Figure 605):

(a) Use the Fault Isolation Manual to find and correct the cause of the high oil pressure in the next 25 flight cycles, do this task: Engine Oil Pressure is High - Fault Isolation, FIM 79-05 TASK 802.

J. High Oil Consumption

SUBTASK 71-00-00-810-003-F00

(1) Refer to the Fault Isolation Manual if these conditions occur:

(a) Oil use shows a slow and continuous increase.

(b) Oil use increases suddenly.

(c) Oil use is more than 0.20 gallons/hr (0.76 liters/hr).

SUBTASK 71-00-00-800-007-F00

(2) For the oil consumption guidelines, refer to the Engine Operation Limits (TASK 71-00-00-800-806-F00).

K. High Oil Temperature

SUBTASK 71-00-00-910-050-F00

(1) The maximum oil temperature for continuous engine operation is 284°F (140°C).

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SUBTASK 71-00-00-910-051-F00

(2) Oil temperatures between 284°F (140°C) and 311°F (155°C) is permitted for 15 minutes without an inspection.

SUBTASK 71-00-00-810-005-F00

(3) If the oil temperature is more than 311°F (155°C), do these steps:

(a) Refer to the Fault Isolation Manual to find and correct the cause of the high oil temperature.

(b) Do this task: Drain the Engine Oil, TASK 12-13-11-600-803.

(c) Do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

(d) Examine the magnetic chip detectors on the lubrication unit for metal particles, do this task: Chip Detectors and Scavenge Screens - Inspection, TASK 79-00-00-200-804-F00.

1) If the engine is serviceable, replace the oil supply filter, do these tasks:

- Oil Supply Filter Removal, TASK 79-21-03-000-802-F00
- Oil Supply Filter Installation, TASK 79-21-03-400-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-0335-(1)-00-B

G87302 S0006581938_V1

Exhaust Gas Temperature (EGT) Overtemperature Inspection (Starting)
Figure 602/71-00-00-990-850-F00

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Exhaust Gas Temperature (EGT) Overtemperature Inspection Takeoff
Figure 603/71-00-00-990-851-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

L88487 S0006581940_V1

Exhaust Gas Temperature (EGT) Overtemperature Inspection (Climb, Cruise or Max Continuous Power)
Figure 604/71-00-00-990-852-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Oil Pressure Out-of-Limit Inspection Requirements
Figure 605/71-00-00-990-883-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-210-801-F00

5. Inspection of the Engine After an Engine Stall or Possible Engine Stall

A. General

(1) This procedure gives the inspection after you have or think you have an engine stall condition.

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)
72-00-00-200-807-F00	HPT Blades Borescope Inspection (P/B 601)
72-00-00-200-808-F00	Stage 1-3 LPT Blades Borescope Inspection (P/B 601)
72-21-02-200-801-F00	Fan Module Inspection (P/B 601)
72-24-02-200-801-F00	Abradable Shroud (Detail) - Inspection (P/B 601)
72-32-00-200-804-F00	High Pressure Compressor Stage 4 Vane Trailing Edge Inspection (P/B 601)

C. Location Zones

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

D. Inspection of an Engine After an Engine Stall or Possible Engine Stall

SUBTASK 71-00-00-210-041-F00

(1) Do this task: Fan Module Inspection, TASK 72-21-02-200-801-F00.

SUBTASK 71-00-00-210-042-F00

(2) Do this task: Abradable Shroud (Detail) - Inspection, TASK 72-24-02-200-801-F00.

SUBTASK 71-00-00-210-043-F00

(3) Visually examine the exhaust area for metal particles.

SUBTASK 71-00-00-290-001-F00

(4) Do a borescope inspection of these components:

(a) The Stage 4 booster blades. To do this inspection, do this task: Stages 2-4 Booster Blades and Vanes Borescope Inspection, TASK 72-00-00-200-803-F00.

(b) The Stages 1, 4 and 8 HPC blades. To do this inspection, do this task: HP Compressor Blades Borescope Inspection, TASK 72-00-00-200-804-F00.

1) If you find damage, do an inspection of the remaining HPC blades.

(c) Do this task: HPT Blades Borescope Inspection, TASK 72-00-00-200-807-F00.

(d) The Stage 1 LPT blades. To do this inspection, do this task: Stage 1-3 LPT Blades Borescope Inspection, TASK 72-00-00-200-808-F00.

(e) Stage 4 Vane Inspection only if the engine has operated in a sandy environment, do this task: High Pressure Compressor Stage 4 Vane Trailing Edge Inspection, TASK 72-32-00-200-804-F00.

SUBTASK 71-00-00-810-006-F00

(5) Refer to the Fault Isolation Manual to find and correct the cause of the engine stall.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-00-210-802-F00

6. Inspection of the Engine After In-Flight Windmilling

A. General

(1) This procedure gives the inspection after an in-flight windmilling condition.

B. References

Reference	Title
71-00-00-700-813-F00	Test 5 - Power Assurance Check (P/B 501)
71-00-03-600-801-F00	Dry-Out and Lubrication of the Engine (P/B 201)
79-00-00-200-804-F00	Chip Detectors and Scavenge Screens - Inspection (P/B 601)
79-21-03-000-802-F00	Oil Supply Filter Removal (P/B 401)
79-21-03-400-801-F00	Oil Supply Filter Installation (P/B 401)
79-21-04-000-801-F00	Scavenge Oil Filter Assembly Removal (P/B 401)
79-21-04-400-801-F00	Scavenge Oil Filter Assembly Installation (P/B 401)

C. Location Zones

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

D. Procedure

SUBTASK 71-00-00-910-052-F00

(1) If the lubrication system was in operation before the in-flight shutdown, there is no time limit for windmilling.

SUBTASK 71-00-00-210-044-F00

(2) If the engine windmills for more than 6 hours without the operation of the lubrication system, do these steps:

(a) Examine these components for unwanted material:

1) Do this task: Chip Detectors and Scavenge Screens - Inspection, TASK 79-00-00-200-804-F00.

(b) If unwanted material is found, do these steps:

1) Replace the oil supply filter.

These are the tasks:

Oil Supply Filter Removal, TASK 79-21-03-000-802-F00,

Oil Supply Filter Installation, TASK 79-21-03-400-801-F00.

2) Replace the scavenge oil filter assembly.

These are the tasks:

Scavenge Oil Filter Assembly Removal, TASK 79-21-04-000-801-F00,

Scavenge Oil Filter Assembly Installation, TASK 79-21-04-400-801-F00.

(c) Do this task: Test 5 - Power Assurance Check, TASK 71-00-00-700-813-F00.

(d) Do this task: Chip Detectors and Scavenge Screens - Inspection, TASK 79-00-00-200-804-F00.

SUBTASK 71-00-00-600-002-F00

(3) If the engine is operable, operate the engine at idle for a minimum of 15-20 minutes and not later than 24 hours after landing.

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SUBTASK 71-00-00-600-001-F00

(4) If the engine is not operable, do this task: Dry-Out and Lubrication of the Engine, TASK 71-00-03-600-801-F00

no later than 24 hours after landing.

——— END OF TASK ———

TASK 71-00-00-200-803-F00

7. Inspection Of The Engine After A Hard Landing

A. General

(1) This procedure gives the inspection after a hard landing.

(2) For a Phase II Hard Landing, do this task: Phase II Inspection, TASK 05-51-01-210-802.

B. References

Reference	Title
05-51-01-210-802	Phase II Inspection (P/B 201)
72-00-00-200-804-F00	HP Compressor Blades Borescope Inspection (P/B 601)
72-24-02-200-801-F00	Abradable Shroud (Detail) - Inspection (P/B 601)
72-56-00-200-802-F00	Turbine Frame Assembly Engine Clevis Mounts Inspection (P/B 601)

C. Location Zones

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

D. Inspection Of The Engine After A Hard Landing

SUBTASK 71-00-00-210-052-F00

(1) Visually examine these components for damage:

(a) Inlet cowl, exhaust sleeve and exhaust nozzle and all the fasteners.

(b) Abradable material on the fan inlet case (Abradable Shroud (Detail) - Inspection, TASK 72-24-02-200-801-F00).

(c) The forward and aft engine mounts on the engine.

(d) Accessory components attached for the engine.

(e) All ducts, tubes, hoses and fittings (look for leaks, cracks or distortion).

(f) The aft flange on the turbine frame (Turbine Frame Assembly Engine Clevis Mounts Inspection, TASK 72-56-00-200-802-F00).

SUBTASK 71-00-00-290-004-F00

(2) Do a borescope inspection of the 1st-, 3rd-, and 8th-stage HPC blades.

(a) Use this procedure: (HP Compressor Blades Borescope Inspection, TASK 72-00-00-200-804-F00).

——— END OF TASK ———

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TASK 71-00-00-210-803-F00

8. Inspection of the Engine After High G-Loads During Transportation

A. General

(1) This procedure gives the inspection after high G loads were applied to the engine during transportation.

B. References

Reference	Title
71-00-00-700-813-F00	Test 5 - Power Assurance Check (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)
79-00-00-200-804-F00	Chip Detectors and Scavenge Screens - Inspection (P/B 601)
79-21-06-000-801-F00	Scavenge Oil Filter Element Removal (P/B 401)
79-21-06-400-801-F00	Scavenge Oil Filter Element Installation (P/B 401)

C. Location Zones

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

D. Inspection of the Engine After High G-Loads During Transportation

SUBTASK 71-00-00-210-047-F00

(1) Visually examine the surfaces of the engine and flange areas for damage such as buckling, deformation and cracks.

SUBTASK 71-00-00-210-045-F00

WARNING

BE CAREFUL WHEN YOU TURN THE FAN BLADES. MAKE SURE YOU ARE IN A STABLE POSITION. YOU MUST WEAR HEAVY PROTECTIVE GLOVES TO PREVENT DAMAGE TO YOUR HANDS. IF YOU DO NOT OBEY THESE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) To examine the fan rotor, turn the fan blades with your hand.

(a) If the bearings are rough, if there are unusual noises, or if the rotor does not turn smoothly, replace the engine.

These are the tasks:

Power Plant - Removal, TASK 71-00-02-000-801-F00,

Power Plant - Installation, TASK 71-00-02-400-801-F00.

NOTE: It is permitted to have light rub marks on the seals and shrouds.

(b) If the seal or the shroud has rubbed but is serviceable, you can operate the engine if this check is satisfactory:

1) Do this task: Test 5 - Power Assurance Check, TASK 71-00-00-700-813-F00.

(c) Examine these components for signs of bearing damage:

1) Do this task: Chip Detectors and Scavenge Screens - Inspection, TASK 79-00-00-200-804-F00.

2) If signs of bearing damage is found, replace the engine.

These are the tasks:

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Power Plant - Removal, TASK 71-00-02-000-801-F00,

Power Plant - Installation, TASK 71-00-02-400-801-F00.

(d) If unwanted material other than bearing material is found, do these steps:

1) Replace the filter element for the scavenge oil filter.

These are the tasks:

Scavenge Oil Filter Element Removal, TASK 79-21-06-000-801-F00,

Scavenge Oil Filter Element Installation, TASK 79-21-06-400-801-F00.

END OF TASK

TASK 71-00-00-200-802-F00

9. Inspection of the Engine After Volcanic Ash, Dust or Sand Ingestion

A. General

(1) This procedure gives the inspection of the engine after volcanic ash, dust or sand ingestion.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
12-13-11-600-803	Drain the Engine Oil (P/B 301)
71-00-00-700-821-F00	Dry Motor the Engine (P/B 201)
72-00-00-200-804-F00	HP Compressor Blades Borescope Inspection (P/B 601)
72-00-00-200-807-F00	HPT Blades Borescope Inspection (P/B 601)
72-00-00-200-815-F00	HPT Shrouds Borescope Inspection (P/B 601)
79-21-06-000-801-F00	Scavenge Oil Filter Element Removal (P/B 401)
79-21-06-400-801-F00	Scavenge Oil Filter Element Installation (P/B 401)

C. Location Zones

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

D. Procedure

SUBTASK 71-00-00-210-048-F00

(1) If the engines have flown through or operated in volcanic ash or severe dust or sand conditions, do these steps for the inspection:

NOTE: Some airplanes have operated in normally sandy or dusty conditions (deserts, unimproved runways) without adverse affects on the engines. This inspection is for severe dust or sand conditions that are more than normal.

(a) Do a visual inspection of the engine inlet and the engine exhaust areas for signs of damage or erosion.

1) Repair or replace the applicable component if the damage is more than the limits.

(b) Do a borescope inspection of these HPC and HPT components and look for this damage:

NOTE: Examine all stages of the HPC. The aft stages of the HPC will be the most affected by erosion.

NOTE: Examine the HPT nozzle vanes and HPT blades for erosion and quantity of solidified material. Sufficient quantity of collected material on the HPT nozzle vanes can cause a reduced engine stall margin.

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1) Erosion that is more than the limits
2) Foreign object damage
3) Ash, dust or sand particles that have solidified on the HPT nozzle vanes and HPT blades
   a) If material has solidified on the HPT nozzle vanes and HPT blades, contact CFMI.
4) Do this task: HP Compressor Blades Borescope Inspection, TASK 72-00-00-200-804-F00.
5) Do this task: HPT Blades Borescope Inspection, TASK 72-00-00-200-807-F00.
6) Do this task: HPT Shrouds Borescope Inspection, TASK 72-00-00-200-815-F00.

SUBTASK 71-00-00-290-002-F00

(2) If the engines have been exposed to volcanic ash or severe dust or sand conditions on the ground but have not flown through these condition, do these steps for the inspection:

NOTE: Do not water wash an engine that has been exposed to volcanic ash or severe dust or sand. Particles can collect on the HPT nozzle and blade cooling paths. Material can collect in the rotor spools and cause rotor imbalance.

(a) Examine the engine inlet and exhaust for ash, dust or sand particles that collected in the engine.
   1) Vacuum the particles from all accessible areas in the engine inlet and exhaust.

(b) To dry motor the engine for two minutes, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00

(c) Do a borescope inspection of the HPC and HPT at the 6 o'clock positions and look for ash, dust or sand.
   1) If loose material is still present in the engine flowpath, dry motor the engine for two minutes.
   2) Do the borescope inspection of the HPC and HPT for loose material.
   3) Do the two minute dry motor and borescope inspection again until all the loose material is removed.

SUBTASK 71-00-00-900-001-F00

(3) Replace these items:

(a) Replace the scavenge oil filter element.

These are the tasks:

Scavenge Oil Filter Element Removal, TASK 79-21-06-000-801-F00,

Scavenge Oil Filter Element Installation, TASK 79-21-06-400-801-F00.

(b) Drain and replace the engine oil.
   1) Do this task: Drain the Engine Oil, TASK 12-13-11-600-803.
   2) Do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

SUBTASK 71-00-00-810-007-F00

(4) Monitor the operation of the engine to find if the performance parameters are usual.

(a) If an engine parameter is unusual, do the Fault Isolation for the applicable engine parameter.

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SUBTASK 71-00-00-290-003-F00

(5) At not more than 400-800 cycles, it is recommended to do a one time borescope inspection of HPT components to make sure the HPT nozzles and HPT blades are serviceable.

——— END OF TASK ———

TASK 71-00-00-740-801-F00

10. Engine Exceedance Page Check

A. General

(1) This task finds and resets the engine exceedances on the FMCS Control Display Unit (CDU).

(a) It also includes a procedure to reset the red box display on the center display unit (center DU) if it stays ON after you reset the exceedance or the CDU shows no current exceedance.

(2) These engine parameters with exceedances are stored in non-volatile memory of the Display Electronics Units (DEU).

(a) N1

(b) N2

(c) EGT RED LIMIT

(d) EGT HOT START.

B. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right

C. Engine Exceedance Page Check

SUBTASK 71-00-00-860-180-F00

(1) Do this step:

Make sure that these circuit breakers are closed:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
D	5	C01359	DISPLAY DEU 1 PRI

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
D	9	C01362	DISPLAY DEU 2 HOLDUP
D	10	C01361	DISPLAY DEU 1 HOLDUP
D	11	C01360	DISPLAY DEU 2 PRI

SUBTASK 71-00-00-740-009-F00

(2) Do these steps to get the engine exceedances on the FMCS CDU:

NOTE: The FMCS CDU does not support a type-ahead function. You must have the prompt on the FMCS CDU screen before you type in the response.

(a) Push the INIT REF function key.

(b) If the POS INIT display shows, then push the line select key (LSK) adjacent to the INDEX prompt.

NOTE: This makes the INIT/REF INDEX show.

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(c) Push the line select key (LSK) adjacent to the MAINT prompt.

(d) From the MAINT BITE INDEX, push the LSK adjacent to the ENGINE prompt.

NOTE: This LSK causes the ENGINE/EXCEED BITE INDEX screen to show.

(e) Push the EXCEEDANCES LSK.

NOTE: This LSK causes the ENGINE EXCEEDANCE page to show. The exceedances are stored by the DEU. The DEU uses data from the EEC to compile the exceedances.

(f) Push the ENGINE X EXCEEDANCES LSK for the applicable engine.

(g) If the current exceedances were not reset during the last flight, the screen shows the CURRENT EXCEEDS SUMMARY with the exceedances.

1) Push the EVENTS LSK to get more data on the event on the CURRENT EXCEEDANCES page.

NOTE: The screen shows one exceedance per page. The page number and total pages show in the upper right corner.

2) Use the NEXT PAGE and PREV PAGE keys to get to the applicable exceedance.

3) Record the data for the exceedance.

4) Push the RESET LSK to reset the exceedance.

a) Do the above steps again to record and reset the current exceedances.

(h) If there were no exceedances during the last flight or if they were reset, the screen shows a LSK for CURRENT EXCEEDANCES and for FLIGHT LEG EXCEEDANCES.

1) If you push the CURRENT EXCEEDANCES LSK, the screen shows NO EXCEEDANCES.

a) Push the INDEX LSK to go back to the previous menu.

NOTE: Use the INDEX LSK at any time to go the applicable menu.

2) Push the FLIGHT LEG EXCEEDANCES LSK, to show the flight legs with the exceedances.

3) Push the applicable LEG X LSK, to show the exceedance data.

NOTE: The screen can show five legs on a page and one exceedance per page. Use the NEXT PAGE and PREV PAGE keys to go to all of the legs and exceedances. The DEUs can show ten exceedances per leg and keep nine legs with exceedances.

4) Record the data for the exceedances.

5) Push the INDEX LSK to go to another LEG.

a) Do the above steps again to record the exceedances for all of the flight legs.

6) Push the INDEX LSK to go to another LEG.

7) To erase all the exceedances for this engine, push the INDEX LSK to go to show the BULK ERASE LSK.

a) Push the BULK ERASE LSK.

b) PUSH the YES LSK.

(i) To go to the exceedances for the other engine, push the INDEX LSK several times until the correct menu shows.

(j) To exit the ENGINE EXCEEDANCES page, push the INIT REF key.

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(k) If you reset the current exceedances but the center DU continues to show the red box for an exceedance, continue to the subsequent step.

D. Reset the Red Box Alert (Engine Exceedance)

SUBTASK 71-00-00-070-001-F00

(1) Do this procedure if the red box alert stays on the center DU, the CURRENT EXCEEDANCES are reset and the CDU shows NO EXCEEDANCES in CURRENT EXCEEDANCES.

SUBTASK 71-00-00-070-002-F00

(2) To reset the red box alert display for an engine exceedance on the CDU, do these steps:

(a) Push the INIT REF key to exit the CDU Maintenance session.

(b) To isolate the DEU2, do this step:

Open these circuit breakers and install safety tags:

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
D	9	C01362	DISPLAY DEU 2 HOLDUP
D	11	C01360	DISPLAY DEU 2 PRI

(c) Get access to the CURRENT EXCEEDANCES page on the CDU.

(d) If the screen still shows CURRENT EXCEEDANCES, reset them.

(e) Push the INIT REF key to exit the CDU Maintenance session.

(f) Do this step:

Remove the safety tags and close these circuit breakers:

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
D	9	C01362	DISPLAY DEU 2 HOLDUP
D	11	C01360	DISPLAY DEU 2 PRI

(g) To isolate the DEU1, do this step:

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
D	5	C01359	DISPLAY DEU 1 PRI

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
D	10	C01361	DISPLAY DEU 1 HOLDUP

(h) Get access to the CURRENT EXCEEDANCES page on the CDU.

(i) If the screen still shows CURRENT EXCEEDANCES, reset them.

(j) Push the INIT REF key to exit the CDU Maintenance session.

(k) Do this step:

Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
D	5	C01359	DISPLAY DEU 1 PRI

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F/O Electrical System Panel, P6-1

Row	Col	Number	Name
D	10	C01361	DISPLAY DEU 1 HOLDUP

(l) Make sure that the red box alert does not show.

END OF TASK

TASK 71-00-00-200-804-F00

11. Nacelle Structure Hot Air Duct Rupture Conditional Inspection

A. General

(1) This task provides the instructions on how to examine the airplane nacelle structure for possible structural damage caused by a ruptured duct below the strut that has occurred for which there was a subsequent deployment of the affected Thrust Reverser.

B. Location Zones

Zone	Area
400	Powerplant and Nacelle Struts

C. Procedure

SUBTASK 71-00-00-210-053-F00

(1) Contact Boeing for specifics of information related to the inspection of the inner wall for both location and the method of inspection.

D. Put the Airplane Back to Its Usual Condition

SUBTASK 71-00-00-410-019-F00

(1) Install the components you removed if they are serviceable, or install replacement parts.

END OF TASK

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POWER PLANT - REMOVAL/INSTALLATION

1. **General**

A. This procedure includes these tasks:

(1) A removal of the power plant

(2) An installation of the power plant.

B. The procedure to remove the power plant can be divided into steps. If you have four persons to remove the power plant, use the table below to help you remove the power plant more quickly:

Table 401/71-00-02-993-817-F00 Power Plant Removal Sequence

Step	Recommended Number of Persons	Description
1	4	Level the airplane. Deactivate/open circuit breakers (as applicable)
2	4	Remove the fan cowl panels
3	1	Open the thrust reversers. Do the core area disconnects on the right side
	1	Open the thrust reversers (2nd person). Do the core area disconnects on the left side
	1	Do the fan case disconnects on the right side. Install the ground support equipment
	1	Do the fan case disconnects on the left side. Install the ground support equipment (2nd person)
4	4	Remove the power plant.

C. The procedure to install the power plant can also be divided into steps. If you have four persons to install the power plant, use the table below to help you install the power plant more quickly:

Table 402/71-00-02-993-818-F00 Power Plant Installation Sequence

Step	Recommended Number of Persons	Description
1	4	Install the power plant.
2	1	Do the fan case connections on the right side. Remove the ground support equipment
	1	Do the fan case connections on the left side. Remove the ground support equipment (2nd person)
	1	Do the core area connections of the right side. Close the thrust reversers
	1	Do the core area connections on the left side. Close the thrust reversers (2nd person)
3	4	Install the fan cowl panels
4	4	Close circuit breakers/activate systems.

D. When you replace a power plant, you can remove the inlet cowl and install it on the replacement power plant.

(1) You can remove the inlet cowl when the power plant is still attached to the strut or you can remove the inlet cowl when the power plant is attached to the dolly.

(a) If you remove the inlet cowl when it is attached to the strut, the inlet cowl attach bolt at the 12 o'clock location will be difficult to remove.

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(b) If you remove the inlet cowl when it is attached to the dolly, the inlet cowl attach bolts between the 4 and 8 o'clock locations will be difficult to remove.

(2) It is recommended that you remove the inlet cowl attach bolts between the 4 and 8 o'clock locations before you lower the power plant from the strut. When the power plant is attached to the dolly, remove the remaining bolts and remove the inlet cowl.

(3) Use the procedure in PAGEBLOCK 71-11-01/401 to remove and install the inlet cowl.

E. After disconnecting the fuel lines, hydraulic lines, and electrical connectors, electrical power can be supplied to the airplane to do other maintenance.

(1) Circuit breakers required for engine removal must be opened and tagged. All electrical connectors, exposed wire terminals, tube ends, ducts, fueling fittings, and hydraulic fittings must be protected with covers.

(2) Make sure that electrical power is removed to connect the fuel lines, hydraulic lines, and electrical connectors after engine installation.

TASK 71-00-02-000-801-F00

2. Power Plant - Removal

A. General

(1) To remove the power plant, you must do these topics:

(a) Prepare for the Removal

(b) Fan Case Disconnection on the Left Side

(c) Fan Case Disconnection on the Right Side

(d) Engine Core Disconnection on the Left Side

(e) Engine Core Disconnection on the Right Side

(f) Power Plant Removal.

(2) During the power plant removal, install protective covers to all tube ends, ducts, electrical connectors, fuel fittings, and hydraulic fittings.

(3) When you remove a power plant, do not disconnect hoses and tubes other than those specifically shown. When these hoses and tubes are disconnected, they can be installed incorrectly during the installation. This can cause the incorrect operation of a component or system.

(4) This task uses bootstrap equipment, or JacXson U70, or Cobra engine change system to remove the power plant from the strut.

(5) The power plant, when removed from the strut, weighs approximately 6700 lb (3039 kg).

B. References

Reference	Title
08-21-02-580-801	Level the Airplane With a Plumb Bob and Inclinometers (P/B 201)
08-21-03-580-801	Make the Airplane Level (P/B 201)
20-40-11-910-801	Static Grounding (P/B 201)
24-22-00-860-811	Supply Electrical Power (P/B 201)
24-22-00-860-812	Remove Electrical Power (P/B 201)
29-11-00-860-805	Hydraulic System A or B Power Removal (P/B 201)
36-13-00-800-801	Pneumatic Manifold System - Deactivation (P/B 201)
71-11-02-000-801-F00	Fan Cowl Panel Removal (Selection) (P/B 401)

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(Continued)

Reference	Title
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-2417	Pump - Hand, Cowl Opening Part #: A78019-29 Supplier: 81205 Part #: B54001-53 Supplier: 81205 Part #: C78005-60 Supplier: 81205 Opt Part #: A78019-27 Supplier: 81205 Opt Part #: C78005-26 Supplier: 81205 Opt Part #: C78005-53 Supplier: 81205
SPL-2433	Equipment - Hold Open, Thrust Reverser Cowl, CFM56-7 Engine Part #: C78019-15 Supplier: 81205
SPL-18640	Blanking Plates - Starter Air Duct & Precooler, CFM Engine Series Part #: C36008-2 Supplier: 81205
STD-858	Tag - DO NOT OPERATE
STD-1054	Container - Fuel Resistant, 5-Gallon (19-Liter)
STD-3906	Mallet - Rubber
STD-13882	Crowfoot - 2 9/16 inch

D. Consumable Materials

Reference	Description	Specification
D00623 [CP5066]	Oil - Fuel System, Corrosion Preventive	MIL-PRF-6081, Grade 1010
D00672 [CP5070]	Vaseline - Pure Mineral	V V-P-236
G00270	Tape - Scotch Flatback Masking 250	ASTM D6123 (Supersedes A-A-883)
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
41	Packing	73-11-01-01-065	LOM 402, 404, 406, 407, 411, 416, 445
		73-11-01-01A-115	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999

F. Location Zones

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

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G. Prepare for the Removal

SUBTASK 71-00-02-580-001-F00

(1) Make sure that the airplane is as close to a 1.5 degree nose-down attitude as possible.

(a) If it is necessary to change the attitude of the airplane, do one of these tasks:

1) Do this task: Level the Airplane With a Plumb Bob and Inclinometers, TASK 08-21-02-580-801.

2) Do this task: Make the Airplane Level, TASK 08-21-03-580-801.

SUBTASK 71-00-02-860-001-F00

(2) Do this task: Static Grounding, TASK 20-40-11-910-801.

SUBTASK 71-00-02-860-021-F00

(3) 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 71-00-02-860-003-F00

(4) If it is not already done, do this task: Supply Electrical Power, TASK 24-22-00-860-811.

SUBTASK 71-00-02-860-004-F00

(5) Make sure that the SPAR VALVE CLOSED (fuel spar shutoff valve) light, on the fuel control panel (P5 overhead panel), is dim.

NOTE: The light for the fuel spar shutoff valve has three positions: 1) bright when the valve is in transition or when it does not agree with the commanded position; or 2) dim when the valve is closed; or 3) off when the valve is opened.

SUBTASK 71-00-02-860-005-F00

(6) For engine 1, 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	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	4	C00359	FUEL SPAR VALVE ENG 1
E	5	C01320	ENGINE FUEL ENGINE 1 HPSOV CONT

SUBTASK 71-00-02-860-006-F00

(7) For engine 2, 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
D	7	C01391	ENGINE 2 ALTN PWR CHAN B
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

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F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	3	C00360	FUEL SPAR VALVE ENG 2
E	3	C01321	ENGINE FUEL ENGINE 2 HPSOV CONT

SUBTASK 71-00-02-860-007-F00

(8) Do this task: Hydraulic System A or B Power Removal, TASK 29-11-00-860-805.

SUBTASK 71-00-02-860-008-F00

(9) Make sure that the supply shutoff valve for the Engine Driven Pump (EDP) is closed.

(a) For engine 1, make sure that this circuit breaker is closed:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	19	C00347	HYDRAULIC SYSTEM SHUTOFF VALVE ENG 1

(b) For engine 2, make sure that this circuit breaker is closed:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	18	C00348	HYDRAULIC SYSTEM SHUTOFF VALVE ENG 2

(c) For engine 1, open these circuit breakers and install safety tags:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
B	22	C00296	FIRE PROTECTION EXTINGUISHERS LEFT
B	24	C01021	FIRE PROTECTION EXTINGUISHERS ALTN L

(d) For engine 2, open these circuit breakers and install safety tags:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
B	20	C00297	FIRE PROTECTION EXTINGUISHERS RIGHT
B	23	C01022	FIRE PROTECTION EXTINGUISHERS ALTN R

(e) Make sure that the engine (1 or 2) fire switch handle for the applicable engine is in its usual position.

NOTE: The engine (1 and 2) fire switch handles are on the P8 control stand panel.

(f) Push the manual override switch that is below the engine fire switch handle.

CAUTION DO NOT TURN THE FIRE HANDLE AFTER YOU PULLED IT UP. YOU WILL CAUSE THE FIRE BOTTLES TO RELEASE THEIR CONTENTS IF YOU TURN THE HANDLE.

(g) Pull the applicable engine (1 or 2) fire switch handle up, but do not turn it.

1) Attach a DO NOT OPERATE tag, STD-858, to the engine fire switch handle.

(h) Make sure that the position indicator on the supply shutoff valve is in the CLOSE position.

(i) For engine 1, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	19	C00347	HYDRAULIC SYSTEM SHUTOFF VALVE ENG 1

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(j) For engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	18	C00348	HYDRAULIC SYSTEM SHUTOFF VALVE ENG 2

SUBTASK 71-00-02-010-001-F00

(10) Do this task: Fan Cowl Panel Removal (Selection), TASK 71-11-02-000-801-F00.

SUBTASK 71-00-02-860-024-F00

(11) Do this task: Pneumatic Manifold System - Deactivation, TASK 36-13-00-800-801.

SUBTASK 71-00-02-010-002-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.

(12) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 71-00-02-860-009-F00

WARNING

REMOVE THE ELECTRICAL POWER BEFORE YOU DISCONNECT OR CONNECT FUEL, HYDRAULIC OR ELECTRICAL LINES. AN ACCIDENTAL OPERATION OF THE PRESSURIZED FLUIDS OR ELECTRICAL CIRCUITS CAN CAUSE A FIRE. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

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

(a) Install a DO NOT OPERATE tag, STD-858, to the BAT switch, on the P5 pilot's overhead panel.

SUBTASK 71-00-02-480-001-F00

(14) Do these steps to install the hold open equipment, SPL-2433, between the two thrust reversers and strut (Figure 401):

NOTE: The hold-open equipment consists of a strut attach beam [4], two arm supports [2], two beam assemblies [5], two retention pins [6], lockpins [1], and lockpins [3]. The hold-open equipment is symmetrical between the inboard and outboard sides.

(a) Use two lockpins [1] to attach the strut attach beam [4] to the two clevis brackets on the strut.

(b) Attach the two arm supports [2] to the strut attach beam [4] as follows:

WARNING

MAKE SURE YOU CORRECTLY ENGAGE EACH ARM SUPPORT INTO THE STRUT ATTACH BEAM. IF YOU DO NOT, THE HOLD-OPEN RODS WILL NOT HOLD THE WEIGHT OF THE THRUST REVERSER. INJURIES TO PERSONS CAN OCCUR.

1) Engage the inboard end of the arm support [2] into the strut attach beam [4].

2) As you hold the arm support [2], use a lockpin [3] to attach the arm support [2] to the strut attach beam [4].

3) Do the above steps again for the other arm support [2].

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(c) Use the retention pins [6] to attach the beam assemblies [5] to the arm supports [2].

1) Make sure that the longer side of the beam assemblies [5] face forward.

> **CAUTION**
> MAKE SURE YOU TURN THE ADJUSTMENT PINS MORE THAN HALFWAY INTO THE BEAM ASSEMBLY. IF YOU DO NOT, THE THRUST REVERSERS WILL NOT BE FULLY OPEN. THIS COULD CAUSE ENGINE COMPONENTS TO HIT THE THRUST REVERSER. DAMAGE TO EQUIPMENT CAN OCCUR.

(d) Turn the two adjustment pins on each beam assembly [5] until they rest in the compression-rod receiver cups on the thrust reversers.

1) Make sure that you turn the adjustment pins more than halfway into the beam assembly [5].

(e) Make sure that the two arm supports [2] are correctly engaged and that all lockpins [1], lockpins [3], and retention pins [6] are correctly installed.

(f) Slowly lower each thrust reverser until its weight is held by the hold-open equipment.

SUBTASK 71-00-02-020-001-F00

(15) Do these steps to disconnect the opening actuators for the thrust reversers (Figure 402):

(a) Remove the dust cap and connect the cowl opening hand pump, SPL-2417, to the opening actuator.

(b) Open the return valve on the pump.

NOTE: Let the thrust reverser lower slowly until its weight is held by the hold-open equipment.

(c) Disconnect the pump from the opening actuator.

1) Install the dust cap.

(d) Push up on the actuator lock collar to disengage the lock.

(e) Disconnect the thrust reverser opening actuators [21] at the lower end.

1) Remove the bolt [22], washer [23] and washers [26], bushing [24], alignment washer [25], and nut [27].

(f) Temporarily attach the lower end of the thrust reverser opening actuator [21] to the thrust reverser with a tie.

(g) Do the above steps again for the other opening actuator.

SUBTASK 71-00-02-420-001-F00

(16) If you will remove engine 2, apply Scotch Flatback Masking Tape 250, G00270, around the edge of the thrust reverser latches to keep them in the closed position.

NOTE: This will give clearance for the dolly on the inboard side.

SUBTASK 71-00-02-420-002-F00

> **WARNING**
> MAKE SURE YOU APPLY PROTECTIVE COVERS OR TAPE AROUND THE FIRE SEALS ON THE TOP AFT SURFACE OF THE THRUST REVERSER INNER SURFACE. IF YOU DO NOT, INJURIES TO A PERSON'S HANDS CAN OCCUR WHEN THE AFT MOUNT BOLTS ARE REMOVED.

(17) Apply protective covers or Scotch Flatback Masking Tape 250, G00270, around the fire seals on the top aft surface of the thrust reverser inner cowl.

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H. Fan Case Disconnection on the Left Side

NOTE: All the disconnects on the left side of the fan case are found at the service disconnect panel on the left side of the fan cowl support beam. When you disconnect the fuel supply line, it is necessary to drain all the remaining fuel in this line. This fuel is drained from the engine fuel filter.

SUBTASK 71-00-02-680-001-F00

(1) Do these steps to drain the fuel supply line (Figure 403):

(a) Put a 5-gallon (19-liter) fuel resistant container, STD-1054, below the fuel filter drain plug [42].

(b) Remove the drain plug [42] and let the fuel drain.

NOTE: The drain plug has a 13/16-inch fitting.

(c) Remove and discard the packing [41] from the drain plug [42].

(d) Lubricate a new packing [41] with oil, D00623 [CP5066], or vaseline, D00672 [CP5070], and install it on the drain plug [42].

(e) Lubricate the threads of the drain plug [42] with oil, D00623 [CP5066].

(f) Install the drain plug [42].

1) Tighten the drain plug [42] to 45 in-lb (5 N·m) - 55 in-lb (6 N·m).

(g) Attach safety wire, G02345 [CP8001], or cable, G50065 [CP8006], to the drain plug [42].

SUBTASK 71-00-02-020-002-F00

(2) Disconnect the electrical connectors DP1234 and D30038 (Figure 404):

(a) If it is necessary, use a crowfoot - 2 9/16 inch, STD-13882, on connector D30038.

SUBTASK 71-00-02-020-003-F00

(3) Do these steps to disconnect the starter duct:

(a) Remove the coupling [61] at the top end of the duct.

NOTE: The seal [62] will be removed later.

SUBTASK 71-00-02-480-019-F00

(4) If the Auxiliary Power Unit (APU) or external air will be used to operate the Environmental Control System (ECS) while the engine is removed, do these steps:

(a) Install the starter air valve blanking plate as follows (View C, Figure 404):

1) Use an E-seal and a coupling with a blanking plate, SPL-18640, and install on the starter air duct.

a) When the coupling is in its position, tighten the coupling.

b) Tighten the coupling nut to the torque given on the part.

c) Lightly tap the outer surface of the coupling with a rubber mallet, STD-3906.

d) Tighten the coupling nut again to the torque given on the part.

SUBTASK 71-00-02-020-004-F00

(5) Do these steps to disconnect the hydraulic lines:

(a) Disconnect the quick disconnect couplings on the hydraulic case drain, hydraulic supply and hydraulic pressure lines.

1) Rotate the quick-release outer sleeve in the clockwise direction and pull the outer sleeve axially away from the male quick-release fitting to disengage the lock tab.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) Rotate the quick-release outer sleeve in the counterclockwise direction to unthread the hose quick-release fitting from the male quick-release fitting.

(b) Install the protective covers on these hydraulic lines and their mating receptacles.

SUBTASK 71-00-02-020-005-F00

(6) Disconnect the fuel supply line at the fan cowl support beam.

(a) If it is necessary, loosen the two clamps that attach the fuel supply line to the fan case.

NOTE: A loose fuel supply line is easier to remove from the strut fitting.

(b) FUEL HOSE WITH A B-NUT FITTING;

Disconnect the B-nut from the strut fitting.

NOTE: Use two wrenches to loosen the B-nut. Use one to hold the hose and use the other to loosen the nut.

(c) Install the protective covers on the fuel supply line and strut fitting.

SUBTASK 71-00-02-020-022-F00

(7) Disconnect the DP0502 connector from the fuel flow transmitter (Figure 409).

NOTE: This permits more clearance for the left dynamometer.

I. Fan Case Disconnection on the Right Side

NOTE: All the disconnects on the right side of the fan case are found at the service disconnect panel on the right side of the fan cowl support beam.

SUBTASK 71-00-02-020-006-F00

(1) Disconnect the eight electrical connectors (Figure 405).

NOTE: There are eight electrical connectors on the right side of the strut. These connectors are, from forward to aft, the DP1104, DP0256, DP1328, DP1620, DP1552, DP0112, DP0324, and DP0460. The removal instructions for all the connectors are equivalent.

SUBTASK 71-00-02-020-007-F00

CAUTION	USE TWO WRENCHES TO LOOSEN THE COUPLING NUTS. USE ONE TO HOLD THE FITTINGS, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(2) Do these steps to disconnect the strut drain line:

(a) Disconnect the drain hose [82] at the drain tube [81] on the engine fan case.

(b) Install protective covers on the drain hose [82] and drain tube [81].

J. Engine Core Disconnection on the Left Side

SUBTASK 71-00-02-020-008-F00

CAUTION	USE TWO WRENCHES TO LOOSEN THE COUPLING NUTS. USE ONE TO HOLD THE FITTINGS, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(1) Do these steps to disconnect the pressure sense line from the side of the precooler (Figure 406):

(a) Disconnect the pressure sense line between the pressure sense line hose [101] and pressure sense line tube [102].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Install protective covers on the pressure sense line hose [101] and pressure sense line tube [102].

SUBTASK 71-00-02-020-009-F00

(2) Do these steps to disconnect the 450 degrees °F temperature sense line from the side of the precooler:

(a) Disconnect the 450 degrees °F temperature sense line hose [104] from the 450 degrees °F temperature sense line tube [103].

(b) Install protective covers on the 450 degrees °F temperature sense line hose [104] and 450 degrees °F temperature sense line tube [103].

SUBTASK 71-00-02-020-021-F00

(3) It can be necessary to disconnect the fire extinguishing tube [100] from the strut and left side of the precooler.

(a) When you lower the engine, the fire extinguishing tube [100] can cause damage to the precooler seal [123].

(b) If the fire extinguishing tube [100] is removed, install a protective cover on the strut connector.

K. Engine Core Disconnection on the Right Side

SUBTASK 71-00-02-020-010-F00

(1) Do these steps to disconnect the 390 degrees °F temperature sense line from the side of the precooler (Figure 407):

(a) Disconnect the 390 degrees °F temperature sense line hose [124] from the 390 degrees °F temperature sense line tube [121].

(b) Install protective covers on the 390 degrees °F temperature sense line hose [124] and 390 degrees °F temperature sense line tube [121].

SUBTASK 71-00-02-020-011-F00

(2) Do these steps to disconnect the pneumatic duct from the precooler:

(a) Disconnect the coupling [122] that attaches the 5th-stage pneumatic duct to the precooler inlet header.

NOTE: The seal [123] will be removed later.

SUBTASK 71-00-02-480-020-F00

(3) If the APU or external air will be used to operate the ECS while the engine is removed, do these steps:

(a) Install the precooler blanking plate as follows (View B, Figure 407):

1) Use an E-seal and a coupling with a blanking plate, SPL-18640, and install on the precooler inlet.

a) When the coupling is in its position, tighten the coupling.

b) Tighten the coupling nut to the torque given on the part.

c) Lightly tap the outer surface of the coupling with a rubber mallet, STD-3906.

d) Tighten the coupling nut to torque given on the part.

L. Power Plant Removal Method Selection

SUBTASK 71-00-02-000-001-F00

(1) Do one of these tasks to remove the power plant:

- Power Plant - Removal with the Bootstrap Equipment, TASK 71-00-02-000-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

- Power Plant - Removal with the Cobra Engine Change System, TASK 71-00-02-000-803-F00
- Power Plant - Removal with the JacXson U70, TASK 71-00-02-000-804-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:
VIEW FROM INSIDE THRUST REVERSER

F34328 S0006581952_V3

Thrust Reverser Hold-Open Equipment
Figure 401/71-00-02-990-801-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F34288 S0006581953_V2

Thrust Reverser Hold-Open Equipment
Figure 401/71-00-02-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

LEFT THRUST REVERSER IS SHOWN,
RIGHT THRUST REVERSER IS OPPOSITE.

1 C78005-60 IS SHOWN

G35743 S0006581954_V3

Thrust Reverser Hold-Open Actuator Disconnections
Figure 402/71-00-02-990-802-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

NOTE:

LEFT THRUST REVERSER IS SHOWN,
RIGHT THRUST REVERSER IS OPPOSITE.

2 THE QUANTITY OF WASHER [26] DEPENDS ON THE PART NUMBER OF BOLT [22].
FOR BACB30PN7C22 USE THREE WASHERS.
FOR BACB30PN7C21 USE TWO WASHERS.
FOR BACB30PN7C20 USE ONE WASHER.

C

F32555 S0006581955_V5

Thrust Reverser Hold-Open Actuator Disconnections
Figure 402/71-00-02-990-802-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fuel Filter Drain Location
Figure 403/71-00-02-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Case Disconnects on the Left Side
Figure 404/71-00-02-990-804-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

N72276 S0006581961_V2

Fan Case Disconnects on the Left Side
Figure 404/71-00-02-990-804-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FWD

SPL-18640 INSTALLATION

C

HYDRAULIC LINE QUICK-RELEASE FITTING
(EXAMPLE)

D

2937112 S0000713148_V2

Fan Case Disconnects on the Left Side
Figure 404/71-00-02-990-804-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F31827 S0006581962_V2

Fan Case Disconnects on the Right Side
Figure 405/71-00-02-990-805-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F31852 S0006581963_V2

Core Area Disconnects on the Left Side
Figure 406/71-00-02-990-806-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F31855 S0006581964_V4

Core Area Disconnects on the Right Side
Figure 407/71-00-02-990-807-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2937115 S0000713149_V2

Core Area Disconnects on the Right Side
Figure 407/71-00-02-990-807-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Forward Bootstrap Equipment Installation
Figure 408/71-00-02-990-808-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

NO. 1 POWERPLANT SHOWN,
NO. 2 POWERPLANT OPPOSITE.

F33610 S0006581966_V3

Forward Bootstrap Equipment Installation
Figure 408/71-00-02-990-808-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

LEFT SIDE (OUTBOARD FOR THE NO.1 POWERPLANT OR INBOARD FOR THE NO. 2 POWERPLANT) IS SHOWN.

1 THE CONNECTOR DP0502 IS DISCONNECTED WITH THE DYNAMOMETER INSTALLED

F36446 S0006581967_V5

Forward Power Plant Attach Points
Figure 409/71-00-02-990-809-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

RIGHT SIDE (INBOARD FOR THE NO.1 POWER PLANT OR OUTBOARD FOR THE NO. 2 POWERPLANT) IS SHOWN.

2957702 S0000735568_V2

Forward Power Plant Attach Points
Figure 409/71-00-02-990-809-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Aft Bootstrap Equipment Installation
Figure 410/71-00-02-990-810-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

ENGINE 1 IS SHOWN,
ENGINE 2 IS OPPOSITE.

B

F34057 S0006581969_V2

Aft Bootstrap Equipment Installation
Figure 410/71-00-02-990-810-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F36447 S0006581970_V3

Aft Power Plant Attach Points
Figure 411/71-00-02-990-811-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

RIGHT SIDE IS SHOWN, LEFT SIDE IS EQUIVALENT. EXCEPT RIGHT SIDE TRUNNION IS ADJUSTABLE DIAGONAL BRACE SHOWN REMOVED.

D33716 S0000151822_V4

Fan Case Attach Points to the AGSE Cradle Assembly
Figure 412/71-00-02-990-812-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

RIGHT SIDE IS SHOWN, LEFT SIDE IS OPPOSITE.

J74428 S0000178162_V3

Fan Case Attach Points to the F.Brown Cradle Assembly
Figure 413/71-00-02-990-821-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Forward Engine Mount Installation
Figure 414/71-00-02-990-813-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Aft Engine Mount Installation
Figure 415/71-00-02-990-814-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F35442 S0006581974_V3

Aft Engine Mount Installation
Figure 415/71-00-02-990-814-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F36026 S0006581975_V2

Turbine Frame Attach Point to the Cradle Assembly
Figure 416/71-00-02-990-815-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F36045 S0006581976_V2

Removed Power Plant with Attached Transportation Base
Figure 417/71-00-02-990-816-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LONG NOZZLE AND PLUG

SHORT NOZZLE AND PLUG

NOTE:

INTERMIX OF LONG AND SHORT NOZZLES AND PLUGS IS NOT PERMITTED

1 MEASURED BETWEEN THE AFT EDGE OF THE NOZZLE AT THE 6 O'CLOCK POSITION AND THE AFT EDGE OF THE EXHAUST PLUG AT THE 6 O'CLOCK POSITION.

2 MEASURED VERTICAL BETWEEN THE AFT EDGE OF THE NOZZLE AT THE 6 O'CLOCK POSITION AND THE SURFACE OF THE EXHAUST PLUG AT THE 6 O'CLOCK POSITION.

2071072 S0000432089_V4

Primary Nozzle and Plug Differences
Figure 418/71-00-02-990-822-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LONG NOZZLE AND PLUG

SHORT NOZZLE AND PLUG

NOTE:

INTERMIX OF LONG AND SHORT NOZZLES AND PLUGS IS NOT PERMITTED

1 MEASURED BETWEEN THE AFT EDGE OF THE NOZZLE AT THE 6 O'CLOCK POSITION AND THE AFT EDGE OF THE EXHAUST PLUG AT THE 6 O'CLOCK POSITION.

2 MEASURED VERTICAL BETWEEN THE AFT EDGE OF THE NOZZLE AT THE 6 O'CLOCK POSITION AND THE SURFACE OF THE EXHAUST PLUG AT THE 6 O'CLOCK POSITION.

3063094 S0000826009_V1

Primary Nozzle and Plug Differences
Figure 418/71-00-02-990-822-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Bleed Air Regulator Bonding Jumper Installation
Figure 419/71-00-02-990-825-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Bleed Air Regulator Bracket Bolt Installation
Figure 420/71-00-02-990-826-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

MARKING AREA AUTHORIZED TO CUSTOMERS
UNDER RESPONSABILITY OF CFM INTERNATIONAL

2856206 S0000669733_V1

Engine Data Plate (Example)
Figure 421/71-00-02-990-824-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-02-000-802-F00

3. Power Plant - Removal with the Bootstrap Equipment

A. General

(1) This task has the steps to remove power plant with the bootstrap equipment.

B. References

Reference	Title
12-15-31-610-802	Main Landing Gear Shock Strut Servicing, Airplane on the Ground (P/B 301)
54-52-01-010-801	Forward Fairing 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-2111	Base - Universal Transportation, CFM56 Engine Part #: AM-2563-227 Supplier: 9M323
COM-2118	Cradle - Transport, CFM56-7 Engine Part #: AM-2811-4800 Supplier: 9M323 Opt Part #: AM-2811-6400 Supplier: 9M323
COM-4953	Cradle - Engine, CFM56-7 Part #: FB70077-100ISSB Supplier: KCWD9 Opt Part #: FB70077-100 Supplier: KCWD9
COM-4954	Stand - Transportation, Engine, CFM56-7 Part #: FB70077-200 Supplier: KCWD9
COM-6276	Cradle - Engine, CFM56-7 Part #: 114702-1 Supplier: 9M323
COM-6277	Stand - Transportation, Engine, CFM56-7 Part #: 114701-1 Supplier: 9M323
SPL-2110	Kit - Bootstrap, CFM56-7 Engine Part #: C71020-134 Supplier: 81205 Opt Part #: C71020-105 Supplier: 81205
SPL-14956	Cradle - Engine Transportation, Air/Truck, CFM56-7 (Cradle D71CRA00005G02 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590
SPL-14957	Trolley - Engine Transportation, Air/Truck, CFM56-7 (Trolley D71TRO00005G03 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590

D. Location Zones

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

E. Power Plant Removal with the Bootstrap Equipment

SUBTASK 71-00-02-840-008-F00

(1) Make sure that the power plant is prepared for removal (TASK 71-00-02-000-801-F00).

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SUBTASK 71-00-02-010-013-F00

(2) For the thumbnail fairing, do this task: Forward Fairing Removal, TASK 54-52-01-010-801.

SUBTASK 71-00-02-980-004-F00

(3) Put the fan cowl panel pins in the strut to keep them away from the engine removal equipment.

SUBTASK 71-00-02-480-040-F00

CAUTION	MAKE SURE THAT YOU VISUALLY INSPECT THE BOOTSTRAP KIT BEFORE USE, INSPECT THE LIFT LUGS FOR GOUGES, LINES, OR CRACKS AT THE LUG ROOT AND THE LANYARD HOLES. IF A LUG JOINT OR STRUCTURE IS SUSPECT, THEN REMOVE IT FROM USE. DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION	DO NOT INSTALL TAG LINES ON THE GSE AFT BRACKET. TAG LINES ARE THE ROPES THAT YOU ATTACH TO A LOAD TO CONTROL LOAD SPIN AND PENDULAR MOVEMENT. THIS PREVENTS A SIDE-LOAD THE LIFTING LUGS. IF YOU DO NOT FOLLOW, DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Install the forward bootstrap equipment from the bootstrap kit, SPL-2110, as follows (Figure 408):

NOTE: The forward bootstrap consists of an inboard arm, an outboard arm, two braces, left and right hand dynamometer assemblies, and two lever hoists.

NOTE: In most locations the lockpins are permanently attached to the bootstrap equipment.

(a) Make sure that the inboard arm [143] is on the inboard side and the outboard arm [145] is on the outboard side of the power plant.

(b) Use the lockpin [141] to attach the inboard arm [143] to the strut attach fitting.

NOTE: The inboard arm has a shear pin below the strut attach fitting to temporarily hold the arm in its correct position. The arm will not fall.

1) Attach the safety pin to the end of the lockpin [141].

(c) Use the lockpin [146] to attach the outboard arm [145] to the strut attach fitting.

NOTE: The outboard arm also has a shear pin below the strut attach fitting to temporarily hold the arm in its correct position. The arm will not fall.

1) Attach the safety pin to the end of the lockpin [146].

(d) Use the lockpin [144] to attach the inboard arm [143] and outboard arm [145] together at the top location.

1) Attach the safety pin to the end of the lockpin [144].

(e) Do these steps to install a brace [142] between the inboard arm [143] and strut:

NOTE: There are two braces on the forward bootstrap. They consist of a metal rod with a clevis on one end and a permanently attached lockpin at the other end. The two braces are the same.

1) Put the brace [142] aft lockpin in the keyed slot of the inboard arm [143].

2) Turn the brace [142] 90 degrees until the clevis at the forward end of the brace is aligned with the attach point on the right forward strut.

a) Look at the aft side of the inboard arm [143] to make sure that the lockpin has turned and is engaged.

3) Use the lockpin [149] to attach the clevis on the forward end of the brace [142] to the strut.

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a) Attach the safety pin to the end of the lockpin [149].

(f) Do the above step again for the other brace [142].

(g) Make sure that the inboard arm [143], outboard arm [145], two braces [142], and all lockpins [141], lockpin [144], lockpin [146], and lockpin [149] are installed correctly.

(h) For Engine 1, do these steps:

1) Attach the lever hoist [148] to outboard arm [145].

> **WARNING**
> MAKE SURE THERE ARE NO SPIRAL TWISTS IN THE LEVER HOIST CHAINS BETWEEN THE LEVER HOIST HOUSING AND ITS LOWER BLOCK (THE ATTACH POINT FOR THE DYNAMOMETER). IF YOU SEE A TWIST IN THE CHAIN, YOU MUST REMOVE IT. IF YOU DO NOT REMOVE IT, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

2) Make sure that the chains on the lever hoist [148] do not have a spiral twist between the lever hoist housing and the lower block.

a) To remove the spiral twist, extend the chain until the twist is removed.

3) Attach the left hand dynamometer assembly [147] to the outboard lever hoist [148] (Figure 409).

NOTE: The dynamometer must face forward. To do this, the left dynamometer must be installed upside down.

4) Attach the right hand dynamometer assembly [151] to the inboard arm [143] (Figure 409).

NOTE: The dynamometer must face forward.

5) Attach the lever hoist [148] to the right hand dynamometer assembly [151] on the inboard side of the engine.

> **WARNING**
> MAKE SURE THERE ARE NO SPIRAL TWISTS IN THE LEVER HOIST CHAINS BETWEEN THE LEVER HOIST HOUSING AND ITS LOWER BLOCK (THE ATTACH POINT FOR THE DYNAMOMETER). IF YOU SEE A TWIST IN THE CHAIN, YOU MUST REMOVE IT. IF YOU DO NOT REMOVE IT, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

6) Make sure that the chains on the lever hoist [148] do not have a spiral twist between the lever hoist housing and the lower block.

a) To remove the spiral twist, extend the chain until the twist is removed.

7) Attach the right lower link assembly [150] to the lever hoist [148] (Figure 409).

(i) For Engine 2, do these steps:

1) Attach the lever hoist [148] to inboard arm [143].

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> **WARNING**
> MAKE SURE THERE ARE NO SPIRAL TWISTS IN THE LEVER HOIST CHAINS BETWEEN THE LEVER HOIST HOUSING AND ITS LOWER BLOCK (THE ATTACH POINT FOR THE DYNAMOMETER). IF YOU SEE A TWIST IN THE CHAIN, YOU MUST REMOVE IT. IF YOU DO NOT REMOVE IT, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

2) Make sure that the chains on the lever hoist [148] do not have a spiral twist between the lever hoist housing and the lower block.
   a) To remove the spiral twist, extend the chain until the twist is removed.
3) Attach the left hand dynamometer assembly [147] to the inboard lever hoist [148] (Figure 409).

   NOTE: The dynamometer must face forward. To do this, the left dynamometer must be installed upside down.
4) Attach the right hand dynamometer assembly [151] to the outboard arm [145] (Figure 409).

   NOTE: The dynamometer must face forward.
5) Attach the lever hoist [148] to the right hand dynamometer assembly [151] on the outboard side of the engine.

> **WARNING**
> MAKE SURE THERE ARE NO SPIRAL TWISTS IN THE LEVER HOIST CHAINS BETWEEN THE LEVER HOIST HOUSING AND ITS LOWER BLOCK (THE ATTACH POINT FOR THE DYNAMOMETER). IF YOU SEE A TWIST IN THE CHAIN, YOU MUST REMOVE IT. IF YOU DO NOT REMOVE IT, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

6) Make sure that the chains on the lever hoist [148] do not have a spiral twist between the lever hoist housing and the lower block.
   a) To remove the spiral twist, extend the chain until the twist is removed.
7) Attach the right lower link assembly [150] to the lever hoist [148] (Figure 409).

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(5) Do these steps to attach the forward bootstrap equipment to the engine (Figure 409):

NOTE: The forward bootstrap equipment is attached directly to a cradle-to-engine bracket at the bootstrap attach point on the power plant.

(a) Get the cradle-to-engine attach brackets [163] from the storage box on the cradle assembly.

(b) Examine the bolts [162] for signs of damage before the installation.
   1) Look at the area from the bolt head to the threads for signs of stretching and necking.
   2) Do not use damaged bolts [162]. Replace the bolt if damage is found.

(c) Install the cradle-to-engine attach brackets [163] in the fan case.
   1) Make sure that the cradle-to-engine attach brackets [163] are fully engaged before you install the bolts [162].
   2) Install the bolts [162] to attach the cradle-to-engine attach brackets [163] to the fan case.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

a) Do not use power tools to install the four bolts [162].

b) Tighten the bolts [162] to 112 ±18 in-lb (12.7 ±2.0 N·m).

(d) Attach the left hand dynamometer assembly [147] to the cradle-to-engine attach bracket [163] (Figure 409).

NOTE: An attach fitting is permanently attached to forward dynamometer.

NOTE: The preferred attach fitting is the "banana link", that is a part of the dynamometer assembly.

1) If it is necessary, adjust the length of the lever hoist [148].

2) Install the lockpin [161].

3) Attach the safety pin to the lockpin [161].

4) For the left forward left hand dynamometer assembly [147], make sure that the connector DP0502 is disconnected from the fuel flow transmitter.

(e) Attach the right lower link assembly [150] to the engine-to-cradle attach bracket [163] (Figure 409).

1) If it is necessary, adjust the length of the lever hoist [148].

2) Install the lockpin [161].

3) Attach the safety pin to the end of the lockpin [161].

(f) Use the lever hoists [148] to remove the slack from the forward bootstrap, but do not apply a load on the power plant at this time.

SUBTASK 71-00-02-480-042-F00

CAUTION	MAKE SURE THAT YOU VISUALLY INSPECT THE BOOTSTRAP KIT BEFORE USE, INSPECT THE LIFT LUGS FOR GOUGES, LINES, OR CRACKS AT THE LUG ROOT AND THE LANYARD HOLES. IF A LUG JOINT OR STRUCTURE IS SUSPECT, THEN REMOVE IT FROM USE. DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION	DO NOT INSTALL TAG LINES ON THE GSE AFT BRACKET. TAG LINES ARE THE ROPES THAT YOU ATTACH TO A LOAD TO CONTROL LOAD SPIN AND PENDULAR MOVEMENT. THIS PREVENTS A SIDE-LOAD THE LIFTING LUGS. IF YOU DO NOT FOLLOW, DAMAGE TO EQUIPMENT CAN OCCUR.

(6) Install the aft bootstrap equipment from the bootstrap kit, SPL-2110, as follows (Figure 410):

NOTE: The aft bootstrap consists of two aft support brace [186] and forward support brace [188], a support beam [184], one dynamometer [183] and one lever hoist [182]. The aft bootstrap equipment can only be installed with the lever hoist and dynamometer on the outboard location.

(a) Attach the forward support brace [188] to the forward side of the two bootstrap attach brackets [181] on the bottom of the strut.

NOTE: The aft support brace [186] and forward support brace [188] must be installed with the longer arm on the outboard side. The location of the braces is opposite between Engine 1 and Engine 2.

(b) Attach the other aft support brace [186] to the aft side of the two bootstrap attach brackets [181] on the bottom of the strut.

(c) Attach the forward support brace [188] and aft support brace [186] together on the inboard side of the strut with the lockpin assembly [185].

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1) Attach the safety pin to the end of the lockpin assembly [185].

(d) Slide the support beam [184] in between the two aft support brace [186] and forward support brace [188] until the inboard end engages the inboard lockpin assembly [185].

(e) Attach the support beam [184] to the two aft support braces [186] and forward support brace [188] at the outboard location with the lockpin assembly [187].

1) Attach the safety pin to the end of the lockpin assembly [187].

(f) Make sure that the two aft support brace [186], forward support brace [188], and support beam [184] are installed correctly.

(g) Attach a lever hoist [182] to the end of the support beam [184] with the lockpin [189].

1) Attach the safety pin to the end of the lockpin [189].

WARNING

MAKE SURE THERE ARE NO SPIRAL TWISTS IN THE LEVER HOIST CHAINS BETWEEN THE LEVER HOIST HOUSING AND ITS LOWER BLOCK (THE ATTACH POINT FOR THE DYNAMOMETER). IF YOU SEE A TWIST IN THE CHAIN, YOU MUST REMOVE IT. IF YOU DO NOT REMOVE IT, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(h) Make sure that the chain on the lever hoist [182] does not have a spiral twist between the lever hoist housing and the lower block.

1) To remove the spiral twist, extend the chain until the twist is removed.

(i) Attach a dynamometer [183] to the lever hoist [182].

SUBTASK 71-00-02-480-043-F00

(7) Do these steps to attach the aft bootstrap equipment to the engine (Figure 411):

NOTE: The aft bootstrap equipment is attached directly to the power plant on the outboard side. On Engine 1, the equipment is attached on the left side. On Engine 2, the equipment is attached on the right side.

(a) Do these steps to attach the engine attach bracket [202] to the turbine rear frame:

1) Attach the engine attach bracket [202] to the two engine flange bracket [204] and engine flange bracket [205] with the two lockpins [203].

2) Attach the safety pin to the end of each lockpin [203].

3) Keep the forward lockpin [203] handle in the up position.

(b) Use the lockpin [201] to attach the dynamometer [183] to the engine attach bracket [202].

NOTE: If it is necessary, adjust the length of the lever hoist [182].

1) Attach the safety pin to the end of the lockpin [201].

(c) Use the lever hoist [182] to remove the slack from the aft bootstrap, but do not apply a load on the power plant at this time.

SUBTASK 71-00-02-480-044-F00

CAUTION

MAKE SURE YOU DO ALL THE STEPS GIVEN BELOW TO PREPARE THE DOLLY AND CRADLE ASSEMBLY FOR THE POWER PLANT REMOVAL. IF YOU DO NOT, THE POWER PLANT CAN HIT AND DAMAGE THE PRECOOLER AND STRUT AS IT IS REMOVED.

(8) AGSE CRADLE;

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Do these steps to prepare the cradle, COM-2118, and base, COM-2111, for the power plant removal (Figure 412):

NOTE: After the bootstrap equipment is installed on the airplane, you must use all four persons to remove the power plant.

(a) If not already done, remove the diagonal braces from the cradle, COM-2118.

1) To remove the diagonal braces, disconnect the lockpins at each end of the diagonal brace.

2) Put the diagonal braces in their storage position on the base, COM-2111.

CAUTION MAKE SURE YOU REMOVE THE EYE-BOLTS BEFORE YOU MOVE THE CRADLE AND DOLLY UNDER THE ENGINE. IF YOU DO NOT, THE EYE-BOLTS CAN HIT THE THRUST REVERSER DURING THE ENGINE REMOVAL. DAMAGE TO THE THRUST REVERSER CAN OCCUR.

(b) Remove the eye-bolts from each forward cradle arm.

(c) Make sure that the lockpin [221] on each angle bracket [222] is removed.

(d) Do these steps to prepare the forward cradle arms:

1) Slide the left trunnion outboard to fully retract it.

2) On the right trunnion, loosen the spanner nut and fully retract the right trunnion outboard.

CAUTION MAKE SURE THE TWO FORWARD CRADLE ARMS ARE IN THE OUTBOARD POSITION. IF THEY ARE NOT, DAMAGE TO EQUIPMENT CAN OCCUR IF THE DOLLY HITS THE POWER PLANT OR INLET.

(e) Make sure that the arms on the cradle, COM-2118, are in the outboard position.

1) Remove the lockpins at the bottom of each arm and let the arms pivot out.

SUBTASK 71-00-02-480-045-F00

(9) F.BROWN CRADLE;

Do these steps to prepare the engine cradle, COM-4953, and transportation stand, COM-4954, for the power plant removal (Figure 413):

(a) Remove the two transportation arms from the cradle.

NOTE: This step is not necessary if the inlet cowl is removed.

(b) Lift the rear support arm from the stowage position and rest it against the right side of the cradle.

(c) Remove the forward trunnions from their clamps.

(d) Put the forward clamp assemblies to the stowed position.

1) Remove the hinge pin and put the clamp assembly to the stowed position.

2) Install the hinge pin.

SUBTASK 71-00-02-480-046-F00

(10) STANLEY AVIATION CRADLE;

Prepare the engine cradle, COM-6276, and transportation stand, COM-6277, for the power plant removal per the vendor manual.

SUBTASK 71-00-02-480-047-F00

(11) DEDIENNE AEROSPACE CRADLE;

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Prepare the engine cradle, SPL-14956, and engine trolley, SPL-14957, for the power plant removal per the vendor manual.

SUBTASK 71-00-02-480-048-F00

> **CAUTION**
> BE CAREFUL WHEN YOU MOVE THE DOLLY BELOW THE POWER PLANT. DAMAGE TO EQUIPMENT CAN OCCUR IF THE DOLLY HITS THE POWER PLANT OR INLET.

(12) Put the applicable cradle and base below the power plant.

NOTE: Under some ground surface and airplane weight conditions, it could be necessary to lift the airplane to get sufficient clearance between the aft engine mount and the precooler. To get this clearance, extend the main and nose landing gear shock struts with dry air or nitrogen (TASK 12-15-31-610-802).

> **CAUTION**
> MAKE SURE THE CRADLE ARMS DO NOT HIT THE THRUST REVERSERS WHEN YOU MOVE THE CRADLE REARWARD. DAMAGE TO EQUIPMENT CAN OCCUR.

(a) AGSE CRADLE;

Put the cradle, COM-2118, and base, COM-2111, in front of the power plant and move it rearward until the cradle is in its correct position under the engine.

NOTE: When the cradle is in the correct position it will not be aligned with the centerline of the engine. The aft end of the cradle will be slightly outboard from a centerline alignment.

NOTE: It is very important to align the cradle with the engine. If they are not aligned, it can be difficult to move the engine from the strut to the cradle.

1) If it is necessary, you can use the cradle steering bars to turn the castors.

NOTE: This will let the cradle move in a side-to-side movement.

(b) F.BROWN;

Put the engine cradle, COM-4953, and transportation stand, COM-4954, in front of the power plant and move it aft until the cradle is in its correct position below the engine.

1) Use the castor steering arms.
2) Stop when the center of the forward arms are in line with the forward engine-to-cradle attach brackets.
3) Put the forward clamp assemblies to the installation position.
   a) Remove the hinge pin and put the clamp assembly to the installation position.
   b) Install the hinge pin and the safety pin.
   c) Loosen the collar nuts and open the clamp assembly.

(c) STANLEY AVIATION CRADLE;

Put the engine cradle, COM-6276, and transportation stand, COM-6277, in its correct position under the engine per the vendor manual.

(d) DEDIENNE AEROSPACE CRADLE;

Put the engine cradle, SPL-14956, and engine trolley, SPL-14957, in its correct position under the engine per the vendor manual.

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SUBTASK 71-00-02-820-030-F00

(13) Before you apply a load to the bootstrap equipment, make sure that all dynamometers are set to the zero position.

SUBTASK 71-00-02-480-049-F00

CAUTION	DO NOT APPLY MORE THAN 3850 POUNDS (1746 KG) TO THE FORWARD INBOARD DYNAMOMETER, 3350 POUNDS (1520 KG) TO THE FORWARD OUTBOARD DYNAMOMETER AND 1300 POUNDS (590 KG) TO THE AFT DYNAMOMETER. IF YOU APPLY MORE THAN THE LIMITS, DAMAGE TO THE POWER PLANT, WING AND STRUT CAN OCCUR.

CAUTION	ONE PERSON MUST OBSERVE EACH DYNAMOMETER WHEN THE LEVER HOISTS ARE OPERATED. LOADS THAT ARE CHANGED AT ONE HOIST CAN AFFECT THE LOADS AT OTHER HOIST LOCATIONS. BECAUSE OF THIS, THE LOADS CAN GO ABOVE THE MAXIMUM BOOTSTRAP LOADS IF NOT MONITORED CAREFULLY.

(14) Apply a load to the lever hoists as follows:

(a) Apply a load to the lever hoists until each dynamometer reads as follows:

NOTE: The load values given below include the necessary preload force and the weight of the engine.

1) Forward dynamometers for the No.1 powerplant:

a) The right hand dynamometer assembly [151] (inboard) reads 3700 ±100 lb (1678 ±45 kg).

b) The left hand dynamometer assembly [147] (outboard) reads 3200 ±100 lb (1451 ±45 kg).

2) Forward dynamometers for the No.2 powerplant:

a) The left hand dynamometer assembly [147] (inboard) reads 3700 ±100 lb (1678 ±45 kg).

b) The right hand dynamometer assembly [151] (outboard) reads 3200 ±100 lb (1451 ±45 kg).

3) The aft dynamometer [183] reads 1100 ±100 lb (499 ±45 kg).

SUBTASK 71-00-02-020-036-F00

(15) Disconnect the forward engine mounts as follows (Figure 414):

(a) Loosen all four forward mount bolts [241] one-half turn until you see a clearance under the bolt heads.

NOTE: Use an 11/16-inch socket to loosen the bolts.

(b) Remove the four forward mount bolts [241].

1) Make sure that the engine mount surfaces continue to touch the strut mating surfaces as you remove the bolts [241].

2) Remove the washers [244].

SUBTASK 71-00-02-020-037-F00

(16) Disconnect the aft engine mounts as follows (Figure 415):

(a) Loosen all four aft mount bolts [263] one-half turn until you see a clearance under the bolt heads.

NOTE: Use a 15/16-inch socket to loosen the bolts [263].

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(b) Remove the four aft engine mount bolts [263].

1) Make sure that the engine mount surfaces continue to touch the strut mating surfaces as you remove the bolts [263].

(c) Remove the washers [262].

SUBTASK 71-00-02-020-038-F00

CAUTION	WHEN YOU LOWER THE ENGINE, MAKE SURE THAT ALL TUBES, WIRES AND DUCTS BETWEEN THE STRUT AND ENGINE ARE DISCONNECTED. DAMAGE TO THE ENGINE AND STRUT CAN OCCUR.

CAUTION	MAKE SURE THE AFT END OF THE ENGINE IS ALWAYS HIGHER THAN THE FRONT. IF IT IS NOT, THE FIRE SHIELD ON THE FAN COWL SUPPORT BEAM CAN HIT THE INLET COWL. DAMAGE TO THE FIRE SHIELD CAN OCCUR.

(17) Do these steps to lower the power plant into the applicable cradle (Figure 416, Figure 417):

(a) Slowly decrease the load on the two lever hoists [148] and lever hoist [182] until the engine mounts are free of the shear pins [242] and shear pin [264].

(b) Carefully monitor the power plant to make sure that all disconnects and separation points have been made.

(c) ENGINES WITH THE SHORT EXHAUST NOZZLE AND SHORT EXHAUST PLUG;

Make sure that the interference pin at the 12 o'clock position on the nozzle shelf does not touch the aft strut while you lower the engine.

(d) When the engine is free of the separation points and disconnect locations, turn the engine in the horizontal direction until it is parallel to the ground.

(e) AGSE CRADLE;

Do these steps to engage the engine with the cradle (Figure 412):

1) Lower the engine into the cradle until the forward cradle arms can swing back to the vertical position with the trunnions clear.

2) Install the lower lockpins which hold the forward arms in the vertical position.

3) Examine and re-position the stand if necessary to align the trunnion shafts with the cradle-to-engine attach bracket [163].

a) If the trunnions are aligned with the brackets, lock the wheel castors on the cradle.

4) Slide the left trunnion into the cradle-to-engine attach bracket [163] until it is fully engaged.

a) Install the lockpin [221] and lockpin [224].

5) Slide the right trunnion into the cradle-to-engine attach bracket [163] until it is fully engaged.

a) Install the lockpin [221] and lockpin [224].

6) Continue to lower the aft end of the engine until you can engage the aft support arm with the clevis on the Turbine Rear Frame (TRF).

a) Install the lockpin [281] to attach the support arm to the TRF.

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7) With the engine still be suspended by the bootstrap, adjust the engine position to make sure that the bottom of the trunnion mounts are in full contact with the angle bracket [222] along the full length of the angle bracket.

8) Insert the adjustment gage [223].

NOTE: The adjustment gage should close to touch the retainer plate.

9) Thread the right forward arm spanner nut outboard until it rests against the angle bracket.

a) Tighten the spanner nut with the wrench to force the forward cradle arms outboard to restrict deflection.

b) Make sure that the left trunnion is indexed against the pin while you adjust the spanner nut.

c) Lock the spanner nut with the set screw.

CAUTION	ADJUST THE RIGHT TRUNNION UNTIL THE PIN FULLY ENGAGES FOR THE LEFT AND RIGHT TRUNNION. IF IT DOES NOT FULLY ENGAGE, THE CRADLE WILL NOT HOLD THE ENGINE IF THE LATERAL LOADS BECOME HIGH. DAMAGE TO EQUIPMENT CAN OCCUR.

10) Make sure that the trunnions are adjusted correctly.

a) The bottom of the trunnion mounts are in full contact with the angle bracket [222] along the full length of the angle bracket.

b) If unpinned, the trunnions slide in and out.

c) The four cap screw heads should have an approximate gap of 0.01 in. (0.254 mm) under each head and lockwire installed.

11) Tighten the collar on the aft mount support arm and tighten the set screw.

(f) F.BROWN CRADLE;

Do these steps to engage the engine with the cradle (Figure 413):

1) Lower the engine until the forward engine-to-cradle attach bracket [163] are approximately 2 in. (50.80 mm) above the forward clamps on the cradle.

2) Install the forward trunnions into the uniball sockets located at the center of the forward engine-to-cradle attach bracket [163].

3) Continue to lower the engine until the trunnions go in the bottom of the forward clamps.

4) As each trunnion reaches a horizontal position, do these steps to lock the clamps:

a) Close the top clamp over the trunnions.

b) Put the swing bolts in the lock position and tighten the collar nuts.

c) Tighten the collar nuts to 50 ft-lb (67.8 N·m).

d) Make sure that the end of the trunnions are correctly installed in the uniball sockets.

5) Continue to lower the aft end until you can engage the support arm with the clevis on the turbine rear frame.

a) Use a lockpin to attach the support arm to the turbine rear frame.

b) Attach the safety pin to the end of the lockpin.

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(g) STANLEY AVIATION CRADLE;

Engage the engine with the cradle per the vendor manual.

(h) DEDIENNE AEROSPACE CRADLE;

Engage the engine with the cradle per the vendor manual.

SUBTASK 71-00-02-020-039-F00

(18) Do these steps to disconnect the bootstrap equipment from the power plant (Figure 409, Figure 411):

(a) For the forward bootstrap equipment, remove the lockpins [161] that attach the left hand dynamometer assembly [147] and right lower link assembly [150] to the cradle-to-engine attach brackets [163].

(b) For the aft bootstrap equipment, remove the lockpin [201] that attaches the dynamometer [183] to the engine attach bracket [202].

SUBTASK 71-00-02-020-040-F00

(19) Do these steps to remove the seal from the top of the engine pneumatic duct and the starter duct.

NOTE: Keep the seals for the installation.

(a) Remove the seal [123] from the top of the engine pneumatic duct (Figure 407).

(b) Remove the seal [62] from the starter duct (Figure 404).

(c) Install protective covers on the openings on the precooler control valve, precooler, engine pneumatic and starter ducts.

SUBTASK 71-00-02-020-041-F00

(20) Remove the power plant from the work area (Figure 417).

CAUTION BE CAREFUL WHEN YOU MOVE THE POWER PLANT AWAY FROM THE AIRPLANE. DAMAGE TO THE THRUST REVERSERS AND POWER PLANT CAN OCCUR IF THE POWER PLANT HITS THE THRUST REVERSERS.

(a) To remove the power plant, move it forward until it is free of the thrust reversers.

SUBTASK 71-00-02-080-031-F00

(21) Remove the two lockpins [203] and engine attach bracket [202] from the turbine rear frame (Figure 411).

SUBTASK 71-00-02-080-032-F00

(22) If it is necessary, remove the bootstrap equipment from the strut (Figure 408, Figure 410).

SUBTASK 71-00-02-080-033-F00

(23) If you move the engine, do these steps:

(a) AGSE CRADLE;

Install the eye-bolt for the diagonal brace on the forward cradle arms.

(b) Install the diagonal brace on the forward cradle arms.

END OF TASK

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TASK 71-00-02-000-803-F00

4. Power Plant - Removal with the Cobra Engine Change System

A. General

(1) This task has the steps to remove power plant with the Cobra engine change system.

B. References

Reference	Title
08-21-02-580-801	Level the Airplane With a Plumb Bob and Inclinometers (P/B 201)
08-21-03-580-801	Make the Airplane Level (P/B 201)
12-15-31-610-802	Main Landing Gear Shock Strut Servicing, Airplane on the Ground (P/B 301)
54-52-01-010-801	Forward Fairing 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-17619	Digital Inclinometer; Range of +/- 45 degrees; Resolution of 0.01 degrees. Part #: 137-2165-01 Supplier: 64790 Part #: 54-635-601-0 Supplier: 1E258
SPL-14956	Cradle - Engine Transportation, Air/Truck, CFM56-7 (Cradle D71CRA00005G02 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590
SPL-14957	Trolley - Engine Transportation, Air/Truck, CFM56-7 (Trolley D71TRO00005G03 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590
SPL-15141	Lifting Adapter - Cobra Part #: TPBAC0B0 Supplier: 1JJE1
SPL-15143	Engine Change System - Cobra Part #: TP91-G Supplier: 1JJE1
SPL-19148	Lifting Beam - Cobra Part #: TPBBC0A0 Supplier: 1JJE1
SPL-19149	Lifting Lug - Cobra Part #: TPBLA0B0 Supplier: 1JJE1
SPL-23691	Tool - Removal/Installation, Beam Part #: TPBIE0A0 Supplier: 1JJE1
STD-11729	Plumb Bob
STD-23306	Level - Laser

D. Location Zones

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

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E. Power Plant Removal with the Cobra Engine Change System

NOTE: The engine trolley, SPL-14957, and engine cradle, SPL-14956, are approved engine stand for using the Cobra system, SPL-15143. To designate a dolly consisting of the engine trolley, SPL-14957, and engine cradle, SPL-14956, the term “engine stand” is used in the procedure.

SUBTASK 71-00-02-840-016-F00

(1) Make sure that the power plant is prepared for removal (TASK 71-00-02-000-801-F00).

SUBTASK 71-00-02-800-010-F00

(2) Use Table 403 for the approved engine stand and applicable upward loads (preload) for the Cobra system, SPL-15143.

NOTE: Cobra Engine Change System uses the term "preload". This term represents the compressive load between the pylon and the engine mounts.

Table 403/71-00-02-993-822-F00 Approved Engine Stand and Preload

Engine Stand	Additional Load Applied to FWD Fork Tube (lb)	Additional Load Applied to AFT Fork Tube (lb)
DEDIENNE AEROSPACE engine stand D71STA00005G02 (engine cradle, SPL-14956, and engine trolley, SPL-14957)	1100	1100

SUBTASK 71-00-02-580-008-F00

(3) Make sure that the airplane is level and stable.

(a) If it is necessary, do one of these tasks:

- Level the Airplane With a Plumb Bob and Inclinometers, TASK 08-21-02-580-801
- Make the Airplane Level, TASK 08-21-03-580-801.

SUBTASK 71-00-02-010-018-F00

(4) For the thumbnail fairing, do this task: Forward Fairing Removal, TASK 54-52-01-010-801.

SUBTASK 71-00-02-980-006-F00

(5) Put the fan cowl panel pins in the strut to keep them away from the engine removal equipment.

SUBTASK 71-00-02-480-067-F00

(6) Prepare the engine trolley, SPL-14957, and engine cradle, SPL-14956, for the power plant removal per the vendor manual.

SUBTASK 71-00-02-840-017-F00

(7) Refer to the Cobra Engine Change System Manual for the detailed instructions for the preparation and use of the tool.

SUBTASK 71-00-02-580-009-F00

(8) Make sure that there is sufficient clearance to put the engine stand in its position under the engine.

SUBTASK 71-00-02-800-011-F00

(9) Make a center line for the engine stand on the floor as follows:

(a) Use the plumb bob, STD-11729, or leveling laser, STD-23306, to mark a location on the floor directly under the center of the engine spinner.

(b) Draw a straight line between the marks.

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SUBTASK 71-00-02-420-045-F00

(10) Use the beam removal/installation tool, SPL-23691, to install the lifting beam, SPL-19148, into the engine stand.

(a) Make sure that the lifting beam, SPL-19148, extend equal distance from the engine stand at both sides.

SUBTASK 71-00-02-480-068-F00

CAUTION	BE CAREFUL WHEN YOU MOVE THE DOLLY BELOW THE POWER PLANT. DAMAGE TO EQUIPMENT CAN OCCUR IF THE DOLLY HITS THE POWER PLANT OR INLET.

(11) Put the engine stand in its correct position under the engine per the vendor manual.

NOTE: Under some ground surface and airplane weight conditions, it could be necessary to lift the airplane to get sufficient clearance between the aft engine mount and the precooler. To get this clearance, extend the main and nose landing gear shock struts with dry air or nitrogen (TASK 12-15-31-610-802).

(a) Locate the engine stand center line 3.5 in. (8.9 cm) outboard from the engine center line.

SUBTASK 71-00-02-480-069-F00

(12) Connect the Cobra system, SPL-15143 to the engine as follows:

(a) Connect the lifting adapters, SPL-15141, to the lifting beams, SPL-19148.

(b) Connect the lifting adapters, SPL-15141, to the engine stand tie-down rings with the tie-down straps.

(c) Position the primary and secondary units of the Cobra system, SPL-15143, on both sides of the engine stand.

1) Make sure that the primary unit is on the outboard side of the engine.

2) Make sure that the secondary unit is on the inboard side of the engine.

(d) Connect the lifting lugs, SPL-19149, to the lifting adapters, SPL-15141.

(e) Connect the lifting lug, SPL-19149, to the primary and secondary units of the Cobra system, SPL-15143.

1) Refer to Cobra Engine Change System Manual for the correct set up of these parts.

SUBTASK 71-00-02-020-046-F00

(13) Use the Cobra Engine Change System Manual to prepare the Cobra system, SPL-15143, as follows:

(a) Connect all hydraulic and electrical connections between the primary and secondary units.

(b) Activate external electrical power to the primary unit of the Cobra system, SPL-15143.

(c) Adjust the two units to make sure that they are in the neutral position at the transversal and lateral movement axis.

(d) Adjust the two units to make sure that the crossbeams and the load cells are in the correct positions.

(e) If there is not a built-in inclinometer on the Cobra system, SPL-15143, install the digital inclinometer, COM-17619, on the engine cradle, SPL-14956, parallel to the ground.

SUBTASK 71-00-02-800-012-F00

(14) Use the mobile panel of the Cobra system, SPL-15143, to select the correct load sheet for the engine and engine stand configuration.

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(a) Make sure that the load sheet is applicable to the engine that will be removed and engine stand configuration.

(b) Use this table for approved engines stands and applicable upward loads (preload) for using the Cobra Engine Change System: Table 403.

NOTE: The Cobra Engine Change System uses the term "preload". This term represents the compressive load between the pylon and the engine mounts.

SUBTASK 71-00-02-480-070-F00

WARNING MAKE SURE THAT NO PERSONNEL ARE BELOW THE ENGINE WHEN THE COBRA SYSTEM IS IN OPERATION. IF YOU DO NOT OBEY, INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT CAN OCCUR.

(15) Do these steps to attach the engine stand to the engine:

(a) Use the Cobra system, SPL-15143, to slowly lift the engine stand to the engine.

(b) Stop operation after you lift the engine stand approximately 2 in. (5.1 cm) - 3 in. (7.6 cm) from the ground.

(c) Tighten the tie-down straps again.

1) Make sure that the lifting beams, SPL-19148, do not move.

(d) Rotate the engine stand approximately 5.5 - 6 degrees.

1) If it is necessary, use the digital inclinometer, COM-17619, or built-in inclinometer to measure the rotation.

(e) Make sure that you monitor the clearances between the engine and the nacelle surfaces.

(f) Make sure that you monitor the clearances between the stand and the ground.

(g) Slowly lift the engine stand, until it is approximately 3 in. (7.6 cm) below the engine.

(h) If personnel needs to be on the engine stand during the engine removal, make sure that they are on the engine stand before the ZERO OUT function is actuated.

1) Make sure that the digital inclinometer, COM-17619, or built-in inclinometer is activated.

(i) Use the mobile panel of the Cobra system, SPL-15143, to select the ZERO OUT function.

NOTE: The values on the main screen represents the additional load values on the pillars, which contributes to the preload values on each mount after activating the ZERO OUT function.

NOTE: After selecting the ZERO OUT function, the actual weight on the Cobra system, SPL-15143, will be tared out.

1) Make sure that no part of the engine stand is in contact with the engine or aircraft when you actuate the ZERO OUT function.

(j) Engage the engine with the engine cradle, SPL-14956, per the vendor manual.

SUBTASK 71-00-02-800-013-F00

CAUTION DO NOT LET MORE THAN PERMITTED WEIGHT ON THE FORWARD AND AFT SIDES. IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE AND ENGINE SUPPORT EQUIPMENT CAN OCCUR.

(16) Use the Cobra system, SPL-15143, to slowly lift the engine stand until the necessary preload is achieved at all four pillars on the mobile panel of the Cobra system, SPL-15143.

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(a) Select the Automatic Preload Maintaining (APM) mode on the mobile panel of the Cobra system, SPL-15143.

1) Make sure that the necessary preload is displayed at all four pillars on the mobile panel of the Cobra system, SPL-15143, before the APM mode is activated.

SUBTASK 71-00-02-020-047-F00

(17) Disconnect the forward engine mounts as follows (Figure 414):

(a) Loosen all four forward mount bolts [241] one-half turn until you see a clearance under the bolt heads.

NOTE: Use an 11/16-inch socket to loosen the bolts.

(b) Remove the four forward mount bolts [241].

1) Make sure that the engine mount surfaces continue to touch the strut mating surfaces as you remove the bolts [241].

2) Remove the washers [244].

SUBTASK 71-00-02-020-048-F00

(18) Disconnect the aft engine mounts as follows (Figure 415):

(a) Loosen all four aft mount bolts [263] one-half turn until you see a clearance under the bolt heads.

NOTE: Use a 15/16-inch socket to loosen the bolts.

(b) Remove the four aft engine mount bolts [263].

1) Make sure that the engine mount surfaces continue to touch the strut mating surfaces as you remove the bolts [263].

(c) Remove the washers [262].

SUBTASK 71-00-02-020-049-F00

CAUTION

WHEN YOU LOWER THE ENGINE, MAKE SURE THAT ALL TUBES, WIRES AND DUCTS BETWEEN THE STRUT AND ENGINE ARE DISCONNECTED. DAMAGE TO THE ENGINE AND STRUT CAN OCCUR.

CAUTION

MAKE SURE THE AFT END OF THE ENGINE IS ALWAYS HIGHER THAN THE FRONT. IF IT IS NOT, THE FIRE SHIELD ON THE FAN COWL SUPPORT BEAM CAN HIT THE INLET COWL. DAMAGE TO THE FIRE SHIELD CAN OCCUR.

(19) Use the mobile panel of the Cobra system, SPL-15143, to lower the engine and the engine stand to the ground as follows:

(a) At the mobile panel of the Cobra system, SPL-15143, deactivate the APM mode.

(b) Slowly lower the engine and the engine stand down until the engine mounts are free of the shear pins [242] and shear pin [264].

(c) Carefully monitor the power plant to make sure that all disconnects and separation points have been made.

(d) ENGINES WITH THE SHORT EXHAUST NOZZLE AND SHORT EXHAUST PLUG;

Make sure that the interference pin at the 12 o'clock position on the nozzle shelf does not touch the aft strut while you lower the engine.

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(e) When the engine is free of the separation points and disconnect locations, rotate the engine and the engine stand in the horizontal direction until the digital inclinometer, COM-17619, or built-in inclinometer reads ZERO.

1) Make sure that you monitor the clearances between the engine and nacelle surfaces.

2) Make sure that you monitor the clearances between the engine stand and the ground.

(f) Slowly lower the engine and the engine stand down until the stand is on the ground.

SUBTASK 71-00-02-020-050-F00

(20) Do these steps to remove the seal from the top of the engine pneumatic duct and the starter duct.

NOTE: Keep the seals for the installation.

(a) Remove the seal [123] from the top of the engine pneumatic duct (Figure 407).

(b) Remove the seal [62] from the starter duct (Figure 404).

(c) Install protective covers on the openings on the precooler control valve, precooler, engine pneumatic and starter ducts.

SUBTASK 71-00-02-020-051-F00

(21) Do these steps to move the engine stand away from the airplane:

(a) Make sure that the pillars are completely retracted.

(b) Turn off external electrical power to the primary unit of the Cobra system, SPL-15143.

(c) Disconnect and stow all electrical and hydraulic lines between the primary and secondary units of the Cobra system, SPL-15143.

(d) Disconnect the lifting lugs, SPL-19149, from the primary and secondary units of the Cobra system, SPL-15143.

(e) Move the primary and secondary units away from the engine stand.

(f) Remove the lifting lugs, SPL-19149, from the lifting adapters, SPL-15141.

(g) Remove the lifting adapters, SPL-15141, from the lifting beams, SPL-19148.

(h) Carefully move the engine stand with the engine until it is clear of the airplane.

(i) Remove the lifting beams, SPL-19148, from the engine stand using the beam removal/installation tool, SPL-23691.

SUBTASK 71-00-02-560-004-F00

(22) If you move the engine, install the diagonal brace on the forward cradle arms.

SUBTASK 71-00-02-860-035-F00

(23) Put the covers on the open ends of the ducts on the engine and strut.

——— END OF TASK ———

TASK 71-00-02-000-804-F00

5. Power Plant - Removal with the JacXson U70

A. General

(1) This task has the steps to remove power plant with the JacXson U70.

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B. References

Reference	Title
12-15-31-610-802	Main Landing Gear Shock Strut Servicing, Airplane on the Ground (P/B 301)
54-52-01-010-801	Forward Fairing 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-14956	Cradle - Engine Transportation, Air/Truck, CFM56-7 (Cradle D71CRA00005G02 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590
SPL-14957	Trolley - Engine Transportation, Air/Truck, CFM56-7 (Trolley D71TRO00005G03 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590

D. Location Zones

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

E. Power Plant Removal with the JacXson U70

SUBTASK 71-00-02-840-009-F00

(1) Make sure that the power plant is prepared for removal (TASK 71-00-02-000-801-F00).

SUBTASK 71-00-02-010-014-F00

(2) Open the left and right thrust reversers on the applicable engine (TASK 78-31-00-010-801-F00).

SUBTASK 71-00-02-010-015-F00

(3) For the thumbnail fairing, do this task: Forward Fairing Removal, TASK 54-52-01-010-801.

SUBTASK 71-00-02-980-005-F00

(4) Put the fan cowl panel pins in the strut to keep them away from the engine removal equipment.

SUBTASK 71-00-02-480-074-F00

(5) Prepare the engine cradle, SPL-14956, and engine trolley, SPL-14957, for the power plant removal per the vendor manual.

SUBTASK 71-00-02-840-010-F00

WARNING

OBEY THE JACXSON U70 USER MANUAL WHEN YOU OPERATE THE JACXSON U70. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONNEL OR DAMAGE TO THE EQUIPMENT CAN OCCUR.

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(WARNING PRECEDES)

> **WARNING** MAKE SURE THAT YOU HAVE A GOOD VIEW OF THE EQUIPMENT AND PERSONNEL WHEN YOU OPERATE THE JACXSON U70. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONNEL OR DAMAGE TO THE EQUIPMENT CAN OCCUR.

(6) Use the JACXSON U70 User Manual for the detailed instructions for the preparation and use of the JACXSON U70 during the engine removal procedure.

SUBTASK 71-00-02-840-011-F00

(7) Use the JACXSON U70 remote control in the CONFIGURE mode to set the engine and engine stand configurations.

(a) Select the option applicable to the engine, engine stand, and inlet or no inlet configuration.

SUBTASK 71-00-02-480-051-F00

(8) Make sure that the JACXSON U70 FWD forks are at position 1.

SUBTASK 71-00-02-480-075-F00

(9) Make sure that the JACXSON U70 AFT forks are at position 25.

SUBTASK 71-00-02-480-076-F00

(10) Make sure that the fork heights use the two middle pin hole locations as defined in the CONFIGURE mode of the remote control.

SUBTASK 71-00-02-480-052-F00

> **CAUTION** BE CAREFUL WHEN YOU MOVE THE DOLLY BELOW THE POWER PLANT. DAMAGE TO EQUIPMENT CAN OCCUR IF THE DOLLY HITS THE POWER PLANT OR INLET.

(11) Use the JACXSON U70 remote control to pick up and maneuver engine cradle, SPL-14956, and engine trolley, SPL-14957, below the power plant.

NOTE: Under some ground surface and airplane weight conditions, it could be necessary to lift the airplane to get sufficient clearance between the aft engine mount and the precooler. To get this clearance, extend the main and nose landing gear shock struts with dry air or nitrogen (TASK 12-15-31-610-802).

(a) Put the engine cradle, SPL-14956, and engine trolley, SPL-14957, in front of the power plant and move it rearward until the cradle is in its correct position under the engine.

(b) Record the values of the engine stand.

NOTE: The values are used when applying preload.

SUBTASK 71-00-02-480-053-F00

(12) Do these steps to lift the engine trolley, SPL-14957, and attach the engine cradle, SPL-14956, to the engine:

(a) Make sure that you continuously monitor the distance between the JACXSON U70 work platform, engine, and thrust reversers for possible interference while you lift the engine stand.

(b) Use the JACXSON U70 remote control to raise the engine trolley, SPL-14957, until it is approximately 4 in. (10 cm) - 6 in. (15 cm) below the engine.

(c) Engage the engine with the engine cradle, SPL-14956, per user manual.

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SUBTASK 71-00-02-480-054-F00

> **CAUTION**
> MONITOR THE LOADS ON THE LOAD MONITOR. MAKE SURE THAT THE LOADS ARE LESS THEN THE LIMITS. IF THE LOADS ARE MORE THAN THE LIMITS, DAMAGE TO THE STRUT AND ENGINE CAN OCCUR.

(13) Use the JACXSON U70 remote control to apply an extra allowable load to the engine until the load monitor show approximately but no more than these extra allowable loads.

(a) Make sure that the combined forward and combined aft loads do not exceed the stated loads below.

NOTE: The load values given below include the necessary preload force and the weight of the engine.

NOTE: The load values below are added to the load of the empty stand recorded earlier.

NOTE: The loads must be determined without personnel standing on the lifting platforms of the JacXson U70.

1) Loads without inlet:

a) 4000 lb (1814 kg) - total (outboard and inboard) forward load.

b) 4500 lb (2041 kg) - total (outboard and inboard) aft load.

2) Loads with inlet:

a) 4400 lb (1996 kg) - total (outboard and inboard) forward load.

b) 4500 lb (2041 kg) - total (outboard and inboard) aft load.

SUBTASK 71-00-02-020-042-F00

(14) Disconnect the forward engine mounts as follows (Figure 414):

(a) Loosen all four forward mount bolts [241] one-half turn until you see a clearance under the bolt heads.

NOTE: Use an 11/16-inch socket to loosen the bolts.

(b) Remove the four forward mount bolts [241].

1) Make sure that the engine mount surfaces continue to touch the strut mating surfaces as you remove the bolts [241].

2) Remove the washers [244].

SUBTASK 71-00-02-020-043-F00

(15) Disconnect the aft engine mounts as follows (Figure 415):

(a) Loosen all four aft mount bolts [263] one-half turn until you see a clearance under the bolt heads.

NOTE: Use a 15/16-inch socket to loosen the bolts [263].

(b) Remove the four aft engine mount bolts [263].

1) Make sure that the engine mount surfaces continue to touch the strut mating surfaces as you remove the bolts [263].

(c) Remove the washers [262].

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SUBTASK 71-00-02-020-044-F00

CAUTION WHEN YOU LOWER THE ENGINE, MAKE SURE THAT ALL TUBES, WIRES AND DUCTS BETWEEN THE STRUT AND ENGINE ARE DISCONNECTED. DAMAGE TO THE ENGINE AND STRUT CAN OCCUR.

CAUTION MAKE SURE THE AFT END OF THE ENGINE IS ALWAYS HIGHER THAN THE FRONT. IF IT IS NOT, THE FIRE SHIELD ON THE FAN COWL SUPPORT BEAM CAN HIT THE INLET COWL. DAMAGE TO THE FIRE SHIELD CAN OCCUR.

(16) Use the JACXSON U70 remote control to lower the engine as follows:

(a) Slowly decrease the load on the JACXSON U70 until the engine mounts are free of the shear pins [242] and shear pin [264].

(b) Carefully monitor the power plant to make sure that all disconnects and separation points have been made.

(c) ENGINES WITH THE SHORT EXHAUST NOZZLE AND SHORT EXHAUST PLUG;

Make sure that the interference pin at the 12 o'clock position on the nozzle shelf does not touch the aft strut while you lower the engine.

(d) When the engine is free of the separation points and disconnect locations, operate the joystick on the remote control for the lift, tilt, and roll management to turn the engine in the horizontal direction until it is parallel to the ground.

SUBTASK 71-00-02-020-045-F00

(17) Do these steps to remove the seal from the top of the engine pneumatic duct and the starter duct.

NOTE: Keep the seals for the installation.

(a) Remove the seal [123] from the top of the engine pneumatic duct (Figure 407).

(b) Remove the seal [62] from the starter duct (Figure 404).

(c) Install protective covers on the openings on the precooler control valve, precooler, engine pneumatic and starter ducts.

SUBTASK 71-00-02-080-034-F00

(18) Use the JACXSON U70 remote control to carefully maneuver the engine on the engine stand away from the aircraft.

(a) Make sure that you monitor the clearance between the engine and other components while you pull the engine stand forward.

SUBTASK 71-00-02-080-036-F00

(19) Use the JACXSON U70 remote control to disengage the JACXSON U70 from the engine trolley, SPL-14957.

SUBTASK 71-00-02-860-031-F00

(20) Put the covers on the open ends of the ducts on the engine and strut.

END OF TASK

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TASK 71-00-02-400-801-F00

6. Power Plant - Installation

A. General

(1) This task provides the instructions on how to install the power plant.

NOTE: The total acoustic panel blockage for the engine installation must be recalculated when components are changed per SRM 54-00-01.

(2) You must do these topics to install the power plant:

(a) Prepare for the Installation

(b) Power Plant Installation

(c) Fan Case Connections on the Left Side

(d) Fan Case Connections on the Right Side

(e) Core Area Connections on the Left Side

(f) Core Area Connections on the Right Side

(g) Put the Airplane Back to Its Usual Condition.

(3) To help you install the power plant more quickly, use the steps and the table found in the front of this task (Table 402).

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
12-13-21-600-801	IDG Servicing (Oil Fill) (P/B 301)
21-00-01-100-801	Oil Contamination Removal from Air Conditioning and Pneumatic Systems (P/B 201)
24-22-00-860-811	Supply Electrical Power (P/B 201)
26-11-01-211-801	Engine Fire Detector Inspection (P/B 601)
26-11-01-400-801	Engine Fire Detector Element Installation (P/B 401)
36-11-02-200-801	Bleed Air Check Valve Inspection (P/B 601)
36-11-03-400-801	Bleed Air Regulator Installation (P/B 401)
36-13-00-800-802	Pneumatic Manifold System - Activation (P/B 201)
51-05-01-210-809	737-6789 Basic Task Description (P/B 201)
54-05-03-210-805	INTERNAL - GENERAL VISUAL: LEFT STRUT FORWARD AND AFT ENGINE MOUNT TO STRUT SHEAR PINS (P/B 201)
54-05-03-210-806	INTERNAL - GENERAL VISUAL: RIGHT STRUT FORWARD AND AFT ENGINE MOUNT TO STRUT SHEAR PINS (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)
71-00-00-700-821-F00	Dry Motor the Engine (P/B 201)
71-00-00-740-801-F00	Engine Exceedance Page Check (P/B 601)
71-00-00-750-803-F00	Test 14B - Fan Trim Balance (On Board Procedure - Vibro-meter AVM) (P/B 501)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-00-03-600-803-F00	Depreservation of an Engine On-Wing (Task Selection) (P/B 201)
71-00-07	POWER PLANT (ENGINE INTERMIX)

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(Continued)

Reference	Title
71-11-02-400-801-F00	Fan Cowl Panel Installation (Selection) (P/B 401)
73-21-60-470-801-F00	EEC Software Load (P/B 201)
77-31-00-970-805-F00	Download the Advanced AVM (AAVM) Bearing Data with the Ground Support Software (GSS) (P/B 201)
78-11-00-210-803-F00	Exhaust Plug Drain Pan and Drain Tube - Inspection/Check (P/B 601)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
80-11-01-610-801-F00	Starter Servicing (Oil Fill) (P/B 301)
SRM 54-00-01	Structural Repair Manual
SWPM 20-20-00	ELECTRICAL BONDING PROCESSES

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-1550	Bonding Meter - Approved, Intrinsically Safe (Approved for use in Class I, Divisions I & II hazardous (classified) locations. Outside these hazardous locations, COM-614 can be used in lieu of COM-1550). Part #: 620LK Supplier: 1CRL2 Part #: M1 Supplier: 3AD17 Part #: M1B Supplier: 3AD17 Part #: T477W (C15292) Supplier: 06659
SPL-2417	Pump - Hand, Cowl Opening Part #: A78019-29 Supplier: 81205 Part #: B54001-53 Supplier: 81205 Part #: C78005-60 Supplier: 81205 Opt Part #: A78019-27 Supplier: 81205 Opt Part #: C78005-26 Supplier: 81205 Opt Part #: C78005-53 Supplier: 81205
SPL-2433	Equipment - Hold Open, Thrust Reverser Cowl, CFM56-7 Engine Part #: C78019-15 Supplier: 81205
SPL-18640	Blanking Plates - Starter Air Duct & Precooler, CFM Engine Series Part #: C36008-2 Supplier: 81205
STD-858	Tag - DO NOT OPERATE
STD-3906	Mallet - Rubber
STD-13882	Crowfoot - 2 9/16 inch

D. Consumable Materials

Reference	Description	Specification
A00160	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63
D00006	Compound - Antiseize, Pure Nickel Special - Never-Seez NSBT-8N/-16N	
D00010	Compound - Thread Antiseize, High Temperature	MIL-PRF-907
D00633	Grease - Aircraft General Purpose	BMS3-33

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(Continued)

Reference	Description	Specification
G00270	Tape - Scotch Flatback Masking 250	ASTM D6123 (Supersedes A-A-883)

E. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right
410	Subzone - Engine 1
420	Subzone - Engine 2

F. Prepare for the Installation

SUBTASK 71-00-02-210-015-F00

(1) Do these steps for the applicable engine:

(a) Do this task: INTERNAL - GENERAL VISUAL: LEFT STRUT FORWARD AND AFT ENGINE MOUNT TO STRUT SHEAR PINS, TASK 54-05-03-210-805.

(b) Do this task: INTERNAL - GENERAL VISUAL: RIGHT STRUT FORWARD AND AFT ENGINE MOUNT TO STRUT SHEAR PINS, TASK 54-05-03-210-806.

SUBTASK 71-00-02-200-002-F00

(2) Do the CPCP basic task (TASK 51-05-01-210-809).

SUBTASK 71-00-02-210-010-F00

(3) Make sure that the configuration of the engine to be installed is compatible with the airplane and thrust reversers.

NOTE: If the engine of a different configuration is installed, the procedure of intermix is required in accordance with POWER PLANT (ENGINE INTERMIX), SUBJECT 71-00-07.

(a) Refer to the applicable Boeing Service Bulletin for the installation procedure and concurrent requirements necessary for each of the CFM56-7B series engine (Table 404).

NOTE: The newest version of the CFM56-7B series engine is the CFM56-7BEXX 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 (Figure 421).

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 (Figure 421).

NOTE: In Table 404, “NONE” indicates that the engine type is the initial delivery configuration for the corresponding airplane line number. If an airplane engine configuration changes to its initial engine installation configuration, use an equivalent opposite procedure for the engine currently installed. For example, if an airplane (line position, 3700-9999) had CFM56-7BEXX engine when delivered, then the CFM56-7BEXX engine replaces the previously installed intermixed CFM56-7BXX SAC engine, refer to the service bulletin 71-1658.

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Table 404/71-00-02-993-819-F00

AIRPLANE LINE POSITION	ENGINE	INTERMIX SERVICE BULLETIN 737
001-2229 WITHOUT 1981, 2093	CFM56-7BXX (SAC)	NONE
	CFM56-7BXX/3 (TI)	71-1588
	CFM56-7BEXX	71-1673
2230-2252	CFM56-7BXX (SAC)	NONE
	CFM56-7BXX/3 (TI)	71-1551
	CFM56-7BEXX	71-1674
2253-3699 AND 1981, 2093	CFM56-7BXX (SAC)	71-1582
	CFM56-7BXX/3 (TI)	NONE
	CFM56-7BEXX	71-1674
3700-9999	CFM56-7BXX (SAC)	71-1658
	CFM56-7BXX/3 (TI)	71-1658
	CFM56-7BEXX	NONE

SUBTASK 71-00-02-210-013-F00

(4) Make sure that the configuration of the primary exhaust nozzle and airplane strut are compatible (Figure 418).

NOTE: The new primary nozzle and primary plug are the short configuration.

NOTE: The short exhaust nozzle has an interference pin at the 12 o'clock position on the nozzle shelf. This pin engages in a mating receptacle on the bottom of the aft strut. If the mating receptacle is not found on the strut, the strut is not compatible with the exhaust nozzle. You must install the long exhaust nozzle and long exhaust plug on this engine.

(a) For the compatible configuration refer to Table 405.

Table 405/71-00-02-993-820-F00

AIRPLANE LINE POSITION	SB 737-54-1047 INCORPORATION	LONG NOZZLE AND LONG PLUG	SHORT NOZZLE AND SHORT PLUG
0001-3761	PRE-SB	PERMITTED	NOT PERMITTED
0001-3761	POST-SB	PERMITTED	PERMITTED
3762-9999	POST BY PRR	NOT PERMITTED	PERMITTED

SUBTASK 71-00-02-860-010-F00

(5) If it is not already done, do this topic: Prepare for the Removal.

SUBTASK 71-00-02-900-001-F00

(6) Do these steps to install the compression rod assembly [110] on the 12:00 o'clock strut of the replacement engine (Figure 406):

NOTE: If you re-install the same engine or if the replacement engine has a compression rod installed, this step is not necessary. The compression rod assembly is installed loosely in the bracket with the thrust reverser open. When the thrust reverser closes, the receiver cups capture the rod and moves the rod to the center of the receiver cups.

(a) For compression rods with stop rings, do these steps to remove the compression rod assembly [110] from the removed engine:

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LOM ALL; AIRPLANES WITH COMPRESSION ROD ASSEMBLY P/N 315A2080-1

1) To remove one of the stop rings, remove the two bolts on a ring half.

LOM ALL; AIRPLANES WITH COMPRESSION ROD ASSEMBLY P/N 315A2080-4

2) Move one of the stop rings to the center of the compression rod.

LOM ALL

3) Remove the rod assembly from the bracket.

LOM ALL; AIRPLANES WITH COMPRESSION ROD ASSEMBLY P/N 315A2080-1

(b) To install the compression rod assembly [110] on the replacement engine, do these steps:

1) Put the rod assembly (with one stop ring installed) in the bracket.

2) Loosely install the removed stop ring on the compression rod with the two bolts.

3) Apply sealant, A00160, between the stop ring and compression rod and to the threads of the two bolts.

4) Torque the two bolts to 22.5 ±2.5 in-lb (2.5 ±0.3 N·m).

LOM ALL; AIRPLANES WITH COMPRESSION ROD ASSEMBLY P/N 315A2080-4

(c) To install the compression rod assembly [110] on the replacement engine, do these steps:

1) Put the rod assembly in the bracket.

2) Move the stop ring away from the center of the compression rod.

LOM ALL

SUBTASK 71-00-02-230-001-F00

(7) Use the same forward mount bolts [241], barrel nuts [243], aft mount bolts [263], or barrel nuts [261] again, do this task: Fluorescent Penetrant Inspection (Water Washable), TASK 70-40-01-910-801-F00 or Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

NOTE: This inspection is necessary if it is the operator's policy to use the mount bolts or barrel nuts again.

NOTE: This inspection is not necessary if the operator uses new mount bolts and barrel nuts.

(a) Discard the forward mount bolts [241] and aft mount bolts [263] with damage that you can feel with a fingernail or thread damage you can see.

1) If there is damage (nicks/dents) on the forward mount bolts [241] and aft mount bolts [263], discard these bolts.

SUBTASK 71-00-02-210-003-F00

(8) Do the self-locking check on the four barrel nuts [243] of the forward engine mount (Figure 414).

(a) Apply Pure Nickel Special compound, D00006, to the threads of the bolts [241].

(b) Make sure that the locking torque on the barrel nuts [243] is between 32 in-lb (3.6 N·m) - 300 in-lb (33.9 N·m).

NOTE: Apply only the torque in the above torque range to prevent wear on the barrel nut threads. It is not necessary to find the breakaway torque.

(c) If the self-locking torque on the barrel nuts [243] is not between 32 in-lb (3.6 N·m) - 300 in-lb (33.9 N·m), replace the barrel nuts [243].

(d) Make sure that the retainers do not have cracks or damage.

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(e) Apply Pure Nickel Special compound, D00006, to the external cylindrical area of the barrel nuts [243].

NOTE: Do not apply Pure Nickel Special compound, D00006, to the self locking feature of the barrel nut.

(f) Install the barrel nuts [243] in the holes on the forward mount.

(g) Make sure that the barrel nuts [243] are correctly installed with the retainers at the bottom side.

(h) Make sure that the indexing retainer is correctly installed in the indexing recess on the forward mount.

SUBTASK 71-00-02-210-004-F00

(9) Do the self-locking check on the four barrel nuts [261] of the aft engine mount (Figure 415).

(a) Apply Pure Nickel Special compound, D00006, to the threads of the bolts [263].

(b) Make sure that the locking torque on the barrel nuts [261] is between 70 in-lb (7.9 N·m) - 600 in-lb (67.8 N·m).

NOTE: Apply only the torque in the above torque range to prevent wear on the barrel nut threads. It is not necessary to find the breakaway torque.

(c) If the self-locking torque on the barrel nuts [261] is not between 70 in-lb (7.9 N·m) - 600 in-lb (67.8 N·m), replace the barrel nuts [261].

(d) Make sure that the retainers do not have cracks or damage.

(e) Apply Pure Nickel Special compound, D00006, to the external cylindrical area of the barrel nuts [261].

NOTE: Do not apply Pure Nickel Special compound, D00006, to the self locking feature of the barrel nut.

(f) Install the barrel nuts [261] in the holes on the strut.

(g) Make sure that the barrel nuts [261] are correctly installed with the retainers on the top side.

SUBTASK 71-00-02-212-001-F01

(10) Do a check of the aft engine mount for the correct installation of the center link.

(a) From the left side of the engine, look at the aft face of the center link.

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(b) MARKED CENTER LINK; Look for the AFT mark on the left side of the center link.

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1) Look for the L mark on the left side and look for the R mark on the right side.

(c) If the center link installation is not correct, remove the aft engine mount and re-install the center link.

SUBTASK 71-00-02-210-007-F00

(11) Do a visual check for worn wires at the forward transponder of the upper engine fire detector (TASK 26-11-01-211-801).

G. Power Plant Installation Method Selection

SUBTASK 71-00-02-400-003-F00

(1) Do one of these tasks to install the power plant:

- Power Plant - Installation with the Bootstrap Equipment, TASK 71-00-02-400-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

- Power Plant - Installation with the Cobra Engine Change System, TASK 71-00-02-400-803-F00
- Power Plant - Installation with the JacXson U70, TASK 71-00-02-400-804-F00.

H. Fan Case Connections on the Left Side

SUBTASK 71-00-02-020-018-F00

(1) Connect the harness connector DP1234 to the strut receptacle (Figure 404).

NOTE: All the connections on the left side of the fan case are found at the service disconnect panel on the left side of the fan cowl support beam.

SUBTASK 71-00-02-211-001-F00

(2) Do these steps to connect the harness connector D30038 to the strut receptacle (Figure 404).

(a) Measure the distance from the end of the connector to the top clamp on the engine.

1) Make sure that the distance is between 13.5 in. (34.3 cm) - 14.0 in. (35.6 cm).

2) If the distance is more than 14.0 in. (35.6 cm), do these steps:

a) Loosen the clamps on the engine that hold the integrated drive generator (IDG) power cable and adjust the cable where necessary.

b) Make sure that the top clamp is approximately 15 degrees below the horizontal axis.

3) If the distance is correct, install the harness connector D30038 to the strut receptacle.

a) If it is necessary, use a crowfoot - 2 9/16 inch, STD-13882.

SUBTASK 71-00-02-020-024-F00

(3) If the blanking plate, SPL-18640, is installed, do these steps (View C, Figure 404):

(a) Remove the coupling from the starter air duct.

(b) Remove the blanking plate, SPL-18640.

(c) Remove the E-seal.

(d) Examine the duct opening for unwanted material.

SUBTASK 71-00-02-420-007-F00

(4) Connect the starter duct to the strut as follows:

(a) Install the seal [62] on the internal groove of the starter duct.

(b) Install the coupling [61] at the top end of the starter duct.

(c) Orient the coupling [61] to give the maximum clearance with the engine and adjacent components.

(d) Tighten the coupling [61] to the torque specified on the part.

(e) Lightly hit the surface of the coupling [61] with a rubber mallet, STD-3906.

(f) Tighten the coupling [61] again to the torque specified on the part.

SUBTASK 71-00-02-420-008-F00

(5) Connect the hydraulic lines as follows:

(a) Remove the protective covers from the hydraulic lines.

(b) Connect the quick disconnect couplings on the hydraulic case drain, hydraulic supply and hydraulic pressure lines.

1) Install the hose coupling on the strut fitting.

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2) Turn the hose coupling until you can push the hose coupling into the fitting.

3) Turn the hose coupling until the knurled sleeve of the hose coupling snaps on the lock of the fitting.

> **CAUTION**
> MAKE SURE THAT YOU FULLY CONNECT THE COUPLING. IF YOU DO NOT, YOU CAN CAUSE DAMAGE TO THE HYDRAULIC PUMP.

(c) Make sure that the three quick-release fittings are properly connected both visually and by pulling the outer sleeves away from the male quick-release fittings.

1) Without applying axial force, make sure that the outer sleeves cannot be rotated counterclockwise.

NOTE: Without applying axial force, the outer sleeves should only rotate approximately 5 degrees in the clockwise direction.

2) Without turning the outer sleeve, apply axial force to the outer sleeves and make sure that there is little or no movement.

3) If the outer sleeves rotate counterclockwise or pull away from the male quick-release fittings, repeat the steps above to connect the hydraulic hose.

NOTE: The quick-release fittings are not properly installed.

4) Make sure that the outer sleeves are fully engaged with the lock tabs on the male quick-release fittings (View D, Figure 404).

SUBTASK 71-00-02-420-009-F00

(6) Connect the fuel supply line as follows:

(a) Remove the protective covers for the fuel supply line and strut fitting.

(b) If it is necessary, loosen the two clamps that attach the fuel supply line to the fan case.

NOTE: A loose fuel supply line is easier to install to the strut fitting.

(c) FUEL HOSE WITH A B-NUT FITTING; Do these steps:

1) Use your hand to connect the fuel hose to the strut fitting.

2) Torque the B-nut to 1200 ±60 in-lb (136 ±7 N·m).

NOTE: Use two wrenches to torque the B-nut. Use one to hold the hose and use the other to torque the nut.

3) Loosen the B-nut and re-torque the B-nut to the above torque value.

(d) If it is necessary, torque the two clamps that attach the fuel supply line to the fan case.

1) Torque the bolts to 104 ±6 in-lb (12 ±1 N·m).

SUBTASK 71-00-02-420-019-F00

(7) Connect the DP0502 connector to the fuel flow transmitter (Figure 409).

SUBTASK 71-00-02-220-001-F00

(8) Make sure that there is a minimum clearance of 0.15 in. (3.81 mm) between the fire detection wires and the strut insulation blanket.

(a) If an adjustment is necessary, refer to this task: Engine Fire Detector Element Installation, TASK 26-11-01-400-801.

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I. Fan Case Connections on the Right Side

SUBTASK 71-00-02-020-019-F00

(1) Connect the electrical harness connectors to their mating receptacles (Figure 405).

NOTE: All the connections on the right side of the fan case are found at the service disconnect panel on the right side of the fan cowl support beam.

NOTE: There are eight electrical connectors on the right side of the strut. They are, from forward to aft, the DP1104, DP0256, DP1328, DP1620, DP1552, DP0112, DP0324, and DP0460. The connection instructions for all the connectors are equivalent.

SUBTASK 71-00-02-420-010-F00

(2) Connect the strut drain line as follows:

(a) Remove the protective covers for the strut drain line.

> **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.

(b) Connect the drain hose [82] to the drain tube [81].

J. Core Area Connections on the Left Side

SUBTASK 71-00-02-420-011-F00

(1) Connect the pressure sense line on the side of the precooler as follows (Figure 406):

(a) Remove the protective covers from the pressure sense line tube [102] and pressure sense line hose [101].

(b) Apply Pure Nickel Special compound, D00006 (preferred), or compound, D00010 (alternate), to all male threads before the connection of the pressure sense line hose [101] and pressure sense line tube [102].

> **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.

(c) Connect the pressure sense line tube [102] to the pressure sense line hose [101].

1) Torque the tube coupling nut to 140 ±7 in-lb (16 ±1 N·m).

SUBTASK 71-00-02-420-012-F00

(2) Connect the 450 degrees °F temperature sense line on the side of the precooler as follows:

(a) Remove the protective covers from the 450 degrees °F temperature sense line tube [103] and 450 degrees °F temperature sense line hose [104].

(b) Apply Pure Nickel Special compound, D00006 (preferred), or compound, D00010 (alternate) to all male threads before the connection of the 450 degrees °F temperature sense line tube [103] and 450 degrees °F temperature sense line hose [104].

> **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.

(c) Connect the 450 degrees °F temperature sense line tube [103] to the 450 degrees °F temperature sense line hose [104].

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Torque the tube coupling nut to 140 ±7 in-lb (16 ±1 N·m).

SUBTASK 71-00-02-420-018-F00

(3) If previously disconnected or removed, install the fire extinguishing tube [100] to the strut.

(a) Make sure that the fire extinguishing tube [100] is clamped on the left side of the precooler.

K. Core Area Connections on the Right Side

SUBTASK 71-00-02-020-023-F00

(1) If the blanking plate, SPL-18640, is installed, do these steps (View B, Figure 407):

(a) Remove the coupling from the precooler inlet.

(b) Remove the blanking plate, SPL-18640.

(c) Remove the E-seal.

(d) Examine the inlet opening for unwanted material.

SUBTASK 71-00-02-420-013-F00

(2) Do these steps to connect the engine pneumatic duct to the precooler as follows (Figure 407):

(a) Install the seal [123] on the internal groove of the pneumatic duct.

(b) Loosely install the coupling [122].

1) Make sure that the seal [123], that was previously installed, is still in its correct position.

(c) Tighten the coupling [122] to the torque given on the part.

(d) Lightly hit the surface of the coupling [122] with a rubber mallet, STD-3906.

(e) Tighten the coupling [122] again to the torque specified on the part.

SUBTASK 71-00-02-420-014-F00

(3) Connect the 390 degrees °F temperature sense line on the side of the precooler as follows:

(a) Remove the protective covers from the 390 degrees °F temperature sense line tube [121] and 390 degrees °F temperature sense line hose [124].

I (b) Apply Pure Nickel Special compound, D00006 (preferred), or compound, D00010 (alternate) to all male threads before the connection of the 390 degrees °F temperature sense line tube [121] and 390 degrees °F temperature sense line hose [124].

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.

(c) Connect the 390 degrees °F temperature sense line tube [121] to the 390 degrees °F temperature sense line hose [124].

1) Torque the tube coupling nut to 140 ±7 in-lb (16 ±1 N·m).

L. Put the Airplane Back to Its Usual Condition

LOM 465-999

SUBTASK 71-00-02-420-023-F00

(1) Make sure that the bonding jumper [7] is installed in the bleed air regulator and bracket [8] (Figure 419).

(a) If the bonding jumper [7] is not installed, do these steps:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM 465-999 (Continued)

1) If it is necessary, remove the bolt [11] from the bracket [8] hole (Figure 420).
2) Attach the bonding jumper [7] to the bleed air regulator (TASK 36-11-03-400-801).
3) Attach the bonding jumper [7] to the bracket [8], do these steps (Figure 419):
   a) Do the solvent cleaning procedure for the bonding jumper [7] terminal, washer [9] under the terminal, and mating surface of the bracket [8].
   b) Install the screw [10] and washers [9] that attach the bonding jumper [7] to the bracket [8].
   c) Torque the screw [10] to 78 in-lb (8.8 N·m) - 82 in-lb (9.3 N·m).
   d) Measure the electrical bonding resistance between the bonding jumper [7] terminal and surface of the bracket [8] (SWPM 20-20-00).
      <1> Use an intrinsically safe approved bonding meter, COM-1550.
      <2> Make sure that the bonding resistance is 0.001 ohm (1.0 milliohm) or less.

LOM 402, 404, 406, 407, 411, 412, 415, 416, 420, 422-434, 437-447, 450-464

SUBTASK 71-00-02-420-024-F00

(2) Do one of these steps:
   (a) If the bonding jumper [7] has been removed from the bleed air regulator and bracket [8], make sure that the bolt [11] is installed in the bracket [8] (Figure 419, Figure 420).
      1) Torque the bolt [11] to 70 in-lb (8 N·m) - 80 in-lb (9 N·m).
   (b) If the bonding jumper [7] is installed on the bracket [8], it is acceptable to attach the bonding jumper [7] to the bleed air regulator (TASK 36-11-03-400-801).

LOM ALL

SUBTASK 71-00-02-860-012-F00

(3) Do these steps to connect the thrust reverser opening actuator [21] (Figure 402):
   (a) Disconnect the thrust reverser opening actuator [21] from its temporary attach point on the thrust reversers.
   (b) Apply grease, D00633, to the shank of the bolt [22].

      NOTE: Do not get the grease on the threads of the bolt.
   (c) Connect the bottom end of the thrust reverser opening actuator [21] to the engine fan case.
      1) Use the bolt [22], washer [23] and washer [26], bushing [24], alignment washer [25], and nut [27].
         a) Make sure that the alignment washer [25] is installed with the teflon surface against the actuator spherical bearing.

            NOTE: The alignment washer is rubber with a teflon surface. The teflon is smoother than the rubber. The washer has two layers and the thinner layer is teflon.
         b) Torque the nut [27] to 300 ±10 in-lb (34 ±1 N·m).
   (d) Remove the dust cap and connect the cowl opening hand pump, SPL-2417, to the actuator.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(e) Close the return valve on the pump and extend the thrust reverser opening actuator [21] slightly until the thrust reverser weight is removed from the thrust reverser hold-open equipment.

(f) Disconnect the hand pump from the opening actuator.

(g) Install the dust cap.

(h) Do these steps to engage the locking collar on the opening actuator:

1) Listen for the "click" sound of the lock collar.

2) Make sure that you see the work LOCKED on the bottom of the extended piston.

3) Make sure that you can see the red band on the actuator rod.

(i) Do the above steps again for the other thrust reverser opening actuator [21].

SUBTASK 71-00-02-080-008-F00

(4) Do these steps to remove the hold open equipment, SPL-2433, from the thrust reversers and the strut (Figure 401):

WARNING	MAKE SURE ALL THE WEIGHT OF THE THRUST REVERSERS IS HELD BY THE TWO OPENING ACTUATORS. IF THEY ARE NOT, THE THRUST REVERSERS CAN MOVE SUDDENLY WHEN YOU REMOVE THE HOLD-OPEN RODS. INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Make sure that the weight of the thrust reversers is held by the two opening actuators.

(b) Turn the two adjustment pins on each beam assembly [5] until they disengage from the compression-rod receiver cups on the thrust reversers.

(c) Remove the lockpin [3] and disengage the arm support [2] (with the beam assembly [5]) from the strut attach beam [4].

(d) Do the above step again for the other arm support [2].

(e) Remove the two lockpins [1] that attach the strut attach beam [4] to the clevis brackets on the strut.

(f) Remove the retention pins [6] from each arm support [2] to release the beam assemblies [5].

(g) Make sure that you keep all lockpins with the hold-open rod assembly.

SUBTASK 71-00-02-420-015-F00

(5) If engine 2 was installed, remove the Scotch Flatback Masking Tape 250, G00270, from the edges of the thrust reverser.

SUBTASK 71-00-02-420-016-F00

(6) Remove the protective covers or Scotch Flatback Masking Tape 250, G00270, from the fire seals on the top aft location on the thrust reverser inner surface.

SUBTASK 71-00-02-630-001-F00

(7) If the engine preservation procedure has been done, do this task: Depreservation of an Engine On-Wing (Task Selection), TASK 71-00-03-600-803-F00.

SUBTASK 71-00-02-211-002-F00

(8) ENGINES WITH BLEED AIR CHECK VALVE P/N 3202222-1;

Do this check of the valve if the engine has been off wing for 7 or more days with this valve.

NOTE: The check is not necessary for a valve that is replaced by a new or overhauled valve at the time of engine installation.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) For the applicable engine, do this task: Bleed Air Check Valve Inspection, TASK 36-11-02-200-801.

SUBTASK 71-00-02-610-001-F00

(9) Make sure that the engine oil system is serviced correctly (TASK 12-13-11-600-801).

SUBTASK 71-00-02-200-001-F00

(10) Do this task: Exhaust Plug Drain Pan and Drain Tube - Inspection/Check, TASK 78-11-00-210-803-F00.

SUBTASK 71-00-02-610-002-F00

(11) Make sure that the oil system for the IDG is serviced correctly (TASK 12-13-21-600-801).

SUBTASK 71-00-02-610-003-F00

(12) Make sure that the oil system for the starter is serviced correctly (TASK 80-11-01-610-801-F00).

NOTE: The oil service of the starter is not necessary if you re-install the removed engine.

SUBTASK 71-00-02-010-004-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.

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

SUBTASK 71-00-02-410-002-F00

(14) Do this task: Fan Cowl Panel Installation (Selection), TASK 71-11-02-400-801-F00.

SUBTASK 71-00-02-940-001-F00

CAUTION

DO NOT LEAVE TOOLS OR OTHER OBJECTS IN THE ENGINE INLET OR AROUND THE POWER PLANT. IF THESE OBJECTS GO THROUGH THE ENGINE, DAMAGE TO THE ENGINE CAN OCCUR.

(15) Remove all objects from the engine inlet and work area around the power plant.

SUBTASK 71-00-02-860-013-F00

(16) For engine 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	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	4	C00359	FUEL SPAR VALVE ENG 1
E	5	C01320	ENGINE FUEL ENGINE 1 HPSOV CONT

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SUBTASK 71-00-02-860-014-F00

(17) For engine 2, 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
D	7	C01391	ENGINE 2 ALTN PWR CHAN B
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	3	C00360	FUEL SPAR VALVE ENG 2
E	3	C01321	ENGINE FUEL ENGINE 2 HPSOV CONT

SUBTASK 71-00-02-860-022-F00

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

SUBTASK 71-00-02-860-038-F00

(19) Put the fire switch handle for the applicable engine in its usual position.

(a) Remove the DO NOT OPERATE tag, STD-858, from the fire switch handle.

SUBTASK 71-00-02-860-039-F00

(20) For engine 1, remove the safety tags and close these circuit breakers:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
B	22	C00296	FIRE PROTECTION EXTINGUISHERS LEFT
B	24	C01021	FIRE PROTECTION EXTINGUISHERS ALTN L
C	19	C00347	HYDRAULIC SYSTEM SHUTOFF VALVE ENG 1

SUBTASK 71-00-02-860-040-F00

(21) For engine 2, remove the safety tags and close these circuit breakers:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
B	20	C00297	FIRE PROTECTION EXTINGUISHERS RIGHT
B	23	C01022	FIRE PROTECTION EXTINGUISHERS ALTN R
C	18	C00348	HYDRAULIC SYSTEM SHUTOFF VALVE ENG 2

SUBTASK 71-00-02-860-020-F00

(22) Do this task: Pneumatic Manifold System - Activation, TASK 36-13-00-800-802.

SUBTASK 71-00-02-860-018-F00

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

(a) Remove the DO NOT OPERATE tag, STD-858 from the BAT switch, on the P5 pilot's overhead panel.

SUBTASK 71-00-02-860-017-F00

(24) Do these steps to reset the Flight Management Computer System (FMCS) Control Display Unit (CDU):

(a) On the FMCS CDU in the flight compartment, get access to the Configuration Report as follows:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Push the INIT/REF button.
2) Push the MAINT button.
3) Push the ENGINE button.
4) Push the ENGINE 1 or ENGINE 2 button for the applicable engine.
5) Push the IDENT/CONFIG button.
6) Push the ENG S/N button.
7) Write the new engine serial number in the FMCS CDU.

CAUTION	AFTER THE CONTINUE BUTTON IS PUSHED, DO NOT PUSH THE INIT/REF BUTTON OR REMOVE POWER FROM THE EEC CHANNELS. IF YOU DO, YOU COULD CORRUPT THE NON-VOLATILE MEMORY IN THE EEC. DAMAGE TO EQUIPMENT CAN OCCUR.

8) Push the CONTINUE button.

NOTE: After approximately 10 seconds, the IDENT/CONFIG screen shows.

a) Make sure that the new engine serial number is correct.

(b) For the applicable engine, do these steps to erase all stored faults in the Electronic Engine Control (EEC):

1) Push the ERASE button.

CAUTION	AFTER THE ERASE ALL BUTTON IS PUSHED, DO NOT PUSH THE INIT/REF BUTTON OR REMOVE POWER FROM THE EEC CHANNELS. IF YOU DO, YOU COULD CORRUPT THE NON-VOLATILE MEMORY IN THE EEC. DAMAGE TO EQUIPMENT CAN OCCUR.

2) Push the ERASE ALL button.

NOTE: After approximately 10 seconds, the IDENT/CONFIG screen shows.

a) Make sure that the new engine serial number is correct.

SUBTASK 71-00-02-210-001-F00

(25) Make sure that the engine thrust rating shown on the IDENT/CONFIG screen is correct.

(a) Get access to the IDENT/CONFIG screen for the other engine and make sure that the engine thrust rating as shown on the screen is the same.

(b) Make sure that the Flight Management Computer MEDB Software, thrust reverser configuration, and the opposite engine EEC software are compatible with the new engine (TASK 73-21-60-470-801-F00).

1) Intermix of some EEC software versions is not permitted.
2) Some EEC software versions must be installed on both engines at the same time.
3) Some EEC software versions require concurrent changes to the airplane configuration.

SUBTASK 71-00-02-210-005-F00

(26) For the applicable engine, do this task: Engine Exceedance Page Check, TASK 71-00-00-740-801-F00.

(a) If you find Exceedances, reset them.

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SUBTASK 71-00-02-210-002-F00

(27) Do a check of the fan balance screws on the engine and in the Airborne Vibration Monitor (AVM) to make sure that they agree.

NOTE: This step is not used for the AVM S360N021-203.

(a) AIRPLANES WITH VIBRO-METER AVM;

To read the AVM, get access to the trim balance menu (TASK 71-00-00-750-803-F00).

1) Continue to read the balance screw data.

LOM 422-434, 437-447, 450-999; LOM 402, 404, 406, 407, 411, 412, 415, 416, 420 POST SB 737-77-1069

SUBTASK 71-00-02-740-001-F00

(28) If the engine was replaced with a different engine, erase the Advanced Airborne Vibration Monitoring (AAVM) memory (TASK 77-31-00-970-805-F00).

(a) You can defer the AAVM memory erasing until the next convenient maintenance opportunity under these conditions:

1) If the AAVM bearing health monitoring features are not being used. No further action required.

2) If the AAVM bearing health monitoring features are being used, then record the date and time of engine change and provide it when submitting data to CFM.

LOM ALL

SUBTASK 71-00-02-710-001-F00

(29) Do the tests that are listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

CAUTION	DO NOT DRY-MOTOR THE ENGINE BEFORE YOU MAKE SURE THAT THE SPAR-VALVE CLOSED LIGHT (ON THE P5 OVERHEAD PANEL) STAYS BRIGHT. IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION	MAKE SURE THAT THE APPLICABLE FOUR LOW PRESSURE LIGHTS ON THE P5 OVERHEAD PANEL ARE OFF. IF YOU DRY-MOTOR THE ENGINE AND APPLICABLE LOW PRESSURE LIGHTS ARE ON, DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION	DO NOT DRY-MOTOR THE ENGINE BEFORE YOU MAKE SURE THAT THERE IS FUEL PRESSURE TO THE FUEL PUMP INLET. THE FUEL PUMP AND HYDRO MECHANICAL UNIT ARE FUEL LUBRICATED. ZERO FUEL PRESSURE CAN CAUSE DAMAGE TO THE FUEL PUMP AND HYDRO MECHANICAL UNIT.

(a) If it is necessary on the engine to be dry motored, apply the boost pump pressure to the fuel pump inlet (Dry Motor the Engine, TASK 71-00-00-700-821-F00).

(b) If it is necessary, clear and bleed the applicable pack to prevent cabin odor (oil) after an engine change.

1) Remove the oil contamination from the applicable engine pneumatic ducts (TASK 21-00-01-100-801).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-02-400-802-F00

7. Power Plant - Installation with the Bootstrap Equipment

A. General

(1) This task has the steps to install power plant with the bootstrap equipment.

B. References

Reference	Title
12-15-31-610-802	Main Landing Gear Shock Strut Servicing, Airplane on the Ground (P/B 301)
54-52-01-410-801	Forward Fairing Installation (P/B 401)
54-54-00-200-802	Forward Strut Fireseal Inspection (P/B 601)
SOPM 20-30-03	General Cleaning Procedures

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-2111	Base - Universal Transportation, CFM56 Engine Part #: AM-2563-227 Supplier: 9M323
COM-2118	Cradle - Transport, CFM56-7 Engine Part #: AM-2811-4800 Supplier: 9M323 Opt Part #: AM-2811-6400 Supplier: 9M323
COM-4953	Cradle - Engine, CFM56-7 Part #: FB70077-100ISSB Supplier: KCWD9 Opt Part #: FB70077-100 Supplier: KCWD9
COM-4954	Stand - Transportation, Engine, CFM56-7 Part #: FB70077-200 Supplier: KCWD9
COM-6276	Cradle - Engine, CFM56-7 Part #: 114702-1 Supplier: 9M323
COM-6277	Stand - Transportation, Engine, CFM56-7 Part #: 114701-1 Supplier: 9M323
SPL-2106	Wrench - CFM56-7 Engine Aft Mount Nut Part #: C71022-6 Supplier: 81205
SPL-2110	Kit - Bootstrap, CFM56-7 Engine Part #: C71020-134 Supplier: 81205 Opt Part #: C71020-105 Supplier: 81205
SPL-14956	Cradle - Engine Transportation, Air/Truck, CFM56-7 (Cradle D71CRA00005G02 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590
SPL-14957	Trolley - Engine Transportation, Air/Truck, CFM56-7 (Trolley D71TRO00005G03 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590
SPL-23046	Protector - Engine Mount Part #: TPFAA-B3-CFM56-7 Supplier: 34107
STD-5468	Feeler Gauge, 0.002 - 0.008 inch

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D. Consumable Materials

Reference	Description	Specification
D00006	Compound - Antiseize, Pure Nickel Special - Never-Seez NSBT-8N/-16N	
G51905	Putty/Lacquer - Tamper-proof, Hydraulic Fluid Resistant, Yellow	BMS8-45 Type III

E. Location Zones

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

F. Power Plant Installation with the Bootstrap Equipment

SUBTASK 71-00-02-840-012-F00

(1) Make sure that the power plant is prepared for installation (TASK 71-00-02-400-801-F00).

SUBTASK 71-00-02-640-007-F00

(2) Lubricate the shear pin [264] on the strut interface of the aft engine mount with Pure Nickel Special compound, D00006 (Figure 415).

(a) Before you lubricate the shear pin [264], do a visual check of the shear pin for damage.

SUBTASK 71-00-02-640-008-F00

(3) Lubricate the two shear pins [242] on the forward engine mount with Pure Nickel Special compound, D00006 (Figure 414).

(a) Before you lubricate the shear pins [242], do a visual check of the shear pins for damage.

SUBTASK 71-00-02-400-001-F00

(4) Do these steps to install the engine mount protector, SPL-23046.

NOTE: The engine mount protector, SPL-23046, can be installed between the forward engine mount and the strut to help align the shear pins with the bushings in the strut. This tool is optional.

(a) Pull out the handle of the engine mount protector, SPL-23046.

NOTE: This will open the shear pin holes in the tool.

(b) Align the engine mount protector, SPL-23046, with the strut (insert it from the FWD direction).

(c) Install the engine mount protector, SPL-23046, to the strut.

(d) Push in the handle of the engine mount protector, SPL-23046.

NOTE: This will close the shear pin holes in the tool.

SUBTASK 71-00-02-480-055-F00

CAUTION

MAKE SURE THAT YOU VISUALLY INSPECT THE BOOTSTRAP KIT BEFORE USE, INSPECT THE LIFT LUGS FOR GOUGES, LINES, OR CRACKS AT THE LUG ROOT AND THE LANYARD HOLES. IF A LUG JOINT OR STRUCTURE IS SUSPECT, THEN REMOVE IT FROM USE. DAMAGE TO EQUIPMENT CAN OCCUR.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(CAUTION PRECEDES)

> **CAUTION** DO NOT INSTALL TAG LINES ON THE GSE AFT BRACKET. TAG LINES ARE THE ROPES THAT YOU ATTACH TO A LOAD TO CONTROL LOAD SPIN AND PENDULAR MOVEMENT. THIS PREVENTS A SIDE-LOAD THE LIFTING LUGS. IF YOU DO NOT FOLLOW, DAMAGE TO EQUIPMENT CAN OCCUR.

(5) If the bootstrap equipment is not already installed, install the bootstrap kit, SPL-2110, on the strut (Figure 408, Figure 409, Figure 410, Figure 411).

SUBTASK 71-00-02-080-037-F00

(6) If the left hand dynamometer assembly [147], right hand dynamometer assembly [151], and dynamometer [183] are attached to the lever hoists [148] and lever hoist [182], remove them temporarily.

NOTE: When the dynamometers are removed, you can use the lever hoist hooks as plumb bobs to help align the engine with the strut.

SUBTASK 71-00-02-820-031-F00

(7) If it is not already done, disconnect the diagonal braces from the left and right forward cradle arms on the dolly.

SUBTASK 71-00-02-080-038-F00

> **CAUTION** MAKE SURE YOU REMOVE THE EYE-BOLTS. IF YOU DO NOT, THE EYE-BOLTS CAN HIT THE FORWARD EDGE OF THE THRUST REVERSER. DAMAGE TO EQUIPMENT CAN OCCUR.

(8) AGSE CRADLE; Remove the eye-bolts from the arms of the cradle, COM-2118.

SUBTASK 71-00-02-480-056-F00

(9) AGSE CRADLE; Put the base, COM-2111, and cradle, COM-2118, with the power plant installed, below the strut as follows (Figure 417):

NOTE: When the cradle is in its correct position under the strut, it will not be aligned with the centerline of the strut.

(a) Move the dolly/power plant in front of the strut and move it rearward until it is below the strut and the lever hoist hooks are aligned with the cradle-to-engine attach brackets [163] and engine attach bracket [202].

NOTE: It can be necessary to extend the chains on the lever hoists.

NOTE: It is very important to align the cradle with the engine. If they are not aligned, it can be difficult to move the engine from the cradle to the strut.

(b) If the cradle-to-engine attach brackets [163] and engine attach bracket [202] are not aligned with the lever hoist [148] and lever hoist [182], adjust the position of the cradle as follows:

1) Make sure that the castors are not locked.
   a) If the castors are locked, unlock them.
2) Adjust the position of the cradle.
   a) Use the cradle steering bars to turn the castors from side to side to adjust the position of the cradle.
3) Visually check if the lever hoist hooks are aligned.
   a) If the hooks are not aligned, continue to adjust the position of the cradle.
   b) If the hooks are aligned, lock the wheel castors on the cradle.

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SUBTASK 71-00-02-480-057-F00

(10) F.BROWN CRADLE; Put the engine cradle, COM-4953, and transportation stand, COM-4954, with the power plant installed, below the strut as follows:

(a) Move the dolly/power plant in front of the strut and move it aft until it is below the strut and the lever hoist hooks are aligned with the cradle-to-engine attach brackets [163].

1) Make sure that all castors have brakes and steering locks off.

2) When the cradle is aligned, lock the castors.

SUBTASK 71-00-02-480-058-F00

(11) STANLEY AVIATION CRADLE; Put the engine cradle, COM-6276, and transportation stand, COM-6277, with the power plant installed, below the strut per the vendor manual.

SUBTASK 71-00-02-480-059-F00

(12) DEDIENNE AEROSPACE CRADLE; Put the engine cradle, SPL-14956, and engine trolley, SPL-14957, with the power plant installed, below the strut per the vendor manual.

SUBTASK 71-00-02-820-032-F00

WARNING

MAKE SURE THERE ARE NO SPIRAL TWISTS IN THE LEVER HOIST CHAINS BETWEEN THE LEVER HOIST HOUSING AND ITS LOWER BLOCK (THE ATTACH POINT FOR THE DYNAMOMETER). IF YOU SEE A TWIST IN THE CHAIN, YOU MUST REMOVE IT. IF YOU DO NOT REMOVE IT, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(13) Make sure that the chains on the two lever hoists [148] and lever hoist [182] do not have a spiral twist between the lever hoist housing and lower block (the lower block attaches the chain to the dynamometer).

(a) To remove a spiral twist, extend the chain until the twist is removed.

SUBTASK 71-00-02-480-060-F00

(14) Attach the left hand dynamometer assembly [147] and right hand dynamometer assembly [151] to the lever hoists [148] (Figure 408).

NOTE: The two dynamometers must face forward. To do this, the left dynamometer must be installed upside down.

SUBTASK 71-00-02-480-061-F00

(15) Attach the dynamometer [183] to the lever hoist [182] (Figure 410).

SUBTASK 71-00-02-480-062-F00

(16) Attach the left hand dynamometer assembly [147] and right lower link assembly [150] to the cradle-to-engine attach brackets [163] with the lockpins [161] (Figure 409).

(a) If it is necessary, adjust the length of the two lever hoists [148].

(b) Attach the safety pin to the end of each lockpin [161].

SUBTASK 71-00-02-480-063-F00

(17) Attach the aft dynamometer [183] to the engine attach bracket [202] with a lockpin [201] (Figure 411).

NOTE: If it is necessary, adjust the length of the lever hoist [182].

(a) Attach the safety pin to the end of each lockpin [201].

SUBTASK 71-00-02-820-033-F00

(18) Make sure that the forward and aft bootstrap and all engine attach brackets are installed correctly.

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SUBTASK 71-00-02-820-034-F00

(19) Before you apply a load to the bootstrap equipment, make sure that all dynamometers are set to the zero position.

SUBTASK 71-00-02-080-039-F00

CAUTION	ONE PERSON MUST MONITOR EACH DYNAMOMETER WHEN YOU OPERATE THE LEVER HOISTS. WHEN YOU CHANGE THE LOADS AT ONE HOIST, THE LOADS CAN CHANGE AT OTHER HOISTS. THIS CAN CAUSE LOADS THAT ARE HIGHER THAN THE MAXIMUM BOOTSTRAP LOADS. DAMAGE TO EQUIPMENT CAN OCCUR.

(20) AGSE CRADLE; Disconnect the engine from the cradle, COM-2118, as follows (Figure 412):

CAUTION	DO NOT APPLY MORE THAN 3850 LB (1746 KG) TO THE FORWARD INBOARD DYNAMOMETER, AND 3350 LB (1520 KG) TO THE FORWARD OUTBOARD DYNAMOMETER. IF YOU APPLY MORE THAN THE LIMITS, DAMAGE TO THE POWER PLANT, WING, AND STRUT CAN OCCUR.

(a) Use the forward lever hoists [148] and aft lever hoist [182] to slowly lift the weight of the engine from the cradle.

(b) Use the aft lever hoist [182] and adjust the load to disconnect the aft support arm from the Turbine Rear Frame (TRF).

1) Remove the lockpin [281] and move the support arm to rest on the cradle.

(c) Disconnect the forward cradle arms from the engine:

1) Disengage the spanner nut on the right trunnion.

a) Thread the nut inboard almost to the end of the threaded shaft.

2) If it is necessary, use the forward lever hoist [148] and adjust the load to remove the lockpin [221] from each trunnion.

3) Slide the trunnions away from the engine until stopped by the capscrews.

a) Make sure that the end support balls are clear of the engine-to-cradle attach bracket [163].

4) Remove the lower lockpins from each forward cradle arm and turn the arms to the outboard position.

SUBTASK 71-00-02-420-036-F00

CAUTION	MAKE SURE THAT YOU LIFT THE LOAD EQUALLY. MAKE SURE THAT LIFT CABLES ARE VERTICAL. ONE PERSON MUST MONITOR EACH DYNAMOMETER WHEN YOU OPERATE THE LEVER HOISTS. WHEN YOU CHANGE THE LOADS AT ONE HOIST, THE LOADS CAN CHANGE AT OTHER HOISTS. THIS CAN CAUSE LOADS THAT ARE HIGHER THAN THE MAXIMUM BOOTSTRAP LOADS. DAMAGE TO EQUIPMENT CAN OCCUR.

(21) F.BROWN CRADLE; Disconnect the engine from the engine cradle, COM-4953, as follows (Figure 413):

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CAUTION DO NOT APPLY MORE THAN 3850 LB (1746 KG) TO THE FORWARD INBOARD DYNAMOMETER, AND 3350 LB (1520 KG) TO THE FORWARD OUTBOARD DYNAMOMETER. IF YOU APPLY MORE THAN THE LIMITS, DAMAGE TO THE POWER PLANT, WING, AND STRUT CAN OCCUR.

(a) Use the forward lever hoists [148] and aft lever hoist [182] to slowly lift the weight of the engine from the cradle.

(b) Release the forward clamp assemblies.

1) Loosen the collar nuts.

2) Move the swing bolts to the unlock position.

3) Open the clamp assemblies.

(c) Use the aft lever hoist [182] and adjust the load to disconnect the aft support arm from the TRF.

1) Remove the lockpin and move the support arm to rest on the cradle.

(d) Remove the forward trunnions from the engine:

1) Continue to lift the engine until the trunnions become loose in their cradle clamp sockets.

2) Remove the trunnions from the engine and store them safely to one side.

(e) Put the forward clamp assemblies to the stowed position:

1) Close the clamp assembly.

2) Put the swing bolts in the lock position and tighten the collar nuts.

3) Remove the hinge pin and put the clamp assembly to the stowed position.

4) Install the hinge pin and safety pin.

SUBTASK 71-00-02-420-037-F00

CAUTION MAKE SURE THAT YOU LIFT THE LOAD EQUALLY. MAKE SURE THAT LIFT CABLES ARE VERTICAL. ONE PERSON MUST MONITOR EACH DYNAMOMETER WHEN YOU OPERATE THE LEVER HOISTS. WHEN YOU CHANGE THE LOADS AT ONE HOIST, THE LOADS CAN CHANGE AT OTHER HOISTS. THIS CAN CAUSE LOADS THAT ARE HIGHER THAN THE MAXIMUM BOOTSTRAP LOADS. DAMAGE TO EQUIPMENT CAN OCCUR.

(22) STANLEY AVIATION CRADLE; Disconnect the engine from the engine cradle, COM-6276, per the vendor manual.

SUBTASK 71-00-02-420-038-F00

CAUTION MAKE SURE THAT YOU LIFT THE LOAD EQUALLY. MAKE SURE THAT LIFT CABLES ARE VERTICAL. ONE PERSON MUST MONITOR EACH DYNAMOMETER WHEN YOU OPERATE THE LEVER HOISTS. WHEN YOU CHANGE THE LOADS AT ONE HOIST, THE LOADS CAN CHANGE AT OTHER HOISTS. THIS CAN CAUSE LOADS THAT ARE HIGHER THAN THE MAXIMUM BOOTSTRAP LOADS. DAMAGE TO EQUIPMENT CAN OCCUR.

(23) DEDIENNE AEROSPACE CRADLE; Disconnect the engine from the engine cradle, SPL-14956, per the vendor manual.

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SUBTASK 71-00-02-820-035-F00

CAUTION	MAKE SURE THAT YOU LIFT THE LOAD EQUALLY. MAKE SURE THAT LIFT CABLES ARE VERTICAL. ONE PERSON MUST MONITOR EACH DYNAMOMETER WHEN YOU OPERATE THE LEVER HOISTS. WHEN YOU CHANGE THE LOADS AT ONE HOIST, THE LOADS CAN CHANGE AT OTHER HOISTS. THIS CAN CAUSE LOADS THAT ARE HIGHER THAN THE MAXIMUM BOOTSTRAP LOADS. DAMAGE TO EQUIPMENT CAN OCCUR.

(24) Slowly increase the load on the left hand dynamometer assembly [147], right hand dynamometer assembly [151], and dynamometer [183] to raise the engine.

(a) Make sure that you observe these areas:

1) The forward side of the fan cowl support beam and aft side of the inlet cowl at the 12:00 location.

2) The fire extinguishing tube and precooler inlet duct flange.

3) The forward side of the thrust reversers and aft side of the fan case at the 12:00 position.

4) The top of the exhaust nozzle and bottom of the strut fairing.

5) ENGINES WITH THE SHORT EXHAUST NOZZLE AND SHORT EXHAUST PLUG; The interference pin at the 12:00 o'clock position on the exhaust nozzle shelf and mating receptacle in the strut.

SUBTASK 71-00-02-820-036-F00

(25) Use the forward outboard lever hoist [148] to roll the engine until it is parallel to the engine mounts on the strut (approximately 6 degrees).

SUBTASK 71-00-02-820-037-F00

(26) As you continue to raise the engine, raise the aft end slightly higher than the forward end.

NOTE: This will keep the above interference areas to a minimum.

NOTE: The forward mount can move in a forward and aft direction. Make sure that the forward mount remains free as you engage the forward shear pins [242].

(a) If the forward mount binds, lower the engine until the shear pins [242] are free.

SUBTASK 71-00-02-820-038-F00

(27) As you engage the shear pin [242] and shear pin [264], make sure that the engine mount surfaces are parallel with the strut.

SUBTASK 71-00-02-820-039-F00

(28) If the engine mount protector, SPL-23046, was used, do these steps to remove the engine mount protector, SPL-23046:

(a) Pull out the handle on engine mount protector, SPL-23046.

NOTE: This will open the shear pin holes in the tool.

(b) Remove the engine mount protector, SPL-23046, from the strut.

SUBTASK 71-00-02-970-002-F00

(29) Record the applied engine load from left hand dynamometer assembly [147], right hand dynamometer assembly [151], and dynamometer [183].

NOTE: This data will be used when the preload is applied later.

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SUBTASK 71-00-02-820-040-F00

(30) Continue to raise the engine until the engine mounts are 0.25 in. (6.35 mm) - 0.5 in. (12.7 mm) below the strut.

(a) Make sure that the aft mount surfaces are parallel to the mating strut surface.

(b) If they are not, use the forward lever hoist [148] to adjust the alignment of the aft mount.

(c) When you get the correct alignment, use the aft lever hoist [182] to raise the aft mount against the mating strut surface.

SUBTASK 71-00-02-210-021-F00

(31) If the rear shear pin [264] does not fully engage and clearance of approximately 0.3 in. (7.6 mm), make sure that the exhaust nozzle is compatible with the strut (Figure 418).

NOTE: The short exhaust nozzle has an interference pin at the 12 o'clock position on the nozzle shelf. To use this nozzle, there must be a mating receptacle in the strut. If this receptacle is not found, the strut is not compatible with the exhaust nozzle. You must install the long exhaust nozzle and long exhaust plug on this engine.

SUBTASK 71-00-02-820-041-F00

(32) Slowly raise the two forward lever hoists [148] equally until the forward mount is engaged with the mating strut surfaces.

SUBTASK 71-00-02-210-022-F00

(33) Examine the strut fireseal to make sure that it is seated correctly and does not protrude over the engine fan case.

(a) Use a plastic spatula at each corner of the seal to push the last horizontal section (3.0 in. (76.2 mm) - 4.0 in. (101.6 mm) long) of the seal forward over the edge of the fan case coaming.

1) This step prevents the protrusion of the fireseal corners into the bypass duct after the thrust reverser is closed.

(b) To examine the forward strut fireseal, do this task: Forward Strut Fireseal Inspection, TASK 54-54-00-200-802.

SUBTASK 71-00-02-820-042-F00

(34) Apply a preload to the lever hoists [148] and lever hoist [182] as follows:

CAUTION

DO NOT APPLY MORE THAN 3850 POUNDS (1746 KG) TO THE FORWARD INBOARD DYNAMOMETER, 3350 POUNDS (1520 KG) TO THE FORWARD OUTBOARD DYNAMOMETER AND 1300 POUNDS (590 KG) TO THE AFT DYNAMOMETER. IF YOU APPLY MORE THAN THE LIMITS, DAMAGE TO THE POWER PLANT, WING AND STRUT CAN OCCUR.

(a) Apply loads to the left hand dynamometer assembly [147], right hand dynamometer assembly [151], and dynamometer [183] that are more than the applied engine load values that you recorded earlier.

NOTE: There is no specific load value that must be applied. The only limits are that the loads must be more than the applied engine load values and that the strut mating surfaces and the engine mounts stay together.

SUBTASK 71-00-02-820-043-F00

(35) If after the preload is applied there is a clearance between the forward or aft mounts, remove the clearance as follows:

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(a) Use a Feeler Gauge, STD-5468, and insert the 0.0030 ±0.0005 in. (0.0762 ±0.0127 mm) feeler gauge between the strut mating surfaces and engine mounts.

1) If the feeler gauge does not contact the shear pins, the clearance/gap is acceptable.

2) If the feeler gauge does contact the shear pins, do these steps:

(b) If there is a clearance in the aft mount, first shake the aft mount.

1) If the clearance remains, use the applicable forward lever hoist [148] to roll the engine to the side with the clearance.

NOTE: As an example, if the clearance is on the inboard side, decrease the load on the outboard forward lever hoist [148] to roll the engine to the inboard position.

(c) If there is a clearance in the forward mount, first shake the forward mount.

1) If the clearance remains, use the applicable forward lever hoist [148] to roll the engine to the side with the clearance.

NOTE: As an example, if the clearance is on the inboard side, decrease the load on the outboard forward lever hoist [148] to roll the engine to the inboard position.

SUBTASK 71-00-02-210-023-F00

(36) ENGINES WITH THE SHORT EXHAUST NOZZLE AND SHORT EXHAUST PLUG; Make sure that the interference pin at the 12:00 o'clock position on the nozzle shelf is centered in the mating receptacle on the strut (Figure 418).

NOTE: The short exhaust nozzle has an interference pin at the 12 o'clock position on the nozzle shelf, To use this nozzle, there must be a mating receptacle in the strut. If this receptacle is not found, the strut is not compatible with the exhaust nozzle. You must install the long exhaust nozzle and long exhaust plug on this engine.

SUBTASK 71-00-02-420-039-F00

(37) Attach the power plant to the strut as follows:

NOTE: Before you tighten the eight bolts that attach the power plant to the strut, you must do a check of the self-locking feature on the forward and aft barrel nuts. If not already done, refer to the procedure, Prepare For The Power Plant Installation.

(a) Loosely install the forward engine mount to the strut (Figure 414):

1) Put a washer [244] on each bolt [241].

2) Make sure that the countersunk side of the washer [244] is adjacent to the head of the bolt [241].

3) Apply Pure Nickel Special compound, D00006, to the threads and shank of the bolts [241].

4) Install the four bolts [241] and four washers [244] in the forward engine mount.

(b) Install the bolts [241], but do not tighten the bolts [241].

(c) Loosely install the aft engine mount to the strut (Figure 415):

1) Install a washer [262] on each bolt [263].

2) Make sure that the countersunk side of the washer [262] is adjacent to the head of the bolt [263].

3) Apply Pure Nickel Special compound, D00006, to the threads and shank of the bolts [263].

4) Install the four bolts [263] and four washers [262] in the aft engine mount.

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(d) Install the bolts [263], but do not tighten the bolts [263].

SUBTASK 71-00-02-420-040-F00

(38) Apply the initial torque with wrench, SPL-2106, as follows:

(a) Cross-tighten the forward engine mount bolts [241] to 45 ft-lb (61.0 N·m) - 55 ft-lb (74.6 N·m).

(b) Cross-tighten the aft engine mount bolts [263] to 80 ft-lb (108.5 N·m) - 98 ft-lb (132.9 N·m).

SUBTASK 71-00-02-420-041-F00

(39) Apply the final torque as follows:

(a) Tighten the forward engine mount bolts [241] to 90 ft-lb (122.0 N·m) - 110 ft-lb (149.1 N·m).

1) Make sure that the mating connection of the forward mount bolts [241] is free of oil, grease, and other unwanted material (SOPM 20-30-03).

2) Apply tamper-proof putty/lacquer, G51905, or torque stripe to the mating connection of the bolts [241].

(b) Tighten the aft engine mount bolts [263] to 160 ft-lb (216.9 N·m) - 195 ft-lb (264.4 N·m).

1) Make sure that the mating connection of the aft mount bolts [263] is free of oil, grease, and other unwanted material (SOPM 20-30-03).

2) Apply tamper-proof putty/lacquer, G51905, or torque stripe to the mating connection of the bolts [263].

SUBTASK 71-00-02-080-040-F00

(40) Remove the dolly from the work area.

SUBTASK 71-00-02-080-041-F00

(41) Remove the load from the lever hoists [148] and lever hoist [182].

SUBTASK 71-00-02-080-042-F00

(42) Disconnect the bootstrap equipment from the power plant as follows:

(a) Disconnect the forward bootstrap equipment (Figure 409):

1) Disconnect the lockpins [161] that attach the left hand dynamometer assembly [147] and right lower link assembly [150] to the cradle-to-engine attach brackets [163].

2) Remove the bolts [162] that attach the cradle-to-engine attach brackets [163] to the fan case.

3) Remove the cradle-to-engine attach brackets [163].

(b) Disconnect the aft bootstrap equipment (Figure 411):

1) Disconnect the lockpin [201] that attaches the aft dynamometer [183] to the engine attach bracket [202].

2) Disconnect the two lockpins [203] that attach the aft engine attach bracket [202] to the engine flange bracket [204] and engine flange bracket [205].

3) Remove the engine attach bracket [202].

(c) Put all removed brackets in the storage box on the cradle.

SUBTASK 71-00-02-080-043-F00

(43) Remove the forward bootstrap equipment from the strut as follows (Figure 408):

(a) Remove the right hand dynamometer assembly [151] and left hand lever hoist [148] from forward arms.

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(b) Release the brace [142] from the inboard arm [143] as follows:

NOTE: There are two braces on the forward bootstrap. They consist of a metal rod with a clevis on one end and permanently attached lockpin at the other end.

1) Disconnect the lockpin [149] that attaches the clevis on the forward end of the brace [142] to the strut.

2) Turn the brace [142] 90 degrees until the brace lockpin is aligned with the keyed slot in the inboard arm [143].

3) Move the brace [142] forward until it is disengaged from the inboard arm [143].

(c) Do the above step again to release the other brace [142].

(d) Disconnect the lockpin [144] that attaches the outboard arm [145] to the inboard arm [143] at the top location.

NOTE: Each arm has a shear pin below the strut attach fitting to temporarily hold the arm in its installed position. The arms will not fall.

(e) To remove the outboard arm [145], disconnect the lockpin [146] at the strut attach fitting.

(f) To remove the inboard arm [143], disconnect the lockpin [141] at the strut attach fitting.

SUBTASK 71-00-02-410-007-F00

(44) For the thumbnail fairing, do this task: Forward Fairing Installation, TASK 54-52-01-410-801.

SUBTASK 71-00-02-080-044-F00

(45) Remove the aft bootstrap equipment from the strut as follows (Figure 410):

(a) Disconnect the lockpin [189] and remove the dynamometer [183] and lever hoist [182] from the support beam [184].

(b) To disconnect the support beam [184], hold it as you disconnect the outboard lockpin assembly [187].

1) Slide the support beam [184] out until it is free of the aft support brace [186] and forward support brace [188].

(c) Remove the lockpin assembly [185] that attaches the aft support brace [186] and forward support brace [188] together at the inboard location.

(d) Remove the forward support brace [188].

(e) Remove the aft support brace [186].

NOTE: The strut attach brackets are permanently attached to the strut and are not removed.

SUBTASK 71-00-02-860-032-F00

(46) If the main and nose landing gear shock struts were extended for clearance between the dolly and thrust reverser, 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.

END OF TASK

TASK 71-00-02-400-803-F00

8. Power Plant - Installation with the Cobra Engine Change System

A. General

(1) This task has the steps to install power plant with the Cobra engine change system.

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B. References

Reference	Title
08-21-02-580-801	Level the Airplane With a Plumb Bob and Inclinometers (P/B 201)
08-21-03-580-801	Make the Airplane Level (P/B 201)
12-15-31-610-802	Main Landing Gear Shock Strut Servicing, Airplane on the Ground (P/B 301)
54-52-01-410-801	Forward Fairing Installation (P/B 401)
54-54-00-200-802	Forward Strut Fireseal Inspection (P/B 601)
71-11-02-000-801-F00	Fan Cowl Panel Removal (Selection) (P/B 401)
SOPM 20-30-03	General Cleaning Procedures

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-17619	Digital Inclinometer; Range of +/- 45 degrees; Resolution of 0.01 degrees. Part #: 137-2165-01 Supplier: 64790 Part #: 54-635-601-0 Supplier: 1E258
SPL-2106	Wrench - CFM56-7 Engine Aft Mount Nut Part #: C71022-6 Supplier: 81205
SPL-14956	Cradle - Engine Transportation, Air/Truck, CFM56-7 (Cradle D71CRA00005G02 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590
SPL-14957	Trolley - Engine Transportation, Air/Truck, CFM56-7 (Trolley D71TRO00005G03 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590
SPL-15141	Lifting Adapter - Cobra Part #: TPBAC0B0 Supplier: 1JJE1
SPL-15143	Engine Change System - Cobra Part #: TP91-G Supplier: 1JJE1
SPL-19148	Lifting Beam - Cobra Part #: TPBBC0A0 Supplier: 1JJE1
SPL-19149	Lifting Lug - Cobra Part #: TPBLA0B0 Supplier: 1JJE1
SPL-23691	Tool - Removal/Installation, Beam Part #: TPBIE0A0 Supplier: 1JJE1
STD-5468	Feeler Gauge, 0.002 - 0.008 inch

D. Consumable Materials

Reference	Description	Specification
D00006	Compound - Antiseize, Pure Nickel Special - Never-Seez NSBT-8N/-16N	
G51905	Putty/Lacquer - Tamper-proof, Hydraulic Fluid Resistant, Yellow	BMS8-45 Type III

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E. Location Zones

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

F. Power Plant Installation with the Cobra Engine Change System

NOTE: The engine trolley, SPL-14957, and engine cradle, SPL-14956, are approved engine stand for using the Cobra system, SPL-15143. To designate a dolly consisting of the engine trolley, SPL-14957, and engine cradle, SPL-14956, the term “engine stand” is used in the procedure.

SUBTASK 71-00-02-840-018-F00

(1) Make sure that the power plant is prepared for installation (TASK 71-00-02-400-801-F00).

SUBTASK 71-00-02-800-014-F00

(2) Use Table 403 for the approved engine stand and applicable upward loads (preload) for the Cobra system, SPL-15143.

NOTE: Cobra Engine Change System uses the term "preload". This term represents the compressive load between the pylon and the engine mounts.

SUBTASK 71-00-02-640-011-F00

(3) Lubricate the shear pin [264] on the strut interface of the aft engine mount with Pure Nickel Special compound, D00006 (Figure 415).

(a) Before you lubricate the shear pin [264], do a visual check of the shear pin for damage.

SUBTASK 71-00-02-640-012-F00

(4) Lubricate the two shear pins [242] on the forward engine mount with Pure Nickel Special compound, D00006 (Figure 414).

(a) Before you lubricate the shear pins [242], do a visual check of the shear pins for damage.

SUBTASK 71-00-02-010-019-F00

(5) Make sure that the left and right fan cowl panels on the applicable engine are removed.

(a) If it is necessary, remove the left and right fan cowl panels (TASK 71-11-02-000-801-F00).

NOTE: Fan cowls must be removed to install an engine using the Cobra system, SPL-15143.

SUBTASK 71-00-02-010-020-F00

(6) Make sure that the left and right thrust reversers are open and held by the hold-open equipment.

SUBTASK 71-00-02-860-036-F00

(7) Remove the covers from the open ends of the ducts on the engine and strut.

SUBTASK 71-00-02-840-019-F00

(8) Refer to the Cobra Engine Change System Manual for the detailed instructions for the preparation and use of the Cobra system, SPL-15143.

SUBTASK 71-00-02-580-010-F00

(9) Make sure that the airplane is level and stable.

(a) If it is necessary, do one of these tasks:

- Level the Airplane With a Plumb Bob and Inclinometers, TASK 08-21-02-580-801
- Make the Airplane Level, TASK 08-21-03-580-801.

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SUBTASK 71-00-02-580-011-F00

(10) Make sure that there is sufficient clearance under the strut to properly position the engine on the engine stand.

SUBTASK 71-00-02-420-046-F00

(11) Use the beam removal/installation tool, SPL-23691, to install the lifting beam, SPL-19148, into the engine stand.

(a) Make sure that the lifting beam, SPL-19148, extend equal distance from the engine stand at both sides.

SUBTASK 71-00-02-480-071-F00

(12) Put the engine on the engine stand below the strut per the vendor manual.

(a) Do one of the following steps:

1) Make sure that the wheels of the engine stand are aligned in the same position as marked in the engine removal.

2) Set the engine stand 3.5 in. (8.9 cm) in the outboard direction of the on wing center line.

SUBTASK 71-00-02-480-072-F00

(13) Connect the Cobra system, SPL-15143, to the engine stand as follows:

(a) Connect the lifting adapters, SPL-15141, to the lifting beams, SPL-19148.

(b) Connect the lifting adapters, SPL-15141, to the engine stand tie-down rings with the tie-down straps.

(c) Position the primary and secondary units of the Cobra system, SPL-15143, on both sides of the engine stand.

1) Make sure that the primary unit is on the outboard side of the engine.

2) Make sure that the secondary unit is on the inboard side of the engine.

(d) Connect the lifting lugs, SPL-19149, to the lifting adapters, SPL-15141.

(e) Connect the lifting lug, SPL-19149, to the primary and secondary units of the Cobra system, SPL-15143.

1) Refer to Cobra Engine Change System Manual for the correct set up of these parts.

SUBTASK 71-00-02-020-052-F00

(14) Use the Cobra Engine Change System Manual to prepare the Cobra system, SPL-15143, as follows:

(a) Connect all hydraulic and electrical connections between the primary and secondary units.

(b) Activate external electrical power to the primary unit of the Cobra system, SPL-15143.

(c) Adjust the two units to make sure that they are in the neutral position at the transversal and lateral movement axis.

(d) Adjust the two units to make sure that the crossbeams and the load cells are in the correct positions.

SUBTASK 71-00-02-800-015-F00

(15) Use the mobile panel of the Cobra system, SPL-15143, to select the correct load sheet for the engine and engine stand configuration.

(a) Make sure that the load sheet is applicable to the engine that will be removed and engine stand configuration.

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SUBTASK 71-00-02-480-073-F00

WARNING MAKE SURE THAT NO PERSONNEL ARE BELOW THE ENGINE WHEN THE COBRA SYSTEM IS IN OPERATION. IF YOU DO NOT OBEY, INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION MAKE SURE THAT THERE IS SUFFICIENT CLEARANCE BETWEEN THE ENGINE STAND AND ENGINE AND THE ADJACENT STRUCTURE. IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE AND SUPPORT EQUIPMENT CAN OCCUR.

(16) Do these steps to lift the engine on the engine stand to the strut:

(a) Make sure that the digital inclinometer, COM-17619, or inclinometer on the Cobra system, SPL-15143, reads ZERO.

(b) If personnel needs to be on the engine stand during the engine installation, make sure that they are on the engine stand before the ZERO OUT function is actuated.

1) Make sure that the digital inclinometer, COM-17619, or inclinometer on the Cobra system, SPL-15143, is activated.

(c) Use Cobra system, SPL-15143, to slowly lift the engine and engine stand.

(d) Make sure that you observe these areas:

1) The forward side of the fan cowl support beam and aft side of the inlet cowl at the 12:00 location.

2) The fire extinguishing tube and precooler inlet duct flange.

3) The top of the exhaust nozzle and bottom of the strut fairing.

4) ENGINES WITH THE SHORT EXHAUST NOZZLE AND SHORT EXHAUST PLUG; The interference pin at the 12:00 o'clock position on the exhaust nozzle shelf and mating receptacle in the strut.

(e) Stop operation after you lift the engine stand approximately 2 in. (5.1 cm) - 3 in. (7.6 cm) from the ground.

(f) Tighten the tie-down straps again.

(g) Roll the engine approximately 5.5 - 6 degrees, until it is parallel with the engine mounts on the strut.

1) If it is necessary, use the digital inclinometer, COM-17619, or built-in inclinometer to measure the rotation.

2) Lift the aft end of the engine slightly more than the forward end.

NOTE: Lifting the aft end of the engine more than the forward end will keep the above interference arias to a minimum.

NOTE: The forward mount can move in a forward and aft direction. Make sure that the forward mount remains free as you engage the forward shear pins [242].

a) If the forward mount binds, lower the engine until the shear pins [242] are free.

(h) As you engage the shear pins [242] and shear pin [264], make sure that the engine mount surfaces are parallel with the strut.

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(i) Use the mobile panel of the Cobra system, SPL-15143, to select the ZERO OUT function.

NOTE: The values on the main screen represents the additional load values on the pillars, which contributes to the preload values on each mount after activating the ZERO OUT function.

1) Make sure that no part of the engine stand is in contact with the engine or aircraft when you actuate the ZERO OUT function.

(j) Slowly lift the engine until there is approximately 0.25 in. (0.6 cm) - 0.5 in. (1.3 cm) between the engine mounts and strut mounts as follows:

1) Make sure that you monitor the clearance between the engine and other parts while you lift the engine.

2) Use the mobile panel of the Cobra system, SPL-15143, to adjust the pillars as required to make all of the clearances the same and align the engine mounts with the strut mounts.

(k) If the rear shear pin [264] does not fully engage and clearance of approximately 0.3 in. (7.6 mm), make sure that the exhaust nozzle is compatible with the strut (Figure 418).

NOTE: The short exhaust nozzle has an interference pin at the 12 o'clock position on the nozzle shelf. To use this nozzle, there must be a mating receptacle in the strut. If this receptacle is not found, the strut is not compatible with the exhaust nozzle. You must install the long exhaust nozzle and long exhaust plug on this engine.

(l) Slowly lift the engine until the engine mount surfaces are engaged with the strut surface.

SUBTASK 71-00-02-210-026-F00

(17) Examine the strut fireseal to make sure that it is seated correctly and does not protrude over the engine fan case.

(a) Use a plastic spatula at each corner of the seal to push the last horizontal section (3.0 in. (76.2 mm) - 4.0 in. (101.6 mm) long) of the seal forward over the edge of the fan case coaming.

1) This step prevents the protrusion of the fireseal corners into the bypass duct after the thrust reverser is closed.

(b) To examine the forward strut fireseal, do this task: Forward Strut Fireseal Inspection, TASK 54-54-00-200-802.

SUBTASK 71-00-02-820-046-F00

CAUTION

MONITOR THE LOAD CELLS ON THE FORWARD AND AFT SIDE OF THE COBRA SYSTEM. IF THE LOADS ARE MORE THAN THE GIVEN LIMITS, DAMAGE TO THE ENGINE AND PYLONS CAN OCCUR.

(18) Lift the engine until you see no clearance between the upper and lower parts of the (forward and aft) engine mounts.

(a) Continue to slowly lift the load until the necessary preload is achieved at all four pillars on the mobile panel of the Cobra system, SPL-15143.

SUBTASK 71-00-02-820-047-F00

(19) If after the preload is applied there is a clearance between the forward or aft mounts, remove the clearance as follows:

(a) Use the Feeler Gauge, STD-5468, and insert the 0.0030 ±0.0005 in. (0.0762 ±0.0127 mm) feeler gauge between the strut mating surfaces and engine mounts.

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1) If the feeler gauge does not contact the shear pins, the clearance/gap is acceptable.
2) If the feeler gauge does contact the shear pins, do these steps:
   a) If there is clearance in the aft or forward mount, first shake the mount.
      <1> Do not tighten the engine mount bolts to try to remove the clearance.
      <2> Use the mobile panel of the Cobra system, SPL-15143, to deactivate the Automatic Preload Maintaining (APM) mode.
      <3> Lower or raise each pillar on the mobile panel to remove the clearances between the aft engine mount and the aft engine mount fitting contact surfaces.
      <4> Continue to adjust each pillar until PRELOAD is displayed at all four pillars.

SUBTASK 71-00-02-840-020-F00

(20) Activate APM mode on the mobile panel of the Cobra system, SPL-15143.
   (a) Make sure that the necessary preload is displayed at all four pillars on the mobile panel of the Cobra system, SPL-15143, when APM mode is activated.

SUBTASK 71-00-02-210-027-F00

(21) ENGINES WITH THE SHORT EXHAUST NOZZLE AND SHORT EXHAUST PLUG; Make sure that the interference pin at the 12:00 o'clock position on the nozzle shelf is centered in the mating receptacle on the strut (Figure 418).

NOTE: The short exhaust nozzle has an interference pin at the 12 o'clock position on the nozzle shelf, To use this nozzle, there must be a mating receptacle in the strut. If this receptacle is not found, the strut is not compatible with the exhaust nozzle. You must install the long exhaust nozzle and long exhaust plug on this engine.

SUBTASK 71-00-02-420-047-F00

(22) Attach the power plant to the strut as follows:

NOTE: Before you tighten the eight bolts that attach the power plant to the strut, you must do a check of the self-locking feature on the forward and aft barrel nuts. If not already done, refer to the procedure, Prepare For The Power Plant Installation.

   (a) Loosely install the forward engine mount to the strut (Figure 418):
      1) Put the washer [244] on each bolt [241].
      2) Make sure that the countersunk side of the washer [244] is adjacent to the head of the bolt [241].
      3) Apply Pure Nickel Special compound, D00006, to the threads and shank of the bolts [241].
      4) Install the four bolts [241] and four washers [244] in the forward engine mount.
   (b) Install the bolts [241], but do not tighten the bolts [241].
   (c) Loosely install the aft engine mount to the strut (Figure 415):
      1) Install the washer [262] on each bolt [263].
      2) Make sure that the countersunk side of the washer [262] is adjacent to the head of the bolt [263].
      3) Apply Pure Nickel Special compound, D00006, to the threads and shank of the bolts [263].
      4) Install the four bolts [263] and four washers [262] in the aft engine mount.

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(d) Install the bolts [263], but do not tighten the bolts [263].

SUBTASK 71-00-02-420-048-F00

(23) Apply the initial torque with wrench, SPL-2106, as follows:

(a) Cross-tighten the forward engine mount bolts [241] to 45 ft-lb (61 N·m) - 55 ft-lb (75 N·m).

(b) Cross-tighten the aft engine mount bolts [263] to 80 ft-lb (108 N·m) - 98 ft-lb (133 N·m).

SUBTASK 71-00-02-420-049-F00

(24) Apply the final torque as follows:

(a) Torque the forward engine mount bolts [241] to 90 ft-lb (122 N·m) - 110 ft-lb (149 N·m).

1) Make sure that the mating connection of the forward mount bolts [241] is free of oil, grease and other unwanted material. (SOPM 20-30-03).

2) Apply tamper-proof putty/lacquer, G51905, or torque stripe to the mating connection of the bolts [241].

(b) Torque the aft engine mount bolts [263] to 160 ft-lb (217 N·m) - 195 ft-lb (264 N·m).

1) Make sure that the mating connection of the aft mount bolts [263] is free of oil, grease and other unwanted material. (SOPM 20-30-03).

2) Apply tamper-proof putty/lacquer, G51905, or torque stripe to the mating connection of the bolts [263].

SUBTASK 71-00-02-420-050-F00

(25) Disconnect the engine from the engine cradle, SPL-14956, as follows:

(a) At the mobile panel of the Cobra system, SPL-15143, deactivate the APM mode.

(b) Use the mobile panel of the Cobra system, SPL-15143, to lower the engine stand until only the load of the empty stand displays on the mobile panel.

NOTE: This procedure makes it easier to get the pins out that secure the stand to the engine.

1) Reference the Cobra Operating Instructions Manual for the Cobra system, SPL-15143, to determine the correct screen.

(c) At the mobile panel of the Cobra system, SPL-15143, activate the APM mode.

(d) Disconnect the engine from the engine cradle, SPL-14956, per the vendor manual.

1) If it is necessary, use the mobile panel of the Cobra system, SPL-15143, to adjust the load as follows:

a) Deactivate the APM mode.

b) Adjust the load as necessary.

c) Activate the APM mode.

SUBTASK 71-00-02-080-051-F00

(26) Use the mobile panel of the Cobra system, SPL-15143, to lower the engine stand, as follows:

(a) Deactivate the APM mode.

(b) Slowly lower the engine stand down until it is free of separation points and possible interference from the engine stand.

(c) Slowly, rotate the engine stand to the horizontal direction until it is parallel to the ground.

1) Make sure that you monitor the clearances between the engine stand, engine, and nacelle surfaces.

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2) Make sure that you monitor the clearances between the engine stand and the ground.

(d) Slowly lower the engine stand down until it is evenly on the ground.

SUBTASK 71-00-02-800-016-F00

(27) Do these steps to move the engine stand away from the airplane:

(a) Make sure that the pillars are completely retracted.

(b) Turn off external electrical power to the primary unit of the Cobra system, SPL-15143.

(c) Disconnect and stow all electrical and hydraulic lines between the primary and secondary units of the Cobra system, SPL-15143.

(d) Disconnect the lifting lugs, SPL-19149, from the primary and secondary units of the Cobra system, SPL-15143.

(e) Move the primary and secondary units away from the engine stand.

(f) Remove the lifting lugs, SPL-19149, from the lifting adapters, SPL-15141.

(g) Remove the lifting adapters, SPL-15141, from the lifting beams, SPL-19148.

(h) Carefully pull the engine stand aft until it is clear of the airplane.

(i) Use the beam removal/installation tool, SPL-23691, to remove lifting beams, SPL-19148, from the engine stand.

SUBTASK 71-00-02-410-009-F00

(28) For the thumbnail fairing, do this task: Forward Fairing Installation, TASK 54-52-01-410-801.

SUBTASK 71-00-02-860-037-F00

(29) If the main and nose landing gear shock struts were extended, 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.

END OF TASK

TASK 71-00-02-400-804-F00

9. Power Plant - Installation with the JacXson U70

A. General

(1) This task has the steps to install power plant with the JacXson U70.

B. References

Reference	Title
54-52-01-410-801	Forward Fairing Installation (P/B 401)
54-54-00-200-802	Forward Strut Fireseal Inspection (P/B 601)
71-11-02-000-801-F00	Fan Cowl Panel Removal (Selection) (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.

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Reference	Description
SPL-2106	Wrench - CFM56-7 Engine Aft Mount Nut Part #: C71022-6 Supplier: 81205
SPL-14956	Cradle - Engine Transportation, Air/Truck, CFM56-7 (Cradle D71CRA00005G02 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590
SPL-14957	Trolley - Engine Transportation, Air/Truck, CFM56-7 (Trolley D71TRO00005G03 is included in Stand D71STA00005G02) Part #: D71STA00005G02 Supplier: F4590
SPL-23366	System - Engine Change, eXcent Part #: JacXson U70 Supplier: FB365
STD-5468	Feeler Gauge, 0.002 - 0.008 inch
STD-24794	Block - Spacer, 1.25 x 1.25 x 5.0 inches (Wood or Plastic)

D. Consumable Materials

Reference	Description	Specification
D00006	Compound - Antiseize, Pure Nickel Special - Never-Seez NSBT-8N/-16N	

E. Location Zones

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

F. Power Plant Installation with the JacXson U70

SUBTASK 71-00-02-840-013-F00

(1) Make sure that the power plant is prepared for installation (TASK 71-00-02-400-801-F00).

SUBTASK 71-00-02-640-009-F00

(2) Lubricate the shear pin [264] on the strut interface of the aft engine mount with Pure Nickel Special compound, D00006 (Figure 415).

(a) Before you lubricate the shear pin [264], do a visual check of the shear pin for damage.

SUBTASK 71-00-02-640-010-F00

(3) Lubricate the two shear pins [242] on the forward engine mount with Pure Nickel Special compound, D00006 (Figure 414).

(a) Before you lubricate the shear pins [242], do a visual check of the shear pins for damage.

SUBTASK 71-00-02-840-014-F00

WARNING OBEY THE JACXSON U70 USER MANUAL WHEN YOU OPERATE THE JACXSON U70. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONNEL OR DAMAGE TO THE EQUIPMENT CAN OCCUR.

WARNING MAKE SURE THAT YOU HAVE A GOOD VIEW OF THE EQUIPMENT AND PERSONNEL WHEN YOU OPERATE THE JACXSON U70. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONNEL OR DAMAGE TO THE EQUIPMENT CAN OCCUR.

(4) Use the JACXSON U70 User Manual for the detailed instructions for the preparation and use of the JACXSON U70 during the engine installation procedure.

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SUBTASK 71-00-02-010-016-F00

(5) Make sure that the left and right fan cowl panels on the applicable engine are removed.

(a) If it is necessary, remove the left and right fan cowl panels (TASK 71-11-02-000-801-F00).

NOTE: Fan cowls must be removed to install an engine using the JACXSON U70.

SUBTASK 71-00-02-010-017-F00

(6) Make sure that the left and right thrust reversers on the applicable engine are opened.

(a) If it is necessary, open the thrust reversers (TASK 78-31-00-010-801-F00).

NOTE: The thrust reverser must be opened to install the engine using the JACXSON U70.

SUBTASK 71-00-02-860-033-F00

(7) Remove the covers from the open ends of the ducts on the engine and strut.

SUBTASK 71-00-02-840-015-F00

(8) Use the JACXSON U70 remote control in the CONFIGURE mode to set the engine and engine stand configurations.

(a) Select the option applicable to the engine, engine stand, and inlet or no inlet configuration.

SUBTASK 71-00-02-480-064-F00

(9) Make sure that the JACXSON U70 FWD forks are at position 1.

SUBTASK 71-00-02-480-077-F00

(10) Make sure that the JACXSON U70 AFT forks are at position 25.

SUBTASK 71-00-02-480-078-F00

(11) Make sure that the fork heights use the two middle pin hole locations as defined in the CONFIGURE mode of the remote control.

SUBTASK 71-00-02-480-065-F00

(12) Use the JACXSON U70 remote control to pick up and maneuver the engine trolley, SPL-14957, and engine cradle, SPL-14956, with the engine underneath the pylon until the engine trolley, SPL-14957, is aligned under the strut.

SUBTASK 71-00-02-480-066-F00

(13) Use the JACXSON U70 remote control to lift the engine trolley, SPL-14957, and engine cradle, SPL-14956, with the engine as follows:

(a) Slowly and carefully, start lifting the engine.

(b) Make sure that you observe these areas:

1) The forward side of the fan cowl support beam and aft side of the inlet cowl at the 12:00 location.

2) The fire extinguishing tube and precooler inlet duct flange.

3) The top of the exhaust nozzle and bottom of the strut fairing.

4) ENGINES WITH THE SHORT EXHAUST NOZZLE AND SHORT EXHAUST PLUG; The interference pin at the 12:00 o'clock position on the exhaust nozzle shelf and mating receptacle in the strut.

(c) When the engine is lifted, roll the engine approximately 6°, until it is parallel with the engine mounts on the strut.

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1) Lift the aft end of the engine slightly more than the forward end.

NOTE: Lifting the aft end of the engine more than the forward end will keep the above interference areas to a minimum.

NOTE: The forward mount can move in a forward and aft direction.

a) Make sure that the forward mount remains free as you engage the forward shear pins [242].

b) If the forward mount binds, lower the engine until the shear pins [242] are free.

(d) As you engage the shear pins [242] and shear pin [264], make sure that the engine mount surfaces are parallel with the strut.

1) Use the spacer block, STD-24794, between the mount surfaces to make sure that they are parallel to each other as possible.

(e) Record the measured loads on the all four lifting points of the JACXSON U70 before contacting the engine mounts to the pylon.

(f) Lift the engine until there is approximately 0.25 in. (0.64 cm) - 0.5 in. (1.27 cm) between the engine mounts and strut mounts as follows:

1) Make sure that you monitor the clearance between the engine and other parts while you lift the engine.

2) Operate the JACXSON U70 lifting beams until the clearance is equal and engine mounts are aligned with the strut mounts.

(g) Make sure that the exhaust nozzle is compatible with the strut (Figure 418).

NOTE: The short exhaust nozzle has an interference pin at the 12 o'clock position on the nozzle shelf. To use this nozzle, there must be a mating receptacle in the strut. If this receptacle is not found, the strut is not compatible with the exhaust nozzle. You must install the long exhaust nozzle and long exhaust plug on this engine.

(h) Slowly lift the engine until the engine mount surfaces are engaged with the strut surface.

SUBTASK 71-00-02-210-024-F00

(14) Examine the strut fireseal to make sure that it is seated correctly and does not protrude over the engine fan case.

(a) Use a plastic spatula at each corner of the seal to push the last horizontal section (3.0 in. (76.2 mm) - 4.0 in. (101.6 mm) long) of the seal forward over the edge of the fan case coaming.

1) This step prevents the protrusion of the fireseal corners into the bypass duct after the thrust reverser is closed.

(b) To examine the forward strut fireseal, do this task: Forward Strut Fireseal Inspection, TASK 54-54-00-200-802.

SUBTASK 71-00-02-820-044-F00

CAUTION

MONITOR THE LOADS ON THE LOAD MONITOR. MAKE SURE THAT THE LOADS ARE LESS THEN THE LIMITS. IF THE LOADS ARE MORE THAN THE LIMITS, DAMAGE TO THE STRUT AND ENGINE CAN OCCUR.

(15) Lift the engine until you see no clearance between the upper and lower parts of the (forward and aft) engine mounts as follows:

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(a) Make sure that the combined forward and combined aft loads do not exceed the stated loads below.

NOTE: The loads are displayed on the load monitor of the remote control.

NOTE: The load values below are added to the load of the engine and stand recorded earlier.

NOTE: The loads must be determined without personnel standing on the lifting platforms of the JacXson U70.

1) Preload values:

a) 800 lb (363 kg) - total (outboard and inboard) forward preload.

b) 1750 lb (794 kg) - total (outboard and inboard) aft preload.

SUBTASK 71-00-02-820-045-F00

(16) After the preload is applied, check the clearance between the forward and aft mounts.

(a) Use the Feeler Gauge, STD-5468, and insert the 0.0030 ±0.0005 in. (0.0762 ±0.0127 mm) feeler gauge between the strut mating surfaces and engine mounts.

1) If the feeler gauge does not contact the shear pins, the clearance/gap is acceptable.

2) If the feeler gauge does contact the shear pins, do these steps:

a) If there is a clearance in the aft mount, first shake the aft mount.

<1> If the clearance remains, operate the JACXSON U70 to slightly lower and readjust the engine.

b) If there is a clearance in the forward mount, first shake the forward mount.

<1> If the clearance remains, operate the JACXSON U70 to slightly lower and readjust the engine.

SUBTASK 71-00-02-210-025-F00

(17) ENGINES WITH THE SHORT EXHAUST NOZZLE AND SHORT EXHAUST PLUG; Make sure that the interference pin at the 12:00 o'clock position on the nozzle shelf is centered in the mating receptacle on the strut (Figure 418).

NOTE: The short exhaust nozzle has an interference pin at the 12 o'clock position on the nozzle shelf, To use this nozzle, there must be a mating receptacle in the strut. If this receptacle is not found, the strut is not compatible with the exhaust nozzle. You must install the long exhaust nozzle and long exhaust plug on this engine.

SUBTASK 71-00-02-420-042-F00

(18) Attach the power plant to the strut as follows:

NOTE: Before you tighten the eight bolts that attach the power plant to the strut, you must do a check of the self-locking feature on the forward and aft barrel nuts. If not already done, refer to the procedure, Prepare For The Power Plant Installation.

(a) Loosely install the forward engine mount to the strut (Figure 414):

1) Put the washer [244] on each bolt [241].

2) Make sure that the countersunk side of the washer [244] is adjacent to the head of the bolt [241].

3) Apply Pure Nickel Special compound, D00006, to the threads and shank of the bolts [241].

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4) Apply Pure Nickel Special compound, D00006, to the external cylindrical area of the barrel nuts [243].

NOTE: Do not apply Pure Nickel Special compound, D00006, to the self locking feature of the barrel nut.

5) Install the barrel nuts [243] in the holes on the forward mount.

6) Make sure that the barrel nuts [243] are correctly installed with the retainers at the bottom side.

7) Make sure that the indexing retainer is correctly installed in the indexing recess on the forward mount.

8) Install the four bolts [241] and four washers [244] in the forward engine mount.

(b) Install the bolts [241], but do not tighten the bolts [241].

(c) Loosely install the aft engine mount to the strut (Figure 415):

1) Install the washer [262] on each bolt [263].

2) Make sure that the countersunk side of the washer [262] is adjacent to the head of the bolt [263].

3) Apply Pure Nickel Special compound, D00006, to the threads and shank of the bolts [263].

4) Apply Pure Nickel Special compound, D00006, to the external cylindrical area of the barrel nuts [261].

NOTE: Do not apply Pure Nickel Special compound, D00006, to the self locking feature of the barrel nut.

5) Install the barrel nuts [261] in the holes on the strut.

6) Make sure that the barrel nuts [261] are correctly installed with the retainers on the top side.

7) Install the four bolts [263] and four washers [262] in the aft engine mount.

(d) Install the bolts [263], but do not tighten the bolts [263].

SUBTASK 71-00-02-420-043-F00

(19) Apply the initial torque with wrench, SPL-2106, as follows:

(a) Cross-tighten the forward engine mount bolts [241] to 45 ft-lb (61 N·m) - 55 ft-lb (75 N·m).

(b) Cross-tighten the aft engine mount bolts [263] to 80 ft-lb (108 N·m) - 98 ft-lb (133 N·m).

SUBTASK 71-00-02-420-044-F00

(20) Apply the final torque as follows:

(a) Torque the forward engine mount bolts [241] to 90 ft-lb (122 N·m) - 110 ft-lb (149 N·m).

(b) Torque the aft engine mount bolts [263] to 160 ft-lb (217 N·m) - 195 ft-lb (264 N·m).

SUBTASK 71-00-02-080-046-F00

CAUTION

MONITOR THE LOADS ON THE LOAD MONITOR. MAKE SURE THAT THE LOADS ARE LESS THEN THE LIMITS. IF THE LOADS ARE MORE THAN THE LIMITS, DAMAGE TO THE STRUT AND ENGINE CAN OCCUR.

(21) Slightly lower the eXcent engine change system, SPL-23366, to remove the preload.

(a) Operate the joystick on the remote control for the lift, tilt, and roll management as needed.

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SUBTASK 71-00-02-080-047-F00

(22) Disconnect the engine from the engine cradle, SPL-14956, per user manual.

SUBTASK 71-00-02-080-048-F00

(23) Use the JACXSON U70 remote control to lower the engine trolley, SPL-14957, as follows:

(a) Slowly and carefully, lower the engine trolley, SPL-14957, from the engine.

(b) When the engine is free of separation points and possible interference from the engine trolley, SPL-14957, and engine cradle, SPL-14956, operate the joystick on the remote control for the lift, tilt, and roll management to turn the engine stand to the horizontal direction until it is parallel to the ground.

SUBTASK 71-00-02-080-049-F00

(24) Use the JACXSON U70 remote control to carefully maneuver the engine trolley, SPL-14957, and engine cradle, SPL-14956, away from the aircraft.

SUBTASK 71-00-02-080-050-F00

(25) Use the JACXSON U70 remote control to disengage the JACXSON U70 from the engine trolley, SPL-14957.

SUBTASK 71-00-02-410-008-F00

(26) For the thumbnail fairing, do this task: Forward Fairing Installation, TASK 54-52-01-410-801.

SUBTASK 71-00-02-860-034-F00

(27) If the main and nose landing gear shock struts were extended, retract the struts to their usual service band limits.

(a) Do this task: Forward Fairing Installation, TASK 54-52-01-410-801.

END OF TASK

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POWER PLANT - MAINTENANCE PRACTICES (PRESERVATION AND DEPRESERVATION)

1. General

A. This procedure contains scheduled maintenance task data.

B. This procedures has these tasks:

(1) Dry-Out and Lubrication of the Engine Procedure

(2) Inlet Cowl Lipskin Protective Coating Procedure

(3) Preservation of an Engine (Task Selection)

(4) Depreservation of an Engine (Task Selection)

(5) Preservation of an Engine for Not More Than 10 Days (Engine On-Wing)

(6) Preservation Renewal of an Engine for Not More Than 10 Days (Engine On-Wing)

(7) Preservation of an Engine for Not More Than One Month (Engine On-Wing)

(8) Preservation Renewal of an Engine for Not More Than One Month (Engine On-Wing)

(9) Depreservation of an Engine, which was Preserved for Not More Than One Month (Engine On-Wing)

(10) Preservation of an Engine for Not More Than Three Months (Engine On-Wing)

(11) Preservation Renewal of an Engine for Not More Than Three Months (Engine On-Wing)

(12) Depreservation of an Engine, which was Preserved for Not More Than Three Month (Engine On-Wing)

(13) Preservation of an Engine from One Month to Not More Than One Year (Engine On-Wing)

(14) Preservation Renewal of an Engine from One Month to Not More Than One Year (Engine On-Wing)

(15) Depreservation of an Engine, which was Preserved from 1 Month to Not More Than One Year (Engine On-Wing)

(16) Preservation of an Engine for More Than the One Year Preservation Time Limit (Engine On-Wing)

C. These instructions are applicable only to power plants that are installed (on-wing).

(1) There are different instructions available from CFMI that are used for engines that are not installed (off-wing).

D. These tasks give the instructions for the preservation, preservation renewal and depreservation for a serviceable and a non-serviceable engine.

NOTE: For this procedure, a serviceable engine is defined as an engine that you can start. A non-serviceable engine is defined as an engine that cannot be started.

(1) The preservation procedures for a serviceable engine give the minimum recommended steps that are necessary to prevent these conditions:

(a) Corrosion

(b) Entry of unwanted material into the engine

(c) The effects of the climate and weather conditions.

(2) The preservation procedures for a non-serviceable engine give the minimum recommended steps that are necessary if you cannot start the engine.

(3) The preservation renewal procedure, if it is permitted, gives the instructions for the renewal of the preservation time.

(4) The depreservation procedure puts the installed engine back in operation.

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E. The preservation procedures are different for different periods of non-operational time, different types of preservation procedures, and if the power plant is serviceable or not serviceable.

(1) Power plant preservation is a flexible program that you can do, and must agree with the applicable weather and storage conditions.

(2) More care is necessary for a program for power plants that are operational in high humidity or large temperature changes or near a salt water area, than for the power plants that are in drier climates or less bad weather conditions.

(a) More care is necessary for power plants exposed to contaminants that promote corrosion (i.e deicing material).

(3) You must do a schedule for the preservation programs for power plants that are not serviceable to do the preservation renewal procedures and monitor the schedule regularly to make sure that you did the necessary procedure before the expiration time.

(4) In case of engine storage environmental humidity level that is higher than 70%, put in place desiccant bags with a humidity indicator in the inlet and the exhaust in order to monitor the humidity level.

NOTE: The best condition for engine storage is to keep an environment with less than 70% humidity.

(a) Make sure that the desiccant bags are not in contact with the engine hardware.

(b) If necessary, use vapor barrier film, G02455 [CP2160] to locally protect the engine hardware.

(c) Attach humidity indicator card (locally available) to monitor humidity level during the preservation period.

(d) Make sure desiccant bags and humidity indicators are easily accessible.

(5) When you use desiccants, you must do an inspection of them and change them regularly as applicable to the environmental conditions. Installation of vapor barrier film, G02455 [CP2160] in inlet and exhaust can help to correctly seal engine flow path to make sure of the desiccant bags effectiveness.

NOTE: This will make sure that the desiccant gives good protection.

(6) You must close the variable bleed valve (VBV) doors when you do the preservation and store the power plant.

NOTE: Make sure that no unwanted material goes into the core engine inlet through the VBV's.

(7) You must do the engine dry-out procedure after an engine had an in-flight shutdown, or when you do the preservation for a long time an engine is not serviceable.

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TASK 71-00-03-600-801-F00

2. Dry-Out and Lubrication of the Engine

(Figure 201, Figure 202, Figure 203, Figure 204)

A. General

(1) This task is to dry the forward sump, aft sump, and the gearbox of the engine with hot air when the engine can not be operated.

WARNING	DO THE DRY-OUT PROCEDURE IN AN AREA WITH A GOOD AIRFLOW. KEEP CLEAR OF THE ENGINE EXHAUST AREA. DO NOT BREATHE THE OIL MIST FROM THE ENGINE EXHAUST. IF YOU DO NOT OBEY THESE PRECAUTIONS, INJURY TO PERSONS CAN OCCUR

CAUTION	IF AN IN-FLIGHT SHUTDOWN OCCURRED ON THE APPLICABLE ENGINE AND THE ENGINE WILL NOT BE OPERATED FOR 24 HOURS AFTER A LANDING, YOU MUST DO THE ENGINE DRY-OUT PROCEDURE AS QUICKLY AS POSSIBLE. IF YOU DO NOT DO THE ENGINE DRY-OUT PROCEDURE IMMEDIATELY AFTER A LANDING, CONDENSATION CAN CAUSE CORROSION DAMAGE ON THE COMPONENTS WET WITH OIL.

(2) This task gives the dry-out and lubrication steps that are necessary for the engine that had an in-flight shutdown.

NOTE: You must do this procedure not longer than 24 hours after landing.

(3) If the engine is to be operated in the 24 hours after it landed, run the engine for a minimum of 20 minutes at low idle.

(4) If the engine run is performed in the 24 hours after landing, it is not necessary to do the Dry-Out and Lubrication of the Engine. In this case, run the engine for a minimum of 20 minutes at low idle.

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)
72-63-01-000-801-F00	Handcranking Drive Cover Removal (P/B 201)
72-63-01-400-801-F00	Handcranking Drive Cover Installation (P/B 201)
79-00-00-200-804-F00	Chip Detectors and Scavenge Screens - Inspection (P/B 601)
79-21-05-400-804-F00	Magnetic Chip Detector (MCD) Installation (P/B 401)
79-21-05-400-805-F00	Debris Monitoring System (DMS) Detector 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-2251	Adapter - Filter, Engine Dry Out Part #: 856A2659G01 Supplier: 58828
SPL-2253	Adapter - Air, Dry Out Engine Sumps Part #: 856A3810G01 Supplier: 58828

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(Continued)

Reference	Description
SPL-2448	Set - Tool, Engine Sumps, Drying and Relube Part #: 856A3620G02 Supplier: 58828
SPL-11931	Core Engine Sealing Plate and Locking Adapter Part #: 856A3728G01 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-1085	Gloves - Insulated

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine	
D00662 [CP5075]	Additive - Corrosion Preventive, Brayco 599	

E. Location Zones

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

F. Prepare for the Dry-Out and Lubrication Procedure

SUBTASK 71-00-03-620-001-F00

(1) For engines that are removed from the airplane, use the CFM Engine Shop Manual, Section 72-00-00, page 1201.

SUBTASK 71-00-03-040-001-F00

(2) For engines that are installed on the wing of the airplane, do these steps:

(a) Install a DO-NOT-OPERATE tag on the applicable start switch.

(b) Put the applicable engine start lever in the CUTOFF position

1) Install a DO-NOT-OPERATE tag.

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

SUBTASK 71-00-03-880-001-F00

(3) Find a hot air source with the specifications that follow:

NOTE: Use a ground air cart or high flow space heater.

(a) Output flow capacity - 120-130 PPM (55-60 KGPM).

(b) Temperature - 300-325 Degree F (150-165 Degree C).

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

SUBTASK 71-00-03-480-001-F00

(4) Install the core engine sealing plate as follows (Figure 201):

(a) Do this task: Handcranking Drive Cover Removal, TASK 72-63-01-000-801-F00.

(b) Install the sealing plate from the Locking Adapter, SPL-11931 with its bolts [1].

(c) Tighten the bolts to 101 ±5 in-lb (11 ±1 N·m).

LOM ALL

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SUBTASK 71-00-03-700-001-F00

> **CAUTION** IDENTIFY THE INITIAL POSITIONS OF THE CHIP DETECTORS. IF YOU DO NOT IDENTIFY THE INITIAL POSITIONS OF THE CHIP DETECTORS BEFORE YOU REMOVE THEM, INCORRECT ANALYSIS CAN OCCUR.

(5) To examine the chip detectors, do this task: Chip Detectors and Scavenge Screens - Inspection, TASK 79-00-00-200-804-F00.

SUBTASK 71-00-03-480-002-F00

(6) Prepare the re-lubrication manifold from tool set, SPL-2448 as follows (Figure 202):

(a) Remove the protective covers from the relubrication manifold openings.

(b) Remove the knurled protectors from the pushers.

(c) Examine the O-rings on the pushers.

1) Replace the O-rings if you find damage.

(d) Remove the knurled bolts from the relubrication manifold.

(e) Remove the lubrication manifold from the plate.

(f) Remove the pushers from the plate.

> **CAUTION** DO NOT APPLY FORCE TO THE PUSHER TO INSTALL IT INTO THE LUBRICATION UNIT. IF YOU APPLY FORCE TO THE PUSHER, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(g) Carefully install one of the pushers (with locking pins) into the aft sump hole of the lubrication unit housing.

1) Align the pusher keys with the lubrication unit sleeve keyways.

2) Push until the pusher is fully in the hole.

3) Turn the pusher one quarter of a turn clockwise to engage in the keyways.

(h) Make sure the pusher is in its locked position:

1) Pull the pusher down.

2) Lightly turn the pusher from side to side to make sure the pusher is 'snapped' down.

(i) Set the plate (from aft side) into the groove of the pusher.

(j) Move the plate forward to engage the pusher.

> **CAUTION** DO NOT APPLY FORCE TO THE PUSHER TO INSTALL IT INTO THE LUBRICATION UNIT. IF YOU APPLY FORCE TO THE PUSHER, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(k) Carefully install one of the pushers (without locking pins) into the forward sump hole of the lubrication unit housing.

1) Push until the pusher is fully in the hole.

(l) Hold the pusher tightly with one hand.

(m) Push the plate forward with your other hand until it move into the pusher groove.

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CAUTION DO NOT APPLY FORCE TO THE PUSHER TO INSTALL IT INTO THE LUBRICATION UNIT. IF YOU APPLY FORCE TO THE PUSHER, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(n) Carefully install the last pusher (with locking pins) into the TGB/AGB hole of the lubrication unit housing:

1) Align the pusher keys with the lubrication unit sleeve keyways.
2) Push until the pusher is fully in the hole.
3) Turn the pusher one quarter of a turn clockwise to engage the key in the keyways.

(o) Make sure the pusher is in its locked position:

1) Pull the pusher down.
2) Lightly turn the pusher from side to side.

NOTE: This is to make sure the pusher is 'snapped' down.

(p) Push the plate forward into the groove of the last pusher.

1) Make sure the plate fully engages all three pushers.

(q) Remove the protective covers from the air filter openings.

(r) Install the relubrication manifold on the three pushers with the air supply connector pointed aft.

(s) Attach the manifold to the plate with the 4 knurled bolts.

1) Use your hand to tighten the bolts.

(t) Make sure the manifold is fully against the plate.

(u) Fill the oil container of the relubrication tool set with one of these solutions:

1) Use 1.7 pints (800 ml) of additive, D00662 [CP5075].
2) To make the alternate oil solution, do these steps:
   a) Use 0.85 pints (400 ml) of anti-corrosion additive (CP2309).
   b) Use 0.85 pints (400 ml) of oil, D00599 [CP2442].

(v) Connect the air pressure supply line to the nipple of the oil container.

(w) Connect the oil supply line to the nipple of the oil container.

(x) Make sure the oil supply valve is closed.

G. The Power Plant Dry-Out Procedure

SUBTASK 71-00-03-600-001-F00

(1) Do the power plant dry-out procedure as follows (Figure 203):

(a) Use the adapter, SPL-2251 to examine the air filter for unwanted material.

1) Blow dry, filtered, compressed air through hoses to remove all unwanted material.

(b) Do these steps to install the air adapter, SPL-2253 on the engine exhaust plug:

1) Install the half flanges on the engine exhaust plug.
2) Tighten the screw to 447.5 ±22.5 in-lb (50.6 ±2.5 N·m).
3) Put the tubing at the end of exhaust plug.
4) Attach the tubing to the half flanges with the four threaded rods.
5) Tighten the four nuts.

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(c) Do these steps to install the first hose of the adapter, SPL-2251 to the hot air source:

1) Install one end to the hot air supply outlet.

2) Install the other end to the air filter inlet.

3) Attach each hose end with a clamp.

(d) Do these steps to install the second hose of the adapter, SPL-2251 to the air adapter, SPL-2253:

1) Install one end to the air filter outlet.

2) Install the other end to the air adapter, SPL-2253.

3) Attach each hose end with a clamp.

(e) Install the protective mat, STD-585 in the inlet on the full lower half of the inlet cowl.

WARNING STAY CLEAR OF THE RELUBRICATION MANIFOLD INSTALLED ON THE LUBRICATION UNIT BY A MINIMUM OF 20 FEET (6 METERS). THE RELUBRICATION MANIFOLD BLOWS HOT AIR AND CAN CAUSE INJURY TO PERSONS.

(f) Turn ON the hot air source.

1) Let the pressure increase slowly to the operation level.

2) The air temperature must be 300-325 degrees F (150-165 degrees C).

(g) Do the dry-out cycle for a minimum of 20 minutes.

WARNING DO NOT MANUALLY TURN THE FAN ROTOR WITHOUT GOOD GLOVES. MAKE SURE YOU ARE ON A SAFE SURFACE WHILE YOU TURN THE FAN. BE VERY CAREFUL WHILE YOU TURN THE FAN TO PREVENT INJURY.

1) Use insulated gloves, STD-1085 to turn the fan rotor slowly in a counterclockwise direction.

NOTE: One full turn in the usual operational direction.

2) Turn the fan rotor slowly one full turn every five minutes for 20 minutes.

(h) Turn OFF the hot air source when you complete the cycle time.

(i) Remove the hot air source hose from the adapter, SPL-2251.

(j) Remove the air adapter, SPL-2253 from the engine exhaust plug.

H. The Lubrication Procedure

SUBTASK 71-00-03-480-003-F00

(1) Do the lubrication procedure as follows (Figure 204):

(a) Move the hot air source hose to the air supply connector of the relubrication manifold.

1) Attach the hose end with a clamp.

(b) Turn ON the hot air source.

1) Let the pressure increase slowly to the operation level.

2) The air temperature must be 300-325 degrees F (150-165 degrees C).

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> **WARNING** STAY CLEAR OF THE ENGINE EXHAUST AREA. IF YOU BREATHE THE OIL MIST FROM THE ENGINE EXHAUST, INJURY CAN OCCUR.

(c) Open the oil supply valve when you see hot air move from the engine exhaust.

> **WARNING** DO NOT MANUALLY TURN THE FAN ROTOR WITHOUT GOOD GLOVES. MAKE SURE YOU ARE ON A SAFE SURFACE WHILE YOU TURN THE FAN. BE VERY CAREFUL WHILE YOU TURN THE FAN TO PREVENT INJURY.

(d) Use insulated gloves, STD-1085 to turn the fan rotor slowly in a counterclockwise direction.

NOTE: One full turn in the usual operational direction.

(e) Turn the N2 rotor slowly one full turn each minute.

(f) Move the fan rotor until the oil container is empty.

NOTE: This usually takes five to six minutes.

(g) Do these steps when the oil container is empty:

1) Close the oil supply valve.

2) Shut OFF the hot air source.

I. The Dry-Out and Lubrication Equipment Removal

SUBTASK 71-00-03-080-001-F00

(1) Do these steps to remove the Dry-Out and Lubrication Equipment (Figure 201, Figure 202).

(a) Remove the hot air source hose from the relubrication manifold and the air filter outlet.

(b) Remove the hose from the air filter inlet and the hot air source.

(c) Remove the oil supply line from the oil container.

(d) Remove the air pressure supply line from the oil container.

(e) Do these steps to remove the relubrication manifold and plate:

1) Remove the four knurled bolts

2) Remove the relubrication manifold.

3) Remove the forward sump pusher while you move the plate:

a) Push the pusher in and turn one quarter turn counterclockwise to release the locking keys.

4) Do these steps to remove the aft sump pusher and the TGB/AGB pusher.

a) Push each pusher in and turn one quarter turn counterclockwise to release the locking keys.

5) Install protective covers on the relubrication manifold openings.

(f) Examine the air filter for unwanted material.

(g) Clean the air filter if there is unwanted material on it.

(h) Install protective covers on the air filter openings.

SUBTASK 71-00-03-410-001-F00

(2) Do this task: Magnetic Chip Detector (MCD) Installation, TASK 79-21-05-400-804-F00 or Debris Monitoring System (DMS) Detector Installation, TASK 79-21-05-400-805-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

SUBTASK 71-00-03-080-002-F00

(3) Remove the core engine sealing plate as follows:

(a) Remove the bolts [1].

(b) Remove the plate.

SUBTASK 71-00-03-410-002-F00

(4) Do this task: Handcranking Drive Cover Installation, TASK 72-63-01-400-801-F00.

LOM ALL

J. Put the Engine Back to its Usual Condition

SUBTASK 71-00-03-840-001-F00

(1) Do these steps:

(a) Remove the protective mat, STD-585 from the inlet cowl.

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

(c) Remove the DO-NOT-OPERATE tag on the applicable start switch.

(d) Remove the DO-NOT-OPERATE tag from the engine start lever.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G83968 S0006581981_V2

Core Engine Sealing Plate Installation
Figure 201/71-00-03-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Engine Sumps Relubrication Manifold Tool Set
Figure 202/71-00-03-990-802-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03840-00-B
G83971 S0006581983_V2

Engine Sumps Relubrication Manifold Tool Set
Figure 202/71-00-03-990-802-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Engine Sumps Relubrication Manifold Tool Set
Figure 202/71-00-03-990-802-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ENGINE OFF WING LAYOUT
(ENGINE ON WING LAYOUT IS EQUIVALENT)

S-M56-MM-03841-00
G83977 S0006581985_V3

Dry-Out Equipment General Layout
Figure 203/71-00-03-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ENGINE OFF WING LAYOUT
(ENGINE ON WING LAYOUT IS EQUIVALENT)

S-M56-MM-03843-00-B
G83978 S0006581986_V2

Relubrication Equipment General Layout
Figure 204/71-00-03-990-804-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-03-600-815-F00

3. Inlet Cowl Lipskin Protective Coating Procedure

(Figure 205)

A. General

(1) This task provides instructions to apply a protective coating on the inlet cowl lipskin to prevent corrosion.

NOTE: It is acceptable to leave the inlet cowl lipskin bare if the engine is preserved for 7 days or less.

NOTE: It is recommended checking the lipskins for visual appearance every two weeks for the first two months and reapplying protective coating as necessary. Operators can then adjust their schedule based on operational environment and use of the aircraft.

LOM ALL POST SB 737-71-1717

NOTE: This procedure is not applicable if heat resistant aluminized paint (HRAP) has been applied to the inlet lip skin. If HRAP has been applied, no additional corrosion protections are required on the lip skin.

LOM ALL

(2) The task includes the procedure to remove the protective coating.

(3) This task should be done if the engine (on-wing) is preserved for more than 7 days.

(4) There are three methods to preserve the inlet cowl lipskin:

(a) Method 1 - Apply the corrosion preventative compound X20-18 compound, G51625, to the lipskin.

NOTE: The X20-18 compound, G51625, can be left on the lipskin during engine idle runs if the engine anti-ice system is deactivated.

NOTE: If the engine anti-ice system is to be turned on during engine idle runs, the X20-18 compound, G51625, coating must be removed and reapplied after the engine run.

NOTE: The X20-18 compound, G51625, coating must be removed prior to return to service.

NOTE: Please refer to the supplier instructions for additional information regarding the application and removal of X20-18 compound, G51625.

(b) Method 2 - Apply the peelable protective coating system, Protectapeel SC-1074B-1 coating, C50013/Protectapeel SC-1090 topcoat, C50014, PPG Z6160 coating, C50411/PPG Z6148 topcoat, C50412, or Gardo Protect 350 coating, C50410.

NOTE: Boeing recommends that peelable protective coatings be applied to the inlet lipskin when airplanes are stored indoors or when using a typical inlet cover that covers the inlet lipskin and nacelles.

NOTE: The consumable materials Protectapeel SC-1074B-1 coating, C50013, and Protectapeel SC-1090 topcoat, C50014, are now discontinued by the manufacturer. The coatings can still be used as a coating system and operators are encouraged to use any existing stock before using the alternative materials PPG Z6160 coating, C50411/PPG Z6148 topcoat, C50412, or Gardo Protect 350 coating, C50410.

NOTE: Protectapeel SC-1074B-1 coating, C50013/Protectapeel SC-1090 topcoat, C50014, PPG Z6160 coating, C50411/PPG Z6148 topcoat, C50412, or Gardo Protect 350 coating, C50410, must be removed prior to engine runs.

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(c) Method 3 - Weekly inspection for corrosion and cleaning.

B. References

Reference	Title
20-10-34-110-802	Clean Bare, Clad, or Plated Metal with Solvent (P/B 701)
30-00-00-040-803	MMEL 30-03 (DDPG) Preparation - Engine and Nose Cowl Anti-Ice Valves Inoperative (P/B 901)
30-00-00-440-803	MMEL 30-03 (DDPG) Restoration - Engine and Nose Cowl Anti-Ice Valves Inoperative (P/B 901)
SOPM 20-30-03	General Cleaning Procedures

C. Tools/Equipment

Reference	Description
STD-1064	Scraper - Phenolic, Hard Resin

D. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
B00666	Solvent - Methyl Propyl Ketone	BMS11-9
C50013	Coating - Protective, Strippable, Sprayable - Protectapeel SC-1074B-1 (Use Until Stock Depleted)	
C50014	Topcoat - Protective, Water-Based Coating Protectapeel SC-1090 (Use Until Stock Depleted)	
C50410	Coating - Peelable - Gardo Protect 350	BAC5034-1
C50411	Coating - Basecoat, Peelable, Preservation - PPG Z6160	BAC5034-1
C50412	Topcoat - Water-Borne, Preservation - Z6148	BAC5034-1
G00834	Cloth - Lint-free Cotton	
G02356	Tape - Saint Gobain Rulon J Tape	
G02418	Water - De-ionized	
G50933	Cloth - Cleaning, Low-Lint Cloth (General Use)	A-A-59323 Type II (Supersedes MIL-C-85043)
G51625	Compound - Corrosion Preventive (AECI 3 X20-18)	

E. Location Zones

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

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Method 1 - Protective Coating Application

WARNING

MAKE SURE THAT YOU READ THE MANUFACTURER'S SAFETY DATA SHEET (MSDS) FOR THE MATERIALS YOU WILL USE, AND WEAR THE PROTECTIVE CLOTHING AND EQUIPMENT IF IT IS SPECIFIED. IF YOU DO NOT OBEY, INJURY TO PERSONS CAN OCCUR.

SUBTASK 71-00-03-100-002-F00

(1) If it is necessary, remove existing pitting, corrosion and surface oxidation from the inlet cowl lipskin.

(a) Use the applicable Structural Repair Manual (SRM) procedure.

(b) Make sure that the minimum thickness requirements per the SRM are met.

SUBTASK 71-00-03-100-003-F00

(2) Prepare the lipskin for the application of X20-18 compound, G51625.

(a) Clean the lipskin with XS3 Aircraft Wash and XG5 Hard Surface Cleaner furnished from the X20-18 compound, G51625, vendor prior to application.

NOTE: X20-18 compound, G51625, will not remove corrosion but will act to assist in preventing future corrosion. It is acceptable to perform general solvent cleaning per Clean Bare, Clad, or Plated Metal with Solvent, TASK 20-10-34-110-802 as an alternative to the products recommended by Grantize.

(b) Remove any dust, dirt, unwanted material, oil, grease or moisture.

SUBTASK 71-00-03-950-005-F00

(3) Mask the lipskin.

(a) Mask the inner and outer barrel assembly and the fan compartment.

(b) Make sure that the sealant common to the lipskin is protected.

(c) It is permitted for about 0.1 in. (2.54 mm) of the lipskin to be unprotected.

(d) Apply Rulon J tape, G02356, to the three radial seams of the lipskin.

(e) Do not apply the protective coating to the acoustic barrel area.

SUBTASK 71-00-03-370-005-F00

(4) Prepare for the application of X20-18 compound, G51625, to the lipskin.

(a) Make sure that the lipskin surface temperature is between 67.5 ±22.5°F (19.7 ±12.5°C).

(b) Avoid application of X20-18 compound, G51625, when the ambient humidity is above 90%.

(c) Apply a few drops of the X20-18 compound, G51625, to a soft cotton applicator. Do not saturate the applicator to the point of dripping.

NOTE: If the X20-18 compound, G51625, pours out in a cloudy or milky consistency, do not use it. Discard the remaining contents.

SUBTASK 71-00-03-370-006-F00

(5) Apply X20-18 compound, G51625, to the lipskin.

(a) Apply a thin film of X20-18 compound, G51625, to an area of 2.5 ±0.5 ft^2 (0.2 ±0.0 m^2) in a sweeping motion.

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1) Do not allow the X20-18 compound, G51625, to dry. Wipe the treated area immediately with a dry and soft cloth until all wet film is buffed off and no longer visible. Rotate the cloth as necessary when absorbency decreases.

NOTE: The initial application of the X20-18 compound, G51625, may remove remaining amounts of polishing residue if cleaning wasn't completed adequately. If only a small amount; proceed with application. Otherwise, repeat cleaning steps in previous section.

NOTE: Direct exposure to sunlight or warm surface temperatures can result in streaking.

(b) Repeat application process until entire lipskin is treated. The process is complete when three (3) coats are applied.

NOTE: The process is complete when three coats are applied.

1) Allow a minimum of 30 minutes between coat applications.

NOTE: X20-18 compound, G51625, has a 12 hour cure time.

SUBTASK 71-00-03-370-007-F00

(6) It is recommended to repolish and reapply X20-18 compound, G51625, at a cycle of every ninety (90) days or after the surface loses its shine. Whichever occurs first.

NOTE: Boeing recommends a schedule for checking the lipskin visual appearance every two (2) weeks for the first two (2) months and then adjusting the schedule according to operator experience based on environment and use of airplane.

(a) To detect the presence of X20-18 compound, G51625, on bare metal surfaces, perform one of the following:

1) Use Rulon J tape, G02356, fold one end back to make a tab at the end. Firmly press the tape on a subject treated area and suspected untreated area. Pull the tab back slowly at a 90 degree angle to the surface. Noticeable ease in resistance will take place on a treated surface compared to a non-treated surface.

2) Spray clean deionized water on the surface. Moisture will bead up on a treated surface when compared to a non-treated surface.

SUBTASK 71-00-03-950-006-F00

(7) Remove the masking material from the inner and outer barrels and the fan compartment.

SUBTASK 71-00-03-040-002-F00

(8) If engine idle runs will be performed throughout aircraft storage, it is required to deactivate the engine anti-ice system if X20-18 compound, G51625, is still applied to the lipskin. Deactivating the engine anti-ice system will allow the X20-18 compound, G51625, to be left on during engine runs.

NOTE: Failure to keep the Engine Anti Ice deactivated during the entire engine run with AECI 3 applied to the lipskin would cause AECI 3 burning, and will result in permanent staining of the lipskin.

(a) Make sure that the X20-18 compound, G51625, has cured for 12 hours before performing engine runs.

(b) Deactivate the engine anti-ice system with the engine anti-ice valve inoperative CLOSED (TASK 30-00-00-040-803).

NOTE: The system can be left deactivated throughout storage. There is no need to do the restoration procedure after each engine run.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G. Method 2 - Protective Coating Application

WARNING

MAKE SURE THAT YOU READ THE MANUFACTURER'S SAFETY DATA SHEET (MSDS) FOR THE MATERIALS YOU WILL USE, AND WEAR THE PROTECTIVE CLOTHING AND EQUIPMENT IF IT IS SPECIFIED. IF YOU DO NOT OBEY, INJURY TO PERSONS CAN OCCUR.

SUBTASK 71-00-03-100-005-F00

(1) If it is necessary, remove existing pitting, corrosion and surface oxidation from inlet cowl lipskin.

(a) Use the applicable SRM procedure.

(b) Make sure that the minimum thickness requirements per the SRM are met.

SUBTASK 71-00-03-100-001-F00

(2) Clean the lipskin and get a water break free surface.

(a) Use a lint-free cloth, G00834, and solvent, B00666, to wipe the lipskin.

(b) Remove any dust, dirt, unwanted material, oil, grease or moisture.

SUBTASK 71-00-03-950-003-F00

(3) Mask the lipskin.

(a) Mask the inner and outer barrel assembly and the fan compartment.

(b) Make sure that the sealant common to the lipskin is protected.

(c) It is permitted for about 0.1 in. (2.54 mm) of the lipskin to be unprotected.

(d) Apply Rulon J tape, G02356, to the three radial seams of the lipskin.

(e) Do not apply the protective coating to the acoustic barrel area.

SUBTASK 71-00-03-370-001-F00

(4) Prepare the basecoat Protectapeel SC-1074B-1 coating, C50013.

(a) Let the material get to 70°F (21.1°C) - 80°F (26.7°C).

(b) Mix the material to a homogeneous consistency.

(c) Standard spray equipment with an atomization pressure of 75 psi (517 kPa) and pot pressure of 5 psi (34.5 kPa) is recommended to get the proper fluid delivery.

SUBTASK 71-00-03-370-002-F00

(5) Apply the basecoat Protectapeel SC-1074B-1 coating, C50013, to the lipskin.

(a) Apply a 4 mils (0.004 in.) layer in one application with the spray equipment.

(b) Let this layer dry for 1 hour.

NOTE: You can decrease this time with warm air or infrared lamps. Protect the area from freezing.

(c) Apply a second layer to get a total of 8 mils (0.008 in.) thickness.

SUBTASK 71-00-03-370-003-F00

(6) Prepare the Protectapeel SC-1090 topcoat, C50014.

(a) Let the material get to 70°F (21.1°C) - 80°F (26.7°C).

(b) Mix the material to a homogeneous consistency.

(c) Apply the topcoat in two separate layers using standard spray equipment with an atomization pressure of 75 psi (517 kPa) and pot pressure of 5 psi (34.5 kPa).

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SUBTASK 71-00-03-370-004-F00

(7) Apply the Protectapeel SC-1090 topcoat, C50014, to the lipskin.

(a) Make sure that the basecoat is dry (no gloss).

(b) The temperature at the time of application and drying should be a minimum of 40°F (4.4°C). Protect the area from freezing.

(c) Dry apply the first layer of topcoat over the basecoat with a wide fan and the gun held about 18 in. (45.7 cm) from the surface.

1) This discontinuous layer should barely cover the black basecoat to minimize bubbles in the protective coating.

(d) Apply a second layer in a usual spray application to get a thickness of 3 mils (0.003 in.) of dry film.

(e) The basecoat and topcoat will fully dry together to make a rain resistant coating with these conditions:

1) Two hours of drying time with conditions of 50% relative humidity and 70°F (21.1°C).

2) The lipskin can be dried outside if there is no direct rain and the temperature is about 50°F (10.0°C).

SUBTASK 71-00-03-370-008-F00

(8) Prepare the PPG Z6160 coating, C50411.

NOTE: PPG Z6160 coating, C50411, can be used alone or for added exterior durability it can be over coated with Z6148 preservation topcoat.

(a) Let the PPG Z6160 coating, C50411, get to 70°F (21.11°C) – 80°F (26.67°C).

(b) Fully mix the PPG Z6160 coating, C50411, in the container.

NOTE: If a mechanical paint shaker is used, the recommended mix time is 5 minutes.

(c) Apply the basecoat with standard spray equipment.

NOTE: Use spray equipment with an atomization pressure of 75 psi (517 kPa) and a pot pressure of 5 psi (34 kPa) to make sure that the fluid is delivered correctly.

SUBTASK 71-00-03-370-009-F00

(9) Apply the PPG Z6160 coating, C50411, to the lip skin.

(a) Apply a 4 mils (0.004 in.) layer in one application with the spray equipment.

(b) Let the first coat dry for one hour.

NOTE: Drying can be accelerated by the circulation of warm air.

(c) Apply a second 4 mils (0.004 in.) layer to achieve a total coating of 8 mils (0.008 in.) thickness.

(d) Let the second coat dry for one hour.

SUBTASK 71-00-03-370-010-F00

(10) Prepare the PPG Z6148 topcoat, C50412.

(a) Let the material get to 70°F (21.11°C) – 80°F (26.67°C).

(b) Fully mix the PPG Z6160 coating, C50411, in the container.

NOTE: If a mechanical paint shaker is used, the recommended mix time is 5 minutes.

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(c) Apply the topcoat with standard spray equipment.

NOTE: Use spray equipment with an atomization pressure of 75 psi (517 kPa) and a pot pressure of 5 psi (34 kPa) to make sure that the fluid is delivered correctly.

SUBTASK 71-00-03-370-011-F00

(11) Apply the PPG Z6148 topcoat, C50412, to the lip skin.

(a) Make sure that the basecoat is dry (no gloss).

(b) Apply a 2 mils (0.002 in.) layer in one application with the spray equipment.

(c) Allow to dry for two hours.

NOTE: Full cure is achieved in 16 hours.

SUBTASK 71-00-03-370-012-F00

(12) Prepare the Gardo Protect 350 coating, C50410.

(a) Let the material get to 70°F (21.11°C) – 80°F (26.67°C).

(b) Fully mix the Gardo Protect 350 coating, C50410, in the container.

(c) Apply the coating with standard spray equipment.

NOTE: Use spray equipment with an atomization pressure of 75 psi (517 kPa) and a pot pressure of 5 psi (34 kPa) to make sure that the fluid is delivered correctly.

SUBTASK 71-00-03-370-013-F00

(13) Apply the Gardo Protect 350 coating, C50410, to the lip skin.

(a) Apply a 2 mils (0.002 in.) - 3 mils (0.003 in.) layer in one application with the spray equipment.

(b) Allow to dry for 15 to 30 minutes.

SUBTASK 71-00-03-950-004-F00

(14) Remove the masking material from the inner and outer barrels and the fan compartment.

H. Method 3 - Weekly Inspection for Corrosion and Cleaning

SUBTASK 71-00-03-100-004-F00

(1) If a protective coating is not available, do the following at least once (1) weekly. Daily inspection and cleaning is preferred.

NOTE: Frequency of inspections will depend on the environmental condition that the airplane is stored in. Inspections and cleaning should be done at a frequency that ensures the lipskin does not have corrosive substance build up or prolonged moisture pooling on the lipskin surface.

(a) With a soft low-lint cleaning cloth, G50933, moisten with alcohol, B00130, (preferred) or with de-ionized water, G02418, clean the nose cowl lipskin (TASK 20-10-34-110-802).

(b) If corrosion is found, remove per the applicable SRM procedure. Make sure that the minimum thickness requirements per SRM are met.

I. Protective Coating Removal

SUBTASK 71-00-03-000-001-F00

(1) Do one of these steps to remove the protective coating from the lipskin:

(a) If X20-18 compound, G51625, was used, perform the following steps:

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1) Clean the lipskin with XS3 Aircraft Wash and XG5 Hard Surface Cleaner furnished from the X20-18 compound, G51625, vendor.

   NOTE: It is acceptable to perform general solvent cleaning per SOPM 20-30-03 as an alternative to the products recommended by Granitize.

2) Clean the surface until there are no signs of X20-18 compound, G51625, present on the lipskin.

   a) To detect the presence of X20-18 compound, G51625, on bare metal surfaces, perform one of the following:

      <1> Use Rulon J tape, G02356, to make a tab at the end. Firmly press the tape on a subject treated area and suspected untreated area. Pull the tab back slowly at a 90 degree angle to the surface. Noticeable ease in resistance will take place on a treated compared to the untreated surface.

      <2> Spray clean de-ionized water, G02418, on the surface. Moisture will bead up on a treated surface when compared to a non-treated surface.

3) Do this task if the aircraft will be put back into service: MMEL 30-03 (DDPG) Restoration - Engine and Nose Cowl Anti-Ice Valves Inoperative, TASK 30-00-00-440-803.

(b) If Protectapeel SC-1074B-1 coating, C50013/Protectapeel SC-1090 topcoat, C50014, PPG Z6160 coating, C50411/PPG Z6148 topcoat, C50412, or Gardo Protect 350 coating, C50410, was used, perform one of the following steps:

1) Use your hand to peel off the coating or use clean shop air.

   a) Refer to the coating manufacturer's recommendations for more details.

2) Do not use hand tools harder than the aluminum lipskin to prevent damage.

CAUTION SCRIBE MARKS OR CUTS WHICH GO INTO THE METAL SURFACE OF THE LIP SKIN CAN CAUSE DAMAGE TO THE LIP SKIN. THE DAMAGE CAUSES LOSS OF FATIGUE LIFE OF THE METAL.

(c) If necessary, use a hard resin phenolic scraper, STD-1064, (or equivalent), to help you remove the peelable coating with these conditions:

1) The tool does not go completely through the coating

2) The tool does not score or mar the lipskin

3) Use a scraper which has an adjustable depth of cut on the coating.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Inlet Cowl Lipskin Protective Coating
Figure 205/71-00-03-990-808-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-03-600-802-F00

4. Preservation of An Engine On-Wing (Task Selection)

A. General

(1) The purpose of this task is to permit you to select the applicable method to do the engine preservation.

(2) This procedure is used for an engine that is installed on the airplane (on-wing).

B. Consumable Materials

Reference	Description	Specification
G02455 [CP2160]	Film, Vapor Barrier, Polyethylene	L-P-512

C. Location Zones

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

D. Procedure

SUBTASK 71-00-03-620-002-F00

(1) From the time specification for the preservation tasks, select the applicable task to do the engine preservation:

(a) Do this task: Preservation of an Engine for Not More Than 10 Days (Engine On-Wing), TASK 71-00-03-600-804-F00.

(b) Do this task: Preservation of an Engine for Not More Than One Month (Engine On-Wing), TASK 71-00-03-600-806-F00.

(c) Do this task: Preservation of an Engine for Not More Than Three Months (Engine On-Wing), TASK 71-00-03-600-809-F00.

(d) Do this task: Preservation of an Engine From One Month to One Year (Engine On-Wing), TASK 71-00-03-600-811-F00.

SUBTASK 71-00-03-620-043-F00

(2) These tasks give the instructions for the preservation, preservation renewal and depreservation for a serviceable and a non-serviceable engine.

NOTE: For this procedure, a serviceable engine is defined as an engine that you can start. A non-serviceable engine is defined as an engine that cannot be started.

(a) The preservation procedures for a serviceable engine gives the minimum recommended steps that are necessary to prevent these conditions:

1) Corrosion

2) Entry of unwanted material into the engine

3) The effects of the climate and weather conditions.

(b) The preservation procedures for a non-serviceable engine gives the minimum recommended steps that are necessary if you cannot start the engine

(c) The preservation renewal procedure, if it is permitted, gives the instructions for the renewal of the preservation time.

(d) The depreservation procedure puts the installed engine back in operation.

SUBTASK 71-00-03-620-044-F00

(3) The preservation procedures are different for different periods of non-operational time, different types of preservation procedures, and if the power plant is serviceable or not serviceable.

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(a) Power plant preservation is a flexible program that you can do, and must agree with the applicable weather and storage conditions.

(b) More care is necessary for a program for power plants that are operational in high humidity or large temperature changes or near a salt water area, than for the power plants that are in drier climates or less bad weather conditions.

1) More care is necessary for power plants exposed to contaminants that promote corrosion (i.e deicing material).

(c) You must do a schedule for the preservation programs for power plants that are not serviceable to do the preservation renewal procedures and monitor the schedule regularly to make sure that you did the necessary procedure before the expiration time.

(d) In case of engine storage environmental humidity level that is higher than 70%, put desiccant bags in position with a humidity indicator in the inlet and the exhaust in order to monitor the humidity level.

NOTE: The best condition for engine storage is to keep an environment with less than 70% relative humidity.

1) Make sure that the desiccant bags are not in contact with the engine hardware.

2) If necessary, use vapor barrier film, G02455 [CP2160] to locally protect the engine hardware.

3) Attach humidity indicator card (locally available) to monitor humidity level during the preservation period.

4) Make sure desiccant bags and humidity indicators are easily accessible.

(e) When you use desiccants, you must do an inspection of them and change them regularly as applicable to the environmental conditions.

NOTE: Installation of vapor barrier film, G02455 [CP2160] in inlet and exhaust can help to correctly seal engine flow path to make sure of desiccant bags effectiveness.

NOTE: This will make sure that the desiccant gives good protection.

(f) You must close the variable bleed valve (VBV) doors when you do the preservation and store the power plant.

NOTE: Make sure that no unwanted material goes into the core engine inlet through the VBV's.

(g) You must do the engine dry-out procedure after an engine had an in-flight shutdown, or when you do the long term preservation for a not serviceable engine.

——— END OF TASK ———

TASK 71-00-03-600-803-F00

5. Depreservation of an Engine On-Wing (Task Selection)

A. General

(1) The purpose of this task is to permit you to select the applicable method to do the engine depreservation.

(2) This procedure is used for an engine that is installed on the airplane (on-wing).

B. References

Reference	Title
71-00-00-700-821-F00	Dry Motor the Engine (P/B 201)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C. Location Zones

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

D. Depreservation of an Engine On-Wing

SUBTASK 71-00-03-630-001-F00

(1) From the time specification for the depreservation tasks, select the applicable task to do the engine depreservation:

> **CAUTION** DO NOT DRY-MOTOR THE ENGINE BEFORE YOU MAKE SURE THAT THE SPAR-VALVE CLOSED LIGHT (ON THE P5 OVERHEAD PANEL) STAYS BRIGHT. IF YOU DO NOT OBEY, DAMAGE TO THE ENGINE CAN OCCUR.

> **CAUTION** MAKE SURE THAT THE APPLICABLE FOUR LOW PRESSURE LIGHTS ON THE P5 OVERHEAD PANEL ARE OFF. IF YOU DRY-MOTOR THE ENGINE AND APPLICABLE LOW PRESSURE LIGHTS ARE ON, DAMAGE TO THE ENGINE CAN OCCUR.

> **CAUTION** DO NOT DRY-MOTOR THE ENGINE BEFORE YOU MAKE SURE THAT THERE IS FUEL PRESSURE TO THE FUEL PUMP INLET. THE FUEL PUMP AND HYDRO MECHANICAL UNIT ARE FUEL LUBRICATED. ZERO FUEL PRESSURE CAN CAUSE DAMAGE TO THE FUEL PUMP AND HYDRO MECHANICAL UNIT.

(a) If necessary on the engine to be dry motored, apply the boost pump pressure to the fuel pump inlet (TASK 71-00-00-700-821-F00).

(b) Do this task: Depreservation of an Engine, which was Preserved for Not More Than One Month (Engine On-Wing), TASK 71-00-03-600-808-F00.

(c) Do this task: Depreservation of an Engine, which was Preserved for Not More Than Three Months (Engine On-Wing), TASK 71-00-03-600-816-F00.

(d) Do this task: Depreservation of an Engine, which was Preserved From One Month to Not More Than One Year (Engine On-Wing), TASK 71-00-03-600-813-F00.

END OF TASK

TASK 71-00-03-600-804-F00

6. Preservation of an Engine for Not More Than 10 Days (Engine On-Wing)

A. General

(1) This task is used for an engine that is installed on the airplane (on-wing).

(2) This task gives the instructions for a serviceable and a non-serviceable power plant.

B. References

Reference	Title
24-11-21-200-801	Integrated Drive Generator (IDG) Air/Oil Cooler - Inspection/Check (P/B 201)
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (P/B 201)

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
COM-1501	Kit - Engine Cover Part #: BBJ-2001-JB-R Supplier: 4VVY1 Part #: BBJ-2001-JB-SDP Supplier: 4VVY1 Part #: I10233AR Supplier: 064U8
COM-1516	Cover - Engine Inlet, CFM56-7 Part #: 892807 Supplier: SBK11 Part #: AVTB73NCFM56 Supplier: 018PR Part #: B737-150 Supplier: 1LE67 Part #: B737-152 Supplier: 1LE67 Part #: BBJ-2V Supplier: 4VVY1 Part #: WL14L96A Supplier: 8M213
SPL-1517	Cover - Engine Exhaust Part #: 896807 Supplier: SBK11 Part #: AVTB73NCFM56EPS Supplier: 018PR Part #: AVTB73NCFM5EEPS Supplier: 018PR
SPL-14648	Plug - Fan Reverser Part #: 895807 Supplier: SBK11 Part #: AVTB73NCFM56BPS Supplier: 018PR
SPL-18121	Plug - Bypass & Exhaust Part #: B737-250 Supplier: 1LE67 Part #: BBJ-XG-2001 Supplier: 4VVY1 Part #: WL15L96A Supplier: 8M213

D. Consumable Materials

Reference	Description	Specification
B00666	Solvent - Methyl Propyl Ketone	BMS11-9
G00252	Film - Polyethylene Film And Sheeting	ASTM D2103 (Supersedes L-P-512)
G00253	Material - Barrier Materials, Greaseproofed, Waterproof, Flexible, Heat-Sealable	MIL-PRF-121 (Supersedes MIL-B-121)
G00834	Cloth - Lint-free Cotton	
G00920	Tape - Waterproof, Packaging	ASTM D5486
G51576	Tape - Pressure Sensitive Adhesive - BA6866	BAC5034-4
G51663	Tape - Duct, Outdoor - 3M 8979	BAC5034-4
G51664	Tape - Duct, Outdoor - 3M 8979N (MIL-STD-2041 Compliant)	BAC5034-4

E. Location Zones

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

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Power Plant Preservation (Serviceable)

SUBTASK 71-00-03-210-003-F00

(1) If it is operator policy, examine and clean the IDG air/oil cooler (TASK 24-11-21-200-801).

NOTE: This check is recommended to prevent corrosion and cooler failure especially during operation in winter.

SUBTASK 71-00-03-860-001-F00

(2) If the engine has not been started and operated at the idle-power speed for a minimum of 3 minutes during the last engine operation, do these steps:

(a) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

1) Let the engine become stable for 3 minutes at low idle.

(b) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 71-00-03-620-046-F00

(3) Install desiccant bags and a humidity indicator card in the inlet and exhaust of the engine and monitor them during the preservation period (PAGEBLOCK 71-00-03/201).

NOTE: The best condition for engine storage is to keep an environment with less than 70% humidity.

(a) Inspect the desiccant bag (Desiccant Bags Inspection Procedure, TASK 71-00-03-200-801-F00).

SUBTASK 71-00-03-480-004-F00

CAUTION

MAKE SURE THAT THE DRAIN MASTS ARE CLEAR OF BLOCKAGE. BLOCKED DRAINS CAN CAUSE WATER TO COLLECT IN THE THRUST REVERSER. THIS CAN CAUSE DAMAGE TO THE EQUIPMENT.

(4) Install the covers for the engine inlet and exhaust to prevent fan windmilling and to prevent Foreign Object Damage (FOD).

(a) Install the engine cover kit, COM-1501 (preferred).

(b) Install the engine inlet cover, COM-1516, and exhaust plug, SPL-18121 (alternate).

NOTE: The exhaust plug, SPL-18121, installs to the exhaust and bypass of the engine.

NOTE: The engine exhaust cover, SPL-1517, and engine fan reverser plug, SPL-14648, are an alternative covers to the exhaust plug, SPL-18121.

CAUTION

DO NOT APPLY THE G00920 TAPE TO THE PAINTED SURFACES. THE TAPE IS HARD TO REMOVE. IT CAN CAUSE DAMAGE TO THESE SURFACES.

1) If the engine inlet and exhaust tool covers are not available, use a barrier (plastic sheet) and tape.

2) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

3) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

a) When you use a plastic sheet for the exhaust cover, make sure that the drain holes or tubes are clear of the cover.

b) When you use a plastic sheet, for the inlet cover, do the steps that follow:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

<1> Use lint-free cloth, G00834, and solvent, B00666, to wipe the area where the tape is used.

<2> Cut an approximately 60 in. (1.5 m) diameter circle from a plastic sheet.

<3> Put tape on the circle on the FWD edge of the acoustic panel behind the lipskin.

<4> Apply a minimum of 3 overlap layers of tape around the perimeter of the inlet acoustic panel.

<5> Do not place plastic or tape over the lipskin or cover the lipskin with plastic

<6> Apply the tape across the diameter of the circular sheet to decrease the pillowing of the plastic sheeting.

G. Power Plant Preservation (Not Serviceable)

SUBTASK 71-00-03-210-004-F00

(1) If it is operator policy, examine and clean the IDG air/oil cooler (TASK 24-11-21-200-801).

NOTE: This check is recommended to prevent corrosion and cooler failure especially during operation in winter.

SUBTASK 71-00-03-620-003-F00

(2) If the engine had an in-flight shutdown, do this task: Dry-Out and Lubrication of the Engine, TASK 71-00-03-600-801-F00.

SUBTASK 71-00-03-620-047-F00

(3) Install desiccant bags and a humidity indicator card in the inlet and exhaust of the engine and monitor them during the preservation period (PAGEBLOCK 71-00-03/201).

NOTE: The best condition for engine storage is to keep an environment with less than 70% humidity.

(a) Inspect the desiccant bag (Desiccant Bags Inspection Procedure, TASK 71-00-03-200-801-F00).

SUBTASK 71-00-03-480-005-F00

CAUTION

MAKE SURE THAT THE DRAIN MASTS ARE CLEAR OF BLOCKAGE. BLOCKED DRAINS CAN CAUSE WATER TO COLLECT IN THE THRUST REVERSER. THIS CAN CAUSE DAMAGE TO THE EQUIPMENT.

(4) Install the covers for the engine inlet and exhaust to prevent fan windmilling and to prevent FOD.

(a) Install the engine cover kit, COM-1501 (preferred).

(b) Install the engine inlet cover, COM-1516, and exhaust plug, SPL-18121 (alternate).

NOTE: The exhaust plug, SPL-18121, installs to the exhaust and bypass of the engine.

NOTE: The engine exhaust cover, SPL-1517, and engine fan reverser plug, SPL-14648, are an alternative covers to the exhaust plug, SPL-18121.

CAUTION

DO NOT APPLY THE G00920 TAPE TO THE PAINTED SURFACES. THE TAPE IS HARD TO REMOVE. IT CAN CAUSE DAMAGE TO THESE SURFACES.

1) If the engine inlet and exhaust tool covers are not available, use a barrier (plastic sheet) and tape.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

3) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

a) When you use a plastic sheet for the exhaust cover, make sure that the drain holes or tubes are clear of the cover.

b) When you use a plastic sheet, for the inlet cover, do the steps that follow:

<1> Use lint-free cloth, G00834, and solvent, B00666, to wipe the area where the tape is used.

<2> Cut an approximately 60 in. (1.5 m) diameter circle from a plastic sheet.

<3> Put tape on the circle on the FWD edge of the acoustic panel behind the lipskin.

<4> Apply a minimum of 3 overlap layers of tape around the perimeter of the inlet acoustic panel.

<5> Do not place plastic or tape over the lipskin or cover the lipskin with plastic

<6> Apply the tape across the diameter of the circular sheet to decrease the pillowing of the plastic sheeting.

SUBTASK 71-00-03-550-001-F00

(5) When this task is done, the engine is preserved for 10 days from the time of its last operation or from the completion of the engine dry-out procedure, as applicable.

——— END OF TASK ———

TASK 71-00-03-600-805-F00

7. Preservation Renewal of an Engine for Not More Than 10 Days (Engine On-Wing)

A. General

(1) This procedure is used for an engine that is installed on the airplane (on-wing).

(2) This task gives the instructions for a serviceable and a non-serviceable power plant.

(3) Before engine operation, refer to Inlet Cowl Lipskin Protective Coating Procedure, TASK 71-00-03-600-815-F00 for lipskin coating requirements during engine operation.

B. Location Zones

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

C. Serviceable Power Plant

SUBTASK 71-00-03-620-004-F00

(1) Do this task: Preservation of an Engine for Not More Than 10 Days (Engine On-Wing), TASK 71-00-03-600-804-F00.

(a) There is no limit on the number of times you can do this procedure.

SUBTASK 71-00-03-620-041-F00

(2) If applicable, apply protective coating to the inlet cowl lipskin after engine operation. Do this task: Inlet Cowl Lipskin Protective Coating Procedure, TASK 71-00-03-600-815-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D. Not Serviceable Power Plant

SUBTASK 71-00-03-620-005-F00

(1) You must do one of these procedures:

(a) The preservation procedure of a non-serviceable power plant for not more than 1 month (TASK 71-00-03-600-806-F00).

NOTE: This will permit a preservation for not more than 30 days maximum from the time of the last engine operation or from the time the engine dry-out procedure was done.

(b) The preservation procedure from one month to not more than one year for a non-serviceable power plant (TASK 71-00-03-600-811-F00) if you will do the preservation renewal procedure.

——— END OF TASK ———

TASK 71-00-03-600-806-F00

8. Preservation of an Engine for Not More Than One Month (Engine On-Wing)

(Figure 205)

A. General

(1) This task is used for an engine that is installed on the airplane (on-wing).

(2) This task gives the instructions for a serviceable and a non-serviceable power plant.

B. References

Reference	Title
24-11-21-200-801	Integrated Drive Generator (IDG) Air/Oil Cooler - Inspection/Check (P/B 201)
36-11-02-000-801	Bleed Air Check Valve - Removal (P/B 401)
36-11-04-000-801	PRSOV Removal (P/B 401)
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)
75-32-00-730-801-F00	VBV 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-1501	Kit - Engine Cover Part #: BBJ-2001-JB-R Supplier: 4VVY1 Part #: BBJ-2001-JB-SDP Supplier: 4VVY1 Part #: I10233AR Supplier: 064U8
COM-1516	Cover - Engine Inlet, CFM56-7 Part #: 892807 Supplier: SBK11 Part #: AVTB73NCFM56 Supplier: 018PR Part #: B737-150 Supplier: 1LE67 Part #: B737-152 Supplier: 1LE67 Part #: BBJ-2V Supplier: 4VVY1 Part #: WL14L96A Supplier: 8M213

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(Continued)

Reference	Description
SPL-1517	Cover - Engine Exhaust Part #: 896807 Supplier: SBK11 Part #: AVTB73NCFM56EPS Supplier: 018PR Part #: AVTB73NCFM5EEPS Supplier: 018PR
SPL-14648	Plug - Fan Reverser Part #: 895807 Supplier: SBK11 Part #: AVTB73NCFM56BPS Supplier: 018PR
SPL-18121	Plug - Bypass & Exhaust Part #: B737-250 Supplier: 1LE67 Part #: BBJ-XG-2001 Supplier: 4VVY1 Part #: WL15L96A Supplier: 8M213
SPL-18258	Blanking Plate - PRSOV Part #: C36008-1 Supplier: 81205
STD-3906	Mallet - Rubber

D. Consumable Materials

Reference	Description	Specification
B00666	Solvent - Methyl Propyl Ketone	BMS11-9
G00252	Film - Polyethylene Film And Sheeting	ASTM D2103 (Supersedes L-P-512)
G00253	Material - Barrier Materials, Greaseproofed, Waterproof, Flexible, Heat-Sealable	MIL-PRF-121 (Supersedes MIL-B-121)
G00834	Cloth - Lint-free Cotton	
G00920	Tape - Waterproof, Packaging	ASTM D5486
G02304	Tape - Moisture Barrier, Adhesive One-side	BMS8-346
G02455 [CP2160]	Film, Vapor Barrier, Polyethylene	L-P-512
G02456 [CP2098]	Desiccant - Activated, Bagged, Packaging Use And Static Dehumidification	MIL-D-3464
G51576	Tape - Pressure Sensitive Adhesive - BA6866	BAC5034-4
G51663	Tape - Duct, Outdoor - 3M 8979	BAC5034-4
G51664	Tape - Duct, Outdoor - 3M 8979N (MIL-STD-2041 Compliant)	BAC5034-4

E. Location Zones

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

F. Power Plant Preservation (Serviceable)

SUBTASK 71-00-03-210-005-F00

(1) If it is operator policy, examine and clean the IDG air/oil cooler (TASK 24-11-21-200-801).

NOTE: This check is recommended to prevent corrosion and cooler failure especially during operation in winter.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-03-860-002-F00

(2) If the engine was not started and operated at idle power for a minimum of 15 to 20 minutes during the last engine operation, do these steps:

NOTE: Under these conditions, consider the engine to be preserved for 30 days from the time of the last engine operation.

(a) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

1) Let the engine become stable for 15-20 minutes at idle.

(b) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

(c) When the engine cannot be operated at idle condition, dry motor the engine for 5 minutes, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

NOTE: If procedure is applied after a 10-day preservation procedure (initial or renewal) and it is not possible to start the engine, consider the 30 days preservation period has started since last idle run.

SUBTASK 71-00-03-710-001-F00

(3) If the VBV doors are open, close them.

(a) Do this task: VBV Actuation System - Manual Operation, TASK 75-32-00-730-801-F00.

SUBTASK 71-00-03-710-002-F00

(4) Put vapor barrier film, G02455 [CP2160], on the VBV bleed grills.

SUBTASK 71-00-03-620-045-F00

(5) Install desiccant bags and a humidity indicator card in inlet and exhaust of the engine and monitor them during preservation period (PAGEBLOCK 71-00-03/201).

NOTE: The best condition for engine stored is to keep an environment with less than 70% humidity.

(a) Inspect the desiccant bag (TASK 71-00-03-200-801-F00).

SUBTASK 71-00-03-480-006-F00

CAUTION

MAKE SURE THAT THE DRAIN MASTS ARE CLEAR OF BLOCKAGE. BLOCKED DRAINS CAN CAUSE WATER TO COLLECT IN THE THRUST REVERSER. THIS CAN CAUSE DAMAGE TO THE EQUIPMENT.

(6) Install the covers for the engine inlet and exhaust to prevent fan windmilling and to prevent Foreign Object Damage (FOD).

(a) Install the engine cover kit, COM-1501 (preferred).

(b) Install the engine inlet cover, COM-1516, and exhaust plug, SPL-18121 (alternate).

NOTE: The exhaust plug, SPL-18121, installs to the exhaust and bypass of the engine.

NOTE: The engine exhaust cover, SPL-1517, and engine fan reverser plug, SPL-14648, are an alternative covers to the exhaust plug, SPL-18121.

CAUTION

DO NOT APPLY THE G00920 TAPE TO THE PAINTED SURFACES. THE TAPE IS HARD TO REMOVE. IT CAN CAUSE DAMAGE TO THESE SURFACES.

1) If the engine inlet and exhaust tool covers are not available, use a barrier (plastic sheet) and tape.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

3) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

a) When you use a plastic sheet for the exhaust cover, make sure that the drain holes or tubes are clear of the cover.

b) When you use a plastic sheet, for the inlet cover, do the steps that follow:

<1> Use lint-free cloth, G00834, and solvent, B00666, to wipe the area where the tape is used.

<2> Cut an approximately 60 in. (1.5 m) diameter circle from a plastic sheet.

<3> Put tape on the circle on the FWD edge of the acoustic panel behind the lipskin.

<4> Apply a minimum of 3 overlap layers of tape around the perimeter of the inlet acoustic panel.

<5> Do not place plastic or tape over the lipskin or cover the lipskin with plastic

<6> Apply the tape across the diameter of the circular sheet to decrease the pillowing of the plastic sheeting.

SUBTASK 71-00-03-020-001-F00

(7) If the APU or external air will be used to operate the ECS while the engine is preserved, it is recommended to remove the PRSOV and 5th stage bleed air check valve and store them off of the airplane, do the steps that follow:

(a) Remove the PRSOV, do this task: PRSOV Removal, TASK 36-11-04-000-801.

(b) Remove the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Removal, TASK 36-11-02-000-801.

NOTE: If removal of the fifth stage duct assembly was necessary to remove the bleed air check valve, it may also be stored off airplane.

(c) Install an E-seal and a coupling with a blanking plate, SPL-18258, on the precooler upstream duct.

1) When the coupling is in place, tighten the coupling.

a) Tighten the coupling nut to 115.0 in-lb (13.0 N·m) - 125.0 in-lb (14.1 N·m).

b) Lightly tap the outer surface of the coupling with a rubber mallet, STD-3906.

c) Tighten the coupling nut again to 115.0 in-lb (13.0 N·m) - 125.0 in-lb (14.1 N·m).

(d) On the intersection manifold duct assembly and fifth stage duct assembly, cover the openings with a protective cover or polyethylene film, G00252, and tape, G00920.

1) If the fifth stage duct assembly is removed during removal of the bleed air check valve, cover the opening on the engine case (fifth stage port) with polyethylene film, G00252, and tape, G00920.

G. Power Plant Preservation (Not Serviceable)

SUBTASK 71-00-03-210-006-F00

(1) If it is operator policy, examine and clean the IDG air/oil cooler (TASK 24-11-21-200-801).

NOTE: This check is recommended to prevent corrosion and cooler failure especially during operation in winter.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-03-620-006-F00

(2) If the engine had an in-flight shutdown, do this task: Dry-Out and Lubrication of the Engine, TASK 71-00-03-600-801-F00.

SUBTASK 71-00-03-980-001-F00

(3) If the doors are open, close them, do this task: VBV Actuation System - Manual Operation, TASK 75-32-00-730-801-F00.

SUBTASK 71-00-03-950-001-F00

(4) Install vapor barrier film, G02455 [CP2160], on the VBV bleed grills.

SUBTASK 71-00-03-020-002-F00

(5) If the APU or external air will be used to operate the ECS while the engine is preserved, it is recommended to remove the PRSOV and 5th stage bleed air check valve and store them off of the airplane, do the steps that follow:

(a) Remove the PRSOV, do this task: PRSOV Removal, TASK 36-11-04-000-801.

(b) Remove the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Removal, TASK 36-11-02-000-801.

NOTE: If removal of the fifth stage duct assembly was necessary to remove the bleed air check valve, it may also be stored off airplane.

(c) Install an E-seal and a coupling with a blanking plate, SPL-18258, on the precooler upstream duct.

1) When the coupling is in place, tighten the coupling.

a) Tighten the coupling nut to 115.0 in-lb (13.0 N·m) - 125.0 in-lb (14.1 N·m).

b) Lightly tap the outer surface of the coupling with a rubber mallet, STD-3906.

c) Tighten the coupling nut again to 115.0 in-lb (13.0 N·m) - 125.0 in-lb (14.1 N·m).

d) On the intersection manifold duct assembly and fifth stage duct assembly, cover the openings with a protective cover or polyethylene film, G00252, and tape, G00920.

<1> If the fifth stage duct assembly is removed during removal of the bleed air check valve, cover the opening on the engine case (fifth stage port) with polyethylene film, G00252, and tape, G00920.

SUBTASK 71-00-03-910-001-F00

(6) If you remove engine components, make sure that you install protective covers on all accessory units that you remove.

SUBTASK 71-00-03-910-002-F00

(7) Install protective covers on all disconnect lines and electrical connections.

SUBTASK 71-00-03-620-027-F00

(8) Put desiccant bags, G02456 [CP2098], and humidity indicators in inlet and exhausts of the engine to protect it from moisture as follows:

(a) Attach the desiccant bags in inlet and exhausts of the engine.

1) Make sure that the desiccant bags are not in contact with the engine hardware.

(b) If necessary, use vapor barrier film to locally protect the engine hardware.

SUBTASK 71-00-03-480-024-F00

(9) Seal the inlet and exhaust openings with vapor barrier film, G02455 [CP2160].

(a) Attach vapor barrier film, G02455 [CP2160], with moisture barrier tape, G02304.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) To cover the inlet opening, apply the tape at the inner barrel ring (Figure 205).

(c) Do not apply tape to or on the inlet cowl lipskin.

SUBTASK 71-00-03-480-008-F00

(10) Install a water proof cover on the engine and attach it tightly.

SUBTASK 71-00-03-550-002-F00

(11) When this task is done, the engine is preserved for 30 days from the time of its last operation or from the completion of the engine dry-out procedure, as applicable.

END OF TASK

TASK 71-00-03-600-807-F00

9. Preservation Renewal of an Engine for Not More Than One Month (Engine On-Wing)

A. General

(1) This task is used for an engine that is installed on the airplane (on-wing).

(2) This task gives the instructions for a serviceable and a non-serviceable power plant.

(3) Before engine operation, refer to TASK 71-00-03-600-815-F00 for lipskin coating requirements during engine operation.

B. References

Reference	Title
36-11-02-400-801	Bleed Air Check Valve - Installation (P/B 401)
36-11-04-400-801	PRSOV Installation (P/B 401)

C. Location Zones

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

D. Serviceable Power Plant

SUBTASK 71-00-03-420-005-F00

(1) Before engine operation, if the Pressure Regulating and Shutoff Valve (PRSOV) and 5th stage bleed air check valve were removed and stored off the airplane, do the steps that follow:

(a) Remove the coupling, blanking plate, and E-seal from the duct.

(b) Inspect the duct openings for unwanted material.

(c) Install the PRSOV, do this task: PRSOV Installation, TASK 36-11-04-400-801.

(d) Install the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Installation, TASK 36-11-02-400-801.

SUBTASK 71-00-03-630-002-F00

(2) Do this task: Preservation of an Engine for Not More Than One Month (Engine On-Wing), TASK 71-00-03-600-806-F00.

(a) If you do a 30–day preservation with engine idle run, this procedure can be renewed five (5) more times for a total duration of 180 days (TASK 71-00-03-600-806-F00).

(b) If you do a 30-day preservation with engine dry motor, this procedure can be renewed two (2) more times for a total duration of 90 days (TASK 71-00-03-600-806-F00).

NOTE: During engine idle run, both oil and fuel circulate through its system. During engine dry motor, the fuel does not circulate through the complete fuel system.

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(c) If the power plant will be kept for more than the subsequent 30 days, you must do one of these steps:

1) Do this task: Preservation of an Engine for Not More Than Three Months (Engine On-Wing), TASK 71-00-03-600-809-F00.

2) Do the preservation of a serviceable engine from one month to one year (TASK 71-00-03-600-811-F00).

(d) If applicable, apply protective coating to the inlet cowl lipskin after engine operation, do this task: Inlet Cowl Lipskin Protective Coating Procedure, TASK 71-00-03-600-815-F00.

E. Not Serviceable Power Plant

SUBTASK 71-00-03-620-007-F00

(1) A preservation renewal procedure is not permitted.

SUBTASK 71-00-03-420-006-F00

(2) Operate the engine.

(a) Remove the coupling, blanking plate, and E-seal from the duct.

(b) Inspect the duct openings for unwanted material.

(c) Install the PRSOV, do this task: PRSOV Installation, TASK 36-11-04-400-801.

(d) Install the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Installation, TASK 36-11-02-400-801.

SUBTASK 71-00-03-620-008-F00

(3) Do the preservation of a not serviceable engine from one month to one year (TASK 71-00-03-600-811-F00).

——— END OF TASK ———

TASK 71-00-03-600-808-F00

10. Depreservation of an Engine, which was Preserved for Not More Than One Month (Engine On-Wing)

A. General

(1) This task is used for an engine that is installed on the airplane (on-wing).

(2) This task gives the instructions for a serviceable or a non-serviceable power plant.

B. References

Reference	Title
36-11-02-400-801	Bleed Air Check Valve - Installation (P/B 401)
36-11-04-400-801	PRSOV Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
G02304	Tape - Moisture Barrier, Adhesive One-side	BMS8-346
G02455 [CP2160]	Film, Vapor Barrier, Polyethylene	L-P-512
G02456 [CP2098]	Desiccant - Activated, Bagged, Packaging Use And Static Dehumidification	MIL-D-3464

D. Location Zones

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

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E. Power Plant Depreservation

SUBTASK 71-00-03-630-003-F00

(1) Remove the waterproof cover or engine bag (as applicable), vapor barrier film, G02455 [CP2160], and desiccant bag, G02456 [CP2098].

SUBTASK 71-00-03-630-007-F00

> **CAUTION** MAKE SURE THAT YOU FOLLOW THE LIPSKIN COATING PROCEDURES BEFORE AN ENGINE OPERATION. IF YOU DO NOT FOLLOW INSTRUCTIONS, THE COATING CAN MELT AND GO INTO THE ENGINE. THIS CAN CAUSE ENGINE DAMAGE.

(2) If not already done, remove the lipskin protective coating from the inlet cowl lipskin (TASK 71-00-03-600-815-F00).

SUBTASK 71-00-03-630-004-F00

(3) Make sure that all of the moisture barrier tape, G02304, is removed from the inlet and exhaust areas and that there is no unwanted material.

SUBTASK 71-00-03-420-001-F00

(4) If the PRSOV and 5th stage bleed air check valve were removed and stored off of the airplane, do the steps that follow:

(a) Remove the coupling, blanking plate, and E-seal from the duct.

(b) Inspect the duct openings for unwanted material.

(c) Install the PRSOV, do this task: PRSOV Installation, TASK 36-11-04-400-801.

(d) Install the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Installation, TASK 36-11-02-400-801.

——— **END OF TASK** ———

TASK 71-00-03-600-809-F00

11. Preservation of an Engine for Not More Than Three Months (Engine On-Wing)

A. General

(1) This task is used for an engine that is installed on the airplane (on-wing).

(2) This task gives the instructions for a serviceable power plant.

NOTE: An engine preserved up to 90 days on-wing will continue to retain its preservation capability off-wing and it expires in 90 days from the original preservation date.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
12-13-11-600-803	Drain the Engine Oil (P/B 301)
24-11-21-200-801	Integrated Drive Generator (IDG) Air/Oil Cooler - Inspection/Check (P/B 201)
36-11-02-000-801	Bleed Air Check Valve - Removal (P/B 401)
36-11-04-000-801	PRSOV Removal (P/B 401)
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)
75-32-00-730-801-F00	VBV Actuation System - Manual Operation (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-1501	Kit - Engine Cover Part #: BBJ-2001-JB-R Supplier: 4VVY1 Part #: BBJ-2001-JB-SDP Supplier: 4VVY1 Part #: I10233AR Supplier: 064U8
COM-1516	Cover - Engine Inlet, CFM56-7 Part #: 892807 Supplier: SBK11 Part #: AVTB73NCFM56 Supplier: 018PR Part #: B737-150 Supplier: 1LE67 Part #: B737-152 Supplier: 1LE67 Part #: BBJ-2V Supplier: 4VVY1 Part #: WL14L96A Supplier: 8M213
SPL-1517	Cover - Engine Exhaust Part #: 896807 Supplier: SBK11 Part #: AVTB73NCFM56EPS Supplier: 018PR Part #: AVTB73NCFM5EEPS Supplier: 018PR
SPL-14648	Plug - Fan Reverser Part #: 895807 Supplier: SBK11 Part #: AVTB73NCFM56BPS Supplier: 018PR
SPL-18121	Plug - Bypass & Exhaust Part #: B737-250 Supplier: 1LE67 Part #: BBJ-XG-2001 Supplier: 4VVY1 Part #: WL15L96A Supplier: 8M213
SPL-18258	Blanking Plate - PRSOV Part #: C36008-1 Supplier: 81205
STD-3906	Mallet - Rubber

D. Consumable Materials

Reference	Description	Specification
B00666	Solvent - Methyl Propyl Ketone	BMS11-9
D00599 [CP2442]	Oil - Engine	
D00662 [CP5075]	Additive - Corrosion Preventive, Brayco 599	
D00664 [CP5067]	Oil - Corrosion Preventive, Lubricative System	MIL-PRF-6085
G00252	Film - Polyethylene Film And Sheeting	ASTM D2103 (Supersedes L-P-512)
G00253	Material - Barrier Materials, Greaseproofed, Waterproof, Flexible, Heat-Sealable	MIL-PRF-121 (Supersedes MIL-B-121)
G00834	Cloth - Lint-free Cotton	
G00920	Tape - Waterproof, Packaging	ASTM D5486
G02455 [CP2160]	Film, Vapor Barrier, Polyethylene	L-P-512
G02456 [CP2098]	Desiccant - Activated, Bagged, Packaging Use And Static Dehumidification	MIL-D-3464
G51576	Tape - Pressure Sensitive Adhesive - BA6866	BAC5034-4
G51663	Tape - Duct, Outdoor - 3M 8979	BAC5034-4

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(Continued)

Reference	Description	Specification
G51664	Tape - Duct, Outdoor - 3M 8979N (MIL-STD-2041 Compliant)	BAC5034-4

E. Location Zones

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

F. Power Plant Preservation

SUBTASK 71-00-03-210-007-F00

(1) If it is operator policy, examine and clean the IDG air/oil cooler (TASK 24-11-21-200-801).

NOTE: This check is recommended to prevent corrosion and cooler failure especially during operation in winter.

SUBTASK 71-00-03-680-001-F00

(2) If it is not already done, do this task: Drain the Engine Oil, TASK 12-13-11-600-803.

SUBTASK 71-00-03-620-009-F00

(3) To fill the oil tank with preservation oil, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

(a) Fill the oil tank with 20 qt (19 l) of one of the preservation oils given below:

1) Engine oil, D00599 [CP2442], and at least 5 percent by volume of oil, D00664 [CP5067], or

2) Engine oil, D00599 [CP2442], and at least 7 percent by volume of additive, D00662 [CP5075].

SUBTASK 71-00-03-620-048-F00

(4) Alternative method without oil tank draining: it is possible to skip step (2) above and prepare the mixture directly if you add the appropriate amount of corrosion preventive oil or corrosion inhibitor to the oil remaining in the tank.

(a) In this case, add 1 qt (1 l) (resp. 1.4 qt (1.3 l)) of system corrosion preventive oil, D00664 [CP5067] (resp. corrosion preventive additive, D00662 [CP5075]), in the oil tank.

(b) If it is necessary, partially drain the oil tank before you add the additive to prevent over servicing.

(c) Complete the servicing with engine oil, D00599 [CP2442], after you add the additive.

NOTE: In this case, operating the engine at ground idle (step 5 below) is necessary and cannot be replaced by dry motoring.

(d) If it is necessary, check oil level.

SUBTASK 71-00-03-860-003-F00

(5) Perform idle run as follows:

(a) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

(b) Let the engine become stable for 15-20 minutes at the idle.

(c) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

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(d) When the engine cannot be operated at idle condition, dry motor the engine for 5 minutes, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

NOTE: This alternative is possible only if steps 2 and 3 have been completed (oil tank draining).

(e) Refer to starter limitation to find out the number of dry motoring cycles to make sure of the total motoring time.

NOTE: Preferred method to preserve the engine is by doing an idle run. During engine idle run, both oil and fuel circulate through its system. During engine dry motor, the fuel does not circulate through the complete fuel system.

SUBTASK 71-00-03-710-003-F00

(6) If the VBV doors are open, close them.

(a) Do this task: VBV Actuation System - Manual Operation, TASK 75-32-00-730-801-F00.

SUBTASK 71-00-03-710-004-F00

(7) Put vapor barrier film, G02455 [CP2160], on the VBV bleed grills.

SUBTASK 71-00-03-020-003-F00

(8) If the APU or external air will be used to operate the ECS while the engine is preserved, it is recommended to remove the PRSOV and 5th stage bleed air check valve and store them off of the airplane, do these steps:

(a) Remove the PRSOV, do this task: PRSOV Removal, TASK 36-11-04-000-801.

(b) Remove the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Removal, TASK 36-11-02-000-801.

NOTE: If removal of the fifth stage duct assembly was necessary to remove the bleed air check valve, it may also be stored off of the airplane.

(c) Install an E-seal and a coupling with a blanking plate, SPL-18258, on the precooler upstream duct.

1) When the coupling is in place, torque the coupling.

a) Torque the coupling nut to 115.0 in-lb (13.0 N·m) - 125.0 in-lb (14.1 N·m).

b) Lightly tap the outer surface of the coupling with a rubber mallet, STD-3906.

c) Torque the coupling nut again to 115.0 in-lb (13.0 N·m) - 125.0 in-lb (14.1 N·m).

CAUTION

DO NOT APPLY THE G00920 TAPE TO THE PAINTED SURFACES. THE TAPE IS HARD TO REMOVE. IT CAN CAUSE DAMAGE TO THESE SURFACES.

(d) On the intersection manifold duct assembly and fifth stage duct assembly, cover the openings with a protective cover or use a barrier (plastic sheet) and tape.

(e) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

(f) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

1) If the fifth stage duct assembly is removed during removal of the bleed air check valve, cover the opening on the engine case (fifth stage port) with a barrier (plastic sheet) and tape.

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2) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

3) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

SUBTASK 71-00-03-620-028-F00

(9) Put desiccant bags, G02456 [CP2098], and humidity indicators in the inlet and exhausts of the engine to protect it from moisture as follows (PAGEBLOCK 71-00-03/201):

NOTE: The best condition for engine stored is to keep an environment with less than 70% humidity.

NOTE: Desiccant bags must be inspected/replaced at regular intervals depending on weather conditions.

(a) Make sure that they are accessible for inspection/replacement while disturbing a minimum amount of protective material, do this task: Desiccant Bags Inspection Procedure, TASK 71-00-03-200-801-F00.

(b) Mark the date on the humidity indicator tags.

(c) Attach desiccant bags, G02456 [CP2098], in the inlet and exhausts of the engine.

1) Make sure that they are not in contact with the engine hardware.

(d) If it is necessary, use vapor barrier film, G02455 [CP2160], to locally protect the engine hardware.

SUBTASK 71-00-03-620-029-F00

(10) If it is necessary, seal the inlet and exhausts of the engine with vapor barrier film, G02455 [CP2160], to protect it from moisture.

SUBTASK 71-00-03-480-009-F00

(11) Put the adequate protective cover that follows:

(a) If the engine is stored off-wing, put a waterproof cover over the whole engine.

1) Make sure that it is tightly fitted to the engine.

(b) If the engine is stored on-wing, put a waterproof cover over the whole powerplant.

1) Make sure that it is tightly fitted to the powerplant.

CAUTION MAKE SURE THAT THE DRAIN MASTS ARE CLEAR OF BLOCKAGE. BLOCKED DRAINS CAN CAUSE WATER TO COLLECT IN THE THRUST REVERSER. THIS CAN CAUSE DAMAGE TO THE EQUIPMENT.

2) If not possible, as an alternative, install the kit, COM-1501 (preferred), or inlet cover, COM-1516, and exhaust plug, SPL-18121 (alternate), to prevent fan windmilling and to prevent Foreign Object Damage (FOD).

NOTE: The exhaust plug, SPL-18121, installs to the exhaust and bypass of the engine.

NOTE: The engine exhaust cover, SPL-1517, and engine fan reverser plug, SPL-14648, are alternative covers to the exhaust plug, SPL-18121.

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CAUTION DO NOT APPLY THE G00920 TAPE TO THE PAINTED SURFACES. THE TAPE IS HARD TO REMOVE. IT CAN CAUSE DAMAGE TO THESE SURFACES.

(c) If the engine inlet and exhaust tool covers are not available, use a barrier (plastic sheet) and tape.

(d) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

(e) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

1) When you use a plastic sheet for the exhaust cover, make sure that the drain holes or tubes are clear of the cover.

2) When you use a plastic sheet, for the inlet cover, do the steps that follow:

a) Use lint-free cloth, G00834, and solvent, B00666, to wipe the area where the tape is used.

b) Cut an approximately 60 in. (1.5 m) diameter circle from a plastic sheet.

c) Put tape on the circle on the FWD edge of the acoustic panel behind the lipskin.

d) Apply a minimum of 3 overlap layers of tape around the perimeter of the inlet acoustic panel.

e) Do not place plastic or tape over the lipskin or cover the lipskin with plastic.

f) Apply the tape across the diameter of the circular sheet to reduce the pillowing of the plastic sheeting.

SUBTASK 71-00-03-970-003-F00

(12) Attach a tag to the power plant that shows that the oil system preservation was done with preservation oil.

(a) Include the date of the preservation procedure.

G. Power Plant Preservation (Alternative Procedure)

SUBTASK 71-00-03-620-030-F00

(1) Use this alternative procedure with the operable power plant during the day of the preservation plan and before one of the flights preceding the engine preservation procedure.

SUBTASK 71-00-03-620-031-F00

(2) If it is operator policy, examine and clean the IDG air/oil cooler (TASK 24-11-21-200-801).

NOTE: This check is recommended to prevent corrosion and cooler failure especially during operation in winter.

SUBTASK 71-00-03-620-032-F00

(3) If it is not already done, do this task: Drain the Engine Oil, TASK 12-13-11-600-803.

SUBTASK 71-00-03-620-033-F00

(4) To fill the oil tank with preservation oil, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

NOTE: In this alternative procedure, it is not acceptable to use corrosion preventive additive, D00662 [CP5075].

(a) Fill the oil tank with 20 qt (19 l) of the preservation mixture given below:

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1) Engine oil, D00599 [CP2442], and at least 5 percent by volume of oil, D00664 [CP5067].

SUBTASK 71-00-03-620-049-F00

(5) Alternative method without oil tank draining: it is possible to skip step (3) above and prepare the mixture directly if you add the appropriate amount of corrosion preventive oil or corrosion inhibitor to the oil remaining in the tank.

(a) In this case, add 1 qt (1 l) (resp. 1.4 qt (1.3 l)) of system corrosion preventive oil, D00664 [CP5067], in the oil tank.

(b) If it is necessary, partially drain the oil tank before you add the additive to prevent over servicing.

(c) Complete the servicing with engine oil, D00599 [CP2442], after you add the additive.

SUBTASK 71-00-03-710-005-F00

(6) If the VBV doors are open, close them.

(a) Do this task: VBV Actuation System - Manual Operation, TASK 75-32-00-730-801-F00

SUBTASK 71-00-03-710-006-F01

(7) Put vapor barrier film, G02455 [CP2160], on the VBV bleed grills.

SUBTASK 71-00-03-620-035-F00

(8) Put desiccant bags, G02456 [CP2098], and humidity indicators in the inlet and exhausts of the engine to protect it from moisture as follows (PAGEBLOCK 71-00-03/201):

NOTE: The best condition for engine stored is to keep an environment with less than 70% humidity.

NOTE: Desiccant bags must be inspected/replaced at regular intervals depending on weather conditions.

(a) Make sure that they are accessible for inspection/replacement while disturbing a minimum amount of protective material, do this task: Desiccant Bags Inspection Procedure, TASK 71-00-03-200-801-F00.

(b) Mark the date on the humidity indicator tags.

(c) Attach desiccant bags, G02456 [CP2098], in the inlet and exhausts of the engine.

1) Make sure that they are not in contact with the engine hardware.

(d) If it is necessary, use vapor barrier film, G02455 [CP2160], to locally protect the engine hardware.

SUBTASK 71-00-03-620-036-F00

(9) If it is necessary, seal the inlet and exhausts of the engine with vapor barrier film, G02455 [CP2160], to protect it from moisture.

SUBTASK 71-00-03-620-037-F00

(10) Put the adequate protective cover that follows:

(a) If the engine is stored off-wing, put a waterproof cover over the whole engine.

1) Make sure that it is tightly fitted to the engine.

(b) If the engine is stored on-wing, put a waterproof cover over the whole power plant.

1) Make sure that it is tightly fitted to the power plant.

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> **CAUTION** MAKE SURE THAT THE DRAIN MASTS ARE CLEAR OF BLOCKAGE. BLOCKED DRAINS CAN CAUSE WATER TO COLLECT IN THE THRUST REVERSER. THIS CAN CAUSE DAMAGE TO THE EQUIPMENT.

2) If it is not possible, as an alternative, install the kit, COM-1501 (preferred), or inlet cover, COM-1516, and exhaust plug, SPL-18121 (alternate), to prevent fan windmilling and to prevent FOD.

NOTE: The exhaust plug, SPL-18121, installs to the exhaust and bypass of the engine.

NOTE: The engine exhaust cover, SPL-1517, and engine fan reverser plug, SPL-14648, are alternative covers to the exhaust plug, SPL-18121.

> **CAUTION** DO NOT APPLY THE G00920 TAPE TO THE PAINTED SURFACES. THE TAPE IS HARD TO REMOVE. IT CAN CAUSE DAMAGE TO THESE SURFACES.

(c) If the engine inlet and exhaust tool covers are not available, use a barrier (plastic sheet) and tape.

(d) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

(e) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

1) When you use a plastic sheet for the exhaust cover, make sure that the drain holes or tubes are clear of the cover.

2) When you use a plastic sheet, for the inlet cover, do the steps that follow:

a) Use lint-free cloth, G00834, and solvent, B00666, to wipe the area where the tape is used.

b) Cut an approximately 60 in. (1.5 m) diameter circle from a plastic sheet.

c) Put tape on the circle on the FWD edge of the acoustic panel behind the lipskin.

d) Apply a minimum of 3 overlap layers of tape around the perimeter of the inlet acoustic panel.

e) Do not place plastic or tape over the lipskin or cover the lipskin with plastic.

f) Apply the tape across the diameter of the circular sheet to reduce the pillowing of the plastic sheeting.

SUBTASK 71-00-03-620-038-F00

(11) Attach a tag to the power plant that shows that the oil system preservation was done with preservation oil.

(a) Include the date of the preservation procedure.

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H. Overdue Situation

SUBTASK 71-00-03-550-003-F00

(1) Up to three months of overdue are permitted without additional maintenance before return to service or preservation renewal, only if:

NOTE: The following overdue extension is not intended to be used routinely.

NOTE: The maximum expiration period of three months is permitted only one time in the full duration of the engine storage period (with renewals included) before return to service.

(a) The engine is stored with engine covers installed (or equivalent specified in the AMM preservation procedure).

(b) The engine is stored in an indoor location (hanger) with controlled environment. The humidity level must be kept below 70%:

1) With the hangar conditioning system.

2) With the installation and monitoring of desiccant bags, G02456 [CP2098].

(c) The storage complies with the requirements of these tasks: Preservation of an Engine for Not More Than Three Months (Engine On-Wing), TASK 71-00-03-600-809-F00 and Preservation of An Engine On-Wing (Task Selection), TASK 71-00-03-600-802-F00.

(d) The fuel system was not drained during the storage period.

END OF TASK

TASK 71-00-03-600-810-F00

12. Preservation Renewal of an Engine for Not More Than Three Months (Engine On-Wing)

A. General

(1) This task is used for an engine that is installed on the airplane (on-wing).

(2) Before engine operation, refer to Inlet Cowl Lipskin Protective Coating Procedure, TASK 71-00-03-600-815-F00 for lipskin coating requirements during engine operation.

B. References

Reference	Title
36-11-02-400-801	Bleed Air Check Valve - Installation (P/B 401)
36-11-04-400-801	PRSOV Installation (P/B 401)

C. Location Zones

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

D. Preservation Renewal

SUBTASK 71-00-03-420-004-F00

(1) Before engine operation, if the PRSOV and the 5th stage bleed air check valve were removed and stored off the airplane, do the steps that follow:

(a) Remove the coupling, blanking plate and E-seal from the duct.

(b) Inspect the duct openings for unwanted material.

(c) Install the PRSOV, do this task: PRSOV Installation, TASK 36-11-04-400-801.

(d) Install the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Installation, TASK 36-11-02-400-801.

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SUBTASK 71-00-03-620-010-F00

(2) Do this task: Preservation of an Engine for Not More Than Three Months (Engine On-Wing), TASK 71-00-03-600-809-F00.

(a) Maximum One time preservation renewal is permitted.

(b) It is necessary to operate the engine at idle to do this procedure.

NOTE: Dry motoring procedure is not acceptable as an alternative to engine idle run to do preservation renewal.

NOTE: When you do the renewal, there is no need to drain oil tank and/or add preservation fluid in the oil tank (you can skip Step F (2) and F(3) of SUBTASK 71-00-03-620-030-F00.

SUBTASK 71-00-03-620-011-F00

(3) If the power plant will be kept preserved for longer than 3 months, do this task: Preservation of an Engine From One Month to One Year (Engine On-Wing), TASK 71-00-03-600-811-F00.

SUBTASK 71-00-03-620-042-F00

(4) If applicable, apply protective coating to the inlet cowl lipskin after engine operation. Do this task: Inlet Cowl Lipskin Protective Coating Procedure, TASK 71-00-03-600-815-F00.

——— END OF TASK ———

TASK 71-00-03-600-816-F00

13. Depreservation of an Engine, which was Preserved for Not More Than Three Months (Engine On-Wing)

A. General

(1) This procedure gives instructions for the depreservation of an installed power plant that is serviceable.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
12-13-11-600-803	Drain the Engine Oil (P/B 301)
36-11-02-400-801	Bleed Air Check Valve - Installation (P/B 401)
36-11-04-400-801	PRSOV Installation (P/B 401)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
71-00-00-700-822-F00	Wet Motor the Engine (P/B 201)
80-11-01-610-801-F00	Starter Servicing (Oil Fill) (P/B 301)
80-11-01-680-801-F00	Starter Servicing (Oil Drain) (P/B 301)

C. Location Zones

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

D. Power Plant Depreservation

SUBTASK 71-00-03-080-004-F00

(1) If installed, remove the waterproof cover and desiccant.

(a) Make sure that you remove all of the moisture barrier tape from the inlet and exhaust areas and that there is no unwanted material.

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SUBTASK 71-00-03-630-006-F00

CAUTION	MAKE SURE THAT YOU FOLLOW THE LIPSKIN COATING PROCEDURES BEFORE AN ENGINE OPERATION. IF YOU DO NOT FOLLOW INSTRUCTIONS, THE COATING CAN MELT AND GO INTO THE ENGINE. THIS CAN CAUSE ENGINE DAMAGE.

(2) If not already done, remove the lipskin protective coating from the inlet cowl lipskin (TASK 71-00-03-600-815-F00).

SUBTASK 71-00-03-420-002-F00

(3) If the PRSOV and 5th stage bleed air check valve were removed and stored off the airplane, do the steps that follow:

(a) Remove the coupling, blanking plate, and E-seal from the duct.

(b) Inspect the duct openings for unwanted material.

(c) Install the PRSOV, do this task: PRSOV Installation, TASK 36-11-04-400-801.

(d) Install the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Installation, TASK 36-11-02-400-801.

SUBTASK 71-00-03-680-005-F00

(4) Do this task: Drain the Engine Oil, TASK 12-13-11-600-803.

(a) Make sure that you drain the oil tank and the accessory gearbox.

SUBTASK 71-00-03-680-006-F00

(5) Do this task: Starter Servicing (Oil Drain), TASK 80-11-01-680-801-F00.

SUBTASK 71-00-03-610-004-F00

(6) Do a check of the oil tank level.

(a) If it is necessary to fill the tank, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

SUBTASK 71-00-03-610-005-F00

(7) Do this task: Starter Servicing (Oil Fill), TASK 80-11-01-610-801-F00.

SUBTASK 71-00-03-790-003-F00

(8) Do this task: Wet Motor the Engine, TASK 71-00-00-700-822-F00.

SUBTASK 71-00-03-790-004-F00

(9) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Operate the engine at idle for ten minutes before you stop the engine.

END OF TASK

TASK 71-00-03-600-811-F00

14. Preservation of an Engine From One Month to One Year (Engine On-Wing)

(Figure 206, Figure 207, Figure 208)

A. General

(1) This task is used for an engine that is installed on the airplane (on-wing).

(2) This task gives the instructions for a serviceable or a non-serviceable power plant.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)

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(Continued)

Reference	Title
12-13-11-600-803	Drain the Engine Oil (P/B 301)
24-11-21-200-801	Integrated Drive Generator (IDG) Air/Oil Cooler - Inspection/Check (P/B 201)
24-22-00-860-811	Supply Electrical Power (P/B 201)
24-22-00-860-812	Remove Electrical Power (P/B 201)
36-11-02-000-801	Bleed Air Check Valve - Removal (P/B 401)
36-11-04-000-801	PRSOV Removal (P/B 401)
70-30-01-910-802-F00	Seals (Preformed Packings and O-Rings) and Gaskets (P/B 201)
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)
71-00-00-700-822-F00	Wet Motor the Engine (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (P/B 201)
72-00-00-980-801-F00	Turn the N2 Rotor (P/B 201)
73-11-02-000-801-F00	Fuel Filter - Removal (P/B 401)
73-11-02-400-801-F00	Fuel Filter - Installation (P/B 401)
75-32-00-730-801-F00	VBV Actuation System - Manual Operation (P/B 201)
79-21-04-000-801-F00	Scavenge Oil Filter Assembly Removal (P/B 401)
79-21-04-400-801-F00	Scavenge Oil Filter 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-1501	Kit - Engine Cover Part #: BBJ-2001-JB-R Supplier: 4VVY1 Part #: BBJ-2001-JB-SDP Supplier: 4VVY1 Part #: I10233AR Supplier: 064U8
COM-1516	Cover - Engine Inlet, CFM56-7 Part #: 892807 Supplier: SBK11 Part #: AVTB73NCFM56 Supplier: 018PR Part #: B737-150 Supplier: 1LE67 Part #: B737-152 Supplier: 1LE67 Part #: BBJ-2V Supplier: 4VVY1 Part #: WL14L96A Supplier: 8M213

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(Continued)

Reference	Description
COM-1537	Dispenser - Servicing, Engine Oil Part #: 7011 Supplier: K6057 Part #: 7036 Supplier: K6057 Part #: BOB02 Supplier: D2029 Part #: BOB05 Supplier: D2029 Part #: BOB20 Supplier: D2029 Part #: MODEL 150 Supplier: 94861 Part #: Model 250 Supplier: 94861 Part #: PF53481-3P Supplier: 94861 Part #: PF53481-5PWS Supplier: 94861 Part #: PF53481-8PWS Supplier: 94861 Part #: PF55451-2WS Supplier: 94861 Part #: PF55451-7WS Supplier: 94861 Opt Part #: 150-3 Supplier: 94861 Opt Part #: PF53361-2PWS Supplier: 94861 Opt Part #: PF53361-8PWS Supplier: 94861 Opt Part #: UZ/7/1826 Supplier: K6057 Opt Part #: WF150-1 Supplier: 94861 Opt Part #: WF174410 Supplier: 94861
SPL-1517	Cover - Engine Exhaust Part #: 896807 Supplier: SBK11 Part #: AVTB73NCFM56EPS Supplier: 018PR Part #: AVTB73NCFM5EEPS Supplier: 018PR
SPL-2178	Unit - Engine, Preservation/False Metering Valve Signal Part #: 856A1480G01 Supplier: 58828
SPL-14648	Plug - Fan Reverser Part #: 895807 Supplier: SBK11 Part #: AVTB73NCFM56BPS Supplier: 018PR
SPL-18121	Plug - Bypass & Exhaust Part #: B737-250 Supplier: 1LE67 Part #: BBJ-XG-2001 Supplier: 4VVY1 Part #: WL15L96A Supplier: 8M213
SPL-18258	Blanking Plate - PRSOV Part #: C36008-1 Supplier: 81205
STD-858	Tag - DO NOT OPERATE
STD-1054	Container - Fuel Resistant, 5-Gallon (19-Liter)
STD-1055	Container - Oil Resistant, 5 Gallon (19 Liter)
STD-3906	Mallet - Rubber
STD-3938	Container - Oil Resistant, 10 U.S. Gallon (38 Liter)

D. Consumable Materials

Reference	Description	Specification
B00666	Solvent - Methyl Propyl Ketone	BMS11-9
D00006	Compound - Antiseize, Pure Nickel Special - Never-Seez NSBT-8N/-16N	
D00599 [CP2442]	Oil - Engine	
D00601 [CP2101]	Vaseline - Graphite Mineral	

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(Continued)

Reference	Description	Specification
D00623 [CP5066]	Oil - Fuel System, Corrosion Preventive	MIL-PRF-6081, Grade 1010
D00662 [CP5075]	Additive - Corrosion Preventive, Brayco 599	
D00664 [CP5067]	Oil - Corrosion Preventive, Lubricative System	MIL-PRF-6085
D00672 [CP5070]	Vaseline - Pure Mineral	V V-P-236
G00252	Film - Polyethylene Film And Sheeting	ASTM D2103 (Supersedes L-P-512)
G00253	Material - Barrier Materials, Greaseproofed, Waterproof, Flexible, Heat-Sealable	MIL-PRF-121 (Supersedes MIL-B-121)
G00834	Cloth - Lint-free Cotton	
G00920	Tape - Waterproof, Packaging	ASTM D5486
G02304	Tape - Moisture Barrier, Adhesive One-side	BMS8-346
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	AMS 5687
G02455 [CP2160]	Film, Vapor Barrier, Polyethylene	L-P-512
G02456 [CP2098]	Desiccant - Activated, Bagged, Packaging Use And Static Dehumidification	MIL-D-3464
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.8 mm) Diameter	M50 TF 9 CL-A
G51576	Tape - Pressure Sensitive Adhesive - BA6866	BAC5034-4
G51663	Tape - Duct, Outdoor - 3M 8979	BAC5034-4
G51664	Tape - Duct, Outdoor - 3M 8979N (MIL-STD-2041 Compliant)	BAC5034-4

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
21	O-ring	73-11-01-01-065	LOM 402, 404, 406, 407, 411, 416, 445
		73-11-01-01A-115	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
24	Packing	73-11-01-01-120	LOM 402, 404, 406, 407, 411, 416, 445
		73-11-01-01A-230	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
25	Packing	73-11-01-01-115	LOM 402, 404, 406, 407, 411, 416, 445
		73-11-01-01A-225	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
27	Packing	73-11-01-01-125	LOM 402, 404, 406, 407, 411, 416, 445
		73-11-01-01A-235	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999

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F. Location Zones

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

G. Power Plant Preservation (Serviceable)

SUBTASK 71-00-03-910-003-F00

(1) Obey the CAUTIONS when you do this procedure:

> **CAUTION** DO NOT SPRAY PRESERVATIVE OIL INTO ENGINE GAS PATH, AS POSSIBLE DIRT DEPOSITION ON BLADES AND VANES WILL REDUCE ENGINE EFFICIENCY.

> **CAUTION** DO NOT SPRAY PRESERVATIVE OIL OR EQUIVALENT INTO THE ENGINE INLET, CORE COMPRESSOR, TURBINE, OR ENGINE EXHAUST. UNWANTED PARTICLES THAT STAY ON THE BLADES AND VANES WET WITH OIL CAN CAUSE DAMAGE TO THE ENGINE.

> **CAUTION** DO NOT USE SILICONE-BASED OILS IN THE FUEL SYSTEM. THIS WILL HELP PREVENT DAMAGE TO THE FUEL SYSTEM.

(a) Do not apply a spray of preservative oil into the inlet, compressor, turbine, or exhaust.

SUBTASK 71-00-03-620-050-F00

(2) If it is operator policy, examine and clean the Integrated Drive Generator (IDG) air/oil cooler (TASK 24-11-21-200-801).

NOTE: This check is recommended to prevent corrosion and cooler failure especially during operation in winter.

SUBTASK 71-00-03-680-002-F00

(3) If it is not already done, do this task: Drain the Engine Oil, TASK 12-13-11-600-803.

SUBTASK 71-00-03-620-012-F00

(4) To fill the oil tank with preservative oil, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

NOTE: This step may be done just before the last ground run/flight.

NOTE: Only oil, D00664 [CP5067], is approved by the engine manufacturer to be used to operate the engine just before the last ground run/flight.

(a) Fill the oil tank with 20 qt (19 l) of one of the preservative oils given below:

1) oil, D00599 [CP2442], and at least 5 percent by volume of oil, D00664 [CP5067] (CP2851), or

2) oil, D00599 [CP2442], and at least 7 percent by volume of additive, D00662 [CP5075].

SUBTASK 71-00-03-860-005-F00

(5) Perform idle run as follows:

(a) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

(b) Let the engine become stable for 15-20 minutes at the idle.

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1) When the engine cannot be operated at idle condition, dry motor the engine for 4 minutes, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

(c) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 71-00-03-480-010-F00

(6) If you remove an engine component, make sure that you install protective covers and gaskets on all openings.

SUBTASK 71-00-03-620-013-F00

(7) Do these steps to do the engine fuel system preservation:

(a) Make sure that the applicable engine start lever is in the CUTOFF position.

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

(b) Make sure that the SPAR VALVE CLOSED light, on the P5 overhead panel, is dim.

NOTE: The light for the engine spar valve has three positions: 1) bright when the valve is in transition or when it does not agree with the commanded position; or 2) dim when the valve is closed; or 3) OFF when the valve is opened.

(c) Do these steps to drain the fuel supply line (Figure 206):

1) Put the 5-gallon (19-liter) fuel resistant container, STD-1054, below the fuel filter drain plug [22].

2) Remove the drain plug [22] and let the fuel drain.

NOTE: The drain plug has a 13/16-inch fitting.

3) Remove and discard the O-ring [21] from the drain plug [22].

4) Lubricate a new O-ring [21] with vaseline, D00672 [CP5070], and install it on the drain plug [22].

5) Lubricate the threads of the drain plug [22] with graphite mineral vaseline, D00601 [CP2101].

6) Install the drain plug [22].

a) Torque the drain plug [22] to 45 in-lb (5 N·m) - 55 in-lb (6 N·m).

7) Attach safety wire, G02345 [CP8001], or cable, G50065 [CP8006], to the drain plug [22].

(d) Disconnect the fuel inlet line at the engine fuel tube (Figure 207).

1) Remove the bolts [31] that attach the fuel inlet line to the engine fuel tube.

2) Remove the gasket [32] from the fuel inlet line.

a) Keep the gasket [32] for the later installation.

3) Install a protective cover on the fuel inlet line.

(e) Connect a temporary line from the engine oil servicing dispenser, COM-1537, to the engine fuel tube to supply oil, D00623 [CP5066], at 50 psi (345 kPa) maximum pressure.

1) If a pressurized oil cart is not available, a 42 qt (40 l) gravity flow container is permitted if the container is 1 ft (305 mm) above the fuel pump.

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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.

(f) Disconnect the line from the PCR port on the Hydro-Mechanical Unit (HMU).

(g) Install a temporary hose drain line 118 in. (3 m) long from the PCR port on the HMU and put the other end of the hose in a oil resistant container (10 gal), STD-3938.

1) Attach the end of the hose to the container to prevent fluid leakage.

(h) If the oil cart is used, apply and hold an oil pressure of 50 psi (345 kPa) maximum to the fuel pump inlet.

1) Hold this pressure during the motoring of the engine.

> **CAUTION** DO NOT APPLY BOOST PUMP PRESSURE TO THE FUEL PUMP INLET WHEN YOU DRY-MOTOR THE ENGINE WITH THE DISCONNECTED FUEL LINE. FUEL WILL SPILL ON THE ENGINE AND CAUSE DAMAGE TO THE EQUIPMENT.

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

> **CAUTION** DO NOT CONTINUE TO DRY-MOTOR THE ENGINE WITHOUT PRESERVATIVE FLUID IN THE GRAVITY FLOW CONTAINER. IF YOU DO, DAMAGE TO THE FUEL PUMP CAN OCCUR.

1) Cease dry motoring operation after visual verification of preservative fluid leaving HMU is observed.

(j) After the engine stops, remove the temporary drain line from the PCR port on the HMU.

(k) Do these steps to tighten the coupling nut:

1) Install the PCR line to the PCR port.

> **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) Torque the coupling nut to 285 ±15 in-lb (32 ±2 N·m).

(l) Do these steps to let the preservation fluid flow in the engine:

1) Make sure to do this check of the circuit breakers before you do the wet motor procedure to prevent fuel leakage.

2) Open these circuit breakers and install safety tags:

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	3	C00360	FUEL SPAR VALVE ENG 2
B	4	C00359	FUEL SPAR VALVE ENG 1

3) Remove the DO NOT OPERATE tag, STD-858, from the applicable engine start lever.

4) Do this task: Wet Motor the Engine, TASK 71-00-00-700-822-F00.

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5) Wet motor the engine for 5 seconds or until you see a spray of the preservation fluid out the engine exhaust nozzle.

6) Move the engine start lever to the CUTOFF position and continue to motor for 2 minutes.

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

7) Put the applicable engine start switch to the CONT position.

NOTE: When you stop the engine with the engine start switch in the CONT position, the Electronic Engine Control (EEC) will command the Variable Stator Vane (VSV)'s to the full open position and the Variable Bleed Valve (VBV)'s to the full closed position.

8) Let the engine stop completely.

9) Put the applicable engine start switch to the OFF position.

10) Remove the safety tags and close these circuit breakers:

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	3	C00360	FUEL SPAR VALVE ENG 2
B	4	C00359	FUEL SPAR VALVE ENG 1

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

(n) Remove the temporary oil supply line from the engine fuel tube.

(o) Do this step to make sure that the gasket [32] is clean and serviceable:

1) Do this task: Seals (Preformed Packings and O-Rings) and Gaskets, TASK 70-30-01-910-802-F00.

(p) Lubricate the threads of the bolts [31] with Pure Nickel Special compound, D00006.

(q) Install the bolts [31] to attach the fuel inlet line to the engine fuel tube.

(r) Torque the bolts [31] to 50 in-lb (5.6 N·m) - 55 in-lb (6.2 N·m).

SUBTASK 71-00-03-020-006-F00

(8) If the Auxiliary Power Unit (APU) or external air will be used to operate the Environmental Control System (ECS) while the engine is preserved, it is recommended to remove the PRSOV and 5th stage bleed air check valve and store them off of the airplane, do these steps:

(a) Remove the Pressure Regulating and Shutoff Valve (PRSOV), do this task: PRSOV Removal, TASK 36-11-04-000-801.

(b) Remove the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Removal, TASK 36-11-02-000-801.

NOTE: If removal of the fifth stage duct assembly was necessary to remove the bleed air check valve, it may also be stored off airplane.

(c) Install an E-seal and a coupling with the blanking plate, SPL-18258, on the precooler upstream duct

1) When the coupling is in place, tighten the coupling.

a) Torque the coupling nut to 115.0 in-lb (13.0 N·m) - 125.0 in-lb (14.1 N·m).

b) Lightly tap the outer surface of the coupling with the rubber mallet, STD-3906.

c) Torque the coupling nut again to 115.0 in-lb (13.0 N·m) - 125.0 in-lb (14.1 N·m).

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CAUTION DO NOT APPLY THE G00920 TAPE TO THE PAINTED SURFACES. THE TAPE IS HARD TO REMOVE. IT CAN CAUSE DAMAGE TO THESE SURFACES.

(d) On the intersection manifold duct assembly and fifth stage duct assembly, cover the openings with a protective cover or use a barrier (plastic sheet) and tape.

(e) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

(f) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

1) If the fifth stage duct assembly is removed during removal of the bleed air check valve, cover the opening on the engine case (fifth stage port) with a barrier (plastic sheet) and tape.

2) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

3) Use the preferred 3M 8979 tape, G51663, 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

SUBTASK 71-00-03-980-002-F00

(9) If the VBV doors are open, close them, do this task: VBV Actuation System - Manual Operation, TASK 75-32-00-730-801-F00.

SUBTASK 71-00-03-480-011-F00

(10) Put vapor barrier film, G02455 [CP2160], on the VBV bleed grills.

SUBTASK 71-00-03-480-012-F00

(11) Install protective covers on all disconnected lines and electrical connections.

SUBTASK 71-00-03-620-039-F00

(12) Put desiccant bags, G02456 [CP2098], and humidity indicators in the inlet and exhausts of the engine to protect it from moisture as follows:

NOTE: Desiccant bags must be inspected/replaced at regular intervals depending on weather conditions.

(a) Make sure that they are accessible for inspection/replacement while disturbing a minimum amount of protective material, do this task: Desiccant Bags Inspection Procedure, TASK 71-00-03-200-801-F00.

(b) Mark the date on the humidity indicator tags.

(c) Attach desiccant bags, G02456 [CP2098], in the inlet and exhausts of the engine.

1) Make sure that they are not in contact with the engine hardware.

(d) If necessary, use vapor barrier film, G02455 [CP2160], to locally protect the engine hardware.

SUBTASK 71-00-03-480-013-F00

(13) Seal the inlet and exhaust openings with the vapor barrier film, G02455 [CP2160].

(a) Attach vapor barrier film, G02455 [CP2160], with moisture barrier tape, G02304.

(b) To cover the inlet opening, apply the tape at the inner barrel ring (Figure 205).

(c) Do not apply tape to or on the inlet cowl lipskin.

SUBTASK 71-00-03-480-016-F00

(14) Put the adequate protective cover that follows:

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(a) If the engine is stored on-wing, put a waterproof cover over the whole powerplant.

1) Make sure that it is tightly fitted to the powerplant.

> **CAUTION** MAKE SURE THAT THE DRAIN MASTS ARE CLEAR OF BLOCKAGE. BLOCKED DRAINS CAN CAUSE WATER TO COLLECT IN THE THRUST REVERSER. THIS CAN CAUSE DAMAGE TO THE EQUIPMENT.

2) If not possible, as an alternative, install the kit, COM-1501 (preferred), or inlet cover, COM-1516, and exhaust plug, SPL-18121 (alternate), to prevent fan windmilling and to prevent Foreign Object Damage (FOD).

NOTE: The exhaust plug, SPL-18121, installs to the exhaust and bypass of the engine.

NOTE: The engine exhaust cover, SPL-1517, and engine fan reverser plug, SPL-14648, are an alternative covers to the exhaust plug, SPL-18121.

> **CAUTION** DO NOT APPLY THE G00920 TAPE TO THE PAINTED SURFACES. THE TAPE IS HARD TO REMOVE. IT CAN CAUSE DAMAGE TO THESE SURFACES.

(b) If the engine inlet and exhaust tool covers are not available, use a barrier (plastic sheet) and tape.

(c) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

(d) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

1) When you use a plastic sheet for the exhaust cover, make sure that the drain holes or tubes are clear of the cover.

2) When you use a plastic sheet, for the inlet cover, do the steps that follow:

a) Use lint-free cloth, G00834, and solvent, B00666, to wipe the area where the tape is used.

b) Cut an approximately 60 in. (1.5 m) diameter circle from a plastic sheet.

c) Put tape on the circle on the FWD edge of the acoustic panel behind the lipskin.

d) Apply a minimum of 3 overlap layers of tape around the perimeter of the inlet acoustic panel.

e) Do not place plastic or tape over the lipskin or cover the lipskin with plastic.

f) Apply the tape across the diameter of the circular sheet to reduce the pillowing of the plastic sheeting.

SUBTASK 71-00-03-970-001-F00

(15) Attach a tag to the power plant that shows that the fuel and oil systems preservation was done with preservative oil.

(a) Include the date of the preservation procedure.

H. Power Plant Preservation (Not Serviceable)

NOTE: If you can motor the engine, do this task: Preservation of an Engine From One Month to One Year (Engine On-Wing), TASK 71-00-03-600-811-F00 (Serviceable).

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SUBTASK 71-00-03-620-051-F00

(1) If it is operator policy, examine and clean the IDG air/oil cooler (TASK 24-11-21-200-801).

NOTE: This check is recommended to prevent corrosion and cooler failure especially during operation in winter.

SUBTASK 71-00-03-620-014-F00

(2) Do these steps to prepare for the procedure:

(a) Make sure that the applicable engine start lever is in the CUTOFF position.

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

(b) Make sure that the SPAR VALVE CLOSED light, on the P5 on the overhead panel, is dim.

NOTE: The light for the engine spar valve has three positions: 1) bright when the valve is in transition or when it does not agree with the commanded position; or 2) dim when the valve is closed; or 3) OFF when the valve is opened.

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

SUBTASK 71-00-03-680-004-F00

(3) Do these steps to drain the fuel system (Figure 206):

(a) Put the 5-gallon (19-liter) fuel resistant container, STD-1054, below the fuel pump.

(b) Disconnect the filter upstream pressure sensing tube from the fuel pump housing.

NOTE: The filter upstream pressure sensing tube is the lower sensing tube. The other end of this tube is connected to the fuel filter differential pressure switch.

1) Let the fuel drain into the container.

(c) Remove the drain plug [22] and let the fuel drain.

NOTE: The drain plug has a 13/16-inch fitting.

(d) Remove and discard the O-ring [21] from the drain plug [22].

(e) Lubricate a new O-ring [21] with vaseline, D00672 [CP5070], and install it on the drain plug [22].

(f) Lubricate the threads of the drain plug [22] with graphite mineral vaseline, D00601 [CP2101].

(g) Install the drain plug [22].

1) Torque the drain plug [22] to 45 in-lb (5 N·m) - 55 in-lb (6 N·m).

(h) Attach safety wire, G02345 [CP8001], or cable, G50065 [CP8006], to the drain plug [22].

SUBTASK 71-00-03-010-001-F00

(4) Disconnect the fuel inlet line at the engine fuel tube (Figure 207).

(a) Remove the bolts [31] that attach the fuel inlet line to the engine fuel tube.

(b) Remove the gasket [32] from the fuel inlet line.

1) Keep the gasket [32] for the subsequent installation.

2) Install a protective cover on the engine fuel tube.

SUBTASK 71-00-03-010-002-F00

(5) Do these steps to drain the lube flow screen assembly (Figure 206):

(a) Remove the lube flow screen assembly [23] from the fuel pump, and drain the fuel into the 5-gallon (19-liter) fuel resistant container, STD-1054.

(b) Remove and discard the preformed packing [24] and packing [25] from the screen assembly.

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(c) Lightly lubricate the new packing [24] and packing [25] with oil, D00599 [CP2442].

(d) Install the new packings on the lube flow screen assembly.

SUBTASK 71-00-03-010-003-F00

(6) Remove the fuel filter, do this task: Fuel Filter - Removal, TASK 73-11-02-000-801-F00.

SUBTASK 71-00-03-620-019-F00

(7) Do these steps to pump preservative oil into the lube flow screen port on the fuel pump:

> **CAUTION**
> DO NOT USE SILICONE-BASED OILS IN THE FUEL SYSTEM. THIS WILL HELP PREVENT DAMAGE TO THE FUEL SYSTEM.

(a) Connect a temporary line from the engine oil servicing dispenser, COM-1537, to the lube flow screen port to supply oil, D00623 [CP5066], at 50 psi (345 kPa) maximum pressure.

1) Make sure that the oil cart has a 10 micron filter.

2) Torque the connector to 45 in-lb (5 N·m) - 55 in-lb (6 N·m).

(b) Pump filtered oil into the lube flow screen port until oil flows from the filter upstream pressure sensing port and the fuel filter housing.

1) Continue to pump oil into the port until no fuel is mixed with the oil.

(c) Connect the filter upstream pressure sensing tube to the fuel pump housing.

1) Torque the connector to 45 in-lb (5 N·m) - 55 in-lb (6 N·m).

(d) Install a new fuel filter, do this task: Fuel Filter - Installation, TASK 73-11-02-400-801-F00.

(e) Remove the PHP plug [26] from the fuel pump.

(f) Pump filtered oil into the lube flow screen port until oil flows from the PHP port.

1) Continue to pump oil into the port until no fuel is mixed with the oil.

(g) Disconnect the oil cart from the lube flow screen port.

(h) Install the lube flow screen assembly [23] with the new packing [24] and packing [25] in the fuel pump.

1) Torque the lube flow screen assembly to 90 in-lb (10 N·m) - 110 in-lb (12 N·m).

2) Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006], to the lube flow screen assembly.

SUBTASK 71-00-03-620-022-F00

(8) Do these steps to pump preservative oil into the PHP port on the fuel pump:

(a) Connect a temporary line from the engine oil servicing dispenser, COM-1537, to the PHP port to supply oil, D00623 [CP5066], at 50 psi (345 kPa) maximum pressure.

1) Torque the connector to 45 in-lb (5 N·m) - 55 in-lb (6 N·m).

> **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) Disconnect the hose from the PCR port on the HMU.

1) Install a temporary drain line to the PCR port to direct unwanted fluid in to the container.

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(c) Disconnect the J6 electrical connector from the receptacle identified as CH B on the HMU.

(d) If it is necessary, use soft nose pliers.

1) Connect the unit, SPL-2178, to the HMU receptacle identified as CH B.

NOTE: The Engine Preservation/False Metering Valve Signal Unit will cause the Fuel Metering Valve (FMV) open to let preservative oil flow to the fuel nozzles.

(e) Pump filtered oil into the PHP port until oil flows from the PCR port.

1) Continue to pump oil into the port until no fuel is mixed with the oil.

(f) Remove the unit, SPL-2178, from the HMU receptacle.

1) Connect the J6 electrical connector to the receptacle identified as CH B on the HMU.

(g) Remove the temporary drain line to the PCR port.

(h) Connect the PCR hose to the PCR port on the HMU.

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) Torque the PCR hose coupling to 180 in-lb (20 N·m) - 220 in-lb (25 N·m).

(i) Disconnect the hose from the LPTCC port on the HMU.

1) Install a temporary drain line to the LPTCC port to direct unwanted fluid into the container.

(j) Pump filtered oil into the PHP port until oil flows from the LPTCC port.

1) Continue to pump oil into the port until no fuel is mixed with the oil.

(k) Disconnect the cart from the PHP port.

(l) Install the PHP plug [26] with a new packing [27] in the fuel pump.

1) Torque the PHP plug [26] to 45 in-lb (5 N·m) - 55 in-lb (6 N·m).

(m) Remove the temporary drain line from the LPTCC port.

(n) Connect the LPTCC hose to the LPTCC port on the HMU.

1) Torque the LPTCC hose coupling to 180 in-lb (20 N·m) - 200 in-lb (23 N·m).

SUBTASK 71-00-03-430-001-F00

(9) Do these steps to install the fuel inlet line:

(a) Make sure that the gasket [32] is clean and serviceable.

1) Do this task: Seals (Preformed Packings and O-Rings) and Gaskets, TASK 70-30-01-910-802-F00.

(b) Lubricate the threads of the bolts [31] with Pure Nickel Special compound, D00006.

(c) Install the bolts [31] to attach the fuel inlet line to the engine fuel tube.

(d) Torque the bolts [31] to 45 in-lb (5 N·m) - 55 in-lb (6 N·m).

SUBTASK 71-00-03-210-002-F00

(10) Make sure that these connections are made and do not leak:

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(a) Filter upstream pressure sensing line

(b) Lube flow screen assembly

(c) PHP port plug

(d) PCR port hose

(e) LPTCC port hose.

SUBTASK 71-00-03-020-007-F00

(11) If the APU or external air will be used to operate the ECS while the engine is preserved, it is recommended to remove the PRSOV and 5th stage bleed air check valve and store them off of the airplane, do these steps:

(a) Remove the PRSOV, do this task: PRSOV Removal, TASK 36-11-04-000-801.

(b) Remove the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Removal, TASK 36-11-02-000-801.

NOTE: If removal of the fifth stage duct assembly was necessary to remove the bleed air check valve, it may also be stored off airplane.

(c) Install an E-seal and a coupling with the blanking plate, SPL-18258, on the precooler upstream duct.

1) When the coupling is in place, tighten the coupling.

a) Torque the coupling nut to 115.0 in-lb (13.0 N·m) - 125.0 in-lb (14.1 N·m).

b) Lightly tap the outer surface of the coupling with the rubber mallet, STD-3906.

c) Torque the coupling nut again to 115.0 in-lb (13.0 N·m) - 125.0 in-lb (14.1 N·m).

CAUTION DO NOT APPLY THE G00920 TAPE TO THE PAINTED SURFACES. THE TAPE IS HARD TO REMOVE. IT CAN CAUSE DAMAGE TO THESE SURFACES.

(d) On the intersection manifold duct assembly and fifth stage duct assembly, cover the openings with a protective cover or use a barrier (plastic sheet) and tape.

(e) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

(f) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

1) If the fifth stage duct assembly is removed during removal of the bleed air check valve, cover the opening on the engine case (fifth stage port) with a barrier (plastic sheet) and tape.

2) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

3) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

SUBTASK 71-00-03-620-024-F00

(12) Close the VBV doors, do this task: VBV Actuation System - Manual Operation, TASK 75-32-00-730-801-F00

(a) Install vapor barrier film, G02455 [CP2160], over the VBV bleed grills.

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SUBTASK 71-00-03-620-015-F00

(13) Do the preservation procedure for the engine lubrication system:

(a) Recommended Procedure.

1) Do this task: Dry-Out and Lubrication of the Engine, TASK 71-00-03-600-801-F00.

(b) Alternate Procedure.

1) Do these steps to drain the engine lubrication system:

a) For the engine oil tank and the Accessory Gear Box (AGB), do this task: Drain the Engine Oil, TASK 12-13-11-600-803.

b) For the oil circuit, do this task: Scavenge Oil Filter Assembly Removal, TASK 79-21-04-000-801-F00.

c) Put the oil resistant container (5 gal)(19 Liter), STD-1055, below the oil supply filter.

d) Remove the oil filter drain plug and let the oil drain fully.

2) Do this task: Scavenge Oil Filter Assembly Installation, TASK 79-21-04-400-801-F00.

3) Make sure that the drain plug for the oil supply filter is installed.

4) Do the preservation procedure for the engine lubrication system.

a) Use the engine oil servicing dispenser, COM-1537, and fill the locations that follow with the fluid mixtures given below at a maximum pressure of 50 psi (345 kPa) (Table 201).

b) Use oil, D00599 [CP2442], and 5 percent by volume of oil, D00664 [CP5067] (CP2851), or oil, D00599 [CP2442], and 7 percent by volume of additive, D00662 [CP5075].

Table 201/71-00-03-993-807-F00

Location	Oil Fill Qty.
Oil Supply to AGB	6 quarts (6 liters)
Oil Supply to Fwd Sump	2 quarts (2 liters)
Oil Supply to Aft Sump	1 quart (1 liter)
Oil Tank	20 quarts (20 liters)
Lube Unit	Make parts wet
Oil Supply to Scavenge Oil Filter	0.5 pint (0.24 liter)

<1> You can disconnect the oil supply tubes at the lubrication unit (Figure 208).

5) If it is possible, while you pump the oil in, do these steps to turn the fan and core rotors with your hand:

a) For the N1 rotor, turn the fan rotor with your hand.

b) For the N2 rotor, do this task: Turn the N2 Rotor, TASK 72-00-00-980-801-F00.

c) Continue to turn the rotors for 1 minute until all of the oil is added.

d) After the oil is added, install protective covers on all the lube system ports, tube openings, drains, and vents to seal the lube system.

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SUBTASK 71-00-03-480-017-F00

(14) Make sure that all disconnected lines and electrical connections have protective covers installed.

SUBTASK 71-00-03-620-040-F00

(15) Put desiccant bags, G02456 [CP2098], and humidity indicators in the inlet and exhausts of the engine to protect it from moisture as follows:

NOTE: Desiccant bags must be inspected/replaced at regular intervals depending on weather conditions.

(a) Make sure that they are accessible for inspection/replacement while disturbing a minimum amount of protective material, do this task: Desiccant Bags Inspection Procedure, TASK 71-00-03-200-801-F00.

(b) Mark the date on the humidity indicator tags.

(c) Attach desiccant bags, G02456 [CP2098], in the inlet and exhausts of the engine.

1) Make sure that they are not in contact with the engine hardware.

(d) If it is necessary, use vapor barrier film, G02455 [CP2160], to locally protect the engine hardware.

SUBTASK 71-00-03-480-018-F00

(16) Seal the inlet and exhaust openings with vapor barrier film, G02455 [CP2160].

(a) Attach vapor barrier film, G02455 [CP2160], with moisture barrier tape, G02304.

(b) To cover the inlet opening, apply the tape at the inner barrel ring (Figure 205).

(c) Do not apply tape to or on the inlet cowl lipskin.

SUBTASK 71-00-03-480-020-F00

(17) Put the adequate protective cover that follows:

(a) If the engine is stored on-wing, put a waterproof cover over the whole powerplant.

1) Make sure that it is tightly fitted to the powerplant.

CAUTION MAKE SURE THAT THE DRAIN MASTS ARE CLEAR OF BLOCKAGE. BLOCKED DRAINS CAN CAUSE WATER TO COLLECT IN THE THRUST REVERSER. THIS CAN CAUSE DAMAGE TO THE EQUIPMENT.

2) If it is not possible, as an alternative, install the kit, COM-1501 (preferred), or inlet cover, COM-1516, and exhaust plug, SPL-18121 (alternate), to prevent fan windmilling and to prevent FOD.

NOTE: The exhaust plug, SPL-18121, installs to the exhaust and bypass of the engine.

NOTE: The engine exhaust cover, SPL-1517, and engine fan reverser plug, SPL-14648, are an alternative covers to the exhaust plug, SPL-18121.

CAUTION DO NOT APPLY THE G00920 TAPE TO THE PAINTED SURFACES. THE TAPE IS HARD TO REMOVE. IT CAN CAUSE DAMAGE TO THESE SURFACES.

(b) If the engine inlet and exhaust tool covers are not available, use a barrier (plastic sheet) and tape.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Make the barrier from barrier material, G00253, polyethylene film, G00252, or an equivalent 6 MIL or thicker material.

(d) Use the preferred 3M 8979 tape, G51663, or 3M 8979N tape, G51664, or alternate tape, G51576, or tape, G00920.

1) When you use a plastic sheet for the exhaust cover, make sure that the drain holes or tubes are clear of the cover.

2) When you use a plastic sheet, for the inlet cover, do the steps that follow:

a) Use lint-free cloth, G00834, and solvent, B00666, to wipe the area where the tape is used.

b) Cut an approximately 60 in. (1.5 m) diameter circle from a plastic sheet.

c) Put tape on the circle on the FWD edge of the acoustic panel behind the lipskin.

d) Apply a minimum of 3 overlap layers of tape around the perimeter of the inlet acoustic panel.

e) Do not place plastic or tape over the lipskin or cover the lipskin with plastic.

f) Apply the tape across the diameter of the circular sheet to reduce the pillowing of the plastic sheeting.

SUBTASK 71-00-03-970-002-F00

(18) Attach a tag to the power plant to show that the preservation procedure for the fuel and oil systems is completed.

(a) Include the date of preservation procedure.

SUBTASK 71-00-03-860-013-F00

(19) Make sure that the applicable engine start lever is in the CUTOFF position.

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

SUBTASK 71-00-03-860-010-F00

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

I. Overdue Situation

SUBTASK 71-00-03-550-004-F00

(1) Up to three months of overdue are permitted without additional maintenance before return to service or preservation renewal, only if:

NOTE: The following overdue extension is not intended to be used routinely.

NOTE: The maximum expiration period of three months is permitted only one time in the full duration of the engine storage period (with renewals included) before return to service.

(a) The engine is stored with engine covers installed (or equivalent specified in the Airplane Maintenance Manual (AMM) preservation procedure).

(b) The engine is stored in an indoor location (hanger) with controlled environment. The humidity level must be kept below 70%:

1) With the hangar conditioning system.

2) With the installation and monitoring of desiccant bags, G02456 [CP2098].

(c) The storage complies with the requirements of these tasks: Preservation of an Engine From One Month to One Year (Engine On-Wing), TASK 71-00-03-600-811-F00 and Preservation of An Engine On-Wing (Task Selection), TASK 71-00-03-600-802-F00.

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(d) The fuel system was not drained during the storage period.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H03381 S0006582000_V3

Fuel Filter Drain and Fuel Pump/HMU Ports
Figure 206/71-00-03-990-805-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fuel Inlet Line Disconnect Point
Figure 207/71-00-03-990-806-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Oil Supply Tube Location
Figure 208/71-00-03-990-809-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-03-600-812-F00

15. Preservation Renewal of an Engine From One Month to Not More Than One Year (Engine On-Wing)

A. General

(1) This task is used for an engine that is installed on the airplane (on-wing).

(2) This task gives the instructions for a serviceable or a non-serviceable power plant.

(3) There is no limit on the number of times you can do this task.

(4) Before engine operation, refer to Inlet Cowl Lipskin Protective Coating Procedure, TASK 71-00-03-600-815-F00 for lipskin coating requirements during engine operation.

B. References

Reference	Title
36-11-02-400-801	Bleed Air Check Valve - Installation (P/B 401)
36-11-04-400-801	PRSOV Installation (P/B 401)

C. Location Zones

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

D. Serviceable Power Plant

SUBTASK 71-00-03-620-016-F00

(1) Do this task: Preservation of an Engine From One Month to One Year (Engine On-Wing), TASK 71-00-03-600-811-F00.

(a) Operate the engine.

1) Before engine operation, if the PRSOV and 5th stage bleed air check valve were removed and stored off the airplane, do the steps that follow:

a) Remove the coupling, blanking plate, and E-seal from the duct.

b) Inspect the duct openings for unwanted material.

c) Install the PRSOV, do this task: PRSOV Installation, TASK 36-11-04-400-801.

d) Install the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Installation, TASK 36-11-02-400-801.

2) After engine operation, if necessary, apply protective coating to the inlet cowl lipskin, do this task: Inlet Cowl Lipskin Protective Coating Procedure, TASK 71-00-03-600-815-F00.

E. Not Serviceable Power Plant

SUBTASK 71-00-03-620-017-F00

(1) A preservation renewal procedure is not permitted.

(a) You must make the power plant serviceable and do the preservation procedure for a serviceable power plant before 365 days preservation time is expired.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-00-03-600-813-F00

16. Depreservation of an Engine, which was Preserved From One Month to Not More Than One Year (Engine On-Wing)

A. General

(1) This procedure gives instructions for the depreservation of an installed power plant that is serviceable.

(2) Depreservation includes fluid replacement in the oil and fuel systems.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
12-13-11-600-803	Drain the Engine Oil (P/B 301)
36-11-02-400-801	Bleed Air Check Valve - Installation (P/B 401)
36-11-04-400-801	PRSOV Installation (P/B 401)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
71-00-00-700-822-F00	Wet Motor the Engine (P/B 201)
80-11-01-610-801-F00	Starter Servicing (Oil Fill) (P/B 301)
80-11-01-680-801-F00	Starter Servicing (Oil Drain) (P/B 301)

C. Consumable Materials

Reference	Description	Specification
G02304	Tape - Moisture Barrier, Adhesive One-side	BMS8-346
G02455 [CP2160]	Film, Vapor Barrier, Polyethylene	L-P-512
G02456 [CP2098]	Desiccant - Activated, Bagged, Packaging Use And Static Dehumidification	MIL-D-3464

D. Location Zones

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

E. Power Plant Depreservation

SUBTASK 71-00-03-080-003-F00

(1) Remove the waterproof cover, vapor barrier film, G02455 [CP2160], and desiccant bag, G02456 [CP2098].

(a) Make sure that you remove all of the moisture barrier tape, G02304, from the inlet and exhaust areas and that there is no unwanted material.

SUBTASK 71-00-03-630-005-F00

> **CAUTION**
> MAKE SURE THAT YOU FOLLOW THE LIPSKIN COATING PROCEDURES BEFORE AN ENGINE OPERATION. IF YOU DO NOT FOLLOW INSTRUCTIONS, THE COATING CAN MELT AND GO INTO THE ENGINE. THIS CAN CAUSE ENGINE DAMAGE.

(2) If not already done, remove the lipskin protective coating from the inlet cowl lipskin (TASK 71-00-03-600-815-F00).

SUBTASK 71-00-03-410-003-F00

(3) Install the accessory units that you removed.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-00-03-420-003-F00

(4) If the PRSOV and 5th stage bleed air check valve were removed and stored off the airplane, do the steps that follow:

(a) Remove the coupling, blanking plate, and E-seal from the duct.

(b) Inspect the duct openings for unwanted material.

(c) Install the PRSOV, do this task: PRSOV Installation, TASK 36-11-04-400-801.

(d) Install the 5th stage bleed air check valve, do this task: Bleed Air Check Valve - Installation, TASK 36-11-02-400-801.

SUBTASK 71-00-03-410-004-F00

(5) Connect the lines and electrical connections that you removed.

SUBTASK 71-00-03-610-001-F00

(6) Do this task: Drain the Engine Oil, TASK 12-13-11-600-803.

(a) Make sure that you drain the oil tank and the accessory gearbox.

SUBTASK 71-00-03-610-006-F00

(7) Do this task: Starter Servicing (Oil Drain), TASK 80-11-01-680-801-F00.

SUBTASK 71-00-03-610-002-F00

(8) Do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

SUBTASK 71-00-03-610-007-F00

(9) Do this task: Starter Servicing (Oil Fill), TASK 80-11-01-610-801-F00.

SUBTASK 71-00-03-790-001-F00

(10) Do this task: Wet Motor the Engine, TASK 71-00-00-700-822-F00.

(a) Examine the fuel and lube system lines, fitting, and accessories for leakage.

SUBTASK 71-00-03-610-003-F00

(11) Do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

SUBTASK 71-00-03-790-002-F00

(12) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Operate the engine at idle for 10 minutes before you stop the engine.

——— END OF TASK ———

TASK 71-00-03-600-814-F00

17. Preservation of an Engine for More Than the One Year Preservation Time Limit (Engine On-Wing)

A. General

(1) This procedure is used for an engine that is installed on the airplane (on-wing).

(2) This procedure is for a power plant that remained preserved for more than the long term preservation time limit (365 days).

B. Location Zones

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

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C. Procedure

SUBTASK 71-00-03-620-018-F00

(1) If the engine preservation period of 365 days expired, please refer to your CFM representative for instructions.

NOTE: Engineering analysis must be used to evaluate the situation. Several factors must be analyzed: the total time beyond the preservation time limit, the engine storage location (outside or inside), the humidity level, the temperature changes, how often the desiccant was changed, and other factors.

SUBTASK 71-00-03-620-026-F00

(2) If the preservation period of 365 days expires on the inlet cowl lipskin, do these steps:

(a) Remove the protective coating on the lipskin.

(b) Examine the lipskin for signs of corrosion.

(c) If it is necessary, you can re-apply the protective coating to preserve the lipskin for another 365 days.

——— END OF TASK ———

TASK 71-00-03-200-801-F00

18. Desiccant Bags Inspection Procedure

A. General

(1) This inspection procedure is to be done if desiccant bags and humidity indicators have been placed in the inlet and exhaust of the engine.

(2) When you use desiccants, you must examine and change them regularly, as applicable. As an example, start to monitor the desiccant bags as follows. That will help get a good interval for desiccant bags replacement. The schedule is as follows:

(a) Second day after storage.

(b) Fourteenth day after storage.

(c) Every three months.

NOTE: The best condition for engine storage is to keep an environment with less than 70 percent of humidity.

B. Consumable Materials

Reference	Description	Specification
G02456 [CP2098]	Desiccant - Activated, Bagged, Packaging Use And Static Dehumidification	MIL-D-3464

C. Procedure

SUBTASK 71-00-03-010-004-F00

(1) Remove cover and protective material as necessary to get access to humidity indicators.

SUBTASK 71-00-03-210-008-F00

(2) Make sure that you can see the humidity indication at the inlet and exhaust of the engine to monitor flow path humidity levels.

SUBTASK 71-00-03-200-001-F00

(3) Do a check of the humidity indicators. Their color must show a relative humidity of less than 70 percent. If not, do as follows:

(a) Open the plastic film cover.

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(b) Remove, discard and replace desiccant bags, G02456 [CP2098] and humidity indicators with new ones.

(c) Put protection material and cover back in place.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

POWER PLANT - MAINTENANCE PRACTICES (ENGINE TRANSPORTATION)

1. General

A. This procedure has this task:

(1) The instructions when you transport an engine.

TASK 71-00-04-500-801-F00

2. Engine Transportation

(Figure 201, Figure 202, Figure 203, Figure 204, Figure 205, Figure 206)

A. General

(1) An engine can be transported in these configurations:

(a) An engine that has the QEC (Quick Engine Change) equipment items installed and that is ready for aircraft installation.

(b) An engine that has part of the QEC equipment items installed:

1) The QEC engine is without the inlet cowl, exhaust nozzle and plug.

(c) A bare Engine without its QEC equipment items installed.

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)
71-00-03-600-802-F00	Preservation of An Engine On-Wing (Task 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-2111	Base - Universal Transportation, CFM56 Engine Part #: AM-2563-227 Supplier: 9M323
COM-2118	Cradle - Transport, CFM56-7 Engine Part #: AM-2811-4800 Supplier: 9M323 Opt Part #: AM-2811-6400 Supplier: 9M323
COM-4953	Cradle - Engine, CFM56-7 Part #: FB70077-100ISSB Supplier: KCWD9 Opt Part #: FB70077-100 Supplier: KCWD9
COM-4954	Stand - Transportation, Engine, CFM56-7 Part #: FB70077-200 Supplier: KCWD9
COM-6276	Cradle - Engine, CFM56-7 Part #: 114702-1 Supplier: 9M323
COM-6277	Stand - Transportation, Engine, CFM56-7 Part #: 114701-1 Supplier: 9M323
SPL-14262	Stand - Engine Transportation, Air/Truck, CFM56-7 Part #: D71STA00005G02 Supplier: F4590

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(Continued)

Reference	Description
SPL-14730	Cover - Engine Shipping, CFM56-7 Part #: 856A3700G04 Supplier: 58828 Opt Part #: 856A3700G01 Supplier: 58828 Opt Part #: 856A3700G02 Supplier: 58828 Opt Part #: 856A3700G03 Supplier: 58828

D. Engine Transportation Cautions

SUBTASK 71-00-04-800-007-F00

> **CAUTION**
> OBEY ALL THE INSTRUCTIONS AND NECESSARY CONDITIONS GIVEN IN THIS PROCEDURE OTHERWISE ENGINE DAMAGE CAN OCCUR.

> **CAUTION**
> FOR ANY DEVIATION FROM THE INSTRUCTIONS GIVEN IN THIS PROCEDURE, CONTACT CFMI FOR ENGINE DISPOSITION. A DEVIATION CAN CAUSE ENGINE DAMAGE.

(1) Follow these cautions throughout this procedure, otherwise engine damage can occur.

E. Prepare To Move The Engine

SUBTASK 71-00-04-800-006-F00

> **CAUTION**
> USE ONLY ONE OF THE SHIPPING STANDS SHOWN BELOW FOR ENGINE TRANSPORTATION. OTHERWISE ENGINE DAMAGE CAN OCCUR.

(1) The CFM56-7 engine must be installed only on one of the CFMI approved shipping stands (or base with cradle assembly) that follow:

(a) AGSE: base, COM-2111, with cradle, COM-2118.

(b) F. BROWN: transportation stand, COM-4954, with engine cradle, COM-4953.

(c) STANLEY: transportation stand, COM-6277, with engine cradle, COM-6276.

(d) DEDIENNE: engine stand, SPL-14262

SUBTASK 71-00-04-510-001-F00

> **CAUTION**
> OBEY THE REMOVAL AND INSTALLATION PROCEDURES GIVEN BELOW. USE THE CORRECT LIFT AND ATTACH POINTS TO PREVENT RAPID MOVEMENT OF THE ENGINE DURING TRANSPORTATION. IF YOU DO NOT OBEY THIS CAUTION, ENGINE DAMAGE CAN OCCUR.

(2) The removal and installation of the engine are the operator's responsibility.

These are the tasks:

Power Plant - Removal, TASK 71-00-02-000-801-F00,

Power Plant - Installation, TASK 71-00-02-400-801-F00.

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SUBTASK 71-00-04-800-002-F00

> **CAUTION** USE A PROTECTIVE COVER TO PROTECT THE ENGINE FROM FOREIGN OBJECT DAMAGE, DUST, AND RAIN DURING SHIPMENT, OR ENGINE DAMAGE CAN OCCUR.

(3) Do these steps to protect the engine during transportation:

(a) Make sure that the engine is preserved before transportation (TASK 71-00-03-600-802-F00).

(b) Put the applicable protective shipping cover, SPL-14730 over the whole engine:

1) For a bare engine, use the protective cover 856A3700G04, or protective cover 856A3700G03, or protective cover 856A3700G01.

2) For a QEC or partial QEC engine, use the protective cover 856A3700G02.

SUBTASK 71-00-04-800-003-F00

(4) After transportation of the engine, do these steps:

(a) Examine the general condition of the engine.

(b) Make sure that there is no water, dust or unwanted objects in the engine.

F. In-plant Transportation

SUBTASK 71-00-04-560-001-F00

(1) Do these steps to tow the engine in the cradle and base assembly:

(a) Release the 4 swivel locks supplied with casters.

> **CAUTION** THE MAXIMUM SPEED LIMIT TO TOW THE ENGINE, CRADLE, AND BASE ASSEMBLY IS NOT MORE THAN 3 MPH (5 KPH) ON A SMOOTH AND HORIZONTAL SURFACE, OR ENGINE DAMAGE CAN OCCUR.

(b) Tow the engine, cradle and base assembly at not more than 3 MPH (5 KPH).

(c) Use spring-type casters or pneumatic tires to tow the engine.

(d) Make sure that the cradle is free of attaching device to keep the full efficiency of the shock absorbers.

(e) Use the casters' braking system to hold the base assembly after you tow the engine.

G. Road Transportation

SUBTASK 71-00-04-510-002-F00

(1) Inform the freight company of engine transportation requirements.

SUBTASK 71-00-04-510-003-F00

> **CAUTION** MAKE SURE THAT YOU USE A PNEUMATIC SUSPENSION SYSTEM AS FOLLOWS. TRANSPORT THE ENGINE ONLY ON NON-OBSTRUCTED ROADS, OR ENGINE DAMAGE CAN OCCUR.

(2) Shipment by tractor and semi-trailer:

(a) If you use a semi-trailer with one engine installed above the trailer axle, the trailer must have pneumatic suspension.

(b) If you use a semi-trailer with two or more engines installed on the trailer, the tractor and the trailer must have pneumatic suspension.

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SUBTASK 71-00-04-510-004-F00

(3) Shipment by towed trailer or wagon-bed truck:

(a) If you use a trailer or a wagon-bed truck, the two axles must have a pneumatic suspension system.

NOTE: It is recommended to use Air Ride type suspension or an alternate hydraulic type suspension with nitrogen accumulators.

SUBTASK 71-00-04-510-005-F00

(4) Preparation and installation of the engine:

(a) Make sure that the engine and cradle fasteners are in good condition.

(b) Make sure that the cradle and base fasteners are in good condition.

(c) Lock the caster wheels and move the tow bars into the stowed position.

WARNING DO NOT LIFT THE BASE AND CRADLE ASSEMBLY BY ITS HOIST POINTS WHEN AN ENGINE IS INSTALLED IN IT. THESE HOIST POINTS ARE USED ONLY TO LIFT AN EMPTY BASE AND CRADLE ASSEMBLY. IF YOU USE THE HOIST POINTS TO LOAD THE ENGINE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION BE CAREFUL WHEN YOU MOVE AN ENGINE. PREVENT RAPID MOVEMENT OF THE ENGINE DURING TRANSPORTATION OR ENGINE DAMAGE CAN OCCUR.

(d) Use a fork lift truck to lift the engine, cradle and base assembly on to the trailer.

NOTE: Put the assembly lengthwise on the trailer.

CAUTION BE CAREFUL WHEN YOU LOAD THE ENGINE, CRADLE AND BASE ASSEMBLY ON TO THE TRAILER BED. IF THE CLEARANCE BETWEEN THE LOWEST PART OF THE ENGINE CRADLE AND THE TRAILER BED IS NOT SUFFICIENT, ENGINE DAMAGE CAN OCCUR.

(e) Make sure the minimum clearance between the cradle and the trailer bed is 2 inches (51 mm).

CAUTION IF YOU USE SHIMS TO GET THE CORRECT CLEARANCE, MAKE SURE THAT YOU PUT THE SHIMS BELOW THE BASE AND NOT BELOW THE CRADLE FRAME, OR ENGINE DAMAGE CAN OCCUR.

1) If it is necessary, install shims below the base side beams to get the correct clearance.

SUBTASK 71-00-04-510-006-F00

(5) Tie-down procedures:

CAUTION ATTACH ONLY THE BASE OF THE STAND TO THE BED OF THE TRAILER BY THE "AIR AND TRUCK" TIE-DOWN POINTS. THE ENGINE AND CRADLE ASSEMBLY MUST BE FREE OF ALL FASTENER SYSTEMS WHICH PREVENT THE FULL TRAVEL OF THE SHOCK ABSORBERS, OR DAMAGE TO THE ENGINE BEARINGS CAN OCCUR.

(a) Recommended tie-down procedure (Figure 202, Figure 203):

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1) Attach the tie-down straps or chains to the “Air and Truck” tie-down points on the base of the shipping stand .
2) Pull the tie-down straps or chains diagonally across the trailer bed.
3) Attach the tie-down straps or chains to the fitting points on the trailer bed.
4) Tighten and safety all tie-down straps or chains.

(b) Alternative tie-down procedure (Figure 204):

1) Put the tie-down straps or chains through the fork lift tunnels on the base.
2) Pull the tie-down straps or chains forward and aft along the sides of the trailer bed.
3) Attach the tie-down straps or chains to the fitting points on the trailer bed.
4) Tighten and safety all tie-down straps or chains.

H. Water Transportation

SUBTASK 71-00-04-510-007-F00

(1) Inform the freight company of engine transportation requirements.

SUBTASK 71-00-04-510-008-F00

CAUTION	IF THE ENGINE IS EXPOSED TO SALTY AIR MORE THAN EIGHT DAYS, INCLUDING LOADING AND UNLOADING FROM SHIP, ENGINE DAMAGE CAN OCCUR.

CAUTION	THE ENGINE TO BE MOVED MUST BE INSTALLED ON A TRAILER BED WITH AN ACTIVE SUSPENSION SYSTEM. ENGINE DAMAGE CAN OCCUR IN CASE OF TRANSPORTATION OF AN ENGINE IN A CONTAINER NOT APPROVED.

(2) Shipment procedure for the engine, cradle and base assembly:

(a) Obey the instructions and conditions, from above, for Road Transportation.

(b) Make sure that the applicable protective cover is in position and correctly attached.

(c) Make sure that the trailer suspension system is active and its bottles inflated during all of the water transportation.

(d) Make sure that the engine is not exposed to salty air for more than eight days, loading and unloading sequences included.

SUBTASK 71-00-04-510-009-F00

(3) Loading requirements:

WARNING	DO NOT LIFT THE BASE AND CRADLE ASSEMBLY BY ITS HOIST POINTS WHEN AN ENGINE IS INSTALLED IN IT. THESE HOIST POINTS ARE USED ONLY TO LIFT AN EMPTY BASE AND CRADLE ASSEMBLY. IF YOU USE THE HOIST POINTS TO LOAD THE ENGINE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION	BE CAREFUL WHEN YOU MOVE AN ENGINE. PREVENT RAPID MOVEMENT OF THE ENGINE DURING TRANSPORTATION, OR ENGINE DAMAGE CAN OCCUR.

(a) If it is possible, use a tractor to tow the trailer on board the ship through its cargo doors.

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(b) If it is not possible to use the cargo doors, lift the trailer on board the ship using a crane.

NOTE: It is recommended that you transport the engine in a dry area of the ship's cargo area.

I. Rail Transportation

SUBTASK 71-00-04-510-010-F00

(1) It is not recommended that you move an engine by rail.

J. Air Cargo Transportation

SUBTASK 71-00-04-510-011-F00

(1) Inform the freight company of engine transportation requirements.

SUBTASK 71-00-04-510-012-F00

(2) Installation of the engine:

(a) Take note of engine shipping stand dimensions and weight, then use the information to determine applicable airplane to be used for engine shipment (Figure 206).

NOTE: The inner dimensions in some types or series of aircraft is different between operators.

(b) Make sure that caster wheels and tow bars are locked in stowed position.

WARNING DO NOT LIFT THE BASE AND CRADLE ASSEMBLY BY ITS HOIST POINTS WHEN AN ENGINE IS INSTALLED IN IT. THESE HOIST POINTS ARE USED ONLY TO LIFT AN EMPTY BASE AND CRADLE ASSEMBLY. IF YOU USE THE HOIST POINTS TO LOAD THE ENGINE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION BE CAREFUL WHEN YOU MOVE AN ENGINE. PREVENT RAPID MOVEMENT OF THE ENGINE DURING TRANSPORTATION OR ENGINE DAMAGE CAN OCCUR.

(c) Use a fork lift truck to install the engine, cradle and base assembly on a standard air cargo pallet.

CAUTION IF YOU USE SHIMS TO GET THE CORRECT CLEARANCE, MAKE SURE THAT YOU PUT THE SHIMS BELOW THE BASE AND NOT BELOW THE CRADLE FRAME, OR ENGINE DAMAGE CAN OCCUR.

(d) Make sure the minimum clearance between the cradle and the pallet is 2 inches (51 mm).

1) If the clearance is less than the limit, install shims below the base side beams to get the correct clearance.

(e) Attach the tie-down straps from the "Air and Truck" tie-down points of the shipping stand base to the pallet fitting points (Figure 205).

(f) Tighten and safety all tie-down straps.

(g) Move the engine and pallet assembly to the aircraft and load it in the aircraft.

1) Load the engine in compliance with the Aircraft Loading Specifications.

END OF TASK

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S-M56-MM-03815-00-B
H33202 S0006582013_V2

Engine Transportation Cradle and Base
Figure 201/71-00-04-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-05315-01
2451965 S0000568749_V1

Location of Tie-Down Points on Engine Shipping Stand (Base and Cradle Assembly)
Figure 202/71-00-04-990-805-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03816-00-B
H33368 S0006582014_V2

Correct Tie-down Procedure with Shims Below Stand Base
Figure 203/71-00-04-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03817-00-B
H33386 S0006582015_V2

Alternate Tie-down Procedure Through the Stand Fork Lift Tunnels
Figure 204/71-00-04-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

S-M56-MM-03818-00-B
H33403 S0006582016_V2

Location of Tie-down for Base Attachment to Standard Pallet
Figure 205/71-00-04-990-804-F00

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MANUFACTURER CRADLE BASE	HEIGHT WITH ENGINE	WIDTH WITH ENGINE	LENGTH WITH BARE ENGINE	LENGTH WITH QEC ENGINE	WEIGTH STAND ONLY	WEIGTH WITH BARE ENGINE	WEIGTH WITH QEC ENGINE
AGSE AM2811 AM2563	96 (2438)	96 (2438)	171 (4343)	201 (5105)	4420 (2005)	9583 (4347)	10862 (4927)
FRANCK BROWN & SON FB70-077-100 FB70-077-200	89 (2261)	96 (2438)	143 (3632)	236 (5994)	4799 (2177)	9963 (4519)	11241 (5099)
STANLEY 114702 114701	87 (2210)	98 (2489)	128 (3251)	207 (5258)	3918 (1777)	9081 (4119)	10360 (4699)
DEDIENNE AEROSPACE D71CRA00005G02 D71TRO00005G03	94 (2377)	99 (2513)	194 (4924)	207 (5268)	4828 (2190)	9991 (4532)	11270 (5112)

NOTES:

DIMENSIONS ARE GIVEN IN INCHES WITH MILLIMETERS IN PARENTHESES.
WEIGHTS ARE GIVEN IN POUNDS WITH KILOGRAMMES IN PARENTHESES.

HEIGHT INCLUDES STANDARD PALLET 2 INCHES THICK.

2452136 S0000568755_V1

Dimensions and Weight for the Shipping Stands (Base and Cradle Assemblies)
Figure 206/71-00-04-990-806-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

POWER PLANT (ENGINE INTERMIX) - MAINTENANCE PRACTICES

1. **General**
   A. A Boeing service bulletin is necessary for each airplane to do these tasks:
      (1) Engine Intermix
      (2) Engine Substitution
      (3) Takeoff Thrust Rating Change
   B. Use the instructions in the service bulletin to do the applicable task.
   C. Contact your Boeing Customer Engineering representative for specific information on the service bulletin applicability to your fleet.

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INLET COWL - REMOVAL/INSTALLATION

1. General

A. This procedure contains these tasks:

(1) A removal of the inlet cowl

(2) An installation of the inlet cowl

(3) A removal of the inlet cowl with a sling and an overhead hoist

(4) An installation of the inlet cowl with a sling and an overhead hoist

(5) A removal of the inlet cowl with a nose cowl dolly or boom hoist

(6) An installation of the inlet cowl with a nose cowl dolly or boom hoist.

B. Inlet cowls are interchangeable between engine positions 1 and 2.

TASK 71-11-01-000-801-F00

2. Remove the Inlet Cowl

A. General

(1) The purpose of this task is to permit mechanics to select the applicable method to remove the inlet cowl.

(2) The procedure can be used for the left inlet cowl or right inlet cowl.

B. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

C. Procedure

SUBTASK 71-11-01-240-001-F00

(1) Do one of these tasks to remove the inlet cowl:

(a) Do this task: Remove the Inlet Cowl (Sling and Overhead Hoist), TASK 71-11-01-000-802-F00.

(b) Do this task: Remove the Inlet Cowl (Nose Cowl Dolly or Boom Hoist), TASK 71-11-01-000-803-F00.

——— END OF TASK ———

TASK 71-11-01-400-801-F00

3. Install the Inlet Cowl

A. General

(1) The purpose of this task is to permit mechanics to select the applicable method to install the inlet cowl.

(2) The procedure can be used for the left inlet cowl or right inlet cowl.

NOTE: The total acoustic panel blockage for the engine installation must be recalculated when components are changed per SRM 54-00-01.

B. References

Reference	Title
SRM 54-00-01	Structural Repair Manual

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C. **Location Zones**

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

D. **Procedure**

SUBTASK 71-11-01-400-001-F00

(1) Do one of these tasks to install the inlet cowl:

(a) Do this task: Install the Inlet Cowl (Sling and Overhead Hoist), TASK 71-11-01-400-802-F00.

(b) Do this task: Install the Inlet Cowl (Nose Cowl Dolly or Boom Hoist), TASK 71-11-01-400-803-F00.

——— END OF TASK ———

TASK 71-11-01-000-802-F00

4. Remove the Inlet Cowl (Sling and Overhead Hoist)

(Figure 401, Figure 402, Figure 403)

A. **General**

(1) The removal and installation of the inlet cowl is done with a sling and an overhead hoist.

(2) The sling attaches to the four ground handling points on the inlet cowl.

(3) An overhead hoist is used with the sling to move the inlet cowl.

B. **References**

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
73-21-05-000-801-F00	T12 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-2062	Sling - Inlet Cowl Part #: B71040-66 Supplier: 81205 Opt Part #: B71040-38 Supplier: 81205 Opt Part #: B71040-39 Supplier: 81205

D. **Location Zones**

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

E. **Access Panels**

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Prepare for the Removal of the Inlet Cowl

SUBTASK 71-11-01-860-008-F00

(1) For engine 1, 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 71-11-01-860-009-F00

(2) For engine 2, 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 71-11-01-860-001-F00

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

G. Inlet Cowl Removal

SUBTASK 71-11-01-020-001-F00

(1) Do these steps to disconnect the T12 electrical harnesses from the inlet cowl (Figure 401):

(a) Open the applicable T12 access doors:

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

(b) Disconnect the T12 sensor connector [9] (Ch A) and T12 sensor connector [8] (Ch B) from the forward side of the inlet cowl bulkhead.

(c) Do these steps to remove the electrical connectors DJ0804 [7] and DJ0704 [14] from the aft side of the inlet cowl bulkhead:

1) Remove the four bolts [10] and washers [11] that attach the electrical connectors DJ0704 [14] and DJ0804 [7] to the inlet cowl bulkhead.

2) Pull the harnesses DJ0704 [14] and DJ0804 [7] away from the inlet cowl.

NOTE: Temporarily attach these harnesses to the engine fan case.

SUBTASK 71-11-01-020-002-F00

(2) Remove the nut [12] and washer [13] that attach the bonding jumper [6] to the aft side and forward side of the inlet cowl bulkhead.

SUBTASK 71-11-01-020-003-F00

(3) If a T12 sensor is not installed on the replacement inlet cowl, do this task: T12 Sensor Removal, TASK 73-21-05-000-801-F00.

SUBTASK 71-11-01-410-002-F00

(4) Close the applicable T12 access doors:

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

SUBTASK 71-11-01-020-004-F00

(5) Do these steps to disconnect the EEC cooling hose [4]:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Disconnect the EEC cooling hose clamp [5] on the EEC cooling hose [4].

(b) Disconnect the EEC cooling hose [4] from the duct on the inlet cowl bulkhead.

SUBTASK 71-11-01-020-005-F00

(6) Remove the coupling [2] that attaches the inlet cowl TAI duct [1] to the aft side of the inlet cowl bulkhead.

SUBTASK 71-11-01-080-001-F00

(7) Do these steps to install the removal equipment for the inlet cowl [31] (Figure 402):

(a) Connect a hoist to the inlet cowl sling, SPL-2062.

(b) Use four hoist pins [33] to attach the four inlet cowl sling straps [32] to the inlet cowl [31].

(c) Attach the lever hoists [34] and inlet cowl sling straps [32] to the crossbeam.

CAUTION

ADJUST THE SLING TO HOLD ONLY THE WEIGHT OF THE INLET COWL. MORE FORCE CAN CAUSE DAMAGE TO THE INLET COWL.

(d) Adjust the lever hoists [34] to remove the slack from the inlet cowl sling straps [32].

SUBTASK 71-11-01-020-006-F00

(8) Do these steps to remove the inlet cowl [31] (Figure 403):

WARNING

BE CAREFUL WHEN YOU MOVE THE INLET COWL. BECAUSE THE INLET COWL WEIGHS 310 POUNDS (141 KG). INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Remove the following fasteners that attach the inlet cowl flange to the engine flange:

NOTE: You can unclip wire harnesses to get access, specially for the right side.

LOM ALL PRE SB 737-71-1938

1) Remove the bolts [55], spacers [54], washers [53], and nuts [52].

LOM ALL POST SB 737-71-1938

2) Remove the bolts [55], spacers [56], washers [53], and nuts [52].

LOM ALL

CAUTION

USE PRECAUTION WHEN YOU PULL THE INLET COWL FORWARD. DAMAGE TO THE INTEGRATED DRIVE GENERATOR (IDG), IDG OIL COOLING TUBING, AND HYDRAULIC HOSES COULD OCCUR.

(b) Pull the inlet cowl [31] forward until it is clear of the shear pins [51] on the engine attach flange.

NOTE: The shear pins are attached to the engine attach flange at the 3:00 and 9:00 o'clock positions.

(c) Move the inlet cowl [31] forward and away from the engine attach flange.

(d) Loosen the lever hoists [34] and turn the inlet cowl [31] until the inlet attach flange faces down and inlet lip skin faces upward.

(e) Install the inlet cowl [31] on a pallet or other suitable surface.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-11-01-900-001-F00

(9) Remove the seal [3] from the forward flange of the inlet cowl TAI duct [1].

(a) Make sure that the seal is serviceable.

(b) If the seal is not serviceable, replace it.

(c) Install the seal.

NOTE: The seal is slightly "oval" and will snap into its position.

SUBTASK 71-11-01-020-007-F00

(10) Install protective caps on the EEC cooling hose [4], inlet cowl TAI duct [1] and openings on the inlet cowl bulkhead.

SUBTASK 71-11-01-080-002-F00

(11) Remove the sling and overhead hoist as follows:

(a) Release the tension from the straps and lever hoists.

(b) Remove the four hoist pins [33] that attach the inlet cowl sling straps [32] to the inlet cowl [31].

(c) Remove the sling from the inlet cowl [31].

SUBTASK 71-11-01-980-001-F00

(12) Remove the inlet cowl [31] from the work area.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Inlet Cowl Installation
Figure 401/71-11-01-990-802-F00 (Sheet 1 of 2)

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Inlet Cowl Installation
Figure 401/71-11-01-990-802-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Inlet Cowl Equipment
Figure 402/71-11-01-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Inlet Cowl Installation
Figure 403/71-11-01-990-804-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Inlet Cowl Installation
Figure 403/71-11-01-990-804-F00 (Sheet 2 of 2)

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TASK 71-11-01-400-802-F00

5. Install the Inlet Cowl (Sling and Overhead Hoist)

(Figure 401, Figure 402, Figure 403)

A. General

(1) This task gives the instructions to install the inlet cowl with a sling and overhead hoist.

(2) This task can be used for the left or right inlet cowl.

NOTE: The total acoustic panel blockage for the engine installation must be recalculated when components are changed per SRM 54-00-01.

B. References

Reference	Title
30-21-11-000-801	Engine Cowl TAI Valve - Removal (P/B 401)
30-21-11-400-801	Engine Cowl TAI Valve - Installation (P/B 401)
36-00-00-860-805	Supply Pressure Upstream of the PRSOV (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
73-21-05-400-801-F00	T12 Sensor Installation (P/B 401)
SRM 54-00-01	Structural Repair Manual
SWPM 20-20-10	Replacement of Ground Studs and Bonding Jumper Installation

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-1550	Bonding Meter - Approved, Intrinsically Safe (Approved for use in Class I, Divisions I & II hazardous (classified) locations. Outside these hazardous locations, COM-614 can be used in lieu of COM-1550). Part #: 620LK Supplier: 1CRL2 Part #: M1 Supplier: 3AD17 Part #: M1B Supplier: 3AD17 Part #: T477W (C15292) Supplier: 06659
SPL-2062	Sling - Inlet Cowl Part #: B71040-66 Supplier: 81205 Opt Part #: B71040-38 Supplier: 81205 Opt Part #: B71040-39 Supplier: 81205
STD-3906	Mallet - Rubber

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
3	Seal	30-21-11-01A-125	LOM ALL
31	Inlet cowl	71-11-01-01A-025	LOM ALL

E. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. Access Panels

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

G. Inlet Cowl Installation

SUBTASK 71-11-01-400-002-F00

(1) If it is necessary, prepare the inlet cowl sling, SPL-2062, for the installation (Figure 402).

SUBTASK 71-11-01-480-001-F00

(2) Do these steps to attach the sling to the inlet cowl [31]:

(a) Connect the hoist to the inlet cowl sling, SPL-2062.

(b) Attach the inlet cowl sling straps [32] to the inlet cowl [31] with the four hoist pins [33] (Figure 402).

(c) Attach the aft inlet cowl sling straps [32] to the lever hoists [34].

(d) Make sure that the aft inlet cowl sling straps [32] are vertical.

SUBTASK 71-11-01-820-001-F00

(3) Make sure that the shear pins [51] at the 3:00 and 9:00 o'clock positions on the engine flange are correctly installed (Figure 403).

SUBTASK 71-11-01-020-008-F00

(4) Remove the protective caps on the EEC cooling hose [4], inlet cowl TAI duct [1], and openings on the inlet cowl bulkhead.

SUBTASK 71-11-01-420-001-F00

(5) Make sure that the seal [3] is installed in the forward flange of the inlet cowl TAI duct [1].

(a) If the seal [3] is not installed, install the seal [3].

NOTE: The seal is slightly "oval" and will snap into its position.

SUBTASK 71-11-01-420-002-F00

(6) Do these steps to install the inlet cowl [31]:

WARNING BE CAREFUL WHEN YOU MOVE THE INLET COWL. BECAUSE THE INLET COWL WEIGHS 310 POUNDS (141 KG). INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Lift the inlet cowl [31] off the pallet or other surface.

(b) Use the lever hoists [34] to turn the inlet cowl [31] until the inlet attach flange is vertical.

NOTE: To turn the inlet, decrease the length of the lever hoist chains.

CAUTION USE CAUTION WHEN YOU ENGAGE THE INLET ATTACH FLANGE TO THE ENGINE ATTACH FLANGE. DAMAGE TO THE CTAI OR EEC COOLING DUCT FLANGES COULD OCCUR.

CAUTION BE CAREFUL WHEN YOU ADJUST THE INLET COWL ON THE ENGINE. THE INLET COWL CAN HIT THE INTEGRATED DRIVE GENERATOR (IDG), IDG OIL COOLING TUBING AND HYDRAULIC HOSES.

(c) Adjust the inlet cowl [31] until the holes in the inlet attach flange are aligned with the shear pins [51] on the engine attach flange.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(d) Make sure that the inlet attach flange touches the engine attach flange in all locations.

SUBTASK 71-11-01-820-002-F00

(7) Make sure that you align the inlet cowl TAI duct [1] with the duct on the inlet cowl bulkhead.

(a) If it is necessary, adjust the Thermal Anti-Ice (TAI) valve and the related aft duct to align the TAI duct (TASK 30-21-11-000-801 and TASK 30-21-11-400-801).

SUBTASK 71-11-01-820-005-F00

(8) Make sure that you align the EEC cooling hose [4] with the duct on the inlet cowl bulkhead.

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SUBTASK 71-11-01-420-003-F00

(9) Do these steps to attach the inlet cowl [31] to the engine (Figure 403):

(a) Install the 24 bolts [55], 24 spacers [54], 24 washers [53], and 24 nuts [52], do these steps:

1) Install the bolts [55] with the bolthead on the forward side of the flange.

NOTE: As an alternate procedure, you can install the bolts with the boltheads aft.

2) Install the spacers [54] on the aft side of the flange.

3) Install the washers [53] on the forward side of the flange.

(b) Cross-tighten the bolts [55] to 585 in-lb (66 N·m) - 715 in-lb (81 N·m).

NOTE: As a guide, tighten the fastener that is on the forward side of the flange and near the washer.

1) If you used the alternate procedure to install the bolts [55], tighten the nuts [52] to 500 in-lb (56 N·m) - 650 in-lb (73 N·m).

LOM ALL POST SB 737-71-1938

SUBTASK 71-11-01-420-017-F00

(10) Do these steps to attach the inlet cowl [31] to the engine (Figure 403):

(a) Install the 24 bolts [55], 24 spacers [56], 24 washers [53], and 24 nuts [52].

1) Install the bolts [55] with the boltheads on the forward side of the flange.

NOTE: As an alternate procedure, you can install the bolts with the boltheads aft.

2) Install the spacers [56] on the aft side of the flange.

3) Install the washers [53] on the forward side of the flange.

(b) Snug fit the four nuts [52] or four bolts [55] in the sequence of 3:00, 9:00, 6:00, and 12:00 o'clock positions until there is no space between the mating surfaces of the inlet cowl [31] and the engine.

(c) Tighten the nuts [52] to 388 in-lb (44 N·m) - 412 in-lb (47 N·m).

NOTE: Do not tighten the bolts.

1) Tighten the four nuts [52] in the sequence of 3:00, 9:00, 6:00, and 12:00 o'clock positions.

2) Cross-tighten the remaining 20 nuts [52].

3) Make sure that the nut [52] at the 3:00 o'clock position is within the specified torque range.

a) If it is necessary, re-tighten the 24 nuts [52] and check again.

LOM ALL

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SUBTASK 71-11-01-080-003-F00

(11) Do these steps to remove the inlet cowl installation equipment:

(a) Release the load from the inlet cowl sling straps [32].

(b) To disconnect the inlet cowl sling straps [32] from the inlet cowl [31], remove the four hoist pins [33].

(c) Remove the sling, cross beam, lever hoists [34], and overhead hoist.

SUBTASK 71-11-01-420-004-F00

(12) Do these steps to connect the inlet cowl TAI duct [1] (Figure 401):

(a) Adjust the coupling [2] to give the maximum clearances to the coupling bolt.

(b) Tighten the coupling [2] to the torque given on the part.

(c) Lightly tap the outer edge of the coupling [2] with a rubber mallet, STD-3906.

(d) Tighten the coupling [2] again to the torque given on the part.

SUBTASK 71-11-01-420-005-F00

(13) Do these steps to install the EEC cooling hose [4] (Figure 401):

(a) Install the EEC cooling hose [4] on the aft side of the inlet cowl bulkhead.

(b) Install the EEC cooling hose clamp [5] on the EEC cooling hose [4].

(c) Tighten the EEC cooling hose clamp [5] to 26 in-lb (2.9 N·m) - 30 in-lb (3.4 N·m).

SUBTASK 71-11-01-700-001-F00

(14) Do this task: Supply Pressure Upstream of the PRSOV, TASK 36-00-00-860-805.

SUBTASK 71-11-01-910-001-F00

CAUTION DO NOT KEEP THE COWL TAI VALVE OPEN FOR MORE THAN THE SPECIFIED TIME WHEN THE TEMPERATURE IS MORE THAN THE SPECIFIED LIMIT. DAMAGE TO THE INLET COWL CAN OCCUR.

(15) Put the applicable ENG ANTI-ICE switch in the ON position.

(a) If the outside air temperature is more than 50°F (10°C), operate the engine cowl anti-icing system for 30 seconds or less.

(b) There is no time limit for operation of the engine cowl anti-icing system when the temperature is at or less than 50°F (10°C).

SUBTASK 71-11-01-790-004-F00

(16) Check the inlet cowl TAI duct [1] for leakage.

NOTE: It is permitted to have a small leakage around the couplings. A jet of air is not permitted.

(a) If you find leakage that is not permitted, repair the ducts and couplings.

SUBTASK 71-11-01-860-014-F00

(17) Put the applicable ENG ANTI-ICE switch in the OFF position.

SUBTASK 71-11-01-790-002-F00

(18) Do a visual inspection of the EEC cooling hose [4] to make sure that the ends are correctly attached and no visual defects are present.

SUBTASK 71-11-01-410-003-F00

(19) If a T12 sensor is not installed on the replacement inlet cowl [31], do this task: T12 Sensor Installation, TASK 73-21-05-400-801-F00.

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SUBTASK 71-11-01-420-006-F00

(20) Do these steps to install the T12 electrical harnesses to the inlet cowl [31] (Figure 401):

(a) Install the four bolts [10] and four washers [11] that attach the electrical connectors DJ0804 [7] and DJ0704 [14] to the aft side of the inlet cowl bulkhead.

NOTE: The electrical connector DJ0804 [7] (on the J8 wiring harness) is inboard and electrical connector DJ0704 [14] (on the J7 wiring harness) is outboard.

1) Tighten the bolts [10] to 72 in-lb (8.1 N·m) - 88 in-lb (9.9 N·m).

(b) Open the T12 access doors:

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

(c) Connect these electrical connectors:

1) Connect the T12 sensor connector [8] (Ch B) to the electrical connector DJ0804 [7].

2) Connect the T12 sensor connector [9] (Ch A) to the electrical connector DJ0704 [14].

SUBTASK 71-11-01-420-007-F00

(21) Do these steps to install the bonding jumper [6] to the aft side of the inlet cowl bulkhead:

(a) Connect the bonding jumper [6] to the terminal lug with the nut [12] and washer [13].

(b) Tighten the nut [12] to 65 in-lb (7.3 N·m) - 70 in-lb (7.9 N·m).

(c) Measure the electrical bonding resistance between the bonding jumper [6] and structure (SWPM 20-20-10).

1) Use an intrinsically safe approved bonding meter, COM-1550.

2) Make sure that the electrical bonding resistance is 0.0010 ohm (1.0 milliohm) or less.

SUBTASK 71-11-01-410-004-F00

(22) Close the T12 access doors:

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

SUBTASK 71-11-01-860-002-F00

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

SUBTASK 71-11-01-860-004-F00

(24) For engine 1, 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 71-11-01-860-010-F00

(25) For engine 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

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(Continued)

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

END OF TASK

TASK 71-11-01-000-803-F00

6. **Remove the Inlet Cowl (Nose Cowl Dolly or Boom Hoist)**
(Figure 401, Figure 403, Figure 404, Figure 405)

A. General

(1) The removal and installation of the inlet cowl is done with a nose cowl dolly or a boom hoist.

(a) An overhead hoist is not necessary for this procedure.

(b) The dolly, COM-2060, operates as follows:

1) The dolly is a fixture which has a structural base mounted on three casters.

2) The three casters let the dolly move in the longitudinal direction.

3) Three hand jacks let the dolly move in the vertical direction.

4) For this procedure the nose cowl dolly will be referred to as the dolly.

(c) The boom hoist, SPL-2430, is a boom hoist and uses a installation/removal frame equipment, SPL-2165, frame assembly to attach to the inlet cowl.

1) The boom hoist is also used for removal of the thrust reverser and aft fairing.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
73-21-05-000-801-F00	T12 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
COM-2060	Dolly - Nose Cowl, Removal/Installation, CFM56-3 and -7 Engine Part #: AGSE-T073-G03 Supplier: 9M323 Opt Part #: AM-1940-400 Supplier: 9M323
SPL-2165	Installation/Removal Frame Equipment - Inlet Cowl, CFM56-7 Engine Part #: C71027-1 Supplier: 81205
SPL-2430	Hoist ? Boom, 800 lbs WLL, 250 lbs Load Positioner Compatible Part #: C20002-267 Supplier: 81205 Part #: K20017-1 Supplier: 81205 Opt Part #: C78026-161 Supplier: 81205 Opt Part #: C78026-259 Supplier: 81205

D. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl

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(Continued)

Zone	Area
422	Engine 2 - Nose Inlet Cowl

E. Access Panels

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

F. Prepare for the Removal of the Inlet Cowl

SUBTASK 71-11-01-860-011-F00

(1) For engine 1, 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 71-11-01-860-012-F00

(2) For engine 2, 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 71-11-01-010-002-F00

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

G. Inlet Cowl Removal

SUBTASK 71-11-01-020-009-F00

(1) Do these steps to remove the T12 electrical harnesses from the inlet cowl (Figure 401):

(a) Open the T12 access doors:

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

(b) Disconnect the T12 sensor connector [9] (Ch A) and T12 sensor connector [8] (Ch B) from the forward side of the inlet cowl bulkhead.

(c) Do these steps to remove the electrical connectors DJ0804 [7] and DJ0704 [14] from the aft side of the inlet cowl bulkhead:

1) Remove the four bolts [10] and washers [11] that attach the electrical connectors DJ0704 [14] and DJ0804 [7] to the inlet cowl bulkhead.

2) Pull the harnesses DJ0704 [14] and DJ0804 [7] away from the inlet cowl.

NOTE: Temporarily attach these harnesses to the engine fan case.

SUBTASK 71-11-01-020-010-F00

(2) Remove the nut [12] and the washer [13] that attach the bonding jumper [6] to the aft side and forward side of the inlet cowl bulkhead.

SUBTASK 71-11-01-020-011-F00

(3) If a T12 sensor is not installed on the replacement inlet cowl, do this task: T12 Sensor Removal, TASK 73-21-05-000-801-F00.

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SUBTASK 71-11-01-410-005-F00

(4) Close the applicable T12 access doors:

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

SUBTASK 71-11-01-020-012-F00

(5) Do these steps to disconnect the EEC cooling hose [4]:

(a) Disconnect the EEC cooling hose clamp [5] on the EEC cooling hose [4].

(b) Remove the EEC cooling hose [4] from the duct on the inlet cowl bulkhead.

SUBTASK 71-11-01-020-013-F00

(6) Remove the coupling [2] that attaches the inlet cowl TAI duct [1] to the aft side of the inlet cowl bulkhead.

SUBTASK 71-11-01-020-014-F00

(7) To install the support equipment for the inlet cowl removal, do the applicable steps that follow:

(a) To use the dolly, do these steps (Figure 404):

1) Put the dolly below the inlet cowl [31].

2) Use the hand jacks on the dolly to lift the dolly until it touches the inlet cowl [31].

3) Adjust the hand jacks so that all three of the rubber supports on the dolly touch the inlet cowl [31].

4) Attach the engine cowling strap around the inlet cowl [31] and to the two connections on the dolly.

CAUTION APPLY ONLY THE FORCE WHICH IS NECESSARY TO HOLD THE INLET COWL IN THE DOLLY. MORE FORCE CAN CAUSE DAMAGE TO THE INLET COWL.

5) Tighten the engine cowling strap to hold the inlet cowl [31] to the dolly.

(b) To use the boom hoist, do these steps (Figure 405):

1) Install the frame assembly on the inlet cowl [31] with the pins at the four GSE attach points.

NOTE: You can assemble the frame on the inlet cowl. Install the two side parts on the inlet cowl. Use the pins to install the parts of the forward assembly.

2) Adjust the boom hoist and align the holes in the frame assembly with the adapter on the hoist.

a) Make sure that you know the hydraulic operation of the boom, mast and pitch controls.

3) Attach the boom hoist to the frame assembly with the two lockpins.

SUBTASK 71-11-01-020-015-F00

(8) Do these steps to remove the inlet cowl [31] (Figure 403).

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WARNING BE CAREFUL WHEN YOU MOVE THE INLET COWL. BECAUSE THE INLET COWL WEIGHS 310 POUNDS (141 KG). INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Remove the following fasteners that attach the inlet cowl flange to the engine flange:

NOTE: You can unclip wire harnesses to get access, specially for the right side.

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1) Remove the bolts [55], spacers [54], washers [53], and nuts [52].

LOM ALL POST SB 737-71-1938

2) Remove the bolts [55], spacers [56], washers [53], and nuts [52].

LOM ALL

CAUTION USE PRECAUTION WHEN YOU PULL THE INLET COWL FORWARD. DAMAGE TO THE INTEGRATED DRIVE GENERATOR (IDG), IDG OIL COOLING TUBING, AND HYDRAULIC HOSES COULD OCCUR.

(b) Pull the inlet cowl [31] forward until it is clear of the shear pins [51] on the engine attach flange.

NOTE: The shear pins are attached to the engine attach flange at the 3:00 and 9:00 o'clock positions.

(c) Move the inlet cowl [31] forward and away from the engine attach flange to a suitable location.

SUBTASK 71-11-01-900-002-F00

(9) Remove the seal [3] from the forward flange of the inlet cowl TAI duct [1].

(a) Make sure that the seal is serviceable.

(b) If the seal is not serviceable, replace it.

(c) Install the seal.

NOTE: The seal is slightly "oval" and will snap into its position.

SUBTASK 71-11-01-020-016-F00

(10) Install protective caps on the EEC cooling hose [4], inlet cowl TAI duct [1] and openings on the inlet cowl bulkhead.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Inlet Cowl Equipment - Nose Cowl Dolly
Figure 404/71-11-01-990-805-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Inlet Cowl Equipment - Boom Hoist
Figure 405/71-11-01-990-806-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-01-400-803-F00

7. Install the Inlet Cowl (Nose Cowl Dolly or Boom Hoist)

(Figure 401, Figure 403, Figure 404, Figure 405)

A. General

(1) This task gives the instructions to install the inlet cowl with a nose cowl dolly or boom hoist.

(2) This task can be used for the left or right inlet cowl.

NOTE: The total acoustic panel blockage for the engine installation must be recalculated when components are changed per SRM 54-00-01.

B. References

Reference	Title
30-21-11-000-801	Engine Cowl TAI Valve - Removal (P/B 401)
30-21-11-400-801	Engine Cowl TAI Valve - Installation (P/B 401)
36-00-00-860-805	Supply Pressure Upstream of the PRSOV (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
73-21-05-400-801-F00	T12 Sensor Installation (P/B 401)
SRM 54-00-01	Structural Repair Manual
SWPM 20-20-10	Replacement of Ground Studs and Bonding Jumper Installation

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-1550	Bonding Meter - Approved, Intrinsically Safe (Approved for use in Class I, Divisions I & II hazardous (classified) locations. Outside these hazardous locations, COM-614 can be used in lieu of COM-1550). Part #: 620LK Supplier: 1CRL2 Part #: M1 Supplier: 3AD17 Part #: M1B Supplier: 3AD17 Part #: T477W (C15292) Supplier: 06659
COM-2060	Dolly - Nose Cowl, Removal/Installation, CFM56-3 and -7 Engine Part #: AGSE-T073-G03 Supplier: 9M323 Opt Part #: AM-1940-400 Supplier: 9M323
SPL-2165	Installation/Removal Frame Equipment - Inlet Cowl, CFM56-7 Engine Part #: C71027-1 Supplier: 81205
SPL-2430	Hoist ? Boom, 800 lbs WLL, 250 lbs Load Positioner Compatible Part #: C20002-267 Supplier: 81205 Part #: K20017-1 Supplier: 81205 Opt Part #: C78026-161 Supplier: 81205 Opt Part #: C78026-259 Supplier: 81205
STD-3906	Mallet - Rubber

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
3	Seal	30-21-11-01A-125	LOM ALL

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
31	Inlet cowl	71-11-01-01A-025	LOM ALL

E. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

F. Access Panels

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

G. Inlet Cowl Installation

SUBTASK 71-11-01-480-002-F00

(1) Make sure that the support equipment is correct for the inlet cowl [31] installation, do these steps:

(a) Use the dolly, COM-2060 (Figure 404).

> **CAUTION** APPLY ONLY THE FORCE WHICH IS NECESSARY TO HOLD THE INLET COWL IN THE DOLLY. MORE FORCE CAN CAUSE DAMAGE TO THE INLET COWL.

1) Make sure that the engine cowling strap is tightened around the inlet cowl [31] to hold the inlet cowl [31] to the dolly, COM-2060.

(b) Use the boom hoist, SPL-2430, to make sure that the installation/removal frame equipment, SPL-2165, frame, and boom hoist, SPL-2430, are installed correctly (Figure 405).

1) If it is necessary, install the support equipment (TASK 71-11-01-000-803-F00).

SUBTASK 71-11-01-820-003-F00

(2) Make sure that the shear pins [51] at the 3:00 and 9:00 o'clock positions on the engine flange are correctly installed (Figure 403).

SUBTASK 71-11-01-020-017-F00

(3) Remove the protective caps on the EEC cooling hose [4], inlet cowl TAI duct [1], and openings on the inlet cowl bulkhead.

SUBTASK 71-11-01-420-008-F00

(4) Make sure that the seal [3] is installed in the forward flange of the inlet cowl TAI duct [1].

(a) If the seal [3] is not installed, install the seal [3].

NOTE: The seal is slightly "oval" and will snap into its position.

SUBTASK 71-11-01-420-009-F00

(5) Do these steps to install the inlet cowl [31]:

> **WARNING** BE CAREFUL WHEN YOU MOVE THE INLET COWL. BECAUSE THE INLET COWL WEIGHS 310 POUNDS (141 KG). INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Move the support equipment with the inlet cowl [31] to the engine attach flange.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Use the controls of the support equipment to lift the inlet cowl [31] to the height of the engine attach flange.

> **CAUTION** USE CAUTION WHEN YOU ENGAGE THE INLET ATTACH FLANGE TO THE ENGINE ATTACH FLANGE. DAMAGE TO THE CTAI OR EEC COOLING DUCT FLANGES COULD OCCUR.

> **CAUTION** BE CAREFUL WHEN YOU ADJUST THE INLET COWL ON THE ENGINE. THE INLET COWL CAN HIT THE INTEGRATED DRIVE GENERATOR (IDG), IDG OIL COOLING TUBING AND HYDRAULIC HOSES.

(c) Adjust the inlet cowl [31] until the holes in the inlet attach flange are aligned with the shear pins [51] on the engine attach flange.

(d) Make sure that the inlet attach flange touches the engine attach flange in all locations.

SUBTASK 71-11-01-820-004-F00

(6) Make sure that you align the inlet cowl TAI duct [1] with the duct on the inlet cowl bulkhead.

(a) If it is necessary, adjust the Thermal Anti-Ice (TAI) valve and the related aft duct to align the TAI duct (TASK 30-21-11-000-801 and TASK 30-21-11-400-801).

SUBTASK 71-11-01-820-006-F00

(7) Make sure that you align the EEC cooling hose [4] with the duct on the inlet cowl bulkhead.

LOM ALL PRE SB 737-71-1938

SUBTASK 71-11-01-420-010-F00

(8) Do these steps to attach the inlet cowl [31] to the engine (Figure 403):

(a) Install the 24 bolts [55], 24 spacers [54], 24 washers [53], and 24 nuts [52], do these steps:

1) Install the bolts [55] with the bolthead on the forward side of the flange.

NOTE: As an alternate procedure, you can install the bolts [55] with the boltheads aft.

2) Install the spacers [54] on the aft side of the flange.

3) Install the washers [53] on the forward side of the flange.

(b) Cross-torque the bolts [55] to 585 in-lb (66 N·m) - 715 in-lb (81 N·m).

NOTE: As a guide, tighten the fastener that is on the forward side of the flange and near the washer.

1) If you used the alternate procedure to install the bolts [55], torque the nuts to 500 in-lb (56 N·m) - 650 in-lb (73 N·m).

LOM ALL POST SB 737-71-1938

SUBTASK 71-11-01-420-018-F00

(9) Do these steps to attach the inlet cowl [31] to the engine (Figure 403):

(a) Install the 24 bolts [55], 24 spacers [56], 24 washers [53], and 24 nuts [52].

1) Install the bolts [55] with the boltheads on the forward side of the flange.

NOTE: As an alternate procedure, you can install the bolts with the boltheads aft.

2) Install the spacers [56] on the aft side of the flange.

3) Install the washers [53] on the forward side of the flange.

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LOM ALL POST SB 737-71-1938 (Continued)

(b) Snug fit the four nuts [52] or four bolts [55] in the sequence of 3:00, 9:00, 6:00, and 12:00 o'clock positions until there is no space between the mating surfaces of the inlet cowl [31] and the engine.

(c) Tighten the nuts [52] to 388 in-lb (44 N·m) - 412 in-lb (47 N·m).

NOTE: Do not tighten the bolts.

1) Tighten the four nuts [52] in the sequence of 3:00, 9:00, 6:00, and 12:00 o'clock positions.

2) Cross-tighten the remaining 20 nuts [52].

3) Make sure that the nut [52] at the 3:00 o'clock position is within the specified torque range.

a) If it is necessary, re-tighten the 24 nuts [52] and check again.

LOM ALL

SUBTASK 71-11-01-020-018-F00

(10) To remove the support equipment, do these steps:

(a) To remove the dolly, COM-2060, do these steps:

1) Remove the engine cowling strap.

2) Lower the dolly, COM-2060, and remove the dolly, COM-2060, from below the inlet cowl [31].

(b) To remove the boom hoist, SPL-2430, do these steps:

1) Disconnect the frame assembly from the inlet cowl [31] at the four Ground Support Equipment (GSE) attach points.

2) Move the boom hoist, SPL-2430, and frame assembly away from the inlet cowl [31].

3) Remove the frame assembly from the boom hoist, SPL-2430.

SUBTASK 71-11-01-420-011-F00

(11) Do these steps to connect the inlet cowl TAI duct [1] (Figure 401):

(a) Adjust the coupling [2] to give the maximum clearances to the coupling bolt.

(b) Tighten the coupling [2] to the torque given on the part.

(c) Lightly tap the outer edge of the coupling with a rubber mallet, STD-3906.

(d) Tighten the coupling [2] again to the torque given on the part.

SUBTASK 71-11-01-420-012-F00

(12) Do these steps to install the EEC cooling hose [4] (Figure 401):

(a) Install the EEC cooling hose [4] on the aft side of the inlet cowl bulkhead.

(b) Install the EEC cooling hose clamp [5] on the EEC cooling hose [4].

(c) Torque the EEC cooling hose clamp [5] to 26 in-lb (2.9 N·m) - 30 in-lb (3.4 N·m).

SUBTASK 71-11-01-700-002-F00

(13) Do this task: Supply Pressure Upstream of the PRSOV, TASK 36-00-00-860-805.

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SUBTASK 71-11-01-910-002-F00

> **CAUTION** DO NOT KEEP THE COWL TAI VALVE OPEN FOR MORE THAN THE SPECIFIED TIME WHEN THE TEMPERATURE IS MORE THAN THE SPECIFIED LIMIT. DAMAGE TO THE INLET COWL CAN OCCUR.

(14) Put the applicable ENG ANTI-ICE switch in the ON position.

(a) If the outside air temperature is more than 50°F (10°C), operate the engine cowl anti-icing system for 30 seconds or less.

(b) There is no time limit for operation of the engine cowl anti-icing system when the temperature is at or less than 50°F (10°C).

SUBTASK 71-11-01-790-005-F00

(15) Check the inlet cowl TAI duct [1] for leakage.

NOTE: It is permitted to have a small leakage around the couplings. A jet of air is not permitted.

(a) If you find leakage that is not permitted, repair the ducts and couplings.

SUBTASK 71-11-01-860-015-F00

(16) Put the applicable ENG ANTI-ICE switch in the OFF position.

SUBTASK 71-11-01-790-003-F00

(17) Do a visual inspection of the EEC cooling hose [4] to make sure that the ends are correctly attached and no visual defects are present.

SUBTASK 71-11-01-410-006-F00

(18) If a T12 sensor is not installed on the replacement inlet cowl [31], do this task: T12 Sensor Installation, TASK 73-21-05-400-801-F00.

SUBTASK 71-11-01-420-013-F00

(19) Do these steps to install the T12 electrical harnesses to the inlet cowl [31] (Figure 401):

(a) Install the four bolts [10] and four washers [11] that attach the electrical connector DJ0804 [7] and DJ0704 [14] to the aft side of the inlet cowl bulkhead.

NOTE: The electrical connector DJ0804 [7] (on the J8 wiring harness) is inboard and electrical connector DJ0704 [14] (on the J7 wiring harness) is outboard.

(b) Torque the bolts [10] to 72 in-lb (8.1 N·m) - 88 in-lb (9.9 N·m).

(c) Open the T12 access doors:

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

(d) Connect these electrical connectors:

1) Connect the T12 sensor connector [8] (Ch B) to the electrical connector DJ0804 [7].

2) Connect the T12 sensor connector [9] (Ch A) to the electrical connector DJ0704 [14].

SUBTASK 71-11-01-420-014-F00

(20) Do these steps to install the bonding jumper [6] to the aft side of the inlet cowl bulkhead:

(a) Connect the bonding jumper [6] to the terminal lug with the nut [12] and washer [13].

(b) Torque the nut [12] to 65 in-lb (7.3 N·m) - 70 in-lb (7.9 N·m).

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(c) Measure the electrical bonding resistance between the bonding jumper [6] and structure (SWPM 20-20-10).

1) Use an intrinsically safe approved bonding meter, COM-1550.

2) Make sure that the electrical bonding resistance is 0.0010 ohm (1.0 milliohm) or less.

SUBTASK 71-11-01-410-007-F00

(21) Close the T12 access doors:

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

SUBTASK 71-11-01-860-003-F00

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

SUBTASK 71-11-01-860-005-F00

(23) For engine 1, 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 71-11-01-860-013-F00

(24) For engine 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

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INLET COWL - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has these tasks:
      (1) The task to examine the inlet cowl skin for damage
      (2) The task to examine the bolts that attach the inlet cowl to the engine.
      (3) The task to examine the inner surface of the inlet cowl.

TASK 71-11-01-200-801-F00

2. **Inlet Cowl Inspection**
   (Figure 601)

A. General

(1) This task examines the skin of the inlet cowl for damage.

B. References

Reference	Title
71-11-01-300-801-F01	Replace the Thermal Anti-Ice (TAI) Exhaust Duct (P/B 801)
SRM 54-10-01	Structural Repair Manual

C. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

D. Procedure

SUBTASK 71-11-01-210-001-F00

(1) Examine the internal skin, the external skin and the lip skin of the inlet cowl for the damage that follows:
   (a) Cracks
   (b) Nicks, gouges, scratches and corrosion
   (c) Dents
   (d) Holes
   (e) Erosion (on the lip skin)
   (f) Missing sealant between the lip skin segments (3 locations)
      1) Missing sealant is permitted between the segments. It is not necessary to re-apply the sealant.

SUBTASK 71-11-01-220-001-F00

(2) If you find damage, refer to this reference (SRM 54-10-01) for the permitted limits.

SUBTASK 71-11-01-210-004-F00

(3) If you find blockage in the acoustic panel holes in the inner barrel, use the limits for acoustic area loss (Figure 602)
   (a) Acoustic area loss is usually counted when more than half the holes in an area are blocked and the area is more than one square inch (6.45 square cm).
      1) Holes are counted as blocked if fully or not fully filled with adhesive, resin, fibers, paint or other material.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) Holes which are angled but are otherwise clear are permitted and not considered blocked.

3) Some small areas of perforation blockage are part of the new part production bonding process.

SUBTASK 71-11-01-210-003-F00

(4) Visually examine the cowl Thermal Anti-Ice (TAI) duct louver for signs of cracks or missing louvers.

NOTE: The TAI duct louver is found at the 6 o'clock position of the inlet cowl.

NOTE: To repair the TAI exhaust duct, remove the duct from the inlet cowl. Do this task: Replace the Thermal Anti-Ice (TAI) Exhaust Duct, TASK 71-11-01-300-801-F01. It is not necessary to remove the inlet cowl to do this repair.

(a) If one or more missing louvers are found with no cracks in the slotted areas, it is permitted to return the airplane to service.

1) Missing louvers should be repaired in 800 hrs after you note the missing louvers.

(b) If one or more missing louvers are found with cracks in the slotted areas, it is permitted to return the airplane to service with these conditions:

1) If cracks are found in the slotted areas but do not exceed 1 in. (25.40 mm) in length, do these steps for a temporary repair:

a) Do a stop drill repair with a #30 drill (0.1285 inch dia.) at the end of the cracks.

b) Return the airplane to service.

2) Cracks should be repaired in 800 hrs after you do the temporary repair.

a) Refer to component manual for the applicable repair.

3) If the crack damage is more than 1 in. (25.40 mm) in length in any slot area, the duct should be replaced or contact the vendor (Goodrich) for disposition.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Inlet Cowl Inspection
Figure 601/71-11-01-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ACOUSTIC AREA LOST

A 1

ACOUSTIC AREA NOT LOST

A

1 MORE THAN 1 SQUARE INCH (6.45 SQUARE cm) AND MORE THAN 50 OUT OF 100 ADJACENT HOLES BLOCKED.

2 MORE THAN 1 SQUARE INCH (6.45 SQUARE cm) AND LESS THAN 51 OUT OF 100 ADJACENT HOLES BLOCKED.

3 LESS THAN 1 SQUARE INCH (6.45 SQUARE cm).

2016566 S0000398527_V2

Inner Barrel Acoustic Panel Inspection
Figure 602/71-11-01-990-808-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-01-200-802-F00

3. Inlet Cowl Bolt Inspection

A. General

(1) This task is a visual check of the bolts (24 locations) that attach the inlet cowl to the engine.

B. References

Reference	Title
71-11-01-400-801-F00	Install the Inlet Cowl (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)

C. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

D. Procedure

SUBTASK 71-11-01-010-001-F00

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

SUBTASK 71-11-01-210-002-F00

(2) Do a visual check of the bolts (24 locations) which attach the inlet cowl to the engine (flange A1) for the correct installation.

(a) Look for bolts which are loose or missing.

1) Missing or loose bolts are not permitted.

2) Refer to the task to install the inlet cowl to install and tighten the bolts (TASK 71-11-01-400-801-F00).

SUBTASK 71-11-01-410-001-F00

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

END OF TASK

TASK 71-11-01-200-803-F00

4. Inlet Cowl Inner Surface Inspection

(Figure 603)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task examines the inner surface skin of the inlet cowl for damage.

B. References

Reference	Title
SRM 54-10-01	Structural Repair Manual

C. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

ECCN 9E991 BOEING PROPRIETARY - See title page for details

D. Procedure

SUBTASK 71-11-01-210-005-F00

(1) Examine the internal skin of the inlet cowl for the damage that follows:

(a) Cracks

(b) Nicks, gouges, scratches and corrosion

(c) Dents

(d) Holes

SUBTASK 71-11-01-210-006-F00

(2) If you find damage, refer to this reference (SRM 54-10-01) for the permitted limits.

SUBTASK 71-11-01-220-002-F00

(3) If you find blockage in the acoustic panel holes in the inner barrel, use the limits for acoustic area loss (Figure 604).

(a) Acoustic area loss is usually counted when more than half the holes in an area are blocked and the area is more than one square inch (6.45 square cm).

1) Holes are counted as blocked if fully or not fully filled with adhesive, resin, fibers, paint or other material.

2) Holes which are angled but are otherwise clear are permitted and not considered blocked.

3) Some small areas of perforation blockage are part of the new part production bonding process.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2867257 S0000676371_V1

Inlet Cowl Inner Surface Inspection
Figure 603/71-11-01-990-809-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ACOUSTIC AREA LOST

A 1

ACOUSTIC AREA NOT LOST

A

1 MORE THAN 1 SQUARE INCH (6.45 SQUARE cm) AND MORE THAN 50 OUT OF 100 ADJACENT HOLES BLOCKED.

2 MORE THAN 1 SQUARE INCH (6.45 SQUARE cm) AND LESS THAN 51 OUT OF 100 ADJACENT HOLES BLOCKED.

3 LESS THAN 1 SQUARE INCH (6.45 SQUARE cm).

2016566 S0000398527_V2

Inner Barrel Acoustic Panel Inspection
Figure 604/71-11-01-990-810-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

INLET COWL - REPAIR

1. **General**

A. This repair is to replace the thermal anti-ice (TAI) exhaust duct in the inlet cowl.

TASK 71-11-01-300-801-F01

2. **Replace the Thermal Anti-Ice (TAI) Exhaust Duct**

A. General

(1) This task is to replace the TAI exhaust duct in the inlet cowl.

(2) Use this procedure for the left or right inlet cowl.

(3) The TAI exhaust duct is found at the 6 o'clock position on the inlet cowl.

B. References

Reference	Title
SRM 51-10-01	Structural Repair Manual

C. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

D. Replace the Thermal Anti-Ice (TAI) Exhaust Duct

SUBTASK 71-11-01-010-003-F01

(1) Do these steps to remove the access panel:

(a) Remove the bolts that attach the access panel to the outer barrel of the inlet cowl.

(b) Remove the access panel.

SUBTASK 71-11-01-020-019-F01

(2) Do these steps to remove the TAI exhaust duct [1]:

(a) Remove the bolts and washers from the flange of the TAI exhaust duct.

(b) Remove the TAI exhaust duct.

(c) Apply tape to cover the TAI duct area on the “D” duct bulkhead of the inlet cowl.

SUBTASK 71-11-01-420-015-F01

(3) Do these steps to install the TAI exhaust duct [1]:

(a) Remove the tape from the TAI duct area.

(b) Put the TAI exhaust duct in the correct position in the inlet cowl.

1) Align the holes in the duct flange with the holes in the inner barrel.

(c) Install the bolts and washers.

1) Tighten the bolts to 30 in-lb (3.39 N·m) - 35 in-lb (3.95 N·m).

SUBTASK 71-11-01-410-008-F01

(4) Do these steps to install the access panel:

NOTE: Make sure you do not damage the bulb seal when you install the access panel. Carefully guide the exhaust duct stand-off over the TAI duct mounting flange.

(a) Install the access panel with the bulb seal in contact with the flange of the TAI exhaust duct.

(b) Install the bolts.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Tighten the bolts in an alternate pattern to 24 in-lb (2.71 N·m) - 27 in-lb (3.05 N·m).

(c) Apply the aerodynamic sealant to the access panel per SRM 51-10-01.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TAI Exhaust Duct
Figure 801/71-11-01-990-807-F01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(ROTATED 90˚ CLOCKWISE)
(VIEW IN THE FORWARD DIRECTION)

B

C

420727 S0000137447_V4

TAI Exhaust Duct
Figure 801/71-11-01-990-807-F01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN COWL PANELS - MAINTENANCE PRACTICES

1. General

A. This procedure has two tasks:

(1) Open the Fan Cowl Panels

(2) Close the Fan Cowl Panels.

TASK 71-11-02-010-801-F00

2. Open the Fan Cowl Panels

(Figure 201)

A. General

(1) This task provides the instructions on how to open the fan cowl panels.

(2) Each fan cowl panel is held open with two hold-open rods.

(3) The hold-open rod is spring-loaded in the stowed position and has a double action lock.

(a) You must pull back the end sleeve and compress the rod from the end to release the hold-open rod from the stow receiver.

(4) Two clear movements of the lock are necessary to release the hold-open rod from the locked position.

(a) You must turn and pull the release sleeve in the direction of the arrow.

(b) The hold-open rod is free to extend or compress.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Flaps and Slats Deactivation (P/B 201)

C. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left
424	Engine 2 - Fan Cowl, Right

D. Open the Fan Cowl Panels

SUBTASK 71-11-02-860-001-F00

WARNING

DO NOT UNLATCH THE FAN COWL PANELS DURING AN ENGINE OPERATION. THE FORWARD LATCHES ARE IN THE HAZARD AREA ZONE OF THE ENGINE INLET. IF YOU GO INTO THE HAZARD AREA, YOU CAN GET PULLED INTO THE ENGINE WHICH CAN CAUSE INJURY TO PERSONNEL.

WARNING

DO NOT OPEN THE FAN COWL PANELS IN HIGH WINDS OR GUST CONDITIONS THAT ARE MORE THAN 40 KNOTS. IF YOU DO NOT OBEY, INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT COULD OCCUR.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(WARNING PRECEDES)

> **CAUTION** DO NOT OPEN THE INBOARD FAN COWL PANEL UNLESS THE LEADING EDGE FLAPS ARE DEACTIVATED IN THE RETRACTED POSITION. IF THERE IS NOT SUFFICIENT CLEARANCE, DAMAGE TO EQUIPMENT CAN OCCUR.

(1) When you open the inboard fan cowl panel, retract and do the deactivation procedure for the leading edge flaps (TASK 27-81-00-040-801).

SUBTASK 71-11-02-010-002-F00

(2) Release the three latches along the mating line of the fan cowl panels:

(a) Push the trigger to release the safety catch and pull the handle to release the latch.

1) Use a screwdriver in the slot if it is necessary.

(b) Do the steps again for the other two latches.

SUBTASK 71-11-02-010-003-F00

> **WARNING** YOU MUST HOLD THE FAN COWL PANEL WHILE YOU EXTEND OR UNLOCK THE HOLD-OPEN RODS. IF THE FAN COWL PANEL FALLS, INJURY TO PERSONNEL AND DAMAGE TO THE ENGINE COMPONENTS CAN OCCUR.

(3) Do these steps to open the fan cowl panels:

NOTE: It is recommended that you open the two fan cowl panels and install the hold-open rods, and not let a fan cowl panel hang loose.

LOM ALL POST SB 737-71-1937

> **CAUTION** DO NOT PUSH UP ON THE BOTTOM OF THE FAN COWL WHEN YOU OPEN OR CLOSE IT. IF YOU DO NOT OBEY, DAMAGE BETWEEN THE FAN COWL AND WIRE BUNDLES CAN OCCUR.

(a) If the fan cowl shows any resistance during the early stages of opening or closing, make sure that there is no interference between the radial restraint and the wiring bundles.

LOM ALL

(b) Manually hold the fan cowl panel and move it away from the engine until you can get access to hold open rods

(c) Do these steps to engage the forward hold-open rod on the engine:

1) Retract the sleeve at the receiver end of the hold-open rod and compress it to disengage the rod from the receiver.

2) The rod will extend and snap into the first position to hold the fan cowl panel in the 28-degree open position.

3) Engage the hold-open rod on the engine mounted receiver.

NOTE: For the left side of the fan case, the forward receiver is on the engine flange B1 at the 10:00 o'clock position. The aft receiver is near the fuel nozzle filter. For the right side of the fan case, the forward receiver is on the engine flange A1 at the 2:00 o'clock position. The aft receiver is on the flange B6, aft of the EEC.

(d) Do the steps again, to engage the aft hold-open rod on the engine.

(e) Do these steps to fully open the fan cowl panel to the 55-degree position:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Hold the fan cowl panel.
2) Move the TURN/PULL sleeve in the direction of the arrow to unlock each hold-open rod.
3) Move the fan cowl panel away from the engine until the hold-open rods extend and snap into the fully open position.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Cowl Panel Opening and Closing
Figure 201/71-11-02-990-802-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F98801 S0006582045_V2

Fan Cowl Panel Opening and Closing
Figure 201/71-11-02-990-802-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F98813 S0006582046_V2

Fan Cowl Panel Opening and Closing
Figure 201/71-11-02-990-802-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

3005228 S0000780190_V1

Fan Cowl Panel Opening and Closing
Figure 201/71-11-02-990-802-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-02-410-801-F00

3. Close the Fan Cowl Panels

(Figure 201)

A. General

(1) This task provides the instructions on how to close the fan cowl panels.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Flaps and Slats - Activation (P/B 201)
71-11-03-700-801-F00	Fan Cowl Panel Latch Adjustment (P/B 501)

C. Close the Fan Cowl Panels

SUBTASK 71-11-02-410-002-F00

WARNING DO NOT CLOSE THE FAN COWL PANEL DURING AN ENGINE OPERATION. THE FORWARD LATCHES ARE IN THE HAZARD AREA ZONE OF THE ENGINE INLET. IF YOU GO INTO THE HAZARD AREA, YOU CAN GET PULLED INTO THE ENGINE. IF YOU DO NOT OBEY, DANGEROUS INJURY OR DEATH CAN OCCUR.

WARNING BE CAREFUL WHEN YOU CLOSE THE FAN COWL PANEL IN HIGH WINDS OR SUDDEN STRONG WIND CONDITIONS. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL CAN OCCUR.

WARNING DO NOT TRY TO CLOSE THE FAN COWL IN WINDS MORE THAN 40 KNOTS. THE FAN COWL PANELS CAN STAY OPEN IN WINDS TO 65 KNOTS. IN WINDS MORE THAN 65 KNOTS, THE HOLD-OPEN ROD CAN BREAK. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL CAN OCCUR.

WARNING HOLD THE FAN COWL PANEL WHILE YOU UNLOCK OR RETRACT THE HOLD-OPEN RODS. IF THE FAN COWL PANEL FALLS, INJURY TO PERSONS AND DAMAGE TO THE ENGINE COMPONENTS CAN OCCUR.

(1) Do these steps to engage the hold-open rod on the fan cowl panel:

(a) Hold the fan cowl panel.

(b) Move the TURN/PULL sleeve in the direction of the arrow to unlock each hold-open rod.

(c) Manually move the fan cowl panel toward the engine until the hold-open rods lock at the first click (28-degree position).

(d) Do these steps to engage the forward hold-open rod on the fan cowl panel:

1) Retract the sleeve at the receiver end of the hold-open rod and compress it to disengage the rod from the receiver.

2) Engage the hold-open rod end on the receiver on the fan cowl panel with the curved lock end facing away from the fan cowl.

(e) Do the steps again to engage the aft hold-open rod on the fan cowl panel.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL POST SB 737-71-1937

SUBTASK 71-11-02-410-006-F00

> **CAUTION** DO NOT PUSH UP ON THE BOTTOM OF THE FAN COWL WHEN YOU OPEN OR CLOSE IT. IF YOU DO NOT OBEY, DAMAGE BETWEEN THE FAN COWL AND WIRE BUNDLES CAN OCCUR.

(2) If the fan cowl shows any resistance during the early stages of opening or closing, make sure that there is no interference between the radial restraint and the wiring bundles.

LOM ALL

SUBTASK 71-11-02-410-003-F00

> **WARNING** DO NOT LET THE FAN COWL PANEL CLOSE QUICKLY. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL CAN OCCUR.

(3) Slowly lower the fan cowl panel.

SUBTASK 71-11-02-410-004-F00

> **CAUTION** DO NOT USE MORE THAN 60 POUNDS (270 NEWTONS) OF FORCE TO PUSH THE LATCH HANDLE CLOSED. TOO MUCH FORCE CAN CAUSE DAMAGE TO THE LATCH.

(4) Close the three latches along the mating line of the fan cowl panels:

(a) Engage the center latch hook to latch the keeper and push the latch handle closed.

(b) Engage the forward latch hook to latch the keeper and push the latch handle closed.

(c) Engage the aft latch hook to latch the keeper and push the latch handle closed.

(d) If a latch adjustment is necessary, do this task: Fan Cowl Panel Latch Adjustment, TASK 71-11-03-700-801-F00.

D. Put the Airplane Back to its Usual Condition

SUBTASK 71-11-02-410-005-F00

(1) Do this task: Leading Edge Flaps and Slats - Activation, TASK 27-81-00-440-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN COWL PANEL - REMOVAL/INSTALLATION

1. **General**

A. This procedure has these tasks:

(1) Fan Cowl Panel Removal (Selection)

(2) Fan Cowl Panel Installation (Selection)

(3) Fan Cowl Panel Removal (Manual Procedure)

(4) Fan Cowl Panel Installation (Manual Procedure)

(5) Fan Cowl Panel Removal (Sling Procedure)

(6) Fan Cowl Panel Installation (Sling Procedure).

TASK 71-11-02-000-801-F00

2. **Fan Cowl Panel Removal (Selection)**

A. General

(1) The purpose of this task is to permit mechanics to select the applicable procedure to remove a fan cowl panel. The manual procedure uses four persons to remove the fan cowl panel. The sling procedure uses a sling and hoist.

(2) The procedures can be used for the left or the right fan cowl panels.

B. Fan Cowl Panel Removal (Selection)

SUBTASK 71-11-02-020-001-F00

(1) Do one of these tasks to remove the applicable fan cowl panel:

(a) Do this task: Fan Cowl Panel Removal (Manual Procedure), TASK 71-11-02-000-802-F00.

(b) Do this task: Fan Cowl Panel Removal (Sling Procedure), TASK 71-11-02-000-803-F00.

END OF TASK

TASK 71-11-02-400-801-F00

3. **Fan Cowl Panel Installation (Selection)**

A. General

(1) The purpose of this task is to permit mechanics to select the applicable procedure to install a fan cowl panel. The manual procedure uses four persons to install the fan cowl panel. The sling procedure uses a sling and hoist.

(2) The procedures can be used for the left or the right fan cowl panels.

B. Fan Cowl Panel Installation (Selection)

SUBTASK 71-11-02-420-001-F00

(1) Do one of these tasks to install the applicable fan cowl panel:

(a) Do this task: Fan Cowl Panel Installation (Manual Procedure), TASK 71-11-02-400-802-F00.

(b) Do this task: Fan Cowl Panel Installation (Sling Procedure), TASK 71-11-02-400-803-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-02-000-802-F00

4. Fan Cowl Panel Removal (Manual Procedure)

(Figure 401)

A. General

(1) This task provides the instructions on how to remove the fan cowl panel manually.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Flaps and Slats Deactivation (P/B 201)

C. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left
424	Engine 2 - Fan Cowl, Right

D. Prepare for the Removall

SUBTASK 71-11-02-840-001-F00

WARNING DO NOT TRY TO REMOVE THE FAN COWL PANELS DURING AN ENGINE OPERATION BECAUSE THE FORWARD LATCHES ARE IN THE ENGINE INLET HAZARD ZONE. IF YOU GO INTO THE HAZARD AREA, YOU CAN BE PULLED INTO THE ENGINE. SERIOUS OR FATAL INJURIES CAN OCCUR.

WARNING BE CAREFUL WHEN YOU REMOVE THE FAN COWL PANEL IN HIGH WINDS OR GUSTY WIND CONDITIONS. DO NOT TRY TO REMOVE THE FAN COWL PANELS IF THE WINDS ARE ABOVE 40 KNOTS. THE WINDS CAN CAUSE THE FAN COWL PANELS TO MOVE SUDDENLY. INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Make sure you obey these precautions when you remove the fan cowl panel:

(a) The engine is not operational

(b) The maximum wind velocity is not more than 40 knots.

SUBTASK 71-11-02-860-003-F00

(2) If you remove the inboard fan cowl panel, you must retract and do the deactivation procedure for the leading edge flaps (TASK 27-81-00-040-801).

SUBTASK 71-11-02-860-010-F00

(3) Install a DO-NOT-OPERATE tag on the engine start lever for the applicable engine.

NOTE: This step will make sure the applicable engine will not operate.

E. Fan Cowl Panel Removal (Manual Procedure)

SUBTASK 71-11-02-020-002-F00

(1) Release the three latches along the mating line of the fan cowl panels:

(a) Push the trigger to release the safety catch and pull the handle to release the latch.

1) Use a screwdriver in the slot if more leverage is necessary.

(b) Do the above steps again for the other two latches.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-11-02-020-003-F00

CAUTION	MAKE SURE YOU USE A MINIMUM OF FOUR PERSONS TO REMOVE THE FAN COWL PANEL. USE THREE PERSONS TO HOLD THE PANEL AND ONE TO DISENGAGE THE FAN COWL CLEVIS FROM THE STRUT LUGS. THE LEFT FAN COWL PANEL WEIGHS APPROXIMATELY 80 POUNDS (36 KG), AND THE RIGHT FAN COWL PANEL WEIGHS APPROXIMATELY 96 POUNDS (44 KG). IF YOU DO NOT USE THE MINIMUM NUMBER OF PERSONS, DAMAGE TO THE FAN COWL PANEL, STRUT, INLET AND THRUST REVERSER CAN OCCUR.

(2) Do these steps to remove the fan cowl panel [1]:

CAUTION	BE CAREFUL WHEN YOU OPEN THE FAN COWL PANELS. OPEN THE FAN COWL PANEL JUST UNTIL ONE PERSON CAN GO UNDER THE FAN COWL AND DISENGAGE THE PINS. IF YOU OPEN THEM TOO MUCH, DAMAGE TO THE STRUT CAN OCCUR.

(a) Use three persons to hold the fan cowl panel [1] open.

(b) Use the fourth person to disengage each quick-release pin as follows:

NOTE: There is a quick-release pin for each of the three attach points. Each quick-release pin is permanently attached to the strut.

1) Remove the safety pin from the end of the quick-release pin.

2) Release the quick release pin with the button on the end.

3) Do the above steps again for the other two quick release pins.

(c) Move the fan cowl panel [1] away from the engine.

(d) Put the fan cowl panel [1] on a pallet or other suitable surface.

NOTE: Put the fan cowl panel with its top and bottom edges on the pallet or surface.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Fan Cowl Panel Installation
Figure 401/71-11-02-990-803-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

LEFT FAN COWL SHOWN,
RIGHT FAN COWL EQUIVALENT.

1 OUTER HINGE SHOWN. THE QUICK-RELEASE PIN IS INSTALLED FROM THE FORWARD SIDE ON THE MIDDLE HINGE.

F92985 S0006582053_V3

Fan Cowl Panel Installation
Figure 401/71-11-02-990-803-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-02-400-802-F00

5. Fan Cowl Panel Installation (Manual Procedure)

(Figure 401)

A. General

(1) This task provides the instructions on how to install the fan cowl panel manually.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Flaps and Slats - Activation (P/B 201)
71-11-03-700-801-F00	Fan Cowl Panel Latch Adjustment (P/B 501)
71-11-08-000-801-F00	Vortex Control Device Removal (P/B 401)
71-11-08-400-801-F00	Vortex Control Device Installation (P/B 401)

C. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left
424	Engine 2 - Fan Cowl, Right

D. Prepare for the Installation

SUBTASK 71-11-02-840-002-F00

WARNING

DO NOT TRY TO INSTALL THE FAN COWL PANELS DURING AN ENGINE OPERATION BECAUSE THE FORWARD LATCHES ARE IN THE ENGINE INLET HAZARD ZONE. IF YOU GO INTO THE HAZARD AREA, YOU CAN BE PULLED INTO THE ENGINE. SERIOUS OR FATAL INJURIES CAN OCCUR.

WARNING

BE CAREFUL WHEN YOU INSTALL THE FAN COWL PANEL IN HIGH WINDS OR GUSTY WIND CONDITIONS. DO NOT INSTALL THE FAN COWL PANELS IF THE WINDS ARE ABOVE 40 KNOTS. THE WINDS CAN CAUSE THE FAN COWL PANELS TO MOVE SUDDENLY. INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Make sure you obey these precautions when you install the fan cowl panel [1]:

(a) The engine is not operational.

(b) The maximum wind velocity is not more than 40 knots.

SUBTASK 71-11-02-900-001-F00

CAUTION

MAKE SURE THAT THE FAN COWL PANEL AT THE INBOARD POSITION ON THE ENGINE HAS A VORTEX CONTROL DEVICE (VCD). IF THE VCD IS NOT INSTALLED, AIRPLANE OPERATION WILL BE AFFECTED.

(2) For an inboard fan cowl panel, make sure that the replacement fan cowl panel [1] has a vortex control device (VCD).

(a) If it is necessary to install a VCD on the replacement fan cowl panel [1], do these steps to remove the VCD from the removed fan cowl panel [1] and install it to the new fan cowl panel [1]:

1) Do this task: Vortex Control Device Removal, TASK 71-11-08-000-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

2) Do this task: Vortex Control Device Installation, TASK 71-11-08-400-801-F00.

SUBTASK 71-11-02-900-002-F00

(3) For an outboard fan cowl panel, make sure that the replacement fan cowl panel does not have a VCD.

(a) If the fan cowl panel has a VCD, do this task: Vortex Control Device Removal, TASK 71-11-08-000-801-F00

(b) If the fan cowl panel does not have a VCD, verify that the 12 setscrews are installed in the mounting holes.

E. Fan Cowl Panel Installation (Manual Procedure)

SUBTASK 71-11-02-420-002-F00

WARNING	BE CAREFUL WHEN YOU MOVE THE FAN COWL PANEL. BECAUSE THE LEFT FAN COWL PANEL WEIGHS 80 POUNDS (36 KG) AND THE RIGHT FAN COWL PANEL WEIGHS 96 POUNDS (44 KG), INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION	BE CAREFUL WHEN YOU PUT THE FAN COWL PANEL ON THE HINGES. DAMAGE TO THE HINGES, STRUT AND FAN COWL PANEL CAN OCCUR.

CAUTION	MAKE SURE YOU USE A MINIMUM OF FOUR PERSONS TO INSTALL THE FAN COWL PANEL. IF YOU DO NOT USE THE MINIMUM NUMBER OF PERSONS, DAMAGE TO THE FAN COWL PANEL, STRUT, INLET AND THRUST REVERSER CAN OCCUR.

(1) Do these steps to install the fan cowl panel [1]:

(a) Use three persons to lift the fan cowl panel [1] to the engine and align the fan cowl clevises with the strut lugs.

(b) Use the fourth person to install the quick-release pins.

(c) At two of the three locations, install the quick-release pins to attach the strut lugs to the fan cowl clevises.

NOTE: For the forward and aft attach points, the quick-release pins are installed from the aft side. For the center attach point, the quick-release pin is installed from the forward side.

NOTE: The quick-release pins and the safety pins are permanently attached to the strut.

1) Install the safety pin through the hole in the end of each quick-release pin.

(d) At the remaining location, install the quick-release pin.

NOTE: You can apply a maximum force of 30 pounds (133 Newtons) to the fan cowl at the hinge locations to align the hinges.

1) Install the safety pin through the hole in the end of the quick-release pin.

(e) Slowly close, but do not latch, the fan cowl panel [1].

SUBTASK 71-11-02-420-003-F00

(2) If you replaced the fan cowl panel, do this task: Fan Cowl Panel Latch Adjustment, TASK 71-11-03-700-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-11-02-010-004-F00

> **CAUTION** DO NOT USE MORE THAN 60 POUNDS (270 NEWTONS) OF FORCE TO PUSH THE LATCH HANDLE CLOSED. TOO MUCH FORCE CAN CAUSE DAMAGE TO THE LATCH.

(3) Close the three latches along the mating line of the fan cowl panels:

(a) Engage the latch hook to latch the keeper, and push the latch handle closed.

(b) Do the above step again for the other two latches.

SUBTASK 71-11-02-860-005-F00

(4) If you installed the inboard fan cowl panel, do this task: Leading Edge Flaps and Slats - Activation, TASK 27-81-00-440-801.

——— END OF TASK ———

TASK 71-11-02-000-803-F00

6. Fan Cowl Panel Removal (Sling Procedure)

(Figure 402)

A. General

(1) This task provides the instructions on how to remove the fan cowl panel with a sling.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Flaps and Slats Deactivation (P/B 201)
27-81-00-860-804	Leading Edge Flaps and Slats Retraction (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-2108	Sling - Fan Cowl, CFM56-7 Engine Part #: C71026-8 Supplier: 81205 Opt Part #: C71026-1 Supplier: 81205
STD-858	Tag - DO NOT OPERATE

D. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left
424	Engine 2 - Fan Cowl, Right

E. Prepare for the Removal

SUBTASK 71-11-02-840-003-F00

> **WARNING** DO NOT OPEN THE FAN COWL PANEL DURING AN ENGINE OPERATION. THE FORWARD LATCHES ARE IN THE DANGEROUS AREA ZONE OF THE ENGINE INLET. IF YOU GO INTO THE DANGEROUS AREA, THE ENGINE CAN PULL YOU IN. IF YOU DO NOT OBEY, INJURY OR DEATH CAN OCCUR.

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(WARNING PRECEDES)

> **WARNING** DO NOT TRY TO REMOVE OR INSTALL THE FAN COWL PANELS IN HIGH WINDS OR GUST CONDITIONS OF MORE THAN 40 KNOTS. THE WINDS CAN CAUSE THE FAN COWL PANELS TO MOVE SUDDENLY. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Obey the safety precautions and maintenance practices to remove the fan cowl panel [1]:

(a) The engine is not operational

(b) The maximum wind velocity is not more than 40 knots (74.1 km/h).

SUBTASK 71-11-02-860-006-F00

> **CAUTION** RETRACT THE LEADING EDGE SLATS, AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THESE PRECAUTIONS, THE FAN COWL PANELS WILL HIT THE SLATS. DAMAGE WILL OCCUR.

(2) If the inboard fan cowl panel [1] is removed, do these steps:

(a) Do this task: Leading Edge Flaps and Slats Retraction, TASK 27-81-00-860-804.

(b) Do this task: Leading Edge Flaps and Slats Deactivation, TASK 27-81-00-040-801.

SUBTASK 71-11-02-860-011-F00

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

NOTE: This step will make sure the applicable engine will not operate.

F. Fan Cowl Panel Removal (Sling Procedure)

SUBTASK 71-11-02-480-001-F00

(1) Install the fan cowl sling, SPL-2108, at the Ground Support Equipment (GSE) attach point on the fan cowl panels [1].

(a) Do not tighten the hoist ring bolt more than the torque shown on the sling.

SUBTASK 71-11-02-010-005-F00

(2) Release the three latches along the mating line of the fan cowl panels [1]:

(a) Push the trigger to release the safety catch and pull the handle to release the latch.

1) Use a screwdriver in the slot if more leverage is necessary.

(b) Do the above steps again for the other two latches.

SUBTASK 71-11-02-020-005-F00

> **WARNING** GET SUFFICIENT AID FROM OTHER PERSONNEL AND EQUIPMENT TO HOLD THE COMPONENT DURING THE REMOVAL, AND INSTALLATION. IF THE COMPONENT ACCIDENTALLY FALLS, IT WILL CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

> **WARNING** DO NOT FULLY DISENGAGE THE FAN COWL FROM THE STRUT HINGES WHILE A MECHANIC IS UNDER THE COWLING. USE THE DRIFT PINS TO SECURE THE COWLING THEN REMOVE THE DRIFT PINS BY REACHING UNDER THE COWLING. INJURIES TO PERSONS CAN OCCUR.

(3) Do these steps to remove the fan cowl panel [1]:

(a) Use the hoist and fan cowl sling, SPL-2108, to hold the fan cowl panel [1] open.

1) Do not open the fan cowl panel [1] too much.

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(b) Disengage the quick-release pin at an outer hinge as follows:

NOTE: There is a quick-release pin for each of the three attach points. Each quick-release pin is permanently attached to the strut.

1) Remove the safety pin from the end of the quick-release pin.
2) Release the quick-release pin with the button on the end and remove the pin.
3) Install the drift pin from the sling kit at the outer hinge.
4) Do the above steps again at the remaining outer hinge.

(c) Disengage and remove the quick-release pin at the center hinge.

(d) Adjust the position of the fan cowl panel [1], until the drift pins can be easily removed.

(e) Remove the drift pin at each outer hinge.

(f) Carefully move the fan cowl panel [1] away from the engine.

(g) Put the fan cowl panel [1] on a pallet or other suitable surface.

1) Put the fan cowl panel [1] with its top and bottom edges on the pallet or surface.

(h) If it is necessary, remove the fan cowl sling, SPL-2108, from the fan cowl panel [1].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Cowl Panel Installation (Sling Procedure)
Figure 402/71-11-02-990-804-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

LEFT FAN COWL SHOWN,
RIGHT FAN COWL EQUIVALENT.

1 OUTER HINGE SHOWN. THE QUICK-RELEASE PIN IS INSTALLED FROM THE FORWARD SIDE ON THE MIDDLE HINGE.

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Fan Cowl Panel Installation (Sling Procedure)
Figure 402/71-11-02-990-804-F00 (Sheet 2 of 2)

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TASK 71-11-02-400-803-F00

7. Fan Cowl Panel Installation (Sling Procedure)

(Figure 402)

A. General

(1) This task provides the instructions on how to install the fan cowl panel with a sling.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Flaps and Slats - Activation (P/B 201)
71-11-03-700-801-F00	Fan Cowl Panel Latch Adjustment (P/B 501)
71-11-08-000-801-F00	Vortex Control Device Removal (P/B 401)
71-11-08-400-801-F00	Vortex Control Device 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-2108	Sling - Fan Cowl, CFM56-7 Engine Part #: C71026-8 Supplier: 81205 Opt Part #: C71026-1 Supplier: 81205

D. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left
424	Engine 2 - Fan Cowl, Right

E. Prepare for the Installation

SUBTASK 71-11-02-840-004-F00

WARNING DO NOT TRY TO REMOVE OR INSTALL THE FAN COWL PANELS IN HIGH WINDS OR GUST CONDITIONS OF MORE THAN 40 KNOTS. THE WINDS CAN CAUSE THE FAN COWL PANELS TO MOVE SUDDENLY. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Obey the safety precautions and maintenance practices to install the fan cowl panel [1]:

(a) The engine is not operational.

(b) The maximum wind velocity is not more than 40 knots (74.1 km/h).

SUBTASK 71-11-02-900-003-F00

CAUTION INSTALL THE VCD ONLY ON THE INBOARD FAN COWL PANEL. THE INCORRECT INSTALLATION OF THE VCD AND FAN COWL PANEL CAN CAUSE INCORRECT AIRPLANE PERFORMANCE AND DAMAGE.

(2) For an inboard fan cowl panel [1], make sure that the replacement fan cowl panel [1] has a Vortex Control Device (VCD).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) If it is necessary to install the VCD on the replacement the fan cowl panel [1], do these steps to remove the VCD from the removed fan cowl panel [1] and install it to the new fan cowl panel [1]:

1) Do this task: Vortex Control Device Removal, TASK 71-11-08-000-801-F00.

2) Do this task: Vortex Control Device Installation, TASK 71-11-08-400-801-F00.

SUBTASK 71-11-02-900-004-F00

(3) For an outboard fan cowl panel [1], make sure that the replacement fan cowl panel [1] does not have the VCD.

(a) If the fan cowl panel [1] has the VCD, do this task: Vortex Control Device Removal, TASK 71-11-08-000-801-F00.

(b) If the fan cowl panel [1] does not have the VCD, verify that the 12 setscrews are installed in the mounting holes.

F. Fan Cowl Panel Installation (Sling Procedure)

SUBTASK 71-11-02-420-005-F00

WARNING GET SUFFICIENT AID FROM OTHER PERSONNEL AND EQUIPMENT TO HOLD THE COMPONENT DURING THE REMOVAL, AND INSTALLATION. IF THE COMPONENT ACCIDENTALLY FALLS, IT WILL CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(1) Do these steps to install the fan cowl panel [1]:

(a) Use the hoist and fan cowl sling, SPL-2108, to lift the fan cowl panel [1] to the engine and align the fan cowl clevises with the strut lugs.

WARNING DO NOT FULLY DISENGAGE THE FAN COWL FROM THE STRUT HINGES WHILE A MECHANIC IS UNDER THE COWLING. USE THE DRIFT PINS TO SECURE THE COWLING THEN REMOVE THE DRIFT PINS BY REACHING UNDER THE COWLING. INJURIES TO PERSONS CAN OCCUR.

(b) Install the drift pins from the sling kit at the two outer hinges.

(c) At the center hinge, install the quick-release pin from the forward side to attach the strut lug to the fan cowl clevis.

NOTE: For the center attach point, the quick-release pin is installed from the forward side. For the forward and aft attach points, the quick-release pins are installed from the aft side.

NOTE: The quick-release pins and the safety pins are permanently attached to the strut.

1) Install the safety pin through the hole in the end of the quick-release pin.

(d) At one of the outer hinges, do these steps install the quick-release pin from the aft side:

1) Remove the drift pin.

2) Install the quick-release pin.

a) If it is necessary, apply the force to the fan cowl panel [1] at the hinge locations to align the hinges but not more than 30 lb (13.6 kg).

b) Install the safety pin through the hole in the end of the quick-release pin.

3) Do the above steps again to install the quick-release pin at the remaining outer hinge.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-11-02-080-001-F00

(2) To remove the sling, do these steps:

(a) Slowly lower and close, but do not latch, the fan cowl panel [1].

(b) Remove the hoist ring bolt to remove the sling.

SUBTASK 71-11-02-420-006-F00

(3) If the fan cowl panel [1] was replaced, do this task: Fan Cowl Panel Latch Adjustment, TASK 71-11-03-700-801-F00.

SUBTASK 71-11-02-010-006-F00

CAUTION

DO NOT USE MORE THAN 60 POUNDS (270 NEWTONS) OF FORCE TO PUSH THE LATCH HANDLE CLOSED. TOO MUCH FORCE CAN CAUSE DAMAGE TO THE LATCH.

(4) Close the three latches along the mating line of the fan cowl panels [1]:

(a) Engage the latch hook to latch the keeper, and push the latch handle closed.

(b) Do the above step again for the other two latches.

SUBTASK 71-11-02-860-008-F00

(5) If the inboard fan cowl panel [1] was removed, do this task: Leading Edge Flaps and Slats - Activation, TASK 27-81-00-440-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN COWL PANELS - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has two tasks:
      (1) Fan Cowl Panels Inspection
      (2) Fan Cowl Panels (Outer Surface) Inspection.

TASK 71-11-02-200-801-F00

2. **Fan Cowl Panels Inspection**
   (Figure 601)

A. General

(1) This task examines the condition of the fan cowl panels.

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)
SRM 54-20-01	Structural Repair Manual
SRM 54-20-90	Structural Repair Manual

C. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left
424	Engine 2 - Fan Cowl, Right

D. Procedure

SUBTASK 71-11-02-210-001-F00

(1) Examine the outer surfaces of each fan cowl for damage.
   (a) If there is damage, for the limits and the repair tasks refer to SRM 54-20-01.

SUBTASK 71-11-02-010-001-F00

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

SUBTASK 71-11-02-210-002-F00

(3) Examine the inner surfaces of each fan cowl for damage.
   (a) If there is damage, for the limits and the repair tasks refer to SRM 54-20-01.

SUBTASK 71-11-02-210-003-F00

(4) Examine the hinges of each fan cowl for damage and worn areas.
   (a) If there is damage or worn areas, for the limits and the repair tasks refer to SRM 54-20-90.

SUBTASK 71-11-02-210-004-F00

(5) Examine each hold-open rod for damage and worn areas.
   (a) If there is damage or the hold-open rod is inoperative, for the removal instructions and inspection criteria refer to CMM 71-13-30.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-11-02-410-001-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

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Fan Cowl Panel Inspection
Figure 601/71-11-02-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-02-200-802-F00

3. Fan Cowl Panels (Outer Surface) Inspection

A. General

(1) This task examines the outer surface of the fan cowl panels.

B. References

Reference	Title
SRM 54-20-01	Structural Repair Manual

C. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left
424	Engine 2 - Fan Cowl, Right

D. Procedure

SUBTASK 71-11-02-210-005-F00

(1) Examine the outer surfaces of each fan cowl for damage.

(a) If there is damage, for the limits and repair tasks refer to SRM 54-20-01.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN COWL PANEL LATCH - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) Fan Cowl Panel Latch Removal

(2) Fan Cowl Panel Latch Installation

(3) Fan Cowl Panel Latch Keeper Removal

(4) Fan Cowl Panel Latch Keeper Installation.

TASK 71-11-03-000-801-F00

2. Fan Cowl Panel Latch Removal

(Figure 401)

A. General

(1) This task provides the instructions on how to remove the fan cowl panel latch.

(2) The fan cowl panel latches are found on the bottom of the left fan cowl panel.

(3) For this procedure, the fan cowl panel latch will be referred to as the latch.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

D. Prepare for the Removal

SUBTASK 71-11-03-010-001-F00

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

E. Fan Cowl Panel Latch Removal

SUBTASK 71-11-03-020-001-F00

(1) Remove each latch as follows:

(a) Remove the cotter pin [5] from the nut [4].

(b) Remove the nut [4], the two washers [2], and the bolt [3].

(c) Remove the hook latch assembly [1].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Fan Cowl Panel Latch Installation
Figure 401/71-11-03-990-804-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-03-400-801-F00

3. Fan Cowl Panel Latch Installation

(Figure 401)

A. General

(1) This task provides the instructions on how to install the fan cowl panel latch.

(2) The fan cowl panel latches are found on the bottom of the left fan cowl panel.

(3) For this procedure, the fan cowl panel latch will be referred to as the latch.

B. References

Reference	Title
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
71-11-03-700-801-F00	Fan Cowl Panel Latch Adjustment (P/B 501)

C. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Hook latch assembly	71-11-02-10-208	LOM ALL
		71-11-02-10-210	LOM ALL
		71-11-02-10-212	LOM ALL

D. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

E. Fan Cowl Panel Latch Installation

SUBTASK 71-11-03-910-003-F00

(1) Install each latch as follows:

(a) Put the hook latch assembly [1] in the latch housing and align the holes.

(b) Install the bolt [3] and washer [2] with the bolt head on the forward side of the latch.

(c) Install the washer [2] and the nut [4].

> **CAUTION**
> DO NOT USE MORE THAN 20 POUND-INCHES (2.26 NEWTON-METERS) TORQUE ON THE NUT. TOO MUCH TORQUE CAN CAUSE DAMAGE TO THE EQUIPMENT.

1) Tighten the nut with your hand until you can align the holes for the cotter pin.

(d) Install the cotter pin [5].

F. Fan Cowl Panel Latch Test

SUBTASK 71-11-03-910-004-F00

(1) Do this task: Fan Cowl Panel Latch Adjustment, TASK 71-11-03-700-801-F00.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 71-11-03-410-002-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

TASK 71-11-03-000-802-F00

4. Fan Cowl Panel Latch Keeper Removal

(Figure 402)

A. General

(1) This task provides the instructions on how to remove the fan cowl panel latch keeper.

(2) The fan cowl panel latch keepers are found on the bottom of the right fan cowl panel.

(3) For this procedure, the fan cowl panel latch keeper will be referred to as the latch keeper.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
424	Engine 2 - Fan Cowl, Right

D. Prepare for the Removal

SUBTASK 71-11-03-010-002-F00

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

E. Fan Cowl Panel Latch Keeper Removal

SUBTASK 71-11-03-020-002-F00

(1) Remove each latch keeper [21] as follows:

(a) Remove the four nuts [24], the eight washers [22] and the four bolts [23] that attach the latch keeper to the latch keeper housing.

(b) Remove the latch keeper [21].

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Fan Cowl Panel Latch Keeper Installation
Figure 402/71-11-03-990-805-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-03-400-802-F00

5. Fan Cowl Panel Latch Keeper Installation

(Figure 402)

A. General

(1) This task provides the instructions on how to install the fan cowl panel latch keeper.

(2) The fan cowl panel latch keepers are found on the bottom of the right fan cowl panel.

(3) For this procedure, the fan cowl panel latch keeper will be referred to as the latch keeper.

B. References

Reference	Title
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
71-11-03-700-801-F00	Fan Cowl Panel Latch Adjustment (P/B 501)

C. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
424	Engine 2 - Fan Cowl, Right

D. Fan Cowl Panel Latch Keeper Installation

SUBTASK 71-11-03-910-007-F00

(1) Install each latch keeper [21] as follows:

(a) Put the latch keeper [21] in the latch keeper housing and align the bolt holes.

(b) Install the four bolts [23], the eight washers [22], and the four nuts [24].

(c) Tighten the nuts [24] to 50-70 pound-inches (5.65-7.91 Newton meters).

E. Fan Cowl Panel Latch Keeper Test

SUBTASK 71-11-03-910-009-F00

(1) Do this task: Fan Cowl Panel Latch Adjustment, TASK 71-11-03-700-801-F00.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 71-11-03-410-003-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

FAN COWL PANEL LATCH - ADJUSTMENT/TEST

1. General

A. This procedure has one task:

(1) Fan Cowl Panel Latch Adjustment.

TASK 71-11-03-700-801-F00

2. Fan Cowl Panel Latch Adjustment

(Figure 501)

A. General

(1) This task provides the instructions on how to adjust the fan cowl panel latch.

(2) Latch adjustments are necessary to get the correct clearance at the mating line of the fan cowl panels and to get the correct latch tension.

(a) The clearance adjustment uses laminated washers at each latch position.

(b) The latch tension adjustment gives the correct force to close the latch handle.

(3) Do the latch adjustments in the sequence given.

(4) Do the latch adjustments after the removal or the replacement of these components:

(a) The fan cowl panels

(b) The latches or the latch keepers on the fan cowl panels

(c) The inlet cowl, the thrust reverser or the engine.

(5) The latch adjustments for the fan cowl panels are written with the inlet cowl installed and the thrust reverser closed, latched and correctly adjusted.

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

Reference	Description
STD-1099	Gauge - Push/Pull, Dial, 0-150 Lb Capacity

D. Consumable Materials

Reference	Description	Specification
G02020	Clay, Modeling	

E. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left
424	Engine 2 - Fan Cowl, Right

F. Fan Cowl Panel Latch Clearance Adjustment

SUBTASK 71-11-03-820-001-F00

(1) Do these steps for an initial clearance check:

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

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Apply clay, G02020 to the striker plate and alignment pin flange on each latch keeper housing on the right fan cowl panel (View D-D).

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

1) Engage but do not close the latches.

CAUTION DO NOT USE MORE THAN 60 POUNDS (267 N) OF FORCE TO PUSH THE LATCH HANDLE CLOSED. TOO MUCH FORCE CAN CAUSE DAMAGE TO THE EQUIPMENT.

(d) Put a push/pull gauge (0-150 lbs), STD-1099 approximately 1.0 inch (25.4 mm) from the end of the latch handle and close the latch with a force of 15-25 pounds (67-111 N).

(e) If the force is not 15-25 pounds (67-111 N), do these steps to adjust the latch keepers (Views A-A and B-B):

1) Keep the latch handle open in the free travel position of approximately 15 degrees.

2) Put a 5/32 inch (4 mm) hexagonal wrench into the slots of the latch keeper.

3) Turn the wrench in the aft direction to increase the latch tension or the forward direction to decrease the tension.

(f) Measure the clearance at the mating line between the fan cowl panels at each latch.

1) Make sure that the clearance is 0.120 ± 0.090 inch (3.048 ± 2.286 mm) (VIEW A).

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

(h) Measure the clay at the striker plate and the alignment pin flange at each latch.

1) There must be no measureable clearance between the striker plate and the latch housing or the alignment pin flange and the latch housing.

(i) If there is no clearance, remove the clay from the latch with a clean cotton cloth.

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

2) Do this procedure: Latch Tension Adjustment.

(j) If there is a clearance, continue to the subsequent step.

SUBTASK 71-11-03-820-002-F00

(2) Do these steps to remove the laminated washers [7] from the striker plate [6] at each latch (View D-D):

(a) Remove the nut [9], the washer [8] and the bolt [5] that attach the striker plate [6] to the latch keeper housing.

(b) Remove the striker plate [6] and the laminated washers [7] and keep the laminated washers for the subsequent installation.

(c) Install the striker plate [6], the bolt [5], the washer [8] and the nut [9].

1) Tighten the nut [9] to 18-25 pound-inches (2.03-2.82 Newton-meters).

SUBTASK 71-11-03-820-003-F00

(3) Do these steps to remove the laminated washers [1] from the alignment pin [2] at each latch (View A):

(a) Remove the nut [4] and the washer [3] that attach the alignment pin [2] to the keeper housing.

(b) Remove the alignment pin [2], and the laminated washers [1] and keep the laminated washers for the subsequent installation.

(c) Install the alignment pin [2], the washer [3], and the nut [4].

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1) Tighten the nut [4] to 270-350 pound-inches (30.50-39.54 Newton-meters).

SUBTASK 71-11-03-820-004-F00

(4) Do these steps to find the correct thickness of the washer [1] and the washer [7] to install at each latch.

(a) Apply clay, G02020 to the striker plate and the alignment pin flange.

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

1) Engage the forward and aft latch hooks in the latch keepers.

(c) Adjust the forward and aft latch keepers to get these conditions:

1) A force of 15-25 pounds (67-111 N) to close the latch

2) A clearance of 0.120 ± 0.090 inch (3.048 ± 2.286 mm) at the mating line between the fan cowl panels.

NOTE: A tapered clearance between the fan cowl panels from the forward end to the aft end is permitted.

3) Do these steps for the adjustment:

a) Keep the latch handle open in the free travel position of approximately 15 degrees.

b) Put a 5/32 inch (4 mm) hexagonal wrench into the slots of the keeper.

c) Turn the wrench in the aft direction to increase the latch tension or the forward direction to decrease the tension.

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

(e) Measure the thickness of the clay at the striker plate and alignment pin flange at each latch.

1) This is the correct thickness of laminated washer [1] and the washer [7] to install.

SUBTASK 71-11-03-820-005-F00

(5) Do these steps to install the correct thickness of laminated washer [1] and the washer [7] at the striker plate [6] and the alignment pin [2] at each latch (View D-D):

(a) Remove the clay from the striker plate, alignment pin flange, and latch keeper housing with a clean cotton cloth.

(b) Remove the nut [9], the washer [8], the bolt [5], and the striker plate [6].

(c) Adjust the quantity of the laminated washer [1] and the washer [7] to agree with the correct thickness that you found.

(d) Install the striker plate [6], laminated washers [7], and bolt [5] with the laminated washers between the striker plate and the keeper housing.

(e) Install the washer [8] and the nut [9].

NOTE: Put laminated washers or equivalent washers between the keeper housing and the nut to keep the correct fastener grip length.

1) Tighten the nut [9] to 18-25 pound-inches (2.03-2.82 Newton-meters).

(f) Remove the nut [4], the washer [3], and the alignment pin [2].

(g) Install the necessary laminated washers [1] and the alignment pin [2] with the laminated washers between the pin flange and the keeper housing.

(h) Install the washer [3] and the nut [4].

NOTE: Put laminated washers or equivalent washers between the keeper housing and the nut to keep the correct fastener grip length.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Tighten the nut [4] to 270-350 pound-inches (30.50-39.54 Newton-meters).

SUBTASK 71-11-03-410-001-F00

(6) Do these steps for a clearance check of the washer installation:

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

1) Engage the latch hooks in the keepers in this sequence:

a) Engage the center latch hook.

b) Engage the forward latch hook.

c) Engage the aft latch hook.

(b) Make sure that the striker plate and the alignment pin flange touch fully with the latch housings at each latch.

1) If there is a clearance at one or more positions, do these steps again:

a) Remove the laminated washers.

b) Find the correct thickness of washers with clay.

c) Install the laminated washers.

d) Do the clearance check of the washer installation.

2) If there are no clearances, do this procedure: Latch Tension Adjustment.

G. Fan Cowl Panel Latch Tension Adjustment

SUBTASK 71-11-03-820-006-F00

CAUTION

DO NOT USE MORE THAN 60 POUNDS (267 N) OF FORCE TO PUSH THE LATCH HANDLE CLOSED. TOO MUCH FORCE CAN CAUSE DAMAGE TO THE EQUIPMENT.

(1) Do these steps to adjust the latch tension:

(a) Disengage one of the three latches.

(b) Put a push/pull gauge (0-150 lbs), STD-1099 approximately 1.0 inch (25.4 mm) from the end of the latch handle and close the latch with a force of 40-60 pounds (178-267 N).

1) If it is necessary, adjust the latch keeper to get the correct force on the latch handle.

a) Keep the latch handle open in the free travel position of approximately 15 degrees.

b) Put a 5/32 inch (4 mm) hexagonal wrench into the slots of the keeper.

c) Turn the wrench in the aft direction to increase the latch tension or the forward direction to decrease the tension.

2) Adjust the latch tension for the remaining latches.

NOTE: Make sure the trigger lock of the latch handle engages to hold the handle in the closed position.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Fan Cowl Panel Latch Adjustment
Figure 501/71-11-03-990-803-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Fan Cowl Panel Latch Adjustment
Figure 501/71-11-03-990-803-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

IDG ACCESS DOOR - MAINTENANCE PRACTICES

1. General

A. This procedure has two tasks:

(1) IDG Access Door Latch Removal

(2) IDG Access Door Latch Installation.

TASK 71-11-04-900-801-F00

2. IDG Access Door Latch Removal

(Figure 201)

A. General

(1) This task provides the instructions on how to remove the IDG access door latch (referred to as the latch).

(2) The IDG access door (referred to as the door) is on the left fan cowl panel.

B. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

C. Access Panels

Number	Name/Location
413AL	IDG Access Door, Engine 1
423AL	IDG Access Door, Engine 2

D. Prepare for the Removal

SUBTASK 71-11-04-010-004-F00

(1) Open the applicable door:

Number	Name/Location
413AL	IDG Access Door, Engine 1

or open this access panel:

Number	Name/Location
423AL	IDG Access Door, Engine 2

(a) Push the larger end of the latches into the door to open the latches.

(b) Pull the door down to the fully open position.

E. IDG Access Door Latch Removal

SUBTASK 71-11-04-020-001-F00

(1) Remove each latch [3] as follows:

(a) Remove the four nuts [1] and pins [4] that attach the latch to the door.

(b) Remove the latch [3].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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IDG Access Door Latch Installation
Figure 201/71-11-04-990-802-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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IDG Access Door Latch Installation
Figure 201/71-11-04-990-802-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-04-400-802-F00

3. IDG Access Door Latch Installation

(Figure 201)

A. General

(1) This task provides the instructions on how to install the IDG access door latch (referred to as the latch).

(2) The IDG access door (referred to as the door) is on the left fan cowl panel.

B. References

Reference	Title
71-11-04-820-802-F00	IDG Access Door Free Play Adjustment (P/B 501)

C. Tools/Equipment

Reference	Description
STD-442	Gun - Heat, 180 deg. F (82 deg. C) Maximum Output Temperature

D. Consumable Materials

Reference	Description	Specification
A00247	Sealant - Pressure And Environmental - Chromate Type	BMS5-95
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
3	Latch	71-11-02-10-135	LOM ALL

F. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

G. Access Panels

Number	Name/Location
413AL	IDG Access Door, Engine 1
423AL	IDG Access Door, Engine 2

H. IDG Access Door Latch Installation

SUBTASK 71-11-04-860-001-F00

(1) Apply two layers of primer, C00259, to the mating surfaces of the latch [3].

(a) Dry the primer for five minutes with the 180 deg. F (82 deg. C) maximum output temperature heat gun, STD-442.

SUBTASK 71-11-04-860-002-F00

(2) Put the latch [3] in the door and align the bolt holes.

SUBTASK 71-11-04-640-002-F00

(3) Apply a layer of sealant, A00247, to the bottom side of the heads of the four pins [4].

SUBTASK 71-11-04-420-003-F00

(4) Install the four pins [4] and nuts [1].

(a) Tighten the nuts [1] to 10.5 ±0.5 in-lb (1.19 ±0.06 N·m).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Clean all unwanted sealant from the head of the pins and the outer surface of the door.

SUBTASK 71-11-04-820-003-F00

(5) Make sure that the latch is smooth with the outer surface of the door in 0.000 ±0.030 in. (0.000 ±0.762 mm).

(a) If the latch is not in the limits, replace the latch.

SUBTASK 71-11-04-820-004-F00

(6) Measure the distance between the latch [3] and latch cut-out in the door (View A-A, Figure 201).

(a) If the distance is not correct, adjust the latch [3] as follows:

1) Loosen the four nuts [1].

2) Set the latch [3] for the correct distance.

3) Tighten the four nuts [1] to 10.5 ±0.5 in-lb (1.19 ±0.06 N·m).

SUBTASK 71-11-04-410-007-F00

(7) Close the applicable door:

Number	Name/Location
413AL	IDG Access Door, Engine 1

or close this access panel:

Number	Name/Location
423AL	IDG Access Door, Engine 2

(a) Make sure that the latches are in the fully open position.

(b) Close the door.

(c) Push the middle of each latch into the door to close the latch.

I. IDG Access Door Latch Adjustment

SUBTASK 71-11-04-820-005-F00

(1) Do this task: IDG Access Door Free Play Adjustment, TASK 71-11-04-820-802-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

IDG ACCESS DOOR - REMOVAL/INSTALLATION

1. **General**

A. This procedure has two tasks:

(1) IDG Access Door Removal

(2) IDG Access Door Installation.

TASK 71-11-04-000-801-F00

2. **IDG Access Door Removal**

(Figure 401)

A. General

(1) This task provides the instructions on how to remove the IDG access door (referred to as the door) from the left fan cowl panel.

(2) The applicable door is identified below in the Access Panels list.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

D. Access Panels

Number	Name/Location
413AL	IDG Access Door, Engine 1
423AL	IDG Access Door, Engine 2

E. Prepare for the Removal

SUBTASK 71-11-04-010-005-F00

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

SUBTASK 71-11-04-010-006-F00

(2) Open the applicable door:

Number	Name/Location
413AL	IDG Access Door, Engine 1

or open this access panel:

Number	Name/Location
423AL	IDG Access Door, Engine 2

(a) Push the larger end of each latch into the door to open the latches.

(b) Pull the door down to the fully open position.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

F. IDG Access Door Removal

SUBTASK 71-11-04-020-002-F00

(1) Remove the door [3] as follows:

NOTE: You can find more than one spacer [5] with the bolts and nuts at the hinge. These spacers are necessary to align the door in the middle of its opening. Make sure to keep the spacers, because you will use the spacers in the correct quantity to install the door.

(a) Remove the nut [1], the washers [2], the spacers [5], the bushing [4], the bushing [6], the bushing [8], and the bolt [7] at each door hinge.

1) If you will re-install the same door, record the number and the location of the spacers [5] that you remove.

(b) Remove the door [3].

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

IDG Access Door Installation
Figure 401/71-11-04-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-04-400-801-F00

3. IDG Access Door Installation

(Figure 401)

A. General

(1) This task provides the instructions on how to install the IDG access door (referred to as the door) on the left fan cowl panel.

(2) The applicable door is identified below in the Access Panels list.

B. References

Reference	Title
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
71-11-04-820-801-F00	IDG Access Door Adjustment (P/B 501)
71-11-04-820-802-F00	IDG Access Door Free Play Adjustment (P/B 501)

C. Consumable Materials

Reference	Description	Specification
D00633	Grease - Aircraft General Purpose	BMS3-33

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
3	Door	71-11-02-10-133	LOM ALL

E. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

F. Access Panels

Number	Name/Location
413AL	IDG Access Door, Engine 1
423AL	IDG Access Door, Engine 2

G. IDG Access Door Installation

SUBTASK 71-11-04-210-001-F00

(1) Examine the stops for worn areas or deterioration.

(a) Replace the stops if damage is found.

SUBTASK 71-11-04-210-002-F00

(2) Examine the bushing [4], bushing [6], and bushing [8] for worn areas.

(a) Replace the bushings if worn areas are found.

SUBTASK 71-11-04-640-001-F00

(3) Lubricate the bolts [7] with grease, D00633.

SUBTASK 71-11-04-700-001-F00

(4) Do these steps to install the door [3].

(a) Put the door [3] in the opening of the fan cowl panel and align the bolt holes at the hinges.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Install the bolt [7], bushing [4], bushing [6], bushing [8], spacers [5], washers [2], and nut [1] at each hinge.

NOTE: If you re-install the same door, install the same number of the spacers in the same location that you recorded in the removal task.

1) Tighten the nuts [1] with your hand.

> **CAUTION**
> DO NOT APPLY MORE THAN 40 POUND-INCHES (4.52 NEWTON METERS) TORQUE ON THE NUT. IF MORE TORQUE IS APPLIED, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(c) Tighten the nuts [1] to the correct torque.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 71-11-04-410-006-F00

(1) Close the applicable access door:

Number	Name/Location
413AL	IDG Access Door, Engine 1

or close this access panel:

Number	Name/Location
423AL	IDG Access Door, Engine 2

(a) Make sure that the latches are in the fully open position and close the door.

(b) Push the middle of the latches into the door, to close the latches.

I. IDG Access Door Adjustment

SUBTASK 71-11-04-410-005-F00

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

SUBTASK 71-11-04-700-002-F00

(2) Do this task: IDG Access Door Adjustment, TASK 71-11-04-820-801-F00.

SUBTASK 71-11-04-700-003-F00

(3) Do this task: IDG Access Door Free Play Adjustment, TASK 71-11-04-820-802-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

IDG ACCESS DOOR - ADJUSTMENT/TEST

1. **General**

A. This procedure has two tasks:

(1) IDG Access Door Adjustment

(2) IDG Access Door Free Play Adjustment.

TASK 71-11-04-820-801-F00

2. **IDG Access Door Adjustment**

(Figure 501)

A. General

(1) This task provides the instructions on how to adjust the IDG access door (referred to as the door) with its opening in the left fan cowl panel.

(a) The adjustments are for the correct edge clearances and the aerosmoothness of the door.

(2) This procedure is necessary after the removal or the replacement of the door.

B. References

Reference	Title
71-11-04-000-801-F00	IDG Access Door Removal (P/B 401)
71-11-04-400-801-F00	IDG Access Door Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-1107	Gauge - Feeler, 0.0 - 0.5 Inch, Readable to 1/1000th

D. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

E. Access Panels

Number	Name/Location
413AL	IDG Access Door, Engine 1
423AL	IDG Access Door, Engine 2

F. IDG Access Door Adjustment

SUBTASK 71-11-04-410-001-F00

(1) Close the applicable access door:

Number	Name/Location
413AL	IDG Access Door, Engine 1

or close this access panel:

Number	Name/Location
423AL	IDG Access Door, Engine 2

(a) Make sure that the latches are in the fully open position and close the door.

(b) Push the middle of the latches into the door, to close the latches.

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SUBTASK 71-11-04-220-001-F00

(2) Measure the clearance between the door and the fan cowl panel at the forward and aft edges with a 0.0 - 0.5 Inch feeler gauge, STD-1107 (View B).

(a) Make sure that the clearance is 0.060 ± 0.030 inch (1.524 ± 0.762 mm).

(b) If the clearance is not correct, do these steps to adjust the clearance:

1) Do this task: IDG Access Door Removal, TASK 71-11-04-000-801-F00.

2) Record the number and the location of the spacers that you remove from between the bushings.

3) Add or remove the spacers between the bushings to get the clearances equal and in the limits.

4) Do this task: IDG Access Door Installation, TASK 71-11-04-400-801-F00.

SUBTASK 71-11-04-220-002-F00

(3) Measure the clearance between the door and the fan cowl panel at the top and bottom edges with the gage.

(a) Make sure that the clearance is 0.060 ± 0.030 inch (1.524 ± 0.762 mm).

SUBTASK 71-11-04-220-003-F00

(4) Make sure that the edges of the door are smooth with the outer surface of the fan cowl panel at 0.00 ± 0.030 inch (0.762 mm).

(a) If the door is not in the limits, replace the door (TASK 71-11-04-000-801-F00 and TASK 71-11-04-400-801-F00).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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IDG Access Door Adjustment
Figure 501/71-11-04-990-801-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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IDG Access Door Adjustment
Figure 501/71-11-04-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-04-820-802-F00

3. IDG Access Door Free Play Adjustment

(Figure 501)

A. General

(1) This task provides the instructions on how to do the free play adjustment of the IDG access door (referred to as the door) with its opening in the left fan cowl panel.

(a) The adjustments are for a tight fit with the latches locked.

(2) This procedure is necessary after the removal or the replacement of the door or the latches.

B. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

C. Access Panels

Number	Name/Location
413AL	IDG Access Door, Engine 1
423AL	IDG Access Door, Engine 2

D. IDG Access Door Free Play Adjustment

SUBTASK 71-11-04-410-002-F00

(1) Close the applicable access door:

Number	Name/Location
413AL	IDG Access Door, Engine 1

or close this access panel:

Number	Name/Location
423AL	IDG Access Door, Engine 2

(a) Make sure that the latches are in the fully open position and close the door.

(b) Push the middle of the latches into the door, to close the latches.

SUBTASK 71-11-04-820-001-F00

(2) Examine the door for a tight fit, make sure that there is no free play with the latches fully locked.

(a) If there is play, do these steps to adjust the latches:

1) Open the door.

2) Do these steps to remove the three striker plates [1]:

a) Center punch the four rivets on the striker plate.

b) Drill out the rivets with a 5/32-inch bit.

c) Remove the striker plate [1].

3) Install the new striker plates [1] with new rivets.

(b) Close the applicable door.

(c) Make sure that the edges of the door are smooth with the outer surface of the fan cowl panel.

1) The limits are 0.00 ±0.030 inch (0.762 mm).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OIL TANK ACCESS DOOR - MAINTENANCE PRACTICES

1. **General**

A. This procedure has two tasks:

(1) Oil Tank Access Door Latch Removal

(2) Oil Tank Access Door Latch Installation.

TASK 71-11-05-900-801-F00

2. **Oil Tank Access Door Latch Removal**

(Figure 201)

A. General

(1) This task provides the instructions on how to remove the oil tank access door latch (referred to as the latch).

(2) The oil tank access door (referred to as the door) is on the right fan cowl panel.

B. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
424	Engine 2 - Fan Cowl, Right

C. Access Panels

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1
424AR	Oil Tank Access Door, Engine 2

D. Oil Tank Access Door Latch Removal

SUBTASK 71-11-05-010-003-F00

(1) Open the applicable door:

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1

or open this door:

Number	Name/Location
424AR	Oil Tank Access Door, Engine 2

(a) Push the larger end of the latches into the door to open the latches.

(b) Pull the door out to the fully open position.

SUBTASK 71-11-05-020-002-F00

(2) Remove each latch [1] as follows:

(a) Remove the four nuts [2] and the pins [3] that attach the latch [1]to the door.

(b) Remove the latch [1].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Oil Tank Access Door Latch Installation
Figure 201/71-11-05-990-802-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B

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Oil Tank Access Door Latch Installation
Figure 201/71-11-05-990-802-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-05-400-802-F00

3. Oil Tank Access Door Latch Installation

(Figure 201)

A. General

(1) This task provides the instructions on how to install the oil tank access door latch (referred to as the latch).

(2) The oil tank access door (referred to as the door) is on the right fan cowl panel.

B. References

Reference	Title
71-11-05-820-802-F00	Oil Tank Access Door Free Play Adjustment (P/B 501)

C. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
424	Engine 2 - Fan Cowl, Right

D. Access Panels

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1
424AR	Oil Tank Access Door, Engine 2

E. Oil Tank Access Door Latch Installation

SUBTASK 71-11-05-420-001-F00

(1) Do these steps to install each latch [1]:

(a) Put the latch [1] in the door and align the bolt holes.

(b) Install the four pins [3] and the nuts [2].

F. Oil Tank Access Door Latch Adjustment

SUBTASK 71-11-05-820-005-F00

(1) Make sure that the latch is smooth with the outer surface of the door in 0 ± 0.030 in. (0.762 mm).

(a) If the latch [1] is not in the limits, replace the latch.

SUBTASK 71-11-05-820-006-F00

(2) Measure the distance between the latch [1] and the latch cut-out in the door (View A-A).

(a) If the distance is not correct, adjust the latch as follows:

1) Loosen the four nuts [2].

2) Set the latch for the correct distance.

3) Tighten the four nuts [2].

a) Torque the four nuts [2] to 10 in-lb (1.1 N·m) - 11 in-lb (1.2 N·m)

SUBTASK 71-11-05-410-007-F00

(3) Close the applicable door:

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1

ECCN 9E991 BOEING PROPRIETARY - See title page for details

or close this door:

Number	Name/Location
424AR	Oil Tank Access Door, Engine 2

(a) Make sure that the latches are in the fully open position.

(b) Close the door.

(c) Push the middle of each latch into the door to close the latch.

SUBTASK 71-11-05-820-007-F00

(4) Examine the door for a tight fit.

(a) Make sure that there is no free play with the latches fully locked.

(b) If there is free play, do this task: Oil Tank Access Door Free Play Adjustment, TASK 71-11-05-820-802-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

OIL TANK ACCESS DOOR - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) Oil Tank Access Door Removal

(2) Oil Tank Access Door Installation.

TASK 71-11-05-000-801-F00

2. Oil Tank Access Door Removal

(Figure 401)

A. General

(1) This task provides the instructions on how to remove the oil tank access door (referred to as the door) from the right fan cowl panel.

(2) The applicable door is identified in the Access Panels list.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
424	Engine 2 - Fan Cowl, Right

D. Access Panels

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1
424AR	Oil Tank Access Door, Engine 2

E. Prepare for the Removal

SUBTASK 71-11-05-010-005-F00

(1) Open the applicable doors:

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1
424AR	Oil Tank Access Door, Engine 2

(a) Push the larger end of each latch into the door to open the latches.

(b) Pull the door to the fully open position.

SUBTASK 71-11-05-010-006-F00

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

F. Oil Tank Access Door Removal

SUBTASK 71-11-05-020-001-F00

(1) Remove the door [1] as follows:

NOTE: You can find more than one spacer [5] with the bolts and nuts at the hinge. These spacers are necessary to align the door in the middle of its opening. Make sure to keep the spacers, because you will use the spacers in the correct quantity to install the door.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Remove the nut [8], the washer [7], the bushing [3], the bushing [4] and the bushing [6], the spacers [5], and the bolt [2] at each door hinge.

1) If you will re-install the same door, record the number and location of the spacers [5] that you remove.

(b) Remove the door [1].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Oil Tank Access Door Installation
Figure 401/71-11-05-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-05-400-801-F00

3. Oil Tank Access Door Installation

(Figure 401)

A. General

(1) This task provides the instructions on how to install the oil tank access door (referred to as the door) on the right fan cowl panel.

(2) The applicable door is identified in the Access Panels list.

B. References

Reference	Title
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
71-11-05-820-801-F00	Oil Tank Access Door Adjustment (P/B 501)
71-11-05-820-802-F00	Oil Tank Access Door Free Play Adjustment (P/B 501)

C. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Door	71-11-02-10A-372	LOM ALL

D. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
424	Engine 2 - Fan Cowl, Right

E. Access Panels

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1
424AR	Oil Tank Access Door, Engine 2

F. Oil Tank Access Door Installation

SUBTASK 71-11-05-210-001-F00

(1) Examine the stops for worn areas or deterioration.

(a) Replace the stops, if there is damage.

SUBTASK 71-11-05-210-002-F00

(2) Examine the bushing [3], the bushing [4] and the bushing [6] for worn areas.

(a) Replace the bushings, if there are worn areas.

SUBTASK 71-11-05-700-001-F00

(3) Install the door [1] as follows.

(a) Put the door [1] in the opening of the fan cowl panel and align the bolt holes at the hinges.

(b) Install the bolt [2], the bushing [3], the bushing [4] and the bushing [6], the spacers [5], the washers [7], and the nut [8] at each hinge.

NOTE: If you re-install the same door, install the same number of the spacers [5] in the same location that you recorded in the removal task.

1) Tighten the nuts [8] with your hand.

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> **CAUTION** DO NOT USE MORE THAN 40 POUND-INCHES (4.52 NEWTON METERS) TORQUE ON THE NUT TO PREVENT DAMAGE TO THE EQUIPMENT.

(c) Tighten the nuts [8] to the correct torque.

G. Put the Airplane Back to its Usual Condition

SUBTASK 71-11-05-410-006-F00

(1) Close the applicable access door:

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1

or close this access door:

Number	Name/Location
424AR	Oil Tank Access Door, Engine 2

(a) Make sure that the latches are in the fully open position and close the door.

(b) Push the middle of the latches into the door, to close the latches.

H. Oil Tank Access Door Adjustment

SUBTASK 71-11-05-820-001-F00

(1) Do this task: Oil Tank Access Door Adjustment, TASK 71-11-05-820-801-F00.

SUBTASK 71-11-05-820-002-F00

(2) Do this task: Oil Tank Access Door Free Play Adjustment, TASK 71-11-05-820-802-F00.

SUBTASK 71-11-05-410-002-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

OIL TANK ACCESS DOOR - ADJUSTMENT/TEST

1. General

A. This procedure has two tasks:

(1) Oil Tank Access Door Adjustment

(2) Oil Tank Access Door Free Play Adjustment.

TASK 71-11-05-820-801-F00

2. Oil Tank Access Door Adjustment

(Figure 501)

A. General

(1) This task provides the instructions on how to adjust the oil tank access door (referred to as the door) with its opening in the right fan cowl panel.

(a) The adjustments are for the correct edge clearances and the aerosmoothness of the door.

(2) This procedure is necessary after the removal or the replacement of the door.

B. References

Reference	Title
71-11-05-000-801-F00	Oil Tank Access Door Removal (P/B 401)
71-11-05-400-801-F00	Oil Tank Access Door Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-1107	Gauge - Feeler, 0.0 - 0.5 Inch, Readable to 1/1000th

D. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
424	Engine 2 - Fan Cowl, Right

E. Access Panels

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1
424AR	Oil Tank Access Door, Engine 2

F. Oil Tank Access Door Adjustment

SUBTASK 71-11-05-410-004-F00

(1) Do this step;

Close the applicable access door:

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1

or close this access door:

Number	Name/Location
424AR	Oil Tank Access Door, Engine 2

(a) Make sure that the latches are in the fully open position and close the door.

(b) Push the middle of the latches into the door, to close the latches.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-11-05-220-001-F00

(2) Measure the clearance between the door and the fan cowl panel at the top and bottom edges with a 0.0 - 0.5 Inch feeler gauge, STD-1107.

(a) Make sure that the clearance is 0.060 -0.050/+0.030 inch (1.524 -1.270/+0.762 mm).

(b) If the clearance is not correct, do these steps to adjust the clearance:

1) Do this task: Oil Tank Access Door Removal, TASK 71-11-05-000-801-F00.

2) Record the number and the location of the spacers that you remove from between the hinges and the bushings.

3) Add or remove the spacers between the hinge brackets and the bushings to get the clearances to be equal and in the limits.

4) Do this task: Oil Tank Access Door Installation, TASK 71-11-05-400-801-F00.

SUBTASK 71-11-05-220-002-F00

(3) Measure the clearance between the door and the fan cowl panel at the forward and aft edges with the gage.

(a) Make sure that the clearance is 0.120 ±0.030 inch (3.048 ±0.762 mm) for the forward edge.

(b) Make sure that the clearance is 0.060 -0.050/+0.030 inch (1.524 -1.270/+0.762 mm) for the aft edge.

(c) If the clearances are not correct, replace the door (TASK 71-11-05-000-801-F00 and TASK 71-11-05-400-801-F00).

SUBTASK 71-11-05-220-003-F00

(4) Make sure that the edges of the door are smooth with the outer surface of the fan cowl panel at 0.00 ±0.030 inch (0.762 mm).

(a) If the door is out of limits, adjust the door as follows:

1) Open the door.

2) Add or remove the shims [6] below the hinge brackets [5].

3) Add or remove the shims [2] below the striker plates [1].

4) Close the door.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Oil Tank Access Door Adjustment
Figure 501/71-11-05-990-803-F00 (Sheet 1 of 2)

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Oil Tank Access Door Adjustment
Figure 501/71-11-05-990-803-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-05-820-802-F00

3. **Oil Tank Access Door Free Play Adjustment**
(Figure 501)

A. **General**

(1) This task provides the instructions on how to do the free play adjustment of the oil tank access door (referred to as the door) with its opening in the right fan cowl panel.

(a) The adjustments are for a tight fit with locked latches.

(2) This procedure is necessary after the removal or the replacement of the door or the latches.

B. **Location Zones**

Zone	Area
414	Engine 1 - Fan Cowl, Right
424	Engine 2 - Fan Cowl, Right

C. **Access Panels**

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1
424AR	Oil Tank Access Door, Engine 2

D. **Oil Tank Access Door Free Play Adjustment**

SUBTASK 71-11-05-410-005-F00

(1) Do this step;

Close the applicable access door:

Number	Name/Location
414AR	Oil Tank Access Door, Engine 1

or close this access door:

Number	Name/Location
424AR	Oil Tank Access Door, Engine 2

(a) Make sure that the latches are in the fully open position and close the door.

(b) Push the middle of the latches into the door, to close the latches.

SUBTASK 71-11-05-820-004-F00

(2) Examine the door for a tight fit, make sure that there is no free play with the latches fully locked.

(a) If there is play, do these steps to adjust the latches:

1) Open the door.

2) Do these steps to remove the two striker plates [1]:

a) Remove the two nuts [3] and pins [4] that attach the striker plate to the door.

b) Remove the striker plate [1].

c) Remove the shim [2].

3) Adjust the thickness of the shim [2] to remove the free play.

4) Do these steps to install the two striker plates [1]:

a) Install the two pins [4], the shims [2], the striker plate [1] and the two nuts [3].

b) Tighten the nuts [3].

(b) Close the door.

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(c) Make sure that the edges of the door are smooth with the outer surface of the fan cowl panel.

1) The limits are 0.00 ±0.030 inch (0.762 mm).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

T12 ACCESS/PRESSURE RELIEF DOOR - MAINTENANCE PRACTICES

1. **General**

A. This procedure has two tasks:

(1) T12 Access/Pressure Relief Door Latch Removal

(2) T12 Access/Pressure Relief Door Latch Installation.

TASK 71-11-06-900-801-F00

2. **T12 Access/Pressure Relief Door Latch Removal**

(Figure 201)

A. General

(1) This task provides the instructions on how to remove the T12 access/pressure relief door latch (referred to as the latch).

(2) The T12 access/pressure relief door (referred to as the door) is on the right side of the inlet cowl.

B. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

C. Access Panels

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

D. Prepare for the Removal

SUBTASK 71-11-06-010-005-F00

(1) Open the applicable doors:

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

(a) Put a screwdriver blade into the latch button slot.

(b) Move the latch button up to release the latch.

(c) Open the door.

E. T12 Access/Pressure Relief Door Latch Removal

SUBTASK 71-11-06-020-002-F00

(1) Remove the latch [3] as follows:

(a) Remove the four nuts [1], the washers [2], and the bolts [4] that attach the latch to the door.

(b) Remove the latch [3].

END OF TASK

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T12 Access/Pressure Relief Door Latch Installation
Figure 201/71-11-06-990-802-F00

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TASK 71-11-06-400-802-F00

3. **T12 Access/Pressure Relief Door Latch Installation**
(Figure 201)

A. **General**

(1) This task provides the instructions on how to install the T12 access/pressure relief door latch (referred to as the latch).

(2) The T12 access/pressure relief door (referred to as the door) is on the right side of the inlet cowl.

B. **References**

Reference	Title
71-11-06-820-802-F00	T12 Access/Pressure Relief Door Free Play Adjustment (P/B 501)
71-11-06-820-803-F00	T12 Access/Pressure Relief Door Latch Release Test (P/B 501)

C. **Expendables/Parts**

AMM Item	Description	AIPC Reference	AIPC Effectivity
3	Latch	71-11-01-02-115	LOM ALL

D. **Location Zones**

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

E. **Access Panels**

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

F. **T12 Access/Pressure Relief Door Latch Installation**

SUBTASK 71-11-06-420-004-F00

(1) Install the latch [3] as follows:

(a) Put the latch [3] on the door and align the bolt holes.

(b) Install the four bolts [4], the washers [2], and the nuts [1].

(c) Tighten the nuts [1].

G. **Put the Airplane Back to its Usual Condition**

SUBTASK 71-11-06-410-007-F00

(1) Close the applicable doors:

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

(a) Make sure that the latch is in the fully open position and close the door.

(b) Push the latch button into the door until the latch button is smooth with the door.

SUBTASK 71-11-06-820-008-F00

(2) Make sure that the latch button is smooth with the outer surface of the door at 0.0 ±0.030 inch (±0.762 mm).

(a) If the latch is not in the limits, replace the latch.

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SUBTASK 71-11-06-820-011-F00

(3) Make sure that the clearance between the latch button and the door is constant (View A-A).

(a) If the latch is not in the limits, do these steps:

1) Loosen the nuts [1].

2) Adjust the latch position for the correct clearance.

3) Tighten the nuts 15].

SUBTASK 71-11-06-210-003-F00

(4) Examine the door for a tight fit.

(a) Make sure that there is no free play with the latch fully locked.

(b) If there is free play, do this task: T12 Access/Pressure Relief Door Free Play Adjustment, TASK 71-11-06-820-802-F00.

H. T12 Access/Pressure Relief Door Latch Test

SUBTASK 71-11-06-820-010-F00

(1) Do this task: T12 Access/Pressure Relief Door Latch Release Test, TASK 71-11-06-820-803-F00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

T12 ACCESS/PRESSURE RELIEF DOOR - REMOVAL/INSTALLATION

1. **General**

A. This procedure has two tasks:

(1) T12 Access/Pressure Relief Door Removal

(2) T12 Access/Pressure Relief Door Installation.

TASK 71-11-06-000-801-F00

2. **T12 Access/Pressure Relief Door Removal**

(Figure 401)

A. General

(1) This task provides the instructions on how to remove the T12 access/pressure-relief door (referred to as the door) from the right side of the inlet cowl.

(2) The applicable door is identified in the Access Panels list.

B. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

C. Access Panels

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

D. Prepare for the Removal

SUBTASK 71-11-06-010-004-F00

(1) Open the applicable door:

Number	Name/Location
412AR	T12 Access Door, Engine 1

or open this access door:

Number	Name/Location
422AR	T12 Access Door, Engine 2

(a) Put a screwdriver blade into the latch button slot.

(b) Move the latch button up to release the latch.

(c) Open the door.

E. T12 Access/Pressure Relief Door Removal

SUBTASK 71-11-06-020-001-F00

(1) Remove the door [6] as follows:

NOTE: You can find more than one spacer [8] with the bolts and nuts at the hinge. These spacers are necessary to align the door in the middle of its opening. Make sure to keep the spacers, because you will use the spacers in the correct quantity to install the door.

(a) Remove the nut [1], the washers [2], the spacers [8], the bushing [3], the bushing [4], and the bushing [9], and the bolt [5] at each door hinge.

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1) If you will re-install the same door, record the number and location of the spacers [8] that you remove.

(b) Remove the door [6].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

T12 Access/Pressure Relief Door Installation
Figure 401/71-11-06-990-801-F00

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TASK 71-11-06-400-801-F00

3. **T12 Access/Pressure Relief Door Installation**
(Figure 401)

A. **General**

(1) This task provides the instructions on how to install the T12 access/pressure-relief door (referred to as the door) on the right side of the inlet cowl.

(2) The applicable door is identified in the Access Panels list.

B. **References**

Reference	Title
71-11-06-820-801-F00	T12 Access/Pressure Relief Door Adjustment (P/B 501)
71-11-06-820-802-F00	T12 Access/Pressure Relief Door Free Play Adjustment (P/B 501)
71-11-06-820-803-F00	T12 Access/Pressure Relief Door Latch Release Test (P/B 501)

C. **Expendables/Parts**

AMM Item	Description	AIPC Reference	AIPC Effectivity
6	Door	71-11-01-02-110	LOM ALL

D. **Location Zones**

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

E. **Access Panels**

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

F. **T12 Access/Pressure Relief Door Installation**

SUBTASK 71-11-06-210-001-F00

(1) Examine the stops [7] for worn areas or deterioration.

(a) Replace the stops, if there is damage.

SUBTASK 71-11-06-210-002-F00

(2) Examine the bushing [3], the bushing [4], and the bushing [9] for worn areas.

(a) Replace the bushings, if there are worn areas.

SUBTASK 71-11-06-420-001-F00

(3) Install the door [6] as follows:

(a) Put the door [6] in the opening on the inlet cowl and align the bolt holes at the hinges.

(b) Install the bolt [5], the bushing [3], the bushing [4], the bushing [9], the spacers [8], the washers [2], and the nut [1] at each hinge.

NOTE: If you re-install the same door, install the number of the spacers [8] in the same location as you recorded in the removal task.

1) Tighten the nuts [1] with your hand.

2) Tighten the nuts [1] to the correct torque.

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G. Put the Airplane Back to its Usual Condition

SUBTASK 71-11-06-410-006-F00

(1) Close the applicable door:

Number	Name/Location
412AR	T12 Access Door, Engine 1

or close this access door:

Number	Name/Location
422AR	T12 Access Door, Engine 2

(a) Make sure that the latch is in the fully open position and close the door.

(b) Push the latch button into the door until the latch button is smooth with the door.

H. T12 Access/Pressure Relief Door Adjustment

SUBTASK 71-11-06-820-001-F00

(1) Do this task: T12 Access/Pressure Relief Door Adjustment, TASK 71-11-06-820-801-F00.

SUBTASK 71-11-06-820-002-F00

(2) Do this task: T12 Access/Pressure Relief Door Free Play Adjustment, TASK 71-11-06-820-802-F00.

SUBTASK 71-11-06-820-003-F00

(3) Do this task: T12 Access/Pressure Relief Door Latch Release Test, TASK 71-11-06-820-803-F00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

T12 ACCESS/PRESSURE RELIEF DOOR - ADJUSTMENT/TEST

1. General

A. This procedure has these tasks:

(1) T12 Access/Pressure Relief Door Adjustment

(2) T12 Access/Pressure Relief Door Free Play Adjustment

(3) T12 Access/Pressure Relief Door Latch Release Test.

TASK 71-11-06-820-801-F00

2. T12 Access/Pressure Relief Door Adjustment

(Figure 501)

A. General

(1) This task provides the instructions on how to adjust the T12 access/pressure-relief door (referred to as the door) with its opening in the right side of the inlet cowl.

(a) The adjustments are for the correct edge clearances and the aerosmoothness of the door.

(2) This procedure is necessary after the removal or the replacement of the door.

B. References

Reference	Title
71-11-06-000-801-F00	T12 Access/Pressure Relief Door Removal (P/B 401)
71-11-06-400-801-F00	T12 Access/Pressure Relief Door Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-1107	Gauge - Feeler, 0.0 - 0.5 Inch, Readable to 1/1000th

D. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

E. Access Panels

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

F. Prepare for the Adjustment

SUBTASK 71-11-06-410-003-F00

(1) Close the applicable access door:

Number	Name/Location
412AR	T12 Access Door, Engine 1

or close this access door:

Number	Name/Location
422AR	T12 Access Door, Engine 2

(a) Make sure that the latch is in the fully open position and close the door.

(b) Push the latch button into the door until the latch button is smooth with the door.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G. T12 Access/Pressure Relief Door Adjustment

SUBTASK 71-11-06-220-001-F00

(1) Measure the clearance between the door and the inlet cowl at the top and bottom edges with a 0.0 - 0.5 Inch feeler gauge, STD-1107.

(a) Make sure that the clearance is 0.060 ± 0.030 inch (1.524 ±0.762 mm).

(b) If the clearance is not correct, do these steps to adjust the clearance:

1) Do this task: T12 Access/Pressure Relief Door Removal, TASK 71-11-06-000-801-F00.

a) Record the number and the location of the spacers installed between the bushings.

2) Add or remove the spacers between the bushings to keep the clearances equal and in the limits.

3) Do this task: T12 Access/Pressure Relief Door Installation, TASK 71-11-06-400-801-F00.

SUBTASK 71-11-06-220-002-F00

(2) Measure the clearance between the door and the inlet cowl at the forward and aft edges with the gage.

(a) Make sure that the clearance is 0.060 ± 0.030 inch (1.524 ±0.762 mm).

1) If the clearance is not correct, replace the door (TASK 71-11-06-000-801-F00 and TASK 71-11-06-400-801-F00).

SUBTASK 71-11-06-220-003-F00

(3) Make sure that the edges of the door are smooth with the outer surface of the inlet cowl at 0.00 ± 0.030 inch (±0.762 mm).

(a) If the door is out of limits, adjust the door as follows:

1) Open the door.

2) Add or remove the shims [4] and [6] below the plates [5] and [7].

3) Add or remove the shims [3] below the striker plate [2].

4) Close the door.

——— END OF TASK ———

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T12 Access/Pressure Relief Door Adjustment
Figure 501/71-11-06-990-803-F00 (Sheet 1 of 2)

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C

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T12 Access/Pressure Relief Door Adjustment
Figure 501/71-11-06-990-803-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-06-820-802-F00

3. T12 Access/Pressure Relief Door Free Play Adjustment

(Figure 501)

A. General

(1) This task provides the instructions on how to do the free play adjustment of the T12 access and pressure-relief door (referred to as the door) with its opening on the right side of the inlet cowl.

(a) The adjustments are for a tight fit with the latch locked.

(2) This procedure is necessary after the removal or the replacement of the door or the latches.

B. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

C. Access Panels

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

D. Prepare for the Adjustment

SUBTASK 71-11-06-010-003-F00

(1) Close the applicable access door:

Number	Name/Location
412AR	T12 Access Door, Engine 1

or close this access door:

Number	Name/Location
422AR	T12 Access Door, Engine 2

(a) Make sure that the latch is in the fully open position and close the door.

(b) Push the latch button into the door until the latch button is smooth with the door.

E. T12 Access/Pressure Relief Door Free Play Adjustment

SUBTASK 71-11-06-220-004-F00

(1) Make sure the edges of the door are smooth with the outer surface of the cowl at 0.00 ± 0.030 inch (± 0.762 mm).

SUBTASK 71-11-06-820-006-F00

(2) Examine the door for a tight fit, make sure that there is no free play with the latch fully locked.

(a) If there is play, adjust the latch as follows:

1) Open the door.

2) Do these steps to install a new striker plate [2]:

a) Remove the two nuts [1] and pins [8], the striker plate [2] and the shim [3].

b) Install the two pins [8], shim [3], the new striker plate [2], and the two nuts [1].

c) Tighten the two nuts [1].

3) Close the door.

(b) Make sure that the edges of the door are smooth with the outer surface of the inlet cowl.

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1) The limits are 0.00 ± 0.030 inch (± 0.762 mm).

——— END OF TASK ———

TASK 71-11-06-820-803-F00

4. T12 Access/Pressure Relief Door Latch Release Test

(Figure 502)

A. General

(1) This task makes sure that the T12 access and pressure-relief door latch (referred to as the latch) opens at the correct load.

(2) The T12 access and pressure-relief door (referred to as the door) is found on the right side of the inlet cowl.

B. References

Reference	Title
71-11-06-400-802-F00	T12 Access/Pressure Relief Door Latch Installation (P/B 201)
71-11-06-900-801-F00	T12 Access/Pressure Relief Door Latch 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-4409	Adapter Equipment - Load Test, Pressure Relief Door Latch Part #: B71044-37 Supplier: 81205

D. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

E. Access Panels

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

F. Prepare for the Test

SUBTASK 71-11-06-010-006-F00

(1) Make sure that the applicable access doors are closed:

Number	Name/Location
412AR	T12 Access Door, Engine 1
422AR	T12 Access Door, Engine 2

G. T12 Access/Pressure Relief Door Latch Release Test

SUBTASK 71-11-06-970-001-F00

(1) Calculate the minimum and the maximum torque for the length of the wrench that you use with the formula (Table 501).

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Table 501/71-11-06-993-805-F00

LATCH RELEASE TEST - TORQUE CALCULATION
TORQUE pound-inch = 0.53(P)(L)/(L + 1.5 inch) Where P = Latch open load in pounds L = Wrench effective length in inches Figure 502 For METRIC, N.m = 0.13442(P)(L)/(L + 38.1 mm) P in Newtons, L in mm
Pmin-Pmax must be 50-65 pounds (222.4-289.1 Newtons)
EXAMPLE CALCULATION (use Pmin-Pmax, L =12 inch) TORQUE minimum = 0.53(50)(12)/(12+1.5) = 23.6 pound-inches TORQUE maximum (use Pmax = 65) = 30.6 pound-inches For METRIC, let L =304.8 mm TORQUE min = 0.13442(222.4)(304.8)/(304.8+38.1) = 2.66 N.m TORQUE maximum (use Pmax = 289.1) = 3.46 N.m

(a) The correct load (Pmin-Pmax) to open the latch is 50 lbf (222.4 N) - 65 lbf (289.1 N).

(b) Find the effective length of the torque wrench (View A-A, Figure 502).

(c) For a 12 in. (304.8 mm) wrench, the correct torque is 23.6 in-lb (2.67 N·m) - 30.6 in-lb (3.46 N·m).

SUBTASK 71-11-06-820-007-F00

(2) Do these steps to do the latch test:

(a) Put the torque adapter on the torque wrench.

1) The torque adapter is part of the adapter equipment, SPL-4409.

(b) Put the thinner end of the adapter tightly into the slot on the latch.

(c) Apply a right-angle force on the torque wrench in the aft direction until the latch opens.

(d) Record the torque value when the latch opens.

(e) If the torque value is not in the calculated limits, replace the latch (TASK 71-11-06-900-801-F00 and TASK 71-11-06-400-802-F00).

(f) Close the door.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

T12 Access/Pressure Relief Door Load Test
Figure 502/71-11-06-990-804-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CHIP DETECTOR ACCESS/PRESSURE RELIEF DOOR - MAINTENANCE PRACTICES

1. General

A. This procedure has two tasks:

(1) Chip Detector Access/Pressure Relief Door Latch Removal

(2) Chip Detector Access/Pressure Relief Door Latch Installation.

TASK 71-11-07-000-802-F00

2. Chip Detector Access/Pressure Relief Door Latch Removal

(Figure 201)

A. General

(1) This task provides the instructions on how to remove the chip detector access/pressure relief door latch (referred to as the latch).

(2) The chip detector access/pressure relief door (referred to as the door) has two latches and is found on the left fan cowl panel.

B. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

C. Access Panels

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

D. Prepare for the Removal

SUBTASK 71-11-07-010-003-F00

(1) Open the applicable doors:

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

(a) Put a screwdriver blade into each latch button slot.

(b) Move the latch button up to release the latch.

(c) Open the door.

E. Chip Detector Access/Pressure Relief Door Latch Removal

SUBTASK 71-11-07-020-001-F00

(1) Do these steps to remove each latch [3]:

(a) Remove the four nuts [1], the washers [2], and the bolts [4] that attach the latch to the door.

(b) Remove the latch [3].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Chip Detector Access/Pressure Relief Door Latch Installation
Figure 201/71-11-07-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-07-400-802-F00

3. Chip Detector Access/Pressure Relief Door Latch Installation

(Figure 201)

A. General

(1) This task provides the instructions on how to install the chip detector access/pressure relief door latch (referred to as the latch).

(2) The chip detector access/pressure relief door (referred to as the door) has two latches and is found on the left fan cowl panel.

B. References

Reference	Title
71-11-07-820-802-F00	Chip Detector Access/Pressure Relief Door Free Play Adjustment (P/B 501)
71-11-07-820-803-F00	Chip Detector Access/Pressure Relief Door Latch Release Test (P/B 501)

C. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
3	Latch	71-11-02-10-150	LOM ALL

D. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

E. Access Panels

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

F. Chip Detector Access/Pressure Relief Door Latch Installation

SUBTASK 71-11-07-420-003-F00

(1) Do these steps to install each latch [3]:

(a) Put the latch [3] on the door and align the bolt holes.

(b) Install the four bolts [4], the washers [2], and the nuts [1].

(c) Tighten the nuts [1].

G. Put the Airplane Back to its Usual Condition

SUBTASK 71-11-07-410-006-F00

(1) Close the applicable doors:

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

(a) Make sure that the latches are in the fully open position and close the door.

(b) Push the latch buttons into the door until the latch buttons are smooth with the door.

SUBTASK 71-11-07-820-011-F00

(2) Make sure that the latch buttons are smooth with the outer surface of the door at 0.0 ±0.030 inch (±0.762 mm).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) If the latch is not in the limits, replace the latch.

SUBTASK 71-11-07-820-012-F00

(3) Make sure that the clearance between the latch button and the door is constant (View A-A).

(a) If the latch is not in the limits, do these steps:

1) Loosen the nuts [1].

2) Adjust the latch position for the correct clearance.

3) Tighten the nuts [1].

SUBTASK 71-11-07-820-013-F00

(4) Examine the door for a tight fit.

(a) Make sure there is no free play with the latches fully locked.

(b) If there is free play, do this task: Chip Detector Access/Pressure Relief Door Free Play Adjustment, TASK 71-11-07-820-802-F00.

H. Chip Detector Access/Pressure Relief Door Latch Test

SUBTASK 71-11-07-820-014-F00

(1) Do this task: Chip Detector Access/Pressure Relief Door Latch Release Test, TASK 71-11-07-820-803-F00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CHIP DETECTOR ACCESS/PRESSURE RELIEF DOOR - REMOVAL/INSTALLATION

1. General

A. This procedure has these two tasks:

(1) Chip Detector Access/Pressure Relief Door Removal

(2) Chip Detector Access/Pressure Relief Door Installation.

TASK 71-11-07-000-801-F00

2. Chip Detector Access/Pressure Relief Door Removal

(Figure 401)

A. General

(1) This task provides the instructions on how to remove the chip detector access and pressure-relief door (referred to as the door) from the left fan cowl panel.

(2) The applicable door is identified in the Access Panels list.

B. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

C. Access Panels

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

D. Chip Detector Access/Pressure Relief Door Removal

SUBTASK 71-11-07-010-002-F00

(1) Open the applicable doors:

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

(a) Put a screwdriver blade into the latch button slots.

(b) Move the latch buttons up to release the latches.

(c) Open the door.

SUBTASK 71-11-07-020-002-F00

(2) Do these steps to remove the door [10]:

(a) Remove the nuts [9], washers [8], washers [11], washers [6], bushings [3], and bolts [4].

(b) Remove the door [10].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Chip Detector Access/Pressure Relief Door Installation
Figure 401/71-11-07-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-07-400-801-F00

3. Chip Detector Access/Pressure Relief Door Installation

(Figure 401)

A. General

(1) This task provides the instructions on how to install the chip detector access/pressure relief door.

B. References

Reference	Title
71-11-07-820-801-F00	Chip Detector Access/Pressure Relief Door Adjustment (P/B 501)
71-11-07-820-802-F00	Chip Detector Access/Pressure Relief Door Free Play Adjustment (P/B 501)
71-11-07-820-803-F00	Chip Detector Access/Pressure Relief Door Latch Release Test (P/B 501)

C. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
10	Door	71-11-02-10-145	LOM ALL

D. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

E. Access Panels

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

F. Chip Detector Access/Pressure Relief Door Installation

SUBTASK 71-11-07-210-001-F00

(1) Examine the stops [1] for worn areas or deterioration.

(a) Replace the stops [1] if there is damage.

SUBTASK 71-11-07-210-002-F00

(2) Examine the bushings [3], bushings [5], and bushings [7] for worn areas.

(a) Replace the bushings if there are worn areas.

SUBTASK 71-11-07-420-002-F00

(3) Do these steps to install the door [10].

(a) Put the door [10] in the opening on the fan cowl panel and align the bolt holes at each hinge.

(b) Install the bolts [4], bushings [3], washers [6], washers [11], washers [8], and nuts [9].

1) Tighten the nuts [9] to 30 in-lb (3.4 N·m) - 40 in-lb (4.5 N·m).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G. Put the Airplane Back to Its Usual Condition

SUBTASK 71-11-07-410-002-F00

(1) Close the applicable doors:

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

(a) Make sure that the latches are in the fully open position and close the door.

(b) Push the latch buttons into the door until the latch buttons are smooth with the door.

H. Chip Detector Access/Pressure Relief Door Adjustment

SUBTASK 71-11-07-820-008-F00

(1) Do this task: Chip Detector Access/Pressure Relief Door Adjustment, TASK 71-11-07-820-801-F00.

SUBTASK 71-11-07-820-009-F00

(2) Do this task: Chip Detector Access/Pressure Relief Door Free Play Adjustment, TASK 71-11-07-820-802-F00.

SUBTASK 71-11-07-820-010-F00

(3) Do this task: Chip Detector Access/Pressure Relief Door Latch Release Test, TASK 71-11-07-820-803-F00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

CHIP DETECTOR ACCESS/PRESSURE RELIEF DOOR - ADJUSTMENT/TEST

1. General

A. This procedure has these tasks:

(1) Chip Detector Access/Pressure Relief Door Adjustment

(2) Chip Detector Access/Pressure Relief Door Free Play Adjustment

(3) Chip Detector Access/Pressure Relief Door Latch Release Test.

TASK 71-11-07-820-801-F00

2. Chip Detector Access/Pressure Relief Door Adjustment

(Figure 501)

A. General

(1) This task provides the instructions on how to adjust the chip detector access/pressure relief door (referred to as the door).

(a) The adjustments are for the correct edge clearances and aerosmoothness of the door.

(2) This procedure is necessary after the removal or the replacement of the door.

B. References

Reference	Title
71-11-07-000-801-F00	Chip Detector Access/Pressure Relief Door Removal (P/B 401)
71-11-07-400-801-F00	Chip Detector Access/Pressure Relief Door Installation (P/B 401)

C. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

D. Access Panels

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

E. Chip Detector Access/Pressure Relief Door Adjustment

SUBTASK 71-11-07-410-003-F00

(1) Close the applicable access doors:

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

(a) Make sure that the latches are in the fully open position and close the door.

(b) Push the latch buttons into the door until the latch buttons are smooth with the door.

SUBTASK 71-11-07-220-001-F00

(2) Measure the clearance between the door and the fan cowl at the top and bottom edges with the gage.

(a) Make sure that the clearance is 0.060 ±0.030 inch (1.524 ±0.762 mm).

(b) If the clearance is not correct, do these steps adjust the clearance:

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1) Do this task: Chip Detector Access/Pressure Relief Door Removal, TASK 71-11-07-000-801-F00.

   a) Record the number and the location of the spacers that you removed from between the bushings.

2) Add or remove the spacers between the bushings to keep the clearances equal and in the limits.

3) Do this task: Chip Detector Access/Pressure Relief Door Installation, TASK 71-11-07-400-801-F00.

SUBTASK 71-11-07-220-002-F00

(3) Measure the clearance between the door and the fan cowl at the forward and aft edges with the gage.

   (a) Make sure that the clearance is 0.090 ±0.030 inch (2.286 ±0.762 mm) for the forward edge.

   (b) Make sure that the clearance is 0.060 ±0.030 inch (1.524 ±0.762 mm) for the aft edge.

   (c) If the clearances are not correct, replace the door (TASK 71-11-07-000-801-F00 and TASK 71-11-07-400-801-F00).

SUBTASK 71-11-07-220-003-F00

(4) Make sure that the edges of the door are smooth with the outer surface of the fan cowl at 0.00 ±0.030 inch (±0.762 mm).

   (a) If the door is out of limits, replace the door (TASK 71-11-07-000-801-F00 and TASK 71-11-07-400-801-F00).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Chip Detector Access/Pressure Relief Door Adjustment
Figure 501/71-11-07-990-803-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

C

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Chip Detector Access/Pressure Relief Door Adjustment
Figure 501/71-11-07-990-803-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-07-820-802-F00

3. Chip Detector Access/Pressure Relief Door Free Play Adjustment

(Figure 501)

A. General

(1) This task provides the instructions on how to do the free play adjustment of the chip detector access/pressure relief door (referred to as the door) with its opening on the left fan cowl panel.

(a) The adjustments are for a tight fit with the latches locked.

(2) This procedure is necessary after the removal or the replacement of the door or the latches.

B. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

C. Access Panels

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

D. Chip Detector Access/Pressure Relief Door Free Play Adjustment

SUBTASK 71-11-07-410-004-F00

(1) Close the applicable access doors:

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

(a) Make sure that the latches are in the fully open position and close the door.

(b) Push the latch buttons into the door until the latch buttons are smooth with the door.

SUBTASK 71-11-07-820-006-F00

(2) Examine the door for a tight fit, make sure that there is no free play with the latches fully locked.

(a) If there is play, do these steps to adjust the latch:

1) Open the door.

2) Install new striker plates [2] as follow:

a) Remove the two pins [4], the two nuts [1], the striker plate [2] and the shim [3].

b) Install the two pins [4], the shim [3], the new striker plate [2], and the two nuts [1].

c) Tighten the two nuts [1].

3) Close the door.

(b) Make sure the edges of the door are smooth with the outer surface of the cowl.

1) The limits are 0.00 ±0.030 inch (±0.762 mm).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-07-820-803-F00

4. Chip Detector Access/Pressure Relief Door Latch Release Test

(Figure 502)

A. General

(1) This task is to makes sure that the chip detector access/pressure relief door latches (referred to as the latch) open at the correct load.

(2) The chip detector access/pressure relief door (referred to as the door) is found on the left fan cowl panel.

B. References

Reference	Title
71-11-07-000-802-F00	Chip Detector Access/Pressure Relief Door Latch Removal (P/B 201)
71-11-07-400-802-F00	Chip Detector Access/Pressure Relief Door Latch 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-4409	Adapter Equipment - Load Test, Pressure Relief Door Latch Part #: B71044-37 Supplier: 81205

D. Location Zones

Zone	Area
413	Engine 1 - Fan Cowl, Left
423	Engine 2 - Fan Cowl, Left

E. Access Panels

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

F. Prepare for the Test

SUBTASK 71-11-07-010-004-F00

(1) Make sure that the applicable access doors are closed:

Number	Name/Location
413BL	Chip Detector/Pressure Relief Door, Engine 1
423BL	Chip Detector/Pressure Relief Door, Engine 2

G. Chip Detector Access/Pressure Relief Door Latch Release Test

SUBTASK 71-11-07-970-001-F00

(1) Calculate the minimum and maximum torque for the length of the wrench that you use with the formula (Table 501).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 501/71-11-07-993-805-F00

LATCH RELEASE TEST - TORQUE CALCULATION
TORQUE pound-inch = 0.53(P)(L)/(L + 1.5 inch) Where P = Latch open load in pounds L = Wrench effective length in inches Figure 502 For METRIC, N.m = 0.13442(P)(L)/(L + 38.1 mm) P in Newtons, L in mm
Pmin-Pmax must be 63-77 pounds (280.2-342.5 Newtons)
EXAMPLE CALCULATION (use Pmin-Pmax, L =12 inch) TORQUE minimum = 0.53(63)(12)/(12+1.5) = 29.7 pound-inches TORQUE maximum (use Pmax = 77) = 36.3 pound-inches For METRIC, let L =304.8 mm TORQUE min = 0.13442(280.2)(304.8)/(304.8+38.1) = 3.35 N.m TORQUE maximum (use Pmax = 342.5) = 4.10 N.m

(a) The correct load (Pmin-Pmax) to open the door is 63 lbf (280.2 N) - 77 lbf (342.5 N).

(b) Find the effective length of the torque wrench (View A-A, Figure 502).

(c) For a 12 in. (304.8 mm) wrench, the correct torque is 29.7 in-lb (3.36 N·m) - 36.3 in-lb (4.10 N·m).

SUBTASK 71-11-07-820-007-F00

(2) Do these steps to do the load test:

(a) Make sure that each latch is locked.

(b) Put the torque adapter on the torque wrench.

1) The torque adapter is part of the adapter equipment, SPL-4409.

(c) Put the thinner end of the adapter tightly into the slot on the latch.

(d) Apply a right-angle force on the torque wrench in the aft direction until the latch opens.

(e) Record the torque value when the latch opens.

(f) Close the latch and do the load test again on the other latch.

(g) If the torque value is not in the calculated limits, replace the latch (TASK 71-11-07-000-802-F00 and TASK 71-11-07-400-802-F00).

(h) Close the door.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Chip Detector Access/Pressure Relief Door Load Test
Figure 502/71-11-07-990-804-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

VORTEX CONTROL DEVICE - REMOVAL/INSTALLATION

1. **General**

A. This procedure has two tasks:

(1) Vortex Control Device Removal

(2) Vortex Control Device Installation.

TASK 71-11-08-000-801-F00

2. **Vortex Control Device Removal**

(Figure 401)

A. General

(1) This task includes the steps how to remove the Vortex Control Device (VCD).

(2) The VCD is located on the inboard fan cowl panel of the engine.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
A00372	Compound - Sealing And Coating Compound, Corrosion Inhibitive	MIL-PRF-81733 (Supersedes MIL-S-81733)

E. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left

F. Prepare for the Removal

SUBTASK 71-11-08-860-001-F00

(1) Do these steps to make sure that the ENGINE START switch and the START LEVER switch are not operated:

(a) On the P5 overhead panel, make sure that the applicable ENGINE START switch is in the AUTO or OFF position.

1) Put a DO NOT OPERATE tag, STD-858, on the applicable ENGINE START switch.

(b) On the P10 control stand, make sure that the applicable START LEVER switch is in the CUTOFF position.

1) Put a DO NOT OPERATE tag, STD-858, on the applicable START LEVER switch.

SUBTASK 71-11-08-860-004-F00

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

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G. Vortex Control Device Removal

SUBTASK 71-11-08-020-001-F00

(1) Remove the bolts [2] and nuts [4] that attach the vortex control device [1] to the inboard fan cowl panel.

SUBTASK 71-11-08-020-002-F00

(2) Remove the vortex control device [1].

SUBTASK 71-11-08-420-001-F00

(3) If you will not replace the vortex control device [1] on this fan cowl panel, do these steps to install the setscrews [3] in the mounting holes:

(a) Install the setscrews [3] and adjust the setscrews [3] to 0.06 in. (1.5 mm) below the external surface on the fan cowl panel.

(b) Apply compound, A00372, to seal the setscrews [3] to the fan cowl panel and fill the holes.

(c) Make sure that the compound is smooth with the external surface of the fan cowl panel.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

USE SETSCREWS TO FILL THE HOLES WHEN VORTEX CONTROL DEVICE IS NOT INSTALLED.

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Vortex Control Device Installation
Figure 401/71-11-08-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-08-400-801-F00

3. Vortex Control Device Installation

(Figure 401)

A. General

(1) This task provides the instructions on how to install the vortex control device (VCD).

(2) The vortex control device (VCD) is found on the inboard fan cowl panel of the engine.

(3) It is possible to install the VCD on left or right fan cowl panel, so make sure that the VCD is installed only on the inboard fan cowl panel.

(4) On the fan cowl panels without a VCD, setscrews are installed in the mounting holes.

B. References

Reference	Title
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Consumable Materials

Reference	Description	Specification
A00372	Compound - Sealing And Coating Compound, Corrosion Inhibitive	MIL-PRF-81733 (Supersedes MIL-S-81733)
D00633	Grease - Aircraft General Purpose	BMS3-33

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Vortex control device	71-11-30-01-015	LOM ALL
		71-11-30-01-020	LOM ALL

F. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left

G. Vortex Control Device Installation

SUBTASK 71-11-08-420-002-F00

> **CAUTION**
> INSTALL THE VCD ONLY ON THE INBOARD FAN COWL PANEL. THE INCORRECT INSTALLATION OF THE VCD AND FAN COWL PANEL CAN CAUSE INCORRECT AIRPLANE PERFORMANCE.

(1) Put the vortex control device [1] on the inboard fan cowl and align the bolt holes.

SUBTASK 71-11-08-420-003-F00

(2) Do these steps to install the bolts [2] and nuts [4]:

(a) Apply the grease, D00633, to the threads of the bolts [2].

(b) Install the bolts [2] and nuts [4].

NOTE: Do not apply the compound, A00372, to the countersunk holes.

1) Tighten the bolts [2] to 30 in-lb (3.39 N·m) - 45 in-lb (5.08 N·m).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-11-08-390-001-F00

(3) Apply the compound, A00372, to seal the heads of the bolts [2].

(a) Make sure that the compound is smooth with the surface of the vortex control device [1].

SUBTASK 71-11-08-390-002-F00

(4) Apply the compound, A00372, to seal the edge of the vortex control device [1] where it touches the fan cowl skin.

NOTE: Do not apply the compound to the rubber seal at the forward end of the vortex control device [1].

SUBTASK 71-11-08-210-001-F00

(5) Make sure that the vortex control device [1] is installed only on the inboard fan cowl panel on each engine.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 71-11-08-860-002-F00

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

SUBTASK 71-11-08-860-003-F00

(2) Do these steps to remove the DO NOT OPERATE tags, STD-858, from the applicable ENGINE START switch and START LEVER switch:

(a) On the P5 overhead panel, remove the DO NOT OPERATE tag, STD-858, from the applicable ENGINE START switch.

(b) On the P10 control stand, remove the DO NOT OPERATE tag, STD-858, from the applicable START LEVER switch.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

VORTEX CONTROL DEVICE SEAL - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) Vortex Control Device Seal Removal

(2) Vortex Control Device Seal Installation.

TASK 71-11-09-000-801-F01

2. Vortex Control Device Seal Removal

(Figure 401)

A. General

(1) This task provides the instructions on how to remove the Vortex Control Device (VCD) seal.

(2) The VCD is found on the inboard fan cowl panel of the engine.

B. References

Reference	Title
71-11-08-000-801-F00	Vortex Control Device Removal (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B01054	Solvent - Methyl Ethyl Ketone and sec-Butyl Alcohol Blend - (MEK:secButyl Alcohol - 42:58 Percent)	BAC5750, ASTM D740/ASTM D1007
G00834	Cloth - Lint-free Cotton	

D. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left

E. Prepare for the Removal

SUBTASK 71-11-09-020-001-F01

(1) Remove the vortex control device [1] from the inboard fan cowl panel (TASK 71-11-08-000-801-F00).

F. Vortex Control Device Seal Removal

SUBTASK 71-11-09-020-002-F01

(1) Remove seal [2] from the vortex control device [1].

(a) If it is necessary, use a metal scraper.

(b) Discard the seal [2].

SUBTASK 71-11-09-110-001-F01

> **WARNING**
> DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT. REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS.

(2) Clean the vortex control device [1].

(a) Remove all unwanted material with solvent, B01054, and lint-free cloth, G00834.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(b) Dry the vortex control device [1] with a clean lint-free cloth, G00834, before evaporation of solvent, B01054.

1) Use gloves when handling the cleaned surface.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Vortex Control Device Seal Installation
Figure 401/71-11-09-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-11-09-420-801-F01

3. Vortex Control Device Seal Installation

(Figure 401)

A. General

(1) This task provides the instructions on how to install the Vortex Control Device (VCD) seal.

(2) The VCD is found on the inboard fan cowl panel of the engine.

(3) It is possible to install the VCD on left or right fan cowl panel, so make sure that the VCD is installed only on the inboard fan cowl panel.

(4) On the fan cowl panels without a VCD, setscrews are installed in the mounting holes.

B. References

Reference	Title
71-11-08-400-801-F00	Vortex Control Device Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
A00066	Sealant - RTV - Dow Corning 90-006	
A01079	Sealant - Silicone - RTV88	
B01054	Solvent - Methyl Ethyl Ketone and sec-Butyl Alcohol Blend - (MEK:secButyl Alcohol - 42:58 Percent)	BAC5750, ASTM D740/ASTM D1007
C00580	Primer - Adhesive Bonding, RTV - PR-1200 (Formerly DC 1200)	
G00834	Cloth - Lint-free Cotton	
G50078	Abrasive - Aluminum Oxide Paper, 320 grit or finer	

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
2	Seal	71-11-30-01-035	LOM ALL

E. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left

F. Vortex Control Device Seal Installation

SUBTASK 71-11-09-120-001-F01

(1) Prepare the faying surfaces of the vortex control device [1] and new seal [2].

(a) Abrade the faying surfaces of the vortex control device [1] and seal [2] with 320 grit or finer abrasive paper, G50078.

(b) Clean the vortex control device [1] and seal [2] with a clean lint-free cloth, G00834, and solvent, B01054 or equivalent.

(c) Dry the vortex control device [1] and seal [2] with a clean lint-free cloth, G00834.

1) Wear gloves when handling the cleaned surfaces.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

> **WARNING**
> DO NOT GET PRIMER AND SEALANT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM PRIMER AND SEALANT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE PRIMER AND SEALANT. KEEP PRIMER AND SEALANT AWAY FROM SPARKS, FLAME, AND HEAT. PRIMER AND SEALANT IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(d) Apply a thin coat of PR-1200 primer, C00580, to the faying surfaces of the vortex control device [1] and seal [2].

1) Use clean gloves when handling primed surfaces.

(e) Air dry the primer for 30 minutes at room temperature with a relative humidity of 50 percent or higher.

1) If the relative humidity is less than 50 percent, dry the primer for 3 hours at room temperature.

SUBTASK 71-11-09-390-001-F01

(2) Apply adhesive Dow Corning 90-006 sealant, A00066 (or alternate RTV88 sealant, A01079).

> **WARNING**
> DO NOT GET THE ADHESIVE IN YOUR EYES OR ON YOUR SKIN. WEAR SAFETY GLASSES TO PROTECT YOUR EYES. WEAR POLYETHYLENE GLOVES TO PROTECT YOUR HANDS. INJURIES TO PERSONNEL COULD OCCUR.

(a) Mix the two parts in accordance with the manufacturer's instructions.

(b) Apply a layer of Dow Corning 90-006 sealant, A00066 (or alternate RTV88 sealant, A01079) 10-12 MIL thick, to the faying surfaces of the vortex control device [1] and rubber seal [2].

1) Apply the adhesive within 4 hours after primer application.

2) Install seal [2] onto the vortex control device [1] within 5-10 minutes after adhesive has been applied.

(c) Place seal [2] onto the vortex control device [1].

1) Make sure that seal [2] is correctly aligned on the vortex control device [1].

NOTE: It is acceptable to squeeze out sealant after assembly, but not necessary.

(d) Seal the gap at the aft edge of the seal [2] to vortex control device [1] interface.

(e) Clamp seal [2] to the vortex control device [1].

1) Use only enough pressure to keep seal [2] in place.

(f) Cure the adhesive for 24 hours at room temperature.

(g) As an alternate cure method, cure adhesive for 2 hours at room temperature, and then at 200°F (93.33°C) for 2 hours.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 71-11-09-420-002-F00

(1) Install the vortex control device [1] (TASK 71-11-08-400-801-F00).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

VORTEX CONTROL DEVICE SEAL - REPAIRS

1. General

A. This procedure has this task:

(1) A repair of the seal on the Vortex Control Device (VCD).

TASK 71-11-09-300-801-F00

2. VCD Seal Repair

A. General

(1) This task is a repair of the Vortex Control Device (VCD) seal.

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)
71-11-09-000-801-F01	Vortex Control Device Seal Removal (P/B 401)
71-11-09-420-801-F01	Vortex Control Device Seal Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
B00676 [CP1041]	Alcohol - Isopropyl	
G01043	Cloth - Lint-free	
G51102 [CP2515]	Tape - 3M ALY 434 Aluminum Speed Tape	

D. Location Zones

Zone	Area
414	Engine 1 - Fan Cowl, Right
423	Engine 2 - Fan Cowl, Left

E. VCD Seal Repair

SUBTASK 71-11-09-210-001-F00

(1) Examine the outer surface of the VCD seal [1] for erosion damage.

(a) A VCD seal [1] with erosion damage can continue in service with these conditions:

1) No portion of the seal may be missing from underneath the VCD where the seal interfaces with the inlet cowl outer barrel surface.

2) No gaps allowed under seal where it interfaces with the inlet cowl outer barrel surface.

3) No tears are allowed if the tear extends aft underneath the VCD.

(b) If you find one or more of the above conditions, replace the VCD seal [1] (TASK 71-11-09-000-801-F01 and TASK 71-11-09-420-801-F01).

NOTE: If seal damage does not extend under the VCD, or no portion of the seal is missing and has no gaps, then no action is required.

SUBTASK 71-11-09-350-001-F00

(2) Do these steps to repair (trim) the VCD seal [1]:

(a) Make a trim template for the VCD seal [1] as follows:

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1) Determine how far aft the leading edge of the VCD seal [1] can be trimmed without creating a gap between the underside of the seal and the external surface of the outer barrel skin.
2) Make a mark (horse shoe shaped) on the eroded part/area of the seal to be removed.
3) Make a trim template with 6 in. (152 mm) by 6 in. (152 mm) by 0.050 in. (1.27 mm) thick, A286 CRES to align with the shape of the seal material to be removed.
4) Make the template with 0.50 in. (12.70 mm) radius corners.
   a) Contour the template to align the external surface of the outer barrel with light finger pressure.
5) De-burr and remove all sharp edges from the template.
6) Apply teflon tape around the edges of the template to prevent damage to the outer barrel external surface during installation.

(b) Install the template as follows:
1) Open the fan cowl panel and safety it in the open position to get access to the inlet cowl (TASK 71-11-02-010-801-F00).
2) Carefully put the template on the outer barrel external surface where the VCD seal [1] will touch when the fan cowl panel is closed.
3) Make a mark around the edges of the installed position for the template.

CAUTION BE CAREFUL WHEN YOU APPLY THE TEFLON TAPE OR INSTALL THE TRIM PLATE. DAMAGE TO THE TOP OF THE PAINT COAT CAN OCCUR.

4) Apply teflon tape or equivalent to the entire area where you will install the template as follows:
   a) Apply the tape approximately 2.0 in. (50.8 mm) beyond the edge of the template on all sides for added protection.
5) Attach the trim plate in position with teflon tape or equivalent.
6) Close the fan cowl panel and make sure that the VCD seal [1] is centered on the template (TASK 71-11-02-410-801-F00).

(c) Trim the VCD seal [1]:
1) Carefully place the template over the horse shoe shaped mark on the top of the VCD seal [1] and trim the eroded part of the seal with a sharp knife.
   a) Make sure that there is sufficient seal material below the VCD after the repair.
      NOTE: The seal material prevents damage to the inlet cowl and VCD during flight conditions.
2) Make sure that there are no tears or frayed edges after the repair that no gap is apparent.
3) Carefully remove the seal trimmings and the template.
4) Open the fan cowl panel and carefully remove the teflon tape and all traces of glue or /adhesive on the external surface of the Outer Barrel skin.

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

5) Clean the area with a lint-free cloth, G01043, made moist with alcohol, B00130.
   a) Remove all unwanted material and wipe dry with lint-free cloth, G01043.

(d) Examine the VCD seal [1].
   1) Close the fan cowl panel.
   2) Visually examine the VCD seal [1] to outer barrel external skin interface.
   3) Make sure that there is no gap under seal where it interfaces with the inlet cowl outer barrel.
   4) If a gap is found, replace the VCD seal [1].
   5) If you do not find a gap, continue the airplane in service.

SUBTASK 71-11-09-350-002-F00

(3) Do these steps to repair the VCD seal [1] to continue service for up to 40 days:

NOTE: This is permitted as long as no report of other damage.

NOTE: This repair is applicable to damage on the VCD seal. The entire seal may be recessed under the VCD footprint 0.150 in. (3.810 mm).

(a) Clean the inlet cowl outer barrel outer surface near the VCD leading edge at the damaged area of the VCD seal [1] with isopropyl alcohol, B00676 [CP1041], and a clean lint-free cloth, G01043.

NOTE: Wipe the surface dry before the solvent evaporates.

(b) Visually inspect the outer surface of the inlet cowl outer barrel outer surface and the leading edge of the VCD for damage.

NOTE: If you find additional damage, contact Boeing.

(c) Remove all loose VCD parts or protruding seal parts.

NOTE: All amounts of seal material can be removed or missing as long as there is no seal gap between the VCD and the inlet cowl.

(d) Apply aluminum speed tape, G51102 [CP2515], to cover the gap for the temporary repair as follows:

NOTE: This is the gap between the VCD and the outer surface of the inlet cowl.

   1) Make sure that the tape extends 3 in. (76.2 mm) past the footprint of the missing portion of the seal.
   2) Make sure that you apply each ply of aluminum speed tape, G51102 [CP2515], with a 50% bias overlap.

      NOTE: There should be no gap between the strips.

(e) If you will open the fan cowl after the speed tape application, make sure that you do the procedure again to maintain the aerodynamic seal.

(f) Do a daily visual inspection of the temporary repair area to make sure that the damage did not grow.
   1) If it is necessary, re-apply aluminum speed tape, G51102 [CP2515].

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(g) Replace the VCD seal [1] before the expiration of the 40 day extension.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 ALL OF THE SEAL PERIPHERY CAN HAVE DAMAGE AND IS PERMITTED TO BE RECESSED UNDER THE VCD FOOTPRINT 0.150 INCH (3.81 mm).

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VCD Chine/Seal Acceptable Damage
Figure 801/71-11-09-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

ENGINE MOUNTS - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has these tasks:
      (1) Forward Engine Mount Bolts Inspection (Engine Installed)
      (2) Forward Engine Mount Inspection (Engine Installed)
      (3) Forward Engine Mount Visual Inspection
      (4) Forward Engine Mount Detailed Inspection
      (5) Aft Engine Mount Visual Inspection
      (6) Aft Engine Mount Detailed Inspection.

TASK 71-21-00-200-801-F00

2. **Forward Engine Mount Bolts Inspection (Engine Installed)**
   (Figure 601)

A. General

(1) This task is a visual check of the bolts which attach the forward engine mount to the engine.

(2) The forward engine mount is found at the 12:00 o'clock position on the outer case of the fan frame.

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)
71-21-01-400-801-F00	Forward Engine Mount Installation (P/B 401)

C. Location Zones

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

D. Prepare for the Inspection

SUBTASK 71-21-00-010-004-F00

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

E. Forward Engine Mount Bolts Inspection (Engine Installed)

SUBTASK 71-21-00-210-001-F00

(1) Do a visual check of the bolts which attach the forward engine mount to the fan frame for the correct installation and damage.
   (a) Incorrect installation or damage is not permitted.
      1) Replace the bolt (TASK 71-21-01-400-801-F00).

F. Put the Airplane Back to its Usual Condition

SUBTASK 71-21-00-410-004-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

Forward Engine Mount Bolts Inspection
Figure 601/71-21-00-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-21-00-210-801-F00

3. **Forward Engine Mount Inspection (Engine Installed)**
(Figure 602)

A. General

(1) This task provides the instructions on how to do the inspection of the forward engine mount.

(2) The forward engine mount is found at the 12:00 o'clock position on the outer case of the fan frame.

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. Prepare for the Inspection

SUBTASK 71-21-00-010-005-F00

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

E. Forward Engine Mount Inspection (Engine Installed)

SUBTASK 71-21-00-210-018-F00

(1) Do a visual check of the forward engine mount.

(a) Examine the bushings in the hangar fitting and fan case fitting.

1) Look for bushing migration.

2) If you find bushing migration, do these steps:

a) Do a visual check for cracks.

b) Do the check for bushing migration again every 24 months or 6,000 flight cycles (whichever comes first) until the condition is corrected per the component manual.

F. Put the Airplane Back to its Usual Condition

SUBTASK 71-21-00-410-005-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

Forward Engine Mount Inspection (Engine Installed)
Figure 602/71-21-00-990-808-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-21-00-200-803-F00

4. Forward Engine Mount Visual Inspection

(Figure 603)

A. General

(1) This task provides instructions on how to do the visual inspection of the forward engine mount.

(2) This task is used when the engine is off-wing.

(3) The forward engine mount is found at the 12:00 o'clock position on the outer case of the fan frame.

B. Location Zones

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

C. Forward Engine Mount Visual Inspection

SUBTASK 71-21-00-210-005-F00

(1) Examine the forward engine mount for these signs of damage.

(a) Corrosion is not permitted.

(b) Cracks are not permitted.

(c) Nicks are not permitted.

(d) Dents are not permitted.

(e) Scratches are not permitted.

(f) Bushing movement is not permitted.

(g) Damage on the vertical tension bolt is not permitted.

(h) Damage to the side link assembly is not permitted.

(i) Damage to the shear pin is not permitted.

(j) Damage to the bearing is not permitted.

1) Cracks to the bearing (race) are not permitted.

2) Cracks to the bearing ball are not permitted.

3) Seized bearing is not permitted.

4) Cracks in bearing are not permitted.

5) Bearing movement is not permitted.

6) All other types of damage to the bearing are not permitted.

(k) Fretting is not permitted.

NOTE: Fretting is caused when two adjacent pieces of metal rub one another.

(l) Pickup is not permitted.

NOTE: Pickup occurs when material is moved from one surface to a surface which it touches.

(m) High metal is not permitted.

NOTE: High metal is metal which is pushed above the surface adjacent to scratches or other damage.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-21-00-210-006-F00

(2)) If the damage is more than the allowable limits (see structural repair procedure) of the forward engine mount, please contact Boeing.

SUBTASK 71-21-00-210-008-F00

(3) Examine the forward engine mount for worn areas.

(a) If you find signs of wear on the forward engine mount.

1) Do this task: Forward Engine Mount Detailed Inspection, TASK 71-21-00-200-804-F00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Forward Engine Mount Inspection
Figure 603/71-21-00-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-21-00-200-804-F00

5. **Forward Engine Mount Detailed Inspection**
(Figure 604)

A. **General**

(1) This task gives the detailed inspection instructions for the forward engine mount.

(2) This task is used when the engine is off-wing.

B. **References**

Reference	Title
71-21-01-000-801-F00	Forward Engine Mount Removal (P/B 401)
71-21-01-400-801-F00	Forward Engine Mount Installation (P/B 401)

C. **Location Zones**

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

D. **Forward Engine Mount Detailed Inspection**

SUBTASK 71-21-00-210-009-F00

(1) Do a check of the component attach points for worn areas.

NOTE: If you find worn areas on the forward engine mount, refer to component maintenance manual 71-21-37 for wear limits and repair instructions.

(a) Examine the barrel nuts in the forward engine mount to make sure that they are free of damage.

(b) Examine the pin-pawl in the forward engine mount to make sure that they are free of damage.

(c) Examine the shear pins are free of damage.

(d) Examine the linkage and flange brackets for the forward engine mount.

1) Make sure that they are free of damage and attached correctly.

(e) Examine the areas where the forward lower engine mount attaches to the engine fan case.

1) All types of damage are not permitted.

SUBTASK 71-21-00-210-013-F00

(2) If you find the component attach points are more than the wear limits (Table 601), do these steps that follow.

(a) Replace the forward engine mount component, if it is necessary.

1) Do this task: Forward Engine Mount Removal, TASK 71-21-01-000-801-F00.

2) Do this task: Forward Engine Mount Installation, TASK 71-21-01-400-801-F00.

Table 601/71-21-00-993-801-F00 Forward Engine Mount Wear Limits

			DIMENSION		WEAR LIMITS (INCHES)
INDEX NO.	PART NAME	DIM.	MIN	MAX	MAXIMUM CLEARANCE
1	BUSHING-SHEAR	ID	-	0.5575	0.0585
	BOLT-SPECIAL	OD	0.4985	-	

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 601/71-21-00-993-801-F00 Forward Engine Mount Wear Limits (Continued)

			DIMENSION		WEAR LIMITS (INCHES)
INDEX NO.	PART NAME	DIM.	MIN	MAX	MAXIMUM CLEARANCE
2	FITTING	ID	-	0.8905	0.0270
	BUSHING-SHEAR	OD	0.8600	-	
3	FITTING	ID	-	0.5620	0.0630
	BOLT-SPECIAL	OD	0.4985	-	
4	FITTING	ID		-	-
	PIN-SHEAR	OD	-		
5	*[1]	ID	-	0.5057	0.0092
	PIN-SHEAR	OD	0.4919	-	
6	BEARING (RACE)	ID	-	1.1905	0.0040
	BEARING (BALL)	OD	1.1845	-	
7	BEARING	ID	-	0.7515	0.0030
	PIN-PAWL	OD	0.7470	-	
8	BUSHING	ID	-	0.7521	0.0036
	PIN-PAWL	OD	0.7467	-	
9	FITTING-HANGAR	ID	-	0.7115	0.0070
	PIN-SHEAR	OD	0.7010	-	

*[1] Engine Fan Frame

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Forward Engine Mount Inspection
Figure 604/71-21-00-990-806-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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C-C

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Forward Engine Mount Inspection
Figure 604/71-21-00-990-806-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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A

E-E

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Forward Engine Mount Inspection
Figure 604/71-21-00-990-806-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-21-00-200-805-F00

6. Aft Engine Mount Visual Inspection

(Figure 605)

A. General

(1) This task provides instructions on how to do the visual inspection of the aft engine mount.

(2) This task is used when the engine is off-wing.

(3) The aft engine mount is found at the 12:00 o'clock position on the turbine rear frame.

B. Location Zones

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

C. Aft Engine Mount Visual Inspection

SUBTASK 71-21-00-210-010-F00

(1) Examine the aft engine mount for these signs of damage.

(a) Corrosion is not permitted.

(b) Cracks are not permitted.

(c) Nicks are not permitted.

(d) Dents are not permitted.

(e) Scratches are not permitted.

(f) Bushing movement is not permitted.

(g) Damage on the vertical tension bolt is not permitted.

(h) Damage to the side link assembly is not permitted.

(i) Damage to the shear pin is not permitted.

(j) Damage to the bearing is not permitted.

1) Cracks to the bearing (race) are not permitted.

2) Cracks to the bearing ball are not permitted.

3) Seized bearing is not permitted.

4) Cracks in bearing are not permitted.

5) Bearing movement is not permitted.

6) All other types of damage to the bearing are not permitted.

(k) Fretting is not permitted.

NOTE: Fretting is caused when two adjacent pieces of metal rub one another.

(l) Pickup is not permitted.

NOTE: Pickup occurs when material is moved from one surface to a surface which it touches.

(m) High metal is not permitted.

NOTE: High metal is metal which is pushed above the surface adjacent to scratches or other damage.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-21-00-210-011-F00

(2) If the damage is more than the allowable limits (see structural repair procedure) of the aft engine mount, please contact Boeing.

SUBTASK 71-21-00-210-017-F00

(3) Examine the aft engine mount for worn areas.

(a) If you find signs of wear on the aft engine mount.

1) Do this task: Aft Engine Mount Detailed Inspection, TASK 71-21-00-200-806-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Aft Engine Mounts Inspection
Figure 605/71-21-00-990-807-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-21-00-200-806-F00

7. Aft Engine Mount Detailed Inspection

(Figure 606)

A. General

(1) This task provides the instructions on how to do the detailed inspection of the aft engine mount.

(2) This task is used when the engine is off-wing.

B. References

Reference	Title
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. Location Zones

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

D. Aft Engine Mount Detailed Inspection

SUBTASK 71-21-00-210-014-F00

(1) Do a check of the component attach points for worn areas.

NOTE: If you find worn areas on the aft engine mount, refer to component maintenance manual 71-21-37 for wear limits and repair instructions.

(a) Examine the barrel nuts in the aft engine mount to make sure that they are free of damage.

(b) Examine the pin-pawl in the aft engine mount to make sure that they are free of damage.

(c) Examine the bearings are free of damage.

(d) Examine the bushings are free of damage.

(e) Examine the even bars are free of damage.

(f) Examine the linkage and flange brackets for the aft engine mount are free of damage.

(g) Examine the Worn areas on the clip [left side link].

1) If the wear on the dimples of the clip do not go through the clip [no hole], no action is necessary.

2) If the wear on the dimples of the clip goes through the clip [hole at dimple], it is permitted to continue to operate the engine for up to 12 months prior to repair/replacement of the clip or left side link.

(h) Examine the areas where the aft engine mount attaches to the engine exhaust outer case.

1) All types of damage are not permitted.

SUBTASK 71-21-00-210-016-F00

(2) If you find the component on the aft engine mount center link attach points are more than the wear limits (Table 602), do these steps that follow.

(a) Replace the aft engine mount center link component, if it is necessary.

1) Do this task: Aft Engine Mount Removal, TASK 71-21-03-000-801-F00.

2) Do this task: Aft Engine Mount Installation, TASK 71-21-03-400-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 602/71-21-00-993-803-F00 Aft Engine Mount Wear Limits

			DIMENSION		WEAR LIMITS (INCHES)
INDEX NO.	PART NAME	DIM.	MIN	MAX	MAXIMUM CLEARANCE
1	BUSHING-FLANGED	ID	-	1.0026	0.0046
	PIN-PAWL	OD	0.9957	-	
2	BUSHING	ID	-	1.0026	0.0046
	PIN-PAWL	OD	0.9957	-	
3	BEARING	ID	-	1.0030	0.0050
	PIN-PAWL	OD	0.9955	-	
4	BEARING (RACE)	ID	-	1.6752	0.0068
	BEARING (BALL)	OD	1.6650	-	
5	BUSHING	ID	-	1.0026	0.0046
	PIN-PAWL	OD	0.9957	-	
6	BUSHING	ID	-	1.0026	0.0046
	PIN-PAWL	OD	0.9957	-	
7	BUSHING	ID	-	1.2530	0.0050
	PIN-PAWL	OD	1.2455	-	
8	BUSHING	ID	-	1.2530	0.0050
	PIN-PAWL	OD	1.2455	-	
9	BEARING (RACE)	ID	-	2.0642	0.0056
	BEARING (BALL)	OD	2.0540	-	
10	BEARING	ID	-	1.2530	0.0050
	PIN-PAWL	OD	1.2455	-	
11	BEARING (RACE)	ID	-	2.0642	0.0056
	BEARING (BALL)	OD	2.0540	-	
12	BEARING	ID	-	1.2530	0.0050
	PIN-PAWL	OD	1.2455	-	
13	BUSHING	ID	-	1.2530	0.0050
	PIN-PAWL	OD	1.2455	-	
14	BUSHING	ID	-	1.2530	0.0050
	PIN-PAWL	OD	1.2455	-	

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Table 602/71-21-00-993-803-F00 Aft Engine Mount Wear Limits (Continued)

			DIMENSION		WEAR LIMITS (INCHES)
INDEX NO.	PART NAME	DIM.	MIN	MAX	MAXIMUM CLEARANCE
15	BEARING (BALL)	ID	-	1.1905	0.0040
	BEARING (RACE)	OD	1.1845	-	
16	BEARING	ID	-	0.7515	0.0030
	PIN-PAWL	OD	0.7470	-	

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

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Aft Engine Mount Inspection
Figure 606/71-21-00-990-805-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

B-B

C-C

D-D

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Aft Engine Mount Inspection
Figure 606/71-21-00-990-805-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FORWARD ENGINE MOUNT - REMOVAL/INSTALLATION

1. General

A. This procedure contains these tasks:

(1) Forward Engine Mount Removal

(2) Forward Engine Mount Installation.

TASK 71-21-01-000-801-F00

2. Forward Engine Mount Removal

(Figure 401)

A. General

(1) This task provides the instructions on how to remove the forward engine mount.

(2) The forward engine mount is found at the 12:00 o'clock position on the outer case of the fan frame.

(3) You must remove the engine from the strut before you can remove the forward engine mount.

B. References

Reference	Title
71-00-02-000-801-F00	Power Plant - Removal (P/B 401)

C. Location Zones

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

D. Prepare for the Removal

SUBTASK 71-21-01-010-001-F00

(1) Do this task: Power Plant - Removal, TASK 71-00-02-000-801-F00.

E. Forward Engine Mount Removal

SUBTASK 71-21-01-020-001-F00

(1) Do these steps to remove the hangar fitting assembly [1]:

(a) Remove the three nuts [4] and the end caps [3] from the pawl pins [2] in the hangar fitting assembly [1].

1) PAWL PINS WITH A SPRING LOADED PAWL; Hold the spring-loaded pawl in while you remove the nuts [4].

NOTE: You can use a metal or hard plastic tube or another nut to hold the pawl in.

2) PAWL PINS WITH A COTTER PIN; Remove the cotter pin before you remove the nuts [4].

(b) Remove the three pawl pins [2] and the two washers [11].

(c) Remove the hangar fitting assembly [1].

SUBTASK 71-21-01-020-002-F00

(2) Do these steps to remove the fan case fitting [5]:

(a) Remove the four bolts [6] and the washers [7] at the center of the fitting.

(b) Remove the six bolts [6] and the bolts [8], the six washers [7], and the two bushings [9] at the outer positions.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Remove the fan case fitting [5].

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Forward Engine Mount Installation
Figure 401/71-21-01-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-21-01-400-801-F00

3. Forward Engine Mount Installation

(Figure 401)

A. General

(1) This task provides the instructions on how to install the forward engine mount.

(2) The forward engine mount is found at the 12:00 o'clock position on the outer case of the fan frame.

B. References

Reference	Title
71-00-02-400-801-F00	Power Plant - Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
D00006	Compound - Antiseize, Pure Nickel Special - Never-Seez NSBT-8N/-16N	
G01912	Lockwire - MS20995NC32, Monel - 0.032 Inch (0.8128 mm) Diameter	NASM20995
G50043	Tubing - Fluoroelastomer, Tyco Electronics Viton-3/16-0-SP (Formerly Raychem RT-1146 Tubing)	AS23053/13
G50044	Sleeve - Ben-Har Viton 44, 3/16 inch, P/N 3800300503	
G50375	Kit - Safety Cable, 321 CRES - 0.032 Inch (0.81 mm) Diameter, (Contains both Cable and Ferrule)	BACC13AT3K, AMS 5689

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Fitting assembly	71-21-01-02-020	LOM ALL
5	Fan case fitting	71-21-01-02-110	LOM ALL
		71-21-01-02-112	LOM ALL

E. Location Zones

Zone	Area
410	Subzone - Engine 1
420	Subzone - Engine 2

F. Forward Engine Mount Installation

SUBTASK 71-21-01-640-001-F00

(1) Apply the Pure Nickel Special compound, D00006 to the bolt threads and under the bolts [6] heads and the bolts [8] heads.

SUBTASK 71-21-01-020-003-F00

(2) Install the fan case fitting [5] as follows:

(a) Put the fan case fitting [5] on the fan case and align the holes.

(b) Install the two longer bolts [8], the washers [7] and the bushings [9] at the outer positions.

NOTE: Make sure the washers [7] are installed under the bolt [8] with the countersunk side up.

(c) Install the four bolts [6] and the washers [7] at the outer positions.

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(d) Install the four bolts [6] and the washers [7] at the center of the fitting.

(e) Tighten the ten bolts [6] and the bolts [8] for the fan case fitting to 585 in-lb (66 N·m) to 715 in-lb (81 N·m).

NOTE: Make sure that the bolts [6] and the bolts [8] are tightened equally.

(f) Install the MS20995NC32 lockwire, G01912 or safety cable kit, G50375 to the four bolts [6] at the center of the fitting.

NOTE: The safety cable kit, G50375 may be used as an alternate to the MS20995NC32 lockwire, G01912.

1) Attach a lockwire to the two forward bolts.

2) Attach a lockwire to the two aft bolts.

(g) Install the MS20995NC32 lockwire, G01912 or safety cable kit, G50375 on the three bolts [6] and the bolts [8] at the outer positions.

NOTE: The safety cable kit, G50375 may be used as an alternate to the MS20995NC32 lockwire, G01912.

1) Install Tyco Fluoroelastomer Tubing, G50043 or Viton sleeve, G50044 on the lockwire where it rubs against the fan case fitting.

SUBTASK 71-21-01-020-004-F00

(3) Apply Pure Nickel Special compound, D00006 to the pawl pin threads and shanks; and, to the bushings, bearings, and bores.

SUBTASK 71-21-01-020-005-F00

(4) Do these steps to install the hangar fitting assembly [1]:

(a) Put the hangar fitting assembly [1] on the fan case fitting [5] and align the holes for the pawl pins.

1) Make sure to install the hangar fitting assembly [1] with the shear pins on the forward edge.

(b) Install the three pawl pins [2] with the head on the forward side of the mount.

NOTE: The fit for the middle pawl is looser. There is more clearance between the pawl pin and the bushing in the fan case fitting.

(c) Install the washer [11] at each outer pin location.

NOTE: The washer [11] can be installed on the forward or aft side of the bearing.

1) Make sure that the chamfer side of the washer [11] is against the bearing.

(d) Install the three end caps [3] and nuts [4].

1) Make sure that the flat side of the end cap [3] is against the pin shoulder.

2) Tighten the three nuts to 290 in-lb (33 N·m) to 510 in-lb (58 N·m).

a) You can apply the torque to the nut or the head of the pin.

3) PAWL PINS WITH A SPRING LOADED PAWL; Make sure the spring-loaded pawl on the pins are in the extended position after the nuts are tight.

4) PAWL PINS WITH A COTTER PIN; Install the cotter pin.

G. Put the Airplane Back to its Usual Condition

SUBTASK 71-21-01-410-001-F00

(1) Do this task: Power Plant - Installation, TASK 71-00-02-400-801-F00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

THRUST LINK ASSEMBLY - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) A removal of the thrust link assembly

(2) An installation of the thrust link assembly.

TASK 71-21-02-000-801-F00

2. Thrust Link Assembly Removal

(Figure 401)

A. General

(1) This task contains the instructions to remove the thrust link assembly.

(2) The thrust links are installed between the fan frame and the aft engine mount.

(3) You can only remove and install one thrust link at a time with the power plant installed on the strut because of the load.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
72-32-00-200-804-F00	High Pressure Compressor Stage 4 Vane Trailing Edge Inspection (P/B 601)
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
SPL-2438	Equipment - Hold-Open, 65-Degree, T/R Cowl, CFM56-7 Engine Part #: C78021-1 Supplier: 81205

D. Location Zones

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

E. Prepare for the Removal

SUBTASK 71-21-02-010-004-F00

(1) 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.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(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. Thrust Link Assembly Removal

SUBTASK 71-21-02-020-001-F00

> **CAUTION** DO NOT REMOVE THE TWO THRUST LINKS AT THE SAME TIME. IF YOU DO NOT OBEY THE INSTRUCTIONS, THE ENGINE CAN MOVE REARWARD AND DAMAGE TO THE ENGINE FAIRINGS CAN OCCUR.

(1) Do these steps to remove the left or right thrust link assembly [1]:

(a) For the left thrust link assembly [1], remove the Low Pressure Turbine (LPT) cooling air tube (TASK 72-32-00-200-804-F00).

(b) For the right thrust link assembly [1], do these steps, if it is necessary:

1) Disconnect the T3 sensor from the T3 sensor bracket.

2) Disconnect the T3 sensor bracket from the engine.

(c) Remove the nut [3] and end cap [2] at each end of the thrust link assembly [1].

1) PAWL PINS WITH A SPRING LOADED PAWL; Hold the spring-loaded pawl in while you remove the nut [3].

NOTE: You can use the thread protector, a metal or hard plastic tube, or another nut to hold the pawl in.

2) PAWL PINS WITH A COTTER PIN; Remove the cotter pin before you remove the nut [3].

(d) Install a thread protectors from the equipment, SPL-2438, on the pawl pins [5] at each end of the thrust link assembly [1].

(e) Remove the pawl pin [5] and washer [4] from the aft end of the thrust link assembly [1].

(f) Remove the pawl pin [5] and washer [4] from the forward end of the thrust link assembly [1].

1) Remove the washer [6].

(g) Remove the thrust link assembly [1] in the down direction.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Thrust Link Assembly Installation
Figure 401/71-21-02-990-801-F00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 APPLY ANTI-SEIZE COMPOUND AS INDICATED.

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Thrust Link Assembly Installation
Figure 401/71-21-02-990-801-F00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

L05548 S0006582156_V2

Thrust Link Assembly Installation
Figure 401/71-21-02-990-801-F00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-21-02-400-801-F00

3. Thrust Link Assembly Installation

(Figure 401)

A. General

(1) This task contains the instructions to install the thrust link assembly.

B. References

Reference	Title
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-32-00-200-804-F00	High Pressure Compressor Stage 4 Vane Trailing Edge Inspection (P/B 601)
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

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-2438	Equipment - Hold-Open, 65-Degree, T/R Cowl, CFM56-7 Engine Part #: C78021-1 Supplier: 81205

D. Consumable Materials

Reference	Description	Specification
A00081	Adhesive - Silicone Rubber - RTV 106	BAC5010 Type 74
A00933	Sealant - Silicone Rubber - RTV 159	
D00006	Compound - Antiseize, Pure Nickel Special - Never-Seez NSBT-8N/-16N	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Thrust link assembly	71-21-02-02-025	LOM ALL
		71-21-02-02-030	LOM ALL

F. Location Zones

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

G. Thrust Link Assembly Installation

SUBTASK 71-21-02-640-001-F00

(1) Apply Pure Nickel Special compound, D00006, to the threads and shank of the pawl pins [5] (View A-A and View B-B, Figure 401).

SUBTASK 71-21-02-480-001-F00

(2) Install the thread protector from the equipment, SPL-2438, on the pawl pin [5] for the forward end of the thrust link assembly [1].

SUBTASK 71-21-02-420-001-F00

(3) Do these steps to install the left or right thrust link assembly [1]:

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(a) Apply Pure Nickel Special compound, D00006, to the spherical bearing bores and ball flat surfaces of the thrust link fitting on the engine fan frame and aft engine mount attaching points.

(b) Put the thrust link assembly [1] on the engine.

1) Align the aft end of the thrust link assembly [1] with the aft engine mount and align the forward end of the thrust link assembly [1] with the thrust link fitting.

(c) Install the pawl pin [5] and washer [4] at the aft end of the thrust link assembly [1].

1) Apply RTV 159 sealant, A00933, or RTV 106 adhesive, A00081, between the washer [4] and underneath the bolt head of the pawl pin [5].

2) Put the countersunk side of the washer [4] against the head of the pawl pin [5].

(d) Remove the thread protector from the pawl pin [5] at the aft end of the thrust link assembly [1].

(e) Install the end cap [2] and nut [3] at the aft end of the thrust link assembly [1].

1) Make sure that the flat side of the end cap [2] is against the shoulder of the pawl pin [5].

2) PAWL PINS WITH A SPRING LOADED PAWL; Make sure that the spring-loaded pawl is in the extended position after you install the nut [3].

(f) Install the pawl pin [5], washer [4], and washer [6] at the forward end of the thrust link assembly [1].

1) Apply RTV 159 sealant, A00933, or RTV 106 adhesive, A00081, between the washer [4] and underneath the bolt head of the pawl pin [5].

2) Put the countersunk side of the washer [4] against the head of the pawl pin [5].

3) Put the countersunk side of the washer [6] against the spherical bearing.

(g) Remove the thread protector from the pawl pin [5] at the forward end of the thrust link assembly [1].

(h) Install the end cap [2] and nut [3] at the forward end of the thrust link assembly [1].

1) Make sure that the flat side of the end cap [2] is against the shoulder of the pawl pins [5].

2) PAWL PINS WITH A SPRING LOADED PAWL; Make sure that the spring-loaded pawl is in the extended position after you install the nut [3].

(i) Torque the nuts [3] or the heads of the pawl pins [5] to 290 in-lb (32.8 N·m) - 510 in-lb (57.6 N·m) at each end of the thrust link assembly [1].

NOTE: You can apply the torque to the nut or to the head of the pawl pin.

(j) PAWL PINS WITH A COTTER PIN; Install the cotter pin.

(k) For the left thrust link assembly [1], install the Low Pressure Turbine (LPT) cooling air tube (TASK 72-32-00-200-804-F00).

(l) For the right thrust link assembly [1], re-connect the T3 sensor bracket to the engine and the T3 sensor to the T3 sensor bracket, if disconnected.

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H. Put the Airplane Back to Its Usual Condition

SUBTASK 71-21-02-410-002-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 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

THRUST LINK ASSEMBLY - INSPECTION/CHECK

1. General

A. This procedure has two tasks.

(1) Thrust Links Visual Inspection

(2) Thrust Links Detailed Inspection.

TASK 71-21-02-210-802-F00

2. Thrust Links Visual Inspection

A. General

(1) This task provides the instructions on how to do the visual inspection instructions for the thrust link.

(2) The thrust links are installed between the inner fan frame and the aft engine mount.

B. References

Reference	Title
71-21-02-000-801-F00	Thrust Link Assembly Removal (P/B 401)
71-21-02-400-801-F00	Thrust Link Assembly Installation (P/B 401)

C. Location Zones

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

D. Thrust Links Visual Inspection

SUBTASK 71-21-02-210-003-F00

(1) Examine the thrust links for damage:

(a) Cracks are not permitted.

(b) Nicks are not permitted.

(c) Dents are not permitted.

(d) Scratches are not permitted.

(e) Pitting is not permitted.

(f) Fretting is not permitted.

NOTE: Fretting is caused when two adjacent pieces of metal rub one another.

(g) Pickup is not permitted.

NOTE: Pickup occurs when material is moved from one surface to a surface which it touches.

(h) High metal is not permitted.

NOTE: High metal is metal which is pushed above the surface adjacent to scratches or other damage.

(i) Bushing movement is not permitted.

SUBTASK 71-21-02-210-004-F00

(2) If damage is found on the thrust links, refer to the Structural Repair Manual for the allowable damage limits (SRM 54-70-90).

(a) Replace the thrust links component, if it is more than the allowable damage limits.

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1) Do this task: Thrust Link Assembly Removal, TASK 71-21-02-000-801-F00.

2) Do this task: Thrust Link Assembly Installation, TASK 71-21-02-400-801-F00.

SUBTASK 71-21-02-210-005-F00

(3) Examine the thrust link for worn areas.

NOTE: The thrust links can be damaged from contact with the thrust reverser insulation blanket .

(a) If you find signs of wear on the thrust links.

1) Do this task: Thrust Links Detailed Inspection, TASK 71-21-02-210-803-F00.

END OF TASK

TASK 71-21-02-210-803-F00

3. Thrust Links Detailed Inspection

(Figure 601)

A. General

(1) This task provides the instructions on how to do the detailed inspection instructions for the thrust link.

(2) This task is used when the thrust link is removed.

B. Location Zones

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

C. Thrust Links Detailed Inspection

SUBTASK 71-21-02-210-006-F00

(1) Do these steps to examine the thrust link for worn areas.

(a) Examine the areas where the thrust links attach points to the aft engine mount and the engine compressor case.

(b) If you find the component attach points are more than the wear limits (Table 601).

1) Replace the worn component of the thrust links, if it is necessary.

Table 601/71-21-02-993-801-F00 Thrust Links Wear Limits

			DIMENSION		WEAR LIMITS (INCHES)
INDEX NO.	PART NAME	DIM.	MIN	MAX	MAXIMUM CLEARANCE
1	BEARING (RACE)	ID	-	1.1905	0.0040
	BEARING (BALL)	OD	1.1845	-	
2	BEARING	ID	-	0.7515	0.0030
	PIN-PAWL	OD	0.7470	-	
3	BUSHING	ID	-	0.7521	0.0036
	PIN-PAWL	OD	0.7467	-	

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Thrust Links Inspection
Figure 601/71-21-02-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

AFT ENGINE MOUNT - REMOVAL/INSTALLATION

1. General

A. This procedure contains two tasks:

(1) Aft Engine Mount Removal

(2) Aft Engine Mount Installation.

TASK 71-21-03-000-801-F00

2. Aft Engine Mount Removal

(Figure 401)

A. General

(1) This task provides the instructions on how to remove the aft engine mount.

(2) The aft engine mount is attached to the turbine rear frame at the 12:00 o'clock position.

(3) You must remove the engine from the strut before you can remove the aft engine mount.

B. References

Reference	Title
71-00-02-000-801-F00	Power Plant - 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-2107	Fixture - Lift, Engine Aft Mount Part #: C71024-20 Supplier: 81205

D. Location Zones

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

E. Prepare for the Removal

SUBTASK 71-21-03-840-001-F00

(1) Do this task: Power Plant - Removal, TASK 71-00-02-000-801-F00.

F. Aft Engine Mount Removal

SUBTASK 71-21-03-020-001-F00

(1) Disconnect the two thrust links [2] from the aft engine mount [1].

(a) Remove the nut [11], end cap [12], washer [13] and pawl pin [14] at each thrust link [2].

1) PAWL PINS WITH A SPRING LOADED PAWL;

Hold the spring-loaded pawl in while you remove the nut [11].

NOTE: You can use a metal or hard plastic tube or another nut to hold the pawl in.

2) PAWL PINS WITH A COTTER PIN;

Remove the cotter pin before you remove the nut [11].

SUBTASK 71-21-03-480-001-F00

(2) If you use the optional sling, do these steps to install the fixture, SPL-2107.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Install the "SHORT LEG" to the front hole on the left side as marked on the strap.

(b) Install the "LONG LEG" to the aft hole on the right side as marked on the strap.

SUBTASK 71-21-03-020-002-F00

WARNING BE CAREFUL WHEN YOU MOVE THE AFT ENGINE MOUNT. BECAUSE THE AFT ENGINE MOUNT WEIGHS APPROXIMATELY 60 POUNDS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these steps to remove the aft engine mount [1]:

(a) Remove the two nuts [4] and end caps [3] and the pawl pins [10] and [15] from the aft engine mount [1] at the two inner locations.

1) PAWL PINS WITH A SPRING LOADED PAWL;

Hold the spring-loaded pawl in while you remove the nut [4].

NOTE: You can use a metal or hard plastic tube or another nut to hold the pawl in.

2) PAWL PINS WITH A COTTER PIN;

Remove the cotter pin before you remove the nut [4].

(b) Remove the two nuts [5], end caps [6] and pawl pins [9] from the aft engine mount [1] at the two outer locations.

(c) Remove the aft engine mount [1].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Aft Engine Mount Installation
Figure 401/71-21-03-990-801-F00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 APPLY ANTI-SEIZE COMPOUND AS INDICATED.

2 PAWL PIN CAN TURN WITH HAND PRESSURE AFTER INSTALLATION.

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Aft Engine Mount Installation
Figure 401/71-21-03-990-801-F00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-21-03-400-801-F00

3. Aft Engine Mount Installation

(Figure 401)

A. General

(1) This task provides the instructions on how to install the aft engine mount.

(2) The aft engine mount is attached to the turbine rear frame at the 12:00 o'clock position.

B. References

Reference	Title
71-00-02-400-801-F00	Power Plant - 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-2107	Fixture - Lift, Engine Aft Mount Part #: C71024-20 Supplier: 81205

D. Consumable Materials

Reference	Description	Specification
D00006	Compound - Antiseize, Pure Nickel Special - Never-Seez NSBT-8N/-16N	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Mount	71-21-03-04-035	LOM ALL

F. Location Zones

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

G. Aft Engine Mount Installation

SUBTASK 71-21-03-480-002-F00

(1) If you use the optional sling, install the fixture, SPL-2107 (TASK 71-21-03-000-801-F00).

SUBTASK 71-21-03-212-001-F01

(2) Do a check of the assembled aft engine mount [1] for the correct installation of the center link.

(a) Look at the aft face of the center link.

(b) MARKED CENTER LINK;

1) Look for the AFT mark on the left side of the center link.

2) Look for the L mark on the left side and look for the R mark on the right side.

(c) If the center link installation is not correct, remove and re-install the center link.

SUBTASK 71-21-03-640-001-F00

(3) Apply Pure Nickel Special compound, D00006, to the threads, shanks, and below the heads of the pins and to bushings, bearings, and bores (Views A-A, B-B and C-C, Figure 401).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-21-03-420-001-F00

> **WARNING** BE CAREFUL WHEN YOU MOVE THE AFT ENGINE MOUNT. BECAUSE THE AFT ENGINE MOUNT WEIGHS APPROXIMATELY 60 POUNDS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR

(4) Do these steps to install the aft engine mount [1]:

(a) When you install the end caps [6], make sure that the flat side of the end cap [6] is against the pin shoulder.

1) If necessary, you can apply the torque to the nut [5] or the head of the pawl pin [9].

(b) Put the aft engine mount [1] on the turbine rear frame.

(c) Install the two pawl pins [9], end caps [6] and nuts [5] at the outer locations.

1) Make sure that no preload is applied when the pawl pins [9] are installed.

2) Tighten the nuts [5] to 440 in-lb (50 N·m) - 650 in-lb (73 N·m).

3) PAWL PINS WITH A SPRING LOADED PAWL;

a) Make sure the spring loaded pawl is in the extended position after you tighten the nut [5].

4) PAWL PINS WITH A COTTER PIN;

a) Install the cotter pin.

(d) Install the pawl pins [10], pawl pins [15], two end caps [3] and nuts [4] at the inner locations.

NOTE: The fit for pawl pin [10] is looser than the fit for pawl pin [15]. The pawl pin [10] is smaller than pawl pin [15] in diameter.

1) Make sure that no preload is applied when the pawl pins are installed.

a) If a preload is necessary, make sure to do the above check of the aft mount [1] for the correct installation of the center link.

2) Tighten the nuts [4] to 440 in-lb (50 N·m) - 650 in-lb (73 N·m).

3) PAWL PINS WITH A SPRING LOADED PAWL;

a) Make sure the spring loaded pawl is in the extended position after you tighten the nut [4].

4) PAWL PINS WITH A COTTER PIN;

a) Install the cotter pin.

SUBTASK 71-21-03-080-001-F00

(5) If you use the optional sling, remove the sling.

SUBTASK 71-21-03-420-002-F00

(6) Do these steps to connect the two thrust links [2] to the aft engine mount [1]:

(a) Put the thrust links [2] on the aft engine mount [1].

(b) Install the pawl pins [14], washers [13], end caps [12] and nuts [11].

1) Tighten the nuts [11] to 290 in-lb (32.8 N·m) - 510 in-lb (57.6 N·m).

2) PAWL PINS WITH A SPRING LOADED PAWL;

a) Make sure the spring-loaded pawl is in the extended position after you tighten the nut [11]

3) PAWL PINS WITH A COTTER PIN;

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a) Install the cotter pin.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 71-21-03-840-002-F00

(1) Do this task: Power Plant - Installation, TASK 71-00-02-400-801-F00.

END OF TASK

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NACELLE WIRING HARNESSES - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) Nacelle Wiring Harnesses Removal

(2) Nacelle Wiring Harnesses Installation.

TASK 71-51-03-000-801-F00

2. Nacelle Wiring Harnesses Removal

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, and Figure 406)

A. General

(1) This task provides the instructions on how to remove the nacelle wiring harnesses MW0301, MW0302, MW0303, MW0304, MW0311, MW0312 and MW0313.

(a) To remove the MW0311 harness, do this task: 3 O'clock Strut Harness Removal, TASK 73-21-06-000-802-F00

(2) Make sure you install protective covers on all electrical connectors and receptacles.

(3) For this procedure, a nacelle wiring harness will be referred to as a harness.

(4) You can remove one or more harnesses at a time. The removal procedure for each harness is equivalent.

B. References

Reference	Title
24-22-00-860-812	Remove Electrical Power (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
73-21-06-000-802-F00	3 O'clock Strut Harness Removal (P/B 401)

C. Location Zones

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

D. Prepare for Removal

SUBTASK 71-51-03-010-001-F00

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

SUBTASK 71-51-03-860-001-F00

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

E. Nacelle Wiring Harness Removal

SUBTASK 71-51-03-020-001-F00

(1) To remove the MW0301 harness [1], do these steps (Figure 401):

(a) Find the MW0301 harness [1] on the engine.

(b) Disconnect the harness from these components:

1) The service disconnect panel on the right side of the fan cowl support beam D30212 (D30412), DP0112.

2) The J1 receptacle on the aft side of the EEC, DP0101

3) Ignition Box 1, DP0102

4) The A/C receptacle on the N1 Speed Sensor, DP0103.

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SUBTASK 71-51-03-020-002-F00

(2) To remove the MW0302 harness [11], do these steps (Figure 402):

(a) Find the harness [11] on the engine.

(b) Disconnect the harness from these components:

1) The service disconnect panel on the right side of the fan cowl support beam D30256 (D30456), DP0256

2) The J2 receptacle on the aft side of the EEC, DP0202

3) Ignition Box 2, DP0201.

SUBTASK 71-51-03-020-003-F00

(3) To remove the MW0303 harness [21], do these steps (Figure 403):

(a) Find the MW0303 harness [21] on the engine.

(b) Disconnect the harness from these components:

1) The service disconnect panel on the right side of the fan cowl support beam D30224 (D30424), DP0324

2) The J3 receptacle on the aft side of the EEC, DP0303.

SUBTASK 71-51-03-020-004-F00

(4) To remove the MW0304 harness [31], do these steps (Figure 404):

(a) Find the MW0304 harness [31] on the engine.

(b) Disconnect the harness from these components:

1) The service disconnect panel on the right side of the fan cowl support beam D30260 (D30460), DP0460

2) The J4 receptacle on the aft side of the EEC, DP0404.

SUBTASK 71-51-03-020-012-F00

(5) To remove the MW0312 harness [41], do these steps (Figure 405):

(a) Find the MW0312 harness [41] on the engine.

(b) Disconnect the harness from these components:

1) The service disconnect panel on the left side of the fan cowl support beam D30234 (D30434), DP1234

2) The Start Valve, DP1202

3) The N2 Speed Sensor, DP1201

4) The IDG, DP1205 and DP1206

5) The EDP, DP1204

6) The HMU, DP1203 and DP1207.

SUBTASK 71-51-03-020-013-F00

(6) To remove the MW0313 harness [51], do these steps (Figure 406):

(a) Find the MW0313 harness [51] on the engine.

(b) Disconnect the harness from these components:

1) The service disconnect panel on the right side of the fan cowl support beam D30228 (D30428), DP1328

2) The inlet cowl TAI valve, DP1302 and DP1303

3) The oil quantity transmitter, DP1301

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4) The Number 1 Bearing Vibration Sensor, found aft of the oil tank and above the engine nameplate, DP1304.

SUBTASK 71-51-03-010-002-F00

(7) Disengage the harness you want to remove from its attach points.

NOTE: The attach points can be quarter-turn clamps, clips, clamp blocks, "P-clamps" or a combination of the three.

SUBTASK 71-51-03-010-003-F00

(8) Remove the harness from the engine.

END OF TASK

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Nacelle Wiring Harness (MW0301) Installation
Figure 401/71-51-03-990-801-F00

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Nacelle Wiring Harness (MW0302) Installation
Figure 402/71-51-03-990-802-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

G37244 S0006582182_V2

Nacelle Wiring Harness (MW0303) Installation
Figure 403/71-51-03-990-803-F00

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G37261 S0006582183_V2

Nacelle Wiring Harness (MW0304) Installation
Figure 404/71-51-03-990-804-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Nacelle Wiring Harness (MW0312) Installation
Figure 405/71-51-03-990-805-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

H54235 S0006582185_V2

Nacelle Wiring Harness (MW0313) Installation
Figure 406/71-51-03-990-806-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-51-03-400-801-F00

3. Nacelle Wiring Harnesses Installation

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, and Figure 406)

A. General

(1) This task provides the instructions on how to install the nacelle wiring harnesses MW0301, MW0302, MW0303, MW0304, MW0311, MW0312, and MW0313.

(a) To install the MW0311 harness, do this task: 3 O'clock Strut Harness Installation, TASK 73-21-06-400-802-F00.

(2) For this task, a nacelle wiring harness will be referred to as a harness.

(3) One or more harnesses can be installed at a time. The installation task for each harness is equivalent.

(4) Make sure that protective covers are correctly connected, cleaned, and removed from all electrical connectors and receptacles.

B. References

Reference	Title
24-11-00-700-802	Number 1 IDG - Operational Test (P/B 501)
24-11-00-700-803	Number 2 IDG - Operational Test (P/B 501)
24-22-00-860-811	Supply Electrical Power (P/B 201)
29-11-11-710-801	Hydraulic systems A and B Engine-Driven Pump (EDP) Depressurization Solenoid Valve - Operational Check (P/B 501)
30-21-11-400-801	Engine Cowl TAI Valve - Installation (P/B 401)
70-20-03-910-803-F00	Replacement of Hinged Clamp Cushions (P/B 201)
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)
73-21-06-400-802-F00	3 O'clock Strut Harness Installation (P/B 401)
79-31-01-400-801-F00	Oil Quantity Transmitter Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	Vaseline - Graphite Mineral	

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Harness	71-51-03-01-070	LOM 402, 404, 406, 407, 411, 416, 445
		71-51-03-01A-120	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
11	Harness	71-51-03-01-060	LOM 402, 404, 406, 407, 411, 416, 445
		71-51-03-01A-110	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
21	Harness	71-51-03-01-075	LOM 402, 404, 406, 407, 411, 416, 445

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(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
21 (cont.)		71-51-03-01A-125	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
31	Harness	71-51-03-01-080	LOM 402, 404, 406, 407, 411, 416, 445
		71-51-03-01A-130	LOM 411, 412, 415, 416, 420, 422-434, 437-447, 450-999
41	Harness	71-51-03-01-058	LOM 402, 404, 406, 407, 411, 416, 445
		71-51-03-01A-050	LOM 412, 415, 416, 420, 422-434, 437-447, 450-999
51	Harness	71-51-03-01-065	LOM 402, 404, 406, 407, 411, 416, 445
		71-51-03-01A-115	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. Prepare for the Installation

SUBTASK 71-51-03-020-007-F00

(1) Do these steps to prepare the attach hardware for the harness installation:

(a) Examine all clamps to make sure that they are not damaged.

1) Replace all damaged clamps.

(b) If it is necessary, lubricate the threads of the bolts and nuts with graphite mineral vaseline, D00601 [CP2101], before their installation.

G. Nacelle Wiring Harness Installation

SUBTASK 71-51-03-420-001-F00

(1) To install the MW0301 harness [1], do these steps (Figure 401):

(a) Put the MW0301 harness [1] on the engine.

(b) Connect the harness to these components:

1) The service disconnect panel on the right side of the fan cowl support beam D30212 (D30412), DP0112

2) The J1 receptacle on the aft side of the EEC, DP0101

3) Ignition Box 1, DP0102

4) The A/C receptacle on the N1 Speed Sensor, DP0103.

SUBTASK 71-51-03-420-002-F00

(2) To install the MW0302 harness [11], do these steps (Figure 402):

(a) Put the MW0302 harness [11] on the engine.

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(b) Connect the harness to these components:

1) The service disconnect panel on the right side of the fan cowl support beam D30256 (D30456), DP0256

2) The J2 receptacle on the aft side of the EEC, DP0202

3) Ignition Box 2, DP0201.

SUBTASK 71-51-03-420-003-F00

(3) To install the MW0303 harness [21], do these steps (Figure 403):

(a) Put the MW0303 harness [21] on the engine.

(b) Connect the harness to these components:

1) The service disconnect panel on the right side of the fan cowl support beam D30224 (D30424), DP0324

2) The J3 receptacle on the aft side of the EEC, DP0303.

SUBTASK 71-51-03-420-004-F00

(4) To install the MW0304 harness [31], do these steps (Figure 404):

(a) Put the MW0304 harness [31] on the engine.

(b) Connect the harness to these components:

1) The service disconnect panel on the right side of the fan cowl support beam D30260 (D30460), DP0460

2) The J4 receptacle on the aft side of the EEC, DP0404.

SUBTASK 71-51-03-420-005-F00

(5) To install the MW0312 harness [41], do these steps (Figure 405):

(a) Put the MW0312 harness [41] on the engine.

CAUTION	DO NOT TIGHTEN THE PLUG COUPLING RINGS TOO MUCH. DO NOT USE WATER PUMP PLIERS, PIPE WRENCHES, OR VICE GRIPS TO TIGHTEN THE COUPLING RING OR DAMAGE TO THE ELECTRICAL CONNECTOR CAN OCCUR.

(b) Connect the harness to these components:

1) The service disconnect panel on the left side of the fan cowl support beam D30234 (D30434), DP1234

2) The Start Valve, DP1202

3) The N2 Speed Sensor, DP1201

4) The IDG, DP1205 and DP1206

5) The EDP, DP1204

6) The HMU, DP1203 and DP1207.

SUBTASK 71-51-03-420-006-F00

(6) To install the MW0313 harness [51], do these steps (Figure 406):

(a) Put the MW0313 harness [51] on the engine.

(b) Connect the harness to these components:

1) The service disconnect panel on the right side of the fan cowl support beam D30228 (D30428), DP1328

2) The inlet cowl TAI valve, DP1302 and DP1303

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3) The oil quantity transmitter, DP1301

4) The Number 1 Bearing Vibration Sensor, found aft of the oil tank and above the engine nameplate, DP1304.

SUBTASK 71-51-03-020-009-F00

(7) Make sure that the connectors are fully engaged and do not move.

SUBTASK 71-51-03-020-010-F00

(8) Make sure that the force on the harness is applied equally and the harness is not stressed or torn.

SUBTASK 71-51-03-020-011-F00

(9) Engage the harness in its attach points on the engine.

NOTE: The attach points can be quarter-turn clamps, clips, clamp blocks, "P-clamps" or a combination of the three.

(a) Do this task: Replacement of Hinged Clamp Cushions, TASK 70-20-03-910-803-F00.

SUBTASK 71-51-03-420-007-F00

(10) Torque the hinged clamp bolts to 60 in-lb (6.8 N·m) - 65 in-lb (7.3 N·m).

SUBTASK 71-51-03-860-002-F00

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

H. Nacelle Wiring Harness Test

SUBTASK 71-51-03-710-002-F00

(1) For the MW0313 harness [51], do these steps:

(a) Do the Engine Cowl TAI Valve Installation Test (TASK 30-21-11-400-801).

(b) Do the Oil Quantity Transmitter Installation Test (TASK 79-31-01-400-801-F00).

SUBTASK 71-51-03-710-004-F00

(2) For the MW0312 harness [41], do these steps:

(a) Do this task: Hydraulic systems A and B Engine-Driven Pump (EDP) Depressurization Solenoid Valve - Operational Check, TASK 29-11-11-710-801.

(b) For Engine 1, do this task: Number 1 IDG - Operational Test, TASK 24-11-00-700-802.

(c) For Engine 2, do this task: Number 2 IDG - Operational Test, TASK 24-11-00-700-803.

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

SUBTASK 71-51-03-710-003-F00

(3) For the other wiring harnesses, do the applicable test(s) listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

I. Put the Airplane Back to Its Usual Condition

SUBTASK 71-51-03-400-001-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 VENTS AND DRAINS - INSPECTION/CHECK

1. General

A. This procedure has these tasks:

(1) Engine Vents and Drains Inspection

(2) Drain Lines Inspection (Operational Check)

NOTE: This procedure is a scheduled maintenance task.

(3) Drain Lines Inspection (General Visual).

TASK 71-71-00-200-801-F00

2. Engine Vents and Drains Inspection

(Figure 601, Figure 602, Figure 603, and Figure 604)

A. General

(1) This task estimates the condition of the Line Replaceable Unit (LRU) by the rate of fluid leakage at the drains.

(2) Leaks from the drain can occur on an engine that does not operate or during an engine start. These leaks are not unusual, and may stop after the engine operates at minimum idle for five (5) minutes.

(3) This task examines the engine and strut drains in these areas:

(a) Below the engine fan case for Accessory Gear Box (AGB)-mounted and engine core component drains, the forward sump and the service disconnect (strut) drain.

(b) Inside the primary plug assembly for the aft sump drain.

B. References

Reference	Title
24-11-00-700-801	IDG Oil System Static Leak Check (P/B 201)
24-11-11-000-801	Integrated Drive Generator (IDG) Removal (P/B 401)
24-11-11-400-801	Integrated Drive Generator (IDG) Installation (P/B 401)
24-11-21-200-801	Integrated Drive Generator (IDG) Air/Oil Cooler - Inspection/Check (P/B 201)
28-22-15-710-801	Engine Fuel Feed Manifold - Leak Test (P/B 601)
29-00-00-790-801	Hydraulic System External Leakage Check (P/B 601)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
71-00-00-700-807-F00	Test 12 - Actuators Test (P/B 501)
71-00-00-700-823-F00	Test 3B - Part-Power Leak Check (P/B 501)
71-00-00-800-806-F00	Engine Operation Limits (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)
72-00-00-200-802-F00	Borescope Inspection Preparation (P/B 601)
72-60-00-000-801-F00	Magnetic Seal Removal (P/B 201)
72-60-00-000-802-F00	Sealol Seal - Removal (P/B 201)
72-60-00-400-801-F00	Magnetic Seal Installation (P/B 201)
72-60-00-400-802-F00	Sealol Seal - Installation (P/B 201)

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Reference	Title
73-11-01-000-801-F00	Fuel Pump Package Removal (P/B 401)
73-11-01-400-801-F00	Fuel Pump Package Installation (P/B 401)
73-11-08-000-801-F00	Burner Staging Valve Removal (P/B 401)
73-11-08-400-801-F00	Burner Staging Valve Installation (P/B 401)
73-21-10-000-801-F00	HMU Removal (P/B 401)
73-21-10-400-801-F00	HMU Installation (P/B 401)
75-21-01-000-801-F00	HPTACC Valve Removal (P/B 401)
75-21-01-400-801-F00	HPTACC Valve Installation (P/B 401)
75-22-04-000-802-F00	LPTACC Valve Removal (P/B 401)
75-22-04-400-802-F00	LPTACC Valve Installation (P/B 401)
75-23-01-000-801-F00	Transient Bleed Valve Removal (P/B 401)
75-23-01-400-801-F00	Transient Bleed Valve Installation (P/B 401)
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)
75-32-02-000-801-F00	Left VBV Actuator Removal (P/B 401)
75-32-02-000-802-F00	Right VBV Actuator Removal (P/B 401)
75-32-02-400-801-F00	Left VBV Actuator Installation (P/B 401)
75-32-02-400-802-F00	Right VBV Actuator 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)
79-00-00-200-804-F00	Chip Detectors and Scavenge Screens - Inspection (P/B 601)
79-11-01-300-801-F00	Replacement of the Filler Cap Packing or Filler Cap (P/B 801)
79-21-02-000-801-F00	Main Oil/Fuel Heat Exchanger Removal (P/B 401)
79-21-02-400-801-F00	Main Oil/Fuel Heat Exchanger Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)
STD-3941	Container - Calibrated, 1 quart (1 l), oil resistant

D. Location Zones

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

E. Prepare for the Inspection

SUBTASK 71-71-00-010-012-F00

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

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F. Engine Vents and Drains Inspection

SUBTASK 71-71-00-790-001-F00

(1) Do a visual check of the drains for signs of leakage (Figure 601, Figure 602).

NOTE: Leaks from the drain can occur on an engine that does not operate or during an engine start. These leaks are not unusual, and may stop after the engine operates at idle power for 5 minutes.

SUBTASK 71-71-00-790-002-F00

(2) If there are no signs of leakage, the engine is serviceable.

(a) Continue to the task in the paragraph, Put the Airplane Back to Its Usual Condition.

SUBTASK 71-71-00-790-011-F00

(3) These leakage limits are given in threshold limits and serviceable limits:

NOTE: The limits apply for static leaks (engine off) and dynamic leaks (engine on).

(a) For fuel leaks:

1) If the total leakage rate from the drains is less than the threshold limit, you can continue to operate the engine (maintenance action is not necessary).

2) If the total leakage rate from the drains is more than the threshold limit, but less than the serviceable limit, corrective action must be done before 25 flight cycles.

3) If the total leakage rate from the drains is more than the serviceable limit, you must do the corrective action.

(b) For oil leaks:

1) If the leakage rate is more than the threshold limit, but less than the serviceable limit, you can continue to operate the engine until maintenance can be done.

2) If the leakage rate is more than the serviceable limit, maintenance must be done before you operate the engine again.

(c) For hydraulic leaks:

1) If the total leakage rate from the strut drain is more than the serviceable limit, you must do the corrective action.

(d) Use the applicable limit in the paragraph, Leakage Limits and Corrective Action.

(e) If maintenance action is not necessary, continue to the task in the paragraph, Put the Airplane Back to Its Usual Condition.

SUBTASK 71-71-00-790-003-F00

WARNING OBSERVE THE HAZARD AREAS, ESPECIALLY THE ENTRY/EXIT CORRIDOR. ENTRY INTO THE HAZARD AREA COULD CAUSE SERIOUS INJURY TO PERSONS OR POSSIBLE LOSS OF LIFE.

(4) If you see signs of leakage, do these steps to identify the source of the leakage and the leakage rate:

NOTE: These steps are not necessary if the leakage rate is less than the threshold limit for the applicable drain.

(a) Put a 1 U.S.-gal (3.81 l) oil resistant container, STD-203, below the drain you think has leakage.

1) You can install plastic tubes and bottles on the drain.

a) Use a minimum tube length and make sure that the connections are sealed.

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(b) To identify hydraulic leakage, do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

1) Record the start time and the stop time.

(c) To identify fuel leakage from a specific fuel component, do one of the tasks that follow: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00 or Test 12 - Actuators Test, TASK 71-00-00-700-807-F00.

1) Record the start time and the stop time.

(d) To identify oil leakage, do this task: Test 3B - Part-Power Leak Check, TASK 71-00-00-700-823-F00.

1) Record the start time and the stop time.

(e) Monitor the drains for drops of fluid.

1) If you see leakage, identify the drain location and record the number of drops.

(f) Calculate the total engine operation time.

(g) Calculate the number of drops per minute.

(h) Change the number of drops per minute to cc's per hour.

NOTE: 20 drops are approximately one cc.

(i) Compare the leakage rate with the threshold and serviceable limits for that fluid system drain.

NOTE: Leakage from the drain of the main oil/fuel heat exchanger can be fuel or oil.

NOTE: Leakage from the hydraulic pump AGB pad can be hydraulic fluid or oil.

NOTE: Leakage from the drain of the main fuel pump can be fuel or oil.

SUBTASK 71-71-00-790-004-F00

WARNING OBSERVE THE HAZARD AREAS, ESPECIALLY THE ENTRY/EXIT CORRIDOR. ENTRY INTO THE HAZARD AREA COULD CAUSE SERIOUS INJURY TO PERSONS OR POSSIBLE LOSS OF LIFE.

(5) If the leakage is more than the threshold or serviceable limit, do these steps again to make sure that the corrective action is necessary:

(a) Put a 1 U.S.-gal (3.81 l) oil resistant container, STD-203, below the drain you think has leakage.

1) Install plastic tubes and bottles on the drain.

a) Use a minimum tube length.

b) Make sure that the connections are sealed.

(b) To identify fuel or hydraulic leakage, do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

1) Record the start time and the stop time.

(c) To identify oil leakage from the oil drains (static), do this task: Test 3B - Part-Power Leak Check, TASK 71-00-00-700-823-F00.

1) Record the start time and the stop time.

(d) To identify oil leakage from the AGB pad drain (AGB rotating seal), do this task: Test 3B - Part-Power Leak Check, TASK 71-00-00-700-823-F00.

1) Record the start time and the stop time.

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(e) Monitor the drain for drops of fluid.

(f) Calculate the total engine operation time.

(g) Calculate the number of drops per minute.

(h) Change the number of drops per minute to cc's per hour.

NOTE: 20 drops are approximately one cc.

(i) Compare the leakage rate with the threshold and serviceable limits for that fluid system drain.

NOTE: Leakage from the drain of the main oil/fuel heat exchanger can be fuel or oil.

NOTE: Leakage from the hydraulic pump AGB pad can be hydraulic fluid or oil.

NOTE: Leakage from the drain of the main fuel pump can be fuel or oil.

(j) If the leakage rate is still more than the threshold or serviceable limit, do the corrective action for the applicable drain as given below in this paragraph: Leakage Limits and Corrective Action.

SUBTASK 71-71-00-790-005-F00

(6) If you find oil leakage from the Integrated Drive Generator (IDG) pad drain, find if the leakage is from the IDG or AGB:

(a) Do this task: IDG Oil System Static Leak Check, TASK 24-11-00-700-801.

(b) If there is a static leak, then the leakage is from the IDG input shaft seal.

(c) If there is no static leak, then the leakage is from the AGB pad seal.

LOM ALL PRE SB CFM56-7B 73-044

SUBTASK 71-71-00-790-006-F00

(7) If you find leakage from the Burner Staging Valve (BSV)/Low Pressure Turbine Active Clearance Control (LPTACC) valve drain, do these steps (Figure 603):

NOTE: The BSV and the LPTACC valve have a common drain line. Before you can do the corrective action, you must find which of the two components has the leak. CFMI SB 73-044 deletes BSV and the common drain.

WARNING KEEP PERSONNEL AND EQUIPMENT AWAY FROM THE AREA AROUND THE THRUST REVERSERS. THE THRUST REVERSERS EXTEND AND RETRACT QUICKLY. INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

(b) Do these steps to isolate the leakage:

1) Remove the nut [2] and bolt [1] from the loop clamp [3] and remove the loop clamp [3].

2) Disconnect the LPTACC drain tube from the BSV drain tube.

3) Put a protective cap on the end of the BSV drain tube.

4) Put a plastic bag on the tube nut of the LPTACC drain tube and tighten it with a plastic tie.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LOM ALL PRE SB CFM56-7B 73-044 (Continued)

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

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

(d) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

1) Record the start time and the stop time.

2) Run the engine at idle power for ten minutes.

(e) Monitor the drain for drops of fuel.

(f) Calculate the total engine operation time.

(g) Record the number of drops from the BSV drain tube.

(h) Change the number of drops per minute to cc's per hour.

NOTE: 20 drops are approximately one cc.

(i) Do these steps to find the leakage rate from the LPTACC valve:

> **WARNING** KEEP PERSONNEL AND EQUIPMENT AWAY FROM THE AREA AROUND THE THRUST REVERSERS. THE THRUST REVERSERS EXTEND AND RETRACT QUICKLY. 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.

2) Remove the plastic bag from the LPTACC valve drain tube.

3) Put the fuel from the inside of the bag in a 1 quart (1 l) oil resistant calibrated container, STD-3941.

4) Calculate the leakage rate for the LPTACC valve.

(j) Compare the leakage rate with the limits for the LPTACC valve and the BSV.

(k) Do these steps to connect the LPTACC drain tube to the BSV drain tube:

1) Remove the cap from the BSV drain tube.

2) Connect the LPTACC drain tube to the BSV drain tube.

a) Torque the tube nut to 135 in-lb (15 N·m) - 150 in-lb (17 N·m).

3) Install the loop clamp [3] on the LPTACC drain tube with the bolt [1] and nut [2].

a) Torque the nut [2] to 62 in-lb (7 N·m) - 68 in-lb (8 N·m).

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

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

LOM ALL

G. Leakage Limits and Corrective Action

SUBTASK 71-71-00-790-007-F00

(1) Fuel drain system

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(a) Fluid: Fuel

(b) Threshold limit: 180 cc/hr (60 drops per minute)

1) If the leakage is less than the threshold limit, no maintenance action is necessary.

2) If the leakage is more than the threshold limit and less than the serviceable limit, you can continue the engine in service for not more than 25 flight cycles before you replace the applicable component.

(c) Serviceable limit: 270 cc/hr (90 drops per minute)

(d) Replace the applicable component:

1) For the left Variable Stator Vane Actuator (VSVA), these are the tasks:

Left VSV Actuator Removal, TASK 75-31-01-000-801-F00 and

Left VSV Actuator Installation, TASK 75-31-01-400-801-F00.

2) For the right VSVA, these are the tasks:

Right VSV Actuator Removal, TASK 75-31-01-000-802-F00 and

Right VSV Actuator Installation, TASK 75-31-01-400-802-F00.

3) For the left Variable Bleed Valve (VBV) actuator, these are the tasks:

Left VBV Actuator Removal, TASK 75-32-02-000-801-F00 and

Left VBV Actuator Installation, TASK 75-32-02-400-801-F00.

4) For the right VBV actuator, these are the tasks:

Right VBV Actuator Removal, TASK 75-32-02-000-802-F00 and

Right VBV Actuator Installation, TASK 75-32-02-400-802-F00.

5) For the Transient Bleed Valve (TBV), these are the tasks:

Transient Bleed Valve Removal, TASK 75-23-01-000-801-F00 and

Transient Bleed Valve Installation, TASK 75-23-01-400-801-F00.

LOM ALL PRE SB CFM56-7B 73-044

6) For the BSV, these are the tasks:

Burner Staging Valve Removal, TASK 73-11-08-000-801-F00 and

Burner Staging Valve Installation, TASK 73-11-08-400-801-F00.

LOM ALL

7) For the High Pressure Turbine Active Clearance Control (HPTACC) valve, these are the tasks:

HPTACC Valve Removal, TASK 75-21-01-000-801-F00 and

HPTACC Valve Installation, TASK 75-21-01-400-801-F00.

8) For the LPTACC valve, these are the tasks:

LPTACC Valve Removal, TASK 75-22-04-000-802-F00 and

LPTACC Valve Installation, TASK 75-22-04-400-802-F00.

9) For the gasket or the Hydro-Mechanical Unit (HMU), these are the tasks:

HMU Removal, TASK 73-21-10-000-801-F00 and

HMU Installation, TASK 73-21-10-400-801-F00.

10) For the main oil/fuel heat exchanger, these are the tasks:

Main Oil/Fuel Heat Exchanger Removal, TASK 79-21-02-000-801-F00 and

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Main Oil/Fuel Heat Exchanger Installation, TASK 79-21-02-400-801-F00.

11) For the main fuel pump, these are the tasks:
Fuel Pump Package Removal, TASK 73-11-01-000-801-F00 and
Fuel Pump Package Installation, TASK 73-11-01-400-801-F00.

SUBTASK 71-71-00-010-002-F00

(2) Engine oil drain system (not the IDG and its cooling system and N2 drive pad)
(a) Fluid: Oil
(b) Threshold limit: 7 cc/hr (2 drops per minute)
1) You can continue the engine in service until the maintenance can be done.
a) At that time, replace the applicable component below.
(c) Serviceable limit: 20 cc/hr (7 drops per minute)
(d) Replace the applicable component:
1) For the main oil/fuel heat exchanger, these are the tasks:
Main Oil/Fuel Heat Exchanger Removal, TASK 79-21-02-000-801-F00 and
Main Oil/Fuel Heat Exchanger Installation, TASK 79-21-02-400-801-F00.
2) Replace the AGB rotating seal of the applicable pad for the fuel pump, hydraulic pump or IDG as follows:
a) For a magnetic seal, these are the tasks:
Magnetic Seal Removal, TASK 72-60-00-000-801-F00 and
Magnetic Seal Installation, TASK 72-60-00-400-801-F00.
b) For a Sealol seal, these are the tasks:
Sealol Seal - Removal, TASK 72-60-00-000-802-F00 and
Sealol Seal - Installation, TASK 72-60-00-400-802-F00.

SUBTASK 71-71-00-010-003-F00

(3) Hydraulic drain system
(a) Fluid: Hydraulic fluid
(b) For the limits of the hydraulic engine-driven pump (TASK 29-00-00-790-801).

SUBTASK 71-71-00-790-008-F00

(4) IDG input shaft seal
(a) Fluid: Oil
(b) Serviceable Limit: 1 cc/hr
(c) Corrective action: replace the IDG (TASK 24-11-11-000-801 and TASK 24-11-11-400-801).

SUBTASK 71-71-00-790-013-F00

(5) If it is necessary, repair or replace the IDG air/oil cooler (TASK 24-11-21-200-801).

SUBTASK 71-71-00-790-012-F00

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

(6) N2 drive (hand cranking) pad drain
(a) Fluid: Oil
(b) Threshold Limit: 7 cc/hr (2 drops/minute)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(c) Serviceable Limit: 20 cc/hr (7 drops/minute)

(d) Corrective action, replace the Sealol seal (TASK 72-60-00-000-802-F00 and TASK 72-60-00-400-802-F00).

LOM ALL

SUBTASK 71-71-00-010-004-F00

(7) Forward Sump

(a) Fluid: Oil

(b) Threshold Limit: 15 cc/hr (5 drops/minute)

(c) Serviceable Limit: 60 cc/hr (20 drops/minute)

(d) Corrective action:

1) Replace the engine (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

SUBTASK 71-71-00-010-005-F00

(8) Oil Tank Scupper

(a) Fluid: Oil

(b) Serviceable limit: Oil that flows from the oil tank servicing only.

(c) Corrective action:

1) Make sure that the oil tank cap is installed correctly.

2) Make sure that there is no oil leakage when you service the oil tank.

3) Make sure that the oil tank cap O-ring is not damaged.

a) If the O-ring is damaged, do this task: Replacement of the Filler Cap Packing or Filler Cap, TASK 79-11-01-300-801-F00.

SUBTASK 71-71-00-010-006-F00

(9) Aft Sump (Overboard Drain)

NOTE: Oil traces at the bottom of exhaust plug, the exhaust sleeve and the Turbine Rear Frame (TRF) are usual. Oil coking at the flame arrestor and on the rear cover is usual.

NOTE: An engine exhaust system consists of the exhaust plug and the exhaust sleeve.

NOTE: An oil puddle in the exhaust system is usual. After engine dry or wet motoring, a large oil puddle in the exhaust system is usual. Oil leaks are possible at the TRF and primary exhaust system flange. It is permitted to see oil drops at the TRF drain port at the 6:00 o'clock location.

NOTE: If oil puddling is found, refer to Borescope Inspection Preparation, TASK 72-00-00-200-802-F00 for cleaning the primary plug.

(a) Fluid: Oil

(b) Serviceable limit:

1) Any amount, if the oil consumption remains within Airplane Maintenance Manual (AMM) limits (TASK 71-00-00-800-806-F00).

(c) Corrective action:

1) Do the scavenge screen inspection for the aft sump only and look for obstruction (TASK 79-00-00-200-804-F00).

ECCN 9E991 BOEING PROPRIETARY - See title page for details

a) If you find obstruction, clean the screen and do the corrective action for the type of material you find.

b) If you do not find obstruction in the scavenge screen, examine the aft sump oil scavenge line or obstruction.

c) If no problem is found, replace the engine (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

SUBTASK 71-71-00-010-007-F00

(10) Service Disconnect (Strut) Drain

(a) Fluid: Hydraulic fluid

1) Serviceable limit: 0

2) Corrective action:

a) Find and correct the hydraulic fluid leak (TASK 29-00-00-790-801).

(b) Fluid: Fuel

1) Serviceable limit: 0

2) Corrective action:

a) Find and correct the fuel leak (TASK 28-22-15-710-801).

H. Put the Airplane Back to its Usual Condition

SUBTASK 71-71-00-410-007-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

NOTE:

ENGINE 1 SHOWN
ENGINE 2 OPPOSITE

Fan Cowl Panel Inspection
Figure 601/71-71-00-990-801-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Engine Vents and Drains Inspection
Figure 602/71-71-00-990-802-F00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 ENGINES POST-CFMI-SB 73-044;
LPTACC VALVE DRAIN ONLY

G43758 S0006582193_V2

Engine Vents and Drains Inspection
Figure 602/71-71-00-990-802-F00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 NON-7BE ENGINES PRE-CFM-SB 72-0564

2 NON-7BE ENGINES POST-CFM-SB 72-0564 OR 7BE ENGINES

G43663 S0006582196_V4

Engine Vents and Drains Inspection
Figure 602/71-71-00-990-802-F00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

1 SHORT PRIMARY PLUG DRAIN

K21726 S0006582197_V5

Engine Vents and Drains Inspection
Figure 602/71-71-00-990-802-F00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

NOTE:

EXTENSION RING SEGMENT NOT SHOWN.

1 ENGINES PRE-CFMI-SB 73-044

G43673 S0006582198_V3

LPTACC Valve Drain Tube Disconnection
Figure 603/71-71-00-990-803-F00

ECCN 9E991 BOEING PROPRIETARY - See title page for details

FAN CASE
(RIGHT SIDE)

L05070 S0006582202_V2

Drain Lines Operational Check
Figure 604/71-71-00-990-804-F00 (Sheet 1 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HYDROMECHANICAL UNIT (HMU)

A

L05256 S0006582203_V2

Drain Lines Operational Check
Figure 604/71-71-00-990-804-F00 (Sheet 2 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

L05296 S0006582204_V2

Drain Lines Operational Check
Figure 604/71-71-00-990-804-F00 (Sheet 3 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

HPTACC VALVE AND
RIGHT VSV ACTUATOR

C

FUEL MANIFOLD

D

FUEL MANIFOLD

D

RIGHT VBV ACTUATOR

E

1 ENGINES PRE-CFM-SB 73-045
2 ENGINES POST-CFM-SB 73-045

L05200 S0006582205_V3

Drain Lines Operational Check
Figure 604/71-71-00-990-804-F00 (Sheet 4 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

Drain Lines Operational Check
Figure 604/71-71-00-990-804-F00 (Sheet 5 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

LEFT VSV ACTUATOR

G

LEFT VBV ACTUATOR

H

L05142 S0006582207_V2

Drain Lines Operational Check
Figure 604/71-71-00-990-804-F00 (Sheet 6 of 6)

ECCN 9E991 BOEING PROPRIETARY - See title page for details

TASK 71-71-00-700-801-F00

3. **Drain Lines Inspection (Operational Check)**

(Figure 602, Figure 603, and Figure 604)

NOTE: This procedure is a scheduled maintenance task.

A. 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)
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. Tools/Equipment

Reference	Description
STD-1280	Source - Air, Regulated, Dry Filtered, 0-30 PSIG

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. Drain Lines Inspection (Operational Check)

SUBTASK 71-71-00-010-013-F00

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

SUBTASK 71-71-00-010-010-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.

(2) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 71-71-00-210-004-F00

(3) Do these steps to prepare for the operational check:

(a) Find the drain lines for the check (Figure 602).

(b) Find the applicable drain line connections at the engine component to disconnect (Figure 603 and Figure 604).

NOTE: Some connections are found at a different location than the engine component.

1) The forward sump drain is on the fan case (rear) at the 5:00 o'clock position.

2) The TBV drain is on the TBV fuel manifold.

3) The VSV drain is on the rod-end and head-end of the actuators.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

SUBTASK 71-71-00-700-001-F00

(4) Do the operational check for each drain line.

(a) It is not necessary to do a check of the engine aft sump drain.

(b) Disconnect the applicable drain line from the engine component and push the line away from the component.

1) It is not necessary to disconnect the oil tank scupper drain.

2) It can be necessary to disconnect the clamps on some of the drain lines.

LOM ALL PRE SB CFM56-7B 73-044

3) For the BSV/LPTACC valve drain line, disconnect the drain lines from the two components and alternately install a cap on the drain lines to do the check of each drain.

LOM ALL POST SB CFM56-7B 73-044

4) The BSV is not installed.

LOM ALL

5) For the HPTACC valve drain, do the applicable step to get access to the drain:

LOM ALL PRE SB 737-CFM56-7B-73-045

a) Disconnect the drain line at the fuel manifold.

LOM ALL POST SB 737-CFM56-7B-73-045

b) Remove the four bolts at the fuel manifold.

LOM ALL

(c) Connect the 0-30 psig dry filtered regulated air source, STD-1280, to the bottom of the applicable drain line.

(d) Make sure that the air flows freely through the line.

(e) If you find blockage, remove the blockage or replace the drain line.

(f) Re-connect the applicable drain line at the engine component.

1) For the HPTACC valve drain, do the applicable step to connect the drain:

LOM ALL PRE SB 737-CFM56-7B-73-045

a) Connect the drain line at the fuel manifold.

LOM ALL POST SB 737-CFM56-7B-73-045

b) Connect the fuel manifold.

<1> Lubricate the threads of the four bolts with graphite mineral vaseline, D00601 [CP2101].

<2> Install the gasket between the fuel manifold and the HPTACC valve.

<a> If the gasket is damaged or deformed, replace it.

<3> Install the four bolts.

<4> Tighten the four bolts to 62 in-lb (7 N·m) - 68 in-lb (8 N·m).

LOM ALL

(g) Connect the clamps that you loosened to move the drain line.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

(h) Remove the 0-30 psig dry filtered regulated air source, STD-1280, from the bottom of the applicable drain line.

SUBTASK 71-71-00-410-003-F00

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

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

SUBTASK 71-71-00-410-008-F00

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

LOM ALL POST SB 737-CFM56-7B-73-045

SUBTASK 71-71-00-710-001-F00

(7) Do a leak check of the HPTACC valve fuel manifold (TASK 71-00-00-800-811-F00).

LOM ALL

END OF TASK

TASK 71-71-00-200-802-F00

4. Drain Lines Inspection (General Visual)

(Figure 602 and Figure 603)

A. General

(1) This task examines the drain lines for physical damage (as an example, dents and cracks).

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. Location Zones

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

D. Prepare for the Inspection

SUBTASK 71-71-00-010-014-F00

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

SUBTASK 71-71-00-010-015-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.

(2) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

ECCN 9E991 BOEING PROPRIETARY - See title page for details

E. Drain Lines Inspection (General Visual)

SUBTASK 71-71-00-210-002-F00

(1) Visually examine the drain lines for the correct installation.

(a) Make sure there are no loose connections and loose clamps.

SUBTASK 71-71-00-210-003-F00

(2) Visually examine the drain lines for obvious signs of damage.

(a) Look for dents, cracks, wear, and kinks.

(b) If you find damage, replace or repair the drain line.

F. Put the Airplane Back to its Usual Condition

SUBTASK 71-71-00-410-010-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 71-71-00-410-009-F00

(2) 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