CHAPTER

72

ENGINE

(CFM56 ENGINES (CFM56-7))

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

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R 801	Jun 15/2016	
802	Oct 15/2014	
803	Oct 15/2014	
R 804	Jun 15/2016	
805	Oct 15/2015	
R 806	Jun 15/2016	
R 807	Jun 15/2016	
R 808	Jun 15/2016	
809	Oct 15/2015	
810	Feb 15/2015	
811	Oct 15/2014	
812	Feb 15/2016	
813	Oct 15/2014	
814	Oct 15/2014	
R 815	Jun 15/2016	
R 816	Jun 15/2016	
R 817	Jun 15/2016	
R 818	Jun 15/2016	
R 819	Jun 15/2016	
R 820	Jun 15/2016	
R 821	Jun 15/2016	
R 822	Jun 15/2016	
R 823	Jun 15/2016	
824	Feb 15/2016	
825	Feb 15/2016	
826	Feb 15/2016	
72-56-00 (cont)		
827	Feb 15/2016	
828	Feb 15/2016	
829	Feb 15/2016	
830	Feb 15/2016	
831	Feb 15/2016	
832	Feb 15/2016	
833	Feb 15/2016	
834	Feb 15/2016	
835	Feb 15/2016	
836	Feb 15/2016	
837	Feb 15/2016	
838	BLANK	
72-56-01		
401	Feb 15/2015	
402	Feb 15/2015	
R 403	Jun 15/2016	
R 404	Jun 15/2016	
R 405	Jun 15/2016	
R 406	Jun 15/2016	
407	Feb 15/2015	
408	Oct 15/2014	
409	Oct 15/2014	
410	BLANK	
72-60-00		
201	Jun 15/2015	
202	Jun 15/2015	
R 203	Jun 15/2016	
R 204	Jun 15/2016	
R 205	Jun 15/2016	
R 206	Jun 15/2016	
R 207	Jun 15/2016	
208	Oct 15/2015	
209	Oct 15/2015	
210	Jun 15/2015	
211	Feb 15/2016	
R 212	Jun 15/2016	
72-60-00 (cont)		
R 213	Jun 15/2016	
R 214	Jun 15/2016	
215	Oct 15/2015	
216	Oct 15/2015	
R 217	Jun 15/2016	
R 218	Jun 15/2016	
R 219	Jun 15/2016	
R 220	Jun 15/2016	
R 221	Jun 15/2016	
R 222	Jun 15/2016	
223	Feb 15/2016	
224	Feb 15/2016	
225	Feb 15/2016	
R 226	Jun 15/2016	
227	Feb 15/2016	
R 228	Jun 15/2016	
O 229	Jun 15/2016	
230	BLANK	
72-60-00		
601	Jun 15/2015	
602	Jun 15/2015	
R 603	Jun 15/2016	
R 604	Jun 15/2016	
605	Jun 15/2015	
606	BLANK	
72-62-00		
401	Jun 15/2015	
402	Jun 15/2015	
403	Oct 15/2014	
404	Oct 15/2014	
R 405	Jun 15/2016	
R 406	Jun 15/2016	
R 407	Jun 15/2016	
R 408	Jun 15/2016	
R 409	Jun 15/2016	
R 410	Jun 15/2016	

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72-62-00 (cont)		
411	Oct 15/2015	
412	Oct 15/2015	
413	Oct 15/2014	
414	BLANK	
72-62-00		
601	Jun 15/2015	
602	Jun 15/2015	
R 603	Jun 15/2016	
R 604	Jun 15/2016	
R 605	Jun 15/2016	
R 606	Jun 15/2016	
607	Feb 15/2016	
608	Oct 15/2015	
609	Jun 15/2015	
R 610	Jun 15/2016	
R 611	Jun 15/2016	
612	BLANK	
72-63-00		
201	Jun 15/2015	
202	Oct 15/2014	
203	Oct 15/2014	
R 204	Jun 15/2016	
R 205	Jun 15/2016	
R 206	Jun 15/2016	
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R 211	Jun 15/2016	
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R 403	Jun 15/2016	
O 404	Jun 15/2016	
O 405	Jun 15/2016	
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O 406	Jun 15/2016	
R 407	Jun 15/2016	
R 408	Jun 15/2016	
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R 410	Jun 15/2016	
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R 422	Jun 15/2016	
R 423	Jun 15/2016	
R 424	Jun 15/2016	
R 425	Jun 15/2016	
R 426	Jun 15/2016	
R 427	Jun 15/2016	
R 428	Jun 15/2016	
R 429	Jun 15/2016	
R 430	Jun 15/2016	
O 431	Jun 15/2016	
R 432	Jun 15/2016	
O 433	Jun 15/2016	
O 434	Jun 15/2016	
435	Oct 15/2015	
R 436	Jun 15/2016	
O 437	Jun 15/2016	
438	BLANK	
72-63-00		
601	Jun 15/2015	
602	Oct 15/2014	
72-63-00 (cont)		
603	Oct 15/2014	
604	Jun 15/2015	
R 605	Jun 15/2016	
R 606	Jun 15/2016	
R 607	Jun 15/2016	
R 608	Jun 15/2016	
R 609	Jun 15/2016	
R 610	Jun 15/2016	
72-63-01		
201	Jun 15/2015	
202	Oct 15/2014	
R 203	Jun 15/2016	
R 204	Jun 15/2016	
R 205	Jun 15/2016	
206	Oct 15/2015	
72-99-99		
401	Feb 15/2015	
402	Feb 15/2015	
403	Feb 15/2015	
404	BLANK	

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

CHAPTER 72
ENGINE

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
ENGINE - MAINTENANCE PRACTICES	72-00-00		201	AKS ALL
Turn the N2 Rotor TASK 72-00-00-980-801-F00			201	AKS ALL
Find the Zero Index Mark on the N2 Rotor TASK 72-00-00-980-802-F00			211	AKS ALL
Engine Tubes, Hoses and Fittings Inspection TASK 72-00-00-910-801-F00			216	AKS ALL
Engine Power - Deactivation TASK 72-00-00-040-801-F00			226	AKS ALL
Engine Power - Activation TASK 72-00-00-440-801-F00			229	AKS ALL
ENGINE - INSPECTION/CHECK	72-00-00		601	AKS ALL
Continue-In-Service (CIS) Limits - General TASK 72-00-00-200-801-F00			601	AKS ALL
Borescope Inspection Preparation TASK 72-00-00-200-802-F00			602	AKS ALL
Stages 2-4 Booster Blades and Vanes Borescope Inspection TASK 72-00-00-200-803-F00			609	AKS ALL
HP Compressor Blades Borescope Inspection TASK 72-00-00-200-804-F00			619	AKS ALL
HP Compressor Blades (Stages 2,4,6 and 8) Borescope Inspection TASK 72-00-00-200-817-F00			640	AKS ALL
Combustion Section Borescope Inspection TASK 72-00-00-200-805-F00			650	AKS ALL
HPT Nozzle Guide Vanes Borescope Inspection (SAC (/1) and DAC Engines) TASK 72-00-00-200-806-F00			670	AKS ALL
HPT Nozzle Guide Vanes Borescope Inspection (Tech Insertion (/3) and CFM56-7BE Engines) TASK 72-00-00-200-818-F00			682	AKS ALL
HPT Blades Borescope Inspection TASK 72-00-00-200-807-F00			694	AKS ALL

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HPT Shrouds Borescope Inspection TASK 72-00-00-200-815-F00			698.9	AKS ALL
Stage 1-3 LPT Blades Borescope Inspection TASK 72-00-00-200-808-F00			698.14	AKS ALL
Stage 4 LPT Blades Borescope Inspection TASK 72-00-00-200-809-F00			698.30	AKS ALL
Stage 4 LPT Blades Axial Preload Check TASK 72-00-00-200-810-F00			698.41	AKS ALL
Stage 1 LPT Nozzle Guide Vanes Inspection TASK 72-00-00-200-811-F00			698.43	AKS ALL
Stage 2-4 LPT Nozzle Guide Vanes Inspection TASK 72-00-00-200-812-F00			698.49	AKS ALL
LPT Outer Stationary Air Seals Inspection TASK 72-00-00-200-813-F00			698.54	AKS ALL
Borescope Inspection of the Stage 1 Low-Pressure Turbine Nozzle Outer Air Duct Condition TASK 72-00-00-290-801-F00			698.57	AKS ALL
Put the Airplane Back to Its Usual Condition TASK 72-00-00-200-814-F00			698.70	AKS ALL
ENGINE - CLEANING/PAINTING	72-00-00		701	AKS ALL
Engine Cleaning Specifications TASK 72-00-00-100-801-F00			701	AKS ALL
Clean the Fan Blades TASK 72-00-00-100-802-F00			703	AKS ALL
Clean the Engine Gas-Path With Pure Water TASK 72-00-00-100-803-F00			705	AKS ALL
Clean the Engine Gas-Path with Cleaning Solution TASK 72-00-00-100-804-F00			712	AKS ALL
Clean the External Engine Surfaces TASK 72-00-00-100-805-F00			717	AKS ALL
ENGINE - REPAIRS	72-00-00		801	AKS ALL
Repair the HPC Rotor Blades TASK 72-00-00-300-801-F00			801	AKS ALL

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AIR INLET SECTION - INSPECTION/CHECK	72-20-00		601	AKS ALL
TGB and AGB Mount Lugs Inspection (Visual Check) TASK 72-20-00-210-801-F00			601	AKS ALL
FAN AND BOOSTER ASSEMBLY - MAINTENANCE PRACTICES	72-21-00		201	AKS ALL
Fan Rotor Blades and Fan Disk Lubrication TASK 72-21-00-640-801-F00			201	AKS ALL
FAN AND BOOSTER ASSEMBLY - INSPECTION/CHECK	72-21-00		601	AKS ALL
Power Plant Inlet and Fan Blades Inspection (General Visual) TASK 72-21-00-200-801-F00			601	AKS ALL
Engine Inlet and Fan Blades Inspection (Detail) TASK 72-21-00-220-801-F00			603	AKS ALL
SPINNER CONES - REMOVAL/INSTALLATION	72-21-01		401	AKS ALL
Spinner Cones Removal TASK 72-21-01-000-801-F00			401	AKS ALL
Spinner Cones Installation TASK 72-21-01-400-801-F00			408	AKS ALL
SPINNER CONE - INSPECTION/CHECK	72-21-01		601	AKS ALL
Spinner Cone and Retaining Flange Inspection TASK 72-21-01-200-801-F00			601	AKS ALL
SPINNER CONES - REPAIR	72-21-01		801	AKS ALL
Fan Retaining Flange Replacement TASK 72-21-01-900-801-F00			801	AKS ALL
Replace or Retighten the Threaded Pins on the Fan Retaining Flange TASK 72-21-01-300-801-F00			802	AKS ALL
Repair the Fan Retaining Flange Slots TASK 72-21-01-300-802-F00			805	AKS ALL
FAN BLADE - REMOVAL/INSTALLATION	72-21-02		401	AKS ALL
Fan Blade Removal (Complete Set) TASK 72-21-02-000-801-F00			401	AKS ALL

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Fan Blade Installation (Complete Set) TASK 72-21-02-400-801-F00			421	AKS ALL
Fan Blade Replacement (Complete Set) TASK 72-21-02-900-801-F00			427	AKS ALL
Fan Blade Replacement (Blade Pair) TASK 72-21-02-000-802-F00			429	AKS ALL
FAN BLADE - INSPECTION/CHECK	72-21-02		601	AKS ALL
Fan Module Inspection TASK 72-21-02-200-801-F00			601	AKS ALL
FAN BLADE - REPAIRS	72-21-02		801	AKS ALL
Repair the Fan Blade TASK 72-21-02-300-801-F00			801	AKS ALL
Fan Blade Platform Forward Lug Repair TASK 72-21-02-300-808-F00			812	AKS ALL
Platform Balance Weight Replacement TASK 72-21-02-300-806-F00			817	AKS ALL
Replace or Retighten the Fan Disk Mid Lug Threaded Pins TASK 72-21-02-300-804-F00			822	AKS ALL
Replace or Retighten the Booster Spool Threaded Pins TASK 72-21-02-300-805-F00			825	AKS ALL
Recondition the Lubricant Coating on the Fan Blade Shim TASK 72-21-02-300-807-F00			830	AKS ALL
SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - REMOVAL/INSTALLATION	72-21-03		401	AKS ALL
Splitter Fairing Removal TASK 72-21-03-000-801-F00			401	AKS ALL
Splitter Fairing Installation TASK 72-21-03-400-801-F00			402	AKS ALL
Stage 1 Booster Vane Assembly Removal TASK 72-21-03-000-802-F00			406	AKS ALL
Stage 1 Booster Vane Assembly Installation TASK 72-21-03-400-802-F00			407	AKS ALL

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SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - INSPECTION/CHECK	72-21-03		601	AKS ALL
Stage 1 Booster Vane Assembly Inspection (Visual) TASK 72-21-03-200-801-F00			601	AKS ALL
SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - REPAIRS	72-21-03		801	AKS ALL
Repair the Stage 1 Booster Vane Assembly TASK 72-21-03-300-801-F00			801	AKS ALL
OUTLET GUIDE VANES - REMOVAL/INSTALLATION	72-23-01		401	AKS ALL
Outlet Guide Vanes Removal TASK 72-23-01-000-801-F00			401	AKS ALL
Outlet Guide Vanes Installation TASK 72-23-01-400-801-F00			404	AKS ALL
OUTLET GUIDE VANES - INSPECTION/CHECK	72-23-01		601	AKS ALL
Outlet Guide Vanes (OGV) Inspection TASK 72-23-01-200-801-F00			601	AKS ALL
OGV Inner Shrouds and Seals Inspection TASK 72-23-01-200-802-F00			604	AKS ALL
AFT ACOUSTICAL PANELS - REMOVAL/INSTALLATION	72-23-02		401	AKS ALL
Aft Acoustical Panel Removal TASK 72-23-02-000-801-F00			401	AKS ALL
Aft Acoustical Panel Installation TASK 72-23-02-400-801-F00			405	AKS ALL
AFT ACOUSTICAL PANELS - INSPECTION/CHECK	72-23-02		601	AKS ALL
Acoustical Panels and Profile Struts Inspection TASK 72-23-02-200-801-F00			601	AKS ALL
THRUST REVERSER EXTENSION RING (INNER) - REMOVAL/INSTALLATION	72-23-03		401	AKS ALL
Shroud Segments Removal TASK 72-23-03-000-802-F00			401	AKS ALL
Shroud Segments Installation TASK 72-23-03-400-802-F00			415	AKS ALL

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THRUST REVERSER EXTENSION RING (INNER) - INSPECTION/CHECK	72-23-03		601	AKS ALL
Thrust Reverser Extension Ring (Inner) Inspection TASK 72-23-03-200-801-F00			601	AKS ALL
12 O'clock Engine Strut Inspection TASK 72-23-03-200-802-F01			606	AKS ALL
THRUST MOUNT - REMOVAL/INSTALLATION	72-23-04		401	AKS ALL
Thrust Mount Removal TASK 72-23-04-000-801-F00			401	AKS ALL
Thrust Mount Installation TASK 72-23-04-400-801-F00			404	AKS ALL
THRUST MOUNT - INSPECTION/CHECK	72-23-04		601	AKS ALL
Thrust Mounts Inspection TASK 72-23-04-200-801-F00			601	AKS ALL
Thrust Mount Attach Bolts Inspection (Visual) TASK 72-23-04-200-802-F00			603	AKS ALL
FAN FRAME - INSPECTION/CHECK	72-23-05		601	AKS ALL
Fan Frame (Detailed) Inspection TASK 72-23-05-700-801-F00			601	AKS ALL
FAN FRAME - REPAIRS	72-23-05		801	AKS ALL
Fan Frame (Stop Drill) Repairs TASK 72-23-05-300-801-F00			801	AKS ALL
Fan Frame Aft Lip Blend Area Repairs TASK 72-23-05-300-803-F00			808	AKS ALL
Fan Frame Shroud Aft Lip Cold Reforming Repairs TASK 72-23-05-350-801-F00			812	AKS ALL
Fan Frame (Under Anchor Bolts Corrosion) Repairs TASK 72-23-05-300-805-F00			822	AKS ALL

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INNER RADIAL DRIVE SHAFT ASSEMBLY - REMOVAL/INSTALLATION	72-23-06		401	AKS ALL
Inner Radial Drive Shaft Assembly Removal TASK 72-23-06-000-801-F00			401	AKS ALL
Inner Radial Driveshaft assembly Installation TASK 72-23-06-400-801-F00			405	AKS ALL
INNER RADIAL DRIVE SHAFT - INSPECTION/CHECK	72-23-06		601	AKS ALL
Inner Radial Drive Shaft Inspection TASK 72-23-06-200-801-F00			601	AKS ALL
FAN DUCT PANELS - REMOVAL/INSTALLATION	72-23-07		401	AKS ALL
Fan Duct Panel Removal TASK 72-23-07-000-801-F00			401	AKS ALL
Fan Duct Panel Installation TASK 72-23-07-400-801-F00			405	AKS ALL
FAN DUCT PANELS - INSPECTION/CHECK	72-23-07		601	AKS ALL
Fan Duct Panels Inspection TASK 72-23-07-200-801-F00			601	AKS ALL
FAN INLET CASE - INSPECTION/CHECK	72-24-01		601	AKS ALL
Fan Inlet Case Inspection (Detail) TASK 72-24-01-200-801-F00			601	AKS ALL
Fan Inlet Case Erosion Inspection TASK 72-24-01-270-801-F00			610	AKS ALL
Fan Inlet Case Template Inspection TASK 72-24-01-220-801-F00			615	AKS ALL
ABRADABLE SHROUD - INSPECTION/CHECK	72-24-02		601	AKS ALL
Abradable Shroud (Detail) Inspection TASK 72-24-02-200-801-F00			601	AKS ALL
ABRADABLE SHROUD - REPAIRS	72-24-02		801	AKS ALL
Local Recondition of the Abradable Shroud TASK 72-24-02-200-802-F00			801	AKS ALL

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HIGH PRESSURE COMPRESSOR FRONT STATOR - INSPECTION/CHECK	72-32-00		601	AKS ALL
High Pressure Compressor Front Stator Inspection TASK 72-32-00-200-801-F00			601	AKS ALL
HIGH PRESSURE COMPRESSOR FRONT STATOR - REPAIRS	72-32-00		801	AKS ALL
Replace the Actuation Ring Flanged Bushing (Stage 1 and 2) TASK 72-32-00-900-801-F00			801	AKS ALL
Replace the Lever Arms and Bushings (IGV and Stage 3) TASK 72-32-00-900-802-F00			805	AKS ALL
COMBUSTION CASE - INSPECTION/CHECK	72-41-00		601	AKS ALL
Combustion Case Inspection TASK 72-41-00-200-801-F00			601	AKS ALL
LOW PRESSURE TURBINE CASE - INSPECTION/CHECK	72-54-00		601	AKS ALL
Low Pressure Turbine Case Inspection TASK 72-54-00-200-801-F00			601	AKS ALL
LOW PRESSURE TURBINE CASE - REPAIR	72-54-00		801	AKS ALL
Replacement of Broken Studs on the T49.5 Probe Bracket Assembly TASK 72-54-00-300-801-F00			801	AKS ALL
LOW PRESSURE TURBINE SHAFT - MAINTENANCE PRACTICES	72-55-00		201	AKS ALL
Replacement of the LPT Shaft Plug O-ring TASK 72-55-00-941-801-F00			201	AKS ALL
Replacement of the CVT O-ring and Damper Seals TASK 72-55-00-941-802-F00			206	AKS ALL
LOW PRESSURE TURBINE SHAFT - INSPECTION	72-55-00		601	AKS ALL
Low Pressure Turbine Shaft Assembly Inspection TASK 72-55-00-200-801-F00			601	AKS ALL

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Turbine Rear Frame (TRF) Oil Inlet Cover Removal TASK 72-56-00-000-802-F00			401	AKS ALL
Turbine Rear Frame (TRF) Oil Inlet Cover Installation TASK 72-56-00-400-801-F00			408	AKS ALL
TURBINE FRAME ASSEMBLY - INSPECTION/CHECK	72-56-00		601	AKS ALL
Turbine Frame Assembly Inspection TASK 72-56-00-200-801-F00			601	AKS ALL
Turbine Frame Assembly Engine Mounting Lugs Inspection TASK 72-56-00-200-802-F00			611	AKS ALL
TURBINE FRAME ASSEMBLY - CLEANING/PAINTING	72-56-00		701	AKS ALL
Oil Inlet Cover Cleaning TASK 72-56-00-100-801-F00			701	AKS ALL
Oil Supply Line Cleaning TASK 72-56-00-000-801-F00			702	AKS ALL
Oil Scavenge Line Cleaning TASK 72-56-00-100-802-F00			718	AKS ALL
TURBINE FRAME ASSEMBLY - REPAIRS	72-56-00		801	AKS ALL
Oil Supply Tube Replacement TASK 72-56-00-300-801-F00			801	AKS ALL
Bushings in the Clevis Mounts of the TRF Assembly Replacement TASK 72-56-00-300-802-F00			809	AKS ALL
Defective Studs on the AFT Face of the Inner Hub of the Turbine Frame Replacement TASK 72-56-00-300-803-F00			823	AKS ALL
TURBINE FRAME AIR/OIL SEPARATOR - REMOVAL/INSTALLATION	72-56-01		401	AKS ALL
Air/Oil Separator Removal TASK 72-56-01-000-801-F00			401	AKS ALL

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Air/Oil Separator Installation TASK 72-56-01-400-801-F00			407	AKS ALL
ACCESSORY DRIVES - MAINTENANCE PRACTICES	72-60-00		201	AKS ALL
Magnetic Seal Removal TASK 72-60-00-000-801-F00			201	AKS ALL
Magnetic Seal Installation TASK 72-60-00-400-801-F00			207	AKS ALL
Sealol Seal Removal TASK 72-60-00-000-802-F00			209	AKS ALL
Sealol Seal Installation TASK 72-60-00-400-802-F00			222	AKS ALL
ACCESSORY DRIVES - INSPECTION/CHECK	72-60-00		601	AKS ALL
Accessory Gearbox and Transfer Gearbox Mount Inspection TASK 72-60-00-200-801-F00			601	AKS ALL
Accessory Gearbox, Transfer Gearbox, and Horizontal Drive Shaft - Oil Leakage Inspection TASK 72-60-00-200-802-F00			605	AKS ALL
TRANSFER GEARBOX ASSEMBLY - REMOVAL/INSTALLATION	72-62-00		401	AKS ALL
Transfer Gearbox Assembly Removal TASK 72-62-00-000-801-F00			401	AKS ALL
Transfer Gearbox Assembly Installation TASK 72-62-00-400-801-F00			409	AKS ALL
TRANSFER GEARBOX - INSPECTION/CHECK	72-62-00		601	AKS ALL
Transfer Gearbox External Inspection TASK 72-62-00-200-801-F00			601	AKS ALL
Transfer Gearbox Internal Inspection TASK 72-62-00-200-802-F00			606	AKS ALL
ACCESSORY GEARBOX - MAINTENANCE PRACTICES	72-63-00		201	AKS ALL
Axial Link End Dampers Removal TASK 72-63-00-000-802-F00			201	AKS ALL

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Axial Link End Dampers Installation TASK 72-63-00-400-802-F00			206	AKS ALL
Axial Link End or Upper (Lower) Mount Link Removal TASK 72-63-00-000-803-F00			209	AKS ALL
Axial Link End or Upper (Lower) Mount Link Installation TASK 72-63-00-400-803-F00			210	AKS ALL
ACCESSORY GEARBOX - REMOVAL/INSTALLATION	72-63-00		401	AKS ALL
Accessory Gearbox Removal TASK 72-63-00-000-804-F00			401	AKS ALL
Accessory Gearbox Installation TASK 72-63-00-400-804-F00			430	AKS ALL
ACCESSORY GEARBOX - INSPECTION/CHECK	72-63-00		601	AKS ALL
Accessory Gearbox Inspection TASK 72-63-00-200-801-F00			601	AKS ALL
HANDCRANKING DRIVE COVER - MAINTENANCE PRACTICES	72-63-01		201	AKS ALL
Handcranking Drive Cover Removal TASK 72-63-01-000-801-F00			201	AKS ALL
Handcranking Drive Cover Installation TASK 72-63-01-400-801-F00			205	AKS ALL
ENGINE MODULES - REMOVAL/INSTALLATION	72-99-99		401	AKS ALL
Discard the Fan Disk TASK 72-99-99-000-801-F00			401	AKS ALL
Discard the Booster Spool TASK 72-99-99-000-802-F00			401	AKS ALL
Discard the Fan Shaft TASK 72-99-99-000-803-F00			401	AKS ALL
Discard the Stages 1 and 2 Spool TASK 72-99-99-000-804-F00			401	AKS ALL
Discard the Stage 3 Disk TASK 72-99-99-000-805-F00			401	AKS ALL

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CHAPTER 72
ENGINE

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Discard the Stages 4 thru 9 Spools TASK 72-99-99-000-806-F00			402	AKS ALL
Discard the Front Shaft TASK 72-99-99-000-807-F00			402	AKS ALL
Discard the Rear Rotation (CDP) Seal TASK 72-99-99-000-808-F00			402	AKS ALL
Discard the HPT Front Shaft TASK 72-99-99-000-809-F00			402	AKS ALL
Discard the HPT Front Rotating Air Seal TASK 72-99-99-000-810-F00			402	AKS ALL
Discard the HPT Disk TASK 72-99-99-000-811-F00			402	AKS ALL
Discard the HPT Front and Rear Shafts TASK 72-99-99-000-812-F00			403	AKS ALL
Discard the LPT Rotor Support TASK 72-99-99-000-813-F00			403	AKS ALL
Discard the LPT Shaft TASK 72-99-99-000-814-F00			403	AKS ALL
Discard the LPT Stage Disks TASK 72-99-99-000-815-F00			403	AKS ALL

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1. General

A. This procedure has these tasks:

(1) Turn the N2 rotor.

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

(3) Engine Tubes, Hoses and Fittings Inspection.

(4) Engine power - deactivation.

(5) Engine power - activation.

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

2. Turn the N2 Rotor

(Figure 201 and Figure 202)

A. General

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

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

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

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

B. References

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

C. Tools/Equipment

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

Reference	Description
SPL-2298	Drive Motor - Hand Operated - Core Engine Part #: 856A1815G05 Supplier: 58828 Opt Part #: 856A1815G02 Supplier: 58828
SPL-11936	Drive - Manual Drive Without Motor, Core Engine Part #: 856A1815G06 Supplier: 58828 Opt Part #: 856A1815G03 Supplier: 58828
SPL-11937	Drive Motor - Hand Operated, Core Engine Part #: 856A1815G04 Supplier: 58828 Opt Part #: 856A1815G01 Supplier: 58828
STD-1057	Air Source - Regulated, Dry Filtered, Compressed 60-105 PSIG (414-723.9 KPa)(22 SCFM)

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D. **Consumable Materials**

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

E. **Location Zones**

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

F. **Prepare to Turn the N2 Rotor**

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

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

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

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

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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

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

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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

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

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

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

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

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

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

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

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

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

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

NOTE: Do not remove the lanyard that attaches the cover [3] to the AGB.

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

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

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

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

NOTE: Do not remove the lanyard that attaches the cover [3] to the AGB.

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AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE (Continued)

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

AKS ALL

G. Turn the N2 Rotor

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

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

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

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

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

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

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

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

(c) Remove the tools from the drive pad.

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

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

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

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

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

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

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

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

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

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

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

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

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

1) Adjust the air supply pressure to 90 PSI.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1) Adjust the air supply pressure to 90 PSI.

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

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

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

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

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

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

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

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

AKS ALL

H. Put the Airplane Back to Its Usual Condition

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

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

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

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

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

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

NOTE: Make sure that the cover is fully clean of foreign objects or dirt before you install the cover.

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

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

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

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

(d) Lightly lubricate the threads of the bolts [1] with graphite compound, D00601 [CP2101].

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

1) Tighten the bolts to 97-106 pound-inches (11-12 Newton meters).

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

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

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

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

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

NOTE: Make sure that the cover is fully clean of foreign objects or dirt before you install the cover

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

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

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

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

(d) Lightly lubricate the threads of the bolts [1] with graphite compound, D00601 [CP2101].

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

1) Tighten the bolts to 97-106 pound-inches (11-12 Newton meters).

AKS ALL

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

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

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

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

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

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

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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

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

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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

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

END OF TASK

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G44633 S0006582215_V3

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

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

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H47501 S0006582216_V2

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

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G-MM-1155942-00-A

1931936 S0000365086_V2

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

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

3. Find the Zero Index Mark on the N2 Rotor

(Figure 203)

A. General

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

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

B. References

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

C. Tools/Equipment

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

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

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687

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(Continued)

Reference	Description	Specification
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

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

F. Prepare to Find the Zero Index Mark

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

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

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

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

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

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

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

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

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

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

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

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

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

NOTE: Use the rigid borescope with the yellow band.

(a) Connect Rigid Borescope, COM-2195 to light source, SPL-4305.

(b) Connect Rigid Borescope, COM-4302 to light source, SPL-4306.

(c) Connect Rigid Borescope, COM-4303 to light source, SPL-2197.

(d) Connect Rigid Borescope, COM-4304 to light source, SPL-4308

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

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

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

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

G. Find the Index Mark

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

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

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

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

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

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

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

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

NOTE: Counterclockwise when seen from the rear.

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

1) The locking lug is found between the blades.

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

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

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

NOTE: This is the zero index mark.

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

(4) Remove the borescope equipment.

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

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

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

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

(b) Install the plug in the compressor case.

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

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

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

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

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

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

H. Put the Airplane Back to Its Usual Condition

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

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

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

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

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

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

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

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

——— END OF TASK ———

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G-M56-NT-0030(1)-00-C
G44654 S0006582218_V2

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

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

4. **Engine Tubes, Hoses and Fittings Inspection**
(Figure 204)

A. **General**

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

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

B. **References**

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

C. **Consumable Materials**

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00672 [CP5070]	Grease - Petrolatum	VV-P-236
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

D. **Procedure**

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

CAUTION: USE THESE INSTRUCTIONS FOR CFMI SUPPLIED PARTS ONLY. DO NOT USE THESE INSTRUCTIONS FOR BOEING SUPPLIED PARTS. DAMAGE TO EQUIPMENT COULD OCCUR.

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

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

(a) Tubing for:

1) Splits, cracks or kinks:

a) Not permitted, replace the tube.

2) Dents or flat areas:

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

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

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

a) Blend the nicks or scores.

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

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4) Nicks or scores on all other air and oil lines and aft sump oil scavenge lines:
   a) Blend the nicks or scores.
   b) The maximum permitted depth is not more than 0.005 inch (0.13 mm) after blending.
5) Nicks or scores on all other fuel lines:
   a) Blend the nicks or scores.
   b) The maximum permitted depth is not more than 0.010 inch (0.26 mm) after blending.

(b) Seating surfaces of the fitting for:
1) Scratches in the circumference areas A and C:
   a) Remove the high metal.
   b) All amounts up to 0.005 inch (0.13 mm) is permitted after you remove the high metal.
2) Scratches in circumference area B:
   a) Remove the high metal.
   b) Amounts not found when you use a 0.040 inch (1.02 mm) radius ball scribe.
3) Axial scratches in areas A and C:
   a) Remove the high metal.
   b) Amounts not more than 0.005 inch (0.13 mm) is permitted after you remove the high metal.
4) Axial scratches in area B:
   a) Not permitted, replace the tube.
5) Nicks and pits in area C:
   a) Blend the depressions.
   b) Amounts not more than 0.03 inch (0.8 mm) in depth is permitted after blending.
6) Nicks and pits in areas A and B:
   a) Not permitted, replace the tube.
7) Score marks in the circumference of silver plated seating (mating) surfaces:
   a) Permitted if the score mark does not go through the parent metal.
   b) If the damage goes through, replace the tube.
8) Deformation in the circumference (spreading) of the tube/ferrule:
   a) Permitted if the nut is free to turn.
   b) If the nut does not turn, replace the tube.
9) Deformation in the circumference (spreading) of the flare nut:
   a) Permitted if the nut is free to turn.
   b) If the nut does not turn, replace the tube.
10) Axial deformation (dishing) of the spherical seat fitting surfaces:
   a) Permitted if the depth does not change and is less than 0.005 inch (0.13 mm) to the initial surface.
   b) If the damage is more than the limit, replace the tube.

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(c) Tube and hose fitting nuts for:

1) Damaged corners:

a) Permitted only if you can apply the correct torque.

b) If you cannot apply the correct torque, replace the tube or hose.

2) Damaged threads:

a) Total of one full thread or one continuous thread can be missing after chasing the thread.

b) Chase the threads.

3) Lockwire hole torn out:

a) Permitted, if one hole is still there.

b) If one hole is not there, replace the tube of hose.

(d) Swivel flange fittings for:

1) Nicks or scratches on seating surface (surface B):

a) Not permitted, replace the tube.

2) Nicks or scratches on mating surfaces (areas A and C):

a) Nicks or scratches not more than 0.020 inch (0.51 mm) deep are permitted if you remove the high metal.

3) Cracks:

a) Not permitted, replace the tube.

4) Seating surfaces (surface B) out-of-flat:

a) The maximum out-of-flat dimension permitted is 0.006 inch (0.15 mm).

b) If the out-of-flat dimension is more than the above limit, replace the tube.

5) Cracks that extend out from the bolt holes:

a) The cracks are permitted when not more than two bolt holes are cracked.

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

6) Weld joint cracks:

a) Not permitted, replace the tube.

(e) Tube and hose assemblies for:

1) Leakage:

a) Not permitted, replace the tube or hose.

(f) Hose assemblies for:

1) Broken hose braid:

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

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

2) Crimps:

a) Not permitted, replace the tube or hose.

3) Internal obstructions:

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

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

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

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

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

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

a) Not permitted, replace the hose.

b)

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

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

b) Replace the hose.

(g) Tube mechanical joint (ferrules) for:

1) Wear on the end face:

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

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

a) Permitted if the O-ring retention flange is not deformed after you remove the high metal.

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

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

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

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

(a) Disassemble the connection.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(a) Disassemble the connection.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

——— END OF TASK ———

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HOSE AND TUBE ASSEMBLY
(EXAMPLE)

SEATING SURFACES OF
SPHERICAL SEAT FITTINGS

A

SEATING SURFACES OF
TUBE/HOSE FERRULE

B

GMM-1130351-00-A
W20034 S0006582220_V2

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

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SWIVEL FLANGE FITTINGS

C

SWIVEL FLANGE FITTING

D

GMM-1130356-00-A
W20036 S0006582221_V2

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

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HOSE ASSEMBLY

E

GMM-1130355-00-A
W20035 S0006582222_V2

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

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

5. Engine Power - Deactivation

A. General

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

B. References

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

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Location Zones

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

E. Procedure

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

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

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

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

CAPT Electrical System Panel, P18-2

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

F/O Electrical System Panel, P6-2

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

F. Engine Power - Tryout

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

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

(1) Make sure that the start levers are in the CUTOFF position and install DO NOT OPERATE tags, STD-858.

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

(2) Make sure that the ENGINE START switches are in the OFF position and attach a DO NOT OPERATE tag, STD-858.

——— END OF TASK ———

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FLIGHT COMPARTMENT

2378210 S0000544655_V1

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

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

6. Engine Power - Activation

(Figure 205)

A. General

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

B. References

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

C. Tools/Equipment

Reference	Description
STD-858	Tag - DO NOT OPERATE

D. Location Zones

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

E. Procedure

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

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

CAPT Electrical System Panel, P18-2

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

F/O Electrical System Panel, P6-2

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

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

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

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

(3) Remove the DO NOT OPERATE tag, STD-858 from the ENGINE START switches.

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

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

END OF TASK

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ENGINE - INSPECTION/CHECK

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

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

      (6) Combustion Section Borescope inspection

AKS ALL

      (7) HPT Nozzle Guide Vanes Borescope Inspection (SAC (/1) and DAC Engines)
      (8) HPT Nozzle Guide Vanes Borescope Inspection (Tech Insertion (/3) and CFM56-7BE Engines)
      (9) HPT Blades Borescope Inspection
      (10) HPT Shrouds Borescope Inspection
      (11) Stages 1-3 LPT Blades Borescope Inspection
      (12) Stage 4 LPT Blades Borescope Inspection
      (13) Stage 4 LPT Blades Axial Preload Check
      (14) Stage 1 LPT Nozzle Guide Vanes Inspection
      (15) Stages 2-4 LPT Nozzle Guide Vanes Inspection
      (16) LPT Outer Stationary Seals Inspection
      (17) The put the airplane back to its usual condition procedure.

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

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

END OF TASK

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

3. Borescope Inspection Preparation

(Figure 601 and Figure 602)

NOTE: This procedure is a scheduled maintenance task.

A. General

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

B. References

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

C. Tools/Equipment

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

Reference	Description
COM-2195	Set - Borescope Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P05 Supplier: 58828 Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828
COM-4302	Set - Borescope Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-2198	Kit - Borescope Guide, HP Turbine, CFM56 Engines Part #: 856A1310G01 Supplier: 58828
SPL-2207	Guide Tube - Borescope, HPT Shroud, CFM56 Engines Part #: 856A1351P01 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4307	Light Source - Borescope, Machida Part #: 856A1322P07 Supplier: 58828

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(Continued)

Reference	Description
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers
STD-10711	Shop Vacuum (400Hz if using aircraft power)

D. Consumable Materials

Reference	Description	Specification
G01043	Cloth - Lint-free	
G02481 [CP2801]	Marker - Temporary	

E. Location Zones

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

F. Borescope Inspection Preparation

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

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

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

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

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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

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

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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

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

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

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

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

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).

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

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

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

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

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

CAUTION: MAKE SURE THAT THE POWER SWITCH IS IN THE OFF POSITION AND THE LIGHT INTENSITY CONTROL IS SET AT MINIMUM BEFORE YOU CONNECT THE LIGHT SOURCE TO THE POWER SUPPLY. MAKE SURE THE LIGHT SOURCE AND THE POWER SUPPLY ARE CORRECTLY ATTACHED TO A GROUND. DAMAGE TO THE EQUIPMENT CAN OCCUR.

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

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

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

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

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

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

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

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

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

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

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

(b) Find the number one fan blade.

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

(c) Use a marker, G02481 [CP2801] to make a mark to identify the number one fan blade (TASK 70-10-03-910-801-F00).

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

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

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

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

NOTE: An oil puddle in the exhaust system can occur after the engine is dry or wet motored (refer to task 71–71–00–200–801–F00).

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

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

(a) Clean oil from the surface with a lint-free cloth, G01043. A vacuum, STD-10711 can be used to remove unwanted oil.

END OF TASK

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NOTE:

SOME ENGINE COMPONENTS REMOVED FOR CLARITY.

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

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

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G47263 S0006582229_V3

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

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

G48151 S0006582230_V4

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

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

4. **Stages 2-4 Booster Blades and Vanes Borescope Inspection**
(Figure 601, Figure 603 and Figure 604)

A. **General**

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

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

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

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

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

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

B. **References**

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

C. **Tools/Equipment**

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

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

D. **Location Zones**

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

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E. Prepare for the Inspection

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

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

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

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

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

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

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

NOTE: Use the rigid borescope with the yellow band.

(a) Connect Rigid Borescope, COM-2195 to light source, SPL-4305.

(b) Connect Rigid Borescope, COM-4302 to light source, SPL-4306.

(c) Connect Rigid Borescope, COM-4303 to light source, SPL-2197.

(d) Connect Rigid Borescope, COM-4304 to light source, SPL-4308

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

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

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

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

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

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

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

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

WARNING: BE CAREFUL WHEN YOU TURN THE FAN ROTOR. MAKE SURE YOU ARE IN A STABLE POSITION. ALSO, 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) Manually turn the fan rotor, from the front of the engine, while you do the inspection of the stage 2 booster blades.

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

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

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

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

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

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

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

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

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

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

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(b) Cracks or tears in Area G

1) There is no limit if the radial and the axial length is less than 0.256 inch (6.5 mm).

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

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

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

(c) Worn areas or local distortion at the blade tip corner on the leading and trailing edges

1) There is no limit with these conditions:

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

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

2) The Continue-In-Service limit is 100 cycles or 150 flight hours with these conditions:

a) The radial length is less than 0.984 inch (25 mm).

b) The axial length is less than 0.59 inch (15 mm).

c) No more than 15 blades are damaged.

(d) Nicks, dents, and scratches on the airfoil surfaces that are in area E

1) Permitted with these conditions:

a) The damage is less than 0.019 inch (0.5 mm).

b) The damage does not go through the metal.

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

a) The diameter is less than 0.59 inch (1.5 mm).

b) The damage does not go through the metal.

(e) Nicks, dents, and scratches on the airfoil surfaces that are not in Area E, and not on the leading and trailing edges

1) Permitted with these conditions:

a) The diameter is less than 0.157 inch (4 mm).

b) The damage does not go through the metal.

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

a) The diameter is less than 0.236 inch (6 mm).

b) The damage does not go through the metal.

(f) Nicks, dents, and scratches on the leading and trailing edges, but not in Area E

1) Permitted if the maximum axial length is not more than 0.039 inch (1 mm).

2) The Continue-In-Service limit is 50 cycles or 75 flight hours if the axial length is less than 0.059 inch (1.5 mm).

(g) Distortion to the leading and trailing edges and not in Area E

1) Permitted with these conditions:

a) The maximum axial length is 0.197 inch (5 mm).

b) The maximum radial length is 0.59 inch (15 mm).

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

a) The maximum axial length is 0.275 inch (7 mm).

b) The maximum radial length is 0.708 inch (18 mm).

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

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1) Permitted with this condition:
   a) The damage is less than 0.010 inch (0.25 mm).

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

(j) Deposits and erosion
   1) Permitted.

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

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

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

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

(8) Examine the stage 2 through 4 booster vanes as follow:
   (a) Missing pieces
      1) A maximum of 20 vanes is permitted with these conditions:
         a) The axial length is less than 0.256 inch (6.5 mm).
         b) The radial length is less than 0.728 inch (18.5 mm).
         c) The damage is not in Areas A and B.
      2) The Continue-In-Service limit is 50 cycles or 75 flight hours with these conditions:
         a) No cracks start from the damaged area.
         b) Cracks do not go into Areas A and B.
   (b) Cracks or tears
      1) There is no limit to the number in Areas A and B with these conditions:
         a) The damage is less than 0.128 inch (3.25 mm) radially.
         b) The damage is less than 0.04 inch (1 mm) axially.
      2) The Continue-In-Service limit is 10 cycles or 15 flight hours if the damage is more than the limits but there is no possibility that a piece could break free.
   (c) Nicks, dents, and scratches in Area A and B of the concave and convex surfaces
      1) There is no limit to the number with these conditions:
         a) The diameter is less than 0.09 inch (2.5 mm).
         b) The damage does not go through the metal.
      2) The Continue-In-Service limit is 10 cycles or 15 flight hours with this condition:
         a) The diameter is less than 0.157 inch (4 mm).
   (d) Nicks, dents, and scratches in Area C
      1) Permitted with this condition:
         a) The diameter is less than 0.197 inch (5 mm).

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

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

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

(f) Vanes which have disengaged from the inner shroud

1) Vanes that are disengaged are not permitted.

(g) Distortion of the leading and trailing edges

1) Permitted with these conditions:

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

b) The damage is less than 0.256 inch (12.5 mm) axially.

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

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

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

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

1) Permitted.

(i) Surface oxidation, pitting or corrosion marks

1) Permitted.

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

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

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

NOTE: This port is found between the outlet guide vanes (OGV) at the 3:30 o'clock position.

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

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

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

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

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

G. Put the Airplane Back to Its Usual Condition

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

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

END OF TASK

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

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

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

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

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STAGE 3 AND 4 BOOSTER BLADE AND VANE BORESCOPE INSPECTION

C

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

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

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

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

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

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

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

5. **HP Compressor Blades Borescope Inspection**

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

A. **General**

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

B. **References**

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

C. **Tools/Equipment**

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

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

D. **Consumable Materials**

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	CFM CP2619
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687

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(Continued)

Reference	Description	Specification
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

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

F. Prepare for the Inspection

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

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

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

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

NOTE: Use the rigid borescope with the yellow band.

(a) Connect Rigid Borescope, COM-2195 to light source, SPL-4305.

(b) Connect Rigid Borescope, COM-4302 to light source, SPL-4306.

(c) Connect Rigid Borescope, COM-4303 to light source, SPL-2197.

(d) Connect Rigid Borescope, COM-4304 to light source, SPL-4308

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

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

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

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

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

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

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

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

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

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

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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

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

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

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

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

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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

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

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

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

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

(b) Remove the S1-S6 borescope plugs.

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

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

1) Loosen the borescope cap.

a) Disengage the borescope cap from the compressor case.

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

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

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

a) Remove the borescope plug assembly.

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

a) Remove the retaining ring.

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

b) Remove the borescope cap from the borescope plug.

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

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

e) Install the retaining ring.

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

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

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

c) Discard the parts of the borescope plug assembly.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(b) Make sure the borescope is correctly adjusted.

(c) Turn the light source ON.

G. HP Compressor Blades Borescope Inspection

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

(1) Examine the compressor rotor blades as follows:

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

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

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

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

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

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

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

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

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

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

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1) Any number of radial tip cracks within 0.30 inch (7.6 mm) of the leading or trailing edge, up to 0.25 inch (6.4 mm) in length are serviceable.
   a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.25 inch (6.4 mm) but less than 0.40 inch (10.2 mm) in length.
   b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.
2) Any number of radial tip cracks more than 0.30 inch (7.6 mm) from the leading or trailing edge, up to 0.10 inch (2.5 mm) in length are serviceable.
3) Any number of chord-wise cracks up to 0.30 inch (7.6 mm) from the tip, up to 0.20 inch (5.1 mm) in length are serviceable.
   a) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.20 inch (5.1 mm) but less than 0.30 inch (7.6 mm) in length.
   b) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(b) Cracks in stages 5 thru 9 are not serviceable unless they meet the conditions that follows:
1) Up to 25 blades across stages 5 thru 9 can have radial tip cracks that are no more than 0.20 inch (5.1 mm) from the leading or trailing edge.
   a) The cracks can be up to 0.15 inch (3.8 mm) in length and are serviceable.
   b) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.15 inch (3.8 mm) but less than 0.20 inch (5.1 mm) in length on less than 20% in each stage.
   c) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.
   d) Radial tip cracks more than 0.20 inch (5.1 mm) from the leading or trailing edge are not serviceable.
2) Up to 25 blades across stages 5 thru 9 can have chord-wise cracks that are no more than 0.20 inch (5.1 mm) from the tip.
   a) The cracks can be up to 0.15 inch (3.8 mm) long are serviceable.
   b) A maximum service extension of 10 cycles or 25 hours is permitted if the damage is more than 0.15 inch (3.8 mm) but less than 0.20 inch (5.1 mm) long.
   c) If you find damage that is more than the limits, do this task: Repair the HPC Rotor Blades, TASK 72-00-00-300-801-F00.

(c) Missing or chipped erosion coating on the stages 1 thru 9 blades:
1) There is no limit with this condition.

(d) Nicks, dents and scratches in the airfoil root radius, stages 1 thru 9, (does not include the trailing edge root radius of stage 2 and stage 3)
1) There is no limit to the number with these conditions:
   a) Elliptical, smooth, round bottom dents having no sharp edges with a maximum diameter of 0.030 inch (0.76 mm). Dents must not connect or overlap.
   b) Other damage with 0.005 inch (0.13 mm) maximum in depth.

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c) The scratches are not parallel to the platform.

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

1) Not serviceable.

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

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

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

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

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

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

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

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

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

1) Tears are not permitted.

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

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

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

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

1) Tears are not serviceable.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(p) Platforms of blades.

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1) Clearance between the blade platforms is permitted.
2) There is no maximum limit to the size and quantity of distortions on a blade.
3) Cracks in the material are not serviceable.
4) Shingling is not serviceable.

(q) Blade locks for the stages 4-9 blades
1) Any number of cracks on one lock is permitted for each stage.
a) A maximum service extension of 10 cycles or 25 hours is permitted for two blade locks in the same stage with any number of cracks, if no blade locks are loose in the given stage.
2) Loose blade locks are not permitted.
a) A maximum service extension of 10 cycles or 25 hours is permitted for one loose blade lock on a stage, if the other blade lock on the same stage is not loose or cracked.

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

(s) Compressor stator vane shrouds, stages (Figure 610)
1) No maximum limit of wear caused by rubbing on vanes.

(t) The rub coat at the stator flow path
NOTE: The area adjacent to the borescope ports is the only rub coat you can examine.
1) No maximum limit of areas where the rub coat is gone.
2) No maximum number of cracks which are crazed.

(u) Through holes on stage 1 thru 9 blades
1) Through holes are not serviceable.

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

(3) If the inspection is complete, remove the borescope equipment.
(a) Turn the lightsource to OFF, but keep the blower ON until the lamp and case are cool.

H. Put the Airplane Back to Its Usual Condition

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

(1) If you manually opened the VSV's, actuate the VSV's to full close and remove the equipment (TASK 75-31-00-790-801-F00).
NOTE: If you did the Dry Motor Procedure to open the VSV's, no action is necessary. The EEC will move the VSV's and VBV's to their usual position at the subsequent engine start.

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

(2) Do these steps to install the S1-S6 borescope plugs:
(a) Apply a light layer of graphite compound, D00601 [CP2101], pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and to the friction surfaces of the plug.
(b) Install the plugs in the compressor case.
1) Tighten the plug to 57-63 pound-inches (6.4-7.1 Newton-meters).
(c) Put safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on the plugs.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

a) Tighten the outer plug by hand.

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

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

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

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

END OF TASK

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

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

B-B

1 CONFIGURATION 1
2 CONFIGURATION 2

1137508-00-A
G23353 S0006582245_V4

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

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

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

GMM-1137509-00-A
G24117 S0006582246_V2

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

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

1 CONFIGURATION 1

2 CONFIGURATION 2

GMM-1137510-00-A

G24189 S0006582247_V3

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

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

G48156 S0006582248_V3

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

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1 CONFIGURATION 1
2 CONFIGURATION 2

COMPRESSOR BLADE

A

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

TABLE A 3

NOTE:

ALL DIMENSIONS ARE IN
INCHES WITH
MILLIMETERS IN PARENTHESES.

3 FOR REFERENCE ONLY

1254066-00

G26046 S0006582249_V9

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

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AIRFOIL LEADING OR TRAILING EDGE TIP CORNER

C

POSSIBLE AIRFOIL DAMAGE

D

NOTE:

ALL DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

DEFECT DEPTH IS IN AXIS OF DAMAGE UNLESS OTHERWISE NOTED.

1254189-00
G24275 S0006582250_V5

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

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COMPRESSOR BLADE AIRFOIL RADIUS

D1

1290677-00

1932481 S0000365870_V2

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

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E

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

1222449-00-A
432594 S0000140117_V3

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

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

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1218766-00-A
364977 S0000132036_V2

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

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

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

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

A. General

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

B. References

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

C. Tools/Equipment

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

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

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	CFM CP2619
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

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E. Location Zones

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

F. Prepare for the Inspection

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

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

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

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

NOTE: Use the rigid borescope with the yellow band.

(a) Connect Rigid Borescope, COM-2195 to light source, SPL-4305.

(b) Connect Rigid Borescope, COM-4302 to light source, SPL-4306.

(c) Connect Rigid Borescope, COM-4303 to light source, SPL-2197.

(d) Connect Rigid Borescope, COM-4304 to light source, SPL-4308

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

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

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

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

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

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

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

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

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

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

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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

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

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

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

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

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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

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

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

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

(a) Remove the S2-S6 borescope plugs.

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

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

1) Loosen the borescope cap.

a) Disengage the borescope cap from the compressor case.

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

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

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

a) Remove the borescope plug assembly.

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

a) Remove the retaining ring.

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

b) Remove the borescope cap from the borescope plug.

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

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

e) Install the retaining ring.

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

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

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

c) Discard the parts of the borescope plug assembly.

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

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

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

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

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

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

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

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

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

SUBTASK 72-00-00-290-005-F00

(8) Do these steps to prepare for the inspection of the compressor blades:

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

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

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

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

(b) Make sure the borescope is correctly adjusted.

(c) Turn the light source ON.

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

SUBTASK 72-00-00-290-006-F00

(1) Examine the compressor rotor blades as follows:

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

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

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

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

SUBTASK 72-00-00-290-010-F00

(2) Examine the stage 2, 4, 6 and 8 HP compressor blades with the HPC Inspection Limits for the applicable stages in the following subtask.

(a) If the HPC limits are listed for stages 1 thru 9, then use these limits for stages 2, 4, 6, and 8.

(b) If the HPC limits are listed for stages 1 thru 4, then use these limits for stages 2 and 4.

(c) If the HPC limits are listed for stages 5 thru 9, then use these limits for stages 6 and 8.

SUBTASK 72-00-00-290-011-F00

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1) There is no limit with this condition.

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

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

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

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

c) The scratches are not parallel to the platform.

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

1) Not serviceable.

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

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

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

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

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

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

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

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

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

1) Tears are not permitted.

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

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

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

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

1) Tears are not serviceable.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(p) Platforms of blades.

1) Clearance between the blade platforms is permitted.

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

3) Cracks in the material are not serviceable.

4) Shingling is not serviceable.

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

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

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

2) Loose blade locks are not permitted.

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

(r) Material on blades

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

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

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

(t) The rub coat at the stator flow path

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

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

2) No maximum number of cracks which are crazed.

(u) Through holes on stage 1 thru 9 blades

1) Through holes are not serviceable.

SUBTASK 72-00-00-290-008-F00

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

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

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H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-860-023-F00

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

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

SUBTASK 72-00-00-410-025-F00

(2) Do these steps to install the S2-S6 borescope plugs:

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

(b) Install the plugs in the compressor case.

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

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

SUBTASK 72-00-00-410-026-F00

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

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

1) Put the aluminum rod in the borescope port (Figure 606).

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

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

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

(c) Install the borescope plug in the applicable borescope port.

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

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

3) Tighten the inner plug again to the run-on torque plus 15-20 pound-inches (1.7-2.26 Newton-meters).

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

a) Tighten the outer plug by hand.

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

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

SUBTASK 72-00-00-210-121-F00

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

END OF TASK

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TASK 72-00-00-200-805-F00

7. Combustion Section Borescope Inspection

(Figure 601, Figure 611, Figure 612, Figure 612 and Figure 613)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the instructions on how to examine the combustion section with a borescope.

B. References

Reference	Title
71-00-02-000-801-F00	Power Plant Removal (P/B 401)
71-00-02-400-801-F00	Power Plant Installation (P/B 401)
73-11-04-000-804-F02	Fuel Nozzle Removal (P/B 401)
73-11-04-000-805-F01	Fuel Nozzle Removal (P/B 401)
73-11-04-400-804-F02	Fuel Nozzle Installation (P/B 401)
73-11-04-400-805-F01	Fuel Nozzle Installation (P/B 401)
74-21-02-000-801-F00	Main Igniter Plug Removal (P/B 401)
74-21-02-400-801-F00	Main Igniter Plug Installation (P/B 401)
FIM 71-05 TASK 801	Birdstrike/FOD in Engine - Fault Isolation

C. Tools/Equipment

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

Reference	Description
COM-2195	Set - Borescope Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P05 Supplier: 58828 Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828
COM-4302	Set - Borescope Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

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D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	CFM CP2619
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

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

F. Prepare for the Inspection

SUBTASK 72-00-00-210-024-F00

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

SUBTASK 72-00-00-010-004-F00

(2) Remove the S13 and S15 borescope plugs:

NOTE: To do an initial inspection, it is only necessary to remove the S13 and S15 borescope plugs. If you find damage, you must remove the main igniter plugs and the other borescope plugs to do a complete inspection.

SUBTASK 72-00-00-010-005-F00

(3) If it is necessary to do a complete inspection, do these steps to remove the main igniter plugs and the other borescope plugs:

NOTE: The port for the 4:00 o'clock main igniter plug is referred to as the S10 borescope port. The port for the 8:00 o'clock main igniter plug is referred to as the S11 borescope port.

(a) Do this task: Main Igniter Plug Removal, TASK 74-21-02-000-801-F00.

(b) Remove the S12 and S14 borescope plugs.

SUBTASK 72-00-00-210-027-F00

(4) Do these steps to prepare for the inspection of the combustion section:

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

1) Connect Rigid Borescope, COM-2195 and light source, SPL-4305.

2) Connect Rigid Borescope, COM-4302 and light source, SPL-4306.

3) Connect Rigid Borescope, COM-4303 and light source, SPL-2197.

4) Connect Rigid Borescope, COM-4304 and light source, SPL-4308.

5) Use the rigid borescope with the yellow band to get a general view of the combustion chamber.

6) Use the rigid borescope with the green band as follows:

a) Use the borescope to view circumferentially around the combustion chamber.

b) Use the borescope to view the inner liner that is adjacent to the borescope port.

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7) Use the rigid borescope with the blue band to view the outer liner that is adjacent the borescope port.

8) Use the rigid borescope with the black band to view the aft ends of the inner and outer liners.

9) Use the rigid borescope with the black band to evaluate defects that you found with the other borescopes.

10) Use the fiberscope to view the outside of the outer liner.

(b) Make sure that you adjust the borescope correctly.

(c) Turn the lightsource ON.

SUBTASK 72-00-00-210-028-F00

(5) If it is necessary to do an inspection of the cold-side of the outer liner, do these steps to prepare for the inspection:

(a) Connect the borescope, COM-2196, to the applicable light source.

(b) Make sure that you adjust the borescope correctly.

(c) Turn the light source ON.

G. Combustion Section Borescope Inspection

SUBTASK 72-00-00-210-118-F00

(1) Examine all surfaces as follow:

(a) Discoloration

1) Permitted.

(b) Carbon accumulation

1) Permitted.

(c) Missing, chipped or spalled areas of the thermal barrier coating

1) Permitted.

SUBTASK 72-00-00-210-029-F00

(2) Examine the dome assembly as follows:

(a) Distortion of the deflector or the sleeve

1) Permitted.

(b) Radial cracks in the spectacle plate.

1) Permitted with these conditions:

a) The cracks are not connected.

b) The cracks are less than 2.0 inches (50.8 mm) in length.

2) A continue-in-service limit of 25 flight hours is permitted with these conditions:

a) The cracks are not connected.

b) The cracks are less than 2.5 inches (63.5 mm) in length.

(c) Circumferential cracks in the spectacle plate

1) Permitted with these conditions:

a) The cracks are less than 3.0 inches (76 mm) in length.

b) The minimum distance between cracks is not less than 6.0 inches (152 mm).

2) A continue-in-service limit of 25 flight hours, is permitted with these conditions:

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a) The cracks are less than 3.6 inches (91 mm) in length.

b) The minimum distance between cracks is not less than 4.8 inches (125 mm).

(d) Cracks in the spectacle plate that are connected

1) One radial crack can be connected to one circumferential crack that extends between adjacent deflectors with these conditions:

a) The radial crack is less than 2.0 inches (50.8 mm) in length.

b) The circumferential crack is less than 3.0 inches (76 mm) in length.

c) The minimum distance between cracks is not less than 6.0 inches (152 mm).

2) A continue-in-service limit of 25 flight hours is permitted with these conditions:

a) The radial crack is not more than 2.5 inches (63.5 mm) in length.

b) The circumferential crack is not more than 3.6 inches (91 mm) in length.

c) The minimum distance between cracks is not less than 4.8 inches (125 mm).

(e) Missing material from the spectacle plate

1) A maximum area of 0.060 x 0.060 inch (1.52 x 1.52 mm) is permitted at the point where the cracks connect.

2) A continue-in-service limit of 25 flight hours is permitted if the damage is more than the limits.

(f) Radial cracks in the deflector or the sleeve

1) Permitted, if they are less than 0.5 inch (13 mm) in length.

2) A continue-in-service limit of 25 cycles is permitted if the cracks are not more than 0.6 inch (16 mm) in length.

(g) Circumferential cracks in the deflector or sleeve

1) There is no limit to the number of cracks if they are less than 0.75 inch (19 mm) in length.

2) A continue-in-service limit of 25 cycles is permitted if the cracks are not more than 0.9 inch (23 mm) in length.

(h) Cracks that connect in the deflector or sleeve

1) One radial and one circumferential crack that connect are permitted, with these conditions:

a) The radial crack is less than 0.5 inch (13 mm) in length.

b) The circumferential crack is less than 0.75 inch (19 mm) in length.

2) A continue-in-service limit of 25 cycles is permitted with these conditions:

a) The radial crack is not more than 0.6 inch (16 mm) in length.

b) The circumferential crack is not more than 0.9 (23 mm) in length.

(i) Missing material from the extensions on the deflector

NOTE: Examine the deflector surface as close to perpendicular as possible.

1) Up to 15-exposed dome cooling holes permitted in each deflector quadrant (Figure 612, View C2).

2) Not more than 20-exposed dome cooling holes in any deflector (Figure 612, View C3).

3) Do this inspection again after 750 cycles if up to 25 dome cooling holes total in any deflector are exposed.

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4) More than 25-exposed dome cooling holes total in any deflector, the continue-in-service limit is 25 cycles.

(j) Missing material from the extensions on the sleeve

1) Permitted if the depth is not more than 0.20 inch (5.08 mm).

2) A continue-in-service limit of 50 cycles is permitted if the depth is not more than 0.240 inch (6.10 mm).

(k) Burn holes

1) 3 areas for each dome are permitted if the maximum area of each hole is not more than 1.0 x 1.0 inch (25 x 25 mm).

2) A continue-in-service limit of 25 cycles is permitted with these conditions:

a) There are not more than 3 areas on each dome that have missing material.

b) Each area is not more than 1.2 x 1.2 inch (30 x 30 mm).

(l) Cracks in the primary swirl nozzle

1) Permitted.

(m) Cracks and missing material from the secondary swirl nozzle venturi.

1) Any number of indications (cracks) permitted.

2) Any number with missing material less than 0.10 inch (2.5 mm) in width permitted(Figure 612 , View C1) .

3) Up to six locations up to 0.30 inch (7.6 mm) total width of missing material permitted.

4) Do this inspection again after 750 cycles if; up to ten locations with 0.30 inch (7.6 mm) total width of missing material.

5) If the width exceeds 0.30 inch (7.6 mm) or more than ten locations over 0.10 inch (2.5 mm) , the Continue-In-Service limit is 25 cycles.

SUBTASK 72-00-00-210-030-F00

(3) Examine the inner and outer liners as follow:

(a) Axial cracks on the outer liner

NOTE: The dome band is counted as a panel.

NOTE: Axial cracks that become circumferential cracks for a length that is less than one dilution land, should be counted as one continuous axial crack.

1) Cracks that go across only one panel are permitted.

2) A maximum of 4 cracks that go across more than one panel are permitted with this condition

a) The cracks cannot go across more than 3 panels.

3) If a crack is longer than 3 panels, do the borescope inspection of the cold side of the outer liner.

NOTE: Do the inspection of the cold side only if you have no more than 3 cracks that are longer than 3 panels. More than 3 cracks that are longer than 3 panels are not permitted.

4) A continue-in-service limit of 100 cycles is permitted with these conditions:

a) There are not more than 5 cracks that go across more than one panel.

b) A crack cannot go across more than 5 panels in sequence.

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(b) The cold side of the outer liner for cracks.

NOTE: Do this inspection of the cold side only if you find not more than 3 cracks that are longer than 3 panels during the hot side inspection. More than 3 cracks that are longer than 3 panels is not permitted.

1) The cracks must not go through more than one of the last three cooling ribs (cooling ribs 4, 5, or 6).

2) Cooling rib 1 must not be cracked through.

3) Do this inspection again after 750 cycles.

4) A continue-in-service limit of 25 cycles is permitted with these conditions:

a) There are no more than 5 cracks that go across more than one panel.

b) There are no cracks that go across more than 5 panels.

c) At least one of the cooling ribs (3, 4, 5, or 6) do not have cracks that go through to the cold side.

d) Cooling rib 1 does not have a crack that goes through.

(c) Axial cracks on the inner liner

1) Permitted if the cracks do not go across more than one panel.

2) There are not more than 4 cracks that go across more than one panel.

3) Only one crack can go across more than three panels with these conditions:

a) The crack does not go across more than 4 panels.

b) The crack is connected to a hole caused by burn-through or missing material which is not more than 3 times the size of a dilution hole.

c) The crack is not connected to a circumferential crack that is more than 0.50 inch (12.7 mm) in length.

d) Do this inspection again after each 750 cycles.

4) A continue-in-service limit of 100 cycles is permitted with these conditions:

a) There are not more than 5 cracks that go across more than one panel.

b) There are no cracks that go across more than 4 panels in sequence.

(d) Circumferential cracks on the inner and outer liners

NOTE: Use the length of the dilution lands to help you find the length of the cracks.

NOTE: For the dome bands and panel 2 of the inner and outer liner, use the dilution lands (the distance between the edges of the dilution holes) on panel 1. For the panels 4 and 5 on the outer liner and panel 4 of the inner liner, use the dilution lands on panel 3.

1) Permitted with these conditions:

a) The cracks are not longer than 2 dilution lands.

b) There are no more than 2 adjacent cracks in a dilution land.

c) The cracks are separated by a minimum of 3 dilution lands that do not have cracks.

2) A continue-in-service limit of 25 cycles is permitted with these conditions:

a) The cracks are not longer than 3 dilution lands.

b) The cracks are separated by a minimum of 3 dilution lands that do not have cracks.

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(e) The inner and outer liners for axial and circumferential cracks that connect

1) One axial and one circumferential crack that connect are permitted, if the cracks are in the previous limits.

2) Multiple axial and circumferential cracks that connect are permitted, if:

a) The cracks are contained in one panel.

b) The cracks are contained in one dilution land area.

c) There are not more than two locations in the adjacent panels that are axially aligned.

d) The locations are separated by a minimum of 3 dilution lands that do not have cracks.

e) There are not more than 5 locations with connected cracks.

3) A continue-In-service limit of 100 cycles is permitted with this condition:

a) The cracks do not exceed their individual continue-in-service limits.

(f) Holes that are burned through

1) All quantities of holes total for the two liners are permitted with these conditions:

a) There are not more than two holes in the adjacent panels that are axially aligned.

b) The maximum size of all holes are not more than 5 times the size of a dilution hole.

c) The total area of burn through does not to exceed 15 times the size of a dilution hole.

2) If the current condition exceeds the above limits but does not exceed the continue-in-service limit, repeat this borescope inspection of the holes that are burned through on the inner and outer liner every 250 cycles until the current condition exceeds the continue-in-service limit.

3) A continue-in-service limit of 100 cycles is permitted with these conditions:

a) There are more than three holes in the adjacent panels that are axially aligned.

b) The maximum size of all holes are not more than 6 times the size of the dilution hole.

c) The total area of burn through exceeds 24 times the size of a dilution hole.

(g) Missing overhangs on the inner and outer liners

1) 14 areas in each liner are permitted with these conditions:

a) Each area is not more than 2 times the size of the dilution hole.

b) They are not axially aligned across more than 3 adjacent panels.

2) A continue-in-service limit of 25 cycles is permitted with these conditions:

a) There are not more than 17 areas in each liner.

b) Each area is not more than 2 times the size of the dilution hole.

c) They are not axially aligned across more than 3 areas in adjacent panels.

(h) Distortion of the inner and outer liners

1) All distortions are permitted if each is not distorted more than 0.5 inch (12.7 mm) from the original contour.

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2) A continue-in-service limit of 25 cycles is permitted if the distortion is not more than 0.7 inch (17 mm) from the original contour for each area.

SUBTASK 72-00-00-210-115-F00

(4) If there was a birdstrike/FOD, do these steps to examine the combustion chamber:

(a) Remove the borescope plugs from the combustor as follows:

1) Borescope plug S15 at 10:00 o'clock position
2) Borescope plug S12 at 1:00 o'clock position
3) Borescope plug S13 at 3:00 o'clock position
4) Borescope plug S14 at 6:00 o'clock position.

(b) Do a borescope or fiberscope inspection of the nozzle and swirlers as follows:

1) Put the borescope into one of the ports and turn on the light source for the borescope.
2) Look at the swirler and nozzle area in a clockwise and counter-clockwise direction.

NOTE: When you use a rigid borescope, you will only see one swirler and two deflectors in a clockwise or counter-clockwise direction.

3) Do the fuel nozzle tip inspection as follows:
   a) The primary tips must be in the internal diameter of the primary swirler.
   b) If the damaged fuel nozzle is not in the internal diameter of the primary swirler, replace the engine (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).
4) Look at the opening between the forward edge of the deflector plate and the spectacle plate.
   a) The clearance must be more than 0.080 inch (2.03 mm).
   b) The clearance must not be more than 0.300 inch (7.62 mm).
   c) If the opening is more than 0.300 inch (7.62 mm), examine the area around the nozzle and the outer side of the combustion chamber.
5) Do the inspection through the other ports.
6) If one or more of the above deflector plates are out of limits, and if you are sure the tip is in the correct position, do these steps:
   a) Identify the fuel nozzle adjacent to the damaged area.
   b) Remove the borescope.
   c) Remove the adjacent fuel nozzle (TASK 73-11-04-000-805-F01 or TASK 73-11-04-000-804-F02).
   d) Examine the fuel nozzle for damage.
   e) If the fuel nozzle is in the internal diameter and does not touch the sides, continue to use the engine.
   f) If the fuel nozzle is damaged, replace the fuel nozzle (TASK 73-11-04-400-805-F01 or TASK 73-11-04-400-804-F02)

(c) It is recommended (not mandatory) to do a one-time borescope inspection of the HPT nozzle leading edges at 400-800 cycles after the birdstrike event:

1) If no leading-edge distress is seen, go back to the usual borescope inspection interval.

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2) If you can see missing material or burn through on the HPT nozzle leading-edge wall, contact CFMI and, do this task: Birdstrike/FOD in Engine - Fault Isolation, FIM 71-05 TASK 801.

SUBTASK 72-00-00-080-003-F00

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

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

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-210-032-F00

CAUTION: MAKE SURE THAT THE BORESCOPE PLUGS ARE INSTALLED IN THE CORRECT PORT LOCATIONS. ENGINE DAMAGE CAN OCCUR IF A BORESCOPE PLUG IS NOT INSTALLED IN THE CORRECT LOCATION.

(1) Do these steps to install the borescope plugs as follow:

NOTE: The borescope plug to the LPT stage 1 and combustion case have the same thread size. The stem of the borescope plug to the LPT stage 1 nozzle will be burned away if it is installed in the borescope port for the combustion case.

(a) Lubricate the threads of the borescope plugs with graphite compound, D00601 [CP2101], pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064].

(b) Install the borescope plugs.

1) Tighten each borescope plug to 57-63 pound-inches (6.5-7.1 Newton-meters).

2) Install a safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on each borescope plug.

SUBTASK 72-00-00-210-033-F00

(2) If it is necessary, do this task: Main Igniter Plug Installation, TASK 74-21-02-400-801-F00.

SUBTASK 72-00-00-210-034-F00

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

——— END OF TASK ———

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Combustion Chamber Borescope Port Locations
Figure 611/72-00-00-990-808-F00

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Combustion Section Borescope Inspection
Figure 612/72-00-00-990-841-F00 (Sheet 1 of 9)

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DOME AREA CRACK DAMAGE (EXAMPLE)

C

DOME AREA MISSING MATERIAL DAMAGE (EXAMPLE)

C

1137534-02-A

G24887 S0006582255_V5

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-841-F00 (Sheet 2 of 9)

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C1

5007925-00

2397102 S0000553802_V1

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-841-F00 (Sheet 3 of 9)

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DOME IN QUADRANT DEFINITION (AFT LOOKING FORWARD)

C2

SAMPLE EXPOSED COOLING HOLES

OR

C3

5007927-00

2088288 S0000440608_V3

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-841-F00 (Sheet 4 of 9)

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OUTER LINER

D

OUTER LINER CRACKS AND MISSING MATERIAL DAMAGE (EXAMPLE)

E

1250655-00

1307448 S0000226565_V2

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-841-F00 (Sheet 5 of 9)

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OUTER LINER CRACKS AND MISSING MATERIAL DAMAGE

F

1250656-00

1307795 S0000226567_V2

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-841-F00 (Sheet 6 of 9)

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OUTER LINER CIRCUMFERENTIAL CRACK DAMAGE

G

1250657-00
1307838 S0000226568_V2

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-841-F00 (Sheet 7 of 9)

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INNER LINER

H

INNER LINER FOR CRACKS AND BURN THROUGH

I

1250658-00
1307932 S0000226569_V2

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-841-F00 (Sheet 8 of 9)

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INNER LINER FOR CRACKS AND BURN THROUGH

J

1250659-00

1307933 S0000226570_V2

Combustion Section Borescope Inspection
Figure 612/72-00-00-990-841-F00 (Sheet 9 of 9)

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NOTE:

ALL DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

After Bird Strike Combustion Section Borescope Inspection
Figure 613/72-00-00-990-826-F00

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TASK 72-00-00-200-806-F00

8. HPT Nozzle Guide Vanes Borescope Inspection (SAC (/1) and DAC Engines)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the steps on how to do the borescope inspection of the HPT nozzle guide vanes for SAC (/1) engines and DAC engines.

B. References

Reference	Title
74-21-02-000-801-F00	Main Igniter Plug Removal (P/B 401)
74-21-02-400-801-F00	Main Igniter Plug Installation (P/B 401)

C. Tools/Equipment

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

Reference	Description
COM-2195	Set - Borescope Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P05 Supplier: 58828 Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828
COM-4302	Set - Borescope Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-2198	Kit - Borescope Guide, HP Turbine, CFM56 Engines Part #: 856A1310G01 Supplier: 58828
SPL-2207	Guide Tube - Borescope, HPT Shroud, CFM56 Engines Part #: 856A1351P01 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	

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(Continued)

Reference	Description	Specification
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	CFM CP2619
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

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

F. Prepare for the Inspection

SUBTASK 72-00-00-210-035-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-210-122-F00

(2) Make sure that you verify the version of the CFM56 engine on the data placard.

NOTE: The newest version of the CFM56-7B series engine is the CFM56-7BEXX 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.

NOTE: A Tech Insertion (TI) engine has a “/3” after the thrust rating on the engine data plate. An example of a Singular Annular Combustor (SAC) Engine with TI is CFM56-7B22/3. An example of a non-TI engine is CFM56-7B22. The “XX” in CFM56-7BXX/3 is the thrust rating of the engine. This information is found on the engine data placard on the engine fan case.

SUBTASK 72-00-00-010-006-F00

(3) Remove the S13 and S15 borescope plugs (Figure 611 and Figure 613):

NOTE: To do an initial inspection, it is only necessary to remove the S13 and S15 borescope plugs. If you find damage, you must remove the main igniter plugs and the other borescope plugs to do a complete inspection.

SUBTASK 72-00-00-010-007-F00

(4) If you find damage from the initial inspection, do these steps to remove the main igniter plugs and the other borescope plugs:

NOTE: The port for the 4:00 o'clock main igniter plug is referred to as the S10 borescope port. The port for the 8:00 o'clock main igniter plug is referred to as the S11 borescope port.

(a) Do this task: Main Igniter Plug Removal, TASK 74-21-02-000-801-F00.

(b) Remove the S12 and S14 borescope plugs.

SUBTASK 72-00-00-210-038-F00

(5) Do these steps to prepare for the inspection of the HPT nozzle (Figure 614, Figure 615):

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

1) Rigid Borescope, COM-2195 and light source, SPL-4305

2) Rigid Borescope, COM-4302 and light source, SPL-4306

3) Rigid Borescope, COM-4303 and light source, SPL-2197

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4) Rigid Borescope, COM-4304 and light source, SPL-4308

5) Use the rigid borescope with the black band.

(b) Put the rigid borescope through the borescope port.

(c) Turn the light source ON.

SUBTASK 72-00-00-210-039-F00

(6) If a complete inspection of the nozzle convex side is necessary, do the steps that follow (Figure 614, Figure 615):

NOTE: This inspection is only necessary if you find an indication of damage on the convex side during the initial or complete inspection with the rigid probes.

(a) Connect the borescope, COM-2196 to the applicable light source.

(b) Put the borescope guide kit, SPL-2198 or borescope guide tube, SPL-2207 into the borescope port.

1) Use the borescope guide kit, SPL-2198 to do the inspection of the leading edge and the concave surfaces.

2) Use the borescope guide tube, SPL-2207 to do the inspection of the convex surfaces.

(c) Put the fiberscope through the guide tube.

(d) Make sure the borescope is correctly adjusted.

(e) Turn the lightsource ON.

G. HPT Nozzle Guide Vanes Borescope Inspection

SUBTASK 72-00-00-210-040-F00

(1) Examine the leading edges of the 42 HPT nozzle guide vanes as follow:

NOTE: To estimate the size of distress, use the applicable visual aid. To find distress locations relative to specific rows, refer to the applicable figure.

NOTE: The airfoil baffle is visible inside the airfoil when missing material occurs. It is sheet metal with cooling holes.

(a) Cracks that connect nose holes

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

a) The cracks are not longer than 0.3 inch (7.60 mm).

b) There is no missing material.

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The cracks are not longer than 0.3 inch (7.60 mm).

b) The total area of missing material is not more than 0.25 square inch (161 square mm) per vane. Maximum of 4 vanes per 90° arc.

c) Missing material does not extend aft of rows 3 or 9.

3) Do the inspection again after each 400 cycle interval with these conditions:

a) The cracks are not more than 1 inch (25.4 mm) in length.

b) The total area of missing material is not more than 0.25 square inch (161 square mm) per vane. Maximum of 4 vanes per 90° arc.

c) Missing material does not extend aft of rows 3 or 9.

4) The Continue-In-Service limit is 25 cycles with this condition:

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a) The area of missing material is not more than 0.3 square inch (193 square mm) per vane. Maximum of 4 vanes per 90° arc.

(b) Other cracks

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

a) The cracks are not longer than 0.5 inch (12.7 mm) in length.

b) There is no missing material.

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The cracks are not longer than 0.5 inch (12.7 mm) in length.

b) The total area of missing material is not more than 0.25 square inch (161 square mm) per vane. Maximum of 4 vanes per 90° arc.

c) Missing material does not extend aft of rows 3 or 9.

3) Do the inspection again after each 400 cycle interval with these conditions:

a) The cracks are not more than 1 inch (25.4 mm) in length.

b) The total area of missing material is not more than 0.25 square inch (161 square mm) per vane. Maximum of 4 vanes per 90° arc.

c) Missing material does not extend aft of rows 3 or 9.

4) The Continue-In-Service limit is 25 cycles with this condition:

a) The area of missing material is not more than 0.3 square inch (193 square mm) per vane. Maximum of 4 vanes per 90° arc.

(c) Burns or spalled areas

1) There is no limit to the number with this condition:

a) The area of missing material is not more than 0.15 inch (97 square mm) per vane. Maximum of 4 vanes per 90° arc.

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The total area of missing material is not more than 0.25 square inch (161 square mm) per vane. Maximum of 4 vanes per 90° arc.

b) Missing material does not extend aft of rows 3 or 9.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) The area of missing material is not more than 0.3 square inch (193 square mm) per vane. Maximum of 4 vanes per 90° arc.

(d) Baffle missing material

1) Not Permitted

2) The Continue-In-Service limit is 25 cycles with this condition:

a) The area of missing material is equivalent to a rectangle defined by 4 adjacent holes.

SUBTASK 72-00-00-210-041-F00

(2) Examine the concave surfaces as follow:

(a) Radial cracks that extend from the gill holes

1) Permitted if there is no missing material.

2) Do the inspection again after each 400 cycle interval with these conditions:

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a) The missing material, cause by cracks, is not more than 0.04 square inch (25.81 square mm).

b) No more than 4 airfoils for each engine have missing material caused by cracks.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) The missing material, caused by cracks, is not more than 0.45 square inch (290 square mm).

(b) Other cracks (not in the gill hole rows)

1) Permitted if there is no missing material.

2) Do the inspection again after each 400 cycle interval with these conditions:

a) The missing material, cause by cracks, is not more than 0.04 square inch (25.81 square mm).

b) No more than 4 airfoils for each engine have missing material caused by cracks.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) The missing material, caused by cracks, is not more than 0.45 square inch (290 square mm).

(c) Burns

1) There is no limit to the quantity with this condition:

a) There is no burn-through into the inner cooling passages.

2) The Continue-In-Service limit is 25 cycles with this condition:

a) The area which is burned through is not larger than 0.45 square inch (290 square mm) on each vane.

(d) Missing thermal barrier coating (TBC)

1) There is no limit to the quantity of TBC that can be missing.

SUBTASK 72-00-00-210-110-F00

(3) Examine the convex surfaces as follow:

NOTE: To find distress location relative to specific rows, refer to the applicable figure.

(a) Radial or axial cracks

1) Permitted if there is no missing material.

2) If there is missing material, do the inspection again after each 800 cycle interval with these conditions:

a) The total area of missing material is not more than 0.05 square inch (39.1 square mm) per vane. Maximum of 4 vanes per 90° arc.

b) Cracking does not occur aft of cooling hole row 16.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) The missing material, caused by cracks, is not larger than 0.45 square inch (290 square mm) on each vane.

(b) Burns or bulges

NOTE: An open area of the cavity caused by bulging is to be interpreted as missing material where the following limits apply.

1) Permitted if there is no missing material.

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2) If there is missing material, do the inspection again after each 800 cycle interval with these conditions:

a) The total area of missing material is not more than 0.05 square inch (39.1 square mm) per vane. Maximum of 4 vanes per 90° arc.

b) Bulging does not occur aft of cooling hole row 16.

3) The Continue-In-Service limit 25 cycles with this condition:

a) The missing material is not larger than 0.45 square inch (290 square mm) on each vane.

(c) Missing thermal barrier coating (TBC)

1) There is no limit to the quantity of TBC that can be missing.

SUBTASK 72-00-00-210-042-F00

(4) Examine the trailing edges as follow:

(a) Cracks or burns

1) There is no limit to the number of cracks or the amount of burns permitted.

(b) Buckled or bowed material

1) There is no limit.

(c) Missing material

1) The maximum quantity of missing material from each vane is 0.5 inch (12.7 mm) length in the axial direction.

2) The Continue-In-Service limit is 25 cycles with these conditions:

a) The missing material is not longer than 0.75 inch (19.05 mm) in the axial direction.

b) Make sure that the HPT blades must be in limits (TASK 72-00-00-200-807-F00).

SUBTASK 72-00-00-210-043-F00

(5) Examine all airfoil surfaces as follow:

(a) Craze cracks

NOTE: Craze cracks look like many surface cracks that do not have visual width or depth.

1) There is no limit.

(b) Nicks, marks, scratches, and dents

1) There is no limit.

(c) Metal splatter

1) There is no limit.

SUBTASK 72-00-00-210-044-F00

(6) Examine the inner and outer platforms as follow:

(a) Cracks in the parent metal

1) There is no limit.

(b) Missing metal or burning of parent metal

1) There is no limit of missing metal or burning of parent metal with no through holes.

2) Do the inspection again after 400 cycle interval with these conditions:

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a) The through hole is in or less than 1 inch (25.4mm) of the leading edge of the inner or outer platform.

b) The through hole is not more than 0.06 square inch (38.71 square mm).

c) No more than 4 segments for each engine have through holes on the inner or outer platform.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) Through hole is not more than 0.12 square inch (77.42 square mm).

(c) Nicks, scores, scratches and dents on the platform surface

1) There is no limit.

(d) Bulges and bowing

1) There is no limit.

(e) Cracks in the braze joints of the airfoil-to-platform surfaces

1) There is no limit to the number with this condition:

a) Separation of the braze joint is not permitted, unless it was caused by burning.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-420-008-F00

(1) Install the borescope plugs as follow:

(a) Lubricate the threads of the borescope plugs with pure nickel special compound, D50034 [CP2619], milk of magnesia compound, D50032 [CP1064] or graphite compound, D00601 [CP2101].

(b) Install the borescope plugs.

AKS ALL; AIRPLANES WITH SINGLE ANNULAR COMBUSTOR (SAC) ENGINES

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

AKS ALL

I 2) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on each borescope plug.

SUBTASK 72-00-00-420-009-F00

(2) If they were removed, do this task: Main Igniter Plug Installation, TASK 74-21-02-400-801-F00.

SUBTASK 72-00-00-860-083-F00

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

——— END OF TASK ———

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HPT Nozzle Guide Vanes Borescope Inspection
Figure 614/72-00-00-990-810-F00

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HPT Nozzle Guide Vanes (With Flexible) Borescope Inspection
Figure 615/72-00-00-990-811-F00

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NOTE:

0.09 INCH (2.28 mm) IS THE DISTANCE
BETWEEN COOLING HOLE CENTERLINE.

1218758-00-A
374095 S0000132048_V2

HPT NGV Dimensional Inspection
Figure 616/72-00-00-990-837-F01 (Sheet 1 of 3)

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HPT NGV Dimensional Inspection
Figure 616/72-00-00-990-837-F01 (Sheet 2 of 3)

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1295200-00
1987630 S0000386042_V2

HPT NGV Dimensional Inspection
Figure 616/72-00-00-990-837-F01 (Sheet 3 of 3)

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TASK 72-00-00-200-818-F00

9. HPT Nozzle Guide Vanes Borescope Inspection (Tech Insertion (/3) and CFM56-7BE Engines)

(Figure 617, Figure 618 and Figure 619)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the steps on how to do the borescope inspection of the HPT nozzle guide vanes for Tech Insertion (/3) and CFM56-7BE engines.

B. References

Reference	Title
74-21-02-000-801-F00	Main Igniter Plug Removal (P/B 401)
74-21-02-400-801-F00	Main Igniter Plug Installation (P/B 401)

C. Tools/Equipment

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

Reference	Description
COM-2195	Set - Borescope Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P05 Supplier: 58828 Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828
COM-4302	Set - Borescope Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-2198	Kit - Borescope Guide, HP Turbine, CFM56 Engines Part #: 856A1310G01 Supplier: 58828
SPL-2207	Guide Tube - Borescope, HPT Shroud, CFM56 Engines Part #: 856A1351P01 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	

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(Continued)

Reference	Description	Specification
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	CFM CP2619
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

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

F. Prepare for the Inspection

SUBTASK 72-00-00-840-030-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-210-123-F00

(2) Make sure that you verify the version of the CFM56 engine on the data placard.

NOTE: The newest version of the CFM56-7B series engine is the CFM56-7BEXX 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.

NOTE: A Tech Insertion (TI) engine has a “/3” after the thrust rating on the engine data plate. An example of a Singular Annular Combustor (SAC) Engine with TI is CFM56-7B22/3. An example of a non-TI engine is CFM56-7B22. The “XX” in CFM56-7BXX/3 is the thrust rating of the engine. This information is found on the engine data placard on the engine fan case.

SUBTASK 72-00-00-010-040-F00

(3) Remove the S13 and S15 borescope plugs (Figure 611 and Figure 613).

NOTE: To do an initial inspection, it is only necessary to remove the S13 and S15 borescope plugs. If you find damage, you must remove the main igniter plugs and the other borescope plugs to do a complete inspection.

SUBTASK 72-00-00-020-012-F00

(4) If you find damage from the initial inspection, do these steps to remove the main igniter plugs and the other borescope plugs:

NOTE: The port for the 4:00 o'clock main igniter plug is referred to as the S10 borescope port. The port for the 8:00 o'clock main igniter plug is referred to as the S11 borescope port.

(a) Do this task: Main Igniter Plug Removal, TASK 74-21-02-000-801-F00.

(b) Remove the S12 and S14 borescope plugs.

SUBTASK 72-00-00-840-031-F00

(5) Do these steps to prepare for the inspection of the HPT nozzle (Figure 617, Figure 618):

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

1) Rigid Borescope, COM-2195 and light source, SPL-4305

2) Rigid Borescope, COM-4302 and light source, SPL-4306

3) Rigid Borescope, COM-4303 and light source, SPL-2197

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4) Rigid Borescope, COM-4304 and light source, SPL-4308

5) Use the rigid borescope with the black band.

(b) Put the rigid borescope through the borescope port.

(c) Turn the light source ON.

SUBTASK 72-00-00-480-034-F00

(6) If a complete inspection of the nozzle convex side is necessary, do the steps that follow (Figure 617, Figure 618):

NOTE: This inspection is only necessary if you find an indication of damage on the convex side during the initial or complete inspection with the rigid probes.

(a) Connect the borescope, COM-2196 to the applicable light source.

(b) Put the borescope guide kit, SPL-2198 or borescope guide tube, SPL-2207 into the borescope port.

1) Use the borescope guide kit, SPL-2198 to do the inspection of the leading edge and the concave surfaces.

2) Use the borescope guide tube, SPL-2207 to do the inspection of the convex surfaces.

(c) Put the fiberscope through the guide tube.

(d) Make sure that you adjust the borescope correctly.

(e) Turn the lightsource ON.

G. HPT Nozzle Guide Vanes Borescope Inspection

SUBTASK 72-00-00-220-008-F00

(1) Examine the leading edges of the 42 HPT nozzle guide vanes as follow:

NOTE: To estimate the size of distress, use the applicable visual aid. To find distress locations relative to specific rows, refer to the applicable figure.

NOTE: The airfoil baffle is visible inside the airfoil when missing material occurs. It is sheet metal with cooling holes.

(a) Cracks that connect nose holes

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

a) The cracks are not longer than 0.3 inch (7.60 mm).

b) There is no missing material.

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The cracks are not longer than 0.3 inch (7.60 mm).

b) The total area of missing material is not more than 0.25 square inch (161 square mm) per vane. Maximum of 4 vanes per 90° arc.

c) Missing material does not extend aft of rows 3 or 9.

3) Do the inspection again after each 400 cycle interval with these conditions:

a) The cracks are not more than 1 inch (25.4 mm) in length.

b) The total area of missing material is not more than 0.25 square inch (161 square mm) per vane. Maximum of 4 vanes per 90° arc.

c) Missing material does not extend aft of rows 3 or 9.

4) The Continue-In-Service limit is 25 cycles with this condition:

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a) The area of missing material is not more than 0.3 square inch (193 square mm) per vane. Maximum of 4 vanes per 90° arc.

(b) Other cracks

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

a) The cracks are not longer than 0.5 inch (12.7 mm).

b) There is no missing material.

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The cracks are not longer than 0.5 inch (12.7 mm).

b) The total area of missing material is not more than 0.25 square inch (161 square mm) per vane. Maximum of 4 vanes per 90° arc.

c) Missing material does not extend aft of rows 3 or 9.

3) Do the inspection again after each 400 cycle interval with these conditions:

a) The cracks are not more than 1 inch (25.4 mm) in length.

b) The total area of missing material is not more than 0.25 square inch (161 square mm) per vane. Maximum of 4 vanes per 90° arc.

c) Missing material does not extend aft of rows 3 or 9.

4) The Continue-In-Service limit is 25 cycles with this condition:

a) The area of missing material is not more than 0.3 square inch (193 square mm) per vane. Maximum of 4 vanes per 90° arc.

(c) Burns or spalled areas

1) There is no limit to the number with this condition:

a) The area of missing material is not more than 0.15 square inch (97 square mm) per vane. Maximum of 4 vanes per 90° arc.

2) Do the inspection again after each 800 cycle interval with these conditions:

a) The total area of missing material is not more than 0.25 square inch (161 square mm) per vane. Maximum of 4 vanes per 90° arc.

b) Missing material does not extend aft of rows 3 or 9.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) The area of missing material is not more than 0.3 square inch (193 square mm) per vane. Maximum of 4 vanes per 90° arc.

(d) Baffle missing material

1) Not Permitted

2) The Continue-In-Service limit is 25 cycles with this condition:

a) The area of missing material is equivalent to a rectangle defined by 4 adjacent holes.

SUBTASK 72-00-00-220-009-F00

(2) Examine the concave surfaces as follow:

(a) Radial cracks that extend from the gill holes

1) Permitted if there is no missing material.

2) Do the inspection again after each 400 cycle interval with these conditions:

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a) The missing material, cause by cracks, is not more than 0.04 square inch (25.81 square mm).

b) No more than 4 airfoils for each engine have missing material caused by cracks.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) The missing material caused by cracks is not larger than 0.45 square inch (290 square mm).

(b) Other cracks (not in the gill hole rows)

1) Permitted if there is no missing material.

2) Do the inspection again after each 400 cycle interval with these conditions:

a) The missing material, cause by cracks, is not more than 0.04 square inch (25.81 square mm).

b) No more than 4 airfoils for each engine have missing material caused by cracks.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) The missing material, caused by cracks, is not more than 0.45 square inch (290 square mm).

(c) Burns

1) There is no limit to the quantity with this condition:

a) There is no burn-through into the inner cooling passages.

2) The Continue-In-Service limit is 25 cycles with this condition:

a) The area which is burned through is not larger than 0.45 square inch (290 square mm) on each vane.

(d) Missing thermal barrier coating (TBC)

1) There is no limit to the quantity of TBC that can be missing.

SUBTASK 72-00-00-220-010-F00

(3) Examine the convex surfaces as follow:

NOTE: To find distress location relative to specific rows, refer to the applicable figure.

(a) Radial or axial cracks

1) Permitted if there is no missing material.

2) If there is missing material, do the inspection again after each 800 cycle interval with these conditions:

a) The total area of missing material is not more than 0.05 square inch (39.1 square mm) per vane. Maximum of 4 vanes per 90° arc.

b) Cracking does not occur aft of cooling hole row 16.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) The missing material caused by cracks is not larger than 0.45 square inch (290 square mm).

(b) Burns or bulges

NOTE: An open area of the cavity caused by bulging is to be interpreted as missing material where the limits that follow apply.

1) Permitted if there is no missing material.

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2) If there is missing material, do the inspection again after each 800 cycle interval with these conditions:

a) The total area of missing material is not more than 0.05 square inch (39.1 square mm) per vane. Maximum of 4 vanes per 90° arc.

b) Bulging does not occur aft of cooling hole row 16.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) The missing material caused by cracks is not larger than 0.45 square inch (290 square mm).

(c) Missing thermal barrier coating (TBC)

1) Permitted

SUBTASK 72-00-00-220-011-F00

(4) Examine the trailing edges as follow:

(a) Cracks or burns

1) Permitted

(b) Buckled or bowed material

1) Permitted

(c) Missing material

1) The maximum quantity of missing material from each vane is 0.5 inches (12.7 mm) length in the axial direction.

2) The Continue-In-Service limit is 25 cycles with these conditions:

a) The missing material is not longer than 0.75 inches (19.05 mm) in the axial direction.

b) Make sure that the HPT blades must be in limits (TASK 72-00-00-200-807-F00).

SUBTASK 72-00-00-211-002-F00

(5) Examine all airfoil surfaces as follow:

(a) Craze cracks

NOTE: Craze cracks look like many surface cracks that do not have visual width or depth.

1) Permitted.

(b) Nicks, marks, scratches, and dents

1) Permitted.

(c) Metal splatter

1) Permitted.

SUBTASK 72-00-00-211-003-F00

(6) Examine the inner and outer platforms as follow:

(a) Cracks in the parent metal

1) Permitted.

(b) Missing metal or burning of parent metal

1) There is no limit of missing metal or burning of parent metal with no through holes.

2) Do the inspection again after 400 cycle interval with these conditions:

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a) The through hole is in or less than 1 inch (25.4mm) of the leading edge of the inner or outer platform.

b) The through hole is not more than 0.06 square inch (38.71 square mm).

c) No more than 4 segments for each engine have through holes on the inner or outer platform.

3) The Continue-In-Service limit is 25 cycles with this condition:

a) Through hole is not more than 0.12 square inch (77.42 square mm).

(c) Nicks, scores, scratches and dents on the platform surface

1) Permitted.

(d) Bulges and bowing

1) Permitted.

(e) Cracks in the braze joints of the airfoil-to-platform surfaces

1) Permitted with this condition:

a) Separation of the braze joint is not permitted, unless it was caused by burning.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-410-034-F00

(1) Do these steps to install the borescope plugs:

(a) Lubricate the threads of the borescope plugs with pure nickel special compound, D50034 [CP2619], milk of magnesia compound, D50032 [CP1064] or graphite compound, D00601 [CP2101].

(b) Install the borescope plugs.

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

2) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on each borescope plug.

SUBTASK 72-00-00-410-035-F00

(2) If they were removed, do this task: Main Igniter Plug Installation, TASK 74-21-02-400-801-F00.

SUBTASK 72-00-00-840-032-F00

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

END OF TASK

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1 CONFIGURATION 1

2 CONFIGURATION 2

A-A

1352070-00

G24991 S0006582271_V4

HPT Nozzle Guide Vanes Borescope Inspection
Figure 617/72-00-00-990-847-F00

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HPT Nozzle Guide Vanes (With Flexible) Borescope Inspection
Figure 618/72-00-00-990-848-F00

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NOTE:

0.09 INCH (2.28 mm) IS THE DISTANCE
BETWEEN COOLING HOLE CENTERLINE.

1218758-00-A
374095 S0000132048_V2

HPT NGV Dimensional Inspection
Figure 619/72-00-00-990-849-F00 (Sheet 1 of 3)

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HPT NGV Dimensional Inspection
Figure 619/72-00-00-990-849-F00 (Sheet 2 of 3)

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HPT NGV Dimensional Inspection
Figure 619/72-00-00-990-849-F00 (Sheet 3 of 3)

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TASK 72-00-00-200-807-F00

10. HPT Blades Borescope Inspection

(Figure 601, Figure 620, Figure 621, Figure 622, Figure 623 and Figure 624)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the instructions on how to examine the HPT blades from the forward and aft sides.

(a) Do an inspection of the rotor blades from the aft side with a rigid borescope through borescope port S16 or S17.

(b) Do an inspection of the rotor blades from the forward side with a fiberscope through the main igniter plug port S10 or S11.

B. References

Reference	Title
72-00-00-980-801-F00	Turn the N2 Rotor (P/B 201)
74-21-02-000-801-F00	Main Igniter Plug Removal (P/B 401)
74-21-02-400-801-F00	Main Igniter Plug Installation (P/B 401)

C. Tools/Equipment

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

Reference	Description
COM-2195	Set - Borescope Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P05 Supplier: 58828 Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828
COM-4302	Set - Borescope Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-2198	Kit - Borescope Guide, HP Turbine, CFM56 Engines Part #: 856A1310G01 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

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D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	CFM CP2619
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

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

F. Prepare for the Inspection

SUBTASK 72-00-00-210-048-F00

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

SUBTASK 72-00-00-010-008-F00

(2) Remove the S16 or S17 borescope plug.

SUBTASK 72-00-00-210-050-F00

(3) Remove the main igniter plugs to access the borescope inspection ports S10 and S11 (TASK 74-21-02-000-801-F00).

NOTE: The 4:00 o'clock main igniter plug is referred to as the S10 borescope port. The 8:00 o'clock main igniter plug is referred to as the S11 borescope port.

SUBTASK 72-00-00-210-051-F00

(4) Prepare for the inspection of the HPT blades from the aft side as follows:

(a) If you will use the Rigid Borescope, COM-2195, connect it to light source, SPL-4305.

(b) If you will use the Rigid Borescope, COM-4302, connect it to light source, SPL-4306.

(c) If you will use the Rigid Borescope, COM-4303, connect it to light source, SPL-2197.

(d) If you will use the Rigid Borescope, COM-4304, connect it to light source, SPL-4308.

(e) Use the rigid borescope with the yellow band to get a general view.

(f) Use the rigid borescope with the green band to view the blade platform.

(g) Use the rigid borescope with the blue band to view the blade tip.

(h) Put the rigid borescope through the borescope port.

(i) Make sure the borescope is correctly adjusted.

(j) Turn the light source ON.

SUBTASK 72-00-00-210-052-F00

(5) Prepare for the inspection of the HPT blades from the forward side as follows:

(a) Put the borescope guide kit, SPL-2198 into the S10 or S11 borescope port.

(b) Connect the borescope, COM-2196 to the applicable light source.

(c) Put the fiberscope through the guide tube.

(d) Make sure the borescope is correctly adjusted.

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(e) Turn the light source ON.

SUBTASK 72-00-00-820-001-F00

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

G. HPT Blades Borescope Inspection

SUBTASK 72-00-00-210-053-F00

(1) Examine the trailing edge of the HPT blades as follows:

NOTE: Unless otherwise identified, all damage limits for the HPT blades are the same for the different blade configurations.

NOTE: One engine configuration has 76 HPT blades. The other engine configuration has 80 HPT blades.

(a) Cracks that connect to the trailing edge in Area A

1) One crack is permitted if the crack is not more than 0.10 inch (2.5 mm) in length.

2) For a crack that is more than 0.10 inch (2.5 mm) but less than 0.20 inch (5.1 mm) in length, do the inspection again in or less than 500 cycles.

3) The Continue-In-Service (C-I-S) limit is 10 cycles if the crack is more than 0.20 inch (5.1 mm) but less than 0.25 inch (6.4 mm) in length.

(b) Missing material, burning, or holes in the tip and Area A

1) There is no limit if the missing material is not more than 0.5 x 0.5 inch (12 x 12 mm).

2) The Continue-In-Service limit is 50 cycles if the missing material is not more than 0.5 inch axially x 0.75 inch radially (12 mm axially x 19.1 mm radially).

(c) Nicks and dents in Area A

1) There is no limit.

(d) Nicks and dents in Area B and C

1) There is no limit if the nicks and dents are not more than 0.050 inch (1.27 mm) in length.

2) Repeat the inspection after each 400 cycles if the nicks and dents are 0.050-0.120 inch (1.27-3.04 mm) in length.

3) Repeat the inspection after each 200 cycles if the nicks and dents are 0.120-0.200 inch (3.05-5.08 mm) in length.

4) The Continue-In-Service limit is 40 cycles if the nicks and dents are more than 0.200 inch (5.08 mm), but less than 0.300 inch (7.62 mm) in length.

(e) Cracks that connect to the trailing edge in Areas B, C, and root fillet

1) One crack is permitted, with these conditions:

a) Repeat the inspection after each 400 cycles, if the crack length is less than 0.120 inch (3.04 mm) in length.

b) Repeat the inspection after each 200 cycles, if the crack length is 0.120-0.200 inch (3.05-5.08 mm) in length.

2) The Continue-In-Service limit is 40 cycles if the crack is more than 0.200 inch (5.08 mm) but less than 0.300 inch (7.62 mm) in length.

(f) Missing Thermal Barrier Coating (TBC)

NOTE: Oxidation that is related to the missing TBC is permitted.

1) There is no limit to the quantity of TBC that can be missing.

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(g) Plugged air slots in Area A or B

1) One plugged air passage in each blade is permitted.

2) The Continue-In-Service limit is 50 cycles if two air slots in each blade are plugged.

(h) Plugged air slots in Area C

1) Plugged air slots are not permitted.

2) The Continue-In-Service (C-I-S) limit is 50 cycles if one blade has plugged air slots in Area C.

(i) Bent material at the tip

1) There is no limit.

(j) Distortions or signs of burning or melting

1) Distortions, burning, or melting are not permitted.

2) The Continue-In-Service limit is 25 cycles if no more than 10 blades have distortions, burning, or melting.

SUBTASK 72-00-00-210-054-F00

(2) Examine the tip of the HPT blade as follows:

NOTE: Two blades approximately 90 degrees apart are notched to show the level of blade tip rub. If you cannot see the notches or if the quantity of blades with notches is different, the condition is serviceable if in limits below. The blade rub data can be used to find causes for EGT margin changes and other trends.

(a) Damage that exposes the interior cooling passages of the blade between the leading and trailing edges.

1) Exposed interior cooling passages are not permitted unless the condition is acceptable per trailing edge inspection for Missing Material or Leading Edge Inspection for Through wall hole in area A and B.

2) The Continue-In-Service (C-I-S) limit is 10 cycles if the hole is less than 0.050 inch (1.27 mm) in diameter.

(b) Radial cracks on the convex side, not closer than 0.5 inch (12 mm) to the trailing edge

1) Permitted, if the radial cracks are not more than 0.15 inch (3.8 mm) in length.

2) The Continue-In-Service (C-I-S) limit is 50 cycles if the radial cracks are not more than 0.35 inch (8.8 mm) in length.

(c) Radial cracks on the concave side, no closer than 0.5 inch (12 mm) to the trailing edge

1) Permitted, if the radial cracks are not more than 0.7 inch (17 mm) in length.

2) The Continue-In-Service (C-I-S) limit is 50 cycles if the radial cracks are not longer than 1.0 inch (25 mm).

(d) Radial cracks that are 0.5 inch (12 mm) or closer to the trailing edge

1) Permitted.

(e) Bent, curled, or missing material

1) Permitted, if all damage is above the tip shelf.

2) The Continue-In-Service (C-I-S) limit is 10 cycles if the missing material below the tip shelf is less than 0.050 inch (1.27 mm) in diameter.

(f) Distortions or signs of burning or melting

1) Distortions, burning, or melting are not permitted.

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2) The Continue-In-Service limit is 25 cycles if a maximum of 10 blades have distortions, burning, or melting.

(g) Missing thermal barrier coating (TBC)

NOTE: Oxidation that is related to the missing TBC is permitted.

1) Permitted.

SUBTASK 72-00-00-210-055-F00

(3) Examine the convex and concave surfaces that are not in the leading edge, trailing edge, or tip as follow.

(a) Nicks or dents on the convex and concave surfaces in Areas A and B

1) Permitted, with these conditions:

a) In Area A, the damage is not more than 0.25 inch (6.3 mm) in length.

b) In Area B, the damage is not more than 0.10 inch (2.5 mm) in length.

2) The Continue-In-Service (C-I-S) limit is 25 cycles with this condition:

a) Cracks or missing material is not permitted.

(b) Nicks or dents on the convex and concave surfaces in Area C

1) Three nicks or dents are permitted with these conditions:

a) They are not longer than 0.05 inch (1.2 mm).

b) Dents are separated by at least 0.125 inch (3.17 mm).

2) The Continue-In-Service limit is 25 cycles with this condition:

a) Cracks or missing material is not permitted.

(c) Cracks in the concave and convex surfaces

1) Cracks are not permitted.

(d) Distortions or signs of burning or melting

1) Distortions, burning, or melting are not permitted.

2) The Continue-In-Service limit is 25 cycles, with this condition:

a) A maximum of 10 blades can have distortions, burning, or melting.

(e) Missing Thermal Barrier Coating (TBC)

1) Permitted.

SUBTASK 72-00-00-210-056-F00

(4) Examine the leading edge of the HPT rotor blades as follows:

(a) Axial and radial cracks in Area A

1) Permitted with these conditions:

a) Cracks are not more than 0.05 inch (1.2 mm) in length.

b) Cracks can not connect more than 2 holes.

2) The Continue-In-Service limit is 10 cycles, with this condition:

a) Cracks are less than 0.1 inch (2 mm) in length.

(b) Axial and radial cracks in Area B and C, that include the root fillet, and that do not intersect the nose or gill holes

1) Not permitted.

(c) Axial nose or gill hole cracks in Area B and C

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1) Not permitted.
2) The Continue-In-Service limit is 10 cycles, with this condition:
   a) Cracks are not more than 0.05 inch (1.2 mm) in length.

(d) Radial nose or gill hole cracks in Area B
1) One crack is permitted in Area B, with this condition:
   a) The crack is not more than 0.03 inch (0.7 mm) in length.
2) The Continue-In-Service limit is 10 cycles, with this condition:
   a) The crack is not more than 0.06 inch (1.5 mm) in length.

(e) Radial nose or gill hole cracks in Area C
1) Not permitted.
2) The Continue-In-Service limit is 10 cycles, with this condition:
   a) Cracks are not longer than 0.03 inch (0.7 mm).

(f) Nicks and dents in Area A and B
1) Permitted.

(g) Nicks and dents in Area C, that include the root radius
1) 3 nicks or dents are permitted, with these conditions:
   a) The nicks and dents are not longer than 0.05 inch (1.2 mm).
   b) The nicks and dents are separated by at least 0.125 inch (3.17 mm).

(h) Dirt or environmental contamination
1) Permitted.

(i) Missing Thermal Barrier Coating (TBC)
1) Permitted.

(j) Through wall hole in Area A and B
1) Permitted with these conditions:
   a) Cavity 2 is not exposed.
   b) Not more than two blades have a through wall hole.
   c) Do the inspection again after each 100 cycles.
      <1> After a minimum of four inspections, if the size of the through wall hole has not changed, increase the inspection interval to within every 400 cycles.
      <2> After a minimum of four inspections, if the size of the through wall hole has changed, maintain the inspection interval at 100 cycles.
2) The Continue-In-Service limit is 25 cycles, with this condition:
   a) Cavity 2 is not exposed on all blades.

(k) Through wall hole in Area C
1) ENGINES AFFECTED BY CFM56 SERVICE BULLETINS 72-0636, 72-0886 OR 72-0918;

   Permitted with these conditions:
   a) The hole size is less than 0.070 inch (1.8 mm) diameter, or 0.0038 in^2 (2.45 mm^2) equivalent area.

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<1> Do the inspection again after each 100 cycles.

2) The Continue-In-Service limit is 50 cycles, with this condition:

a) The hole size is less than 0.30 inch (7.6 mm) diameter, or 0.0707 in^2 (45.61 mm^2) equivalent area.

(l) Discoloration and oxidation permitted with this condition:

1) Do the inspection again after each 400 cycles.

SUBTASK 72-00-00-210-057-F00

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

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-210-058-F00

(1) Do these steps to install the borescope plugs as follow:

(a) Lubricate the threads of the borescope plugs with graphite compound, D00601 [CP2101], pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064].

(b) Install the borescope plugs.

1) Tighten each borescope plug to 57-63 pound-inches (6.5-7.1 Newton-meters).

2) Install a safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on each borescope plug.

SUBTASK 72-00-00-410-007-F00

(2) Do this task: Main Igniter Plug Installation, TASK 74-21-02-400-801-F00.

SUBTASK 72-00-00-210-059-F00

(3) Do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

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HPT Blades Borescope Plug Installation
Figure 620/72-00-00-990-812-F00

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HPT Blade Borescope Inspection Locations
Figure 621/72-00-00-990-813-F00

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HPT BLADE
(EXAMPLE)

(SIDE VIEW)

A

NOTE:

80 BLADE HPT ROTOR CONFIGURATION

1352453-00

G24473 S0006582279_V3

HPT Blade Inspection Borescope Common Limits
Figure 622/72-00-00-990-814-F00 (Sheet 1 of 2)

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NOTE:

ROW 1 AND 6-8 (GILL COOLING HOLES).
ROW 2-5 (NOSE COOLING HOLES).

GMM-1163838-00-A
GMM-1137423-02-A

(TOP VIEW)

B

NOTE:

80 BLADE HPT ROTOR CONFIGURATION

1 SOME HPT BLADES HAVE THE TRAILING EDGE TIP CORNER "CROPPED" DURING MANUFACTURE. THIS IS ACCEPTABLE. DO NOT CONFUSE WITH SHROUD DROP RUBBING OF THE BLADE TIP. SHROUD DROP RUBBING RESULTS IN A SHALLOWER ANGLE.

1352454-00
H87161 S0006582280_V3

HPT Blade Inspection Borescope Common Limits
Figure 622/72-00-00-990-814-F00 (Sheet 2 of 2)

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NOTE:

80 BLADE HPT ROTOR CONFIGURATION WITH ADDED TRAILING EDGE COOLING HOLES AND TIP SHELF AREA.

1352455-00
2090811 S0000441462_V2

HPT Blade With Tip Shelf Inspection
Figure 623/72-00-00-990-840-F00

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NOTE:

80 BLADE HPT ROTOR CONFIGURATION WITH ADDED TRAILING EDGE COOLING HOLES AND TIP SHELF AREA.

1352455-00
2090818 S0000441466_V4

HPT Blade With Contoured Platform and Tip Cap Baffle Inspection
Figure 624/72-00-00-990-850-F00

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TASK 72-00-00-200-815-F00

11. HPT Shrouds Borescope Inspection

A. General

(1) This task provides the instructions on how to examine the HPT shrouds with a borescope.

(2) This inspection of the HPT shrouds is done with a rigid borescope through the borescope ports S16 and S17. You can see the shrouds from the aft side.

(3) If you find damage, you must do an inspection of the HPT shrouds from the forward side. This is done with a fiberscope through the main igniter ports (S10 or S11).

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	CFM CP2619
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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E. Prepare for the Inspection

SUBTASK 72-00-00-840-020-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-010-019-F00

(2) Remove the S16-S17 borescope plugs (Figure 626).

SUBTASK 72-00-00-480-024-F00

(3) Do these steps to prepare for the inspection of the HPT shrouds:

(a) Connect the applicable borescope to the light source.

1) Rigid Borescope, COM-2195 and light source, SPL-4305

2) Rigid Borescope, COM-4302 and light source, SPL-4306

3) Rigid Borescope, COM-4303 and light source, SPL-2197

4) Rigid Borescope, COM-4304 and light source, SPL-4308

5) Use the rigid borescope with the yellow band to get a general view.

(b) Connect the rigid borescope to a 90 degree right-angle viewer and a 60 degree field of vision.

(c) Put the rigid borescope through the borescope port (Figure 626).

(d) Make sure the borescope is correctly adjusted.

(e) Turn the light source ON.

F. HPT Shrouds Borescope Inspection

SUBTASK 72-00-00-290-001-F00

(1) Examine the HPT shrouds as follow (Figure 625):

(a) Axial cracks

1) There is no limit to the number or length of cracks in Surface A and Surface B.

(b) Circumferential cracks

1) There is no limit to the number of circumferential cracks that do not connect and are no more than 1.0 inch (25 mm) long in Surface A and Surface B.

2) The Continue-In-Service limit is 25 cycles if the cracks are connected and are more than 1.0 inch (25 mm) long.

3) Any number up to 0.25 inch (6.35 mm) long that are connected to axial cracks in Surface B are permitted.

4) The Continue-In-Service limit is 25 cycles if the cracks are more than 0.25 inch (6.35 mm) long.

(c) Burning and erosion

1) There is no limit if the remaining material is not in the flowpath.

(d) Split-line aft corners

1) An amount of circumferential missing or distorted surface material less than 0.200 in. (5.08 mm) and axial missing or distorted surface material less than 0.400 in. (10.16 mm) measured from the edge of the shroud.

(e) Rubs and wear

1) All rubs and wear are permitted.

(f) Distortion

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1) There is no limit if the shroud is not in the flowpath.

(g) Burn-through on the rub land (this includes holes through the backstrip)

1) Burn-through is not permitted.

2) The Continue-In-Service limit is 25 cycles.

SUBTASK 72-00-00-080-011-F00

(2) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-480-025-F00

(1) Do these steps to install the borescope plugs:

(a) Apply graphite compound, D00601 [CP2101], pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and friction surfaces of the borescope plugs.

(b) Install the borescope plugs.

1) Tighten the borescope plugs to 57-63 pound-inches (6.4-7.1 Newton-meters).

2) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on the borescope plugs.

SUBTASK 72-00-00-840-021-F00

(2) If the borescope procedure is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

——— END OF TASK ———

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ACCEPTABLE

NOT ACCEPTABLE

1227385-00-A
D88876 S0000166077_V3

HPT Shroud (Thermal Densified Coating Limits) Inspection
Figure 625/72-00-00-990-838-F00 (Sheet 1 of 2)

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TDC CURLING MAX LIMITS

A

1248063_00
1308912 S0000227359_V2

HPT Shroud (Thermal Densified Coating Limits) Inspection
Figure 625/72-00-00-990-838-F00 (Sheet 2 of 2)

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TASK 72-00-00-200-808-F00

12. Stage 1-3 LPT Blades Borescope Inspection

(Figure 601, Figure 626 and Figure 627)

A. General

(1) This task provides the instructions on how to do a borescope inspection of the stage 1-3 LPT blades.

(2) The inspection of the stage 1-3 LPT blades is done with a rigid borescope through borescope ports S16 through S20.

(3) The number of Stage 1-3 LPT blades is as follows:

Number of Stage 1–3 LPT Blades

Engine	LPT Blades Stage 1	LPT Blades Stage 2	LPT Blades Stage 3
NON 7BE	162	150	150
7BE	154	134	136

B. References

Reference	Title
71-00-00-800-806-F00	Engine Operation Limits (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	

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(Continued)

Reference	Description	Specification
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	CFM CP2619
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Inspection

SUBTASK 72-00-00-210-060-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-009-F00

CAUTION: DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(2) Cut and remove the lockwires and remove the borescope plugs S16, S17, S18, S19 and S20 (Figure 626).

NOTE: The borescope plugs S16 and S17 are in the same plane and located, respectively, at 5:30 and 8:30 aft looking forward immediately in front of the combustion case aft flange. The borescope plugs S18, S19 and S20 are located approximately at 5:00 o'clock aft looking forward on the LPT case and, from front to rear, relate to the 2nd, 3rd and 4th stages of the LPT, respectively.

AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-035-F00

(3) Cut and remove the lockwires and remove the borescope plugs S16 and S17.

NOTE: The borescope plugs S16 and S17 are in the same plane and located, respectively, at 5:30 and 8:30 aft looking forward immediately in front of the combustion case aft flange.

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AKS ALL POST SB 737-CFM56-7B-0293 (Continued)

SUBTASK 72-00-00-020-009-F00

CAUTION: DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(4) Remove the self-locking borescope cap assemblies S18, S19 and S20.

NOTE: The borescope plugs S18, S19 and S20 are located approximately at 5:00 o'clock aft looking forward on the LPT case and, from front to rear, relate to the 2nd, 3rd and 4th stages of the LPT, respectively.

AKS ALL

SUBTASK 72-00-00-210-062-F00

(5) Do these steps to prepare for the inspection of the LPT stage 1-3 blades:

(a) Connect the applicable borescope to the light source:

1) Rigid Borescope, COM-2195 and light source, SPL-4305.
2) Rigid Borescope, COM-4302 and light source, SPL-4306.
3) Rigid Borescope, COM-4303 and light source, SPL-2197.
4) Rigid Borescope, COM-4304 and light source, SPL-4308.
5) Use the rigid borescope with the yellow band to get a general view.
6) Use the rigid borescope with the green band to view the blade platform.
7) Use the rigid borescope with the blue band to view the blade tip.

(b) Connect the rigid borescope to a 90-degree right-angle viewer and a 60-degree field of vision.

(c) Put the rigid borescope through the borescope port (Figure 626).

(d) Make sure the borescope is correctly adjusted.

(e) Turn the light source ON.

SUBTASK 72-00-00-210-063-F00

(6) Put a protective mat, STD-585 in the inlet cowl.

G. Stages 1-3 LPT Blades Borescope Inspection

SUBTASK 72-00-00-210-064-F00

WARNING: BE CAREFUL WHEN YOU TURN THE FAN ROTOR. MAKE SURE YOU ARE IN A STABLE POSITION. ALSO, YOU MUST WEAR HEAVY PROTECTIVE GLOVES TO PREVENT DAMAGE TO YOUR HANDS. IF YOU DO NOT, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Examine the LPT blades while you turn the fan rotor in a smooth, stable movement.

(a) To examine the airfoil as the blades turn, you must change the depth of the probe in the LPT case.

(b) Turn the probe (azimuth) at the same time you change the depth of the probe. This will permit the maximum view for a given turn speed.

NOTE: It can be necessary to make more than one complete rotation of the LPT as the length of the blade increases. Also, to fully view the platform and the root areas, it can be necessary to put the full probe length into the LPT case.

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(c) When you examine the leading edges or concave sides of the blades, it is recommended that you reverse the rotation of the rotor so the blades come to the borescope, not away from it.

SUBTASK 72-00-00-210-065-F00

(2) Examine the LPT blades as follows (Figure 627):

NOTE: If you think there is damage, you can look at the damage with the retro-angle viewer. For the blade tip and platforms, you can use the fore-oblique angle viewer.

(a) Cracks in these areas

1) Airfoil surface

a) Cracks are not permitted.

2) Platform or tip shroud

a) Cracks are not permitted.

b) The Continue-In-Service limit is 5 cycles or 10 hours, with this condition:

<1> The crack is not more than 50 percent of the chord width.

(b) Nicks and dents in the leading and trailing edges

1) There is no limit to the number with these conditions:

a) The damage in Area E is less than 0.02 inch (0.5 mm) deep.

b) The damage not in Area E is less than 0.03 inch (0.8 mm) deep.

2) The Continue-In-Service limit is 5 cycles or 10 hours.

(c) Nicks and dents in the concave and convex surfaces

1) There is no limit to the number with these conditions:

a) The damage is less than 0.015 inch (0.38 mm) in depth.

b) The damage does not go through to the opposite side.

2) Not more than 5 dents are permitted with this condition:

a) The damage goes through less than 0.01 inch (0.25 mm) on the opposite side.

3) The Continue-In-Service limit is 5 cycles or 10 hours.

(d) Large dents or pieces of metal that are missing in Area E

1) Large dents or missing metal are not serviceable.

(e) Other areas for large dents or missing pieces

1) There must be less than two damaged areas on the same side of the airfoil.

2) There must be less than two damaged areas on opposite sides of the airfoil.

3) Damage must be separated by 0.5 inch (13 mm) radially and 0.2 inch (5 mm) from the leading edge and trailing edge.

4) There must be no more than 5 damaged blades in a 90-degree section.

5) No more than 5 percent of the blades can be damaged.

6) The Continue-In-Service limit is 5 cycles or 10 hours.

(f) Leading edges for distortion caused by over-temperature

NOTE: Over-temperature damage is seen as melted areas or parallel grooves in the hard coat of the blade.

1) Distortion of the leading edge is not permitted.

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2) The Continue-In-Service limit is 15 cycles or 25 hours with these conditions:
   a) The distortion is less than 0.8 inch (20 mm) on stage 1 blades.
   b) The distortion is less than 0.08 inch (2 mm) on stage 2 and 3 blades.

(g) Gaps in the tip shroud interlocks
1) There is no limit, with these conditions:
   a) The interlocks must not show wear.
   b) Stage 2 and 3 gaps are not permitted.
2) The Continue-In-Service limit is 5 cycles.

(h) Shingled or unlatched tip shrouds
1) Shingled or unlatched tip shrouds are not permitted.
2) The Continue-In-Service limit is 5 cycles or 10 hours, with this condition:
   a) The rotor must turn freely, with a vibration level that is not more than the advisory limit (TASK 71-00-00-800-806-F00).

(i) Tip shroud out-of-flush

NOTE: If this out-of-flush condition is caused by over welding and if there is no evidence of unusual wear on the mating or hard faces all along the notch and if the interlocks do fit one in another, this condition is serviceable. If different, refer to the criteria that follow.

1) Stage 1 blades
   a) Not more than 0.0433 inch (1.10 mm), and not more than 0.0315 inch (0.80 mm) on the hard faces.
2) Stage 2 blades
   a) Not more than 0.0472 inch (1.20 mm), and not more than 0.0354 inch (0.90 mm) on the hard faces.
3) Stage 3 blades
   a) Not more than 0.0433 inch (1.10 mm), and not more than 0.0354 inch (0.90 mm) on the hard faces.

(j) Root platform out-of-flush
1) Stage 1 blades
   a) Not more than 0.0198 inch (0.50 mm).
2) Stage 2 and 3 blades
   a) Not more than 0.0236 inch (0.60 mm).

(k) Circumferential looseness
1) There is no limit to circumferential looseness.

(l) Seal teeth wear
1) There is no limit, with these conditions:
   a) If only one stage has wear, the wear must be less than 1/2 of the tooth height.
   b) If two stages have wear, the wear must be less than 1/3 of the tooth height.
   c) If three stages have wear, the wear must be less than 1/4 of the tooth height.

(m) Flaking on the hardened seal teeth
1) There is no limit to the quantity of flaking.

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(n) Pitting / corrosion

1) Any amount.

SUBTASK 72-00-00-080-004-F00

(3) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

H. Put the Airplane Back to Its Usual Condition

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-004-F00

(1) Do these steps to install the borescope plugs:

(a) Apply a light graphite compound, D00601 [CP2101] or pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and friction surfaces of the borescope plugs S16, S17, S18, S19 and S20.

(b) Install S16 and S17 on the combustion case.

(c) Install S18, S19 and S20 on the LPT case.

AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-005-F00

(2) Do these steps to install the borescope plugs:

(a) Apply a light graphite compound, D00601 [CP2101] or pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and friction surfaces of the borescope plugs S16 and S17.

(b) Install S16 and S17 on the combustion case.

(c) Apply graphite compound, D00601 [CP2101] or pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads of the self-locking borescope cap assemblies S18, S19 and S20.

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-006-F00

(3) Torque the plugs to 57-63 pound-inches (6.4-7.1 Newton-meters).

(a) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006].

AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-007-F00

(4) Torque the plugs S16 and S17 to 57-63 pound-inches (6.4-7.1 Newton-meters).

(a) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on the borescope plugs.

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AKS ALL POST SB 737-CFM56-7B-0293 (Continued)

SUBTASK 72-00-00-410-047-F00

(5) Torque the self-locking borescope cap assemblies to 50-55 pound-inches (5.6-6.2 Newton-meters).

NOTE: To achieve the correct installation of the self-locking borescope cap assembly, the slot of its ring must be positioned on the borescope boss lug at the final tightening.

AKS ALL

SUBTASK 72-00-00-410-028-F00

(6) If the borescope procedure is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

END OF TASK

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STAGE	QTY. OF BLADES	LEADING EDGE VIEW-PORT	TRAILING EDGE VIEW PORT
1	162	S16-S17	S18
2	150	S18	S19
3	150	S19	S20
4	134	S20	-

627-1
1377180 S0000249870_V2

LPT Borescope Plug Locations
Figure 626/72-00-00-990-815-F00 (Sheet 1 of 3)

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LPT Borescope Plug Locations
Figure 626/72-00-00-990-815-F00 (Sheet 2 of 3)

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SELF-LOCKING BORESCOPE CAP INSTALLATION

G

SELF-LOCKING BORESCOPE CAP INSTALLED

G

1377357 S0000249874_V2

LPT Borescope Plug Locations
Figure 626/72-00-00-990-815-F00 (Sheet 3 of 3)

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S-M56-MM-03474-00-B
G24453 S0006582285_V2

Stage 1-3 LPT Blade Borescope Inspection
Figure 627/72-00-00-990-816-F00 (Sheet 1 of 6)

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S-M56-MM-03500-00-B
G24241 S0006582286_V2

Stage 1-3 LPT Blade Borescope Inspection
Figure 627/72-00-00-990-816-F00 (Sheet 2 of 6)

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S-M56-MM-03502-00-B
G24251 S0006582287_V2

Stage 1-3 LPT Blade Borescope Inspection
Figure 627/72-00-00-990-816-F00 (Sheet 3 of 6)

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Stage 1-3 LPT Blade Borescope Inspection
Figure 627/72-00-00-990-816-F00 (Sheet 4 of 6)

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VIEW IN THE FORWARD DIRECTION

F

INTERLOCK WEAR

UNLATCHING

SHINGLING

-TIP SHROUD
INTERLOCK DISCONNECTED

-BLADE FORWARD/AFT EDGES OFFSET
-TIP SHROUDS OVERLAPPED AT
INTERLOCK OR CIRCUMFERENTIAL
MATE FACE

INTERLOCK WEAR
(EXAMPLE)

G

S-M56-MM-03494-00-B
G24421 S0006582288_V2

Stage 1-3 LPT Blade Borescope Inspection
Figure 627/72-00-00-990-816-F00 (Sheet 5 of 6)

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Stage 1-3 LPT Blade Borescope Inspection
Figure 627/72-00-00-990-816-F00 (Sheet 6 of 6)

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TASK 72-00-00-200-809-F00

13. Stage 4 LPT Blades Borescope Inspection

(Figure 626, Figure 628 and Figure 629)

A. General

(1) This task provides the instructions on how to do a borescope inspection of the stage 4 LPT blades.

(2) The inspection of the leading edges of the stage 4 LPT blades is done with a rigid borescope through borescope port S20. The inspection of the trailing edges of these blades is done from the aft end of the engine.

(3) There are 134 stage 4 blades on the NON-7BE engine.

(4) There are 138 stage 4 blades on the 7BE engine.

B. References

Reference	Title
71-00-00-800-806-F00	Engine Operation Limits (P/B 201)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers
STD-1081	Flashlight - Explosion Proof
STD-3907	Mirror - Dental

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

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(Continued)

Reference	Description	Specification
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	CFM CP2619
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Inspection

SUBTASK 72-00-00-210-069-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-480-015-F00

(2) Put a protective mat, STD-585 in the inner surface of the inlet cowl.

SUBTASK 72-00-00-010-010-F00

(3) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00.

SUBTASK 72-00-00-210-111-F00

(4) Do these steps to prepare the borescope for the inspection:

(a) Connect the applicable borescope to the light source:

1) Rigid Borescope, COM-2195 and light source, SPL-4305.

2) Rigid Borescope, COM-4302 and light source, SPL-4306.

3) Rigid Borescope, COM-4303 and light source, SPL-2197.

4) Rigid Borescope, COM-4304 and light source, SPL-4308.

5) Use the rigid borescope with the yellow band.

(b) Connect the rigid borescope with the long, right angle borescope extension, 90-degree right-angle viewer, and 60-degree field of vision.

(c) Turn the light source to the ON position.

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-011-F00

(5) Cut and remove the lockwires from the borescope plug, S20.

SUBTASK 72-00-00-020-010-F00

CAUTION: DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(6) Remove the plug (Figure 626).

NOTE: This step is necessary to examine the leading edges of the stage 4 blades. You can visually examine the trailing edges of the stage 4 blades from the aft end of the engine.

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AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-036-F00

CAUTION: DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(7) Remove the self-locking borescope cap assembly, S20.

NOTE: The plug, S20, is the aftmost borescope plug located at 5:00 o'clock on the LPT case.

AKS ALL

G. Stage 4 LPT Blades Borescope Inspection

SUBTASK 72-00-00-210-071-F00

(1) Examine the LPT blades while you turn the fan rotor in a smooth, stable movement.

WARNING: BE CAREFUL WHEN YOU TURN THE FAN ROTOR. MAKE SURE YOU ARE IN A STABLE POSITION. ALSO, YOU MUST WEAR HEAVY GLOVES TO PREVENT DAMAGE TO YOUR HANDS. IF YOU DO NOT OBEY THESE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(a) To examine the airfoil as the blades turn, you must change the depth of the probe in the LPT case.

(b) Turn the probe (azimuth) at the same time you change the depth of the probe. This will permit the maximum view for a given turn speed.

NOTE: It can be necessary to make more than one complete rotation of the LPT as the length of the blade increases. Also, to fully view the platform and the root areas, it can be necessary to put the full probe length into the LPT case.

(c) When you examine the leading edges or concave sides of the blades, it is recommended that you reverse the rotation of the rotor so the blades come to the borescope, not away from it.

SUBTASK 72-00-00-210-072-F00

(2) Examine the blades as follows (Figure 628):

(a) Cracks in Area E of the airfoils

1) Cracks are not permitted.

2) The Continue-In-Service limit is 5 cycles or 10 flight hours with these conditions:

a) One full airfoil can be missing.

b) Engine vibration level is not more than the vibration advisory limit (TASK 71-00-00-800-806-F00).

(b) Cracks in the blade platform

1) Cracks are not permitted.

2) The Continue-In-Service limit is 5 cycles or 10 flight hours.

(c) Cracks in the tip shrouds

1) Cracks are not permitted.

2) The Continue-In-Service limit is 5 cycles or 10 flight hours with these conditions:

a) Engine vibration level is not more than the vibration advisory limit (TASK 71-00-00-800-806-F00).

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b) There is no limit to the number of tip shrouds and related airfoil tips that can be missing.

(d) Nicks and dents on the leading and trailing edges, in Area E

1) There is no limit, with this condition:

a) Damage must be less than 0.02 inch (0.5 mm) in depth.

2) The Continue-In-Service limit is 5 cycles or 10 flight hours.

(e) Nicks and dents on the leading and trailing edges, not in Area E

1) There is no limit, with this condition:

a) Damage must be less than 0.03 inch (0.7 mm) in depth.

2) The Continue-In-Service limit is 5 cycles or 10 flight hours.

(f) Nicks and dents on the concave or convex airfoil surfaces

1) There is no limit, with these conditions:

a) Damage must be less than 0.015 inch (0.38 mm) in depth.

b) Damage must not go through to the opposite side.

2) A maximum of 5 dents are permitted, with this condition:

a) Damage goes through less than 0.01 inch (0.25 mm) on the opposite side.

3) The Continue-In-Service limit is 5 cycles or 10 flight hours.

(g) Large dents or pieces of metal that are missing in Area E

1) Large dents or missing metal are not permitted.

(h) Other areas for large dents or missing pieces

1) There must be less than two damaged areas on the same side of the airfoil.

2) There must be less than two damaged areas on the opposite sides of the airfoil.

3) Damage must be separated by 0.5 inch (13 mm) radially and 0.2 inch (5 mm) from the leading and trailing edges.

4) There must be no more than 5 damaged blades in each quadrant.

5) No more than 5 percent of the blades can be damaged.

6) The Continue-In-Service limit is 5 cycles or 10 flight hours with this condition:

a) Engine vibration level is not more than the vibration advisory limit (TASK 71-00-00-800-806-F00).

(i) Leading edges for distortion caused by over-temperature

NOTE: Overtemperature damage is seen as melted areas or parallel grooves in the hard coat of the blade.

1) Distortion of the leading edge is not permitted.

2) The Continue-In-Service limit is 15 cycles or 25 flight hours with this condition:

a) The distortion is less than 0.08 inch (2 mm).

(j) Tip shroud interlock gaps (Figure 629)

1) Gaps are not permitted.

a) Do this task: Stage 4 LPT Blades Axial Preload Check, TASK 72-00-00-200-810-F00.

2) The Continue-In-Service limit is 25 cycles or 50 flight hours.

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(k) Shingled or unlatched tip shrouds

1) Shingled or unlatched tip shrouds are not permitted.

a) Do the procedure to put the shingled/unlatched blades back to their original position.

b) If the blade tip shrouds are successfully put back in the correct position, do a check of the blade tip shrouds.

2) For shingled blades, the Continue-In-Service limit is 25 cycles or 50 flight hours, with these conditions:

a) The rotor must turn freely.

b) Engine vibration level is not more than the vibration advisory limit (TASK 71-00-00-800-806-F00).

3) For unlatched blades, the Continue-In-Service limit is 100 cycles or 200 flight hours, with these conditions:

a) The rotor must turn freely.

b) Engine vibration level is not more than the vibration advisory limit (TASK 71-00-00-800-806-F00).

(l) Tip shroud interlock wear

NOTE: Maximum interlock wear usually occurs at 2 to 6 locations, equally spaced. Measurement should be done at these locations.

1) Do these steps to measure the interlock wear:

a) Use an explosion proof flashlight, STD-1081 and a dental mirror, STD-3907.

b) You can measure the interlock wear from the alignment of the aft face of the tip shrouds.

c) Do a check of the alignment with the honeycomb cells in the outer stationary seals as a reference. One cell is equivalent to 0.06 inch (1.5 mm).

NOTE: If you are not sure, use modeling clay to get an accurate dimension.

d) Measure the offset on the aft edge of the blades.

(m) Axial preload (Figure 630)

1) Do this task: Stage 4 LPT Blades Axial Preload Check, TASK 72-00-00-200-810-F00.

2) The tip shrouds must have axial preload.

3) The Continue-In-Service limit is 25 cycles or 50 flight hours.

(n) Interlock wear (Figure 629)

1) Interlock wear is serviceable, with these conditions:

a) The bad alignment of the aft face on the tip shrouds is less than 0.059 inch (1.5 mm).

b) The interlocks have axial preload.

2) Interlock wear more than 0.059 inch (1.5 mm) is not serviceable. Remove the engine before 100 cycles or 200 flight hours.

(o) Wear on the lateral faces of the tip shrouds

1) There is no limit, with this condition:

a) There is axial preload.

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(p) Tip shroud out of flush

NOTE: If this out-of-flush condition is caused by over welding and if there is no evidence of unusual wear on the mating or hard faces all along the notch and if the interlocks do fit one in another, this condition is serviceable. If different, refer to the criteria that follow.

1) Not more than 0.0354 in. (0.90 mm), with this condition:

a) The tip shroud platforms must not overlap (shingling).

(q) Root platform out of flush

1) Not more than 0.039 in. (1.0 mm) on the hard faces.

(r) Circumferential looseness

1) There is no limit, with this condition:

a) There is axial preload.

(s) Peeling of particles

1) There is no limit, with this condition:

a) The airfoils are not bowed or melted.

SUBTASK 72-00-00-080-005-F00

(3) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-210-074-F00

(1) Do these steps to install the borescope plug (Figure 626):

(a) Apply graphite compound, D00601 [CP2101] or pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and friction surfaces of the borescope plug.

(b) Install the borescope plug.

AKS ALL PRE SB 737-CFM56-7B-0293

1) Torque the plug to 57-63 pound-inches (6.4-7.1 Newton-meters).

2) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on the borescope plug.

AKS ALL POST SB 737-CFM56-7B-0293

(c) Install the self-locking borescope cap assembly, S20, on the LPT case.

1) Torque the cap assembly to 50-55 pound-inches (5.6-6.2 Newton-meters).

NOTE: To achieve the correct installation of the self-locking borescope cap assembly, the slot of its ring must be positioned on the borescope boss lug at the final tightening.

AKS ALL

SUBTASK 72-00-00-410-024-F00

(2) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00.

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SUBTASK 72-00-00-210-075-F00

(3) If the borescope procedure is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

——— END OF TASK ———

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S-M56-MM-03475-00-B
G23444 S0006582290_V2

Stage 4 LPT Blade Borescope Inspection
Figure 628/72-00-00-990-817-F00 (Sheet 1 of 2)

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Stage 4 LPT Blade Borescope Inspection
Figure 628/72-00-00-990-817-F00 (Sheet 2 of 2)

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Stage 4 LPT Tip Shroud Inspection
Figure 629/72-00-00-990-818-F00 (Sheet 1 of 2)

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TIP SHROUD INTERLOCK GAPS

TIP SHROUD INTERLOCK WEAR

LATERAL FACES WEAR

INTERLOCK WEAR AT A 45‘ ANGLE

C-C

S-M56-MM-03495-00-B

G23803 S0006582292_V2

Stage 4 LPT Tip Shroud Inspection
Figure 629/72-00-00-990-818-F00 (Sheet 2 of 2)

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TASK 72-00-00-200-810-F00

14. Stage 4 LPT Blades Axial Preload Check

(Figure 630)

A. General

(1) This task provides the instructions on how to do the axial preload check of the stage 4 LPT blades.

(2) There are 134 stage 4 LPT blades on the NON-7BE engine.

(3) There are 138 stage 4 blades on the 7BE engine.

B. References

Reference	Title
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Check

SUBTASK 72-00-00-010-012-F00

(1) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00.

E. Stage 4 LPT Blades Axial Preload Check

SUBTASK 72-00-00-210-077-F00

(1) Do the axial preload check as follows:

NOTE: You must separate two tip shrouds in each quadrant to do the check for axial preload.

(a) In a quadrant, separate the two tip shrouds by hand. Do not unlatch the tip shroud interlocks.

1) With your hands, push one blade as you pull the other.

NOTE: This will separate the tip shrouds.

(b) Release the blades, and do a check for a gap between the tip shroud interlocks.

1) Gaps between the tip shroud interlocks are not permitted.

2) The Continue-In-Service limit is 25 cycles or 50 flight hours.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-210-078-F00

(1) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00.

——— END OF TASK ———

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S-M56-MM-03499-00-B
G23961 S0006582294_V2

Stage 4 LPT Blade Axial Preload Check
Figure 630/72-00-00-990-819-F00

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TASK 72-00-00-200-811-F00

15. Stage 1 LPT Nozzle Guide Vanes Inspection

(Figure 631)

A. General

(1) This task provides the instructions on how to examine the stage 1 LPT nozzle guide vanes.

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P05 Supplier: 58828 Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828
COM-4302	Set - Borescope Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-00-00-210-079-F00

(1) Do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

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SUBTASK 72-00-00-210-112-F00

(2) Do these steps to prepare the rigid borescope for the inspection:

(a) Connect the applicable borescope to the light source.

NOTE: Use the rigid borescope with the yellow band.

1) Connect the Rigid Borescope, COM-2195 to the light source, SPL-4305.

2) Connect the Rigid Borescope, COM-4302 to the light source, SPL-4306.

3) Connect the Rigid Borescope, COM-4303 to the light source, SPL-2197.

4) Connect the Rigid Borescope, COM-4304 to the light source, SPL-4308.

(b) Connect the rigid borescope with the long, right angle borescope extension, 90 degree right angle viewer, and 60 degree field of vision.

(c) Turn the light source to the ON position.

SUBTASK 72-00-00-480-030-F00

(3) Do these steps to prepare the flexible borescope for the inspection:

(a) Connect the borescope, COM-2196 to the applicable light source.

(b) Turn the light source to ON.

SUBTASK 72-00-00-010-013-F00

(4) Remove the S16 and S17 borescope plugs.

SUBTASK 72-00-00-210-081-F00

(5) Put the borescope in the borescope port.

NOTE: If you use flexible borescope, make sure to adjust it correctly.

F. Stage 1 LPT Nozzle Guide Vanes Inspection

SUBTASK 72-00-00-210-082-F00

(1) Examine the nozzle guide vanes as follows:

NOTE: Use the rigid borescope or flexible borescope to do this inspection. If you use the rigid borescope, this inspection is limited to what you can see on the two airfoils of the nozzle segments.

(a) Axial cracks on the leading and trailing edges

1) If a rigid borescope is used, examine the axial cracks on the leading and trailing edges as follow:

a) Cracks that are less than 1/3 of the chord width (0.6 inch (15.24 mm) in length) on the 2 airfoils of the nozzle segment are permitted.

b) One crack is permitted per airfoil if the length is more than 1/3 of the chord width (0.6 inch (15.24 mm)) but less than 1/2 of the chord width (1.0 inch (25.4 mm)).

c) A continue-in-service limit of 100 cycles is permitted for axial cracks over the above limits as follows:

<1> There is only one crack on each airfoil.

<2> There is no missing material on the airfoil.

<3> The crack length is more than 1/2 of the chord width (1.0 inch (25.4 mm)) in length but less than 2/3 of the chord width (1.2 inches (30 mm)).

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2) If a 360° flexible borescope is used, examine for axial cracks on the leading and trailing edges as follow:

a) Cracks that are less than 1/3 of the chord width (0.6 inch (15.24 mm) in length) on the airfoils of the nozzle segments are permitted

b) Eight cracks are permitted per set of nozzles with these conditions:

<1> The length is more than 1/3 of the chord width (0.6 inch (15.24 mm)) but less than 3/4 of the chord width (1.35 inch (34.3 mm)).

<2> There are not more than two cracks per segment and one crack per airfoil.

<3> There is no missing material.

c) A continue-in-service limit of 1600 cycles is permitted for axial cracks over the above limits as follows:

<1> There is no full crack.

<2> There are not more than two cracks per segment and one crack per airfoil.

<3> There is no missing material.

<4> After completion of the cycles permitted as continue-in-service, a new 360° flexible borescope inspection of the complete set of nozzles must be performed for continued operations.

d) Use the continue-in-service limits in the Table 1 below with these conditions:

<1> There are no full cracks from the leading edge (LE) to the trailing edge (TE).

<2> The missing material in each hole is not more than 0.039 sq. inch (25 sq. mm).

<3> There are no more than two holes per segment and no more than one hole per airfoil.

Table 1

Missing Material	Airfoil Cracked from Leading Edge to Trailing Edge	Continue-In-Service Limit
1 to 2 holes	0	800 cycles *[1]
3 holes	0	400 cycles *[1]

*[1] After completion of the cycles permitted as continue-in-service, a new 360° flexible borescope inspection of the complete set of nozzles must be performed for continued operations.

e) Use the continue-in-service limits in the Table 2 below with these conditions:

<1> There are full cracks from the LE to the TE but no missing material.

<2> There are no more than two full cracks per segment.

Table 2

Missing Material	Airfoil Cracked from Leading Edge to Trailing Edge	Continue-In-Service Limit
0	1 to 2	1600 cycles *[1]
0	3 to 4	800 cycles *[1]

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Table 2 (Continued)

Missing Material	Airfoil Cracked from Leading Edge to Trailing Edge	Continue-In-Service Limit
0	5 to 6	400 cycles *[1]
0	7	200 cycles *[1]
0	8	25 cycles before removal

*[1] After completion of the cycles permitted as continue-in-service, a new 360° flexible borescope inspection of the complete set of nozzles must be performed for continued operations.

f) Use the continue-in-service limits in the Table 3 below with these conditions:

<1> There is missing material and full cracks from the LE to the TE.

<2> The missing material in each hole is not more than 0.039 sq. inch (25 sq. mm).

<3> There are no more than two holes per segment and no more than one hole per airfoil.

<4> There are no more than two full cracks per segment.

Table 3

Missing Material	Airfoil Cracked from Leading Edge to Trailing Edge	Continue-In-Service Limit
1 to 2 holes	1 to 2	400 cycles *[1]
1 to 2 holes	3 to 4	200 cycles *[1]
1 to 2 holes	5	25 cycles before removal
3 Holes	1 to 2	200 cycles *[1]
3 Holes	3	25 cycles before removal

*[1] After completion of the cycles permitted as continue-in-service, a new 360° flexible borescope inspection of the complete set of nozzles must be performed for continued operations.

(b) Radial cracks

1) A continue-in-service limit of 300 cycles is permitted with this condition:

a) Each airfoil can only have one crack that is less than 1/2 of the chord width in length (1.0 inch (25.4 mm)) and no missing material or axial crack on the same airfoil.

b) After completion of the cycles permitted as continue-in-service, a new 360° flexible borescope inspection of the complete set of nozzles must be performed for continued operations.

2) If one airfoil has an axial crack or missing material cumulated with a radial crack, examine the complete set of nozzle with a flexible borescope, COM-2196.

a) Refer to the continue-In-service limits in the above Tables 1, 2 and 3.

(c) Burns

1) Permitted with this condition:

a) Discoloration with no missing material.

2) A continue-in-service limit of 25 cycles is permitted with this condition:

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a) Melted or missing material more than 0.102 sq. inch (66 sq. mm) for each engine set of nozzle.

(d) Nicks, marks, scratches or dents in the concave/convex surfaces and inner and outer platforms

1) Permitted.

(e) Cracks in the inner and outer platforms

1) Two cracks are permitted for each segment, with these conditions:

a) The cracks are less than 0.5 inch (12.7 mm) in length.

b) The metal does not go into the gaspath.

2) The continue-in-service limit is 3 cycles, with this condition:

a) The cracks are less than 1.0 inch (25.4 mm) in length.

SUBTASK 72-00-00-080-006-F00

(2) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-210-084-F00

CAUTION: MAKE SURE THAT THE BORESCOPE PLUGS ARE INSTALLED IN THE CORRECT PORT LOCATIONS. ENGINE DAMAGE CAN OCCUR IF A BORESCOPE PLUG IS NOT INSTALLED IN THE CORRECT LOCATION.

(1) Do these steps to install the borescope plugs:

NOTE: The borescope plug of the LPT stage one and combustor case have the same thread size. The stem of the borescope plug to the LPT stage one nozzle will burn away if you install it in the borescope port of the combustion chamber.

(a) Apply graphite compound, D00601 [CP2101] to the threads and friction surfaces of the borescope plugs.

(b) Install the borescope plugs.

1) Tighten the borescope plugs to 57-63 pound-inches (6.4-7.1 Newton-meters).

2) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on the borescope plugs.

SUBTASK 72-00-00-210-085-F00

(2) Do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

——— END OF TASK ———

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Stage 1 LPT Nozzle Guide Vane Borescope Inspection
Figure 631/72-00-00-990-820-F00

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TASK 72-00-00-200-812-F00

16. Stage 2-4 LPT Nozzle Guide Vanes Inspection

(Figure 632)

A. General

(1) This task provides the instructions on how to examine the stage 2-4 LPT nozzle guide vanes.

(2) The number of stage 2-4 LPT nozzle guide vanes is as follows:

Number of Nozzle Guide Vanes LPT Stage 2-4

Engine	LPT NGV Stage 2	LPT NGV Stage 3	LPT NGV Stage 4
NON-7BE	108	140	132
7BE	108	108	108

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P05 Supplier: 58828 Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828
COM-4302	Set - Borescope Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

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D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-00-00-210-086-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-840-026-F00

(2) Do these steps to prepare the rigid borescope for the inspection:

(a) Connect the applicable borescope to the light source.

NOTE: Use the rigid borescope with the yellow band.

1) Connect Rigid Borescope, COM-2195 to light source, SPL-4305.

2) Connect Rigid Borescope, COM-4302 to light source, SPL-4306.

3) Connect Rigid Borescope, COM-4303 to light source, SPL-2197.

4) Connect Rigid Borescope, COM-4304 to light source, SPL-4308.

(b) Connect the rigid borescope with the long, right angle borescope extension, 90-degree right-angle viewer, and 60-degree field of vision.

(c) Turn the light source to the ON position.

SUBTASK 72-00-00-840-025-F00

(3) Do these steps to prepare the flexible borescope for the inspection:

(a) Connect the borescope, COM-2196 to the applicable light source.

(b) Turn the light source to the ON position.

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-014-F00

(4) Cut and remove the lockwires from borescope plugs S18, S19 and S20.

SUBTASK 72-00-00-020-011-F00

CAUTION: DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(5) Remove the plugs.

AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-037-F00

CAUTION: DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(6) Remove the self-locking borescope cap assemblies S18, S19 and S20.

AKS ALL

SUBTASK 72-00-00-210-088-F00

(7) Put the borescope through the borescope port.

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F. Stage 2-4 LPT Nozzle Guide Vanes Inspection

SUBTASK 72-00-00-210-089-F00

(1) Examine the nozzle guide vanes as follows:

NOTE: You can use rigid borescope or flexible borescope to do this Inspection.

NOTE: If you use the rigid borescope, this inspection is limited to what you can see.

(a) Cracks in the leading and trailing edges for stages 2 through 4:

NOTE: LPT Stage 2 and 4 nozzles have six airfoils for each segment. LPT Stage 3 nozzles have seven airfoils for each segment.

1) There is no limit, with these conditions:

a) Any number of cracks (leading or trailing edges) if cracks are less than 0.5 inch (12,7 mm) in length (1/3 of the chord width).

b) One crack maximum for each nozzle segment that is 0.5 inch (12,7 mm) (1/3 of the chord width) to 1.0 inch (25,4 mm) in length (2/3 of the chord width).

2) The Continue-In-Service limit is 200 cycles with these conditions:

a) Three cracks maximum for each nozzle segment if cracks are more than 0.5 inch (12.7 mm) (1/3 of the chord width) and less than 1.0 inch (25.4 mm) (2/3 of the chord width) if the adjacent nozzle segments have no more than two cracks more than 0.5 inch (12.7 mm) (1/3 of the chord width) and less than 1.0 inch (25.4 mm) (2/3 of the chord width).

b) One crack maximum for each nozzle segment that is more than 1.0 inch (25.4 mm) (2/3 of the chord width) including open airfoil.

3) The Continue-In-Service limit is 25 cycles, with this condition:

a) One full chord crack on two airfoils for each segment if the adjacent nozzle segments have no more than one airfoil with a full chord crack.

(b) Burns

1) There is no limit, with this condition:

a) Discoloration with no missing material.

2) The Continue-In-Service limit is 25 cycles with this condition:

a) Missing material or melted.

(c) Corrosion/Pitting

1) Any amount, if there is no missing material.

SUBTASK 72-00-00-080-007-F00

(2) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

G. Put the Airplane Back to Its Usual Condition

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-210-091-F00

(1) Do these steps to install the borescope plugs:

(a) Apply graphite compound, D00601 [CP2101] to the threads and friction surfaces of the borescope plugs.

(b) Install the borescope plugs.

1) Tighten the borescope plugs to 57-63 inch-pounds (6.4-7.1 newton-meters).

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AKS ALL PRE SB 737-CFM56-7B-0293 (Continued)

2) Apply safety wire, G02345 [CP8001] or cable, G50065 [CP8006] to the borescope plugs.

AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-410-029-F00

(2) Install the self-locking borescope cap assemblies S18-S20 on the LPT case.

(a) Tighten the cap assemblies to 50-55 pound-inches (5.6-6.2 Newton-meters).

NOTE: To achieve the correct installation of a self-locking borescope cap assembly, the slot of its ring must be positioned on the borescope boss lug at the final tightening.

AKS ALL

SUBTASK 72-00-00-210-092-F00

(3) Do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

——— END OF TASK ———

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Stage 2-4 LPT Nozzle Guide Vanes Borescope Inspection
Figure 632/72-00-00-990-821-F00

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TASK 72-00-00-200-813-F00

17. LPT Outer Stationary Air Seals Inspection

(Figure 626)

A. General

(1) This task provides the instructions on how to examine the LPT outer stationary air seals with a borescope.

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2195	Set - Borescope Rigid, Olympus Part #: 856A1320P04 Supplier: 58828
COM-4302	Set - Borescope Rigid, Wolf Part #: 856A1320P05 Supplier: 58828
COM-4303	Set - Borescope Rigid, Lenox Part #: 856A1320P06 Supplier: 58828
COM-4304	Set - Borescope Rigid, ITI USA Part #: 856A1320P07 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828
SPL-4305	Light Source - Borescope, Olympus (150W) Part #: 856A1322P03 Supplier: 58828
SPL-4306	Light Source - Borescope, Wolf (300W) Part #: 856A1322P04 Supplier: 58828
SPL-4308	Light Source - Borescope, ITI USA (150W) Part #: 856A1322P08 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D50032 [CP1064]	Compound - Antiseize - Milk of Magnesia	
D50034 [CP2619]	Compound - Antiseize - Pure Nickel Special, Never - Seez	CFM CP2619
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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E. Prepare for the Inspection

SUBTASK 72-00-00-210-093-F00

(1) If not already done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-210-114-F00

(2) Do these steps to prepare the borescope for the inspection:

(a) Connect the applicable borescope to the light source.

1) Rigid Borescope, COM-2195 and light source, SPL-4305
2) Rigid Borescope, COM-4302 and light source, SPL-4306
3) Rigid Borescope, COM-4303 and light source, SPL-2197
4) Rigid Borescope, COM-4304 and light source, SPL-4308
5) Use the rigid borescope with the yellow band.

(b) Connect the rigid borescope with the long, right angle borescope extension, 90 degree right-angle viewer, and 60 degree field of vision.

(c) Turn the light source to the ON position.

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-015-F00

CAUTION: DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(3) Cut and remove the lockwires and remove the borescope plugs S16, S17, S18, S19 and S20 (Figure 626).

NOTE: The borescope plugs S16 and S17 are in the same plane and located, respectively, at 5:30 and 8:30 aft looking forward immediately in front of the combustion case aft flange. The borescope plugs S18, S19 and S20 are located approximately at 5:00 o'clock aft looking forward on the LPT case and, from front to rear, relate to the 2nd, 3rd and 4th stages of the LPT, respectively.

AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-030-001-F00

(4) Cut and remove the lockwires and remove the borescope plugs S16 and S17.

NOTE: The borescope plugs S16 and S17 are in the same plane and located, respectively, at 5:30 and 8:30 aft looking forward immediately in front of the combustion case aft flange.

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AKS ALL POST SB 737-CFM56-7B-0293 (Continued)

SUBTASK 72-00-00-030-002-F00

CAUTION: DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(5) Remove the self-locking borescope caps assembly S18, S19 and S20.

NOTE: The borescope plugs S18, S19 and S20 are located approximately at 5:00 o'clock aft looking forward on the LPT case and, from front to rear, relate to the 2nd, 3rd and 4th stages of the LPT, respectively.

AKS ALL

F. LPT Outer Stationary Air Seals Inspection

SUBTASK 72-00-00-210-095-F00

(1) Put the rigid borescope, with a 90 degree angle viewer and a 60 degree field of vision in the appropriate borescope port.

SUBTASK 72-00-00-210-096-F00

(2) Examine the outer stationary seals as follow:

(a) Distortion of the outer stationary seals

1) There is no limit to the quantity with this condition:

a) The shroud does not extend into the air stream.

(b) Worn, jagged, or crushed honeycomb material

1) There is no limit.

SUBTASK 72-00-00-080-008-F00

(3) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source to OFF, but keep the blower ON until the lamp and case are cool.

G. Put the Airplane Back to Its Usual Condition

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-008-F00

(1) Do these steps to install the borescope plugs:

(a) Apply graphite compound, D00601 [CP2101] or pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and friction surfaces of the borescope plugs S16, S17, S18, S19 and S20.

(b) Install S16 and S17 on the combustion case.

(c) Install S18, S19, and S20 on the LPT case.

AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-009-F00

(2) Do these steps to install the borescope plugs:

(a) Apply graphite compound, D00601 [CP2101] or pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads and friction surfaces of the borescope plugs S16 and S17.

(b) Install S16 and S17 on the combustion case.

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AKS ALL POST SB 737-CFM56-7B-0293 (Continued)

(c) Apply graphite compound, D00601 [CP2101] or pure nickel special compound, D50034 [CP2619] or milk of magnesia compound, D50032 [CP1064] to the threads of the self-locking borescope cap assembly S18, S19 and S20.

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-010-F00

(3) Tighten the plugs to 57-63 pound-inches (6.4-7.1 Newton-meters).

(a) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006].

AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-430-011-F00

(4) Tighten the plugs S16 and S17 to 57-63 pound-inches (6.4-7.1 Newton-meters).

(a) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] on the borescope plugs.

SUBTASK 72-00-00-410-046-F00

(5) Tighten the self-locking borescope caps assembly to 50-55 pound-inches (5.6-6.2 Newton-meters).

NOTE: To achieve the correct installation of the self-locking borescope cap assembly, the slot of its ring must be positioned on the borescope boss lug at the final tightening.

AKS ALL

SUBTASK 72-00-00-210-099-F00

(6) If the borescope procedure is complete, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

——— END OF TASK ———

TASK 72-00-00-290-801-F00

18. Borescope Inspection of the Stage 1 Low-Pressure Turbine Nozzle Outer Air Duct Condition

(Figure 633, Figure 634, and Figure 635)

A. General

(1) This task provides the instructions on how to inspect the condition of the complete set of outer air ducts through the S17 or S18 borescope ports by using a flexible borescope, introduced in the cavity located between the Low Pressure Turbine (LPT) stage 1 outer platform and the High Pressure Turbine (HPT) shroud support.

B. Tools/Equipment

Reference	Description
STD-1400	Borescope - Flexible, 4mm, Direct View
STD-10717	Light Source - Borescope, (Meets General Electric Standard Practices Manual Specification)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

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D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-00-00-210-126-F00

(1) Do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00.

SUBTASK 72-00-00-480-051-F00

CAUTION: MAKE SURE THAT YOU ARE TRAINED TO DO THIS PROCEDURE. ACCESS TO THIS AREA OF THE ENGINE IS DIFFICULT. DAMAGE TO THE ENGINE AND THE FLEXIBLE BORESCOPE CAN OCCUR.

CAUTION: DO NOT TURN THE LOW PRESSURE TURBINE (LPT) ROTOR WHEN YOU DO THE BORESCOPE INSPECTION. DAMAGE TO THE ENGINE AND THE FLEXIBLE BORESCOPE CAN OCCUR.

(2) Do these steps to prepare the 4mm direct view flexible borescope, STD-1400 for the inspection:

(a) Connect the 4mm direct view flexible borescope, STD-1400 to the light source, STD-10717.

(b) Turn the light source, STD-10717 to ON.

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-053-F00

CAUTION: DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(3) Do these steps to remove borescope plugs S17 and S18:

(Figure 633)

(a) Cut and remove lockwire and remove the borescope plug S17 at the 5:00 o'clock position immediately in front of the aft flange of the combustion case.

(b) Cut and remove lockwire and remove the plug S18 at the 8:00 o'clock position immediately in front of the aft flange of the combustion case.

AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-010-054-F00

CAUTION: DO NOT REMOVE THE NUTS WHICH HOLD THE LPT BORESCOPE PLUG BOSS. TACK WELDS HOLD THE NUTS IN THEIR POSITIONS. THE REMOVAL OF THE NUTS CAN CAUSE DAMAGE TO THE STUDS.

(4) Do these steps to remove these borescope plugs:

(Figure 634)

(a) Cut and remove lockwire and remove the plug S17 at the 5:00 o'clock position immediately in front of the aft flange of the combustion case.

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AKS ALL POST SB 737-CFM56-7B-0293 (Continued)

(b) Remove the self-locking borescope cap assembly S18 at the 8:00 o'clock position immediately in front of the aft flange of the combustion case.

AKS ALL

F. Stage 1 LPT Outer Air Ducts Inspection

SUBTASK 72-00-00-210-127-F00

(1) Do a 360 degrees borescope inspection.

CAUTION: DO NOT USE A FLEXIBLE BORESCOPE WITH A DIAMETER MORE THAN 0.153 INCH (3.9 MM) OR BLOCKAGE OF THE CAVITY BY THE BORESCOPE CAN OCCUR.

(a) Insert the 4mm direct view flexible borescope, STD-1400 through the S17 or S18 borescope ports. Put the 4mm direct view flexible borescope, STD-1400 into the cavity. (Figure 635)

(b) Do a 180 degrees borescope inspection alternating between the lower and upper side.

(2) Inspect the full set of stage 1 LPT nozzle outer air ducts and use the limits that follow:

Inspection/Check	Maximum Serviceable Limit	Remarks
Stage 1 LPT nozzle outer air ducts for: (Figure 633)		
Outer air duct found blocking port, dislodged or missing.	Not more than 1 outer air duct.	If more than 1 outer air duct is impacted, contact CFM for disposition.

SUBTASK 72-00-00-080-026-F00

(3) When the inspection is complete, remove the borescope equipment.

(a) Turn the light source, STD-10717 to OFF, but keep the blower ON until the lamp and case are cool.

G. Put the Airplane Back to Its Usual Condition

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-420-012-F00

CAUTION: MAKE SURE THAT THE BORESCOPE PLUGS ARE INSTALLED IN THE CORRECT PORT LOCATIONS. ENGINE DAMAGE CAN OCCUR IF A BORESCOPE PLUG IS NOT INSTALLED IN THE CORRECT LOCATION.

(1) Do these steps to install the borescope plugs S17 and S18:

(a) Apply graphite compound, D00601 [CP2101] to the threads and friction surfaces of the borescope plugs S17 and S18.

(b) Install the borescope plugs S17 and S18 into the ports.

AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-420-013-F00

CAUTION: MAKE SURE THAT THE BORESCOPE PLUGS ARE INSTALLED IN THE CORRECT PORT LOCATIONS. ENGINE DAMAGE CAN OCCUR IF A BORESCOPE PLUG IS NOT INSTALLED IN THE CORRECT LOCATION.

(2) Do these steps to install the borescope plug S17 and self-locking borescope cap assembly S18:

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AKS ALL POST SB 737-CFM56-7B-0293 (Continued)

(a) Apply graphite compound, D00601 [CP2101] to the threads and friction surfaces of the borescope plug S17.

1) Install the borescope plug S17 into the port.

(b) Apply graphite compound, D00601 [CP2101] to the threads of the self-locking borescope cap assembly S18.

1) Install self-locking borescope cap assembly S18 into the port.

AKS ALL PRE SB 737-CFM56-7B-0293

SUBTASK 72-00-00-420-014-F00

(3) Tighten the borescope plugs S17 and S18 to 57-63 pound-inches (6.4-7.1 Newton-meters).

(a) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006]

AKS ALL POST SB 737-CFM56-7B-0293

SUBTASK 72-00-00-420-015-F00

(4) Tighten the borescope plugs S17 to 57-63 pound-inches (6.4-7.1 Newton-meters).

(a) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006].

SUBTASK 72-00-00-420-016-F00

(5) Tighten the self-locking borescope cap assembly S18 to 50-55 pound-inches (5.6-6.2 Newton-meters).

NOTE: To achieve the correct installation of the self-locking borescope cap assembly, the slot of its ring must be positioned on the borescope boss lug at the final tightening.

AKS ALL

SUBTASK 72-00-00-210-128-F00

(6) Do this task Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00

——— END OF TASK ———

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Stage 1 LPT Nozzle and HPT Shroud
Figure 633/72-00-00-990-852-F00 (Sheet 1 of 3)

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SCHEMATIC
(VIEW IN THE AFT DIRECTION)

A-A

5018982-00
2421113 S0000558633_V1

Stage 1 LPT Nozzle and HPT Shroud
Figure 633/72-00-00-990-852-F00 (Sheet 2 of 3)

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5018983-00
2421297 S0000558632_V1

Stage 1 LPT Nozzle and HPT Shroud
Figure 633/72-00-00-990-852-F00 (Sheet 3 of 3)

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5018984-00
2421301 S0000558635_V1

Stage 1 LPT Nozzle Outer Platform Cavity
Figure 634/72-00-00-990-855-F00 (Sheet 1 of 5)

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5018985-00
2421307 S0000558641_V1

Stage 1 LPT Nozzle Outer Platform Cavity
Figure 634/72-00-00-990-855-F00 (Sheet 2 of 5)

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B

5018986-00
2421314 S0000558644_V1

Stage 1 LPT Nozzle Outer Platform Cavity
Figure 634/72-00-00-990-855-F00 (Sheet 3 of 5)

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Stage 1 LPT Nozzle Outer Platform Cavity
Figure 634/72-00-00-990-855-F00 (Sheet 4 of 5)

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5018988-00
2421873 S0000558643_V1

Stage 1 LPT Nozzle Outer Platform Cavity
Figure 634/72-00-00-990-855-F00 (Sheet 5 of 5)

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Stage 1 LPT Nozzle Outer Platform Cavity
Figure 635/72-00-00-990-856-F00

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TASK 72-00-00-200-814-F00

19. Put the Airplane Back to Its Usual Condition

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the instructions on how to put the airplane back to its usual condition after an inspection.

B. References

Reference	Title
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-63-01-400-801-F00	Handcranking Drive Cover Installation (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-080-009-F00

CAUTION: MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the inner surface of the inlet cowl.

SUBTASK 72-00-00-210-100-F00

(2) Disassemble the borescope equipment as follows:

(a) Turn the light source to OFF.

1) Keep the blower ON until the lamp and case are cool.

(b) Make sure that the power switch is OFF.

(c) Make sure that the light intensity control is set to minimum.

(d) Disconnect the power supply and the ground.

(e) Disconnect the extension and the viewer from the borescope.

(f) Disconnect the borescope from the fiber light cable.

(g) Disconnect the fiber light cable from the light source.

SUBTASK 72-00-00-210-101-F00

CAUTION: MAKE SURE THAT YOU INSTALL THE COVER ON THE GEARBOX. IF YOU DO NOT INSTALL THE COVER, ENGINE OIL LEAKS CAN OCCUR DURING OPERATION AND ENGINE DAMAGE CAN OCCUR.

(3) If not already done, do this task: Handcranking Drive Cover Installation, TASK 72-63-01-400-801-F00.

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SUBTASK 72-00-00-410-045-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-00-00-860-078-F00

(5) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-00-00-860-079-F00

(6) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-00-00-860-006-F00

(7) On the applicable engine, remove the DO-NOT-OPERATE tag from the start lever.

END OF TASK

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ENGINE - CLEANING/PAINTING

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has these tasks
      (1) Engine cleaning specifications
      (2) To clean the fan blades
      (3) To clean the engine gas path with pure water
      (4) To clean the engine gas path with cleaning solution
      (5) To clean the external engine.

TASK 72-00-00-100-801-F00

2. **Engine Cleaning Specifications**

A. General

CAUTION: DO NOT USE METHANOL. TITANIUM PARTS IN THE ENGINE COULD BE DAMAGED.

CAUTION: DO NOT CLEAN AN ENGINE WHICH WAS EXPOSED TO DRY CHEMICAL FIRE EXTINGUISHING AGENTS UNTIL THE CHEMICAL AGENTS HAVE BEEN COMPLETELY REMOVED. A CORROSIVE COMPOUND IS FORMED WHEN WATER MIXES WITH THE DRY CHEMICAL FIRE EXTINGUISHING AGENT. REMOVE THE ENGINE AND DO AN EXTENSIVE BORESCOPE INSPECTION. IF NOT, DAMAGE TO EQUIPMENT COULD OCCUR.

CAUTION: DO NOT CLEAN AN ENGINE UNLESS THE EGT IS BELOW 150 DEGREES F (66 DEGREES C). DAMAGE TO EQUIPMENT COULD OCCUR.

CAUTION: DO NOT CLEAN AN ENGINE IF THE OUTSIDE AIR TEMPERATURE IS BELOW 14 DEGREES F (-10 DEGREES C). ICE COULD FORM IN THE ENGINE.

(1) You can clean the engine with pure water only (TASK 72-00-00-100-803-F00), or with a solution of gas path cleaner, B01024 [CP5060], (TASK 72-00-00-100-804-F00)

(a) For EGT margin recovery, it is recommended to do the engine gas- path water cleaning with pure water only (without cleaning agent) (TASK 72-00-00-100-803-F00). Pure water (without cleaning agent) is effective in most situations depending on the engine's operating environment and the engine gas-path cleaning program implemented by the Operator.

(b) An engine gas-path water cleaning with detergent (TASK 72-00-00-100-804-F00) provides the most effective method to clean the engine compressors. For the use of detergent, it is necessary to follow strict application of the engine rinsing and bleed system cycling per the procedures to prevent fumes in the cabin when the airplane goes back into service.

1) It may be necessary to clean the engine more than one time if initial results are not satisfactory.

2) Considerations should be given to do an engine gas-path cleaning with detergent for any of these following conditions:

a) Organic debris or oil deposits are observed on compressor airfoils

b) The engine has less than 10 degrees C EGT margin left.

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(2) If the air temperature is below 40°F (4°C), use alcohol, B00676 [CP1041] as the anti-freeze agent with the water rinse or the cleaner solution.

B. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
B01024 [CP5060]	Cleaner - Gas Path	CFM CP5060

C. Engine Cleaning Specifications

SUBTASK 72-00-00-100-001-F00

(1) Water.

(a) Water properties.

1) Use water with less than 500 ppm total solids, less than 25 ppm sodium plus potassium (Na + K), and a PH of 6.0-8.0.

a) Potable water is usually sufficient.

(b) Water flow.

CAUTION: DO NOT USE A WATER FLOW OF MORE THAN 5-6 GPM (19-23 LITERS PER MINUTE). DAMAGE TO THE ENGINE CAN OCCUR.

1) A water flow of 5-6 gpm (19-23 liters in a minute) is necessary at a temperature of more than 40 degrees F (5 degrees C).

NOTE: If the water cart does not have a flowmeter, you can calculate the flow rate using a container of known quantity and a stop watch.

a) For the best results, increase the temperature of the water to 150-200 degrees F (66-93 degrees C) to wash and clean the gas path.

SUBTASK 72-00-00-100-007-F00

(2) Anti-freeze (if it is necessary).

(a) If the air temperature is below 40°F (4°C), prepare the anti-freeze mixture for the water wash or the cleaning solution.

WARNING: USE RUBBER GLOVES AND EYE PROTECTION WHEN YOU HANDLE LIQUID DETERGENT. LIQUID DETERGENT AND ANTI-FREEZE SOLVENT HAVE LOW FLASHPOINTS. KEEP AWAY FROM HEAT AND OPEN FLAME. MAKE SURE THERE IS ADEQUATE VENTILATION.

CAUTION: USE ONLY ISOPROPYL ALCOHOL AS AN ANTI-FREEZE MIXTURE. ALL OTHER ALCOHOL BASE MIXTURES ARE NOT PERMITTED AND CAN CAUSE CORROSION OF THE TITANIUM PARTS OF THE ENGINE.

1) For air temperatures of 23-40 degrees F (-5 to 5 degrees C), mix a solution of 25 percent alcohol, B00676 [CP1041] with 75 percent water.

2) For air temperatures of 14-23 degrees F (-10 to -5 degrees C), mix a solution of 35 percent alcohol, B00676 [CP1041] with 65 percent water.

3) For air temperatures below 14 degrees F (-10 degrees C), do not clean an engine.

SUBTASK 72-00-00-100-006-F00

(3) Cleaning solutions (if it is necessary).

(a) Prepare the cleaning solution mixture.

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WARNING: USE RUBBER GLOVES AND EYE PROTECTION WHEN YOU HANDLE LIQUID DETERGENT. LIQUID DETERGENT AND ANTI-FREEZE SOLVENT HAVE LOW FLASHPOINTS. KEEP AWAY FROM HEAT AND OPEN FLAME. MAKE SURE THERE IS ADEQUATE VENTILATION.

1) Mix a solution of 20-25 percent of gas path cleaner, B01024 [CP5060] with 75-80 percent of water.

END OF TASK

TASK 72-00-00-100-802-F00

3. Clean the Fan Blades

A. General

(1) It is recommended that you do the fan blade cleaning procedure and the gas path cleaning procedure at the same time.

(a) Use a cleaning agent only when organic debris or oil deposits are present.

(2) Fan blade cleaning is not necessary for EGT margin recovery.

B. 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-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers
STD-4048	Bottle - Hand Spray

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
B01024 [CP5060]	Cleaner - Gas Path	CFM CP5060
B50196 [CP2470]	Cleaner - Turco 5948 DPM Light duty Aqueous cleaner	CFM CP2470
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G50220	Pad - Abrasive, Scotch- Brite 7447	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for The Fan Blades Cleaning

SUBTASK 72-00-00-840-022-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-00-00-860-008-F00

(2) Install a DO-NOT-OPERATE tag on the applicable START switch.

SUBTASK 72-00-00-860-009-F00

(3) Make sure the engine start levers are in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

SUBTASK 72-00-00-480-026-F00

CAUTION: MAKE SURE YOU GIVE SUFFICIENT PROTECTION TO THE INNER SURFACE OF THE INLET COWL. IF YOU DO NOT GIVE SUFFICIENT PROTECTION TO THE INLET COWL, DAMAGE CAN OCCUR.

(4) Install the protective mat, STD-585 in the inlet cowl.

SUBTASK 72-00-00-010-020-F00

(5) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

G. Clean The Fan Blades

SUBTASK 72-00-00-100-002-F00

(1) Do these steps to clean the fan blades:

WARNING: MAKE SURE YOU WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES, YOU CAN INJURE YOUR HANDS.

(a) Move each fan blade you are to clean to the 6:00 o'clock position.

CAUTION: DO NOT LET THE SOLUTION SPRAY INTO THE GAS PATH. HOT CORROSION CAN CAUSE DAMAGE TO EQUIPMENT.

(b) Use a hand spray bottle, STD-4048 to apply gas path cleaner, B01024 [CP5060] to the two sides of each fan blade.

NOTE: This will decrease the quantity of solution that touches the fan blade dovetails. The solution will remove the lubricant. If you wipe the fan blades, do it in the down direction, away from the rotor.

(c) Remove the small particles from the fan blade with a soft cloth which is moist with the solution.

1) Flush the fan blade with water.

(d) Remove the hard-to-remove particles from the fan blade with an Scotch-Brite 7447 pad, G50220 which is moist with the cleaning solution.

1) Flush the fan blade with water.

(e) If the fan blade stays dirty, do the steps that follow:

WARNING: AVOID PROLONGED BREATHING OF VAPORS AND REPEATED OR PROLONGED CONTACT WITH YOUR SKIN. CLEANING SOLVENTS ARE FLAMMABLE, VOLATILE AND TOXIC. THEY SHOULD BE USED WITH ADEQUATE VENTILATION.

1) Remove the light deposits with a cotton wiper, G00034 and alcohol, B00676 [CP1041] or Turco 5948 DPM cleaner, B50196 [CP2470].

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a) Rinse thoroughly with water.

2) Remove heavy particles, which are not easy to remove, with a Scotch-Brite 7447 pad, G50220 and alcohol, B00676 [CP1041] or Turco 5948 DPM cleaner, B50196 [CP2470].

a) Rinse thoroughly with water.

H. Put the Engine Back to Its Usual Condition

SUBTASK 72-00-00-080-012-F00

(1) Remove the protective mat, STD-585 from the engine inlet.

SUBTASK 72-00-00-410-018-F00

(2) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-00-00-080-013-F00

(3) Remove the DO-NOT-OPERATE tags from the start levers.

SUBTASK 72-00-00-080-014-F00

(4) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-00-00-440-003-F00

(5) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

——— **END OF TASK** ———

TASK 72-00-00-100-803-F00

4. Clean the Engine Gas-Path With Pure Water

A. General

(1) For EGT margin recovery, it is recommended to clean the engine gas-path with pure water only.

(2) It is not recommended to use a cleaning agent in the water for EGT margin recovery.

NOTE: It is only recommended to clean the engine gas-path with a cleaning agent when organic debris or oil deposits are present or the remaining EGT margin is less than 50°F (10°C).

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
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)
71-00-00-800-806-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)

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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-14318	Handheld TDS digital meter, TDS range 0-9990 PPM +/-2% Accuracy
STD-3940	Air Source - Regulated, Dry Filtered, 0 to 150 psig

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
G00018	Nitrogen - Gaseous, Pressurizing, 99.5 Percent Pure	A-A-59503 Type I Grade B, MIL-PRF-27401 Type I Grade A
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare to Clean the Engine

SUBTASK 72-00-00-100-008-F00

(1) Make sure that you obey the cleaning specifications in this task: Engine Cleaning Specifications, TASK 72-00-00-100-801-F00.

NOTE: If the air temperature is below 40°F (5°C), prepare a solution with anti-freeze.

SUBTASK 72-00-00-010-021-F00

(2) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-00-00-020-002-F00

(3) Do these steps to disconnect the PS3 line:

(a) Disconnect the PS3 line at the EEC.

(b) Put end caps on the line and the EEC connection.

SUBTASK 72-00-00-600-003-F00

(4) Service the engine. Do this task Replenish the Engine Oil, TASK 12-13-11-600-801.

NOTE: The minimum amount of 5 gallons (19 liters) of oil, D00599 [CP2442] is necessary to motor the engine.

SUBTASK 72-00-00-010-022-F00

(5) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

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SUBTASK 72-00-00-860-024-F00

(6) On the overhead panel, P5, make sure the WING ANTI-ICE, ENG 1 ANTI-ICE and ENG 2 ANTI-ICE switches are in the OFF position.

SUBTASK 72-00-00-860-025-F00

(7) On the overhead panel, P5, make sure the BLEED 1 and BLEED 2 switches are in the OFF position.

SUBTASK 72-00-00-860-031-F00

(8) On the overhead panel, P5, make sure the L PACK and R PACK switches are in the OFF position.

G. Clean the Engine Gas-Path With Water

SUBTASK 72-00-00-100-003-F00

CAUTION: DO NOT CLEAN AN ENGINE WHICH WAS EXPOSED TO DRY CHEMICAL FIRE EXTINGUISHING AGENTS UNTIL THE CHEMICAL AGENTS HAVE BEEN COMPLETELY REMOVED. A CORROSIVE COMPOUND IS FORMED WHEN WATER MIXES WITH THE DRY CHEMICAL FIRE EXTINGUISHING AGENT. REMOVE THE ENGINE AND DO AN EXTENSIVE BORESCOPE INSPECTION. IF NOT, DAMAGE TO EQUIPMENT COULD OCCUR.

CAUTION: DO NOT CLEAN AN ENGINE UNLESS THE EGT IS BELOW 150 DEGREES F (66 DEGREES C). DAMAGE TO EQUIPMENT COULD OCCUR.

CAUTION: DO NOT CLEAN AN ENGINE WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 14°F (-10°C). ICE WILL FORM ON THE ENGINE.

CAUTION: THE FUEL PUMP AND HMU ARE FUEL LUBRICATED. DO NOT MOTOR, START, OR OPERATE ENGINE UNLESS THERE IS A POSITIVE FUEL INLET PRESSURE. DAMAGE TO COMPONENTS COULD OCCUR.

CAUTION: DO NOT MOTOR THE ENGINE MORE THAN STARTER DUTY CYCLE ENGINE OPERATION LIMITS, TASK 71-00-00-800-806-F00. STARTER DAMAGE COULD OCCUR.

CAUTION: MAKE SURE THE N1 ROTOR TURNS FREELY THROUGHOUT CLEANING TO PREVENT OIL SYSTEM CONTAMINATION.

CAUTION: DO NOT APPLY WATER AT MORE THAN 6 US GALLONS (23 LITERS) IN A MINUTE. ENGINE DAMAGE CAN OCCUR.

(1) Do these steps to clean the gas-path with water:

WARNING: MAKE SURE THAT YOU USE ANTI-FREEZE SOLUTIONS CORRECTLY. ANTI-FREEZE SOLUTIONS WITH LOW FLASH POINTS CAN CAUSE A FIRE. INJURY TO PERSONNEL CAN OCCUR.

(a) Make sure that you apply the recommended clean water specification to clean the engine listed at the front of this procedure (TASK 72-00-00-100-801-F00).

1) WASH CARTS WITH IMMERSION HEATER.

If you use anti-freeze, do not use the immersion heater.

(b) EEC SOFTWARE VERSION 7.B.U OR LATER.

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Do these steps to prepare the engine for the EEC Water Wash Test:

NOTE: It takes two persons to do this test. One person operates the FMCS CDU and the engine controls, and the other makes sure no one is injured when surfaces move and also monitors the engine.

NOTE: When engine operates, some oil leaks can occur at the aft sump rotating seal. After operation, an oil puddle in the exhaust is usual. When engine operations are done one after the other, it can cause a large oil puddle in the exhaust.

1) Before you use the EEC water wash function for your fleet maintenance, do a test wash with the wash function and your water wash equipment.

   NOTE: The water wash function lets more water into the engine core during the wash. The quantity of water is also different for the type of water wash equipment. Some combinations of equipment and the water wash function can make a 60% N1 engine run necessary to prevent fumes or smoke in the cabin. Refer to the task to flush the cleaning solution (TASK 72-00-00-100-804-F00) for the engine operation.

2) Make sure that all persons and equipment are a safe distance from the engine before you start the test.

3) If the CDU is not active from other engine ground tests, do these steps:

   a) Get access to the CDU in the flight compartment.

   b) Push the INIT REF key to show the PERF INIT screen on the CDU.

      NOTE: The FMCS CDU does not support a type-ahead function. You must have the prompt on the CDU screen before you type in the response.

   c) Push these Line Select Keys (LSK) on the CDU:

      <1> INDEX

      <2> MAINT

      NOTE: This LSK causes the MAINT BITE INDEX screen to show.

      <3> ENGINE

      NOTE: This LSK causes the ENGINE/EXCEED BITE INDEX screen to show.

      <4> Applicable ENGINE X, (X = 1 or 2)

      NOTE: This LSK causes the ENGINE X BITE TEST MAIN MENU to show. Also, the ENGINE X LSK automatically applies power to the EEC and causes the EEC to initialize. The CDU can show INITIALIZING EEC X and EEC SORTING FAULT HISTORY DATA, for a short time, just before the ENGINE X BITE TEST MAIN MENU shows.

      <5> GROUND TESTS

      NOTE: This LSK causes the ENGINE X BITE TEST GROUND TEST menu to show.

      <6> If the FOR CH A ONLY or FOR CH B ONLY screen shows, push the INDEX LSK once, stop for 30 seconds, and then push the GROUND TESTS LSK again.

      NOTE: The system has a 15-second timer for the FMCS CDU and EEC to initialize. Sometimes, this is not enough time and the system will show this problem.

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4) Push the WATER WASH TEST LSK.

NOTE: This will cause screen 1 of the WATER WASH function to show. The screen contains a WARNING about the operation of the engine during this test.

5) Use the interphone to tell the person at the engine that the engine will begin the dry motor procedure.

6) Type "OK" on the CDU pad when you are ready to start the test.

7) Push the CONTINUE LSK.

8) Follow the instructions on the CDU screen.

(c) Optional - Collect a sample of the wash supply water and measure the total dissolved solids with the TDS meter, COM-14318.

1) Make a record of the measurement.

(d) Dry motor the engine for two minutes. To do the dry motor, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

WARNING: STAND AT LEAST 3 FEET (1 M) AWAY FROM THE COWLING INLET WHEN SPRAYING LIQUIDS INTO THE ENGINE TO AVOID PERSONAL INJURY.

(e) After ten seconds of motoring with positive fan rotation, inject the water 360 degrees around the Low Pressure Compressor (LPC) inlet through the fan blades or at the LPC inlet (if a specific rig is used) during the motoring.

(f) Let the engine soak for 5 minutes.

(g) Do the above steps again to dry motor, inject water and soak the engine.

NOTE: This step may be done additional times again for engines with heavy dirt deposits.

(h) Dry motor the engine again for 2 minutes.

(i) After ten seconds of motoring with positive fan rotation, inject the water for one minute 360 degrees around the LPC inlet through the fan blades or at the LPC inlet (if a specific rig is used) during the motoring.

(j) Let the engine soak for 5 minutes.

(k) Optional (if the above optional step to sample the wash water was done) - Collect a sample of the wash water that drains from the exhaust area of the engine.

1) Measure and make a record of the total dissolved solids with the TDS meter, COM-14318.

2) Do a calculation to subtract the initial supply water TDS value from the rinse effluent TDS value.

a) If the net TDS value is less than 150 ppm, no additional rinse cycles are necessary.

b) If the net TDS value is more than 150 ppm, do the additional wash/soak cycles until the net TDS value is below 150 ppm, a maximum of four wash cycles.

(l) Dry motor the engine (TASK 71-00-00-700-821-F00) for two minutes.

(m) EEC SOFTWARE VERSION 7.B.U OR LATER.

Push the END WASH LSK on the CDU screen.

1) The CDU screen will show WASH COMPLETE, RETURN AIRPLANE TO NORMAL CONDITION.

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SUBTASK 72-00-00-010-023-F00

(2) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-00-00-420-002-F00

(3) Do these steps to clean the PS3 line:

(a) Remove the end caps from the PS3 line and the EEC connector.

CAUTION: DO NOT BLOW AIR INTO THE EEC. DAMAGE COULD OCCUR.

(b) Use 0 to 150 psig dry filtered regulated air source, STD-3940 or nitrogen, G00018 set at 20-100 psi to clear the PS3 line of water.

(c) Do a visual inspection to make sure that the PS3 line weeping-hole is clear and there is no blockage.

(d) Connect the PS3 line to the EEC.

CAUTION: USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

1) Torque the connection to 285 ±15 in-lb (32 ±2 N·m).

2) Loosen the connection.

3) Torque again the connection to 285 ±15 in-lb (32 ±2 N·m).

4) Do a check of the connection again.

a) Torque the connection to the above torque value.

5) ENGINES POST-CFM-SB 73-062;

Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006], on the PS3 air tube coupling to the screw on the EEC.

SUBTASK 72-00-00-410-036-F00

(4) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

H. Flush Water From the Lube, Sumps, and Bleed Systems

SUBTASK 72-00-00-170-001-F00

(1) To prevent fumes in the cockpit and cabin when the airplane is put back into service, make sure to do these flush procedures.

SUBTASK 72-00-00-860-010-F00

(2) Do these steps to start the engine:

(a) At not more than two hours (or 30 minutes if icing conditions exist or about to occur) after you cleaned and serviced the engine, operate the engine as follows:

NOTE: This is to remove the water that was ingested into the engine systems.

WARNING: MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

(b) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

1) Operate the engine at idle for 5 minutes.

SUBTASK 72-00-00-860-011-F00

(3) Do these steps to flush the inlet cowl anti-ice system:

(a) Put the APU BLEED switch, on the P5-10 panel, to the OFF position.

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1) Make sure the DUAL BLEED light goes out.

(b) Make sure the applicable BLEED switch on the P5-10, forward overhead panel is in the OFF position.

(c) Put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 Panel, to the ON position.

1) Make sure that the applicable COWL VALVE OPEN light comes on brightly for 1 to 3 seconds, and then goes dim.

CAUTION: THE MAXIMUM OPERATION TIME FOR THE INLET COWL ANTI-ICE SYSTEM IS 30 SECONDS AT AN AIR TEMPERATURE OF MORE THAN 65°F (18°C) ENGINE OPERATION LIMITS, TASK 71-00-00-800-806-F00. IF YOU ARE NOT CAREFUL, DAMAGE TO ENGINE PARTS COULD OCCUR.

(d) Within 30 seconds, put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 Panel, to the OFF position.

1) Make sure the applicable COWL VALVE OPEN light comes on brightly for 1 to 3 seconds, and then goes off.

SUBTASK 72-00-00-700-002-F00

(4) Do these steps to flush the wing anti-ice system:

(a) Put the applicable BLEED switch on the P5-10, forward overhead panel to the ON position.

(b) Put the ISOLATION VALVE switch on the P5-10 panel to the OPEN position.

1) Monitor the dual duct pressure indicator on the P5-10 panel.

2) Make sure that each duct pressure needle indicates approximately 10 or more psi to show that the PRSOV is open.

(c) Put the applicable engine WING ANTI-ICE switch, on the P5-11 panel, to the ON position.

1) Make sure the applicable VALVE OPEN light comes on brightly for 1 to 3 seconds.

2) Make sure the applicable VALVE OPEN light goes dimly after 3 seconds.

(d) After no more than 30 seconds, put the applicable engine WING-ICE switch to the OFF position.

1) Make sure the applicable VALVE OPEN light comes on brightly for 1 to 3 seconds and then goes off.

(e) Put the applicable engine 1 BLEED or 2 BLEED switch, on the P5-10 Panel, to the OFF position.

1) Make sure that the duct pressure goes to zero which indicates that the PRSOV closed.

SUBTASK 72-00-00-860-016-F00

(5) Operate the engine at idle for 15 minutes.

(a) Continue to the subsequent check for odors or fumes in the cabin after the dry-out procedure.

SUBTASK 72-00-00-860-032-F00

(6) Do these steps to make sure there are no odors or fumes in the cockpit or cabin.

(a) Operate the engine at idle.

(b) Put the L and R PACK switches to AUTO.

(c) Put the 1 BLEED and 2 BLEED switches to ON.

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(d) Operate the engine at idle for five minutes and do a check for fumes or odors in the cockpit or cabin.

1) If odors are present, do this task: Flush Cleaning Solution from the Lube, Sumps and Bleed Systems (TASK 72-00-00-100-804-F00).

(e) Put the L and R PACK switches to the OFF position.

(f) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

——— END OF TASK ———

TASK 72-00-00-100-804-F00

5. Clean the Engine Gas-Path with Cleaning Solution

A. General

(1) For EGT margin recovery, it is recommended to clean the engine gas-path with pure water only.

(2) It is recommended that you use a cleaning agent only when organic debris or oil deposits are present.

(3) It is recommended that you do the fan blade cleaning procedure and the gas path cleaning procedure with cleaning agent at the same time.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
21-00-01-100-801	Oil Contamination Removal from Air Conditioning and Pneumatic Systems (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)
71-00-00-800-806-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)

C. Tools/Equipment

Reference	Description
STD-3940	Air Source - Regulated, Dry Filtered, 0 to 150 psig

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
G00018	Nitrogen - Gaseous, Pressurizing, 99.5 Percent Pure	A-A-59503 Type I Grade B, MIL-PRF-27401 Type I Grade A
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

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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 to Clean the Engine

SUBTASK 72-00-00-100-009-F00

(1) Make sure you obey the cleaning specifications. To know the specifications, do this task: Engine Cleaning Specifications, TASK 72-00-00-100-801-F00.

SUBTASK 72-00-00-010-024-F00

(2) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-00-00-020-003-F00

(3) Do these steps to disconnect the PS3 line:

(a) Disconnect the PS3 line at the EEC.

(b) Put end caps on the line and the EEC connection.

SUBTASK 72-00-00-600-004-F00

(4) Service the engine. Do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

NOTE: The minimum amount of 5 gallons (19 liters) of oil, D00599 [CP2442], is necessary to motor the engine.

SUBTASK 72-00-00-010-025-F00

(5) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-00-00-860-026-F00

(6) On the overhead panel, P5, make sure the WING ANTI-ICE, ENG 1 ANTI-ICE and ENG 2 ANTI-ICE switches are in the OFF position.

SUBTASK 72-00-00-860-027-F00

(7) On the overhead panel, P5, make sure the BLEED 1 and BLEED 2 switches are in the OFF position.

SUBTASK 72-00-00-860-030-F00

(8) On the overhead panel, P5, make sure the L PACK and R PACK switches are in the OFF position.

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G. Wash the Engine Gas Path With Cleaning Solution

SUBTASK 72-00-00-160-001-F00

CAUTION: DO NOT CLEAN AN ENGINE WHICH WAS EXPOSED TO DRY CHEMICAL FIRE EXTINGUISHING AGENTS UNTIL THE CHEMICAL AGENTS HAVE BEEN COMPLETELY REMOVED. A CORROSIVE COMPOUND IS FORMED WHEN WATER MIXES WITH THE DRY CHEMICAL FIRE EXTINGUISHING AGENT. REMOVE THE ENGINE AND DO AN EXTENSIVE BORESCOPE INSPECTION. IF NOT, DAMAGE TO EQUIPMENT COULD OCCUR.

CAUTION: DO NOT CLEAN AN ENGINE UNLESS THE EGT IS BELOW 150 DEGREES F (66 DEGREES C). ICE COULD FORM IN THE ENGINE.

CAUTION: THE FUEL PUMP AND HMU ARE FUEL LUBRICATED. DO NOT MOTOR, START, OR OPERATE ENGINE UNLESS THERE IS A POSITIVE FUEL INLET PRESSURE. DAMAGE TO COMPONENTS COULD OCCUR.

CAUTION: DO NOT MOTOR THE ENGINE MORE THAN STARTER DUTY CYCLE ENGINE OPERATION LIMITS, TASK 71-00-00-800-806-F00. STARTER DAMAGE COULD OCCUR.

CAUTION: MAKE SURE THE N1 ROTOR TURNS FREELY THROUGHOUT CLEANING TO PREVENT OIL SYSTEM CONTAMINATION.

CAUTION: DO NOT APPLY WATER AT MORE THAN 6 US GALLONS (23 LITERS) IN A MINUTE. ENGINE DAMAGE CAN OCCUR.

(1) Do these steps to clean the gas-path with the cleaning solution:

WARNING: IF YOU USE ANTI-FREEZE, KEEP ANTI-FREEZE AWAY FROM HEAT AND OPEN FLAME. ANTI-FREEZE HAS A LOW FLASHPOINT. MAKE SURE THAT THERE IS ADEQUATE VENTILATION. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT COULD OCCUR.

(a) Make sure that you use the recommended cleaning solution, that is listed in the specification at the front of this procedure (TASK 72-00-00-100-801-F00).

1) WASH CARTS WITH IMMERSION HEATER.

If you use anti-freeze, do not use the immersion heater.

(b) Dry motor the engine for two minutes. To do the dry motor, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

WARNING: USE RUBBER GLOVES AND EYE PROTECTION WHEN HANDLING LIQUID DETERGENT. LIQUID DETERGENT AND ANTI-FREEZE SOLVENT HAVE LOW FLASHPOINTS. KEEP AWAY FROM HEAT AND OPEN FLAME. MAKE SURE THAT THERE IS ADEQUATE VENTILATION. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT COULD OCCUR.

WARNING: STAND AT LEAST 3 FEET (1 M) AWAY FROM THE COWLING INLET WHEN SPRAYING LIQUIDS INTO THE ENGINE. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT COULD OCCUR.

(c) After 30 seconds of motoring with positive fan rotation, inject the cleaning solution 360 degrees around the Low Pressure Compressor (LPC) inlet through the fan blades or at the LPC inlet (if a specific rig is used) during the motoring.

(d) Let the engine soak for five minutes.

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(e) Do the above steps again, to dry motor, inject solution and soak the engine.

H. Rinse the Cleaning Solution From The Engine Gas Path

SUBTASK 72-00-00-170-003-F00

(1) To prevent fumes in the cockpit and cabin when the airplane is put back into service, make sure to do this rinse procedure.

SUBTASK 72-00-00-100-004-F00

(2) Do these steps to rinse the cleaning solution from the engine gas path:

(a) Dry motor the engine for two minutes. To do the dry motor, do this task: Dry Motor the Engine, TASK 71-00-00-700-821-F00.

WARNING: STAND AT LEAST 3 FEET (1 M) AWAY FROM THE COWLING INLET WHEN SPRAYING LIQUIDS INTO THE ENGINE TO AVOID PERSONAL INJURY.

(b) After ten seconds of motoring with positive fan rotation, inject the water 360 degrees around the Low Pressure Compressor (LPC) inlet through the fan blades or at the LPC inlet (if a specific rig is used) during the motoring.

(c) Let the engine soak for 5 minutes.

(d) Dry motor the engine again for two minutes.

(e) After ten seconds of motoring with positive fan rotation, inject the water 360 degrees around the LPC inlet through the fan blades or at the LPC inlet (if a specific rig is used) during the motoring.

(f) Let the engine soak for 5 minutes.

SUBTASK 72-00-00-010-026-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-00-00-420-003-F00

(4) Do these steps to clean the PS3 line:

(a) Remove the end caps from the line and the EEC connector.

CAUTION: DO NOT BLOW AIR INTO THE EEC. DAMAGE COULD OCCUR.

(b) Use 0 to 150 psig dry filtered regulated air source, STD-3940, or nitrogen, G00018, set at 20-100 psi to blow into the PS3 line and clear it of water.

1) Do a visual inspection to make sure that the PS3 line weep-hole is clear and there is no blockage.

(c) Connect the PS3 line to the EEC.

CAUTION: USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

1) Torque the connection to 285 ±15 in-lb (32 ±2 N·m).

2) Loosen the connection.

3) Torque again the connection to 285 ±15 in-lb (32 ±2 N·m).

4) Do a check of the connection again.

a) Torque the connection to the above torque value.

5) ENGINES POST-CFM-SB 73-062;

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Install safety wire, G02345 [CP8001], or cable, G50065 [CP8006], on the PS3 air tube coupling to the screw on the EEC.

SUBTASK 72-00-00-010-027-F00

(5) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

I. Flush The Cleaning Solution From the Lube, Sumps, and Bleed Systems.

SUBTASK 72-00-00-170-002-F00

(1) To prevent fumes in the cockpit and cabin when the airplane is put back into service, make sure to do these flush procedures.

SUBTASK 72-00-00-860-017-F00

(2) Do one of these steps to make sure there is an exit for the conditioned air:

(a) Make sure the cabin pressure outflow valve is open.

(b) Make sure at least one passenger entry door is open.

SUBTASK 72-00-00-710-001-F00

(3) Do these steps to start the engine:

(a) At not more than two hours (or 30 minutes if icing conditions exist or about to occur) after you cleaned and serviced the engine, operate the engine as follows:

NOTE: This is to remove the cleaning solution that was ingested into the engine systems.

WARNING: MAKE SURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF THE ENGINE DANGER AREA. THE ENGINE INTAKE AND EXHAUST CAN INJURE PERSONNEL AND DAMAGE EQUIPMENT IN THE DANGER AREAS.

(b) Do this task: Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00.

1) Operate the engine at idle for five minutes.

SUBTASK 72-00-00-710-002-F00

(4) Do these steps to flush the inlet cowl anti-ice system:

(a) Put the APU BLEED switch, on the P5-10 panel, to the OFF position.

1) Make sure the DUAL BLEED light goes out.

(b) Put the applicable BLEED switch on the P5-10, forward overhead panel to the ON position.

(c) Put the ISOLATION VALVE switch on the P5-10, forward overhead panel to the OPEN position.

(d) Monitor the dual duct pressure indicator on the P5-10, forward overhead panel.

(e) Make sure that each duct pressure needle shows approximately 10 or more psi to show that the PRSOV is open.

(f) Move the applicable thrust lever to 60 percent N1.

NOTE: Do not increase the engine power to more than 80 percent N1.

(g) Put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 Panel, to the ON position.

1) Make sure that the applicable COWL VALVE OPEN light comes on brightly for 1 to 3 seconds, and then goes dim.

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CAUTION: THE MAXIMUM OPERATION TIME FOR THE INLET COWL ANTI-ICE SYSTEM IS 30 SECONDS AT AN AIR TEMPERATURE OF MORE THAN 65°F (18°C) ENGINE OPERATION LIMITS, TASK 71-00-00-800-806-F00. IF YOU ARE NOT CAREFUL, DAMAGE TO ENGINE PARTS COULD OCCUR.

(h) After not more than 30 seconds, put the applicable ENG ANTI-ICE 1 or ENG ANTI-ICE 2 switch, on the P5-11 Panel, to the OFF position.

1) Make sure the applicable COWL VALVE OPEN light comes on brightly for 1 to 3 seconds, and then goes off.

(i) Move the applicable thrust lever to the IDLE position

1) Operate the engine at idle for 5 minutes.

(j) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.

SUBTASK 72-00-00-710-003-F00

(5) Do this step to flush the pneumatic bleed ducts:

(a) To flush the cleaning solution, do this task: Oil Contamination Removal from Air Conditioning and Pneumatic Systems, TASK 21-00-01-100-801.

——— END OF TASK ———

TASK 72-00-00-100-805-F00

6. Clean the External Engine Surfaces

A. General

(1) There are two methods to clean the external engine surfaces:

(a) The hydrocarbon cleaning method

(b) The steam cleaning method.

B. References

Reference	Title
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-4048	Bottle - Hand Spray

D. Consumable Materials

Reference	Description	Specification
B00682 [CP2011]	Solvent - Stoddard	P-D-680 Type I, II or III

E. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare to Clean the External Engine Surfaces

SUBTASK 72-00-00-860-018-F00

(1) For engine 1, do this step:

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Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	1	C00458	ENGINE 1 IGNITION RIGHT
A	3	C00153	ENGINE 1 IGNITION LEFT
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-00-00-860-019-F00

(2) For engine 2, do this step:

Open these circuit breakers and install safety tags:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT

SUBTASK 72-00-00-040-006-F00

(3) Make sure that the applicable engine START switch is in the OFF position.

(a) Install a DO-NOT-OPERATE tag.

SUBTASK 72-00-00-010-028-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST 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.

(4) For the applicable thrust reverser or thrust reversers, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

G. Clean the External Engine Surfaces

SUBTASK 72-00-00-100-005-F00

(1) Make sure that 5 minutes passed after you stop the engine, before you do these steps:

(a) Hydrocarbon method

WARNING: HYDROCARBONS ARE FLAMMABLE AND TOXIC. AVOID PROLONGED CONTACT WITH THE SKIN AND OBSERVE PRECAUTIONS AGAINST FIRE. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION: SOME PLASTICS AND RUBBER-BASE MATERIALS ARE DAMAGED BY HYDROCARBON SOLVENTS. IF YOU ARE NOT CAREFUL, DAMAGE TO THE ENGINE COULD OCCUR.

1) Light accumulations of grease, oil, gum and dirt can be removed as follows:

NOTE: This method is not effective in the removal of baked-on oil deposits.

a) Apply CP2010 solvent or solvent, B00682 [CP2011], with a hand spray bottle, STD-4048 or use a soaked rag.

b) Remove the accumulation with a soft cloth.

c) Wipe the cleaned area dry with a clean cloth or rinse with clean water.

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CAUTION: DO NOT USE CLEANING COMPOUNDS IN THE STEAM THAT IS USED FOR CLEANING. IF YOU ADD COMPOUNDS, DAMAGE TO THE ENGINE COULD OCCUR.

(b) Steam cleaning method

NOTE: Steam cleaning is a surface cleaning process that is useful when you do not want to remove paint and surface coatings.

1) Cap all tube ends, manifold openings and air extraction ports to prevent entry of contaminants or foreign objects.

CAUTION: DO NOT LET THE STEAM FLOW STAY IN ONE PLACE TOO LONG. IF YOU ARE NOT CAREFUL, DAMAGE TO ENGINE PARTS COULD OCCUR.

2) Steam clean the accessible external surfaces of the engine.

3) Remove covers that you installed above.

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-00-00-860-020-F00

(1) For engine 1, do this step:

Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	1	C00458	ENGINE 1 IGNITION RIGHT
A	3	C00153	ENGINE 1 IGNITION LEFT
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-00-00-860-021-F00

(2) For engine 2, do this step:

Remove the safety tags and close these circuit breakers:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT

SUBTASK 72-00-00-080-015-F00

(3) Remove the DO-NOT-OPERATE tag from the engine START switch.

SUBTASK 72-00-00-010-029-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSER. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

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1. General

A. This procedure has this task:

(1) The repair of the HPC rotor blades.

TASK 72-00-00-300-801-F00

2. Repair the HPC Rotor Blades

(Figure 801, Figure 802, Figure 803, Figure 804)

A. General

(1) Instructions that are given in this procedure are for the blend repair of the high pressure compressor (HPC) rotor blades, stages 1-9 (referred to as the compressor blades).

(2) The repair uses the limits that are given in this procedure.

B. References

Reference	Title
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
72-00-00-200-802-F00	Borescope Inspection Preparation (P/B 601)
72-00-00-200-804-F00	HP Compressor Blades Borescope Inspection (P/B 601)
72-00-00-200-814-F00	Put the Airplane Back to Its Usual Condition (P/B 601)
72-63-01-400-801-F00	Handcranking Drive Cover Installation (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2332	Kit - Borescope, Blending, HPC Blades Part #: 5.08136.001 Supplier: 50958

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare To Repair the Compressor Blades

SUBTASK 72-00-00-040-007-F00

(1) If the preparation steps were not done, do this task: Borescope Inspection Preparation, TASK 72-00-00-200-802-F00

for the HP compressor inspection.

SUBTASK 72-00-00-010-033-F00

(2) If not already done, do the applicable steps in the reference task to get access to the compressor blade; do this task: HP Compressor Blades Borescope Inspection, TASK 72-00-00-200-804-F00.

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F. Blend Limits

SUBTASK 72-00-00-220-001-F00

(1) Make sure the damage and the area of the repair will be less than these blend limits (Figure 801):

NOTE: Multiple blends in the same area are acceptable if the total amount of material that is removed from the original contour is not more than the repairable limit.

(a) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 1-4 compressor blades found in Dim. B of the airfoil.

1) There is no limit to the number of blended damage areas on each blade with this condition:

a) Maximum depth is 0.08 inch (2.03 mm) after the blend.

(b) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 1-4 compressor blade found in Dim. A of the airfoil.

1) Any number of missing or damaged tip corners, with these conditions:

a) Individual blades with missing material greater than 0.30 x 0.30 inch (7.6 x 7.6 mm) missing tip corners after blend on both leading and trailing edges are not permitted.

b) Any number of blades for each stage 1 thru 4, up to 0.30 x 0.30 inch (7.6 x 7.6 mm) missing tip corners after blend if the downstream damage is serviceable.

c) For stage 2, a maximum of 4 blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm), and 46 blades up to 0.30 x 0.30 inch (7.6 x 7.6 mm) missing tip corners after blend for total of 50 blades with missing tip corners.

d) For stage 3, a maximum of 5 blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm) and 51 blades up to 0.30 x 0.30 inch (7.6 x 7.6 mm) missing tip corners after blend for a total of total of 56 blades with missing tip corners.

e) For stage 4, maximum of 6 blades up to 0.40 x 0.40 inch (10.2 x 10.2 mm) and 57 blades up to 0.30 x 0.30 inch (7.6 x 7.6 mm) missing tip corners after blend for a total of total of 63 blades with missing tip corners.

(c) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 5-9 compressor blades found in Dim. B of the airfoil.

NOTE: Multiple blends in the same area are acceptable if the total amount of material that is removed from the original contour is not more than the repairable limit.

1) There is no limit to the number of blended damage areas on each blade with this condition.

a) Maximum depth is 0.08 inch (2.03 mm) after the blend.

(d) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 5-9 compressor blades found in Dim. A.

1) Up to 20% of the blades in each stage with tears, nicks, dents, missing material and erosion with this condition:

a) Maximum area is 0.20 X 0.20 inch (5.1 X 5.1 mm).

(e) Tears, nicks, dents, missing material and erosion on the leading and trailing edge of stages 1-9 compressor blades found in the lower 25% of the airfoil.

1) There is no limit to the number of blended damage areas on each blade with these conditions:

a) Maximum depth is 0.06 in. (1.52 mm) after the blend.

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b) You do not blend in the airfoil root radius (R).

G. Blend Repair of the Compressor Blades

SUBTASK 72-00-00-290-003-F00

(1) Use the blending HPC rotor blades borescope kit, COM-2332 to do the repair.

(a) Equivalent HPC blending tools are not permitted unless approved by CFMI.

SUBTASK 72-00-00-220-002-F00

CAUTION: DO NOT INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING IF IT IS SET IN THE 0-DEGREE POSITION. IF YOU INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING WHILE IT IS SET IN THE 0-DEGREE POSITION, THE DRIVE BELT WILL DISENGAGE.

(2) Measure the damage area as follows:

NOTE: Do not blend into the airfoil root radius (R).

(a) Put the head with bearing in the 90-degree position.

NOTE: This will prevent damage to the rotor blades or the blend tool.

1) Install the measuring grid tip onto the head with bearing (Figure 804).

2) Tighten the lock screw.

(b) Put the measuring grid tip in the 0-degree position.

(c) Put the grid tool in the borescope port.

(d) Monitor the measuring grid tip, and put the head with bearing to the 90-degree position.

(e) Set the measuring grid tip near the compressor blade damage area.

1) Each square on the grid is 0.039 in. (0.99 mm) x 0.039 in. (0.99 mm).

2) The overall grid size is 0.197 in. (5.00 mm) x 0.197 in. (5.00 mm).

(f) Record the damage results such as the defect size and location.

(g) Compare the blade damage that you recorded against the permitted blend limits (Figure 801).

1) Make sure the blade damage is less than the permitted blend limits.

(h) If the damage is less than the permitted blend limits, find the length of the blend that is necessary to keep the minimum blend radius (Figure 803).

(i) Calculate the minimum blend radius at two times the depth of the defect, or one times on each side of the center of the blade defect (Figure 803).

NOTE: Do not blend into airfoil radius (R).

(j) Put the head with bearing (Figure 802) at the 0-degree position.

(k) Remove the tool from the borescope port.

(l) Put the head with bearing at the 90-degree position.

(m) Loosen the lockscrew and remove the measuring grid tip from the head with bearing.

SUBTASK 72-00-00-320-001-F00

(3) Blend the damaged area of the compressor blade:

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CAUTION: DO NOT INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING IF IT IS SET IN THE 0-DEGREE POSITION. IF YOU INSTALL OR REMOVE THE TOOL TIP WITH THE HEAD WITH BEARING WHILE IT IS SET IN THE 0-DEGREE POSITION, THE DRIVE BELT WILL DISENGAGE.

(a) Put the head with bearing at the 90-degree position and install the primary blade edge grinding tip to blend the HPC stage damage (Figure 804).

NOTE: Use longer tool tips for the forward blades and shorter tool tips for the aft blades.

NOTE: Do not blend in the airfoil root radius (R).

CAUTION: MAKE SURE THAT YOU DO A CHECK THE DRIVE BELT FOR POSSIBLE TWISTED INSTALLATION. IF THE DRIVE BELT IS TWISTED, DAMAGE TO THE TOOL COULD OCCUR.

(b) Do these steps to do a check of the drive belt for possible twisted installation:

1) Make sure the tool tip is pointed away from the operator in the 90-degree position.
2) Start the drive motor and make sure the tool tip turns in the clockwise direction.
3) If the tool tip turns in the counter-clockwise direction, the drive belt could be twisted. Use the tool manufacturer's instructions to repair the drive tool.

(c) Apply the light source to the blend tool.

(d) Put the tool tip in the 0-degree position.

(e) Put the primary blade edge grinding tip (Figure 804) in the borescope port and view the tool tip.

1) Move the tool tip from the 0-degree to the 90-degree position.

(f) Put the primary blade edge grinding tip close to the HPC blade defect.

(g) Align the tool tip with the blade defect and do a check for correct movement across the total length of the area to be blended.

NOTE: Do not start the drive motor at this time.

NOTE: Make sure the blend tool tip correctly touches across the total area to be blended.

(h) Use the primary blade edge grinding tip and mark the two sides of the blades defect.

NOTE: The minimum blend radius should be two times the depth of the defect, or one times on each side of the center of the blade defect (Figure 803).

(i) With the drive motor off, apply pressure to the grind tool at the defect area to practice the movement that you will use to blend the defect.

(j) After sufficient practice with the grind tool on the defect surface, do these steps:

1) Turn ON the drive motor using the ON/OFF switch.
2) Use the speed control to increase the speed.

NOTE: If the grind tool does not turn freely, apply less pressure to the blade edge surface.

(k) Blend the defect.

1) Make sure that you put a contour on the edge of the compressor blade and remove the sharp edges.

(l) Stop the drive motor.

(m) Put the tool tip in the 0-degree position.

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(n) Remove the grind tool from the borescope access port.

(o) Put the tool tip in the 90-degree position.

CAUTION: DO NOT INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING IF IT IS SET IN THE 0-DEGREE POSITION. IF YOU INSTALL OR REMOVE THE TOOL TIP WITH THE HEAD WITH BEARING WHILE IT IS SET IN THE 0-DEGREE POSITION, THE DRIVE BELT WILL DISENGAGE.

(p) Loosen the lockscrew and remove the tool tip from the head with bearing.

SUBTASK 72-00-00-320-002-F00

(4) Do these steps to polish the compressor blade that you blended:

CAUTION: DO NOT INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING IF IT IS SET IN THE 0-DEGREE POSITION. IF YOU INSTALL OR REMOVE THE TOOL TIP WITH THE HEAD WITH BEARING WHILE IT IS SET IN THE 0-DEGREE POSITION, THE DRIVE BELT WILL DISENGAGE.

(a) With the head with bearing in the 90-degree position, install the polishing ball tip (Figure 804) into the head with bearing and tighten the lockscrew.

(b) Put the polishing ball tip in the 0-degree position.

(c) Put the grind tool into the borescope access port.

(d) Put the head with bearing at the 90-degree position.

(e) Put the ON/OFF switch to ON to start the drive the motor.

(f) Polish the blended surface.

(g) Stop the drive motor.

(h) Put the polishing ball tip in the 0-degree position.

(i) Remove grind tool from the borescope port.

CAUTION: DO NOT INSTALL OR REMOVE A TOOL TIP FROM THE HEAD WITH BEARING IF IT IS SET IN THE 0-DEGREE POSITION. IF YOU INSTALL OR REMOVE THE TOOL TIP WITH THE HEAD WITH BEARING WHILE IT IS SET IN THE 0-DEGREE POSITION, THE DRIVE BELT WILL DISENGAGE.

(j) Loosen the lockscrew and remove the polishing ball tip from the head with bearing.

SUBTASK 72-00-00-290-002-F00

(5) Do a borescope inspection of the blend repairs:

(a) Use a standard borescope probe 1 configuration, magnified 1 to 1 at 7 in. (178 mm) to examine the blend repair.

1) Make sure that you removed all of the defect.

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-00-00-410-023-F00

(1) Do these steps:

(a) Do the applicable steps in the reference task to install the borescope plugs, do this task: HP Compressor Blades Borescope Inspection, TASK 72-00-00-200-804-F00.

(b) If you have no more borescope tasks to do, do this task: Put the Airplane Back to Its Usual Condition, TASK 72-00-00-200-814-F00.

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CAUTION: MAKE SURE THAT YOU INSTALL THE HANDCRANKING DRIVE COVER. IF THE HANDCRANKING DRIVE COVER IS NOT INSTALLED OR IT IS INSTALLED INCORRECTLY, ENGINE OIL LEAKAGE COULD OCCUR.

1) Make sure that you, do this task: Handcranking Drive Cover Installation, TASK 72-63-01-400-801-F00.

I. Blend Repair Test and Follow-Up Inspection

SUBTASK 72-00-00-790-001-F00

(1) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

SUBTASK 72-00-00-200-001-F00

(2) A one-time inspection of the blended area(s) is necessary as follows:

(a) Not less than 25 cycles

(b) Not more than 100 cycles.

(c) If you blend only in Dim. A and the tip, no follow-up inspection is necessary.

END OF TASK

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COMPRESSOR BLADE
(EXAMPLE)

STAGE	DIM. R	25% of L
1	0.14 (3.6)	0.8 (20.3)
2	0.14 (3.6)	0.6 (15.2)
3	0.12 (3.0)	0.5 (12.7)
4	0.10 (2.5)	0.5 (12.7)
5	0.10 (2.5)	0.4 (10.2)
6	0.09 (2.3)	0.3 (7.6)
7	0.09 (2.3)	0.3 (7.6)
8	0.09 (2.3)	0.3 (7.6)
9	0.09 (2.3)	0.3 (7.6)

TABLE A 1

NOTE:

ALL DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

1 FOR REFERENCE ONLY

1254066-00
K33262 S0006582309_V6

HPC Rotor Blade Blend Limits
Figure 801/72-00-00-990-831-F00 (Sheet 1 of 2)

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AIRFOIL LEADING OR TRAILING EDGE TIP CORNER

B

POSSIBLE AIRFOIL DAMAGE

C

NOTE:

ALL DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES

DEFECT DEPTH IS IN AXIS OF DAMAGE UNLESS OTHERWISE NOTED

GMM-1233642-00-A

K33263 S0006582310_V3

HPC Rotor Blade Blend Limits
Figure 801/72-00-00-990-831-F00 (Sheet 2 of 2)

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1132825-00-A
K33286 S0006582311_V2

HPC Blade Borescope Blending Tool
Figure 802/72-00-00-990-832-F00 (Sheet 1 of 2)

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1132826-00-A
K33299 S0006582312_V2

HPC Blade Borescope Blending Tool
Figure 802/72-00-00-990-832-F00 (Sheet 2 of 2)

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1228314-01-A
K33338 S0006582313_V5

Blend Area Examples
Figure 803/72-00-00-990-833-F00

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Borescope Blend Tool Tip Selection and Tool Tip Installation
Figure 804/72-00-00-990-834-F00

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AIR INLET SECTION - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has one task:
      (1) A visual check of the TGB and AGB mount lugs.

TASK 72-20-00-210-801-F00

2. **TGB and AGB Mount Lugs Inspection (Visual Check)**

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task is a visual check of the mount lugs on the fan frame and case which hold the transfer gearbox (TGB) and accessory gearbox (AGB). This is a scheduled maintenance task.

(2) The TGB is attached to the fan frame at approximately the 9:00 o'clock position. The AGB is attached on the left side of the fan case.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-20-00-010-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-20-00-210-001-F00

(2) Visually examine the mount lugs on the fan frame which hold the TGB and the mount lugs on the fan case which hold the AGB for damage:

(a) Cracks that extend from the bolt holes in the mount lugs

1) Not serviceable.

2) A Continue-In-Service limit of 10 cycles is permitted for one crack that goes through one mounting lug bolt hole, not more than 0.25 in. (6.35 mm) in length.

(b) Cracks in the areas of the mount lugs

1) Not serviceable.

2) A Continue-In-Service limit of 10 cycles is permitted for one crack 0.25 in. (6.35 mm) in length.

(c) Nicks, marks, and scratches

1) There is no limit to the number of nicks, marks, and scratches which are permitted with these conditions:

a) Not more than 1.0 in. (25.4 mm) in length

b) Not more than 0.02 in. (0.51 mm) in depth, after you remove the high metal

c) Minimum separation of 1.0 in. (25.4 mm) between areas of damage.

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(d) Cracks in the rubber damper

1) Any amount is permitted.

SUBTASK 72-20-00-410-001-F00

(3) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

——— END OF TASK ———

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FAN AND BOOSTER ASSEMBLY - MAINTENANCE PRACTICES

1. General

A. This procedure gives the data to lubricate the fan rotor blades and the fan disk.

B. This procedure will decrease the wear on the fan blade and/or fan disk. It can also decrease the engine vibration, which occurs when the fan blades become seized in the disk.

C. The lubricated fan disk and fan blades will also increase the service life of these components.

TASK 72-21-00-640-801-F00

2. Fan Rotor Blades and Fan Disk Lubrication

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This procedure gives the data to lubricate the fan rotor blades and the fan disk.

(2) The fan and booster assembly is aft of the inlet cowl.

B. References

Reference	Title
70-10-05-600-801-F00	Application Of Molybdenum Disulfide And Other Lubricants Dispersed In An Inorganic Binder And Non-Flammable Solvent - Maintenance Practices (P/B 201)
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
G50766 [CP2240]	Sheet - Abrasive Sheet For Cleaning Up And Finishing, Scotch-Brite Type A CFS	CFM CP2240

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare For the Procedure

SUBTASK 72-21-00-865-001-F00

(1) For engine 1, do this step:

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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SUBTASK 72-21-00-865-002-F00

(2) For engine 2, do this step:

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-00-860-001-F00

(3) Make sure the start levers are in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

SUBTASK 72-21-00-490-001-F00

(4) Install a protective mat, STD-585 in the inlet cowl.

SUBTASK 72-21-00-010-001-F00

(5) Do this task, Spinner Cones Removal, TASK 72-21-01-000-801-F00.

SUBTASK 72-21-00-020-001-F00

(6) Do this task, Fan Blade Removal (Complete Set), TASK 72-21-02-000-801-F00.

G. Procedure

SUBTASK 72-21-00-110-001-F00

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

CAUTION: KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(1) Clean all dirt and unwanted material from the fan blade roots, fan disk dovetail slots and shims. Use a clean cloth soaked with alcohol, B00676 [CP1041].

(a) If it is necessary, a soft bristle brush or dry Scotch-Brite Type A CFS Sheet, G50766 [CP2240] can be used to remove dirt build-up.

SUBTASK 72-21-00-640-001-F00

(2) Lubricate the items that follow (TASK 70-10-05-600-801-F00):

NOTE: Make sure to use the reference, too much lubricant can cause high vibration or fumes in the cabin.

(a) Lubricate the mating faces of the fan blade spacer.

(b) Lubricate the threaded pins on the fan disk, booster spool and retaining flange.

(c) Lubricate the dovetail slots (pressure faces) of the fan disk.

(d) Lubricate the aft face of the shank of each fan blade.

(e) Lubricate the roots (Dovetails) of each blade.

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AKS ALL POST CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

(f) Lubricate the shims.

AKS ALL

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-00-420-001-F00

(1) Do this task, Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-00-410-001-F00

(2) Do this task, Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-21-00-490-002-F00

CAUTION: MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(3) Remove the protective mat, STD-585 from the lower surface of the inlet cowl.

SUBTASK 72-21-00-860-002-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-00-860-003-F00

(5) Remove the DO-NOT-OPERATE tag from the start lever for the applicable engine.

END OF TASK

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Fan Rotor Blade and Fan Disk Lubrication
Figure 201/72-21-00-990-803-F00 (Sheet 1 of 4)

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Fan Rotor Blade and Fan Disk Lubrication
Figure 201/72-21-00-990-803-F00 (Sheet 2 of 4)

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THREADED PINS

G

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Fan Rotor Blade and Fan Disk Lubrication
Figure 201/72-21-00-990-803-F00 (Sheet 3 of 4)

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H

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Fan Rotor Blade and Fan Disk Lubrication
Figure 201/72-21-00-990-803-F00 (Sheet 4 of 4)

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FAN AND BOOSTER ASSEMBLY - INSPECTION/CHECK

1. General
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has these tasks:
      (1) A general visual inspection of the power plant inlet and fan blades
      (2) A detailed inspection of the engine inlet and fan blades.

TASK 72-21-00-200-801-F00

2. Power Plant Inlet and Fan Blades Inspection (General Visual)

A. General

(1) This task provides the instructions on how to do the general visual inspection of the power plant inlet and the fan blades.

B. Location Zones

Zone	Area
412	Engine 1 - Nose Inlet Cowl
422	Engine 2 - Nose Inlet Cowl

C. Power Plant Inlet and Fan Blades Inspection

SUBTASK 72-21-00-210-007-F00

(1) Do a visual check of these components for obvious signs of damage, and indications of birdstrike or foreign object damage (FOD):

NOTE: It is not necessary to enter the inlet cowl to do this check.

(a) Inlet cowl inner surfaces
(b) Spinner
(c) Fan blades
(d) Abradable shroud
(e) Inlet to the gas generator (primary gas path)
(f) Inner fan case (visible areas)

SUBTASK 72-21-00-810-001-F00

(2) If you find indications of birdstrike or FOD, do the applicable fault isolation procedure in the FIM.

SUBTASK 72-21-00-220-005-F00

(3) If you find other damage, compare the damage to the limits in the applicable detailed inspection procedure for that component.

END OF TASK

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Power Plant Inlet and Fan Blades Inspection
Figure 601/72-21-00-990-804-F00

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TASK 72-21-00-220-801-F00

3. **Engine Inlet and Fan Blades Inspection (Detail)**
(Figure 602, Figure 603)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task is a scheduled maintenance task which examines the inside of the engine inlet.

(2) The visual check is for the two part spinner, fan blades, and inside surfaces of the fan inlet case and related components.

B. References

Reference	Title
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-01-200-801-F00	Spinner Cone and Retaining Flange Inspection (P/B 601)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-02-000-802-F00	Fan Blade Replacement (Blade Pair) (P/B 401)
72-21-02-200-801-F00	Fan Module Inspection (P/B 601)
72-24-01-200-801-F00	Fan Inlet Case Inspection (Detail) (P/B 601)
72-24-02-200-801-F00	Abradable Shroud (Detail) Inspection (P/B 601)
72-24-02-200-802-F00	Local Recondition of the Abradable Shroud (P/B 801)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For the Inspection

SUBTASK 72-21-00-040-001-F00

(1) For engine 1, do this step:

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-00-040-004-F00

(2) For engine 2, do this step:

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-00-040-002-F00

(3) Make sure the start levers are in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

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SUBTASK 72-21-00-480-001-F00

CAUTION: MAKE SURE YOU INSTALL THE PROTECTIVE MATS IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(4) Install a protective mat, STD-585 in the inlet cowl.

F. Visually Examine the Spinner Front Cone

SUBTASK 72-21-00-210-002-F00

(1) Examine the exposed area of the spinner front cone for damage (TASK 72-21-01-200-801-F00).

SUBTASK 72-21-00-210-010-F00

(2) If you find damage to the spinner front cone that is more than the limits, replace the spinner front cone, unless you are given other instructions.

These are the tasks:

Spinner Cones Removal, TASK 72-21-01-000-801-F00,

Spinner Cones Installation, TASK 72-21-01-400-801-F00.

G. Visually Examine the Spinner Rear Cone

SUBTASK 72-21-00-210-004-F00

(1) Examine the exposed areas of the spinner rear cone for damage (TASK 72-21-01-200-801-F00).

SUBTASK 72-21-00-210-011-F00

(2) If you find damage to the spinner rear cone that is more than the limits, replace the spinner rear cone, unless you are given other instructions.

These are the tasks:

Spinner Cones Removal, TASK 72-21-01-000-801-F00,

Spinner Cones Installation, TASK 72-21-01-400-801-F00.

H. Visually Examine the Fan Blades

SUBTASK 72-21-00-220-002-F00

WARNING: MAKE SURE YOU WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES, YOU CAN INJURE YOUR HANDS.

(1) Do a visual check of the exposed areas of the fan blades (TASK 72-21-02-200-801-F00).

SUBTASK 72-21-00-210-012-F00

(2) If you find damage to the fan blade that is more than the limits, replace the fan blade, unless you are given other instructions. To replace it, do this task: Fan Blade Replacement (Blade Pair), TASK 72-21-02-000-802-F00.

I. Visually Examine the Abradable Shroud

SUBTASK 72-21-00-210-008-F00

(1) Do a visual check of the abradable shroud for damage (TASK 72-24-02-200-801-F00).

SUBTASK 72-21-00-300-001-F00

(2) If you find damage that is more than these limits, do this task: Local Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00, unless you are given other instructions.

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J. Visually Examine the Fan Inlet Case

SUBTASK 72-21-00-210-009-F00

(1) Do a visual check of the exposed areas of the fan inlet case for damage (TASK 72-24-01-200-801-F00).

K. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-00-080-001-F00

WARNING: MAKE SURE THAT YOU REMOVE ALL TOOLS, PARTS OR UNWANTED MATERIAL FROM THE INLET COWL. THIS WILL PREVENT INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Remove the protective mat, STD-585 from the inlet cowl.

SUBTASK 72-21-00-080-002-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable engine start lever.

SUBTASK 72-21-00-040-005-F00

(3) For engine 1, do this step:

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-00-040-003-F00

(4) For engine 2, do this step:

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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Spinner and Fan Blade Inspection
Figure 602/72-21-00-990-801-F00

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Engine Inlet Inspection
Figure 603/72-21-00-990-802-F00

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SPINNER CONES - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of the spinner cones from the fan disk.

(a) This task includes a procedure to remove the retaining flange from the spinner rear cone (if necessary).

(2) The installation of the spinner cones.

(a) This task includes a procedure to install the retaining flange on the fan disk (if necessary).

TASK 72-21-01-000-801-F00

2. Spinner Cones Removal

(Figure 401)

A. General

(1) The spinner cone is made of two parts:

(a) The spinner front cone.

(b) The spinner rear cone.

(2) For this task, the spinner front cone will be referred to as the front cone.

(3) For this task, the spinner rear cone will be referred to as the rear cone.

(4) As part of the AMM validation program, this procedure has been validated at a customer site for the Jun-15-2012 revision.

B. References

Reference	Title
70-10-03-910-801-F00	Temporary Marking Procedures (P/B 201)
72-55-00-941-801-F00	Replacement of the LPT Shaft Plug O-ring (P/B 201)
72-55-00-941-802-F00	Replacement of the CVT O-ring and Damper Seals (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2188	Tool Set - Jack Screws Part #: 856A1130G10 Supplier: 58828
SPL-2190	Pins - Guide, Spinner Rear Cone Part #: 856A3778G01 Supplier: 58828
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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E. Prepare for the Removal

SUBTASK 72-21-01-040-001-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-01-040-002-F00

(2) Make sure the engine start lever is in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable engine start lever.

SUBTASK 72-21-01-480-001-F00

(3) Put a protective mat, STD-585 in the inlet cowl.

F. Spinner Cone Removal

SUBTASK 72-21-01-020-001-F00

(1) Do these steps to remove the front cone [1] from the rear cone [4]:

(a) Remove the six bolts [2] and the six washers [3].

(b) Install three jackscrews, tool set, SPL-2188, into the jackscrew holes.

NOTE: There are nine holes on the front cone [1]. Six holes are used to attach the front cone to the rear cone [4]. The other three holes with jackscrews are used to disengage the front cone away from the rear cone.

(c) Turn the jackscrews until they touch the front flange of the rear cone [4].

(d) Tighten the jackscrews in a sequence order to disengage the front cone [1] from the rear cone [4].

(e) Remove the front cone [1].

(f) Remove the jackscrews from the front cone [1].

NOTE: If you find that the lug of the LPT shaft plug (Pre SB 72–0124) or center vent tube (Post SB 72–0124) is broken (Figure 402), remove the pieces. Replace the LPT shaft plug or the center vent tube at the next shop visit.

SUBTASK 72-21-01-020-002-F00

(2) Do these steps to remove the rear cone [4] and the fan retaining flange [7] as an assembly:

CAUTION: BE CAREFUL NOT TO DAMAGE THE FAN BLADES WHILE YOU REMOVE THE BALANCE SCREWS. DAMAGE TO EQUIPMENT COULD OCCUR.

(a) If you replace the rear cone [4], transfer the balance screws [8] to the replacement rear cone. Keep the same positions.

CAUTION: USE ONE OF THE MARKERS THAT ARE LISTED IN THE REFERENCE. AN INCORRECT MARKER CAN CAUSE DAMAGE TO EQUIPMENT.

1) Make marks to show the relation between the rear cone balance screws [8] and the fan disk (TASK 70-10-03-910-801-F00).

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(b) Remove the twelve bolts [5], the twelve washers [6] that attach the rear cone [4] and the fan retaining flange [7] to the fan disk.

NOTE: If it is necessary, you can remove the balance screws [8] to get access to the bolts [5]. Make sure that you make a mark and record the position of the balance screws for installation in their correct position. This is necessary to keep the rotor balanced.

CAUTION: MAKE SURE THAT YOU HOLD THE REAR CONE AND THE RETAINING FLANGE WHEN YOU DISCONNECT THEM FROM THE FAN DISK. IF YOU DO NOT HOLD THEM, THEY COULD FALL AND CAUSE DAMAGE TO EQUIPMENT.

(c) Install three guide pins, SPL-2190 in the fan disk as the support to guide the rear cone [4] and the fan retaining flange [7] during the removal.

NOTE: This is to make sure the fan retaining flange does not fall.

CAUTION: DO NOT USE JACKSCREWS IF IT IS NOT NECESSARY TO REMOVE THE FAN RETAINING FLANGE FROM THE SPINNER CONE. DAMAGE TO EQUIPMENT COULD OCCUR.

(d) Pull with your hand the rear cone [4] and the fan retaining flange [7] to remove them as an assembly.

NOTE: If you find that the lug of the LPT shaft plug or center vent tube is broken (Figure 402), remove the pieces. Replace the LPT shaft plug or the center vent tube at the next shop visit.

SUBTASK 72-21-01-020-006-F00

(3) If it is necessary, do these steps to remove the fan retaining flange [7] from the rear cone [4]:

(a) Install the three jackscrews, tool set, SPL-2188, equally spaced into the jackscrew holes on the rear flange of the rear cone [4].

(b) Turn the jackscrews until they touch the front flange of the fan retaining flange.

(c) Tighten the jackscrews in a clockwise direction and in a sequence order to disengage the retaining flange from the rear cone.

(d) Remove the fan retaining flange [7].

(e) Remove the jackscrews from the rear cone.

G. OIL WETTING SPINNER CONES

SUBTASK 72-21-01-360-001-F00

(1) Oil wetting of the inner surface of the spinner cones, the fan disk and the fan shaft is not permitted.

(a) To correct the oil seepage, do this task: Replacement of the LPT Shaft Plug O-ring, TASK 72-55-00-941-801-F00 or Replacement of the CVT O-ring and Damper Seals, TASK 72-55-00-941-802-F00.

END OF TASK

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Spinner Installation
Figure 401/72-21-01-990-801-F00 (Sheet 1 of 3)

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Spinner Installation
Figure 401/72-21-01-990-801-F00 (Sheet 2 of 3)

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1 THE SEATING AT THE 12 LOCATION (2X6) IS CORRECT WHEN YOU CANNOT PUT A FEELER GAGE [THICKNESS 0.001 INCH (0.02 mm)] BETWEEN PARTS.

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Spinner Installation
Figure 401/72-21-01-990-801-F00 (Sheet 3 of 3)

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Inspection of the Lug of LPT Shaft Plug or Center Vent Tube
Figure 402/72-21-01-990-803-F00

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TASK 72-21-01-400-801-F00

3. Spinner Cones Installation
(Figure 401)

A. General

(1) For this task, the spinner front cone will be referred to as the front cone.

(2) For this task, the spinner rear cone will be referred to as the rear cone.

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2190	Pins - Guide, Spinner Rear Cone Part #: 856A3778G01 Supplier: 58828
SPL-9286	Pins - Guide, Spinner Cone Part #: 856A3409G01 Supplier: 58828
STD-442	Gun - Heat, 180° F (82° C) Maximum Output Temperature
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G	CFM CP2104
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	
D00673 [CP2569]	Lubricant - Molybdenum Disulfide, Solid - Dow Corning G-n Metal Assembly	CFM CP2569

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Installation

SUBTASK 72-21-01-410-001-F00

(1) Make sure the retaining ring [9] is in its position on the fan disk.

F. Spinner Cones Installation

SUBTASK 72-21-01-420-001-F00

(1) If the fan retaining flange [7] was removed from the rear cone [4], do these steps to install the fan retaining flange [7] and then, the rear cone [4]:

(a) Do these steps to install the fan retaining flange [7] on the fan disk:

1) Lubricate three guide pins guide pins, SPL-2190 with oil, D00599 [CP2442].

2) Install the three guide pins, SPL-2190, equally spaced on the fan disk with one guide pin in the offset hole.

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3) Lubricate the locating threaded pins on the aft side of the fan retaining flange [7] with Molykote G lubricant, D00640 [CP2104], Dow Corning G-n Metal Assembly lubricant, D00673 [CP2569] or Dow Corning 321 lubricant, D00641 [CP5062].

4) Install the fan retaining flange [7] on the fan disk:

NOTE: If some platforms have disengaged bushings and the fan retaining flange [7] moves forward after the fan retaining flange installation, there can be an acceptable clearance between the aft flange of the fan retaining flange [7] and the front face of the fan disk forward flange before you apply the final torque.

a) Align the offset hole of the fan retaining flange [7] with the offset guide pin.

NOTE: The offset hole of the fan retaining flange [7] is identified with a spherical indentation on the surface.

b) Fully engage the fan retaining flange [7] on the fan disk forward flange and the locating pins in the platform holes.

(b) Do these steps to install the rear cone [4]:

CAUTION: MAKE SURE THE FAN RETAINING FLANGE [7] IS INSTALLED ON THE FAN DISK. DAMAGE TO ENGINE PARTS COULD OCCUR.

1) Lightly lubricate the threads of the 12 bolts [5] with graphite compound, D00601 [CP2101].

WARNING: MAKE SURE THAT YOU WEAR GLOVES WHEN YOU HANDLE THE REAR CONE. THE AFT FLANGE OF THE REAR CONE WILL BE HOT WHEN YOU INCREASE THE TEMPERATURE OF THE AFT FLANGE FOR THE INSTALLATION. INJURY CAN OCCUR.

2) Increase the temperature of the aft flange of the rear cone [4] to approximately 140°F (60°C) with a 180° F (82° C) maximum output temperature heat gun, STD-442.

NOTE: Use a Thermocouple Contact Probe to make sure you increase the temperature of the aft flange of the rear cone [4] to the correct temperature.

3) Align the offset hole of the rear cone [4] with the offset guide pin.

NOTE: The offset hole of the fan retaining flange [7] is identified with a spherical indentation on the surface.

4) Engage the rear cone [4] on the fan retaining flange [7].

5) Install the nine bolts [5] and washers [6] and tighten by hand until the rear cone [4] is fully engaged on the fan retaining flange [7].

a) Make sure that all the bolts [5] go through the flanges of the fan disk, the rear cone [4] and the fan retaining flange [7].

6) Let the rear cone [4] cool to ambient temperature.

7) Remove the three guide pins, SPL-2190.

8) Install the three remaining bolts [5] and washers [6]

a) Cross-tighten the bolts [5] to 142.5-157.5 pound-inches (16.2-17.9 Newton meters).

(c) Do the clearance check for the correct installation of the rear cone [4] and retaining flange [7] that follows:

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SUBTASK 72-21-01-420-004-F00

(2) If the fan retaining flange [7] is assembled with the rear cone [4], do these steps to install the rear cone [4] and fan retaining flange [7] on the fan disk:

(a) Lubricate three guide pins, SPL-2190 with oil, D00599 [CP2442].

(b) Install the three guide pins, SPL-2190, equally spaced on the fan disk with one guide pin in the offset hole.

(c) Lubricate the locating threaded pins on the aft side of the fan retaining flange [7] with Molykote G lubricant, D00640 [CP2104], Dow Corning G-n Metal Assembly lubricant, D00673 [CP2569] or Dow Corning 321 lubricant, D00641 [CP5062].

(d) Lubricate the threads of the bolts [5] with graphite compound, D00601 [CP2101].

(e) Align the offset hole of the rear cone [4] with the offset guide pin.

(f) Install the rear cone [4] and the fan retaining flange [7] assembly to the forward flange of the fan disk:

NOTE: If some platforms have disengaged bushings and the fan retaining flange [7] moves forward after the fan retaining flange installation, there is an acceptable clearance between the aft flange of the fan retaining flange [7] and the front face of the fan disk forward flange.

1) Engage the locating pins of the fan retaining flange [7] into the front holes of the inter fan blade platforms and the scallops of the fan retaining flange [7] into the scallops of the retaining ring [9].

2) Equally space and then install the three bolts [5] and three washers [6] through the fan retaining flange [7] and through the rear cone [4] into the fan disk.

3) Cross-tighten the bolts [5] to 142.5-157.5 inch-pounds (16.2-17.9 newton-meters).

4) Remove the three guide pins, SPL-2190.

5) Install the remaining nine bolts [5] and washers [6] through the fan retaining flange [7] and through the rear cone [4] into the fan disk.

6) Cross-tighten the bolts [5] to 142.5-157.5 inch-pounds (16.2-17.9 newton-meters).

(g) Do the clearance check for the correct installation of the rear cone [4] and retaining flange [7] that follows:

SUBTASK 72-21-01-211-003-F00

CAUTION: MAKE SURE THAT THE CLEARANCE BETWEEN THE REAR CONE AND THE FAN RETAINING FLANGE IS CORRECT. THE INCORRECT CLEARANCE CAN CAUSE DAMAGE TO THE EQUIPMENT.

(3) Do this clearance check for the correct installation of the rear cone [4] and retaining flange [7]:

(a) Examine, at six locations with a feeler gage, the clearance between the aft edge of the rear cone [4] and the inter-fan blade platforms:

NOTE: You must do a check of this clearance with the fan blade pulled on its forward stop.

1) The clearance must be in 0-0.0433 inch (0-1.1 mm).

(b) Make sure at six locations, that there is no clearance between the aft flange of the rear cone [4] and the forward flange of the fan retaining flange [7].

1) The installation is correct if you cannot put a 0.001 inch (0.02 millimeter) feeler gage at six different locations.

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2) If the clearance is not correct, make sure the bolts [5] are tightened to the correct torque.

(c) Make sure at six locations, that there is no clearance between the aft flange of the fan retaining flange [7] and the forward flange of the fan disk.

1) The installation is satisfactory if you cannot put a 0.001 inch (0.02 millimeter) feeler gage at six locations.

2) If the clearance is not correct, make sure that the bolts [5] are tightened to the correct torque.

3) If the clearance is not correct, remove the rear cone [4] and the fan retaining flange [7], and find the cause of the problem. Reinstall the rear cone and retaining flange.

SUBTASK 72-21-01-410-005-F00

(4) If you removed some of the balance screws [8] from the rear cone [4], install the balance screws in their correct positions.

(a) Lightly coat the balance screws [8] with Dow Corning 321 lubricant, D00641 [CP5062].

(b) Tighten the balance screws [8] to 68-74 inch-pounds (7.6-8.4 newton-meters).

SUBTASK 72-21-01-420-002-F00

(5) Do these steps to install the front cone [1] (Figure 401):

(a) Install the front cone [1]:

1) Lubricate three guide pins, SPL-9286 with oil, D00599 [CP2442].

2) Install the three guide pins, SPL-9286, equally spaced on the front flange of the rear cone [4] with one guide pin in the offset hole.

NOTE: The offset hole of the rear cone [4] is identified with a spherical indentation on its forward mounting flange.

WARNING: MAKE SURE YOU WEAR GLOVES WHEN YOU HANDLE THE FRONT CONE. YOU COULD COME IN CONTACT WITH THE HOT FRONT FLANGE OF THE REAR CONE WHEN YOU INCREASE THE TEMPERATURE FOR THE INSTALLATION. INJURY CAN OCCUR.

3) Increase the temperature of the forward flange of the rear cone [4] to approximately 140°F (60°C) with a heat 180° F (82° C) maximum output temperature heat gun, STD-442.

NOTE: Use a Thermocouple Contact Probe to make sure that you increase the temperature of the aft flange to reach correct temperature.

4) Align the offset hole of the front cone [1] with the offset guide pin.

5) With the use of the guide pins, engage the front cone [1] to the rear cone [4].

6) Lubricate the threads of the bolts [2] with graphite compound, D00601 [CP2101].

7) Equally space and then install the three bolts [2] and three washers [3] through the front cone [1] into the rear cone [4].

a) Hand tighten the bolts [2] until the front cone [1] is fully engaged.

8) Let the temperature of the front cone [1] decrease to the ambient temperature.

9) Remove the guide pins, SPL-9286 from the rear cone [4].

10) Install the remaining three bolts [2] and three washers [3].

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a) Cross-tighten the six bolts [2] to 110-120 pound-inches (12.4-13.6 Newton meters).

NOTE: Appearance of a gap between the front spinner cone and rear spinner cone seating surfaces may be the result of the chamfer added to the rear spinner cone at manufacturing.

(b) Make sure that the front cone [1] is fully engaged on the rear cone [4]:

1) If the front cone [1] is not fully engaged, make sure the bolts [2] are tightened to the correct torque.

a) If the front cone [1] is not fully engaged and the bolts [2] are tight, remove the front cone [1] and find the cause of the problem.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-01-840-003-F00

CAUTION: MAKE SURE THAT ALL TOOLS, PARTS, AND UNWANTED MATERIAL ARE REMOVED FROM THE INLET COWL. DAMAGE TO THE ENGINE COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(1) Remove the protective mat, STD-585 from the lower surface of the inlet cowl.

SUBTASK 72-21-01-440-001-F00

(2) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-01-080-001-F00

(3) Remove the DO-NOT-OPERATE tag from the start lever for the applicable engine.

——— END OF TASK ———

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SPINNER CONE - INSPECTION/CHECK

1. General

A. This procedure has these tasks:

(1) The inspection of the spinner cone.

(2) The inspection of the retaining flange.

TASK 72-21-01-200-801-F00

2. Spinner Cone and Retaining Flange Inspection

(Figure 601)

A. General

(1) The spinner cone is an assembly of two parts (the spinner front cone and the spinner rear cone).

(2) During the removal of the spinner rear cone, the rear cone and fan retaining flange are removed as an assembly.

(3) This task includes an inspection of the fan retaining flange.

B. References

Reference	Title
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-01-300-801-F00	Replace or Retighten the Threaded Pins on the Fan Retaining Flange (P/B 801)
72-21-01-300-802-F00	Repair the Fan Retaining Flange Slots (P/B 801)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-01-900-801-F00	Fan Retaining Flange Replacement (P/B 801)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-200-801-F00	Fan Module Inspection (P/B 601)
72-21-02-300-804-F00	Replace or Retighten the Fan Disk Mid Lug Threaded Pins (P/B 801)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for Spinner Cone Inspection

SUBTASK 72-21-01-860-001-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-01-860-002-F00

(2) Make sure the start levers are in the CUTOFF position and install DO-NOT-OPERATE tags.

SUBTASK 72-21-01-480-002-F00

CAUTION: MAKE SURE YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(3) Install a protective mat, STD-585 in the fan inlet cowl.

SUBTASK 72-21-01-020-003-F00

(4) It is necessary to remove the spinner front and rear cones to fully examine the spinner cones.

(a) Do this task: Spinner Cones Removal, TASK 72-21-01-000-801-F00.

F. Examine the Spinner Front Cone

SUBTASK 72-21-01-210-002-F00

(1) Do a visual check of the spinner front cone for damage as follows (Figure 601):

NOTE: If you find damage that is more than the limits, replace the spinner front cone, unless you are given other instructions.

(a) Cracks, tears and local distortion

1) Not serviceable.

(b) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.02 inch (0.5 mm) in depth after you remove the high metal.

b) A Continue-In-Service of 100 cycles or 150 hours is permitted if the damage is more than 0.02 inch (0.5 mm) in depth

(c) Missing white spiral-shaped mark (white anti-erosion paint)

1) 100 percent of missing white anti-erosion paint is permitted.

(d) Missing anodized coating (black sulfuric anodizing) or black anti-erosion paint

1) 100 percent of missing coating or black anti-erosion paint is permitted if no corrosion mark is seen (white mushroom pattern).

2) A Continue-In-Service of 100 cycles or 150 hours is permitted if corrosion mark is seen.

(e) Erosion of parent material on the external contour surface

1) Erosion is permitted with these limits:

a) Not more than 0.02 inch (0.5 mm) in depth.

b) A Continue-In-Service of 100 cycles or 150 hours is permitted if the damage is more than 0.02 inch (0.5 mm) in depth.

(f) Erosion of parent material on the attachment bolt holes and jackscrew hole recess edges

1) Erosion is permitted without limit.

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SUBTASK 72-21-01-210-007-F00

(2) Do a visual check of the mating surface (Surface B) and the rabbet diameter (Diameter A) that mate with the spinner rear cone for damage as follows:

(a) Nicks, dents, scratches and corrosion marks

1) All damage is permitted with these limits:

a) Not more than 0.004 inch (0.10 mm) in depth after you remove the high metal.

b) A Continue-In-Service of 100 cycles or 150 hours is permitted if the damage is more than 0.004 inch (0.10 mm) in depth.

(b) Wear on the rabbet diameter (Diameter A)

1) Wear is permitted without limit.

SUBTASK 72-21-01-210-008-F00

(3) Do a visual check of the thread inserts (three equally spaced jackscrew holes) for damage that follows:

(a) Missing or loose thread insert

1) Not permitted.

(b) Damaged internal thread

1) Not permitted.

SUBTASK 72-21-01-210-014-F00

(4) Do a visual check of spinner front cone inner cavity for oil wetting:

(a) If there are signs of oil wetting, examine the fan disk and fan shaft inner cavity for oil wetting (TASK 72-21-02-200-801-F00).

G. Examine the Spinner Rear Cone

SUBTASK 72-21-01-210-003-F00

(1) Do a visual check of the spinner rear cone for damage as follows (Figure 601) :

NOTE: If you find damage that is more than the limits, replace the spinner rear cone, unless you are given other instructions.

(a) Cracks, tears and local distortion

1) Not permitted.

(b) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.01 inch (0.25 mm) in depth after you remove the high metal.

b) A Continue-In-Service of 100 cycles or 150 hours is permitted if the damage is more than 0.01 inch (0.25 mm) in depth.

(c) Damage of surface protection (yellow hard anodizing)

1) 100 percent of missing coating is permitted if no corrosion mark is seen (white mushroom pattern).

a) A Continue-In-Service of 100 cycles or 150 hours is permitted if corrosion mark is seen.

SUBTASK 72-21-01-210-009-F00

(2) Do a visual check of the mating surface (Surface E) and the rabbet diameter (Diameter C) that mate with the spinner front cone for damage as follows:

(a) Nicks, dents, scratches and corrosion marks

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1) All damage is permitted with these limits:
   a) Not more than 0.004 inch (0.10 mm) in depth after you remove the high metal
   b) A Continue-In-Service of 100 cycles or 150 hours is permitted if the damage is more than 0.004 inch (0.10 mm) in depth.

(b) Wear on the rabbet diameter (Diameter C)
   1) Wear is permitted without limit.

(c) Contact marks on three equally spaced spot facings on mating surface (Surface E) front cone extraction screw galling
   1) Contact marks are permitted without limit.

SUBTASK 72-21-01-210-010-F00

(3) Do a visual check of the mating surface (Surface B) and the rabbet diameter (Diameter A) that mate with the fan disk for damage as follows:

(a) Nicks, dents, scratches and corrosion marks
   1) All damage is permitted with these limits:
      a) Not more than 0.004 inch (0.10 mm) in depth after you remove the high metal
      b) A Continue-In-Service of 100 cycles or 150 hours is permitted if the damage is more than 0.004 inch (0.10 mm) in depth.

(b) Wear on the rabbet diameter (Diameter A)
   1) Wear is permitted with this limit:
      a) Not more than 0.004 inch (0.10 mm) in depth after you remove the high metal.
      b) A continue-in-service of 100 cycles or 150 hours is permitted if the damage is more than 0.004 inch (0.10 mm) in depth.

(c) Damaged jackscrew hole internal threads
   1) All damage is permitted with these limits:
      a) A maximum of three damaged jackscrew holes is permitted with a minimum of one serviceable hole between the two damaged holes.

SUBTASK 72-21-01-210-004-F00

(4) Do a visual check of crimped self-locking nuts (Type A) for damage as follows:

(a) Missing self-locking nut
   1) Not permitted.

(b) Loose self-locking nut
   1) Looseness is permitted with this limit
      a) Not more than 0.008 inch (0.2 mm) of axial and/or radial looseness.

(c) Damaged internal threads
   1) Not permitted.

(d) Loss of run-on torque
   1) Not permitted.

SUBTASK 72-21-01-210-005-F00

(5) Do a visual check of the crimped self-locking nuts (Type B) for damage as follows:

NOTE: Do not remove the balance screws from the rear spinner cone to do this procedure.

(a) Missing self-locking nuts

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1) Not permitted.

(b) Loose self-locking nut

1) Looseness is permitted with this limit:

a) Not more than 0.008 inch (0.2 mm) of axial and/or radial looseness.

(c) Damaged internal threads (if balance screws are removed)

1) Not permitted.

(d) Loss of run-on torque (if balance screws are removed)

1) Not permitted.

SUBTASK 72-21-01-210-011-F00

(6) Do a visual check of the rear cone aft end surface (Surface D) for damage follows:

(a) Contact marks because of fan blade platform axial displacement

1) Contact marks are permitted without limit.

(b) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.02 inch (0.5 mm) in depth after you remove the high metal.

b) A Continue-In-Service of 100 cycles or 150 hours is permitted if the damage is more than 0.02 inch (0.5 mm) in depth.

SUBTASK 72-21-01-210-015-F00

(7) Do a visual check of spinner rear cone inner cavity for oil wetting:

(a) If there are signs of oil wetting, examine the fan disk and fan shaft inner cavity for oil wetting (TASK 72-21-02-200-801-F00):

H. Examine the Retaining Flange

SUBTASK 72-21-01-211-001-F00

(1) Examine the retaining flange for damage (Figure 602):

NOTE: If you find damage to the retaining flange that is more than the limits, replace the retaining flange (TASK 72-21-01-900-801-F00), unless you are given other instructions.

Do not remove the threaded pins from retaining flange to do this inspection.

(a) Cracks

1) Not serviceable

(b) Nicks, dents and scratches (except in Areas H, I, J, Q, locating diameters and mating surfaces)

1) All damage is permitted with this limit:

a) The damage is not more than 0.006 inch (0.15 mm) in depth.

(c) Nicks, dents and scratches on the surfaces E, F and G and locating diameters K and M

1) All damage is permitted with this limit:

a) The damage is not more than 0.006 inch (0.15 mm) in depth.

(d) Wear or contact marks due to bolt head galling in area J (extraction screw spot facings)

1) All damage is permitted with this limit:

a) Not more than 0.008 inch (0.2 mm) in depth.

(e) Wear on surface E due to contact with the platform bushings

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1) All damage is permitted with these limits:
   a) The damage is not more than 0.004 inch (0.10 mm) in depth.
   b) A 3000 flight cycles or 5000 flight hours, whichever comes first, continue in-service extension is permitted if the damage is not more than 0.006 inch (0.15 mm) in depth.
   c) A 100 flight cycles or 250 flight hours, whichever comes first, continue in-service extension is permitted if the damage is not more than 0.008 inch (0.20 mm) in depth.

(f) Look for damage in area Q (Slots)
1) Nicks and dents are permitted with these limits:
   a) The damage is not more than 0.002 inch (0.05 mm) in depth.
   b) A 3000 flight cycles or 5000 flight hours, whichever comes first, continue in-service extension is permitted if the damage is not more than 0.004 inch (0.10 mm) in depth.
   c) A 100 flight cycles or 250 flight hours, whichever comes first, continue in-service extension is permitted if the damage is not more than 0.008 inch (0.20 mm) in depth.
2) Scratches are permitted with these limits:
   a) The damage is not more than 0.0008 inch (0.02 mm) in depth.
   b) A 3000 flight cycles or 5000 flight hours, whichever comes first,continue in-service extension is permitted if the damage is not more than 0.002 inch (0.05 mm) in depth.
   c) A 100 flight cycles or 250 flight hours, whichever comes first, continue in-service extension is permitted if the damage is not more than 0.003 inch (0.08 mm) in depth.

AKS ALL PRE CFM56-7B-72-0366

3) Wear in slot edge due to contact with the fan blade spacer in area Q
   a) The damage is not more than 0.002 inch (0.05 mm) in depth,
   b) Wear on the filet radius more than the above limit must be blended per TASK 72-21-01-300-802-F00.

AKS ALL

(g) Look for damage in area H
1) Nicks and dents are permitted with this limit:
   a) The damage is not more than 0.006 inch (0.15 mm) in depth.
2) Scratches are permitted with these limits:
   a) The damage is not more than 0.002 inch (0.05 mm) in depth.
   b) A 3000 flight cycles or 5000 flight hours, whichever comes first, continue in-service extension is permitted if the damage is not more than 0.004 inch (0.10 mm) in depth.
   c) A 100 flight cycles or 250 flight hours, whichever comes first, continue in-service extension is permitted if the damage is not more than 0.006 inch (0.15 mm) in depth.

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(h) Look for damage in area I

NOTE: Removal of the threaded pins and inspection of the attachment holes (dia. P) are to be performed only if the threaded pins are found loose or other condition indicates a requirement. Refer to the appropriate instructions to retighten the threaded pins (TASK 72-21-01-300-801-F00).

1) Nicks and dents are permitted with these limits:

a) The damage is not more than 0.0008 inch (0.02 mm) in depth.

b) A 3000 flight cycles or 5000 flight hours, whichever comes first, continue in-service extension is permitted if the damage is not more than 0.002 inch (0.05 mm) in depth.

c) A 100 flight cycles or 250 flight hours, whichever comes first, continue in-service extension is permitted if the damage is not more than 0.003 inch (0.08 mm) in depth.

2) Scratches:

a) Not serviceable.

b) A 100 flight cycles or 250 flight hours, whichever comes first, continue in-service extension is permitted if the damage is not more than 0.0008 inch (0.02 mm) in depth.

3) Thread marks or hole ovalization

a) Not serviceable.

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SUBTASK 72-21-01-210-016-F00

(2) Examine the axial stop pins for damage (Figure 604):

(a) Rubbing wear, rips, tears and missing pins

1) There is no limit of the quantity of missing pins and all damage is permitted

AKS ALL

SUBTASK 72-21-01-211-002-F00

(3) Examine the threaded pins for damage (Figure 603):

NOTE: Do not remove threaded pins from retaining flange to do this inspection.

If you find damage to the threaded pin that is more than the limits, replace the threaded pins, (TASK 72-21-01-300-801-F00), unless you are given other instructions.

(a) Examine the threaded pins for damage:

1) Cracks (head end)

a) Not serviceable

2) Nicks, dents and scratches on the pin diameter (threaded end)

a) All damage is permitted with these limits:

<1> Not more than 0.02 inch (0.50 mm) in depth after you remove the high metal.

(b) Missing threaded pins

1) Not Serviceable

2) Examine the holes in the fan retaining flange for obvious damage

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3) Remove and discard and the fan blade platforms. Refer to the tasks (TASK 72-21-02-000-801-F00 and TASK 72-21-02-400-801-F00).

4) Remove and discard the fan disk mid-flange threaded pins and nuts. Refer to the task, Replace or Retighten the Fan Disk Mid Lug Threaded Pins, TASK 72-21-02-300-804-F00

5) Replace the threaded pins and nuts. Refer to the task, Replace or Retighten the Threaded Pins on the Fan Retaining Flange, TASK 72-21-01-300-801-F00

(c) Loose threaded pins

1) Remove the loose threaded pins for a visual inspection:

a) If you find damage on the threaded pins, replace them (TASK 72-21-01-300-801-F00).

b) Examine the holes in the fan retaining flange for obvious damage

c) Examine the nuts for damage

(d) Incorrectly installed threaded pins (pin head points forward)

1) Remove and discard the threaded pins and nuts.

2) Remove and discard the fan blade platforms.

3) Remove and discard the fan disk mid-flange threaded pins and nuts

4) Remove the retaining flange, spinner rear cone and fan disk for a full piece part inspection (refer to applicable Engine Shop Manual).

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-01-420-003-F00

(1) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-21-01-080-002-F00

CAUTION: MAKE SURE YOU REMOVE ALL TOOLS, PARTS AND UNWANTED MATERIAL FROM THE INLET COWL. DAMAGE TO EQUIPMENT COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(2) Remove the protective mat, STD-585 from the fan inlet cowl.

SUBTASK 72-21-01-080-003-F00

(3) Remove the DO-NOT-OPERATE tag from the start levers.

SUBTASK 72-21-01-860-003-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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Spinner Cone Inspection
Figure 601/72-21-01-990-802-F00 (Sheet 1 of 2)

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Spinner Cone Inspection
Figure 601/72-21-01-990-802-F00 (Sheet 2 of 2)

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(EXAMPLE)

A

J67696 S0000173985_V2

Fan Retaining Flange Inspection
Figure 602/72-21-01-990-805-F00 (Sheet 1 of 2)

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(ELASTOMER AXIAL STOP PINS NOT SHOWN)

A-A

B-B

(ELASTOMER AXIAL STOP PINS NOT SHOWN)

C-C

J67511 S0000173990_V2

Fan Retaining Flange Inspection
Figure 602/72-21-01-990-805-F00 (Sheet 2 of 2)

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J67537 S0000173992_V2

Fan Retaining Flange Threaded Pin
Figure 603/72-21-01-990-806-F00

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J67559 S0000174113_V2

Fan Retaining Flange Axial Stop Pin
Figure 604/72-21-01-990-808-F00

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SPINNER CONES - REPAIR

1. General

A. This procedure contains these tasks:

(1) Replace the fan retaining flange

(2) Replace or retighten the threaded pins on the fan retaining flange

(3) Repair the Fan Retaining Flange Slots.

TASK 72-21-01-900-801-F00

2. Fan Retaining Flange Replacement

A. General

(1) Use this task to replace the fan retaining flange.

B. References

Reference	Title
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Replacement

SUBTASK 72-21-01-010-001-F00

(1) Remove the rear cone and the fan retaining flange as an assembly (TASK 72-21-01-000-801-F00).

E. Fan Retaining Flange Replacement

SUBTASK 72-21-01-020-005-F00

(1) Remove the fan retaining flange from the spinner rear cone (TASK 72-21-01-000-801-F00):

SUBTASK 72-21-01-010-002-F00

(2) Remove the 24 threaded pins from the fan retaining flange (TASK 72-21-01-300-801-F00):

AKS ALL POST SB CFM56-7B-72-325

SUBTASK 72-21-01-030-001-F00

(3) Remove the axial stop pins from the aft face of the fan retaining flange.

AKS ALL

SUBTASK 72-21-01-410-002-F00

(4) Install the 24 threaded pins on the new retaining flange (TASK 72-21-01-300-801-F00):

AKS ALL POST SB CFM56-7B-72-325

SUBTASK 72-21-01-430-001-F00

(5) Install the axial stop pins in the aft face of the new retaining flange.

(a) Do not mix the black and gray stop pins. Install the stop pins as a full set.

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AKS ALL POST SB CFM56-7B-72-325 (Continued)

1) PRE-CFM-SB 72-678 stop pins are black in color. POST-CFM-SB 72-678 stop pins are gray in color.

AKS ALL

SUBTASK 72-21-01-420-005-F00

(6) Install the fan retaining flange on the fan disk (TASK 72-21-01-400-801-F00).

F. Put the Airplane Back To Its Usual Condition

SUBTASK 72-21-01-410-008-F00

(1) Install the spinner rear and front cones (TASK 72-21-01-400-801-F00)

——— END OF TASK ———

TASK 72-21-01-300-801-F00

3. Replace or Retighten the Threaded Pins on the Fan Retaining Flange

A. General

(1) Use this procedure to replace or retighten applicable threaded pins on the fan retaining flange.

B. References

Reference	Title
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Procedure

SUBTASK 72-21-01-010-006-F00

(1) Remove the rear cone and the fan retaining flange as an assembly. Do this task: Spinner Cones Removal, TASK 72-21-01-000-801-F00.

F. Procedure

SUBTASK 72-21-01-020-007-F00

(1) Remove the threaded pin from the fan retaining flange (Figure 801):

(a) Install a standard wrench on the threaded pin head and loosen the threaded pin.

(b) Remove the threaded pin and nut.

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SUBTASK 72-21-01-110-002-F00

CAUTION: KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(2) Remove oil and grease with a clean white cloth moistened with acetone solvent, B01058 [CP1039] or alcohol, B00676 [CP1041] from the removed parts, attachment holes and surrounding area.

SUBTASK 72-21-01-420-006-F00

(3) Do these steps to install the threaded pin on the fan retaining flange:

(a) Apply a thin layer of graphite compound, D00601 [CP2101] to the threads and below the head of the threaded pin.

CAUTION: INSTALL THE THREADED PINS WITH THEIR HEAD REARWARD. IF YOU INSTALL THEM INCORRECTLY, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(b) Install the threaded pin with the head rearward on the fan retaining flange (Figure 801).

(c) Install the nut and tighten with your hand.

(d) Tighten the threaded pin with this sequence of steps:

1) Tighten the threaded pin to 140-160 inch-pounds (16-18 newton-meters).

2) Loosen the pin by a quarter-turn or a half-turn.

3) Retighten the pin to 140-160 inch-pounds (16-18 newton-meters).

(e) Remove any excess grease.

G. Put The Airplane Back To Its Usual Condition

SUBTASK 72-21-01-410-006-F00

(1) Install the fan retaining flange and spinner cones. Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

——— END OF TASK ———

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J67537 S0000173992_V2

Threaded Pin Installation
Figure 801/72-21-01-990-809-F00

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TASK 72-21-01-300-802-F00

4. Repair the Fan Retaining Flange Slots

(Figure 802)

A. General

(1) This task is to do a blend repair of the 24 slots in the fan retaining flange.

B. References

Reference	Title
70-40-01-910-801-F00	Fluorescent Penetrant Inspection (Water Washable) (P/B 201)
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G01043	Cloth - Lint-free	
G02449 [CP2189]	Cloth - Abrasive, Silicone Carbide, 150 Grit - Durite G422	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Procedure

SUBTASK 72-21-01-020-009-F00

(1) Remove the retaining flange. To remove the retaining flange, do this task: Spinner Cones Removal, TASK 72-21-01-000-801-F00

SUBTASK 72-21-01-030-002-F00

(2) Remove the 24 threaded pins from the fan retaining flange (TASK 72-21-01-300-801-F00):

AKS ALL POST SB CFM56-7B-72-325

SUBTASK 72-21-01-030-003-F00

(3) Remove the axial stop pins from the aft face of the fan retaining flange.

AKS ALL

F. Repair Procedure

SUBTASK 72-21-01-110-005-F00

CAUTION: KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(1) Clean the repair areas with lint-free cloth, G01043 wet with alcohol, B00676 [CP1041] or acetone solvent, B01058 [CP1039].

SUBTASK 72-21-01-120-001-F00

(2) Do these steps to remove the wear and contact marks from the slot corners:

NOTE: When the slot repair is necessary for one slot, you should also repair all of the 24 slots whatever their visual condition.

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WARNING: REMOVE THE TITANIUM PARTICLES WHILE YOU DO THE REPAIR. DO NOT LET TITANIUM PARTICLES COLLECT. TITANIUM PARTICLES CAN CAUSE A FIRE.

CAUTION: DO NOT CAUSE TOO MUCH HEAT DURING THE BLEND REPAIR. TOO MUCH HEAT CAN MAKE THE PART WEAK.

(a) Use a low speed power tool with the correct titanium grinding tool (CFMI CFM56 Standard Practices Manual 70-41-12).

(b) During the repair, make sure there are no changes to the retaining flange shape over the transition area and remove a minimum of the base metal along with the damage depth.

(c) If you use power tools during the repair, regularly touch the retaining flange with a bare hand.

1) If the flange is too hot to the touch, let it cool before you continue.

(d) Complete the repair with strips of Durite G422 cloth, G02449 [CP2189] grade 150 or 180 used dry (CFMI CFM56 SPM 70-41-11). The repair area should make a smooth transition into the surrounding area.

(e) Finish the repair with strips Durite G422 cloth, G02449 [CP2189] grade 400 or 800 used dry to get a surface finish as close to the original surface finish.

(f) Visually examine the repair area and make sure the damage is removed. Sharp grooves are not permitted.

SUBTASK 72-21-01-211-004-F00

(3) Examine the repair area for the correct dimensions (Table 801) and make sure the surface finish is at least the same as the adjacent area.

Table 801/72-21-01-993-802-F00 Repair Dimensions

DESCRIPTION	MINIMUM FINISH DIMENSION	MAXIMUM FINISH DIMENSION
DIMENSION K	0.002 inch (0.05 mm)	0.051 inch (1.29 mm)
RADIUS R1		0.335 inch (8.5 mm)
RADIUS R2		0.008 inch (0.2 mm)
DIMENSION P		0.020 inch (0.5 mm)
DIMENSION H		0.020 inch (0.5 mm)

(a) If the dimensions or the surface finish of the repair area is not in the limits, do the blend repair again.

SUBTASK 72-21-01-110-006-F00

(4) Clean the repair areas with lint-free cloth, G01043 wet with alcohol, B00676 [CP1041] or acetone solvent, B01058 [CP1039].

SUBTASK 72-21-01-230-003-F00

(5) Do this task: Fluorescent Penetrant Inspection (Water Washable), TASK 70-40-01-910-801-F00.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-01-430-002-F00

(1) Install the 24 threaded pins on the new retaining flange (TASK 72-21-01-300-801-F00):

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AKS ALL POST SB CFM56-7B-72-325

SUBTASK 72-21-01-430-003-F00

(2) Install the axial stop pins in the aft face of the new retaining flange.

(a) Do not mix the black and gray axial stop pins. Install the stop pins as a full set.

1) PRE-CFM-SB 72-678 stop pins are black in color. POST-CFM-SB 72-678 stop pins are gray in color.

AKS ALL

SUBTASK 72-21-01-420-008-F00

(3) To install the retaining flange, do these tasks: (TASK 72-21-01-400-801-F00):

(a) Install the retaining flange on the fan disk.

(b) Install the spinner rear cone.

(c) Install the spinner front cone.

END OF TASK

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Retaining Flange Slot Repair
Figure 802/72-21-01-990-811-F00

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FAN BLADE - REMOVAL/INSTALLATION

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has these tasks:
      (1) The removal of a complete set of the fan blades
      (2) The installation of a complete set of fan blades
      (3) The replacement of a complete set of fan blades
      (4) The replacement of one pair (or pairs) of fan blades
         (a) This task includes the replacement of one fan blade.

TASK 72-21-02-000-801-F00

2. **Fan Blade Removal (Complete Set)**
(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, Figure 406, and Figure 407)

A. General

(1) You can get access to the fan blades through the inlet cowl after you remove the spinner front and rear cones.

(2) Each engine has twenty-four fan blades which are installed in the fan disk.

(3) Each fan blade is attached with a fan blade spacer and held in its position with a platform.

B. References

Reference	Title
70-10-03-910-801-F00	Temporary Marking Procedures (P/B 201)
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2193	Puller - Spacers, Fan Blade Part #: 856A3707G06 Supplier: 58828 Part #: 856A3905G03 Supplier: 58828 Part #: 856A3923G01 Supplier: 58828 Opt Part #: 856A3707G05 Supplier: 58828 Opt Part #: 856A3905G02 Supplier: 58828
SPL-2324	Puller - Platform, Fan Blade Part #: 856A3779G02 Supplier: 58828 Opt Part #: 856A3779G01 Supplier: 58828
SPL-2325	Wrench - Fan Blade, Retainer Ring, Removal Part #: 856A3782G02 Supplier: 58828
SPL-8860	Pliers - Elastomer Spacer Part #: 856A2691G01 Supplier: 58828
SPL-11284	Puller - Spacers, Fan Blade Part #: 856A2954G01 Supplier: 58828
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

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D. Consumable Materials

Reference	Description	Specification
D00672 [CP5070]	Grease - Petrolatum	VV-P-236
G50530 [CP5061]	Marker - Temporary	CFM CP5061

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Removal

SUBTASK 72-21-02-840-001-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-860-001-F00

(2) Make sure the engine start levers are in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

SUBTASK 72-21-02-480-001-F00

CAUTION: MAKE SURE YOU GIVE SUFFICIENT PROTECTION TO THE INNER SURFACE OF THE INLET COWL. IF YOU DO NOT GIVE SUFFICIENT PROTECTION TO THE INLET COWL, DAMAGE CAN OCCUR.

(3) Install a protective mat, STD-585 in the fan inlet cowl.

SUBTASK 72-21-02-840-002-F00

(4) Do this task: Spinner Cones Removal, TASK 72-21-01-000-801-F00.

NOTE: The fan retaining flange is removed during the spinner removal task.

G. Fan Blade Removal

AKS ALL POST SB CFM56-7B-72-548

SUBTASK 72-21-02-020-019-F00

(1) Remove the 8 elastomer spacers [12] equally spaced (360 degrees divided by 8) between the fan retaining ring and the fan disk flange.

(a) Use the pliers, SPL-8860.

AKS ALL

SUBTASK 72-21-02-930-001-F00

CAUTION: USE ONLY APPROVED MARKING MATERIALS ON THE FAN BLADES. IF YOU DO NOT USE APPROVED MARKING MATERIALS, DAMAGE CAN OCCUR.

(2) Use a temporary marker, G50530 [CP5061], to put a mark on the fan blades as follows (for a list of markers, see the reference) (TASK 70-10-03-910-801-F00):

(a) Find the number one blade.

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1) The number one blade is immediately above the offset hole on the fan disk bolt flange.

(b) Put a mark on the convex side of this blade to identify it as the number one blade.

(c) Number the remaining blades in a counterclockwise direction from two to twenty-four.

NOTE: This is counterclockwise as seen from the front of the engine.

(3) Use a temporary marker, G50530 [CP5061], to put a mark on the fan blades platform [2] as follows (for a list of markers, see the reference) (TASK 70-10-03-910-801-F00):

(a) Find the number one platform.

1) The number one platform is immediately at the left of the fan blade number one when fan blade number one is at the 12 o'clock location.

(b) Put a mark on this blade to identify it as the number one platform.

(c) Number the remaining platforms in the same counterclockwise direction from two to twenty-four as the fan blades.

NOTE: This is counterclockwise as seen from the front of the engine.

SUBTASK 72-21-02-020-001-F00

WARNING: MAKE SURE YOU WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES, YOU CAN INJURE YOUR HANDS.

(4) Do these steps to remove the fan retaining ring [6] with the wrench, SPL-2325 from the fan disk (Figure 402):

(a) Install the two pins (detail of wrench) in two opposite holes of the fan disk forward flange.

(b) Engage the support on the two pins and seat against the retaining ring [6], engaging the screw heads in the lugs of the retaining ring.

(c) Install the nuts on the pins and tighten. Tighten the knurled nuts.

(d) Turn the wrench handles clockwise to disengage the retaining ring lugs from the fan disk scallops.

(e) Remove the nuts to remove the tool and retaining ring from the fan disk [3].

(f) Loosen the knurled nuts to remove the retaining ring from the support.

(g) Remove the pins from the fan disk forward flange

SUBTASK 72-21-02-640-006-F00

(5) Apply a bead of grease, D00672 [CP5070]on each side of the fan blade No. 1, No. 2 and No. 24 airfoil, above the platform [2] seals when fan blade No. 1 is at the 12 o’clock position.

SUBTASK 72-21-02-860-008-F00

(6) Move the fan blade No. 1 to the 6 o’clock position.

SUBTASK 72-21-02-020-007-F00

(7) Use option one tool to remove the fan blade spacer [4] from fan blade No. 1, No. 2 and No. 24 as follows (Figure 403):

(a) Do these steps to install the spacer puller, SPL-2193 to the fan disk:

NOTE: The Tools List shows the Option 1 tool as the tool 856A3905.

NOTE: Put the fan blade spacer at the 6 o'clock position for removal.

1) Preparation of the tool

a) Unscrew the 3 star knobs.

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b) Set the levers to position 1 by sliding the pads in the installation position.

c) Tighten the 3 star knobs.

d) Unscrew the star knobs completely.

e) Loosen the knurled nut.

2) Install the tool into the fan disk bore

a) Put the tool into the fan disk bore.

b) Set the levers to position 2 by sliding the pads into the working position.

c) Tighten the 3 star knobs.

NOTE: At this step the tool can be rotated freely around the engine axis.

3) Remove the fan blade spacer [4] from fan blade No. 1

a) Move the index over the two fan disk scallops by turning counterclockwise the knurled knob.

NOTE: The index is opposite the spacer to be removed.

b) Align the roller carriage to the spacer to be removed.

c) Put the pin of the carriage roller through the anchor bushing and the hole in the spacer.

d) Remove the spacer by turning the star knob clockwise.

e) Remove the pin from the carriage roller to release the spacer.

f) Store the spacer [4] in its related position in a suitable location.

g) Do the above steps again to remove the spacers from fan blade No. 2 and No. 24.

4) Remove the tool

a) Unscrew the star nut.

b) Unscrew the 3 star knobs.

c) Move the levers to position 1 by sliding the pads into the removal position.

d) Tighten the 3 star knobs.

e) Turn the tool counterclockwise to disengage the index from the fan disk scallop and remove the tool from the fan disk bore.

SUBTASK 72-21-02-020-008-F00

(8) Use option 2 tool to remove the fan blade spacer [4] from fan blade No. 1, No. 2 and No. 24 as follows (Figure 404):

(a) Do these steps to install the spacer puller, SPL-2193 to the fan blade spacer:

NOTE: The Tools List shows the Option 2 tool as the Optional Tool, 856A3707.

NOTE: Remove the fan blade spacer in the counterclockwise direction.

NOTE: Put the fan blade spacer at the 6 o'clock position for removal.

1) Put the puller against the spacer of fan blade No. 1.

2) Move the pin of the support into the fan blade spacer hole.

3) Use the puller to remove the spacer from the fan disk slot.

a) Move the spacer along the spacer axis and not along the engine centerline.

4) Store the spacer [4] in its related position in a suitable location.

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5) Do the above steps again to remove the spacers from fan blade No. 2 and No. 24.

SUBTASK 72-21-02-020-012-F00

(9) Use option 3 tool to remove the fan blade spacer [4] from fan blade No. 1, No. 2 and No. 24 as follows (Figure 405):

(a) Do these steps to use the spacer puller, SPL-2193:

NOTE: The Tools List shows the Option 3 tool as the Tool, 856A3923.

1) Prepare the tool:

a) Move the strainer forward, lift and engage the dowel in its forward locating hole.

b) Loosen the fixture and deploy the belt by pulling the extractor.

c) Put the shim in extended position with the pusher. If the tool is facing a balance weight, retract the shim with the pusher.

2) Install the tool on the fan disk:

a) Position the frame on the disk with the two fingers in line with notches in the fan disk front flange.

b) Turn the tool to engage the two fingers on the rear face of front flange lugs.

3) Remove the fan blade spacer [4] from fan blade No. 1.

a) Align the extractor with the spacer to be removed.

b) Put the pin through the extractor and the hole in the spacer.

c) Actuate the fixture to remove the spacer. Retract the strainer if it is necessary.

d) Remove the pin from the extractor to release the spacer.

e) Store the spacer in its related position in a suitable location.

f) Pull the extractor and re-install the strainer in forward position.

g) Turn the tool to the position for extraction of the next spacer.

h) Do the above steps again to remove the spacers from fan blade No. 2 and No. 24.

4) Remove the tool.

SUBTASK 72-21-02-020-021-F00

(10) Use option 4 tool to remove the fan blade spacer [4] from fan blade No. 1, No. 2 and No. 24 as follows (Figure 406):

(a) Do these steps to use the spacer puller, SPL-11284:

1) Fully insert the hook of the tool in the hole of the fan blade spacer.

a) Pull the handle of the tool to remove the spacer [4] from fan blade No. 1 and hold the spacer to be sure that it does not fall.

NOTE: Hold the spacer before it is fully removed from the fan blade to be sure that it does not fall.

b) Disengage the hook of the tool from the hole of the spacer.

c) Store the spacer in its related position in a suitable location.

(b) Do the above steps again to remove the spacers from fan blade No. 2 and No. 24.

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SUBTASK 72-21-02-020-005-F00

(11) Do these steps to remove the platform No. 24 and No. 1 and the fan blade No. 1 and No. 2 (Figure 407):

NOTE: Put the platforms [2] at the 12 o'clock position for removal, with the puller, SPL-2324.

(a) Shake and lower the three fan blades No. 1, No. 2 and No. 24 on their slots to lubricate the fan blade platforms seals.

(b) Install the puller on the platform No. 24 as follows.

1) Loosen the knurled nut, position the puller support on the platform with the wear stop of the puller against the rear edge of the platform [2]

2) Engage the pin, detail of the plate, in the platform forward flange hole an tighten the knurled nut.

(c) Lift with your hand the rear of the No. 1 fan blade root in the dovetail slot. The rear slots on the fan blade root engage in the booster spool forward flange.

(d) Keep the rear of the No. 1 fan blade root lifted in the dovetail slot with your hand while you push the No. 24 fan blade with your elbow.

(e) Pull axially the platform puller to disengage the platform N° 24 [2] from the threaded pins. Remove the fan blade platform N° 24 from the fan disk [3].

(f) Remove the platform puller from the platform N° 24.

(g) Lower the rear of the N° 1 fan blade in the fan disk slot. Pull and remove the No. 1 fan blade [1] from the fan disk slot.

(h) Put the fan blade No. 1 and the platform No. 24 in their related position in a suitable location

(i) Do the above steps again to remove the fan blade platform No. 1 and the fan blade No. 2.

SUBTASK 72-21-02-020-017-F00

CAUTION: REMOVE THE PARTS IN THE SPECIFIED SEQUENCE AT EACH LOCATION. THIS SEQUENCE PREVENTS DAMAGE TO THE PLATFORM AND FAN BLADE.

(12) To remove the rest of the fan blades, do the steps again in this sequence for each fan blade

NOTE: During the fan blades removal, let the fan rotor turn until stabilization is accomplished.

(a) Remove the spacer No. 3 to No. 23

(b) Remove the fan blade platform No. 2 to No. 23

(c) Remove the fan blade No. 3 to No. 24

SUBTASK 72-21-02-030-002-F00

AKS ALL POST CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

CAUTION: BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(13) Remove the shim from the root of the fan blade.

(a) Put the shims in their related position in a suitable location.

AKS ALL

END OF TASK

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1 ENGINES POST-CFM56-7B-SB 72-0548

2 ENGINES POST-CFM56-7B-SB 72-0485 OR
ENGINES POST-CFM56-7B-SB 72-0324

J67027 S0000175576_V4

Fan Blade Installation
Figure 401/72-21-02-990-834-F00

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J67250 S0000175577_V2

Fan Retaining Ring
Figure 402/72-21-02-990-835-F00

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Fan Blade Spacer Removal (Option 1)
Figure 403/72-21-02-990-801-F00 (Sheet 1 of 4)

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Fan Blade Spacer Removal (Option 1)
Figure 403/72-21-02-990-801-F00 (Sheet 2 of 4)

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Fan Blade Spacer Removal (Option 1)
Figure 403/72-21-02-990-801-F00 (Sheet 3 of 4)

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Fan Blade Spacer Removal (Option 1)
Figure 403/72-21-02-990-801-F00 (Sheet 4 of 4)

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MM-00111-03-B
483675 S0000144317_V2

Fan Blade Spacer Removal (Option 2)
Figure 404/72-21-02-990-822-F00 (Sheet 1 of 2)

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483717 S0000144374_V3

Fan Blade Spacer Removal (Option 2)
Figure 404/72-21-02-990-822-F00 (Sheet 2 of 2)

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Fan Blade Spacer Removal (Option 3)
Figure 405/72-21-02-990-828-F00 (Sheet 1 of 3)

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Fan Blade Spacer Removal (Option 3)
Figure 405/72-21-02-990-828-F00 (Sheet 2 of 3)

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A-A

MM-000244-00-B
D39456 S0000155364_V2

Fan Blade Spacer Removal (Option 3)
Figure 405/72-21-02-990-828-F00 (Sheet 3 of 3)

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1851251 S0000331193_V2

Fan Blade Spacer Removal (Option 4)
Figure 406/72-21-02-990-844-F00

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J67504 S0000175578_V2

Fan Blade Platform
Figure 407/72-21-02-990-836-F00

BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1631638 S0000300453_V2

Fan Retaining Ring Installation
Figure 408/72-21-02-990-842-F00

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TASK 72-21-02-400-801-F00

3. **Fan Blade Installation (Complete Set)**

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, Figure 406, Figure 407, and Figure 408)

A. **General**

(1) This task provides the instructions on how to install a complete set of the fan blade.

B. **References**

Reference	Title
71-00-00-700-814-F00	Test 7 - Vibration Survey (P/B 501)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
72-21-00-640-801-F00	Fan Rotor Blades and Fan Disk Lubrication (P/B 201)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. **Tools/Equipment**

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-10303	Tool - Assistance, Fan Blade, Retaining Ring Part #: 856A2956G01 Supplier: 58828
STD-123	Brush - Soft Bristle
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. **Consumable Materials**

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	
D00672 [CP5070]	Grease - Petrolatum	VV-P-236
D00673 [CP2569]	Lubricant - Molybdenum Disulfide, Solid - Dow Corning G-n Metal Assembly	CFM CP2569
D50019 [CP2444]	Lubricant - Molydisulfide Solid Film, Paste - Molykote G-n Plus	CFM CP2444
D50308 [CP 2171]	Lubricant - MOS2 Solid	MIL-L-8937

E. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. **Prepare for the Installation**

SUBTASK 72-21-02-160-001-F00

(1) Clean the fan blades [1] with alcohol, B00676 [CP1041] and a soft bristle brush, STD-123.

NOTE: Make sure that you comply with the fan blade interchangeability limits given in CFM SB 72-0796 before the fan blade installation. If you do not follow the instructions, you may not concur with the configuration limitation of these engines:

CFM56-7B26E, -7B26E/F, -7B26E/B1, -7B26E/B2, -7B26E/B2F,

CFM56-7B27E, -7B27AE, -7B27E/B1, -7B27E/B3, -7B27E/F, -7B27E/B1F,

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Engine Assembly Configuration operated at B26 or B27 thrust rating with -7BE LPT kit, CFM SB 72-0809.

SUBTASK 72-21-02-640-001-F00

(2) Lubricate the fan blades and fan disk dovetails (TASK 72-21-00-640-801-F00).

SUBTASK 72-21-02-640-003-F00

(3) Lubricate the platform seal with grease, D00672 [CP5070] or Silicone.

NOTE: Apply the lubricant before you do the platform installation. If one hour occurs before you start the platform installation, apply the lubricant again.

NOTE: It is recommended to apply lubricant on the platform seal to help you during the platform installation.

SUBTASK 72-21-02-640-012-F00

(4) Lubricate the swaged bushings and the fan blade mating face with grease, D00672 [CP5070] or Silicone.

AKS ALL POST SB CFM56-7B-72-548

SUBTASK 72-21-02-640-011-F00

(5) Lubricate the 8 elastomer spacers [12] and the slots of the fan retaining ring with grease, D00672 [CP5070] or Lubricant, D50308 [CP 2171] or Dow Corning 321 lubricant, D00641 [CP5062] or Dow Corning G-n Metal Assembly lubricant, D00673 [CP2569] or Molykote G-n Plus lubricant, D50019 [CP2444].

AKS ALL

G. Fan Blade Installation

SUBTASK 72-21-02-210-019-F00

(1) Make sure that the fan disk slots are free of dust and turn the fan disk to put the fan disk slot No. 1 to the 6 o'clock position.

NOTE: The number 1 engraved on each side of the slot identifies the fan disk slot No. 1.

SUBTASK 72-21-02-420-001-F00

CAUTION: INSTALL THE FAN BLADES AND PLATFORMS IN THE CLOCKWISE DIRECTION WHEN YOU LOOK IN THE AFT DIRECTION. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE PLATFORMS CAN OCCUR.

(2) Do these steps to install the first fan blade [1]:

NOTE: The fan blades are installed in the clockwise direction. You start with the No. 24 blade and continue down to the No. 1 blade.

AKS ALL POST SB CFM56-7B-72-0324

CAUTION: OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

CAUTION: BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(a) Install a shim [5] by sliding it on the fan blade root.

NOTE: Reworked fan disks are identified with white paint on the hub of the fan disk: "SHIMS+SPECIFIC", "SPACERS REQUIRED" and "DISK REPAIRED".

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AKS ALL POST CFM56-7B-72-0485

CAUTION: OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

CAUTION: BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(b) Install a shim [5] by sliding it on the fan blade root.

NOTE: These fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, ” SPACERS REQUIRED”.

AKS ALL

(c) Install the No. 24 fan blade [1] in the fan disk slot No. 24.

NOTE: With the disk slot No. 1 at the 6 o’clock position, the fan disk slot No. 24 is immediately to the left of the slot No. 1.

1) Push the fan blade [1] rearward until the fan lug on the rear of the fan blade [1] engages the booster spool recess on the fan disk.

SUBTASK 72-21-02-420-002-F00

(3) Do these steps to install the platform [2]:

NOTE: The fan blade platforms are installed in numerical order. They are numbered counterclockwise when you look in the aft direction.

NOTE: If you mix Pre- and Post-CFM SB 72-0353 platform configuration blades, this can effect engine balance if the blades are not installed as a pair 180 degrees apart. A vibration survey (Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00) can be done at the operator's discretion. The survey will show if it is necessary to perform a fan trim balance or if the installation is correct

NOTE: If you mix Pre- and Post-CFM SB 72-0909 platform configuration blades, this can effect engine balance if the blades are not installed as a pair 180 degrees apart. A vibration survey (Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00) can be done at the operator's discretion. The survey will show if it is necessary to perform a fan trim balance or if the installation is correct.

NOTE: Intermixing platform 340-001-817-0 with the old platforms 340-001-814-0 or 340-001-816-0 are acceptable provided the engine vibration levels are within limits.

CAUTION: MAKE SURE THAT THE BUSHINGS IN THE PLATFORM ARE CORRECTLY INSTALLED IN THEIR HOLES. IF THERE ARE MISSING BUSHINGS, DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION: MAKE SURE THAT ALL THE LOCATING PINS ARE INSTALLED IN THE MIDDLE FLANGE OF THE FAN DISK. MAKE SURE THAT ALL THE LOCATING PINS ARE INSTALLED IN THE FRONT FLANGE OF THE BOOSTER SPOOL. IF THEY ARE MISSING, DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION: INSTALL THE FAN BLADES AND PLATFORMS CLOCKWISE. IF YOU DO NOT INSTALL THE FAN BLADES IN THE CORRECT SEQUENCE, DAMAGE TO THE PLATFORM AND FAN BLADE CAN OCCUR.

(a) Install the No. 23 platform [2]:

1) Engage the fan blade platform [2] immediately at the left of the No. 24 fan blade, when dovetail slot No. 24 is at 6 o’clock location.

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2) Push the fan blade platform [2] fully in position.

SUBTASK 72-21-02-020-002-F00

(4) Do these steps to install the fan blade spacer [4]:

CAUTION: OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

(a) Make sure you install the correct spacer [4].

AKS ALL POST SB CFM56-7B-72-0324

1) There is a specific mark “R” on the front of the spacer.

NOTE: Reworked fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, “SPACERS REQUIRED” and “DISK REPAIRED”.

AKS ALL POST CFM56-7B-72-0485

2) These spacers do not have a specific mark.

NOTE: These fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, “SPACERS REQUIRED”.

AKS ALL

(b) Engage the No. 24 fan blade spacer [4] in the fan disk slot between the No. 24 fan blade [1] and the fan disk.

(c) Push the No. 24 fan blade spacer [4] fully in position.

SUBTASK 72-21-02-420-010-F00

CAUTION: INSTALL THE PARTS IN THE SPECIFIED SEQUENCE AT EACH LOCATION. A DIFFERENT SEQUENCE CAN CAUSE DAMAGE TO THE PLATFORM AND FAN BLADE.

CAUTION: INSTALL THE FAN BLADES AND PLATFORMS CLOCKWISE. IF YOU DO NOT INSTALL THE FAN BLADES IN THE CORRECT SEQUENCE, DAMAGE TO THE PLATFORM AND FAN BLADE CAN OCCUR.

(5) Do the above steps again to install the fan blades [1], the platforms [2] and the fan blade spacers [4] for the No. 23 to No. 4 fan blades.

SUBTASK 72-21-02-420-011-F00

(6) Do these steps to install the remaining fan blades, No. 3 to No. 1:

AKS ALL POST SB CFM56-7B-72-0324

CAUTION: OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

CAUTION: BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(a) Install a shim [5] by sliding it on the fan blade root.

NOTE: Reworked fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, ” SPACERS REQUIRED”, “DISK REPAIRED”.

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AKS ALL POST CFM56-7B-72-0485

CAUTION: OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

CAUTION: BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(b) Install a shim [5] by sliding it on the fan blade root.

NOTE: These fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, ” SPACERS REQUIRED”.

AKS ALL

(c) Install the three fan blades [1] No. 3 to No. 1 in the applicable fan disk slots.

NOTE: Install these fan blades with the fan disk slots at the 12 o’clock position.

(d) Remove the spacer No. 24 from under the fan blade No. 24.

(e) Engage the fan blade platforms [2] No. 3 to No. 1 at their corresponding location on the threaded pins.

(f) Push the fan blade platforms No. 3 to No. 1 fully in position.

(g) Lift with your hand the rear of the No. 1 fan blade root in the dovetail slot while you push the fan blade No. 24 with your elbow to install horizontally the platform No. 24 on the locating threaded pins, between the No. 1 and the No. 24 fan blades.

(h) Push the fan blade platform No. 24 fully in position

CAUTION: OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

(i) Make sure you install the correct spacer [4].

AKS ALL POST SB CFM56-7B-72-0324

1) There is a specific mark “R” on the front of the spacer.

NOTE: Reworked fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, “SPACERS REQUIRED” and “DISK REPAIRED”.

AKS ALL POST CFM56-7B-72-0485

2) These spacers do not have a specific mark.

NOTE: These fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC”, “SPACERS REQUIRED”.

AKS ALL

(j) Engage the four remaining spacers No. 3 to No. 1 and No. 24 in the applicable fan disk slots. Push all of the spacers in position.

NOTE: Do the installation of the remaining spacers with the fan disk slots at the 6 o’clock position.

(k) Make sure the forward retention tab of the spacers is in contact with the fan disk slot forward face.

SUBTASK 72-21-02-020-006-F00

(7) Do these steps to install the fan retaining ring (Figure 408):

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(a) Install the fan retaining ring on the fan disk [3] forward flange.

NOTE: There is no offset hole on the retaining ring.

NOTE: Do not use a tool to install the retaining ring.

CAUTION: YOU CAN USE AN APPLICABLE TOOL TO MOVE THE PLATFORM INSTALLATION SLOWLY IN THE REARWARD POSITION. THE PLATFORM CAN CAUSE DAMAGE TO THE PARTS.

(b) Make sure the fan blades [1], platforms [2] and spacers [4] are in their correct positions.

(c) Align the lugs of the retaining ring in front of the scallops of the fan disk [3].

(d) Engage the retaining ring on the forward fan disk flange.

(e) Install the fan blade retaining ring assistance tool, SPL-10303 on the fan disk to maintain the spacers and platforms.

1) Install the eight bolts and tighten with your hand.

(f) Turn the retaining ring as necessary to put the retaining ring lugs in front of the fan disk lugs.

(g) Remove the eight bolts and remove the fan blade retaining ring assistance tool, SPL-10303.

AKS ALL POST SB CFM56-7B-72-548

SUBTASK 72-21-02-430-002-F00

(8) Install the eight elastomer spacers [12] equally spaced (360 degrees divided by 8) between the fan retaining ring and the fan disk flange.

(a) Make sure that the FWD indication on the elastomer spacer is readable when it is installed (Figure 401).

NOTE: The first spacer is installed under the fan disk slot No. 1.

AKS ALL

SUBTASK 72-21-02-410-001-F00

(9) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

NOTE: The fan retaining flange is installed during the spinner installation task.

SUBTASK 72-21-02-080-001-F00

CAUTION: MAKE SURE THAT YOU REMOVE THE TOOLS, PARTS, AND UNWANTED MATERIAL FROM THE INLET COWL. DAMAGE TO THE ENGINE COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(10) Remove the protective mat, STD-585 from the inlet cowl.

H. Fan Blade Installation Test

SUBTASK 72-21-02-840-003-F00

(1) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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SUBTASK 72-21-02-860-002-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable start lever.

SUBTASK 72-21-02-720-001-F00

(3) Do the tests that are listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

——— END OF TASK ———

TASK 72-21-02-900-801-F00

4. Fan Blade Replacement (Complete Set)

A. General

(1) You can get access to the fan blades through the inlet cowl after you remove the spinner front and rear cones and the fan retaining flange.

(2) Each engine has twenty-four fan blades which are installed in the fan disk.

(3) Each fan blade is attached with a fan blade spacer and held in its position with a platform.

B. References

Reference	Title
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Replacement

SUBTASK 72-21-02-840-008-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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SUBTASK 72-21-02-860-006-F00

(2) Make sure the engine start levers are in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

SUBTASK 72-21-02-490-001-F00

(3) Install a protective mat, STD-585 in the fan inlet cowl.

SUBTASK 72-21-02-010-005-F00

(4) Do this task: Spinner Cones Removal, TASK 72-21-01-000-801-F00.

NOTE: The fan retaining flange is removed during the spinner removal task.

G. Fan Blade (Complete Set) Replacement

SUBTASK 72-21-02-020-011-F00

(1) Do this task: Fan Blade Removal (Complete Set), TASK 72-21-02-000-801-F00.

SUBTASK 72-21-02-010-006-F00

(2) Remove all balance screws from the rear spinner cone and place them in a storage box.

SUBTASK 72-21-02-410-007-F00

(3) Install new P07/P14 balance screws on the rear spinner cone as follows:

(a) Lightly coat the balance screws with Dow Corning 321 lubricant, D00641 [CP5062].

(b) Install the first screw in the No.1 hole near the offset hole.

(c) Install, in the counterclockwise direction, the other thirty-five balance screws.

(d) Tighten each balance screw to 67.5-74.5 pound-inches (7.6-8.4 Newton meters).

SUBTASK 72-21-02-110-002-F00

(4) Clean the fan blades with alcohol, B00676 [CP1041] and a brush

NOTE: Make sure that you comply with the fan blade interchangeability limits given in CFM SB 72-0796 before the fan blade installation. If you do not follow the instructions, you may not concur with the configuration limitation these engines:

CFM56-7B26E, -7B26E/F, -7B26E/B1, -7B26E/B2, -7B26E/B2F,

CFM56-7B27E, -7B27AE, -7B27E/B1, -7B27E/B3, -7B27E/F, -7B27E/B1F,

Engine Assembly Configurations operated at B26 or B27 thrust rating with -7BE LPT kit, CFM SB 72-0809.

SUBTASK 72-21-02-970-007-F00

(5) If it is necessary to do a fan blade set distribution, use the computer method Mapping Procedure 856A3770.

SUBTASK 72-21-02-420-004-F00

(6) Do this task: Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-02-410-008-F00

(7) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

NOTE: The fan retaining flange is installed during the spinner installation task.

SUBTASK 72-21-02-090-001-F00

(8) Remove the protective mat, STD-585 from the inlet cowl.

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H. Fan Blade Installation Test

SUBTASK 72-21-02-865-001-F00

(1) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-860-007-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable start lever.

SUBTASK 72-21-02-710-001-F00

(3) Do the tests that are listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

——— END OF TASK ———

TASK 72-21-02-000-802-F00

5. Fan Blade Replacement (Blade Pair)

A. General

(1) You can get access to the fan blades through the inlet cowl after you remove the spinner front and rear cones and the fan retaining flange.

(2) Each engine has twenty-four fan blades which are installed in the fan disk.

(3) Each fan blade is attached with a fan blade spacer and held in its position with a platform.

(4) You must replace the fan blades in single pair sets or in multiple pair sets. There is a procedure to replace an individual fan blade if a pair is not available.

B. References

Reference	Title
71-00-00-700-814-F00	Test 7 - Vibration Survey (P/B 501)
71-00-00-750-802-F00	Test 14A - Fan Trim Balance (Three-Shot Plot Procedure) (P/B 501)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-00-00-990-844-F00	Figure: Balance Weights with the Center of Mass on One Screw (P/B 501)
71-00-00-990-845-F00	Figure: Balance Weights with the Center of Mass between Two Screws (P/B 501)
72-21-00-640-801-F00	Fan Rotor Blades and Fan Disk Lubrication (P/B 201)
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

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Reference	Description
SPL-2324	Puller - Platform, Fan Blade Part #: 856A3779G02 Supplier: 58828 Opt Part #: 856A3779G01 Supplier: 58828
SPL-8860	Pliers - Elastomer Spacer Part #: 856A2691G01 Supplier: 58828
SPL-10303	Tool - Assistance, Fan Blade, Retaining Ring Part #: 856A2956G01 Supplier: 58828
STD-123	Brush - Soft Bristle
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	
D00672 [CP5070]	Grease - Petrolatum	VV-P-236
G50530 [CP5061]	Marker - Temporary	CFM CP5061

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Fan blade	72-21-00-01-070	AKS ALL

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

G. Prepare for the Removal (In Pairs)

SUBTASK 72-21-02-840-004-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-860-004-F00

(2) Make sure the engine start levers are in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

SUBTASK 72-21-02-480-004-F00

CAUTION: MAKE SURE YOU GIVE SUFFICIENT PROTECTION TO THE INNER SURFACE OF THE INLET COWL. IF YOU DO NOT GIVE SUFFICIENT PROTECTION TO THE INLET COWL, DAMAGE CAN OCCUR.

(3) Install a protective mat, STD-585 in the fan inlet cowl.

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SUBTASK 72-21-02-840-005-F00

(4) Do this task: Spinner Cones Removal, TASK 72-21-01-000-801-F00.

NOTE: If it is necessary, you can remove the balance screws to get access to the bolts. Use a temporary marker, G50530 [CP5061] to make sure that you mark and record the position of the balance screws for installation in their correct position. This is necessary to keep the rotor balanced.

NOTE: The fan retaining flange is removed during the spinner removal task.

(a) Use a temporary marker, G50530 [CP5061] to mark the position of the rear spinner cone before you remove it.

H. Fan Blade Removal (In Pairs)

AKS ALL POST SB CFM56-7B-72-548

SUBTASK 72-21-02-010-010-F00

(1) Remove the 8 elastomer spacers [12] equally spaced (360 degrees divided by 8) between the fan retaining ring [6] and the fan disk [3] flange.

(a) Use the pliers, SPL-8860.

AKS ALL

SUBTASK 72-21-02-930-002-F00

CAUTION: USE ONLY APPROVED MARKING MATERIALS ON THE FAN BLADES. IF YOU DO NOT USE APPROVED MARKING MATERIALS, DAMAGE CAN OCCUR.

(2) Do these steps to identify the fan blades [1] and put a mark on them:

(a) Find the number one fan blade [1] and the fan blade platform [2] (TASK 72-21-02-000-801-F00).

NOTE: The number one fan blade [1] is immediately above the offset hole on the fan disk [3] bolt flange.

(b) Number the remaining fan blades [1] in a counterclockwise direction from two to twenty-four.

(c) Put a mark on the pairs of fan blades [1] you will remove.

SUBTASK 72-21-02-020-004-F00

WARNING: MAKE SURE YOU WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES, YOU CAN INJURE YOUR HANDS.

CAUTION: IF YOU ARE TO INSTALL THE FAN BLADES AGAIN, YOU MUST RECORD THEIR INITIAL POSITIONS. IF YOU MIS-INSTALL THE FAN BLADES, A VIBRATION PROBLEM COULD OCCUR.

(3) Do these steps to remove the marked fan blade [1]:

(a) Remove the fan retaining ring from the fan disk [3] (TASK 72-21-02-000-801-F00).

(b) Do these steps to lubricate the applicable fan blade [1]:

1) Move the fan blade [1] to the 12 o'clock position.

2) Apply a bead of grease, D00672 [CP5070] on each side of the fan blade [1] airfoil above the fan blade platform [2] seals.

3) Lubricate the two adjacent fan blades [1] of the fan blade you will remove.

(c) Move the fan blade [1] you will remove to the 6 o'clock position.

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(d) Remove the spacer [4] from the fan blade [1] you will remove and from the two adjacent fan blades [1] (TASK 72-21-02-000-801-F00).

(e) Do these steps to remove the fan blade [1] you will replace:

NOTE: Put the fan blade [1] you will remove to the 12 o'clock position to remove the platform [2] with the puller, SPL-2324.

1) Shake and lower the three fan blades [1] on their slots to lubricate the fan blade platforms [2] seals.

2) Install the puller on the platform located on the convex side of the fan blade [1] you will remove.

a) Loosen the knurled nut, position the puller support on the platform [2] with the wear stop of the puller against the rear edge of the platform [2].

b) Engage the pin, detail of the plate, in the platform forward flange hole and tighten the knurled nut.

3) Lift with your hand the rear of the fan blade [1] root in the dovetail slot. The rear slots on the fan blade root engage in the booster spool forward flange (Figure 407).

4) Keep the rear of the fan blade [1] root lifted in the dovetail slot with your hand while you push with your elbow the other fan blade, adjacent to the platform.

5) Pull axially the platform puller to disengage the platform [2] from the threaded pins. Remove the fan blade platform from the fan disk.

6) Remove the platform puller from the platform [2].

AKS ALL POST CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

CAUTION: BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

(f) Remove the shim [5] from the root of the fan blade [1].

AKS ALL

(g) Put the removed fan blade [1] and parts on a pallet or other suitable location to avoid shock or damage to the other removed blades.

CAUTION: TAKE CARE OF THE BLADES. SHOCK DAMAGE CAN OCCUR.

(h) Do the above steps again to remove the opposite blade.

(i) Record the location of each fan blade [1] to be replaced and each opposite fan blade.

(j) Record the moment-weight (cm.g) from the bottom of the removed fan blades.

NOTE: The serial number and moment-weight (cm.g) are found under the blade dovetail.

SUBTASK 72-21-02-160-004-F00

(4) Clean these parts with alcohol, B00676 [CP1041] and a soft bristle brush, STD-123:

(a) The fan disk [3] slots

(b) The platform [2] seals

(c) The spacers [4]

(d) The fan retaining ring [6]

(e) The fan blades [1]

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AKS ALL POST CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

(f) The shims [5]

AKS ALL

I. Fan Blade Preparation (In Pairs)

SUBTASK 72-21-02-970-002-F00

(1) Get a pair of spare fan blades [1].

NOTE: When you install the pairs, they must always be at a position 180 degrees apart.

NOTE: Spare fan blades [1] are supplied and kept in pairs so that the difference between their moment-weights is not more than 78 g.in (200 cm.g). However the inspection and the corrections given in (Figure 409) must be done before and after the fan blade [1] installation to make sure the engine imbalance is not more than the limits. Two imbalance conditions can exist, refer to (Figure 409).

NOTE: A vibration survey is at customer convenience.

NOTE: If three pairs of fan blades [1] or less are replaced, and if each pair resultant (Figure 412) is lower or equal to 78 g.inch (200 cm.g), no mapping procedure is necessary. If more than three pairs of fan blades are replaced and the resultant is more than 236 g.inch (600 cm.g), do a mapping procedure. Use fan blade plotting program 856A3770. If the mapping procedure resultant is more than 236 g.in (600 cm.g), do the static correction procedure below. If you replace only one pair of fan blades and the moment-weight of the removed pair is greater than 78 g.inch (200 cm.g), do the static correction (Figure 412).

NOTE: Record the location of each blade to be replaced and each opposite blade. Record the moment-weight (cm.g) from the bottom of the removed blades.

NOTE: Make sure that you comply with the fan blade [1] interchangeability limits given in CFM SB 72-0796 before the fan blade installation. If you do not follow the instructions, you may not concur with the configuration limitation of these engines:

CFM56-7B26E, -7B26E/F, -7B26E/B1, -7B26E/B2, -7B26E/B2F,

CFM56-7B27E, -7B27AE, -7B27E/B1, -7B27E/B3, -7B27E/F, -7B27E/B1F,

Engine Assembly Configuration operated at B26 or B27 thrust rating with -7BE LPT kit, CFM SB 72-0809.

J. Static Correction Procedure

SUBTASK 72-21-02-970-003-F00

(1) Do the static correction as follows (Figure 411) and (Figure 412):

(a) If you change more than 3 pairs of fan blades [1] and the resultant is more than 236 g.in (600 cm.g) or the "BLAMAP" resultant is more than 236 g.in (600 cm.g), do the static correction procedure.

(b) Do a vector diagram work sheet (Figure 410) to calculate the resultant vector FR.

(c) Residual moment-weight calculations:

1) Calculate the delta difference between the moment-weights of the pairs of removed blades and the spare blade pair as follows (Figure 411) (sheet 2):

a) This example shows the case where 4 blades are impacted (24, 1, 2, 3), thus 4 pairs will be removed.

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Table 401/72-21-02-993-827-F00

No. 24	207800 cm.g	No. 12	207600 cm.g
No. 1	208120 cm.g	No. 13	207920 cm.g
No. 2	208400 cm.g	No. 14	208230 cm.g
No. 3	208400 cm.g	No. 15	208240 cm.g

b) Calculate the differences between the moment-weights:

Table 402/72-21-02-993-826-F00

D1	No. 24-12	207800 - 207600 = 200 cm.g
D2	No. 1-13	208120 - 207920 = 200 cm.g
D3	No. 2-14	208400 - 208230 = 170 cm.g
D4	No. 3-15	208400 - 208240 = 160 cm.g

c) For this example, you install these new blades set with the moment-weights:

Table 403/72-21-02-993-828-F00

No. 24'	207700 cm.g	No. 12'	207680 cm.g
No. 1'	207120 cm.g	No. 13'	207110 cm.g
No. 2'	208500 cm.g	No. 14'	208480 cm.g
No. 3'	208650 cm.g	No. 15'	208630 cm.g

d) Calculate the moment-weights difference for the spare fan blades:

Table 404/72-21-02-993-829-F00

D1'	No. 24-12	207700 - 207680 = 20 cm.g
D2'	No. 1-13	207120 - 207110 = 10 cm.g
D3'	No. 2-14	208500 - 208480 = 20 cm.g
D4'	No. 3-15	208650 - 208630 = 20 cm.g

e) Calculate the differences between the blades that you have removed and the spare blades:

Table 405/72-21-02-993-830-F00

D1 - D1' = 200 - 20 = 180 cm.g = F1
D2 - D2' = 200 - 10 = 190 cm.g = F2
D3 - D3' = 170 - 20 = 150 cm.g = F3
D4 - D4' = 160 - 20 = 140 cm.g = F4

f) Find the direction of the correction as follows:

NOTE: For each pair of blades, install the heaviest spare blade at the position of the heaviest blade to be removed.

SUBTASK 72-21-02-970-004-F00

(2) Make the vectorial diagram as follows:

(a) Use a polar chart (Figure 410) and draw the vectors of the moment-weight differences (F1 - F4) between the removed blades and the spare blades.

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1) Do a vectorial addition as performed through (Figure 411).

2) The resultant vector FR will show the weight and the location for the balance screw.

3) If the FR is greater than 236 g.in (600 cm.g), the FR length will give the cm.g value for the balance screw and the opposite vector of the FR gives the location of the balance screw.

NOTE: In this example, the resultant vector is approximately 657 cm.g between blades 13 and 14 (screws 19 and 20). The opposite screws are between blades 1 and 2 (screws 2 and 1).

SUBTASK 72-21-02-970-005-F00

(3) Select the balance screw:

(a) Go to Figure 71-00-00-990-844-F00 (Vector is on a screw hole) or Figure 71-00-00-990-845-F00 (Vector is between screw holes) in Test 14A - Fan Trim Balance (Three Shot Plot Procedure) in this reference (TASK 71-00-00-750-802-F00).

NOTE: If the removed screw (or screws) weight is different than a P07 type, calculate a new screw weight, and select a new screw for installation.

(b) In Figure 71-00-00-990-845-F00 for this example, the resultant vector FR 660 cm.g is the nearest moment-weight to the 657 cm.g which corresponds to four P04 screws in holes 3, 36, 8, and 31:

1) These screw locations, which are shown on the inside of the polar chart, are related to locations 1 and 2, which are in the opposite direction of the FR resultant vector location (Figure 411).

K. Fan Blade Installation (In Pairs)

SUBTASK 72-21-02-640-002-F00

(1) Lubricate the applicable fan blade [1] pair (TASK 72-21-00-640-801-F00).

NOTE: Lubricate the fan blade [1] pair[s] that you will install.

SUBTASK 72-21-02-640-004-F00

CAUTION: APPLY THE LUBRICANT BEFORE YOU DO THE PLATFORM INSTALLATION. IF ONE HOUR OCCURS BEFORE YOU START THE PLATFORM INSTALLATION, APPLY THE LUBRICANT AGAIN. WITHOUT SUFFICIENT LUBRICANT, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(2) Lubricate the platform [2] seal, swaged bushings and the fan blade mating face with grease, D00672 [CP5070] or Silicone.

(a) If you mix Pre- and Post-CFM SB 72-0353 platform configuration blades, this can effect engine balance if the blades are not installed as a pair 180 degrees apart. A vibration survey (Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00) can be done at the operator's discretion. The survey will show if it is necessary to perform a fan trim balance or if the installation is correct.

(b) If you mix Pre- and Post-CFM SB 72-0909 platform configuration blades, this can effect engine balance if the blades are not installed as a pair 180 degrees apart. A vibration survey (Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00) can be done at the operator's discretion. The survey will show if it is necessary to perform a fan trim balance or if the installation is correct.

SUBTASK 72-21-02-400-001-F00

(3) Do these steps to install the first fan blade [1]:

(a) Install the heavier fan blades in the location of the heavier original fan blades.

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AKS ALL POST SB CFM56-7B-72-0324

CAUTION: OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

CAUTION: BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

1) Install a shim [5] by sliding it on the fan blade root.

NOTE: Reworked fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC SPACERS REQUIRED” and “DISK REPAIRED”.

AKS ALL POST CFM56-7B-72-0485

CAUTION: OBEY THE PROCEDURES FOR THE FAN DISK PARTS. IF YOU USE AN INCORRECT PROCEDURE, YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

CAUTION: BE CAREFUL WITH THE SHIMS. THEY ARE THIN, AND EASY TO BEND. DO NOT PUSH THEM WITH TOO MUCH FORCE ACROSS THE BLADE ROOT. YOU CAN CAUSE DAMAGE TO THE BLADE COATINGS, AND THE SHIMS.

2) Install a shim [5] by sliding it on the fan blade root.

NOTE: These fan disks are identified with white paint on the hub of the fan disk: “SHIMS+SPECIFIC SPACERS REQUIRED”.

AKS ALL

3) Move the fan disk slot for the first fan blade to the 12 o'clock position.
4) Install the fan blade [1] into the fan disk slot.
5) Lift the rear of the fan blade root in the dovetail slot while you push the fan blade [1] immediately at the right (forward looking aft) with your elbow to install horizontally the platform [2] on the locating threaded pins, between the two fan blades.
6) Push the fan blade platform [2] fully in position.
7) Engage the three spacers [4] in the fan disk slots of the fan blades [1]. Push all spacers in position.

NOTE: Do the installation of the spacers [4] at the 6 o’clock position.

8) Make sure the forward retention tab of the spacers [4] is in contact with the fan disk slot forward face.

SUBTASK 72-21-02-420-009-F00

(4) Do the above steps again to install the remaining fan blades [1].

NOTE: During the installation, do not stop the rotor. Let it turn freely until stabilization is completed.

NOTE: Install each pair in a clockwise direction.

SUBTASK 72-21-02-410-011-F00

(5) Do these steps to install the fan retaining ring [6]:

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(a) Install the fan retaining ring [6] on the forward fan disk flange.

NOTE: There is no offset hole on the retaining ring.

NOTE: Do not use a tool to install the retaining ring.

CAUTION: YOU CAN USE AN APPLICABLE TOOL TO MOVE THE PLATFORM INSTALLATION SLOWLY IN THE REARWARD POSITION. THE PLATFORM CAN CAUSE DAMAGE TO THE PARTS.

(b) Make sure the fan blades [1], platforms [2] and spacers [4] are in their correct positions.

(c) Align the lugs of the fan retaining ring [6] in front of the scallops of the fan disk [3].

(d) Engage the fan retaining ring [6] on the forward fan disk flange.

(e) Install the fan blade retaining ring assistance tool, SPL-10303 on the fan disk to maintain the spacers [4] and platforms [2].

1) Install the eight bolts and tighten with your hand.

(f) Turn the retaining ring as necessary to put the retaining ring lugs in front of the fan disk lugs.

(g) Remove the eight bolts and remove the fan blade retaining ring assistance tool, SPL-10303.

AKS ALL POST SB CFM56-7B-72-548

SUBTASK 72-21-02-410-014-F00

(6) Install the eight elastomer spacers [12] equally spaced (360 degrees divided by 8) between the fan retaining ring and the fan disk flange.

(a) Make sure that the FWD indication on the elastomer spacer [12] is readable when it is installed (Figure 401).

NOTE: The first spacer [12] is installed under the fan disk slot No. 1.

AKS ALL

SUBTASK 72-21-02-410-012-F00

(7) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

NOTE: The fan retaining flange is installed during the spinner installation task.

SUBTASK 72-21-02-430-001-F00

(8) Install the balance screws identified from the static correction calculation task:

(a) Lightly coat the balance screws with Dow Corning 321 lubricant, D00641 [CP5062].

(b) Tighten each balance screw to 67.5 in-lb (7.6 N·m) – 74.5 in-lb (8.4 N·m).

SUBTASK 72-21-02-080-005-F00

CAUTION: MAKE SURE THAT YOU REMOVE THE TOOLS, PARTS, AND UNWANTED MATERIAL FROM THE INLET COWL. IF YOU DO NOT, DAMAGE TO THE ENGINE WILL OCCUR ON THE SUBSEQUENT ENGINE START.

(9) Remove the protective mat, STD-585 from the inlet cowl.

L. Individual Fan Blade Replacement

SUBTASK 72-21-02-840-006-F00

(1) Do these steps to replace an individual fan blade [1]:

NOTE: In all cases of individual fan blade [1] replacement, you must remove the opposite fan blade [1] to compare their moment-weights.

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(a) Do the procedure above to Prepare for the Removal (In Pairs).

WARNING: MAKE SURE YOU WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES, YOU CAN INJURE YOUR HANDS.

CAUTION: IF YOU RE-INSTALL THE FAN BLADES, MAKE A RECORD OF THEIR INITIAL POSITIONS. USE ONLY APPROVED MARKING MATERIALS. DAMAGE TO EQUIPMENT COULD OCCUR.

(b) Do the procedure above for Fan Blade Removal (In Pairs) to remove the fan blade [1] to be replaced and the opposite fan blade.

(c) Record the location of the heavier of the two fan blades [1] and their moment-weights.

(d) Clean these parts with alcohol, B00676 [CP1041] and a soft bristle brush, STD-123:

1) The fan disk [3] slots
2) The platform [2] seals
3) The spacers [4]
4) The fan retaining ring [6]
5) The fan blades [1]

AKS ALL POST CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

6) The shims [5]

AKS ALL

(e) Do these steps for Fan Blade Preparation (Figure 413, Figure 414):

NOTE: Make sure that you comply with the fan blade [1] interchangeability limits given in CFM SB 72-0796 before the fan blade installation. If you do not follow the instructions, you may not concur with the configuration limitation of these engines:

CFM56-7B26E, -7B26E/F, -7B26E/B1, -7B26E/B2, -7B26E/B2F,

CFM56-7B27E, -7B27AE, -7B27E/B1, -7B27E/B3, -7B27E/F, -7B27E/B1F,

Engine Assembly Configuration operated at B26 or B27 thrust rating with -7BE LPT kit, CFM SB 72-0809.

1) Compare the moment-weight of the replacement fan blade [1] to the opposite fan blade.
2) Put the heavier of the two fan blades [1] into the location which you noted above for the heavier of the initial pair of fan blades.
3) Compare the moment-weight of the replacement fan blade [1] with the opposite fan blade to the removed fan blade.
   a) If the difference between the moment-weights of the replacement fan blade [1] and the opposite fan blade to the removed fan blade is more than 78 g.inch (200 cm.g), do the procedure for the Static Correction. Make sure that you use these figures (Figure 413, Figure 414).

(f) Do the procedure for the Fan Blade Installation (In Pairs), which includes the lubrication steps.

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CAUTION: MAKE SURE THAT YOU REMOVE THE TOOLS, PARTS, AND UNWANTED MATERIAL FROM THE INLET COWL. DAMAGE TO THE ENGINE COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(g) Remove the protective mat, STD-585 from the inlet cowl.

M. Fan Blade Installation Test

SUBTASK 72-21-02-840-007-F00

(1) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-860-005-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable start lever.

SUBTASK 72-21-02-720-002-F00

(3) Do the tests that are listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

——— END OF TASK ———

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1 IF YOU REPLACE ONLY ONE PAIR AND IF REMOVED PAIR IS > 200 CM.G, DO STATIC CORRECTION (FIG. 412).

Change Diagram for Fan Blade Pairs
Figure 409/72-21-02-990-811-F00

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S-M56-MM-00030-00-B

H58374 S0006582355_V2

Polar Graph for Static Correction (Working Sheet)
Figure 410/72-21-02-990-812-F00

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S-M56-MM-00031-00-B

H58698 S0006582356_V2

Replacement of Several Pairs of Fan Blades
Figure 411/72-21-02-990-813-F00 (Sheet 1 of 2)

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TARGET BALANCE WEIGHT (cm.g)	SCREW TYPE														SCREW QUANTITY
	7	6	5	4	3	2	1	1	2	3	4	5	6	7	
532		P04	P03									P03	P04		4
541						P05			P05						2
548							P04	P04							2
558							P05	P05							2
580					P06					P06					2
596					P02		P03	P03		P02					4
597							P05	P05							2
619						P06			P06						2
627		P04				P03			P03				P04		4
638							P06	P06							2
660	P04					P04			P04					P04	4

BLADES REMOVED/ MOMENT-WEIGHT (cm.g)	NEW BLADES/ MOMENT-WEIGHT (cm.g)	DIFFERENCE D-D' = CORRECTION TO BE PERFORMED (cm.g)	DIRECTION OF CORRECTION (BLADE NO.)
NO. 24-12 207800 207600 } D1 = 200	207700 207680 } D'1 = 20	F1 = 180	NO. 12
NO. 1-13 208120 207920 } D2 = 200	207120 207110 } D'2 = 10	F2 = 190	NO. 13
NO. 2-14 208400 208230 } D3 = 170	208500 208480 } D'3 = 20	F3 = 150	NO. 14
NO. 3-15 208400 208240 } D4 = 160	208650 208630 } D'4 = 20	F4 = 140	NO. 15

S-M56-MM-00032-00-B
H58716 S0006582357_V2

Replacement of Several Pairs of Fan Blades
Figure 411/72-21-02-990-813-F00 (Sheet 2 of 2)

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BLADES TO BE REMOVED

NEW BLADES

TARGET BALANCE WEIGHT cm.g	SCREW TYPE 7	6	5	4	3	2	1	1	2	3	4	5	6	7	SCREW QUANTITY
237	P05													P05	2
244						P02			P02						2
251							P02	P02							2
260			P03									P03			2
270	P06													P06	2
271		P02				P01			P01				P02		4
272		P04											P04		2
301				P03							P03				2
308			P02				P01	P01				P02			4
309							P02	P02							2
321		P05											P05		2

1 SCREW P03
1 SCREW P02

LOCATION OF BALANCE SCREW
D > D'
INSTALL SCREW CLOSE TO
HEAVIEST BLADE

S-M56-MM-00033-00-B

H59339 S0006582358_V3

Replacement of One Pair of Fan Blades
Figure 412/72-21-02-990-814-F00

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Change Diagram for an Individual Fan Blade
Figure 413/72-21-02-990-815-F00

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BLADE YOU WILL REMOVE

TARGET BALANCE WEIGHT (cm.g)	SCREW TYPE 7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	SCREW QUANTITY
192	P05														P05	2
193				P02								P02				2
212	P02							P02							P02	3
218					P02						P02					2
218	P06														P06	2
227	P01							P03							P01	3
235			P03										P03			2
237						P02				P02						2
237.5								P04								1
237.5		P04												P04		2

1. SELECT BALANCE SCREWS AS FOLLOWS:
   (a) REFER TO THE UPPER TABLE TO FIND THE SOLUTION CLOSEST TO 215 cm.g :
   1 CENTRAL SCREW P02 + 2 LATERAL SCREW P02 AT THE 7th LOCATION FROM THE CENTRAL SCREW.

NOTE:

THIS SOLUTION PERMITS A SATISFACTORY CORRECTION TO PUT THE FAN CLOSE TO ITS INITIAL BALANCE CONDITION.

2. PUT THE BALANCE SCREWS IN THEIR POSITIONS AS FOLLOWS:
   (a) IF THE NEW BLADE IS LIGHTER THAN THE REMOVED BLADE, INSTALL THE BALANCE SCREWS CENTRALIZED ON THE NEW BLADE SIDE.
   (b) IF THE NEW BLADE IS HEAVIER THAN THE REMOVED BLADE, INSTALL THE BALANCE SCREWS CENTRALIZED ON THE OPPOSITE BLADE FROM THE NEW BLADE.

S-M56-MM-00036-00-B

H58728 S0006582360_V2

Static Imbalance Correction Example (Individual Fan Blade Replacement)
Figure 414/72-21-02-990-816-F00

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FAN BLADE - INSPECTION/CHECK

1. **General**
   A. This procedure has this task:
      (1) Fan Module Inspection.

TASK 72-21-02-200-801-F00

2. **Fan Module Inspection**
(Figure 601, Figure 602, Figure 604, Figure 605, Figure 606, Figure 607, Figure 608, Figure 609, Figure 610, Figure 611, Figure 612, Figure 613 and Figure 614)

A. General

(1) This task gives the instructions on how to do these inspections:
   (a) The inspection of the elastomer spacers
   (b) The inspection of the retaining ring
   (c) The inspection of the platforms
   (d) The inspection of the spacers
   (e) The inspection of the fan blades
   (f) The inspection of the shims
   (g) The inspection of the fan disk
   (h) The inspection of the threaded pins
   (i) The inspection of the counterweights
   (j) The inspection of the booster spool forward flange
   (k) The inspection of the LPT shaft plug O-ring.

B. References

Reference	Title
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-00-00-750-802-F00	Test 14A - Fan Trim Balance (Three-Shot Plot Procedure) (P/B 501)
71-00-00-750-803-F00	Test 14B - Fan Trim Balance (On Board Procedure - Vibro-meter AVM) (P/B 501)
71-00-00-750-805-F00	Test 14C - Fan Trim Balance (Analyzer Procedure) (P/B 501)
71-00-02-000-801-F00	Power Plant Removal (P/B 401)
71-00-02-400-801-F00	Power Plant Installation (P/B 401)
72-21-00-640-801-F00	Fan Rotor Blades and Fan Disk Lubrication (P/B 201)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-300-801-F00	Repair the Fan Blade (P/B 801)
72-21-02-300-804-F00	Replace or Retighten the Fan Disk Mid Lug Threaded Pins (P/B 801)
72-21-02-300-805-F00	Replace or Retighten the Booster Spool Threaded Pins (P/B 801)
72-21-02-300-807-F00	Recondition the Lubricant Coating on the Fan Blade Shim (P/B 801)
72-21-02-300-808-F00	Fan Blade Platform Forward Lug Repair (P/B 801)

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(Continued)

Reference	Title
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)
72-55-00-941-801-F00	Replacement of the LPT Shaft Plug O-ring (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2330	Tool - Inspection, Pressure Faces, Dovetail, Fan Blade, Missing Coating, Inch Units Part #: 856A4628G01 Supplier: 58828
SPL-2331	Tool - Inspection, Pressure Faces, Dovetail, Fan Blade, Missing Coating, MM Units Part #: 856A4628G02 Supplier: 58828
SPL-4052	Gauge - Fan Disk Dovetail Slots Part #: 856A4633G02 Supplier: 58828
SPL-7727	Tool - Inspection, Fan Disk Lugs Part #: 856A4640G01 Supplier: 58828
SPL-11481	Gauge - Fan Blade Rear Shank Part #: 856A4646G01 Supplier: 58828
SPL-12281	Inspection Tool - Booster Spool Forward Flange - CFM56-7B Part #: 856A4637G01 Supplier: 58828
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Inspection

SUBTASK 72-21-02-860-009-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-02-860-010-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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SUBTASK 72-21-02-860-013-F00

(3) Make sure the start levers are in the CUTOFF position and install DO-NOT-OPERATE tags.

SUBTASK 72-21-02-480-002-F00

CAUTION: PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(4) Install a protective mat, STD-585 in the inlet cowl.

SUBTASK 72-21-02-210-001-F00

(5) Examine the spinner, fan blades, and stage 1 booster vanes for evidence of foreign object damage:

(a) If you find damage, do the applicable task in the fault isolation manual.

SUBTASK 72-21-02-020-003-F00

WARNING: MAKE SURE YOU WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES, YOU CAN INJURE YOUR HANDS.

(6) To examine the elastomer spacers, retaining ring, platforms, spacers, fan blades, shims, fan disk, threaded pins, counterweights, booster spool forward flange and the LPT shaft plug O-ring, do this task: Fan Blade Removal (Complete Set), TASK 72-21-02-000-801-F00.

SUBTASK 72-21-02-160-002-F00

WARNING: ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. DO NOT BREATHE VAPORS. USE IN WELL VENTILATED AREA FREE FROM SPARKS, FLAME, OR HOT SURFACES. WEAR SPLASH GOGGLES, SOLVENT RESISTANT GLOVES, AND OTHER PROTECTIVE GEAR. IN CASE OF EYE CONTACT, FLUSH WITH WATER FOR 15 MINUTES AND SEEK MEDICAL ATTENTION. IN CASE OF SKIN CONTACT, WASH WITH SOAP AND WATER.

(7) Clean all dirt and unwanted material from the fan blade with alcohol, B00676 [CP1041].

G. Elastomer Spacers Examination

SUBTASK 72-21-02-220-061-F00

(1) If you find damage to the elastomer spacers that is more than the limits, replace the elastomer spacers unless you are given other instructions.

SUBTASK 72-21-02-220-060-F00

(2) Examine the elastomer spacers for damage (Figure 601).

(a) Cracks and tear

1) All quantities are permitted if the tear does not exceed 3/4 of the elastomer spacers length.

(b) Nicks, dents and scratches on the elastomer spacers

1) All damage is permitted with this limit:

a) Not more than 0.04 inch (1.0 mm) in depth.

(c) Missing elastomer spacers

1) Two missing elastomer spacers are permitted.

a) In all cases, you will install the elastomer spacers in an even quantity and equal distance in the angular direction.

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b) If more than two elastomer spacers are missing, a continue-in-service limit of 300 cycles or 500 flight hours is permitted.

NOTE: Repeat extension is not permitted.

<1> In all cases, you will install the elastomer spacers in an even quantity and equal distance in the angular direction.

H. Retaining Ring Examination

SUBTASK 72-21-02-220-034-F00

(1) If you find damage to the retaining ring that is more than the limits, replace the retaining ring, unless you are given other instructions.

SUBTASK 72-21-02-220-035-F00

(2) Examine the retaining ring for damage (Figure 602):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches that are not in centering diameter C

1) All damage is permitted with these limits:

a) On all surfaces other than fillet radius, not more than 0.002 inch (0.05 mm) in depth.

b) On fillet radius, not more than 0.001 inch (0.025 mm) in depth.

(c) Nicks, dents and scratches in centering diameter C

1) All damage is permitted with these limits:

a) On all surfaces other than fillet radius, not more than 0.002 inch (0.05 mm) in depth.

b) On fillet radius, not more than 0.001 inch (0.025 mm) in depth.

(d) Fretting/wear on the mating surfaces

1) All damage is permitted with this limit:

a) Not more than 0.002 inch (0.05 mm) in depth.

I. Platform Examination

SUBTASK 72-21-02-210-006-F00

(1) Examine the platform for damage (except in Area B, Area K, Area I, Area J, Area E, Area F and Area V) (Figure 603):

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(a) Cracks in lugs

1) Cracks are not permitted, replace the damaged platform.

2) You must do a piece part inspection of the remaining platforms in the set with the shop manual.

a) A continue-in-service limit of 300 cycles or 500 flight hours is permitted.

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(b) Cracks in Area M

1) Not permitted.

(c) Nicks, dents and scratches

1) All damage is permitted with these limits:

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a) Not more than 0.008 inch (0.20 mm) in depth after you remove the high metal.

b) If not more than 0.010 inch (0.25 mm) in depth, a continue in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.012 inch (0.30 mm) in depth, a continue in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(d) Corrosion

1) All quantities of corrosion on the platform are permitted.

(e) Marks because of the shim on surface C (Figure 603).

1) Not permitted.

2) Blend repair the mark (TASK 72-21-02-300-808-F00).

SUBTASK 72-21-02-211-002-F00

(2) Examine the platform for damage in Area K (Figure 603):

(a) Cracks

1) Not permitted.

(b) Damage to the surface protection (anodized coating and anti-erosion paint)

1) 100 percent of missing coating is permitted.

(c) Erosion of parent material on the external contour surface

1) Erosion is permitted with these limits:

a) Not more than 0.012 inch (0.30 mm) in depth after you remove the high metal.

b) A continue in-service limit of 3000 cycles or 5000 flight hours is permitted if the damage is more than 0.020 inch (0.50 mm) in depth.

NOTE: Repeat extension is not permitted.

(d) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.010 inch (0.25 mm) in depth after you remove the high metal.

b) If not more than 0.012 inch (0.30 mm) in depth, a continue in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.015 inch (0.40 mm) in depth, a continue in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(e) Corrosion

1) All quantities of corrosion in Area K are permitted.

(f) Distortion

1) All distortion is permitted with this limit:

a) The distortion is not more than 0.04 inch (1.0 mm) in depth from the original contour.

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(g) Tears or missing material

NOTE: For all platforms found with tears or missing material on Area K lateral side, remove and visually examine the fan disk mid-flange lug threaded pin and booster spool forward flange lug threaded pin shank diameter for damage per the Fan Disk and Booster Spool procedures. Replace the platform, unless you are given other instructions.

1) Not permitted.

(h) Tip corner of Area I forward end

1) All damage is permitted with these limits:

a) Not more than 0.04 inch X 0.04 inch (1.0 mm X 1.0 mm).

b) If not more than 0.24 inch X 0.24 inch (5.0 mm X 5.0 mm), a continue-in-service limit of 1500 cycles or 2500 flight hours is permitted.

NOTE: Repeat extension is not permitted.

SUBTASK 72-21-02-211-003-F00

(3) Examine the platform for damage in Area B (Figure 603):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.008 inch (0.20 mm) in depth after you remove the high metal.

b) If not more than 0.010 inch (0.25 mm) in depth, a continue-in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.014 inch (0.35 mm) in depth, a continue in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(c) Nicks and dents because of interference with the shim axial tab

1) All damage is permitted with these limits:

a) Not more than 0.008 inch (0.20 mm) in depth after you remove the high metal.

b) If not more than 0.098 inch (2.5 mm) in depth, a continue in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

SUBTASK 72-21-02-211-004-F00

(4) Examine the platform for damage in Area I and Area J (Figure 603):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.010 inch (0.25 mm) in depth after you remove the high metal.

b) If not more than 0.012 inch (0.30 mm) in depth, a continue-in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

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c) If not more than 0.015 inch (0.40 mm) in depth, a continue in-service of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(c) Corrosion

1) All quantities of corrosion in Area I and Area J are permitted.

SUBTASK 72-21-02-211-006-F00

(5) Examine the platform for seal damage (Figure 603):

(a) Missing, torn, or unbonded elastomer seals

1) All quantities are permitted if the elastomer seal missing or unbonded cumulated length is not more than 39.37 inches (1000.0 mm).

a) Only one elastomer seal can be missing or unbonded on each platform.

b) Cut and remove the loose material.

2) If the missing or unbonded cumulated length of the elastomer seal is not more than 51 inches (1300 mm), a continue-in-service limit of 300 cycles is permitted as follows:

NOTE: Extension cycle is not permitted.

a) Only one elastomer seal can be missing or unbonded on each platform.

b) Cut and remove the loose material.

3) If the missing or unbonded cumulated length of the elastomer seal is not more than 63 inches (1600 mm), a continue-in-service limit of 200 cycles is permitted as follows:

NOTE: Extension cycle is not permitted.

a) Only one elastomer seal can be missing or unbonded on each platform.

b) Cut and remove the loose material.

4) If the missing or unbonded cumulated length of the elastomer seal is more than 63 inches (1600 mm), a continue-in-service limit of 50 cycles is permitted:

NOTE: Extension cycle is not permitted.

a) Only one elastomer seal can be missing or unbonded on each platform.

b) Cut and remove the loose material.

SUBTASK 72-21-02-211-008-F00

(6) Examine the platform for damage in Area E and Area F (Figure 603):

(a) Cracks

1) Not permitted.

(b) Nicks and dents

1) All damage is permitted with these limits:

a) Not more than 0.004 inch (0.10 mm) in depth after you remove the high metal.

b) If not more than 0.006 inch (0.15 mm) in depth, a continue-in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.008 inch (0.20 mm) in depth, a continue-in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

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(c) Scratches

1) All damage is permitted with these limits:

a) Not more than 0.002 inch (0.05 mm) in depth.

b) If not more than 0.004 inch (0.10 mm) in depth, a continue-in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.006 inch (0.15 mm) in depth, a continue-in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(d) Corrosion

1) Not permitted.

SUBTASK 72-21-02-211-009-F00

(7) Examine the platform for damage Area V (Stiffener) (Figure 603):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches

1) All damage is permitted with these limits:

a) Not more than 0.04 inch (1.0 mm) in depth after you remove the high metal.

b) If not more than 0.06 inch (1.5 mm) in depth, a continue-in-service limit of 3000 cycles or 5000 flight hours is permitted.

NOTE: Repeat extension is not permitted.

c) If not more than 0.08 inch (2.0 mm) in depth, a continue-in-service limit of 100 cycles or 250 flight hours is permitted.

NOTE: Repeat extension is not permitted.

(c) Corrosion

1) All quantities of corrosion in Area V are permitted.

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SUBTASK 72-21-02-211-011-F00

(8) Examine the platform swaged bushing:

(a) Missing swaged bushing

1) Not permitted.

(b) Looseness is permitted with this limit:

1) Not more 0.008 inch (0.2 mm).

AKS ALL

SUBTASK 72-21-02-210-014-F00

(9) Examine the platform for unbonded or missing weight adjustment elastomer strip.

NOTE: You will find these materials at the bottom of some platforms.

(a) There is no limit to the quantity of unbonded elastomer strips:

1) Cut and remove the loose material.

(b) There is no limit to the quantity of missing elastomer strip as long as the engine vibration level is in the limits.

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1) If it is necessary, do this task: Test 14A - Fan Trim Balance (Three-Shot Plot Procedure), TASK 71-00-00-750-802-F00 or Test 14B - Fan Trim Balance (On Board Procedure - Vibro-meter AVM), TASK 71-00-00-750-803-F00 or Test 14C - Fan Trim Balance (Analyzer Procedure), TASK 71-00-00-750-805-F00.

J. Spacers Examination

SUBTASK 72-21-02-210-015-F00

(1) If you find damage to the spacers that is more than the limits, replace the spacers, unless you are given other instructions.

SUBTASK 72-21-02-220-057-F00

(2) Examine the spacer for damage (Figure 604):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches on the parent material are permitted with this limit:

1) Not more than 0.0196 inch (0.50 mm) in depth after you remove the high metal.

a) A continue-in-service limit of 500 cycles or 750 flight hours, whichever comes first, is permitted if the damage is more than 0.0196 inch (0.50 mm) in depth.

(c) Wear on the mating faces of the parent material is permitted with this limit:

1) Not more than 0.011 inch (0.30 mm) in depth.

a) A continue-in-service limit of 500 cycles or 750 flight hours, whichever comes first, is permitted if the damage is more than 0.011 inch (0.30 mm) in depth.

(d) Wear on the front and rear faces of the lug is permitted with this limit:

1) Not more than 0.011 inch (0.30 mm) in depth.

a) A continue-in-service limit of 500 cycles or 750 flight hours, whichever comes first, is permitted if the damage is more than 0.011 inch (0.30 mm) in depth.

(e) Elastomer strips for damage:

1) Missing, torn, or unbonded material is permitted with these limits:

a) A maximum of one elastomer strip is damaged per spacer.

b) A maximum of eight spacers are damaged per engine.

NOTE: It is permitted to cut and remove the damaged elastomer strip areas.

<1> A continue-in-service limit of 100 cycles or 175 flight hours, whichever comes first, is permitted if the damage is more than the above limits.

c) All scoring and scratches on the elastomer strips are permitted.

K. Fan Blade Examination

SUBTASK 72-21-02-200-001-F00

(1) Examine the fan blade for damage (Figure 605, Figure 607 and Figure 608):

(a) If you find damage that is more than the limits, you must replace the fan blade, unless you are given other instructions.

(b) Cracks or tears

1) Not permitted.

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(c) Look for damage to the dovetail pressure faces (Figure 607):

NOTE: The fan blade dovetail pressure faces are defined as the contact area and the non-contact area. The contact area is the critical area where the fan disk dovetail slot pressure faces mate the fan blade dovetail pressure faces. Carefully examine the contact area for damage.

1) Damage of the Molydag coating on the pressure face is permitted with these limits:

a) All quantities of missing Molydag coating in the contact area and in the non-contact area are permitted with these limits:

<1> You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

2) Cu-Ni-In coating on the pressure faces

a) If damage to the coating is found, do a visual inspection of each pressure face with the applicable transparent graduated tool, SPL-2330 or tool, SPL-2331 to find the extent of the damage.

b) Damage to the Cu-Ni-In coating in the non-contact area (Figure 607).

<1> Any amount of missing and/or chipped Cu-Ni-In coating is permitted in the non-contact area.

c) Damage to the Cu-Ni-In coating in the contact area (Figure 607).

<1> Missing or chipped Cu-Ni-In coating in the contact area is permitted.

<a> Missing and/or chipped Cu-Ni-In coating is restricted within the Area X (Figure 608).

<b> There is no wear on base material.

<c> You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

NOTE: Repeat extension is permitted.

<2> A continue-in-service limit of 1500 flight cycles or 2500 flight hours, whichever comes first, is permitted with these conditions:

NOTE: Repeat extension is permitted.

<a> Missing and/or chipped Cu-Ni-In coating is restricted within the Area Y (Figure 608).

<b> There is no wear on base material.

<c> You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

<3> A continue-in-service limit of 50 flight cycles or 75 flight hours, whichever comes first, is permitted with these conditions:

<a> Missing and/or chipped Cu-Ni-In coating is more than Area Y (Figure 608).

<b> There is no wear on base material.

<c> You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

(d) Look for damage to the blade root critical Areas L (includes the forward and aft radius areas) (Figure 605):

1) Nicks, dents and scratches

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a) Not permitted.

2) Wear or rub marks along the concave and/or convex side(s) due to contact with platform seals are permitted with this limit:

a) The damage is not more than 0.004 inch (0.10 mm) in depth.

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3) Damage in the forward radius area concave side due to contact with fan blade shim axial stop/tab is permitted with this limit:

a) The damage is not more than 0.004 inch (0.10 mm) in depth.

AKS ALL POST CFM56-7B-72-0485 OR POST SB CFM56-7B-72-0324

4) Wear or rub marks along the blade concave side due to contact with the fan blade shim are permitted with this limit:

a) The damage is not more than 0.0059 inch (0.15 mm) in depth.

b) A continue-in-service limit of 50 flight cycles is permitted if the damage is not more than 0.0079 inch (0.20 mm) in depth.

AKS ALL

5) Wear or rub marks in other areas.

a) Not permitted.

(e) Look for damage in the blade root Area H (does not include the blade root critical area and the dovetail pressure faces) (Figure 605):

1) Distortion on the trailing edge

a) Not permitted.

2) All nicks, dents and scratches are permitted with these limits:

a) The damage is not more than 0.004 inch (0.10 mm) in depth.

b) The scratches are not more than 0.40 inch (10.0 mm) in length.

3) Damage to the rear surface of the shank:

a) All quantities of missing Molydag coating are permitted with these limits:

<1> You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

b) Wear due to contact with the forward flange of the booster spool is permitted with these limits:

NOTE: Use the fan blade rear shank gauge, SPL-11481 or equivalent to measure the depth.

<1> The wear is not more than 0.0098 inch (0.25 mm) in depth.

<2> You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

AKS ALL POST SB 737-CFM56-7B-72-0753

c) Missing CoCrAlYSi coating on the rear shank is permitted with these limits:

<1> The missing CoCrAlYSi coating is not more than ten percent of the total coating area and if there is no sign of worn areas on base material.

<2> A continue-in-service limit of 500 cycles is permitted with these conditions:

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AKS ALL POST SB 737-CFM56-7B-72-0753 (Continued)

<a> The missing coating is not more than twenty percent of the total coating area.

<b> There is no sign of worn areas on base material.

AKS ALL

4) Wear or rub marks on the front surface of the shank due to contact with fan blade spacer are permitted with this limit:

a) Not more than 0.004 inch (0.10 mm) in depth.

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5) Wear or rub marks on the trailing edge due to contact with booster spool counter weight is permitted with this limit:

a) Not more than 0.004 inch (0.10 mm) in depth.

AKS ALL

6) Wear or rub marks along the concave and/or convex side(s) due to contact with platform seals are permitted with this limit:

a) The damage is not more than 0.004 inch (0.10 mm) in depth.

7) Wear or rub marks on the trailing edge convex side due to contact with the aft edge corner of the platform is permitted with this limit:

a) The damage is not more than 0.004 inch (0.10 mm) in depth.

(f) Look for damage in the critical Area J:

1) Distortion on the leading edge

a) Not permitted.

2) All nicks, dents and scratches are permitted with these limits:

a) The damage is not more than 0.004 inch (0.10 mm) in depth.

b) The scratches are not more than 0.40 inch (10.0 mm) in length.

(g) Look for damage in the fan blade airfoil Area I:

1) Cracks and tears

a) Not permitted.

2) All nicks and dents on the leading edge and trailing edge are permitted with this limit:

a) Not more than 0.028 inch (0.7 mm) in depth.

3) All nicks, dents and scratches on the airfoil (contour surface) are permitted with this limit:

a) Not more than 0.012 inch (0.3 mm) in depth.

CAUTION: AFTER YOU BLEND A FAN BLADE, EXAMINE AND REPAIR THE BLENDED FAN BLADE AT THE FIRST SHOP VISIT OPPORTUNITY (SEE CFMI ENGINE SHOP MANUAL). DAMAGE TO EQUIPMENT COULD OCCUR.

4) Blend repair all nicks, dents and scratches on the leading and trailing edges and blade airfoil that are out of the above limits (TASK 72-21-02-300-801-F00).

5) Local distortion on the leading edge is permitted with these limits:

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a) Not more than two locations and the circumferential dimension (Q) must not be more than 0.4 inch (10.0 mm).

b) The depth (M) into the airfoil chord must be more than six times the circumferential dimension (Q).

c) The radial displacement (N) must be more than ten times the circumferential dimension (Q).

d) The bend radius (R) must be more than one and a half times the radial displacement (N) and, in all cases, must be more than 0.79 inch (20 mm).

e) Do a Fluorescent Penetrant inspection of the distorted area (TASK 70-40-01-230-801-F00).

NOTE: Deferral of this inspection is not permitted.

(h) Look for damage in the fan blade airfoil Area K:

NOTE: Area K does not include the tip.

1) Cracks and tears

a) Not permitted.

2) All nicks and dents on the leading edge and trailing edge are permitted with this limit:

a) Not more than 0.04 inch (1.0 mm) in depth.

3) All nicks, dents and scratches on the airfoil (contour surface) are permitted with this limit:

a) Not more than 0.012 inch (0.3 mm) in depth.

CAUTION: AFTER YOU BLEND A FAN BLADE, EXAMINE AND REPAIR THE BLENDED FAN BLADE AT THE FIRST SHOP VISIT OPPORTUNITY (SEE CFMI ENGINE SHOP MANUAL). DAMAGE TO EQUIPMENT COULD OCCUR.

4) Blend repair all nicks, dents and scratches on the leading and trailing edges and blade airfoil that are out of the above limits (TASK 72-21-02-300-801-F00).

5) Local distortion on the leading edge is permitted with these limits (Figure 606):

a) Not more than two locations and the circumferential dimension (Dim. Q) is not more than 0.4 inch (10.0 mm).

b) The depth (Dim. M) into the blade chord is at least six times greater than the circumferential dimension (Dim. Q).

c) The radial displacement (Dim. N) along the leading edge is at least ten times greater than the circumferential dimension (Dim. Q).

d) The bend radius (Radius R) is more than one and a half times the radial displacement (Dim. N) and, in all cases, is more than 0.79 inch (20.0 mm).

e) The distance (Dim. O) along the leading edge between the end of the distortion and the blade tip is more than 4.33 inches (110.0 mm).

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<1> If the distance (Dim. O) along the leading edge between the end of the distortion and the blade tip is less than 4.33 inches (110.0 mm), do a fluorescent penetrant Inspection of the upper panel (Area K) of the adjacent fan blade (TASK 70-40-01-230-801-F00).

NOTE: For instance, if fan blade positions #17, #18 and #19 are found with leading edge distortion more than the above limit, do a fluorescent penetrant Inspection of the adjacent fan blade position #16. If fan blade positions #17, #19 and #20 are found with leading edge distortion more than the above limit, do a fluorescent penetrant Inspection of the adjacent fan blades position #16 and #18. Numbers are counterclockwise when you look in the aft direction.

NOTE: Deferral of this inspection is not permitted.

f) Do a Fluorescent Penetrant inspection of the distorted area (TASK 70-40-01-230-801-F00).

NOTE: Deferral of this inspection is not permitted.

(i) Look for fan blade tip damage:

1) Cracks and tears

a) Not permitted.

2) Nicks, dents and scratches are permitted with this limit:

a) Not more than 0.04 inch (1.0 mm) in depth.

CAUTION: AFTER YOU BLEND A FAN BLADE, EXAMINE AND REPAIR THE BLENDED FAN BLADE AT THE FIRST SHOP VISIT OPPORTUNITY (SEE CFMI ENGINE SHOP MANUAL). DAMAGE TO EQUIPMENT COULD OCCUR.

3) Blend repair all nicks, dents and scratches on the leading and trailing edges and blade airfoil that are out of the above limits (TASK 72-21-02-300-801-F00).

(j) Look for leading edge tip curl:

1) There is no limit to the quantity of blades with tip curl with these conditions:

a) The tip curl (X) does not extend more than 0.79 inch (20.0 mm) across the blade tip.

b) The tip curl (W) does not extend more than 0.79 inch (20.0 mm) down the leading edge.

c) The bend can not be more than a 60 degree deflection.

d) The maximum deflection (U) from the initial contour is not more than 0.40 inch (10.0 mm).

2) A maximum of four blades with tip curl are permitted with these conditions:

a) The tip curl (X) does not extend more than 1.3 inches (33.0 mm) across the blade tip.

b) The tip curl (W) does not extend more than 2.0 inches (51.0 mm) down the leading edge.

c) The bend can not be more than a 60 degree deflection.

d) No more than two adjacent blades can have tip curl.

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e) The maximum deflection (U) from the initial contour is not more than 0.6 inch (15.0 mm).

3) One blade with tip curl is permitted with these conditions:

a) The tip curl (X) does not extend more than 2.0 inches (51.0 mm) across the blade tip.

b) The tip curl (W) does not extend more than 2.0 inches (51.0 mm) down the leading edge.

c) The bend can not be more than a 60 degree deflection.

d) The maximum deflection (U) from the initial contour is not more than 1 inch (25.4 mm).

e) If the tip curl for one blade is more than the above limits, do a fluorescent penetrant Inspection of the upper panel (Area K) of the adjacent fan blade (TASK 70-40-01-230-801-F00).

NOTE: For instance, if fan blade positions #17, #18 and #19 are found with leading edge tip curl more than the above limit, do a fluorescent penetrant Inspection of the adjacent fan blade position #16. If fan blade positions #17, #19 and #20 are found with leading edge tip curl more than the above limit, do a fluorescent penetrant Inspection of the adjacent fan blades position #16 and #18. Numbers are counterclockwise when you look in the aft direction.

NOTE: Deferral of this inspection is not permitted.

(k) Look for trailing edge tip curl:

1) No limits to the quantity of blades with tip curl are permitted with these conditions:

a) The tip curl (Z) does not extend more than 0.79 inch (20.0 mm across the blade tip.

b) The tip curl (Y) does not extend more than 0.79 inch (20.0 mm) down the trailing edge.

c) The bend can not be more than a 60 degree deflection.

d) The maximum deflection (V) from the initial contour is not more than 0.40 inch (10.0 mm).

2) A maximum of four blades with tip curl of the trailing edge are permitted with these conditions:

a) The tip curl (Z) does not extend more than 1.2 inches (30.0 mm) across the blade tip.

b) The tip curl (Y) does not extend more than 1.2 inches (30.0 mm) down the trailing edge.

c) The bend can not be more than a 60 degree deflection.

d) No more than two adjacent blades can have tip curl.

e) The maximum deflection (V) from the initial contour is not more than 0.6 inch (15.0 mm).

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L. Shim Examination

SUBTASK 72-21-02-220-056-F00

(1) Examine the shim for damage (Figure 609).

NOTE: A reworked fan disk have a white line of paint that circles the fan disk, along with the words SHIMS + SPECIFIC SPACERS REQUIRED, DISK REPAIRED in white letters on one side of the disk.

(a) If you find damage to the shim that is more than the limits, replace the part, unless you are given other instructions.

(b) Damage on the Molydag coating on shim pressure face is permitted with these limits:

1) 25% of Molydag missing is permitted on the shim pressure face contact area.

2) 100% of Molydag coating is missing with these conditions:

NOTE: Repeat extension is not permitted.

a) There is no wear on the shim base material.

b) You lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00.

3) You can recondition the Molydag coating on the shim (TASK 72-21-02-300-807-F00).

(c) Cracks, tears or punctures

1) Not permitted.

(d) Scratches

1) All damage is permitted with this limit:

a) Not more than 0.003 in (0.08 mm) in depth.

(e) Nicks and dents

1) All damage is permitted with this limit:

a) Affected surface is less than 10% of each contact pressure face.

(f) Axial retention distortion

1) All damage is permitted with this limit:

a) Not more than 0.04 inch x 0.04 inch (1 mm x 1 mm) from the original contour.

M. Fan Disk Examination

SUBTASK 72-21-02-220-036-F00

(1) If you find damage to the fan disk that is more than the limits, replace the engine, unless you are given other instructions (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

SUBTASK 72-21-02-220-037-F00

(2) Examine the fan disk (other than the dovetail slots, referenced areas and surfaces, flange locating diameter and mating faces) for damage (Figure 610 and Figure 611):

(a) Cracks

1) Not permitted.

(b) Nicks, dents and scratches (Views B-B and C-C)

1) All damage is permitted with these limits:

a) Not more than 0.003 inch (0.08 mm) in depth.

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b) A continue-in-service limit of 2000 cycles is permitted if the damage is not more than 0.004 inch (0.1 mm) in depth.

SUBTASK 72-21-02-220-058-F00

(3) Examine the fan disk the referenced areas (other than the dovetail slots, flange locating diameter and mating faces) for damage (Figure 610, Figure 611):

(a) Nicks, dents and scratches (Area F; View B-B)

1) All damage is permitted with these limits:

a) Not more than 0.0012 inch (0.03 mm) in depth.

b) A continue-in-service limit of 2000 cycles is permitted if the damage is not more than 0.003 inch (0.08 mm) in depth.

(b) Nicks, dents and scratches (Area B; View B-B)

1) All damage is permitted with these limits:

a) Not more than 0.002 inch (0.05 mm) in depth.

b) A continue-in-service limit of 2000 cycles is permitted if the damage is not more than 0.003 inch (0.08 mm) in depth.

(c) Nicks, dents and scratches (only in Area J)

1) All damage is permitted with this limit:

a) Not more than 0.004 inch (0.10 mm) in depth.

SUBTASK 72-21-02-220-041-F00

(4) Examine the dovetail slots (Figure 610 and Figure 611):

(a) Cracks

1) Not permitted.

(b) Scratches and superficial marks on the pressure faces (only Area Q)

1) All damage is permitted with these limits:

a) Not more than 0.0008 inch (0.02 mm) in depth

b) A continue-in-service limit of 100 cycles is permitted if the damage is not more than 0.002 inch (0.05 mm) in depth.

(c) Fretting or wear on the pressure faces (Area Q) (Figure 611)

NOTE: The fan disk pressure face (Area Q) is defined as the contact area and Areas V. The Areas V are opposite the fan blade undercut areas.

NOTE: CFM SB 72-0525 provides the fan disk slot pressure face (Area Q) wear depth inspection threshold, unless given other AMM instructions. If you find fretting/wear on the fan disk pressure faces (Area Q), the wear depth has to be measured in the first (forward and aft) two inches of the slot with the fan disk dovetail slots gauge, SPL-4052.

1) All damage limits.

a) Wear depth measurement that is less than or equal to 0.007 inch (0.18 mm) is permitted (TASK 72-21-00-640-801-F00).

b) A continue-in-service limit for 1500 cycles is permitted for wear depth measurement that is more than 0.007 inch (0.18 mm) but less than or equal to 0.009 inch (0.23 mm) with this condition:

NOTE: Repeated service extension is permitted.

<1> Lubricate the fan blade and fan disk (TASK 72-21-00-640-801-F00).

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c) A continue-in-service limit of 500 cycles is permitted for a wear depth measurement that is more than 0.009 inch (0.23 mm) but less than or equal to 0.010 inch (0.25 mm) with this condition:

NOTE: Repeated service extension is not permitted.

<1> Lubricate the fan blade and fan disk (TASK 72-21-00-640-801-F00).

d) A continue-in-service limit of 50 cycles is permitted for a wear depth measurement that is more than 0.010 inch (0.25 mm) but less than or equal to 0.011 inch (0.28 mm) with this condition:

NOTE: Repeated service extension is not permitted.

<1> Lubricate the fan blade and fan disk (TASK 72-21-00-640-801-F00).

e) If the wear depth measurement is more than 0.011 inch (0.28 mm), the fan disk is not permitted, replace the engine.

(d) Nicks, dents and scratches on the dovetail slot forward face (not in Area N)

1) All damage is permitted with these limits:

a) Not more than 0.003 inch (0.08 mm) in depth

b) If the depth measurement is not more than 0.005 inch (0.127 mm) in depth, a continue-in-service limit of 3000 cycles is permitted.

c) If the depth measurement is not more than 0.006 inch (0.15 mm) in depth, a continue-in-service limit of 50 cycles is permitted.

d) If the depth measurement is more than 0.006 inch (0.15 mm) in depth, no service extension is permitted.

(e) Nicks, dents and scratches on the bottom edge of the pressure faces radius (only Area L)

1) All damage is permitted with this limit:

a) Not more than 0.0008 inch (0.02 mm) in depth.

(f) Nicks, dents and scratches in the bottom of the dovetail slots (only Area M)

1) All damage is permitted with this limit:

a) Not more than 0.0016 inch (0.04 mm) in depth on the face.

(g) Nicks, dents and scratches in the dovetail slots fillet radius of the fan disk (only on the forward and aft radius in Area N) (View C)

1) All damage is permitted with these limits:

a) Not more than 0.0016 inch (0.04 mm) in depth

b) A continue-in-service limit of 500 cycles is permitted if the damage is not more than 0.003 inch (0.08 mm) in depth.

SUBTASK 72-21-02-220-059-F00

(5) Examine the fan disk in the referenced surfaces, mating faces and locating diameter for damage (Figure 610 and Figure 611):

(a) Nicks, dents and scratches on surface P

1) All damage is permitted with this limit:

a) Not more than 0.004 inch (0.1 mm) in depth.

(b) Nicks, dents and scratches on mating surfaces R and S

NOTE: The mating surfaces are with the fan blade platforms and booster bolts.

1) All damage is permitted with this limit:

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a) Not more than 0.004 inch (0.1 mm) in depth.

(c) Wear on the mating surfaces R and S

1) All damage is permitted with this limit:

a) Not more than 0.002 inch (0.05 mm) in depth.

(d) Nicks, dents and scratches on the locating diameters (diameter P)

1) All damage is permitted with this limit:

a) Not more than 0.004 inch (0.1 mm) in depth.

(e) Fretting or wear (diameter P)

1) All damage is permitted with this limit:

a) All depths with maximum limit of 0.004 inch (0.1 mm) which is not more than 10% of circumference is permitted.

(f) Nicks, dents and scratches (Areas O and D, see Views B-B and D)

1) All damage is permitted with these limits:

a) Not more than 0.002 inch (0.05 mm) in depth.

b) A continue-in-service limit of 2000 cycles is permitted if the damage is not more than 0.003 inch (0.08 mm) in depth.

(g) Nicks, dents and scratches (Area E, see View D)

1) All damage is permitted with this limit:

a) Not more than 0.0059 inch (0.15 mm) in depth.

(h) Fretting or wear (Area E, see View D)

1) Measure the depth of Area E with inspection tool, SPL-7727.

a) A wear depth measurement less than or equal to 0.004 inch (0.10 mm) is permitted.

b) A wear depth measurement more than 0.004 inch (0.10 mm) but less than or equal to 0.006 inch (0.15 mm) is permitted with these conditions:

<1> A one time continue-in-service limit of 500 cycles is permitted if the elastomer spacers (SB 72-0548) are not installed.

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c) A wear depth measurement less than or equal to 0.0157 inch (0.40 mm) is permitted.

AKS ALL

SUBTASK 72-21-02-210-018-F00

(6) Examine the threaded pins on the fan disk mid lug for damage (Figure 612):

NOTE: Do not remove the threaded pins from the fan disk to do this inspection.

NOTE: If you find damage to the threaded pin that is more than the limits, replace the threaded pins unless you are given other instructions (TASK 72-21-02-300-804-F00).

(a) Examine the threaded pins for damage:

1) Cracks on the head end

a) Not permitted.

2) Nicks, dents and scratches on the pin diameter (threaded end)

a) All damage is permitted with these limits:

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<1> Not more than 0.02 inch (0.50 mm) in depth after you remove the high metal.

(b) Missing threaded pins

1) Not permitted

2) Examine the holes in the mid lug for damage.

(c) Loose threaded pins

1) Remove the loose threaded pins for a visual inspection:

a) If you find damage on the threaded pins, replace them (TASK 72-21-02-300-804-F00).

b) Examine the holes in the mid lug for damage.

c) Examine the nuts for damage.

N. Counterweight Examination

SUBTASK 72-21-02-210-011-F00

(1) If you find damage to the counterweights that is more than the limits, replace the counterweight , unless you are given other instructions (TASK 72-21-02-300-805-F00).

SUBTASK 72-21-02-211-001-F00

(2) Examine the counterweights for damage (Figure 613).

(a) Nicks, dents and scratches

1) All damage is permitted with this limit:

a) Not more than 0.008 inch (0.2 mm) in depth.

O. Front Flange (Surface A) of the Booster Spool Examination

SUBTASK 72-21-02-220-053-F00

(1) If you find damage to the front flange (Surface A) of the booster spool that is more than the limits, replace the engine, unless you are given other instructions (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

SUBTASK 72-21-02-220-054-F00

(2) Examine the front flange (Surface A) of the Booster spool for damage (Figure 613):

(a) Fretting/wear due to contact with the rear surface of the blade shank

NOTE: If you find fretting/wear on the booster spool front flange, use the inspection tool, SPL-12281 or equivalent or cast impression to find the extent of the damage.

1) Fretting/wear is permitted if not more than 0.016 inch (0.40 mm) in depth.

a) Lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

2) A 3000 cycles continue in-service extension is permitted if the fretting/wear is not more than 0.020 inch (0.50 mm) in depth with this condition:

NOTE: Repeat extension is permitted.

a) Lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

3) A continue-in-service limit of 1500 cycles is permitted if the fretting/wear is not more than 0.022 inch (0.55 mm) in depth with this condition:

NOTE: Repeat extension is permitted.

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a) Lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

4) A continue-in-service limit of 50 cycles is permitted if the fretting/wear is not more than 0.031 inch (0.80 mm) in depth with this condition:

NOTE: Repeat extension is not permitted.

a) Lubricate the fan blade set and the fan disk before revenue service (TASK 72-21-00-640-801-F00).

5) The booster spool must be removed if the fretting/wear is more than 0.031 inch (0.80 mm) in depth.

(b) Damage to the Molydag coating on the forward surface

1) All quantities of missing Molydag coating is permitted.

SUBTASK 72-21-02-210-016-F00

(3) Examine the threaded pins on the booster spool forward lug for damage (Figure 612):

NOTE: Do not remove the threaded pins from the booster spool to do this inspection.

NOTE: If you find damage to the threaded pin that is more than the limits, replace the threaded pins unless you are given other instructions (TASK 72-21-02-300-805-F00).

(a) Examine the threaded pins for damage:

1) Cracks on the head end

a) Not permitted.

2) Nicks, dents and scratches on the pin diameter (threaded end)

a) All damage is permitted with these limits:

<1> Not more than 0.02 inch (0.50 mm) in depth after you remove the high metal.

(b) Missing threaded pins

1) Not permitted

2) Examine the holes in the forward lug for obvious damage.

(c) Loose threaded pins

1) Remove the loose threaded pins for a visual inspection:

a) If you find damage on the threaded pins, replace them (TASK 72-21-02-300-805-F00).

b) Examine the holes in the forward lug for obvious damage.

c) Examine the nuts for damage.

P. Fan Shaft and Fan Disk Inner Cavity Examination

SUBTASK 72-21-02-210-017-F00

(1) Examine the exposed area of the fan shaft and fan disk inner cavity for oil wetting (Figure 614).

(a) Oil wetting of the inner surface of the spinner cones, the fan disk and the fan shaft is not permitted.

(b) To correct the oil seepage, do this task: Replacement of the LPT Shaft Plug O-ring, TASK 72-55-00-941-801-F00.

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Q. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-02-200-004-F00

CAUTION: MAKE SURE THAT YOU REMOVE ALL TOOLS, LOOSE PARTS AND UNWANTED MATERIAL FROM THE AREA WHEN YOU COMPLETE MAINTENANCE. DAMAGE TO EQUIPMENT COULD OCCUR.

(1) Make sure that you remove tools, parts or unwanted material from the blades and inlet cowl.

SUBTASK 72-21-02-410-002-F00

(2) Do this task: Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-02-080-002-F00

CAUTION: MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(3) Remove the protective mat, STD-585 from the fan inlet.

SUBTASK 72-21-02-440-001-F00

(4) Remove the DO-NOT-OPERATE tag from the applicable engine start lever.

SUBTASK 72-21-02-860-011-F00

(5) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-02-860-012-F00

(6) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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Elastomer Spacer Inspection
Figure 601/72-21-02-990-841-F00

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S-M56-MM-03750-00-B
G22828 S0006582380_V2

Retaining Ring Inspection
Figure 602/72-21-02-990-819-F00

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Platform Inspection
Figure 603/72-21-02-990-805-F00 (Sheet 1 of 2)

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B

B0044300

2243896 S0000502559_V2

Platform Inspection
Figure 603/72-21-02-990-805-F00 (Sheet 2 of 2)

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Spacer Inspection
Figure 604/72-21-02-990-806-F00

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B0024701
G21147 S0006582364_V4

Fan Blade Inspection
Figure 605/72-21-02-990-802-F00 (Sheet 1 of 4)

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G21168 S0006582365_V6

Fan Blade Inspection
Figure 605/72-21-02-990-802-F00 (Sheet 2 of 4)

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Fan Blade Inspection
Figure 605/72-21-02-990-802-F00 (Sheet 3 of 4)

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G

B0044100
1930149 S0000364380_V2

Fan Blade Inspection
Figure 605/72-21-02-990-802-F00 (Sheet 4 of 4)

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NOTE:

DOTTED LINES INDICATE ORIGINAL CONTOUR OF LEADING EDGE

U32723 S0000192366_V2

Fan Blade LE Distortion Area K
Figure 606/72-21-02-990-837-F00

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NOTE:

CONVEX SIDE OF BLADE IS SHOWN, CONCAVE SIDE IS EQUIVALENT.

1 CONTACT AREA

2 NON CONTACT AREA

MM-00248-00

N73330 S0006582367_V6

Fan Blade Pressure Faces Coating/Contact Area Inspection
Figure 607/72-21-02-990-803-F00

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LEGEND:

AREA [X]

L07142 S0006582370_V4

Fan Blade Pressure Faces Coating Inspection
Figure 608/72-21-02-990-804-F00 (Sheet 1 of 2)

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C

D

LEGEND:

AREA [Y]

L07327 S0006582371_V5

Fan Blade Pressure Faces Coating Inspection
Figure 608/72-21-02-990-804-F00 (Sheet 2 of 2)

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NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES.

J67249 S0000174879_V3

Shim Inspection
Figure 609/72-21-02-990-817-F00

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G22834 S0006582381_V2

Fan Disk Inspection
Figure 610/72-21-02-990-820-F00 (Sheet 1 of 3)

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G22876 S0006582382_V3

Fan Disk Inspection
Figure 610/72-21-02-990-820-F00 (Sheet 2 of 3)

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B-B

C-C

B0028902
G22917 S0006582383_V5

Fan Disk Inspection
Figure 610/72-21-02-990-820-F00 (Sheet 3 of 3)

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CONVEX SIDE (CV)

CONCAVE SIDE (CC)

NOTE:

AREAS [V] RELATES TO THE FAN BLADE UNDERCUT AREAS.
THERE IS NO PRESSURE CONTACT ON THE AREAS [V].

- CV FAN DISK SIDE RELATES TO CC FAN BLADE SIDE.
- CC AND DISK SIDE RELATES TO CV FAN BLADE SIDE.

L32879 S0006582384_V5

Fan Disk Pressure Faces Inspection
Figure 611/72-21-02-990-821-F00

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J67492 S0000175026_V2

Fan Disk and Booster Spool Threaded Pins Inspection
Figure 612/72-21-02-990-807-F00

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1 DETAILS OF WEAR OBSERVED AT THE REAR BEARING SURFACE AREA.

MM-00611-00-B
M49439 S0006582386_V3

Booster Spool Inspection
Figure 613/72-21-02-990-823-F00

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LPT Shaft Plug Inspection
Figure 614/72-21-02-990-829-F00

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FAN BLADE - REPAIRS

1. General

A. This procedure has these tasks:

(1) Repair the Fan Blade

(2) Fan Blade Platform Forward Lug Repair

(3) Replace the Platform Balance Weight

(4) Replace or Retighten the Fan Disk Mid Lug Threaded Pins

(5) Replace or Retighten the Booster Spool Threaded Pins

(6) Recondition the Lubricant Coating on the Fan Blade Shim.

TASK 72-21-02-300-801-F00

2. Repair the Fan Blade

(Figure 801, Figure 802)

A. General

(1) Each fan blade can be repaired by blending, as specified in this task.

NOTE: You must remove the fan blade to do this repair. A blending repair of the leading edge can be done with the blade installed.

(2) Blades that have damage that is more than the blending limits in this task must be replaced.

B. References

Reference	Title
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-40-02-200-801-F00	Fan Blade Leading Edge Eddy Current Inspection (P/B 201)
71-00-00-700-814-F00	Test 7 - Vibration Survey (P/B 501)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8468	Inspection Kit - Eddy Current Part #: 856A2682G01 Supplier: 58828
SPL-8910	Template - Fan Blade Leading Edge Part #: 856A3771G01 Supplier: 58828
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735

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E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare To Repair the Fan Blade

SUBTASK 72-21-02-040-003-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-02-040-004-F00

(2) Make sure that the START switches are in the OFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable START switch.

SUBTASK 72-21-02-480-003-F00

CAUTION: MAKE SURE THAT YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(3) Install a protective mat, STD-585 in the inlet cowl.

SUBTASK 72-21-02-160-003-F00

(4) If the fan blade is dirty, clean unwanted material from the fan blade with alcohol, B00676 [CP1041].

G. Examine the Fan Blades

SUBTASK 72-21-02-220-052-F00

(1) Make sure that the damage and the area of the repair will be less than the blending limits that follow (Figure 801, Figure 802):

(a) If the damage or repair area is more than the limits, replace the fan blades.

These are the tasks:

Fan Blade Removal (Complete Set), TASK 72-21-02-000-801-F00,

Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

(b) Repairs are permitted if they are in blending limits.

SUBTASK 72-21-02-350-001-F00

(2) The leading edge, trailing edge, and root area repair in the critical areas:

(a) Find the critical area J on the leading edge as follows (Figure 801):

1) The size and location of the critical area J are nearest the blade root

a) The distance (DIM. AB) from the bottom of the blade root is 1.34 in. (34 mm).

b) The critical area longitudinal dimension (DIM. AN) is 2.36 in. (60 mm) and the chordal dimension (DIM. AC) is 0.79 in. (20 mm).

(b) Blend repairs are not permitted in the critical area and the root area (Figure 801).

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SUBTASK 72-21-02-350-002-F00

(3) The leading edge and trailing edge repair in the non-critical area (not in the root area) (Figure 801):

(a) The leading edge dimensions

1) Taper the blend repair for the dimensions (DIM. W), (DIM. WA), and (DIM. WB) as follows:

a) The blend repair is not more than 0.339 in. (8.600 mm) in the chordal direction (DIM. W).

b) The blend repair is not more than 0.16 in. (4.06 mm) in the chordal direction (DIM. WA).

c) The blend repair is not more than 0.08 in. (2.03 mm) in. the chordal direction (DIM. WB)

d) When the distance (DIM. O) between two blend repairs is less than or equal to five times the depth of the smallest of these blends, tangentially blend out the bottom of the two blends (Figure 802).

e) The leading edge cumulative length of blend repairs for each blade is less than or equal to 5.51 in. (140 mm).

f) The leading edge cumulative length of blend repairs for each engine is less than or equal to 36.22 in. (920 mm).

(b) Leading edge (AREAS A and B) blend repairs are permitted with these limits (Figure 802):

1) Make sure after you do the blending repair, that the edge thickness is not less than the initial thickness.

2) The longitudinal direction of the repair must be equal to or more than fifteen times the depth (DIM. P) of the damage (View A).

3) The radius minimum (R4) is equal to or more than twenty times the depth (DIM. P) of the damage.

4) The radius minimum (R3) for the blend repair on each side of the initial damage is a minimum radius blend of 0.20 in. (5 mm).

5) The radius maximum (R3) for the blend repair on each side of the initial damage is a maximum radius blend of 0.31 in. (8 mm).

(c) Leading edge (AREA C) blend repairs are permitted with these limits (Figure 802):

1) Make sure after you do the blending repair, that the edge thickness is not less than the initial thickness.

2) The longitudinal direction of the repair must be equal to or more than eight times the depth (DIM. P) of the damage (View A).

3) The radius minimum (R4) is equal to or more than ten times the depth (DIM. P).

4) The radius minimum (R3) for the blend repair on each side of the initial damage is a minimum radius blend of 0.20 in. (5 mm).

5) The radius maximum (R3) for the blend repair on each side of the initial damage is a maximum radius blend of 0.31 in. (8 mm).

6) If the distance (DIM. O1) between the blend repair and the blade tip is not more than two times the depth P of the repair, do this step:

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a) Blend the bottom area of the repair tangentially from the depth (DIM. P) of the area to the blade tip and blend the tip to the blending tip radius (R1).

(d) The trailing edge dimensions (Figure 801).

1) Taper the blend repair for dimension (AH) as follows:

a) The blend repair is not more than 0.16 in. (4.06 mm) in the chordal direction (AH).

b) The trailing edge cumulative length of blend repairs is less than or equal to 2.76 in. (70 mm).

(e) Trailing edge (AREA E) blend repairs are permitted with these limits (Figure 802):

1) Make sure after you do the blending repair, that the edge thickness is not less than the initial thickness.

2) The longitudinal direction of the repair must be equal to or more than eight times the depth (DIM. P) of the damage (View A).

3) The radius minimum (R4) is equal to or more than ten times the depth (DIM. P) of the damage.

4) The radius minimum (R3) for the blend repair on either side of the initial damage is a minimum radius blend of 0.2 in. (5 mm).

5) The radius maximum (R3) for the blend repair on either side of the initial damage is a maximum radius blend of 0.31 in. (8 mm).

6) If the distance (DIM. O1) between the blend repair and the blade tip is not more than two times the depth (DIM. P) of the repair, do this step:

a) Blend the bottom area of the repair tangentially from the depth (DIM. P) of the area to the blade tip and blend the tip to the blending tip radius R2.

SUBTASK 72-21-02-320-001-F00

(4) Blade root area blend repair:

(a) Not permitted.

SUBTASK 72-21-02-320-002-F00

(5) Blade tip repair (AREA D):

(a) The blend repair does not extend more than 0.04 in. (1 mm) in the longitudinal direction (AD) (Figure 801).

(b) The chordal direction of the repair must be equal to or more than eight times the depth (DIM. P) of the damage (Figure 802) (View A).

(c) The minimum radius (R4) is equal to or more than ten times the depth (DIM. P) of the damage.

(d) The radius (R1) blend repair between the leading edge and the tip is not less than 0.01 in. (0.25 mm) and is not more than 0.67 in. (17 mm).

(e) The radius (R2) blend repair between the trailing edge and the tip is not less than 0.01 in. (0.25 mm) and is not more than 0.5 in. (12.7 mm).

(f) When the distance (DIM. O) between two blend repairs is less than or equal to two times the depth of the repair, blend the two repairs together to a line which tangentially connects the bottom areas.

(g) If the distance (DIM. O1) between the blend tip repair and the blade leading edge is less than two times the depth of the repair, do this step:

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1) Blend the bottom of the repair tangentially across to the blade leading edge and blend the tip to the blending tip radius R1.

(h) If the distance (DIM. O1) between the blend tip repair and the blade trailing edge is less than two times the depth of the repair, do this step:

1) Blend the bottom of the repair tangentially across to the blade trailing edge and blend the tip to the blending tip radius R2.

(i) The blade tip total cumulative length of the blend repairs is less than or equal to 0.80 in. (20 mm).

SUBTASK 72-21-02-350-003-F00

(6) Fan blade airfoil blend repairs:

(a) The convex or the concave surface repairs

1) Repairs are permitted on the surface with this limit (Figure 801):

a) Do not do repairs inside the blade critical areas.

b) Blending airfoil repair is not permitted in the blade root area.

2) If the blade thickness in the damaged area is less than 0.08 in. (2 mm), do this step (Figure 802) (View C-C):

a) The concave or convex blend repair depth (DIM. K) becomes not more than one-half of the blade thickness (DIM. U).

3) If the blade thickness in the damaged area is equal to or more than 0.08 in. (2 mm), do this step:

a) The concave or convex blend repair depth is not more than 0.04 in. (1 mm).

4) The concave or convex blend repair minimum radius (R5) is not less than eight times the depth (DIM. K).

5) The concave or convex blend repair area length is the sum of (DIM. S) and (DIM. T).

a) The total length of the (DIM. S) and (DIM. T) for a blend repair is not more than 1.0 in. (25.4 mm).

b) The maximum length of the (DIM. T) is two times the length (DIM. S).

c) The convex side cumulated length of all blend repairs (All DIM. S + All DIM. T) is less than or equal to 3.0 in. (76.2 mm).

d) The concave side cumulated length of all blend repairs (All DIM. S + All DIM. T) is less than or equal to 3.0 in. (76.2 mm).

e) The distance (DIM. O2) between two blend repairs must be more than the larger of the two sums (DIM. S)+(DIM. T) of the repairs.

SUBTASK 72-21-02-280-001-F00

(7) At the first opportunity and if the fan blade is removed from the rotor or when the engine is removed, do these steps:

(a) Measure the moment-weight of the blade.

(b) Make a record of the new moment-weight on the blade.

(c) If the moment-weight changes more than 79 g-in. (200 g-cm), correct the balance of the fan blade rotor.

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H. Repair the Fan Blades

SUBTASK 72-21-02-350-004-F00

CAUTION: DO NOT MAKE TOO MUCH HEAT DURING THE BLENDING REPAIR. TOO MUCH HEAT CAN MAKE THE BLADE WEAK AND WILL BURN YOUR HAND.

(1) If you use power tools during the repair, regularly touch the blade with a bare hand.

(a) If the blade is too hot to the touch, let it cool before you continue.

SUBTASK 72-21-02-350-007-F00

(2) Do a blending of the defects as follows:

(a) Hand blend the defects (CFM CFM56 Standard Practices Manual 70-41-11) with a fine file or a silicone carbide abrasive cloth, grade 150 or 180, used dry.

(b) Hand finish/polish with strips of silicone carbide abrasive cloth, grade 400 or 800, until you get a surface finish of 32 micro in. (0.8 micrometers).

(c) If large or deep blends are necessary, you can do blending (CFM CFM56 Standard Practices Manuel 70-41-12) with a low speed power tool equipped with appropriate titanium grinding tool, to decrease the time necessary to remove metal for major blending repairs.

SUBTASK 72-21-02-350-005-F00

(3) These conditions are necessary to get the correct blade repair results:

(a) Do a check that the leading edge blend repairs depths are in the limits of fan blade leading edge template, SPL-8910, or equivalent. The leading and trailing edge radius of the areas that you repaired must agree with the initial contour.

1) See the correct contour specifications to blend the leading edge to the existing profile (Figure 802 and Figure 803).

NOTE: Make sure that the profile is continuous.

(b) Do a check that the convex and concave side depths of the blend repairs relative to adjacent unrepaired surfaces are in the blending limits.

(c) Remove the material to a minimum of 0.03 in. (0.76 mm) below the damage.

SUBTASK 72-21-02-110-003-F00

(4) Clean the blended areas with a white cloth moistened with solvent, B00062, or alcohol, B00676 [CP1041].

SUBTASK 72-21-02-320-005-F00

(5) Make sure that the damage is fully removed, do one of these inspections:

(a) Do this task, Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

1) No indication is permitted.

2) For blend repairs in Area B, C, D or E, it is permitted to defer the penetrant inspection for 10 cycles or 25 hours after the repair.

3) For blend repairs in Area A, do the penetrant inspection immediately after the repair.

(b) Or do this task, Fan Blade Leading Edge Eddy Current Inspection, TASK 70-40-02-200-801-F00.

1) Use the eddy current inspection kit, SPL-8468.

2) No indication is permitted.

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3) For blend repairs in Area B, C, D or E, it is permitted to defer the inspection for 10 cycles or 25 hours after the repair.

4) For blend repairs in Area A, do the inspection immediately after the repair.

I. Put the Airplane Back to its Usual Condition:

SUBTASK 72-21-02-080-003-F00

CAUTION: MAKE SURE THAT YOU REMOVE ALL TOOLS, PARTS AND UNWANTED MATERIAL FROM THE INLET COWL. DAMAGE TO EQUIPMENT COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(1) Remove the protective mat, STD-585 from the fan inlet cowl.

SUBTASK 72-21-02-080-004-F00

(2) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-21-02-860-003-F00

(3) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

J. Fan Blade Repair Installation Test

SUBTASK 72-21-02-210-008-F00

(1) If it is necessary, do this task: Test 7 - Vibration Survey, TASK 71-00-00-700-814-F00.

NOTE: Fan rotor balance could be affected if the moment-weight of a blade is changed more than 79 g-in. (200 g-cm). When a significant amount of base material was removed during fan blade blend repair or if the engine imbalance was close to the limits, make sure that the engine imbalance is not more than the guidelines. A vibration survey (TASK 71-00-00-700-814-F00) can be done if the operator thinks that it is necessary. The results from the vibration survey will indicate if a dynamic fan trim balance is necessary.

END OF TASK

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Definition of Critical Areas
Figure 801/72-21-02-990-809-F00

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	AREAS A and B
RADIUS R4 MIN.	20 x DIM.P
DIM. L MIN.	15 x DIM.P
	AREAS C,D and E
RADIUS R4 MIN.	10 x DIM.P
DIM. L MIN.	8 x DIM.P

LEGEND:

EXAMPLES OF AREAS TO BE BLENDED DEPENDING ON DIM. 0 AND DIM. 01 VALUES.

MM-00073-01-B
G97056 S0006582390_V4

Fan Blade Blend Limits
Figure 802/72-21-02-990-810-F00 (Sheet 1 of 2)

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TYPICAL BLEND REPAIR VALID
FOR CONVEX AND CONCAVE SIDES
(OUT OF L/E AND T/E AND
BLADE TIP AREAS)

RADIUS R5 MINI = 8 x DIM. K
DIM. S MINI = 10 x DIM. K
DIM. T MINI = 1 x DIM. S
DIM. T MAX. = 2 x DIM. S
DIM. O2 MINI = DIM. S + DIM. T

C-C

C-C

MM-00235-00-B
MM-00073-01-B
G97277 S0006582391_V3

Fan Blade Blend Limits
Figure 802/72-21-02-990-810-F00 (Sheet 2 of 2)

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TYPICAL EXAMPLES OF UNACCEPTABLE LEADING EDGE CONTOURS

LEGEND:

NOMINAL CONTOUR
UNACCEPTABLE CONTOUR

NOTE:

THE LEADING EDGE MUST BE CONTINUOUS WITHOUT STRAIGHT OR SHARP AREAS AND IRREGULARITIES OR SUDDEN CHANGES IN THE SHAPE. ABRUPT BREAKS IN CONTOUR OR FLAT SPOTS ON THE LEADING EDGE ARE UNACCEPTABLE.

MM-00236-00-B

438748 S0000141800_V2

Leading Edge Contours
Figure 803/72-21-02-990-825-F01

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TASK 72-21-02-300-808-F00

3. **Fan Blade Platform Forward Lug Repair**

(Figure 804 and Figure 805)

A. **General**

(1) This task gives the instructions on how to repair the forward lug on the fan blade platform.

B. **References**

Reference	Title
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. **Consumable Materials**

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G02449 [CP2189]	Cloth - Abrasive, Silicone Carbide, 150 Grit - Durite G422	
G02450 [CP2191]	Cloth - Abrasive, Silicone Carbide, 180 Grit - Durite G421	

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Prepare for the Repair**

SUBTASK 72-21-02-010-011-F00

(1) Remove the applicable fan blade platform (TASK 72-21-02-000-801-F00).

F. **Fan Blade Platform Repair**

SUBTASK 72-21-02-110-010-F00

WARNING: DO NOT GET ACETONE, ISOPROPYL ALCOHOL, OR DESOCLEAN CLEANING SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON EYE PROTECTION, AND GLOVES. KEEP THE SOLVENTS AWAY FROM SPARKS, FLAME, AND HEAT. THEY ARE POISONOUS AND FLAMMABLE. THEY CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(1) Remove the grease from the area that you will repair with a clean cloth made moist with alcohol, B00676 [CP1041] or acetone solvent, B01058 [CP1039].

SUBTASK 72-21-02-320-006-F00

(2) Remove the marks as follows:

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(a) Do a hand-blending to remove a quantity of material as small as possible.

NOTE: Contact the engine manufacturer for the Standard Practices Manual 70-41-12. Refer to the manual for the hand-blending procedure.

NOTE: To do a large or deep blending, you can use the low-speed power tool given in the Standard Practices Manual 70-41-12. If you use the power tool, you must do a hand-finish as given in the procedure that follows.

NOTE: You must do the blending in a radial direction to the engine axis.

(b) Do a hand-blending to get a clean and smooth surface with Durite G422 cloth, G02449 [CP2189] and Durite G421 cloth, G02450 [CP2191].

NOTE: The surface finish (roughness) must be equal to 63 microinches (1.6 micrometers).

(c) Do a visual inspection of the repair area.

1) Make sure that you fully remove the mark.

NOTE: Sharp grooves are not permitted.

SUBTASK 72-21-02-230-001-F00

(3) Do these steps for the fluorescent penetrant inspection of the platform:

(a) Do a local swab etching on all the blended areas with the etchant for aluminum alloy (S1096).

NOTE: Contact the engine manufacturer for the Standard Practices Manual 70-53-11. Refer to the manual for the swab etching procedure.

(b) Do this task: Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

(c) Make sure that there are no cracks.

SUBTASK 72-21-02-220-062-F00

(4) Do a dimensional inspection of the repaired area as follows:

(a) Dim. BA

1) Minimum Finish Dimension - 0.3582 inch (9.10 mm).

(b) Dim. BB

1) Maximum Finish Dimension - 0.0433 inch (1.10 mm).

(c) Dim. BC

1) Minimum Finish Dimension - 0.2440 inch (6.20 mm)

2) Maximum Finish Dimension - 0.2559 inch (6.50 mm).

(d) Dim. BD

1) Minimum Finish Dimension - 0.0905 inch (2.30 mm)

2) Maximum Finish Dimension - 0.1062 inch (2.70 mm).

(e) Dim. BE

1) Reference Dimension - 0.0618 inch (1.57 mm).

SUBTASK 72-21-02-390-001-F00

(5) Do a spot touch-up of oxide film coating on the repaired area.

NOTE: Contact the engine manufacturer for the Standard Practices Manual 70-62-13. The manual has the touch-up procedure of the oxide film coating.

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SUBTASK 72-21-02-280-002-F00

(6) Find the weight of the fan blade platform.

AKS ALL PRE SB 737-CFM56-7B-72-0909

(a) The minimum weight of the platform that is acceptable is 11.676 oz (331 g).

AKS ALL POST SB 737-CFM56-7B-72-0909

(b) The minimum weight of the platform that is acceptable is 11.394 oz (323 g).

AKS ALL

(c) If the weight is less than the minimum, replace the fan blade platform.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-02-410-015-F00

(1) Install the applicable fan blade platform (TASK 72-21-02-400-801-F00).

——— END OF TASK ———

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Fan Blade Platform Forward Lug (Back Side Corner) Repair
Figure 804/72-21-02-990-845-F00

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B0044500
B0044600
2243972 S0000502609_V2

Fan Blade Platform (Forward Lug Back Side Corner) Finish Dimensions
Figure 805/72-21-02-990-846-F00

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TASK 72-21-02-300-806-F00

4. Platform Balance Weight Replacement

(Figure 806)

A. General

(1) This task is to replace the balance weight on the fan blade platform.

(a) It is necessary to remove the platform to do this repair.

B. References

Reference	Title
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Consumable Materials

Reference	Description	Specification
A50411 [CFMI, CP2604]	Adhesive - Liquid adhesive Agent	
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
C50292 [CFMI, CP2603]	Primer - Polyolefin	

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Replacement

SUBTASK 72-21-02-010-009-F00

(1) Remove the applicable fan blade platform (TASK 72-21-02-000-801-F00).

F. Platform Balance Weight Replacement

SUBTASK 72-21-02-110-007-F00

(1) Remove the grease from the platform with a light alkaline degreasing solution (CFM56 SPM 70-21-14).

NOTE: SPM 70-21-14 is applicable to the AZ5GU.

SUBTASK 72-21-02-020-018-F00

(2) Remove the balance weight (elastomer strip).

SUBTASK 72-21-02-370-001-F00

(3) If you can see the base metal, do a touch-up of sulfuric anodizing at the first shop visit (see CFMI engine shop manual (CFMI-TP.SM.10)).

SUBTASK 72-21-02-221-001-F00

(4) Weigh the platform and record the weight.

AKS ALL PRE SB 737-CFM56-7B-72-0909

SUBTASK 72-21-02-221-002-F00

(5) Cut the elastomer strip to get a total weight of 11.676 oz (331 g) – 11.746 oz (333 g) for the platform and elastomer strip.

NOTE: The adhesive does not change the weight of the parts.

(a) The elastomer strip is 0.31 in. (8 mm) high and 0.59 in. (15 mm) wide.

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AKS ALL PRE SB 737-CFM56-7B-72-0909 (Continued)

0.03527 oz (1 g) = 0.169 in. (4.3 mm) = length of the elastomer strip.

AKS ALL POST SB 737-CFM56-7B-72-0909

SUBTASK 72-21-02-220-063-F00

(6) Cut the elastomer strip to get a total weight of 11.394 oz (323 g) – 11.464 oz (325 g) for the platform and elastomer strip.

NOTE: The adhesive does not change the weight of the parts.

(a) The elastomer strip is 0.31 in. (8 mm) high and 0.59 in. (15 mm) wide.

0.03527 oz (1 g) = 0.169 in. (4.3 mm) = length of the elastomer strip.

AKS ALL

SUBTASK 72-21-02-110-008-F00

(7) Remove the grease from the platform and elastomer strip with a clean cloth made moist with alcohol, B00676 [CP1041].

SUBTASK 72-21-02-350-010-F00

(8) Apply Loctite 770, C50292 [CFMI, CP2603] to the part you will bond.

(a) Let the part dry from one minute to one hour at ambient temperature.

SUBTASK 72-21-02-350-011-F00

(9) Apply Loctite 480, A50411 [CFMI, CP2604] to the other part you will bond.

(a) Apply an approximately 0.004 in. (0.1 mm) – 0.008 in. (0.2 mm) thick layer.

SUBTASK 72-21-02-350-012-F00

(10) Quickly bond the elastomer strip.

NOTE: You cannot change the position of the elastomer strip after contact.

SUBTASK 72-21-02-350-013-F00

(11) Cure the parts for 30 seconds to two hours at ambient temperature.

AKS ALL PRE SB 737-CFM56-7B-72-0909

SUBTASK 72-21-02-221-003-F00

(12) Weigh the platform. Make sure the final weight is 11.676 oz (331 g) - 11.746 oz (333 g).

AKS ALL POST SB 737-CFM56-7B-72-0909

SUBTASK 72-21-02-220-064-F00

(13) Weigh the platform. Make sure the final weight is 11.394 oz (323 g) - 11.464 oz (325 g).

AKS ALL

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-02-410-013-F00

(1) Install the applicable fan blade platforms (TASK 72-21-02-400-801-F00).

END OF TASK

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U66288 S0000212552_V2

Platform Balance Weight Replacement
Figure 806/72-21-02-990-838-F00 (Sheet 1 of 3)

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U66290 S0000212554_V2

Platform Balance Weight Replacement
Figure 806/72-21-02-990-838-F00 (Sheet 2 of 3)

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B

U66295 S0000212592_V2

Platform Balance Weight Replacement
Figure 806/72-21-02-990-838-F00 (Sheet 3 of 3)

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TASK 72-21-02-300-804-F00

5. Replace or Retighten the Fan Disk Mid Lug Threaded Pins

(Figure 807)

A. General

(1) This task is to replace or retighten the threaded pins on the fan disk mid lug.

B. References

Reference	Title
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For The Procedure

SUBTASK 72-21-02-010-007-F00

(1) Remove the applicable fan blades (TASK 72-21-02-000-801-F00).

F. Procedure

SUBTASK 72-21-02-020-014-F00

(1) Remove the applicable threaded pin from the fan disk mid lug:

(a) Use a standard wrench on the threaded pin head to loosen the threaded pin.

(b) Remove the threaded pin and nut.

SUBTASK 72-21-02-110-004-F00

CAUTION: KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(2) Remove oil and grease with a clean white cloth moistened with acetone solvent, B01058 [CP1039] or alcohol, B00676 [CP1041] from the removed parts, attachment holes and surrounding area.

SUBTASK 72-21-02-420-006-F00

(3) Do these steps to install the threaded pin on the fan disk mid lug:

(a) Apply a thin layer of graphite compound, D00601 [CP2101] to the threads and below the head of the threaded pin.

CAUTION: INSTALL THE THREADED PINS WITH THE HEAD FORWARD. AN INCORRECT INSTALLATION WILL CAUSE DAMAGE TO THE EQUIPMENT.

(b) Install the threaded pin, with the head forward, on the fan disk mid lug (Figure 807).

(c) Install the nut and tighten with your hand.

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AKS ALL PRE SB 737-CFM56-7B-72-0777

(d) Tighten the threaded pin with this sequence of steps:

1) Tighten the pin to 140-160 inch-pounds (16-18 newton-meters).
2) Loosen the pin by a quarter-turn or a half-turn.
3) Re-tighten the pin to 140-160 inch-pounds (16-18 newton-meters).

AKS ALL POST SB 737-CFM56-7B-72-0777

(e) Tighten the threaded pin with this sequence of steps:

1) Tighten the pin to 278-307 inch-pounds (31.4-34.7 newton-meters).
2) Loosen the pin by a quarter-turn or a half-turn.
3) Re-tighten the pin to 278-307 inch-pounds (31.4-34.7 newton-meters).

AKS ALL

(f) Remove any excess grease.

G. Put The Airplane Back To Its Usual Condition

SUBTASK 72-21-02-410-009-F00

(1) Install the applicable fan blades (TASK 72-21-02-400-801-F00).

END OF TASK

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J67021 S0000175514_V2

Fan Disk Mid Lug Threaded Pin
Figure 807/72-21-02-990-831-F00

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TASK 72-21-02-300-805-F00

6. Replace or Retighten the Booster Spool Threaded Pins

A. General

(1) This task is to replace or retighten the threaded pins on the booster spool.

AKS ALL POST SB CFM56-7B-72-0296

(a) The threaded pin is installed into a counterweight.

AKS ALL

B. References

Reference	Title
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Procedure

SUBTASK 72-21-02-010-008-F00

(1) Remove the applicable fan blades (TASK 72-21-02-000-801-F00).

AKS ALL POST SB CFM56-7B-72-0296

F. Replace or Retighten the Threaded Pins and Counterweights on the Booster Spool

(Figure 808)

SUBTASK 72-21-02-020-015-F00

(1) Remove the applicable counterweight and threaded pin from the booster spool:

(a) Use a standard wrench on the threaded pin head to loosen the threaded pin.

(b) Remove the threaded pin and the counterweight.

SUBTASK 72-21-02-110-005-F00

CAUTION: KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(2) Remove oil and grease from the removed parts, attachment holes and surrounding area with a clean white cloth moistened with acetone solvent, B01058 [CP1039] or alcohol, B00676 [CP1041].

SUBTASK 72-21-02-420-007-F00

(3) Do these steps to install the threaded pin and counterweight on the booster spool:

(a) Apply a thin layer of graphite compound, D00601 [CP2101] to the threads and below the head of the threaded pin.

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AKS ALL POST SB CFM56-7B-72-0296 (Continued)

CAUTION: INSTALL THE THREADED PINS WITH THE HEAD FORWARD. AN INCORRECT INSTALLATION WILL CAUSE DAMAGE TO THE EQUIPMENT.

(b) Install the threaded pin, with the head forward, and the counterweight on the booster spool (Figure 808). Tighten with your hand.

(c) Tighten the threaded pin with this sequence of steps:

1) Tighten the pin to 312.55 in-lb (35.31 N·m) - 345.45 in-lb (39.03 N·m).

2) Loosen the pin by a quarter-turn or a half-turn.

3) Re-tighten the pin to 312.55 in-lb (35.31 N·m) - 345.45 in-lb (39.03 N·m).

(d) Remove any excess grease.

AKS ALL POST SB CFM56-7B-72-0300

G. Replace or Retighten the Threaded Pins and Counterweights on the Booster Spool (Figure 809)

SUBTASK 72-21-02-020-016-F00

(1) Remove the applicable threaded pin from the booster spool:

(a) Use a standard wrench on the threaded pin head to hold the threaded pin.

(b) Loosen the nut while you hold the threaded pin.

(c) Remove the threaded pin and nut.

SUBTASK 72-21-02-110-006-F00

CAUTION: KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(2) Remove oil and grease from the removed parts, attachment holes and surrounding area with a clean white cloth moistened with acetone solvent, B01058 [CP1039] or alcohol, B00676 [CP1041].

SUBTASK 72-21-02-420-008-F00

(3) Do these steps to install the threaded pin on the booster spool:

(a) Apply a thin layer of graphite compound, D00601 [CP2101] to the threads and below the head of the threaded pin.

CAUTION: INSTALL THE THREADED PINS WITH THE HEAD FORWARD. AN INCORRECT INSTALLATION WILL CAUSE DAMAGE TO THE EQUIPMENT.

(b) Install the threaded pin, with the head forward, on the booster spool and nut (Figure 809). Tighten with your hand.

(c) Tighten the threaded pin with this sequence of steps:

1) Use a standard wrench to hold the nut.

2) Tighten the pin to 465.5 in-lb (52.6 N·m) - 514.5 in-lb (58.1 N·m).

3) Loosen the pin by a quarter-turn or a half-turn.

4) Re-tighten the pin to 465.5 in-lb (52.6 N·m) - 514.5 in-lb (58.1 N·m).

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AKS ALL POST SB CFM56-7B-72-0300 (Continued)

(d) Remove any excess grease.

AKS ALL

H. Put the Airplane back to its Usual Condition

SUBTASK 72-21-02-410-010-F00

(1) Install the applicable fan blades (TASK 72-21-02-400-801-F00).

END OF TASK

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J67033 S0000175565_V2

Booster Spool Threaded Pin and Counterweight
Figure 808/72-21-02-990-832-F00

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J67048 S0000175566_V2

Booster Spool Threaded Pin
Figure 809/72-21-02-990-833-F00

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TASK 72-21-02-300-807-F00

7. **Recondition the Lubricant Coating on the Fan Blade Shim**
(Figure 810)

A. **General**

(1) This task is to recondition the Molydag coating on the fan blade shim.

B. **References**

Reference	Title
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

C. **Consumable Materials**

Reference	Description	Specification
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50220 [CP 2229]	Lubricant - MOS2 Dry Film Lubricant, Heat Cured (Molydag 254)	CFM CP2229
D50290 [CMFI CP 2686]	Lubricant - MOS2 Dry Film Lubricant, Heat Cured (Molydag 254N)	GE A50TF147CLA, MIL-L-8937
G00511	Tape - Glass Cloth - 3M No. 361	
G50766 [CP2240]	Sheet - Abrasive Sheet For Cleaning Up And Finishing, Scotch-Brite Type A CFS	CFM CP2240

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Prepare For The Procedure**

SUBTASK 72-21-02-020-020-F00

(1) Remove the applicable fan blade shim (TASK 72-21-02-000-801-F00).

F. **Procedure**

SUBTASK 72-21-02-350-014-F00

(1) Prepare the areas of the shim before you apply the coating.

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. MAKE SURE TO PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN USING THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAMES AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY OR DAMAGE IF NOT HANDLED PROPERLY.

(a) Degrease the shim with a clean cloth moistened with acetone solvent, B01058 [CP1039].

(b) Remove the old lubricant on areas A and B with Scotch-Brite Type A CFS Sheet, G50766 [CP2240] (CFM SPM 70-41-11).

1) Use very fine grade scotch brite under tap water.

2) Change the scotch brite frequently.

SUBTASK 72-21-02-350-015-F00

(2) Mask the areas you do not coat with 3M No. 361 tape, G00511 (CP2208).

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SUBTASK 72-21-02-640-014-F00

(3) Apply the Molydag 254 lubricant, D50220 [CP 2229] or Molydag 254N lubricant, D50290 [CMFI CP 2686] on the areas to be coated (CFM SPM 70-63-11).

(a) It is recommended to apply the lubricant with a brush.

(b) You must apply two coats maximum.

(c) An overcoat is permitted in the radius areas.

SUBTASK 72-21-02-350-016-F00

(4) Remove the tape from the shim.

SUBTASK 72-21-02-211-012-F00

(5) Make sure that the lubricant coating application is correct (CFM SPM 70-63-11).

(a) The thickness of the lubricant coating must be in the limits of 0.00059-0.00138 inch (0.015-0.035 mm).

G. Put The Airplane Back To Its Usual Condition

SUBTASK 72-21-02-420-012-F00

(1) Install the applicable fan blade and shim (TASK 72-21-02-400-801-F00).

——— END OF TASK ———

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(MOLYDAG AREA)

A-A

MATERIAL: INCONEL 718 (NC19FeNb)

1846322 S0000328551_V2

Shim Lubricant Coating Application
Figure 810/72-21-02-990-843-F00 (Sheet 1 of 2)

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1846343 S0000328563_V2

Shim Lubricant Coating Application
Figure 810/72-21-02-990-843-F00 (Sheet 2 of 2)

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SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - REMOVAL/INSTALLATION

1. General

A. This procedure has four tasks:

(1) The removal of the splitter fairing

(2) The installation of the splitter fairing

(3) The removal of the stage 1 booster vane assembly

(4) The installation of the stage 1 booster vane assembly.

TASK 72-21-03-000-801-F00

2. Splitter Fairing Removal

(Figure 401)

A. General

(1) This procedure is the removal of the splitter fairing.

(2) The splitter fairing is at the interface of the secondary and primary airflows on the inner hub of the fan frame.

B. References

Reference	Title
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2252	Puller - Adapter, Splitter Fairing Part #: 856A2663G01 Supplier: 58828
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for Splitter Fairing Removal

SUBTASK 72-21-03-040-001-F00

(1) For engine 1, do this step:

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-03-040-002-F00

(2) For engine 2, do this step:

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Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-03-040-003-F00

(3) Set the start levers in the CUTOFF position:

(a) Install DO-NOT-OPERATE tags on the start levers.

SUBTASK 72-21-03-480-001-F00

CAUTION: MAKE SURE YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(4) Install the protective mat, STD-585 in the inlet cowl.

SUBTASK 72-21-03-010-001-F00

(5) Do this task: Spinner Cones Removal, TASK 72-21-01-000-801-F00.

SUBTASK 72-21-03-010-002-F00

(6) Remove all of the fan blades (TASK 72-21-02-000-801-F00).

SUBTASK 72-21-03-820-001-F00

(7) Adjust the protective mat, STD-585 to protect the inlet cowl and fan case

F. Remove the Splitter Fairing

SUBTASK 72-21-03-020-001-F00

(1) Do these steps to remove the splitter fairing:

(a) Remove the screws.

(b) To disengage the splitter fairing from the inner shroud of the OGV fan:

1) Use the puller, SPL-2252 with a slide hammer.

(c) Remove the splitter fairing.

——— END OF TASK ———

TASK 72-21-03-400-801-F00

3. Splitter Fairing Installation

(Figure 401)

A. References

Reference	Title
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

B. Tools/Equipment

Reference	Description
STD-442	Gun - Heat, 180° F (82° C) Maximum Output Temperature
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

C. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735

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(Continued)

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for The Splitter Fairing Installation

SUBTASK 72-21-03-480-002-F00

(1) Make sure the protective mat, STD-585 is installed in the fan inlet case to prevent damage to the fan case.

SUBTASK 72-21-03-400-001-F00

WARNING: AVOID PROLONGED BREATHING OF VAPORS AND REPEATED OR PROLONGED CONTACT WITH SKIN. CLEANING SOLVENTS ARE FLAMMABLE, VOLATILE AND TOXIC. USE THEM WITH ADEQUATE VENTILATION.

(2) Clean the mating surfaces of the splitter fairing with alcohol, B00676 [CP1041].

F. Install the Splitter Fairing

SUBTASK 72-21-03-420-001-F00

WARNING: MAKE SURE THAT THE SOLVENT IS COMPLETELY EVAPORATED BEFORE YOU USE THE HEAT GUN. THE SOLVENT IS FLAMMABLE AND COULD IGNITE.

WARNING: USE HEAT INSULATED GLOVES WHEN YOU TOUCH CHILLED OR HOT PARTS TO PREVENT INJURY TO YOUR HANDS.

(1) Increase the temperature of the flange of the splitter fairing with a heat 180° F (82° C) maximum output temperature heat gun, STD-442.

(a) Increase the temperature of the flange to approximately 140 degrees F (60 degrees C).

(b) Move the splitter fairing on the forward edge of the inner shroud and align the screw holes.

(c) Lubricate the threads of screws with graphite compound, D00601 [CP2101].

(d) Install the 18 screws.

1) Tighten to 55-65 pound-inches (6.5-7.5 Newton meters).

G. Put the Airplane back to Its Usual Condition

SUBTASK 72-21-03-410-001-F00

(1) Do this task: Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-03-410-002-F00

(2) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-21-03-210-001-F00

CAUTION: MAKE SURE YOU REMOVE ALL TOOLS, PARTS AND UNWANTED MATERIAL FROM THE INLET COWL. THIS WILL PREVENT DAMAGE TO EQUIPMENT.

(3) Make sure you remove tools, parts and unwanted material from the inlet cowl.

SUBTASK 72-21-03-080-001-F00

(4) Remove the protective mat, STD-585 from the fan inlet case.

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SUBTASK 72-21-03-440-001-F00

(5) For engine 1, do this step:

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-03-440-002-F00

(6) For engine 2, do this step:

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-03-080-002-F00

(7) Remove the DO-NOT-OPERATE tags from the start levers.

——— END OF TASK ———

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Splitter Fairing Installation
Figure 401/72-21-03-990-801-F00

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TASK 72-21-03-000-802-F00

4. Stage 1 Booster Vane Assembly Removal

(Figure 402)

A. General

(1) You get access to the vane assembly of the stage 1 booster through the inlet cowl.

(2) You have to remove the spinner, all of the fan blades, and the splitter fairing.

B. References

Reference	Title
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2188	Tool Set - Jack Screws Part #: 856A1130G10 Supplier: 58828
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Vane Assembly Removal

SUBTASK 72-21-03-040-004-F00

(1) Set the start levers to the CUTOFF position.

(a) Install DO-NOT-OPERATE tags on the start levers.

SUBTASK 72-21-03-440-003-F00

(2) For engine 1, do this step:

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-03-440-004-F00

(3) For engine 2, do this step:

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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SUBTASK 72-21-03-480-003-F00

CAUTION: MAKE SURE YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(4) Install the protective mat, STD-585 in the inlet cowl.

SUBTASK 72-21-03-010-003-F00

(5) Do this task: Spinner Cones Removal, TASK 72-21-01-000-801-F00.

SUBTASK 72-21-03-010-004-F00

(6) Remove all of the fan blades (TASK 72-21-02-000-801-F00).

SUBTASK 72-21-03-010-005-F00

(7) Do this task: Splitter Fairing Removal, TASK 72-21-03-000-801-F00.

F. Remove the Vane Assembly

SUBTASK 72-21-03-020-002-F00

(1) Do these steps to remove the vane assembly:

(a) Remove the 24 bolts.

(b) Do these steps to disengage the stage 1 vane assembly from the stage 2 vane assembly:

1) Find three equally spaced screw holes on the forward flange of the stage 2 vane assembly.

2) Install the three jackscrews from tool set, SPL-2188 on the forward flange.

3) Tighten each of the three jackscrews equally.

(c) Remove the vane assembly.

1) Remove the jackscrews.

END OF TASK

TASK 72-21-03-400-802-F00

5. Stage 1 Booster Vane Assembly Installation

(Figure 402)

A. References

Reference	Title
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-14597	Pin - Guide, Stage 1 to 4 Booster Part #: 856A3735G03 Supplier: 58828
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

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C. **Consumable Materials**

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Prepare for the Vane Assembly Installation**

SUBTASK 72-21-03-480-004-F00

CAUTION: MAKE SURE YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(1) Make sure that the protective mat, STD-585 is installed in the fan inlet case.

SUBTASK 72-21-03-100-001-F00

WARNING: AVOID PROLONGED BREATHING OF VAPORS AND REPEATED OR PROLONGED CONTACT WITH SKIN. CLEANING SOLVENTS ARE FLAMMABLE, VOLATILE AND TOXIC. USE THEM WITH ADEQUATE VENTILATION.

(2) Clean the mating faces of the stage 1 vane and stage 2 vane assemblies with alcohol, B00676 [CP1041].

SUBTASK 72-21-03-410-003-F00

(3) Install two pins of the guide pin, SPL-14597 equally spaced on the forward flange of the stage 2 vane assembly.

F. **Install The Vane Assembly**

SUBTASK 72-21-03-420-002-F00

WARNING: MAKE SURE THAT THE SOLVENT IS COMPLETELY EVAPORATED BEFORE YOU USE THE HEAT GUN. THE SOLVENT IS FLAMMABLE AND COULD IGNITE.

WARNING: USE HEAT INSULATED GLOVES WHEN YOU TOUCH CHILLED OR HOT PARTS TO PREVENT INJURY TO YOUR HANDS.

(1) Increase the temperature of the rear flange of the stage 1 vane assembly with a heat gun to approximately 175°F (79°C).

SUBTASK 72-21-03-420-003-F00

(2) Engage the stage 1 vane assembly on the stage 2 vane assembly.

(a) Align the vane assembly to the two pins of guide pin, SPL-14597.

SUBTASK 72-21-03-420-004-F00

(3) Attach the stage 1 vane assembly as follows:

(a) Lubricate the bolts with graphite compound, D00601 [CP2101].

(b) Install the 21 bolts. Do not apply the final torque of 100 in-lb (11.3 N·m) - 110 in-lb (12.4 N·m).

(c) Remove the two pins of guide pin, SPL-14597.

(d) Install the 3 remaining bolts. Do not apply the final torque of 100 in-lb (11.3 N·m) - 110 in-lb (12.4 N·m).

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SUBTASK 72-21-03-410-004-F00

(4) Let the temperature of the parts decrease to ambient temperature.

SUBTASK 72-21-03-420-006-F00

(5) Tighten the bolts to 100 in-lb (11.3 N·m) - 110 in-lb (12.4 N·m).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-03-410-005-F00

(1) Do this task: Splitter Fairing Installation, TASK 72-21-03-400-801-F00.

SUBTASK 72-21-03-410-006-F00

(2) Do this task: Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-03-410-007-F00

(3) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-21-03-210-002-F00

CAUTION: MAKE SURE YOU REMOVE ALL TOOLS, PARTS AND UNWANTED MATERIAL FROM THE INLET COWL. THIS WILL PREVENT INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(4) Make sure you remove tools, parts and unwanted material from the inlet cowl.

SUBTASK 72-21-03-480-005-F00

(5) Remove the protective mat, STD-585 from the inlet cowl.

SUBTASK 72-21-03-080-003-F00

(6) Remove the DO-NOT-OPERATE tags from the start levers.

SUBTASK 72-21-03-440-005-F00

(7) For engine 1, do this step:

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-21-03-440-006-F00

(8) For engine 2, do this step:

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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Stage 1 Booster Vane Installation
Figure 402/72-21-03-990-802-F00

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SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) The inspection of the stage 1 booster vane assembly.

TASK 72-21-03-200-801-F00

2. Stage 1 Booster Vane Assembly Inspection (Visual)

(Figure 601)

A. General

(1) The visual check is to examine the stage 1 booster vane assembly through the fan blades.

(a) If a full inspection is necessary, you must remove the stage 1 booster vane assembly.

(b) If damage is found, you must do a borescope inspection of the booster blades and the downstream vane stages.

B. References

Reference	Title
72-00-00-200-803-F00	Stages 2-4 Booster Blades and Vanes Borescope Inspection (P/B 601)
72-00-00-200-804-F00	HP Compressor Blades Borescope Inspection (P/B 601)
72-21-03-000-802-F00	Stage 1 Booster Vane Assembly Removal (P/B 401)
72-21-03-300-801-F00	Repair the Stage 1 Booster Vane Assembly (P/B 801)
72-21-03-400-802-F00	Stage 1 Booster Vane Assembly Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For the Inspection

SUBTASK 72-21-03-040-005-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-03-040-006-F00

(2) Make sure the start levers are in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable start lever.

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SUBTASK 72-21-03-480-006-F00

CAUTION: MAKE SURE YOU INSTALL THE PROTECTIVE MATS IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(3) Install a protective mat, STD-585 in the fan inlet cowl.

F. Inspect The Booster Vanes

SUBTASK 72-21-03-210-003-F00

(1) Any amount of surface oxidation, pitting or corrosion marks on the stage 1, 2, 3 and 4 booster vanes is permitted.

SUBTASK 72-21-03-220-001-F00

(2) If you find damage to the stage 1 booster vane assembly that is not in the limits, replace the stage 1 booster vane assembly, unless you are given other instructions

These are the tasks:

Stage 1 Booster Vane Assembly Removal, TASK 72-21-03-000-802-F00,

Stage 1 Booster Vane Assembly Installation, TASK 72-21-03-400-802-F00.

SUBTASK 72-21-03-220-002-F00

(3) If you find damage to the stage 1 booster vane assembly not in the limits, all downstream booster stages and the HP compressor must be inspected with a borescope.

(a) Do this task: Stages 2-4 Booster Blades and Vanes Borescope Inspection, TASK 72-00-00-200-803-F00.

(b) Do this task: HP Compressor Blades Borescope Inspection, TASK 72-00-00-200-804-F00.

SUBTASK 72-21-03-200-001-F00

WARNING: MAKE SURE YOU WEAR GLOVES WHEN YOU TURN THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU TURN THE FAN BLADES, YOU CAN CAUSE AN INJURY TO YOUR HANDS.

(4) Turn the fan rotor as necessary to examine the stage 1 booster vanes through the fan blades.

SUBTASK 72-21-03-220-003-F00

(5) Examine the booster vanes for broken vanes:

(a) Not serviceable.

SUBTASK 72-21-03-220-004-F00

(6) Examine the tip of the vanes (Area D) for damage:

(a) Cracks and tears

1) Cracks and tears are not permitted.

2) A Continue-In-Service limit of 10 cycles or 15 hours is permitted; if the damage is less than 0.127 inch (3.25 mm) in length radially and 0.04 inch (1.0 mm) in length axially.

(b) Dents

1) All damage is permitted with these limits:

a) Not more than 25 percent in depth of the blade airfoil thickness.

b) A Continue-In-Service limit of 10 cycles or 15 hours is permitted, if the damage is more than the limits and less than 40 percent of the blade airfoil thickness.

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(c) Nicks and scratches in airfoil (not on the leading and trailing edges)

1) All damage is permitted with these limits:

a) Not more than 25 percent in depth of the blade airfoil thickness.

b) A Continue-In-Service limit of 10 cycles or 15 hours is permitted, if the damage is more than the limits.

(d) Nicks and scratches on the leading and trailing edges

1) All damage is permitted with these limits:

a) Not more than 0.04 inch (1 mm) in depth (axially).

b) A Continue-In-Service limit of 10 cycles or 15 hours is permitted, if the damage is more than the limits.

(e) Local distortion

1) All distortion is permitted with these limits:

a) The radially damaged dimension is more than six times the axially damaged dimension.

b) The dimension is less than 0.08 inch (2 mm) axially.

c) The dimension is less than 0.47 inch (12 mm) radially.

(f) Missing pieces

1) Missing pieces are not permitted.

SUBTASK 72-21-03-220-005-F00

(7) Examine the leading edge and trailing edges of the vane (Area E) for damage:

(a) Cracks

1) Cracks are not permitted.

2) A Continue-In-Service limit of 10 cycles or 15 hours is permitted; if the damage is less than 0.127 inch (3.25 mm) radially and 0.04 inch (1.0 mm) axially.

(b) Tears

1) Tears are not permitted.

2) A Continue-In-Service limit of 10 cycles or 15 hours is permitted if the damage is less than 0.127 inch (3.25 mm) radially and 0.04 inch (1.0 mm) axially.

(c) Dents

1) Dents are permitted with these limits:

a) Not more than 0.08 inch (2 mm) in depth axially.

2) A Continue-In-Service limit of 10 cycles or 15 hours is permitted before repair or replacement of the vane, if the damage is more than the limits.

3) If the damage is more than the limits, repair the vane assembly leading edge.

a) Do this task, Repair the Stage 1 Booster Vane Assembly, TASK 72-21-03-300-801-F00.

(d) Nicks and scratches

1) Nicks and scratches are permitted with these limits:

a) Not more than 0.08 inch (2 mm) in depth (axially).

2) A Continue-In-Service limit of 10 cycles or 15 hours is permitted before repair or replacement of the vane, if the damage is more than the limits.

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3) If the damage is more than the limits, repair the vane assembly leading edge.

a) Do this task, Repair the Stage 1 Booster Vane Assembly, TASK 72-21-03-300-801-F00.

(e) Local distortion

1) All local distortion is permitted with these limits

a) The damaged dimension L is more than six times the maximum damaged dimension X along the chord.

b) The maximum dimension X along the chord is less than 0.12 inch (3 mm).

c) The dimension L is less than 0.71 inch (18 mm).

2) A Continue-In-Service limit of 50 cycles or 75 hours is permitted, if the damage is more than the limits.

(f) Erosion and deposits

1) All erosion and deposits are permitted.

SUBTASK 72-21-03-220-006-F00

(8) Examine the airfoil of the vane (Area C) for damage:

(a) Cracks and tears

1) Cracks and tears are not permitted.

2) A Continue-In-Service limit of 10 cycles or 15 hours is permitted; if the damage is less than 0.127 inch (3.25 mm) radially and 0.04 inch (1.0 mm) axially.

(b) Dents

1) Dents are permitted with these limits:

a) Not more than 40 percent in depth of the blade airfoil thickness.

b) A Continue-In-Service limit of 50 cycles or 75 hours is permitted, if the damage is more than the limits.

(c) Nicks and scratches

1) Nicks and scratches are permitted with these limits:

a) Not more than 40 percent in depth of the blade airfoil thickness.

(d) Local distortion

1) All local distortion is permitted with these limits:

a) The radially damaged dimension is more than six times the axially damaged dimension.

b) The dimension is less than 0.12 inch (3 mm) axially.

c) The dimension is less than 0.71 inch (18 mm) radially.

2) A Continue-In-Service limit of 50 cycles or 75 hours is permitted, if the damage is more than the limits.

SUBTASK 72-21-03-220-007-F00

(9) Examine the inner shroud (visual inspection through the fan blades)

(a) Cracks

1) Cracks are not permitted.

2) A Continue-In-Service limit of 10 cycles or 15 hours is permitted, if the damage is less than 0.127 inch (3.25 mm) in length.

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(b) Vane loosness

1) Vane looseness is not permitted.

SUBTASK 72-21-03-220-008-F00

(10) Inner shroud (with stage 1 booster vane removed)

(a) To do this inspection, remove the stage 1 booster vane assembly from the power plant (TASK 72-21-03-000-802-F00).

(b) Inner shroud abradable coating for unbonding or flaking

1) Unbonding or flaking is permitted with these limits

a) If the total damaged surface area is not more than 15.5 square inches (100 sq cm).

b) Cut and remove the unbonded parts.

c) A Continue-In-Service limit of 100 hours is permitted, if the damage is more than the limits.

2) Rub marks from seal teeth

a) All rub marks on the seal teeth are permitted.

3) Dents on the forward or aft edge

a) All dents on the forward edge and aft edge are permitted.

SUBTASK 72-21-03-220-009-F00

(11) Outer shroud

(a) To do this inspection, remove the stage 1 booster vane assembly from the power plant (TASK 72-21-03-000-802-F00).

(b) Cracks

1) Cracks are not permitted.

2) A Continue-In-Service limit of 10 cycles or 15 hours is permitted; if the damage is less than 0.127 inch (3.25 mm) in length.

(c) Separation, flaking, or missing material on the abradable coating

1) All separation, flaking, or missing material are permitted with these limits:

a) The total damaged area is not more than 43.4 square inches (280 sq cm).

2) A Continue-In-Service limit of 100 hours is permitted, if the damage is more than the limits.

(d) Booster blade tip rubbing on the abradable coating

1) No limit for rubbing on the full circumference.

(e) Pitting, nicks, dents or local distortion on the abradable coating

1) All pitting, nicks, dents or local distortion on the abradable coating is permitted.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-03-080-004-F00

CAUTION: MAKE SURE YOU REMOVE ALL TOOLS, PARTS AND UNWANTED MATERIAL FROM THE INLET COWL. THIS WILL PREVENT DAMAGE TO EQUIPMENT DURING THE SUBSEQUENT ENGINE START.

(1) Make sure you remove tools, parts or unwanted material from the blades and inlet cowl.

(a) Remove the protective mat, STD-585 from the inlet cowl.

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SUBTASK 72-21-03-440-007-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable engine start lever.

SUBTASK 72-21-03-710-001-F00

(3) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

——— END OF TASK ———

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Stage 1 Booster Vane Inspection
Figure 601/72-21-03-990-803-F00 (Sheet 1 of 2)

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DISTORTION OF T/E AND L/E

B

S-M56-MM-00263-00-B

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Stage 1 Booster Vane Inspection
Figure 601/72-21-03-990-803-F00 (Sheet 2 of 2)

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SPLITTER FAIRING AND STAGE 1 BOOSTER VANE ASSEMBLY - REPAIRS

1. General

A. This procedure has this task:

(1) The repair of the stage 1 booster vanes.

TASK 72-21-03-300-801-F00

2. Repair the Stage 1 Booster Vane Assembly

(Figure 801)

A. General

(1) The leading edge of the stage 1 booster vanes can be repaired by blending as specified in this task.

(2) Vane assemblies that have damage that is more than the blending limits in this task must be replaced.

B. References

Reference	Title
70-40-01-910-801-F00	Fluorescent Penetrant Inspection (Water Washable) (P/B 201)
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)
72-21-02-000-801-F00	Fan Blade Removal (Complete Set) (P/B 401)
72-21-02-400-801-F00	Fan Blade Installation (Complete Set) (P/B 401)
72-21-03-000-802-F00	Stage 1 Booster Vane Assembly Removal (P/B 401)
72-21-03-400-802-F00	Stage 1 Booster Vane Assembly Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
G02449 [CP2189]	Cloth - Abrasive, Silicone Carbide, 150 Grit - Durite G422	
G02450 [CP2191]	Cloth - Abrasive, Silicone Carbide, 180 Grit - Durite G421	

E. Location Zones

Zone	Area
212	Flight Compartment - Right
411	Engine 1 - Engine

F. Prepare to Repair the Booster Vanes

SUBTASK 72-21-03-040-007-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-21-03-040-008-F00

(2) Set the START switches in the OFF position:

(a) Install DO-NOT-OPERATE tags on the applicable start switch.

SUBTASK 72-21-03-480-007-F00

CAUTION: MAKE SURE YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(3) Install the protective mat, STD-585 in the inlet cowl.

SUBTASK 72-21-03-010-006-F00

(4) Do this task: Spinner Cones Removal, TASK 72-21-01-000-801-F00.

SUBTASK 72-21-03-010-007-F00

(5) Remove three of the fan blades, (TASK 72-21-02-000-801-F00).

NOTE: Make sure you number each blade as you remove it, to make sure each is installed in its initial position.

G. Examine the Booster Vanes

SUBTASK 72-21-03-220-010-F00

(1) Examine the dimensions and location of the defects on the leading edge

(a) Make sure the damage and the area of the repair will be less than the blend limits (Figure 801) and the information in the subsequent section.

(b) If the damage or repair area is more than the limits, replace the stage 1 booster vane assembly.

These are the tasks:

Stage 1 Booster Vane Assembly Removal, TASK 72-21-03-000-802-F00,

Stage 1 Booster Vane Assembly Installation, TASK 72-21-03-400-802-F00.

(c) Repairs are permitted if they will be in the blending limits.

H. Repair the Booster Vanes

SUBTASK 72-21-03-350-001-F00

(1) Use these tools to do the blending repair of the damage:

(a) Use a soft file or a silicone carbide abrasive stone, grade C150L8V, used dry.

(b) For major blending repairs, use these materials:

1) Use strips of Durite G422 cloth, G02449 [CP2189] for the prefinish.

2) Use strips of Durite G421 cloth, G02450 [CP2191] for the initial finish.

SUBTASK 72-21-03-350-002-F00

(2) These conditions are necessary to get the correct vane repair results:

(a) Do the blend in a longitudinal direction parallel with the length of the vane.

(b) Make sure the leading edge radius of the area that you repaired agrees with the initial contour.

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(c) If you blend an area that includes a radius, keep the radius as near as possible to the initial radius.

(d) Make sure the finish on a blended area is as near as possible to the initial finish.

(e) Remove the material with these limits:

1) Not less than 0.079 inch (2.0 mm) in depth below the damage in zone A.

2) Not less than 0.01 inch (0.25 mm) in depth below the damage.

3) Not more than 0.16 inch (4.0 mm) in depth below the damage.

(f) Make sure the damage is fully removed, do this task: Fluorescent Penetrant Inspection (Water Washable), TASK 70-40-01-910-801-F00.

1) Replace the vane if you find a crack in the vane.

I. Put the Airplane Back to its Usual Condition:

SUBTASK 72-21-03-010-008-F00

(1) To install each of the three fan blades in their initial positions, do this task: Fan Blade Installation (Complete Set), TASK 72-21-02-400-801-F00.

SUBTASK 72-21-03-010-009-F00

(2) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-21-03-080-005-F00

CAUTION: MAKE SURE YOU REMOVE ALL TOOLS, PARTS AND UNWANTED MATERIAL FROM THE INLET COWL. DAMAGE TO EQUIPMENT COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(3) Remove the protective mat, STD-585 from the inlet cowl.

SUBTASK 72-21-03-080-006-F00

(4) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-21-03-040-009-F00

(5) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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Stage 1 Booster Vane Blend Limits
Figure 801/72-21-03-990-804-F00 (Sheet 1 of 2)

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Stage 1 Booster Vane Blend Limits
Figure 801/72-21-03-990-804-F00 (Sheet 2 of 2)

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OUTLET GUIDE VANES - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of the outlet guide vanes (OGV) and their seals.

(2) The installation of the outlet guide vanes (OGV) and their seals.

TASK 72-23-01-000-801-F00

2. Outlet Guide Vanes Removal

(Figure 401)

A. General

(1) The OGVs are found between the fan blades and the fan frame struts, in the secondary air flow.

(2) There are 76 OGVs on each engine.

(3) In this procedure the outlet guide vanes will be referred to as the OGVs.

B. References

Reference	Title
72-23-01-200-802-F00	OGV Inner Shrouds and Seals Inspection (P/B 601)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 72-23-01-010-001-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSERS (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

E. Outlet Guide Vanes Removal

SUBTASK 72-23-01-020-001-F00

(1) Do these steps to disconnect the OGV from the fan inlet:

(a) Remove the two bolts [1].

NOTE: Be prepared to catch each cup washer.

(b) Remove the two cup washers [2].

SUBTASK 72-23-01-000-001-F00

CAUTION: BE CAREFUL TO NOT TO CAUSE DAMAGE TO THE OGV'S LEADING EDGE OR TRAILING EDGE DURING THE REMOVAL.

(2) Move the inner platform of the OGV [3] into the inner shroud recess.

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SUBTASK 72-23-01-000-002-F00

(3) Carefully move the outer platform of the OGV [3] forward until you can disengage the inner platform from the inner shroud recess.

SUBTASK 72-23-01-000-003-F00

(4) Remove the OGV [3] from the power plant.

SUBTASK 72-23-01-210-001-F00

(5) Examine the seal [4] on the inner shroud for damage (TASK 72-23-01-200-802-F00).

——— END OF TASK ———

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Outlet Guide Vane (OGV) Installation
Figure 401/72-23-01-990-801-F00

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TASK 72-23-01-400-801-F00

3. Outlet Guide Vanes Installation

(Figure 401)

A. References

Reference	Title
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Consumable Materials

Reference	Description	Specification
D50321 [CP2773]	Anti-Corrosion Grease	AR-14-362

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Installation

SUBTASK 72-23-01-640-001-F00

(1) Apply a large quantity of anti-corrosion grease, D50321 [CP2773] to the shafts of the two bolts [1] (thread included) and under bolt heads.

E. Outlet Guide Vanes Installation

SUBTASK 72-23-01-320-001-F00

(1) Do these steps to install the OGV seals [4]:

(a) Align the round cut of the two seals with the 4 o'clock hole of the inner OGV shroud (borescope port).

1) If you install a new OGV seal, drill the borescope hole at the 4 o'clock position to a diameter of 0.41 in. (10.4 mm).

(b) Align the round cut of the two seals with the 6 o'clock hole of the inner OGV shroud (draining hole).

1) If you install a new OGV seal, drill the borescope hole at the 6 o'clock position to a diameter of 0.16 in. (4 mm)

(c) Install the remaining 72 seals [4] in their related slots on the inner OGV shroud.

SUBTASK 72-23-01-420-001-F00

(2) Do these steps to put the OGV [3] into the inner shroud and the fan case:

CAUTION: BE CAREFUL NOT TO CAUSE DAMAGE TO THE OGV'S LEADING AND TRAILING EDGES DURING INSTALLATION.

(a) Carefully engage the OGV inner platform into the seal on the inner shroud.

(b) Move the OGV outer platform to the rear.

(c) Set the outward platform in the correct position on the fan case.

SUBTASK 72-23-01-420-002-F00

CAUTION: AREA AROUND ATTACHMENT HOLES MUST BE CLEAN AND DRY OTHERWISE IT MAY FACILITATE CORROSION AND FRETTING.

(3) Do these steps to attach the OGV to the fan inlet:

(a) Install the two bolts [1] and the two cup washers [2].

(b) Tighten the bolts to 126.35 in-lb (14.28 N·m) - 139.65 in-lb (15.78 N·m).

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(c) Remove all unwanted grease with a dry clean cloth.

F. Put the Aircraft Back to its Usual Condition

SUBTASK 72-23-01-010-002-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

——— END OF TASK ———

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OUTLET GUIDE VANES - INSPECTION/CHECK

1. General

A. This procedure has two tasks:

(1) An inspection of the outlet guide vanes (OGV)

(2) An inspection of the OGV inner shrouds and seals.

TASK 72-23-01-200-801-F00

2. Outlet Guide Vanes (OGV) Inspection

(Figure 601)

A. References

Reference	Title
72-23-01-000-801-F00	Outlet Guide Vanes Removal (P/B 401)
72-23-01-400-801-F00	Outlet Guide Vanes Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

C. Prepare for the Inspection

SUBTASK 72-23-01-010-003-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

D. Do a Check of the OGV's

SUBTASK 72-23-01-210-002-F00

(1) If you find damage that is not in the limits, replace the OGV, unless you are given other instructions.

These are the tasks:

Outlet Guide Vanes Removal, TASK 72-23-01-000-801-F00,

Outlet Guide Vanes Installation, TASK 72-23-01-400-801-F00.

SUBTASK 72-23-01-210-003-F00

(2) Examine the OGV's for damage:

(a) Broken or missing vane

1) Not serviceable.

(b) Cracks and tears in the OGV vane

1) Not serviceable.

(c) Missing paint or coating

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1) All missing paint and anodized coating is permitted.

(d) Nicks or dents on the leading or the trailing edges

1) Nicks and dents are permitted if the damage is less than 0.04 inch (1.0 millimeter) in depth.

a) There is no limit to the number of nicks or dents.

2) If you find that the damage is more than 0.04 inch (1.0 millimeter) in depth.

a) There is no limit to the number of nicks or dents.

b) A Continue-In-Service limit of 10 cycles or 25 hours is permitted (use the first limit to occur).

(e) Nicks or dents on the concave and (or) convex surfaces

1) There is no limit to the number of dents or nicks if the damage is smooth and less than half of the vane thickness in depth.

a) There is no damage permitted on the two sides of the vane.

2) There is no limit to the number of nicks or dents if the damage is more than half of the vane thickness, with this condition.

a) A Continue-In-Service limit of 10 cycles or 25 hours is permitted (use the first limit to occur).

(f) Distortion of the leading or trailing edges

1) Distortion is permitted with these limits:

a) The axial depth is less than 0.1 inch (2.5 millimeter).

b) The radial length is less than 1.0 inch (25 mm).

SUBTASK 72-23-01-010-004-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

——— END OF TASK ———

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Outlet Guide Vane Inspection
Figure 601/72-23-01-990-802-F00

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TASK 72-23-01-200-802-F00

3. OGV Inner Shrouds and Seals Inspection

(Figure 602)

A. References

Reference	Title
70-10-04 P/B 201	SPOT TOUCH-UP OF OXIDE FILM COATING ON ALUMINUM ALLOYS FOR PROTECTION - MAINTENANCE PRACTICES
70-40-01 P/B 201	FLUORESCENT PENETRANT INSPECTION - MAINTENANCE PRACTICES
72-23-01-000-801-F00	Outlet Guide Vanes Removal (P/B 401)
72-23-01-400-801-F00	Outlet Guide Vanes Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

C. Prepare for the Inspection

SUBTASK 72-23-01-010-005-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

D. Do a Check of the OGV's Inner Shrouds and Seals

SUBTASK 72-23-01-210-004-F00

(1) If you find damage that is not in the limits, replace the inner shroud seal, unless you are given other instructions.

These are the tasks:

Outlet Guide Vanes Removal, TASK 72-23-01-000-801-F00,

Outlet Guide Vanes Installation, TASK 72-23-01-400-801-F00.

SUBTASK 72-23-01-210-005-F00

(2) Examine the OGV's inner shroud for damage as follows:

(a) Cracks in the OGV's inner shroud are not serviceable.

(b) Wear or scratches around fan duct panels attachment holes.

1) Maximum depth after a light hand blending to remove sharp edges is 0.012 in. (0.3 mm) with at least a ratio length/depth equal to 10.

2) Perform a FPI per FLUORESCENT PENETRANT INSPECTION - MAINTENANCE PRACTICES, PAGEBLOCK 70-40-01/201 and a spot touch up of alodine per SPOT TOUCH-UP OF OXIDE FILM COATING ON ALUMINUM ALLOYS FOR PROTECTION - MAINTENANCE PRACTICES, PAGEBLOCK 70-10-04/201.

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SUBTASK 72-23-01-210-006-F00

(3) Examine the damage to the seals that mate with the OGV surfaces.

(a) Cracks, cuts or tears on the mating surface of the seal with the OGV shroud.

1) Not serviceable.

a) Replace the seal.

b) The Continue-In-Service limit is 5 cycles, permitted if you find damage.

(b) Cracks, cuts or tears that are not on the mating surface of the seal.

1) There is no limit if you find no damage on the mating surface.

(c) The missing OGV seal is not serviceable.

E. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-01-010-006-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

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Outlet Guide Vane and Liner Shroud Inspection
Figure 602/72-23-01-990-803-F00

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AFT ACOUSTICAL PANELS - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of the aft acoustical panels

(2) The installation of the aft acoustical panels.

TASK 72-23-02-000-801-F00

2. Aft Acoustical Panel Removal

(Figure 401)

A. General

AKS ALL PRE SB CFM56-7B-72-0512

(1) The engine has 12 aft acoustical panels found in the secondary air flow between the fan frame struts on the outer surface.

AKS ALL POST SB CFM56-7B-72-0512

(2) The engine has 13 aft acoustical panels found in the secondary air flow between the fan frame struts on the outer surface.

AKS ALL

(3) All screws and riveted self locking nuts that are locked with the RTV 732 adhesive, A50012 [CP2242] must be replaced at the first shop opportunity.

B. References

Reference	Title
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A50012 [CP2242]	Adhesive - Silicone, Thixotropic Paste, One-Part RTV - RTV 732	CFM CP2242, MIL-A-46106 Type I

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Removal

SUBTASK 72-23-02-010-001-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

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F. Aft Acoustical Panel Removal

SUBTASK 72-23-02-000-001-F00

CAUTION: IF YOU USE A PNEUMATIC OR ELECTRICAL SCREW DRIVER TO LOOSEN AND REMOVE THE ACOUSTICAL PANEL SCREWS, MAKE SURE THE SPEED IS NOT MORE THAN 200 RPM. IF THE SPEED IS MORE THAN 200 RPM, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(1) Remove the five screws [1] and [2] from the applicable acoustical panel:

NOTE: The length of the forward three screws [1] is longer than the two aft screws [2].

(a) Eight acoustical panels [3]

(b) One acoustical panel [4]

(c) One acoustical panel [5]

(d) One acoustical panel [6].

(e) One acoustical panel [7].

AKS ALL POST SB CFM56-7B-72-0512

(2) Remove the four screws (9) and (10) from the acoustical panel (8).

NOTE: The length of the forward two screws (9) is smaller than the two aft screws (10).

AKS ALL

SUBTASK 72-23-02-020-001-F00

(3) If you find a screw which has no torque feel when it is removed, discard and replace it with a new screw.

SUBTASK 72-23-02-000-002-F00

(4) Remove the acoustical panel from the fan frame.

END OF TASK

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NOTE:

SOME ENGINE COMPONENTS NOT SHOWN.

MM-00251-00-B

F30777 S0006582425_V4

Aft Acoustical Panels Installation
Figure 401/72-23-02-990-801-F00 (Sheet 1 of 2)

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NOTE:

SOME ENGINE COMPONENTS NOT SHOWN.

D85633 S0000167082_V2

Aft Acoustical Panels Installation
Figure 401/72-23-02-990-801-F00 (Sheet 2 of 2)

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TASK 72-23-02-400-801-F00

3. Aft Acoustical Panel Installation

(Figure 401)

A. General

(1) This procedure gives the instructions to install the aft acoustical panels at these different locations on the fan frame:

(a) Eight acoustical panels [3]

(b) One acoustical panel [4]

(c) One acoustical panel [5]

(d) One acoustical panel [6]

(e) One acoustical panel [7]

(f) One acoustical panel [8].

B. References

Reference	Title
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A01077 [CP2266]	Adhesive - Silicone Rubber - RTV 102	
A50012 [CP2242]	Adhesive - Silicone, Thixotropic Paste, One-Part RTV - RTV 732	CFM CP2242, MIL-A-46106 Type I
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D50321 [CP2773]	Anti-Corrosion Grease	AR-14-362

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Aft Acoustical Panel Installation

SUBTASK 72-23-02-400-002-F00

(1) Install the acoustical panel:

(a) Clean all the surfaces between the acoustical panels and the strut profiles with alcohol, B00676 [CP1041] for the application of RTV sealant.

AKS ALL PRE SB CFM56-7B-72-0512

(b) Apply a large quantity of anti-corrosion grease, D50321 [CP2773] to the shaft of long screw [1] (thread included), to the shaft of short screw [2] (thread included) and under bolt head.

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AKS ALL POST SB CFM56-7B-72-0512

(c) Apply a large quantity of anti-corrosion grease, D50321 [CP2773] to the shaft of long screws [1] and [10] (thread included), to the shaft of short screws [2] and [9] (thread included) and under bolt head.

AKS ALL

(d) Put the acoustical panel in its position on the fan frame.

(e) Attach the acoustical panel with five screws:

1) Install three long screws [1] in the forward holes.

2) Install two short screws [2] in the aft holes.

AKS ALL POST SB CFM56-7B-72-0512

3) Attach the acoustical panel [8] with the four screws:

4) Install two long screws [10] in the aft holes.

5) Install two short screws [9] in the forward holes.

AKS ALL

CAUTION: IF YOU USE A PNEUMATIC OR ELECTRICAL SCREW DRIVER TO TIGHTEN THE ACOUSTICAL PANEL SCREWS, MAKE SURE THE SPEED IS NOT MORE THAN 200 RPM. IF THE SPEED IS MORE THAN 200 RPM, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(f) As you tighten each screw, make sure that the torque of the self locking nut is 4.5-31 pound-inches (0.5-3.5 Newton meters).

1) If the self locking nut torque is more than 31 pound-inches (3.5 Newton meters), visually examine the installation to make sure the panel is seated correctly.

a) If the panel is not correctly seated, find the cause and correct it.

2) If the self locking nut torque is less than 4.5 pound-inches (0.5 Newton meters), do the steps below to lock the acoustical panel screw.

(g) Lock the acoustical panel screw as follows:

NOTE: Only do these steps if the torque above is less than 4.5 pound-inches (0.5 Newton meters).

1) Remove the screws [1] or [2] and the acoustical panel (if it is necessary).

2) Clean screws and nuts with acetone solvent, B01058 [CP1039].

NOTE: It is necessary to clean the nuts, if access is possible.

3) Apply RTV 732 adhesive, A50012 [CP2242] or RTV 102 adhesive, A01077 [CP2266] to the long screw [1] and short screw [2] threads and contact faces below the screw heads.

4) Re-install the acoustical panel (if removed) with the screws [1] and [2].

AKS ALL PRE SB CFM56-7B-72-0512

CAUTION: IF YOU USE A PNEUMATIC OR ELECTRICAL SCREW DRIVER TO TIGHTEN THE ACOUSTICAL PANEL SCREWS, MAKE SURE THE SPEED IS NOT MORE THAN 200 RPM. IF THE SPEED IS MORE THAN 200 RPM, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(h) Tighten the five screws [1] and [2] to 83.6 in-lb (9.4 N·m) - 92.4 in-lb (10.4 N·m).

1) Where it is possible, start at the screws in the center of the acoustical panels.

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AKS ALL POST SB CFM56-7B-72-0512

CAUTION: IF YOU USE A PNEUMATIC, OR ELECTRICAL SCREW DRIVER, MAKE SURE THAT THE SPEED IS NOT MORE THAN 200 RPM. IF YOU TIGHTEN THE SCREWS AT A FASTER SPEED, DAMAGE TO THE PANEL CAN OCCUR.

(i) Tighten the screws [1], [2], [9] and [10] to 83.6 in-lb (9.4 N·m) - 92.4 in-lb (10.4 N·m) for the applicable panel.

1) Where it is possible, start at the screws in the center of the acoustical panels.

AKS ALL

CAUTION: AREA AROUND ATTACHMENT HOLES MUST BE CLEAN AND DRY OTHERWISE IT MAY FACILITATE CORROSION AND FRETTING.

(j) Remove all unwanted grease with a dry clean cloth.

(k) Apply the RTV material between the acoustical panels and strut profiles as follows:

1) Apply adhesive RTV 732 adhesive, A50012 [CP2242] or RTV 102 adhesive, A01077 [CP2266] to fill up the space between the two acoustical panels and around the strut profile, the space between the intermediate case strut, and attachment clamps. Do the primer application and the RTV application with the applicator, spray gun or spatula.

NOTE: The difference between the adhesive RTV 102 and RTV 103 N (CP2266) is only the color, the characteristics are identical.

a) Apply the elastomer, Primer 1200 (CP2244) or Primer SS 4179 (CP2579) or Primers SS 4004 or SS 4044 (CP5065) with a brush on areas to be coated with sealant.

<1> Do this task: Bonding of Silicone Elastomer Seals to Metal Surfaces CFMI SPM 70-65-16 or Application of a Silicone Elastomer Adhesive/Sealant SPM 70-66-12.

b) Apply RTV 732 adhesive, A50012 [CP2242] with an applicator in the space between the acoustical panels, the strut profiles and between the attachment clamps and the strut profiles (if necessary).

<1> Do this task: Bonding of Silicone Elastomer Seals to Metal Surfaces CFMI SPM 70-65-16 or Application of a Silicone Elastomer Adhesive/Sealant SPM 70-66-12.

c) Alternate Procedure:

Apply RTV 102 adhesive, A01077 [CP2266] with a spray gun between the acoustical panels, the strut profiles and between the attachment clamps and the strut profiles (if necessary).

<1> Do this task: Bonding of Silicone Elastomer Seals to Metal Surfaces CFMI SPM TASK 70-65-16.

d) Alternate Procedure:

Apply a smooth layer of the RTV 732 adhesive, A50012 [CP2242] or RTV 102 adhesive, A01077 [CP2266] with a very clean spatula.

e) Let the RTV polymerize at room temperature and humidity.

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F. Put the Aircraft Back to its Usual Condition

SUBTASK 72-23-02-010-002-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

——— END OF TASK ———

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AFT ACOUSTICAL PANELS - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) The inspection of the acoustical panels and profile struts.

TASK 72-23-02-200-801-F00

2. Acoustical Panels and Profile Struts Inspection

(Figure 601 and Figure 602)

A. References

Reference	Title
72-23-02-000-801-F00	Aft Acoustical Panel Removal (P/B 401)
72-23-02-400-801-F00	Aft Acoustical Panel Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

C. General

SUBTASK 72-23-02-210-001-F00

(1) This task gives you instructions to visually examine the acoustical panels and profile struts.

D. Prepare for the Inspection

SUBTASK 72-23-02-010-003-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

E. Visually Examine the Acoustical Panels and Profile Struts

SUBTASK 72-23-02-900-001-F00

(1) If you find damage to an acoustical panel that is not in the limits, replace the acoustical panel, unless you are given other instructions.

These are the tasks:

Aft Acoustical Panel Removal, TASK 72-23-02-000-801-F00,

Aft Acoustical Panel Installation, TASK 72-23-02-400-801-F00.

SUBTASK 72-23-02-210-002-F00

(2) Examine the acoustical panels for these conditions:

(a) Missing panel

1) Not serviceable.

a) Install a replacement acoustical panel.

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2) A maximum service extension of ten (10) flight cycles is permitted if only one acoustical panel is missing (except for IDG acoustical panel).

(b) Missing or loose bolts

1) Not serviceable.

a) Install or tighten the bolts.

SUBTASK 72-23-02-210-003-F00

(3) Damage to the protective coating (Tedlar film) on the acoustical panel:

(a) Missing coating

1) All missing coating is permitted if you remove the loose material with a sharp blade.

(b) Other indications, such as dents, nicks, tears, cracks, or flaking that lets you see the inner skin.

1) The damage is permitted if you remove the loose material with a sharp blade.

SUBTASK 72-23-02-210-004-F00

(4) Look for damage to the inner skin of the acoustical panel:

(a) Superficial damage (dents, nicks, tears, impact, marks) that does not go through the inner skin

1) There is no limit to the number of damaged areas if the total surface area is less than 4 square inches (25.8 sq cm) for each panel.

a) If the damage is less than 4 square inches (25.8 sq cm), remove the loose material with a sharp blade.

b) If the damage is more than 4 square inches (25.8 sq cm), replace the acoustical panel.

(b) Damage (tears, cracks, punctures) through the inner skin

1) Not serviceable.

a) Replace the acoustical panel.

2) A maximum service extension of 100 flight hours is permitted if the defect is less than 1 square inch (6.45 sq cm).

SUBTASK 72-23-02-210-007-F00

(5) Visually examine the IDG air/oil cooler acoustical panel for damage (Figure 602):

(a) Cracks on panel arms

1) Not serviceable.

a) Install a replacement acoustical panel.

NOTE: If the part is not available, refer to CFMI-SB72-0440 to make sure that you can remove the IDG acoustical panel permanently.

(b) Bumps on surface panel arms

1) The damage is permitted for not more than 150 cycles.

SUBTASK 72-23-02-210-005-F00

(6) Visually examine the profile struts for damage (Figure 601):

(a) Cracks

1) Not serviceable.

a) Replace the applicable part.

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F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-02-210-006-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, 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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NOTE:

SOME ENGINE COMPONENTS NOT SHOWN.

G11793 S0006582429_V2

Acoustical Panel and Profile Strut Inspection
Figure 601/72-23-02-990-802-F00

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IDG Acoustical Panel Configuration
Figure 602/72-23-02-990-803-F00

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THRUST REVERSER EXTENSION RING (INNER) - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) The removal of the shroud segments

(2) The installation of the shroud segments

TASK 72-23-03-000-802-F00

2. Shroud Segments Removal

(Figure 401)

A. General

(1) The tasks gives the instructions to remove the shroud segments on the thrust reverser extension ring (inner).

(2) The thrust reverser extension ring (inner) is found in the aft end of the fan and booster section.

(3) The four shrouds are found on the inner shroud of the thrust reverser extension ring.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-3949	Scalpel - X-ACTO Knife

D. Consumable Materials

Reference	Description	Specification
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02314	Air - Compressed, Breathing	BB-A-1034 Source I Grade A
G02502 [CP2239]	Cloth - Abrasive, Alumina, Size 80 Or 120 - 3M 301D	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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F. Prepare for the removal

SUBTASK 72-23-03-040-001-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

G. Remove the Shroud Segments

SUBTASK 72-23-03-010-001-F00

(1) Do these steps to remove the applicable shroud segment [1]:

(a) Remove the two bolts [3].

(b) Remove the six bolts [2].

(c) UPPER SHROUD SEGMENTS;

Remove the bolt [4], washer [5] and nut [6].

1) If installed, remove the spacer and clip.

(d) Remove the shroud segment [1].

H. Remove the RTV on the Shroud Segments, (If It is Necessary and Only For the Shroud To Be Removed)

SUBTASK 72-23-03-100-001-F00

(1) Do these steps to remove the RTV material from the shroud segment [1]:

(a) Remove the RTV material from the base metal with a X-ACTO knife scalpel, STD-3949.

(b) Use 3M 301D abrasive cloth, G02502 [CP2239] to remove the residual RTV material.

(c) Blow the part clean with air, G02314.

WARNING: DO NOT GET ACETONE IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ACETONE. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE ACETONE. KEEP ACETONE AWAY FROM SPARKS, FLAME AND HEAT. ACETONE IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(d) Remove the grease from the part with a cotton wiper, G00034 soaked in acetone solvent, B01058 [CP1039].

(e) Dry the part with air, G02314.

(f) Make sure you clean dirt and unwanted material from the thrust reverser extension ring

1) Remove the grease from the part with a cotton wiper, G00034 soaked in acetone solvent, B01058 [CP1039].

2) Dry the part with air, G02314.

SUBTASK 72-23-03-110-001-F00

(2) If parent metal shows after you clean the repair area, re-condition the sulfuric anodizing in that area:

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(a) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

——— END OF TASK ———

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Thrust Reverser Extension Ring (Inner) Shroud Segments Installation
Figure 401/72-23-03-990-801-F00

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1847619 S0000328619_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 1 of 10)

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RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 2 of 10)

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C

D

E

LEGEND:

AREAS TO BE COATED
WITH PRIMER AND RTV

1847629 S0000328624_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 3 of 10)

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LEGEND:

AREAS TO BE COATED
WITH PRIMER AND RTV

1847644 S0000328625_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 4 of 10)

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LEGEND:

AREAS TO BE COATED WITH PRIMER AND RTV

H

1847793 S0000328627_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 5 of 10)

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LEGEND:

AREAS TO BE COATED WITH PRIMER AND RTV

I

1847812 S0000328629_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 6 of 10)

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LEGEND:

J

AREAS TO BE COATED WITH PRIMER AND RTV

1847827 S0000328630_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 7 of 10)

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LEGEND:

AREAS TO BE COATED
WITH PRIMER AND RTV

1847838 S0000328631_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 8 of 10)

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1847843 S0000328632_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 9 of 10)

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LEGEND:

P

AREAS TO BE COATED
WITH PRIMER AND RTV

1847856 S0000328633_V2

RTV Application
Figure 402/72-23-03-990-805-F00 (Sheet 10 of 10)

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TASK 72-23-03-400-802-F00

3. **Shroud Segments Installation**

(Figure 401)

A. **References**

Reference	Title
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. **Consumable Materials**

Reference	Description	Specification
A50012 [CP2242]	Adhesive - Silicone, Thixotropic Paste, One-Part RTV - RTV 732	CFM CP2242, MIL-A-46106 Type I
A50236 [CP2244]	Primer - Liquid For Preparation of Surfaces Prior to Elastomer Application.	CFM CP2244, MIL-A-46106A
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	

C. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. **Prepare for the Shroud Segments Installation**

SUBTASK 72-23-03-390-001-F00

(1) If it is necessary, apply the primer 1200 OS, A50236 [CP2244] and RTV 732 adhesive, A50012 [CP2242], only to the locations which are shown in the service bulletin, CFM SB 72-119 (Figure 402).

(a) Apply the primer 1200 OS, A50236 [CP2244] to the areas

(b) After 30 minutes, apply the RTV 732 adhesive, A50012 [CP2242].

E. **Install The Shroud Segments**

SUBTASK 72-23-03-410-001-F00

(1) Do these steps to install the applicable shroud segment [1]:

(a) Apply Dow Corning 321 lubricant, D00641 [CP5062] to the threads of the bolts [2] and [3].

(b) Put the applicable shroud segment [1] in its position.

(c) Install the six bolts [2].

(d) Install the two bolts [3].

(e) UPPER SHROUD SEGMENTS;

Install the bolt [4], washer [5] and nut [6].

1) If removed, install the spacer and clip.

(f) Tighten the bolts [2] and [3] to 70-75 pound-inches (8-8.5 Newton meter).

(g) Tighten the bolt [4] to 65-100 pound-inches (7.3-11.3 Newton meter).

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F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-03-410-002-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

——— END OF TASK ———

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THRUST REVERSER EXTENSION RING (INNER) - INSPECTION/CHECK

1. General

A. This procedure has these tasks:

(1) An inspection of the thrust reverser extension ring (inner).

(2) An inspection of the 12 o'clock engine strut.

TASK 72-23-03-200-801-F00

2. Thrust Reverser Extension Ring (Inner) Inspection

(Figure 601)

A. General

(1) The thrust reverser extension ring inner assembly parts can be found at the aft end of the fan and booster section.

(2) The inner shroud of the thrust reverser extension ring is the location of the parts that follow:

(a) The strut fairings and shroud segments

(b) The shroud pads and clamps.

B. References

Reference	Title
72-23-03-000-802-F00	Shroud Segments Removal (P/B 401)
72-23-03-400-802-F00	Shroud Segments Installation (P/B 401)
73-21-06-000-802-F00	3 O'clock Strut Harness Removal (P/B 401)
73-21-06-400-802-F00	3 O'clock Strut Harness Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare For The Inspection

SUBTASK 72-23-03-040-002-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-03-210-001-F00

(2) Clean all of the dirt or unwanted materials from the inner extension ring.

E. Examine The 3:00 O'clock Strut Fairing

SUBTASK 72-23-03-210-002-F00

(1) If you find damage to the 3:00 o'clock strut fairing that is not in the limits, replace the 3:00 o'clock strut fairing, unless you are given other instructions. Do the applicable steps in the referenced tasks.

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These are the tasks:

3 O'clock Strut Harness Removal, TASK 73-21-06-000-802-F00,

3 O'clock Strut Harness Installation, TASK 73-21-06-400-802-F00.

SUBTASK 72-23-03-220-001-F00

(2) Examine the strut fairings for damage:

(a) Cracks

1) Not serviceable.

(b) Marks and dents

1) All marks and dents are permitted with these limits:

a) All dents and marks with a maximum depth of 0.0197 inches (0.5 mm) are permitted if they have a smooth contour.

b) The minimum distance between two defects is a dimension of five times the diameter of the larger defect.

(c) Loose or missing bolts are not permitted.

1) Replace or tighten the bolt to 30-35 pound inches (3.5-4.0 Newton meters) as it is necessary.

(d) Damage to the 3:00 o'clock fairing seal:

1) Loss of the seal is not permitted.

a) Replace the 3:00 o'clock strut fairing.

2) Seal bond separation is not permitted.

a) Replace the 3:00 o'clock strut fairing.

F. Examine The Shroud Segments

SUBTASK 72-23-03-210-003-F00

(1) If you find damage to the shroud segments that is not in the limits, replace the shroud segments, unless you are given other instructions.

These are the tasks:

Shroud Segments Removal, TASK 72-23-03-000-802-F00,

Shroud Segments Installation, TASK 72-23-03-400-802-F00.

SUBTASK 72-23-03-220-002-F00

(2) Examine the shroud segments for damage (Figure 602):

(a) Cracks

1) Not serviceable.

(b) Marks and dents

1) All marks and dents in areas A and B of the v-groove:

a) Not serviceable.

2) All marks and dents in areas other than area A and B of the v-groove are permitted with these limits:

a) All dents and marks with a maximum depth of 0.0197 inches (0.5 mm) are permitted if they have a smooth contour.

b) The minimum distance between two defects is a dimension of five times the diameter of the larger defect.

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(c) Loose or missing bolts

1) Not serviceable.

2) Replace or tighten the bolt to 70-75 pound-inches (8-8.5 Newton meters) as it is necessary.

(d) Look for wear to the v-groove (areas A and B).

1) Any amount of fretting/wear and missing coating (varnish PTFE or sulfuric anodization) on V-groove and sealing surface is permitted.

NOTE: The wear coating is a yellow-green in color.

2) Aluminum parent material that shows is permitted.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-03-440-001-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

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NOTE:

WHEN IN GOOD CONDITION, THE SEAL IS NOT VISIBLE IF THE FAIRING IS CORRECTLY INSTALLED AND ALSO IN GOOD CONDITION.

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Thrust Reverser Adapter Ring (Inner) Inspection
Figure 601/72-23-03-990-802-F00

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Shroud Segment Inspection
Figure 602/72-23-03-990-803-F00

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TASK 72-23-03-200-802-F01

3. 12 O'clock Engine Strut Inspection

A. General

(1) The 12 o'clock engine strut can be found at the thrust reverser extension ring.

(2) Contact with the thrust reverser insulation blanket can damage the 12 o'clock engine strut.

B. References

Reference	Title
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
G00251	Abrasive - Mat, Non-Woven, Non-Metallic	A-A-58054

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For The Inspection

SUBTASK 72-23-03-010-002-F01

WARNING: DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

F. Procedure

SUBTASK 72-23-03-211-001-F01

(1) Look for signs of wear and gouges on the 12 o'clock engine strut.

(a) If the damage is 0.010 inch (0.254 mm) or less in depth, do this blend repair:

1) Use a light abrasive mat, G00251 or emory cloth and blend out the gouges.

2) Use a 20:1 length-to-depth ratio for smooth transition.

3) Blend no deeper than the depth of the gouges.

4) Maintain a 125RA or better surface finish.

(b) If the damage is 0.011-020 inch (0.279-0.580 mm) in depth, do these steps:

1) Do the above blend repair.

2) The 12 o'clock strut can remain in service for up to 60 months.

a) When this period is up, replace the 12 o'clock strut.

(c) If the damage is 0.21-030 inch (0.533-0.762 mm) in depth, do these steps:

1) Do the above blend repair.

2) The 12 o'clock strut can remain in service for up to 24 months.

a) When this period is up, replace the 12 o'clock strut.

(d) If the damage is more than 0.030 inch (0.762 mm) in depth, there is no on-wing repair:

1) Replace the 12 o'clock strut within 10 days.

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G. Put the Airplane Back to its Usual Condition

SUBTASK 72-23-03-410-003-F01

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

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12 O'clock Engine Strut Inspection
Figure 603/72-23-03-990-804-F01

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THRUST MOUNT - REMOVAL/INSTALLATION

1. **General**

A. This procedure has two tasks:

(1) The removal of the thrust mount

(2) The installation of the thrust mount.

TASK 72-23-04-000-801-F00

2. **Thrust Mount Removal**

(Figure 401)

A. General

(1) The forward thrust mount can be found on the top right and top left positions on the fan frame aft bulkhead.

(2) Disconnect only one thrust link at a time, do not disconnect the two thrust links at the same time.

B. References

Reference	Title
71-21-02-000-801-F00	Thrust Link Assembly Removal (P/B 401)
72-23-03-000-802-F00	Shroud Segments Removal (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Thrust Mount Removal

SUBTASK 72-23-04-010-003-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATE PROCEDURES FOR THE LEADING EDGE, AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-04-040-007-F00

(2) For engine 1, do this step:

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-04-040-008-F00

(3) For engine 2, do this step:

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Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-04-010-004-F00

(4) To remove the applicable shroud segment, do this task: Shroud Segments Removal, TASK 72-23-03-000-802-F00.

SUBTASK 72-23-04-000-001-F00

CAUTION: DO NOT REMOVE OR DISCONNECT THE TWO THRUST LINKS AT THE SAME TIME. RE-INSTALLATION COULD BE VERY DIFFICULT OR NOT POSSIBLE BECAUSE THE ENGINE GEOMETRY WILL CHANGE.

(5) Disconnect the applicable thrust link from the thrust mount only, do this task: Thrust Link Assembly Removal, TASK 71-21-02-000-801-F00.

E. Remove the Thrust Mount

SUBTASK 72-23-04-010-005-F00

(1) Do these steps to remove the applicable forward thrust mount [1]:

(a) Cut and remove the lockwire.

(b) Remove the four bolts [2].

(c) Remove the thrust mount [1].

END OF TASK

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NOTE:

LEFT THRUST MOUNT IS SHOWN,
RIGHT THRUST MOUNT IS THE SAME.

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Forward Engine Thrust Mount Installation
Figure 401/72-23-04-990-803-F00

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TASK 72-23-04-400-801-F00

3. Thrust Mount Installation

(Figure 401)

A. General

(1) The forward thrust mounts can be found on the top right and top left positions on the fan frame aft bulkhead.

(2) Do not disconnect the two thrust links at the same time.

B. References

Reference	Title
71-21-02-400-801-F00	Thrust Link Assembly Installation (P/B 401)
72-23-03-400-802-F00	Shroud Segments Installation (P/B 401)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Install the Thrust Mount

SUBTASK 72-23-04-410-002-F00

(1) Do these steps to install the applicable thrust mount [1]:

NOTE: The installation steps are the same for the left and right thrust mounts.

(a) Put the applicable thrust mount [1] in its position with thrust mount centering pin in the guide pin slot.

(b) Apply a thin layer of graphite compound, D00601 [CP2101] on the four bolts [2].

(c) Install the four bolts [2].

1) Tighten the bolts [2] to 547-603 pound-inches (62-68 Newton meters).

(d) Install the safety wire, G02345 [CP8001] or cable, G50065 [CP8006] to the bolts [2] in groups of 2.

SUBTASK 72-23-04-000-002-F00

(2) Connect the thrust link to the thrust mount, do this task: Thrust Link Assembly Installation, TASK 71-21-02-400-801-F00.

SUBTASK 72-23-04-410-003-F00

(3) For the applicable extension ring shroud segment, do this task: Shroud Segments Installation, TASK 72-23-03-400-802-F00.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-04-040-009-F00

(1) For engine 1, do this step:

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Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-04-040-010-F00

(2) For engine 2, do this step:

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-04-010-006-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

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THRUST MOUNT - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has two tasks:
      (1) The inspection of the forward thrust mounts
      (2) The inspection of thrust mount attach bolts.

TASK 72-23-04-200-801-F00

2. **Thrust Mounts Inspection**
(Figure 601)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) The forward thrust mounts can be found on the upper right and left side of the fan frame.

B. References

Reference	Title
72-23-03-000-802-F00	Shroud Segments Removal (P/B 401)
72-23-03-400-802-F00	Shroud Segments Installation (P/B 401)
72-23-04-000-801-F00	Thrust Mount Removal (P/B 401)
72-23-04-400-801-F00	Thrust Mount Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Inspection

SUBTASK 72-23-04-040-003-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-04-040-004-F00

(2) Install a DO-NOT-OPERATE tag on the applicable engine start switch.

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SUBTASK 72-23-04-040-001-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION FOR THE LEADING EDGE AND THE THRUST REVERSERS (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-04-020-001-F00

(4) Clean all dirt and unwanted material from the thrust mounts.

NOTE: You should use a flashlight and an inspection mirror to examine the areas of the mounts that are not easy to see.

SUBTASK 72-23-04-010-007-F00

(5) Remove the applicable shroud segment, do this task: Shroud Segments Removal, TASK 72-23-03-000-802-F00.

E. Examine the Thrust Mount

SUBTASK 72-23-04-900-001-F00

(1) If you find damage that is not in the limits, replace the thrust mount, unless you are given other instructions.

These are the tasks:

Thrust Mount Removal, TASK 72-23-04-000-801-F00,

Thrust Mount Installation, TASK 72-23-04-400-801-F00.

SUBTASK 72-23-04-210-001-F00

(2) Examine the thrust mount for cracks:

(a) Cracks are not permitted.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-04-010-008-F00

(1) Install the applicable shroud segment, do this task: Shroud Segments Installation, TASK 72-23-03-400-802-F00.

SUBTASK 72-23-04-440-001-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-23-04-440-003-F00

(3) Remove the DO-NOT-OPERATE tag from the applicable engine start switch.

SUBTASK 72-23-04-710-001-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

——— **END OF TASK** ———

TASK 72-23-04-200-802-F00

3. **Thrust Mount Attach Bolts Inspection (Visual)**
(Figure 601)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) The forward thrust mounts can be found on the top right and left side of the fan frame.

B. References

Reference	Title
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
72-23-03-000-802-F00	Shroud Segments Removal (P/B 401)
72-23-03-400-802-F00	Shroud Segments Installation (P/B 401)
72-23-04-000-801-F00	Thrust Mount Removal (P/B 401)
72-23-04-400-801-F00	Thrust Mount Installation (P/B 401)
72-23-07-000-801-F00	Fan Duct Panel Removal (P/B 401)
72-23-07-400-801-F00	Fan Duct Panel Installation (P/B 401)
75-32-00-730-801-F00	VBV Actuation System - Manual Operation (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Inspection

SUBTASK 72-23-04-040-005-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-04-040-006-F00

(2) Install a DO-NOT-OPERATE tag on the applicable engine start switch.

SUBTASK 72-23-04-040-002-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION FOR THE LEADING EDGE AND THE THRUST REVERSERS (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-04-010-001-F00

(4) If it is necessary, remove the applicable shroud segment, do this task: Shroud Segments Removal, TASK 72-23-03-000-802-F00.

SUBTASK 72-23-04-020-002-F00

(5) Clean all dirt and unwanted material from the thrust mounts and bolts.

F. Examine the Thrust Mount Bolts

SUBTASK 72-23-04-210-004-F00

(1) If you find damage that is not in the limits, replace the thrust mount bolts, unless you are given other instructions.

These are the tasks:

Thrust Mount Removal, TASK 72-23-04-000-801-F00,

Thrust Mount Installation, TASK 72-23-04-400-801-F00.

SUBTASK 72-23-04-210-005-F00

(2) Make sure the attach bolts and lockwire for each of the thrust mounts is not missing or loose:

NOTE: You should use a flashlight and an inspection mirror to examine the bolts that are not easy to see.

CAUTION: BE CAREFUL WHEN YOU INSTALL PARTS THAT ARE AROUND AN OPEN VBV DOOR. PARTS THAT FALL INTO AN OPEN VBV DOOR CAN FALL IN THE HIGH PRESSURE COMPRESSOR OF THE ENGINE. PARTS WHICH FALL INTO THE ENGINE CAN CAUSE ENGINE DAMAGE AT THE FIRST ENGINE RUN.

(a) Missing or broken bolt

1) Use a flashlight to shine thru the nut where the bolt is missing:

NOTE: The nuts are in the VBV cavity in the fan frame.

a) Make sure that a piece of broken bolt is not in the nut.

2) If no piece of bolt [3] stays in the nut [4], do these steps:

a) Lubricate the threads of a replacement bolt with graphite compound, D00601 [CP2101].

b) Install the bolt [3].

c) Tighten the bolt [3] to 547-603 pound-inches (62-68 Newton meters).

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d) Examine the other bolts [3] for missing or damaged lockwire.

e) Install new safety wire, G02345 [CP8001] or cable, G50065 [CP8006] [2] to the bolts [3] in groups of two.

3) If a piece of bolt [3] stays in the nut, do these steps:

CAUTION: BE CAREFUL WHEN YOU INSTALL PARTS THAT ARE AROUND AN OPEN VBV DOOR. PARTS THAT FALL INTO AN OPEN VBV DOOR CAN FALL IN THE HIGH PRESSURE COMPRESSOR OF THE ENGINE. PARTS WHICH FALL INTO THE ENGINE CAN CAUSE ENGINE DAMAGE AT THE FIRST ENGINE RUN.

a) Make sure that the VBV doors are in the closed position.

b) If the VBV doors are not fully closed, do this task: VBV Actuation System - Manual Operation, TASK 75-32-00-730-801-F00

c) Remove the applicable fan duct panel, do this task: Fan Duct Panel Removal, TASK 72-23-07-000-801-F00.

d) Remove the two bolts [5].

CAUTION: MAKE SURE THE NUT DOES NOT FALL AND REMAIN IN THE VBV CAVITY. WHEN THE BRACKET IS REMOVED, THE NUT IS NOT HELD ON THE FAN FRAME AND COULD FALL INTO THE ENGINE.

e) Remove the bracket [6] and nut [4].

f) Install a new nut [4].

g) Install the bracket [6].

h) Lubricate the threads of the two bolts [5] with Dow Corning 321 lubricant, D00641 [CP5062].

i) Install and tighten the two bolts [5] with your hand.

NOTE: This is to hold the bracket [6].

j) Make sure that the nut [4] can move freely axially.

k) Tighten the two bolts [5] to 110-120 pound-inches (12.4-13.6 Newton meters).

l) Lubricate the threads of a new bolt [3] with graphite compound, D00601 [CP2101].

m) Install the bolt [3].

n) Tighten the bolt [3] to 547-603 pound-inches (62-68 Newton meters).

o) Install safety wire, G02345 [CP8001] or cable, G50065 [CP8006] [2] to the bolts [3] in groups of two.

(b) Missing or damaged lockwire

1) Remove all damaged pieces of lockwire.

2) Tighten the bolts [3] to 547-603 pound-inches (62-68 Newton meters).

3) Install new safety wire, G02345 [CP8001] or cable, G50065 [CP8006] to the bolts [3] in groups of two.

SUBTASK 72-23-04-410-001-F00

(3) To install the applicable fan duct panel, do this task: Fan Duct Panel Installation, TASK 72-23-07-400-801-F00.

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SUBTASK 72-23-04-010-009-F00

(4) Install the applicable shroud segment, do this task: Shroud Segments Installation, TASK 72-23-03-400-802-F00.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-04-440-002-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-23-04-440-004-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable engine start switch.

SUBTASK 72-23-04-710-002-F00

(3) Close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-04-700-001-F00

(4) If you did the task to manually close the VBV doors, make sure that you do the tests related to the VBV actuation that are listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

END OF TASK

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LEFT THRUST MOUNT IS SHOWN WITH THE FAN DUCT PANEL REMOVED
(EXAMPLE)

B

G29745 S0006582447_V2

Thrust Mount Attach Bolt Inspection
Figure 601/72-23-04-990-801-F00 (Sheet 1 of 2)

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Thrust Mount Attach Bolt Inspection
Figure 601/72-23-04-990-801-F00 (Sheet 2 of 2)

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FAN FRAME - INSPECTION/CHECK

1. **General**

A. This procedure has one task:

(1) A detailed inspection of the fan frame.

TASK 72-23-05-700-801-F00

2. **Fan Frame (Detailed) Inspection**

(Figure 601 or Figure 602 or Figure 603 or Figure 604 or Figure 605)

A. General

(1) This task is the detailed inspection of the fan frame, which includes the fan frame case and struts.

B. References

Reference	Title
51-31-00-390-804	Fillet Seal Application (P/B 201)
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-23-05-300-801-F00	Fan Frame (Stop Drill) Repairs (P/B 801)
72-23-05-300-803-F00	Fan Frame Aft Lip Blend Area Repairs (P/B 801)
72-23-05-300-805-F00	Fan Frame (Under Anchor Bolts Corrosion) Repairs (P/B 801)
72-23-05-350-801-F00	Fan Frame Shroud Aft Lip Cold Reforming Repairs (P/B 801)
72-63-00-200-801-F00	Accessory Gearbox Inspection (P/B 601)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A50096	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63 Type II

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For the Inspection

SUBTASK 72-23-05-860-029-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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SUBTASK 72-23-05-860-030-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-860-031-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable START switch.

SUBTASK 72-23-05-010-007-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

F. Fan Frame (Detailed) Inspection

SUBTASK 72-23-05-210-001-F00

(1) Remove the high metal.

(2) Do a local swab etching before you examine the fan frame by Fluorescent Penetrant Inspection (FPI).

NOTE: See the CFM Standard Practices Manual for the local swab etching procedure.

(3) Do a FPI of the suspected areas (TASK 70-40-01-230-801-F00).

(4) Do a check of the fan frame for damage:

(a) Cracks in the fan frame case, except between fan frame struts 7 and 8.

1) Cracks are not permitted.

2) Missing material is not permitted.

NOTE: There is no service extension permitted for all cracks or missing material found.

(b) Cracks in the fan frame shroud located at the forward acoustical panel attachment (between fan frame struts 7 and 8).

NOTE: It is necessary to remove the acoustical panel before you do this procedure. If corrosion under the anchor nut is observed during removal of the acoustical panel, do this task: Fan Removal of the corrosion under the anchor nuts of the Fan Frame Shroud (TASK 72-23-05-300-805-F00).

1) One single crack per forward acoustical panel attachment is permitted with these conditions:

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a) It is not more than 5.0 inch (127.0 mm) in length.

b) There is a minimum separation of 4.0 inches (101.6 mm) from other cracks.

c) You make sure that all cracks are inside the “NDT inspection area” (Figure 604).

d) A crack must have two or more legs and must have the same source of each leg from the same rivet or hole.

NOTE: One leg cannot divide from another leg.

e) You do the stop drill procedure to stop the crack (TASK 72-23-05-300-801-F00).

f) A continue-in-service limit of 10 cycles or 15 hours is permitted if you find cracks that are more than the above serviceable limits:

<1> 10-flight cycle deferral is permitted, contact your CFM Support Center for disposition.

<2> To use this 10-flight cycle deferral, you must put a bead of sealant, A50096 on the outer surface of the crack (TASK 51-31-00-390-804).

Table 601/72-23-05-993-801-F00 Serviceable Crack Limits

Example Number	Type of Cracks	Characteristics of Cracks	Shroud Serviceability Recommendations
Example 1	Single crack	Length A+B less than 5.0 inches (127.0 mm) with the measure done along the crack and not just between the end-points. Legs “A” and “B” touch the same point (AFT rivet hole of the left nut plate).	SERVICEABLE if Angle C is equal to or more than 90 degrees and if the above conditions are correct. If Angle C is less than 90 degrees, contact your CFM Support Center for disposition.
Example 2	Only one leg	Length D is less than 5.0 inches (127.0 mm). This crack is in NDT area at the middle nut plate. The minimum distance “C” between the Example 1 crack is more than 4.0 inches (101.6 mm) and the “NDT inspection area” (shaded area) completely contains the legs.	SERVICEABLE. No CFM Disposition is necessary.
Example 4	Branched crack (also called “Multi-directional” or Spider Web Crack”)	Leg “B” does not touch leg “A” in a rivet or bolt hole and the Angle C is less than 90 degrees.	NOT SERVICEABLE. Report Dimensions (A, B, D, and the Angle C) to your CFM Support Center for disposition.
Example 5	Not one crack	Leg “A” does not touch leg “B” at the same hole.	NOT SERVICEABLE. Report Dimensions (A, B, D and the Angle C) to your CFM Support Center for disposition.

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Table 601/72-23-05-993-801-F00 Serviceable Crack Limits (Continued)

Example Number	Type of Cracks	Characteristics of Cracks	Shroud Serviceability Recommendations
Example 6	More than one crack	Leg “D” touches leg “E” and leg “F” at the same nut plate area.	NOT SERVICEABLE. Report Dimensions (A, B, D and the Angle C) to your CFM Support Center for disposition.

2) Cracks that go in all directions are not permitted.

(c) Dents or nicks on the struts

1) All dents or nicks are permitted with these limits:

a) It is not more than 0.08 inch (2.00 mm) in depth.

b) A continue-in-service limit of 10 cycles or 25 hours is permitted if you find dents or nicks that are more than the limit.

(d) Fretting wear on V-groove outer ring (Figure 601)

1) All quantities of fretting/wear and missing varnish Poly Tetra Fluoro Ethylene (PTFE) or sulfuric anodization coating on V-groove and sealing surface is permitted.

(e) Distortion on the aft lip (Figure 601 (Sheet 2)).

1) Distortion on the aft lip is permitted with these conditions:

a) It is not more than 0.180 inch (4.57 mm) in width.

b) It is not more than 0.094 inch (2.4 mm) in depth.

c) It is not more than 1.496 inch (38 mm) in length.

d) There is only one area that has the distortion.

2) If the distortion is not in the permitted limits, do this task: Fan Frame Shroud Aft Lip Cold Reforming Repairs, TASK 72-23-05-350-801-F00.

(f) Nicks, dents or impacts on the aft lip

1) Nicks, dents or impacts on the aft lip are not permitted.

2) If nicks, dents or impacts are found, do this task: Fan Frame Aft Lip Blend Area Repairs, TASK 72-23-05-300-803-F00.

(g) Elongated holes on the fan frame flanges

1) All elongated holes for single or double bracket configuration are permitted with these conditions:

a) The hole is not more than 0.279 inch (7.10 mm) in width.

b) The hole is not more than 0.31 inch (8.0 mm) in length (unidirectional wear).

c) The hole is not more than 0.019 inch (0.5 mm) in depth.

d) Install again the applicable bracket with the new bolts, washers and nuts after the initial installation procedure.

2) All elongated holes with double bracket (on each side of flange) are permitted with these conditions:

a) The hole is not more than 0.279 inch (7.10 mm) in width.

b) The hole is not more than 0.433 inch (11.0 mm) in length (unidirectional wear).

c) The hole is not more than 0.039 inch (1.0 mm) in depth.

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d) Install again the applicable new bracket with the new bolts, washers and nuts after the initial installation procedure.

e) A continue-in-service limit of 250 cycles is permitted to replace the bracket.

AKS ALL; AIRPLANES WITHOUT PMUX

(h) Riveted PS13 boss.

1) Missing end fitting is permitted.

AKS ALL

SUBTASK 72-23-05-390-001-F00

(5) Do a spot touch-up of the oxide film coating on the inspected areas (TASK 70-10-04-380-801-F00).

SUBTASK 72-23-05-210-004-F00

(6) Do a visual inspection of the AGB mounts (TASK 72-63-00-200-801-F00).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-05-860-032-F00

(1) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-23-05-860-033-F00

(2) Make sure that you remove all tools, parts and unwanted material from the fan frame.

SUBTASK 72-23-05-860-034-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-035-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-006-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

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Fan Frame Inspection
Figure 601/72-23-05-990-801-F00 (Sheet 1 of 2)

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Fan Frame Inspection
Figure 601/72-23-05-990-801-F00 (Sheet 2 of 2)

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NOTE:

SOME ENGINE COMPONENTS
NOT SHOWN

MM-00239-00-B

436055 S0000141304_V2

Fan Frame Shroud Inspection
Figure 602/72-23-05-990-802-F00

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MM-00240-00-B
436061 S0000141305_V2

Flange Elongated Holes
Figure 603/72-23-05-990-803-F00

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NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARANTHESES.

INNER SIDE

B

B-00327-00

1328297 S0000234022_V2

Fan Frame Shroud Inspection Data Sheet
Figure 604/72-23-05-990-804-F00 (Sheet 1 of 2)

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OUTER SIDE

C

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.

B-00328-00

1328351 S0000234023_V3

Fan Frame Shroud Inspection Data Sheet
Figure 604/72-23-05-990-804-F00 (Sheet 2 of 2)

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B-00329
1328545 S0000234024_V2

Fan Frame Shroud Inspection Cracks Details Description
Figure 605/72-23-05-990-808-F00

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FAN FRAME - REPAIRS

1. General

A. This procedure has these tasks:

(1) Fan Frame (Stop Drill) Repairs

(2) Fan Frame Aft Lip Blend Area Repairs

(3) Fan Frame Shroud Aft Lip Cold Reforming Repair

(4) Fan Frame (Under Anchor Bolts Corrosion) Repairs.

TASK 72-23-05-300-801-F00

2. Fan Frame (Stop Drill) Repairs

(Figure 801)

A. General

(1) This task is an on-wing repair procedure to stop a crack in the fan frame shroud.

(a) You must stop the crack by a stop drill.

B. References

Reference	Title
51-31-00-390-804	Fillet Seal Application (P/B 201)
51-31-00-390-812	Fillet Seals Repair (P/B 201)
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-23-05-700-801-F00	Fan Frame (Detailed) Inspection (P/B 601)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A00803	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63 Type I
A50096	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63 Type II
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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E. Prepare for the Repairs

SUBTASK 72-23-05-860-025-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-026-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-040-004-F00

(3) Make sure that the START switches is in the OFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable START switch.

SUBTASK 72-23-05-010-006-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

F. Fan Frame (Stop Drill) Repairs

SUBTASK 72-23-05-300-001-F00

(1) You can do this repair for these conditions:

(a) Do this repair no later than 20 flight cycles after the fan frame shroud inspection.

1) To use this 20 flight cycles deferral, you must put a bead of the sealant, A00803, on the outer surface to the location of the crack (TASK 51-31-00-390-812).

(b) If the above 20 flight cycles deferral are used, do the fluorescent penetrant inspection (FPI) or eddy current inspection (ECI) again before you do the stop drill procedure.

SUBTASK 72-23-05-350-001-F00

(2) Do the stop drill procedure for the serviceable crack with the following recommendations.

SUBTASK 72-23-05-350-002-F00

(3) A maximum of 2 holes is permitted for each crack.

(4) Measure the length A, B, or D of each crack leg on both the inner and the outer surface of the fan frame shroud.

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(a) If the maximum length of a crack leg is less than 0.50 inch (12.7 mm).

1) Do not do the stop drill on the crack leg, because it can touch with the rivet hole.

(b) If you have all other conditions given in the inspection procedure (TASK 72-23-05-700-801-F00).

1) If the crack is less than 0.50 inch (12.7 mm), this crack is serviceable without the stop drill, but you must continue the necessary repetitive inspection to examine the evaluation.

SUBTASK 72-23-05-350-003-F00

WARNING: USE EYE PROTECTION WHEN YOU USE COMPRESSED AIR TO CLEAN, COOL, OR DRY PARTS OR TOOLS. PARTICLES CAN CAUSE AN INJURY TO YOUR EYES. DO NOT USE MORE THAN 30 PSI (207 KPA). DO NOT POINT COMPRESSED AIR AT YOURSELF OR OTHER PERSONS.

NOTE: If the hole that is more than 0.25 inch (6.35 mm) is not permitted, you must stop drill the hole.

NOTE: Use a satisfactory ventilation system for extraction of cutting chips or dust.

(5) Drill a 0.16 to 0.24 inch (4.06 to 6.10 mm) hole at each end of the crack and break the sharp angles.

NOTE: We recommend to do the stop drill procedure from the surface of the fan frame shroud that has the longer crack leg dimension, and to drill the holes perpendicular to the surface.

SUBTASK 72-23-05-350-004-F00

(6) Do a Non Destructive Test (NDT) inspection to make sure that the correct position of the stop drill holes.

NOTE: Make sure that the external and internal cracks do not go more than the stop drilled hole.

SUBTASK 72-23-05-350-005-F00

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

CAUTION: KEEP TRICHLOROETHYLENE, TRICHLOROETHANE, AND PERCHLOROETHYLENE AWAY FROM TITANIUM PARTS. CHLORINATED AND HALOGEN MATERIALS CAUSE DAMAGE TO TITANIUM PARTS.

(7) Degrease the reworked area with a clean cloth soak in the solvent, B00062 or alcohol, B00676 [CP1041].

NOTE: The isopropyl alcohols is poisonous and flammable. Use personal protection equipment. Use in a well ventilated area.

SUBTASK 72-23-05-350-006-F00

(8) Do a spot touch up of the oxide film coating on the aluminum alloys (TASK 70-10-04-380-801-F00).

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SUBTASK 72-23-05-350-007-F00

(9) Fill the stop drilled holes, the rivet holes and put a bead with the sealant, A50096 on the outer surface of the fan frame shroud at the cracks locations (TASK 51-31-00-390-804).

NOTE: We recommend to use the sealant BMS 5-63, Type II, Class B-1/2 because the dry out time is short.

SUBTASK 72-23-05-350-008-F00

(10) Do the inspection again at 100 cycles and then every 500 cycles per fluorescent penetrant inspection (FPI) (TASK 70-40-01-230-801-F00) or eddy current inspection (ECI) (Refer to BOEING 737 Non Destructive Test Manual, Chapter 6, 51-00-00 for application procedure.

(a) If the crack is more than the limits or it go above the stop drill hole.

1) 10 flight cycles is allowance is permitted.

2) Contact the CFM Support Center for the disposition.

(b) If the crack is in above the limits and if you find the sealant missing, fill the stop drilled holes and put a bead with the sealant, A50096 on the outer surface of the fan frame shroud at the cracks locations.

NOTE: For the cracks which increase through the shroud (visible on both sides of the shroud) an inspection only of the inner skin is permitted.

NOTE: You must do a local swab etching before the examination of the fan frame shroud by the per fluorescent penetrant inspection (FPI) (TASK 70-40-01-230-801-F00).

NOTE: See the CFM Standard Practices Manual for the local swab etching procedure.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-23-05-080-001-F00

(1) Remove the DO-NOT-OPERATE tag from the START switch.

NOTE: Make sure that you remove all tools, parts and unwanted material from the fan frame. Damage to the equipment could occur on the subsequent engine start.

SUBTASK 72-23-05-860-027-F00

(2) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-028-F00

(3) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-005-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

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(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

——— END OF TASK ———

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NOTE:

SOME ENGINE COMPONENTS NOT SHOWN

MM-00239-00-B

1328223 S0000234124_V2

Fan Frame (Stop Drill) Repairs
Figure 801/72-23-05-990-807-F00 (Sheet 1 of 2)

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C

D

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.

1328543 S0000234125_V3

Fan Frame (Stop Drill) Repairs
Figure 801/72-23-05-990-807-F00 (Sheet 2 of 2)

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TASK 72-23-05-300-803-F00

3. **Fan Frame Aft Lip Blend Area Repairs**
(Figure 802)

A. **General**

(1) This task is an on-wing repair procedure to blend the aft lip of the fan frame shroud.

(a) You must blend the nicks, dents, and other impacts on the aft lip.

B. **References**

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. **Consumable Materials**

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	

D. **Prepare for the Repairs**

SUBTASK 72-23-05-860-021-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-022-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-210-002-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable START switch.

SUBTASK 72-23-05-010-005-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

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WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

E. Fan Frame Aft Lip Blend Area Repairs

WARNING: DO NOT BREATHE PARTICLES FROM BLENDING OR LET PARTICLES TOUCH YOU. PARTICLES FROM BLENDING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

SUBTASK 72-23-05-320-001-F00

(1) Blend the nicks, dents, and other impacts as follows (Figure 802):

(a) Power-blend the nicks, dents, and other impacts with smoothed contour.

1) Break all sharp edges with a minimum radius of 0.0032 inch (0.08 mm).

2) The blending length must not be more than 1.96 inch (50 mm).

3) The blending depth must not be more than 0.180 inch (4.5 mm).

4) The blending length must be a minimum of 10 times the blending depth.

5) Remove the material to a minimum radius of 1.000 inch (25.4 mm).

SUBTASK 72-23-05-160-002-F00

WARNING: ACETONE IS EXTREMELY FLAMMABLE AND HAS TOXIC VAPOR. AVOID PROLONGED BREATHING OF VAPOR AND PROLONGED OR REPEATED CONTACT WITH SKIN. AVOID CONTACT WITH EYES. CLEAN PARTS IN WELL-VENTILATED AREA AND USE APPROVED SAFETY EQUIPMENT.

WARNING: ISOPROPYL ALCOHOL IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, AND POISONOUS. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN ISOPROPYL ALCOHOL IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET ISOPROPYL ALCOHOL IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

(2) Clean the blended areas with a white cloth made moist with acetone solvent, B01058 [CP1039], or alcohol, B00676 [CP1041].

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SUBTASK 72-23-05-350-012-F00

(3) Do a local swab etching before you examine the fan frame shroud by Fluorescent Penetrant Inspection (FPI).

NOTE: See the CFM Standard Practices Manual for the local swab etching procedure.

SUBTASK 72-23-05-210-003-F00

(4) Make sure that the nicks, dents, and other impacts are fully removed, and examine as follows:

(a) Do this task: Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

1) No indication is permitted.

SUBTASK 72-23-05-350-011-F00

(5) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-05-860-008-F00

(1) Make sure that you remove all the tools, parts and unwanted material from the fan frame.

SUBTASK 72-23-05-860-005-F00

(2) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-23-05-860-023-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-024-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-004-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

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B0046400

2240728 S0000501383_V2

Fan Frame Aft Lip Blend Area Repairs
Figure 802/72-23-05-990-809-F00

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TASK 72-23-05-350-801-F00

4. **Fan Frame Shroud Aft Lip Cold Reforming Repairs**
(Figure 803, Figure 804, Figure 805 and Figure 806)

A. **General**

(1) This task provides the instructions on how to repair the aft lip on the fan frame shroud by cold reforming.

B. **References**

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. **Consumable Materials**

Reference	Description	Specification
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
G50320 [912-0041]	Cloth - Process Cleaning Absorbent Wiper	

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Prepare for the Repairs**

SUBTASK 72-23-05-860-009-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-010-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-860-011-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable START switch.

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SUBTASK 72-23-05-010-004-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

F. Fan Frame Shroud Aft Lip Cold Reforming Repair

SUBTASK 72-23-05-970-001-F00

(1) Refer to the dimensional information for the repair application in the table that follows:

Repair Dimensional Information

Description	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dim. C	16.784 inches (426.3 mm)	16.799 inches (426.7 mm)	
Dim. E	0.398 inch (10.1 mm)	0.413 inch (10.5 mm)	
Radius F			0.787 inch (20.0 mm)
Radius G			1.250 inch (31.75 mm)
Dim. H	0.0189 inch (0.48 mm)	0.0346 inch (0.88 mm)	
Angle M			24°
Dim. Z			1.18 inch (30.0 mm)

SUBTASK 72-23-05-840-001-F00

(2) Do this repair with these conditions:

(a) Do an inspection of the fan frame shroud for an “R-047” or “R-047→” mark.

NOTE: An “R-047” or “R-047→” mark on the fan frame shroud indicates that this repair has already been applied once. That is in the area delimited by Dim Z.

1) If you find an “R-047” or “R-047→” mark, this repair procedure is not permitted.

(b) Do an inspection of the area that you will repair with these conditions:

1) The length of the cold reforming area shall be at least 10 times the depth of the dent area.

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2) The length of the cold reforming area should not be more than 2.36 inches (60.0 mm).

SUBTASK 72-23-05-110-001-F00

WARNING: DO NOT GET ACETONE, ISOPROPYL ALCOHOL, OR DESOCLEAN CLEANING SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON EYE PROTECTION, AND GLOVES. KEEP THE SOLVENTS AWAY FROM SPARKS, FLAME, AND HEAT. THEY ARE POISONOUS AND FLAMMABLE. THEY CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(3) Clean the impacted area with a clean cloth, G50320 [912-0041] made moist with solvent, B00062 or alcohol, B00676 [CP1041].

SUBTASK 72-23-05-230-002-F00

(4) Do a local swab etching before the examination of the fan frame shroud by Fluorescent Penetrant Inspection (FPI).

NOTE: See the CFM Standard Practices Manual for the local swab etching procedure.

SUBTASK 72-23-05-230-003-F00

(5) Do a FPI of the impacted area (TASK 70-40-01-230-801-F00).

(a) No indication is permitted.

SUBTASK 72-23-05-350-013-F00

(6) Do the reforming of the impacted area as follows:

(a) Cold-reform the impacted area to get the original profile of the thrust reverser seal surface of the V-groove.

1) Find the location of the impacted area (d1d2).

2) Make sure that you follow the specifications of the aft lip relative to the location of the impacted area.

NOTE: Do not use the sections of the aft lip previously repaired as a reference for new repair application.

(b) Cold-reform the impacted area gradually in one direction only and in the same way.

NOTE: Do not do shocks.

NOTE: The locally-manufactured inspection tool must have a shape with a maximum tolerance of 0.0020 inch (0.05 mm).

SUBTASK 72-23-05-210-005-F00

(7) Do an inspection of the repaired area as follows:

WARNING: DO NOT GET ACETONE, ISOPROPYL ALCOHOL, OR DESOCLEAN CLEANING SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON EYE PROTECTION, AND GLOVES. KEEP THE SOLVENTS AWAY FROM SPARKS, FLAME, AND HEAT. THEY ARE POISONOUS AND FLAMMABLE. THEY CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(a) Clean the impacted area with a clean cloth, G50320 [912-0041] made moist with solvent, B00062 or alcohol, B00676 [CP1041].

(b) Do a local swab etching before the examination of the fan frame shroud by FPI.

NOTE: See the CFM Standard Practices Manual for the local swab etching procedure.

(c) Do a FPI of the impacted area (TASK 70-40-01-230-801-F00).

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1) No indication is permitted.

SUBTASK 72-23-05-370-001-F00

(8) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

SUBTASK 72-23-05-930-001-F00

(9) Mark the fan frame shroud after the repair (Refer to CFMI SPM, Task 70-10-12-350-005, Vibro-Peen Marking):

NOTE: If necessary, remove an equipment to get better access.

(a) Write “R-047” or “R-047→” on the marking area, centered in front of the repaired area.

NOTE: The mark must have a depth of 0.0028-0.0059 inch (0.07-0.15 mm).

SUBTASK 72-23-05-370-002-F00

(10) Put the spot touch-up protection on the marking area (TASK 70-10-04-380-801-F00).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-05-480-001-F00

CAUTION: MAKE SURE THAT YOU REMOVE ALL TOOLS, LOOSE PARTS AND UNWANTED MATERIAL FROM THE AREA WHEN YOU COMPLETE MAINTENANCE. DAMAGE TO EQUIPMENT COULD OCCUR.

(1) Make sure that you remove all the tools, parts and unwanted material from the fan frame.

SUBTASK 72-23-05-480-002-F00

(2) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-23-05-860-012-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-013-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-003-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

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REPAIRABLE AREA

A

PROTECTION: SULFURIC ANODIZATION

MATERIAL: 2219

B0048400
2246581 S0000503406_V2

Fan Frame Shroud Repair Area
Figure 803/72-23-05-990-810-F00

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B0048500
2246589 S0000503410_V2

Fan Frame Shroud (Area Angle) Repair
Figure 804/72-23-05-990-811-F00 (Sheet 1 of 2)

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B

B0048600
2246593 S0000503411_V2

Fan Frame Shroud (Area Angle) Repair
Figure 804/72-23-05-990-811-F00 (Sheet 2 of 2)

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NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES
ROUGHNESS IS IN MICROINCHES
WITH MICROMETERS IN PARENTHESES.

B0048700
2246606 S0000503412_V2

Fan Frame Shroud (Repair Dimensions) Repair
Figure 805/72-23-05-990-812-F00 (Sheet 1 of 2)

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NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES
ROUGHNESS IS IN MICROINCHES
WITH MICROMETERS IN PARENTHESES.

B0048800
2246619 S0000503413_V2

Fan Frame Shroud (Repair Dimensions) Repair
Figure 805/72-23-05-990-812-F00 (Sheet 2 of 2)

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Fan Frame Shroud (Marking Area) Repair
Figure 806/72-23-05-990-813-F00

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TASK 72-23-05-300-805-F00

5. **Fan Frame (Under Anchor Bolts Corrosion) Repairs**
(Figure 807)

A. **General**

(1) This task is an on-wing repair procedure to blend the corrosion under the anchor nuts of the fan frame shroud.

(a) You must blend the corrosion under the anchor nuts.

(b) This repair is not applicable in the area between the Struts 7 and 8 (IDG AIR/OIL COOLER) on the fan frame shroud for the Fan Frame Shroud post SB CFM56-7B 72-0495.

B. **References**

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. **Prepare for the Repairs**

SUBTASK 72-23-05-860-014-F00

(1) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-015-F00

(2) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-860-020-F00

(3) Make sure that the START switches are in the OFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable START switch.

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SUBTASK 72-23-05-010-003-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

E. Fan Frame (Under Anchor Bolts Corrosion) Repairs

SUBTASK 72-23-05-020-001-F00

WARNING: DO NOT LET THE SHARP METAL EDGES CUT YOU. PUT ON GLOVES. INJURIES TO PERSONS CAN OCCUR.

(1) For original size, remove rivets head with a 0.094 inch (2.4 mm) diameter drill.

SUBTASK 72-23-05-020-002-F00

WARNING: DO NOT LET THE SHARP METAL EDGES CUT YOU. PUT ON GLOVES. INJURIES TO PERSONS CAN OCCUR.

(2) If you cannot remove the rivets head, use a 0.126 inch (3.2 mm) diameter drill related to the repair size rivet.

SUBTASK 72-23-05-350-014-F00

WARNING: DO NOT BREATHE PARTICLES FROM BLENDING OR LET PARTICLES TOUCH YOU. PARTICLES FROM BLENDING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(3) Remove the corrosion in the anchor nut holes as follows:

(a) Remove corrosion by drilling.

NOTE: Do not remove more material than necessary.

(b) Remove all the corrosion, sharp edges and high metal.

NOTE: Roughness of the repaired area must be 125 micro inches (3.2 micrometers).

SUBTASK 72-23-05-320-002-F00

(4) Do a blending of the corrosion under the anchor nut as follows:

(a) Remove corrosion by hand blending.

NOTE: Do not remove more material than necessary.

(b) Remove all the corrosion, sharp edges and high metal.

NOTE: Make sure the repaired area is as smooth and flat as possible to ensure good tightening.

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SUBTASK 72-23-05-350-015-F00

(5) Remove grease from the part.

SUBTASK 72-23-05-220-001-F00

(6) Do a dimensional inspection of the repaired area.

SUBTASK 72-23-05-230-004-F00

(7) Do a local swab etching before the examination of the fan frame shroud by Fluorescent Penetrant Inspection (FPI) (TASK 70-40-01-230-801-F00).

NOTE: See CFM Standard Practices Manual for the local swab etching procedure.

(a) No indication is permitted.

SUBTASK 72-23-05-370-003-F00

WARNING: DO NOT GET ALODINE IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM ALODINE. PUT ON GOGGLES AND GLOVES WHEN YOU USE ALODINE. KEEP ALODINE AWAY FROM SPARKS, FLAME, AND HEAT. ALODINE IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(8) Do a spot touch-up of oxide film coating on the repaired area (TASK 70-10-04-380-801-F00).

SUBTASK 72-23-05-410-001-F00

(9) Install new anchor nuts on the fan frame shroud.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-05-860-016-F00

(1) Remove the DO-NOT-OPERATE tag from the START switch.

SUBTASK 72-23-05-860-017-F00

(2) Make sure that you remove all tools, parts and unwanted material from the fan frame.

SUBTASK 72-23-05-860-018-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-23-05-860-019-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-23-05-410-002-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

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(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

——— END OF TASK ———

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NUMEROTATION OF STRUTS 1-12
(VIEW IN THE AFT DIRECTION)

A-A

NOTE:

DIMENSIONS ARE IN INCHERS, MILLIMETERS ARE IN PARENTHESES

MATERIAL:

AMS4143 (AU6M) WITH SULFURIC ANODIZATION.

2305458 S0000522871_V2

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 1 of 3)

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A

B

NOTE:

DIMENSIONS ARE IN INCHERS, MILLIMETERS ARE IN PARENTHESES

MATERIAL:

AMS4143 (AU6M) WITH SULFURIC ANODIZATION.

2305607 S0000523549_V2

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 2 of 3)

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AVAILABLE FOR ALL BLENDED AREAS

C

NOTE:

DIMENSIONS ARE IN INCHERS, MILLIMETERS ARE IN PARENTHESES

MATERIAL:

AMS4143 (AU6M) WITH SULFURIC ANODIZATION.

2305849 S0000523550_V2

Fan Frame (Under Anchor Bolts Corrosion) Repairs
Figure 807/72-23-05-990-814-F00 (Sheet 3 of 3)

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INNER RADIAL DRIVE SHAFT ASSEMBLY - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of the inner radial drive shaft assembly.

(2) The installation of the inner radial drive shaft assembly.

TASK 72-23-06-000-801-F00

2. Inner Radial Drive Shaft Assembly Removal

(Figure 401, Figure 402)

A. References

Reference	Title
72-62-00-000-801-F00	Transfer Gearbox Assembly Removal (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8266	Pusher/Puller - Radial Drive Shaft Part #: 856A3708G01 Supplier: 58828

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 72-23-06-210-001-F00

(1) Do this task: Transfer Gearbox Assembly Removal, TASK 72-62-00-000-801-F00.

E. Inner Radial Drive Shaft Removal

SUBTASK 72-23-06-020-002-F00

(1) Do these steps to remove the inner radial drive shaft assembly [3]:

(a) Remove the bolts [1] from the inner radial drive shaft housing [2]. (Figure 401):

NOTE: The inner radial drive shaft housing [2] is on the fan frame shroud at the 9:00 o'clock (strut No. 10) position.

(b) Install the radial drive shaft pusher/puller tool, SPL-8266 in the radial drive shaft housing [2].

(c) Install a rod with a slide hammer on the puller.

(d) Remove the inner radial drive shaft assembly [3] from the strut.

(e) Remove the puller from the inner radial drive shaft housing [2].

(f) Remove the inner drive shaft assembly [3] from the splines of the radial IGB bevel gear.

(g) Remove and discard the o-ring [4].

END OF TASK

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Inner Radial Drive Shaft Assembly Removal
Figure 401/72-23-06-990-801-F00 (Sheet 1 of 2)

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L31043 S0006582457_V2

Inner Radial Drive Shaft Assembly Removal
Figure 401/72-23-06-990-801-F00 (Sheet 2 of 2)

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Inner Radial Drive Shaft Assembly Installation
Figure 402/72-23-06-990-802-F00

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TASK 72-23-06-400-801-F00

3. Inner Radial Driveshaft assembly Installation

(Figure 401, Figure 402)

A. References

Reference	Title
72-62-00-400-801-F00	Transfer Gearbox Assembly Installation (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8266	Pusher/Puller - Radial Drive Shaft Part #: 856A3708G01 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Inner Radial Drive Shaft Assembly Installation

SUBTASK 72-23-06-420-002-F00

(1) Do these steps to install the inner radial drive shaft assembly [3]:

WARNING: DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(a) Lubricate the new o-ring [4] with engine oil, D00599 [CP2442].

(b) Install the o-ring [4] on the inner radial drive shaft assembly [3].

(c) Lubricate the threads of the bolts [1] with engine oil, D00599 [CP2442].

(d) Do these steps to install the inner radial drive shaft assembly [3] in the splines of the radial IGB bevel gear (Figure 402):

1) Engage the lugs of the radial drive shaft pusher/puller tool, SPL-8266 in the inner radial drive shaft slot.

2) Push and turn the pusher to engage the shaft splines in the IGB bevel gear.

(e) Remove the pusher from the inner radial drive shaft assembly [3].

(f) Make sure the inner radial drive shaft housing [2] is correctly seated on the fan frame shroud.

(g) Install the bolts [1] to attach the inner radial drive shaft housing [2] to the fan frame shroud.

1) Tighten the bolts [1] to 140-160 pound-inches (16-18 Newton meters).

SUBTASK 72-23-06-210-002-F00

(2) Do this task: Transfer Gearbox Assembly Installation, TASK 72-62-00-400-801-F00.

END OF TASK

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INNER RADIAL DRIVE SHAFT - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) A detailed inspection of the inner radial drive shaft.

TASK 72-23-06-200-801-F00

2. Inner Radial Drive Shaft Inspection

A. General

(1) This task is the inspection of the inner radial drive shaft.

B. References

Reference	Title
72-23-06-000-801-F00	Inner Radial Drive Shaft Assembly Removal (P/B 401)
72-23-06-400-801-F00	Inner Radial Driveshaft assembly Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare For the Inspection

SUBTASK 72-23-06-020-001-F00

(1) Do this task: Inner Radial Drive Shaft Assembly Removal, TASK 72-23-06-000-801-F00.

E. Procedure

SUBTASK 72-23-06-900-001-F00

(1) If you find damage that is not in the limits, replace the inner radial drive shaft, unless you are given other instructions.

SUBTASK 72-23-06-220-001-F00

(2) Do a check of the inner radial drive shaft:

(a) Nicks and dents

1) All damage is permitted with these limits:

a) Not more than 0.025 inch (0.64 mm) in depth after you remove the high metal.

(b) Scratches

1) All damage is permitted with these limits:

a) You cannot feel the scratch with a 0.03 inch (0.76 mm) radius scriber.

(c) Cracks

1) Not permitted.

(d) Lack of protective material on non-machined surfaces

1) All damage is permitted with these limits:

a) There is not more than 5 percent of the total surface area that does not have protective material.

(e) Corrosion

1) Not permitted.

(f) Wear

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1) Not permitted.

F. Put the Airplane Back to its Usual Condition

SUBTASK 72-23-06-420-001-F00

(1) Do this task: Inner Radial Driveshaft assembly Installation, TASK 72-23-06-400-801-F00.

——— END OF TASK ———

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FAN DUCT PANELS - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of the fan duct panels

(2) The installation of the fan duct panels.

TASK 72-23-07-000-801-F00

2. Fan Duct Panel Removal

A. General

(1) Each engine has 12 fan duct panels.

(a) Eleven panels have a grid and the twelfth panel has a scoop.

(2) The removal instructions for all the fan duct panels are equivalent.

(3) All the fan duct panels are on the engine fan frame, between the fan frame struts.

B. References

Reference	Title
75-32-00-730-801-F00	VBV Actuation System - Manual Operation (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 72-23-07-010-001-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSERS (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-07-710-001-F00

(2) Manually operate the VBV actuation system to closed position (TASK 75-32-00-730-801-F00).

E. Remove the Fan Duct Panel

SUBTASK 72-23-07-020-001-F00

(1) Do these steps to remove the applicable fan duct panel (Figure 401):

(a) Loosen the two forward screws [3].

(b) Loosen the two middle screws [4].

(c) Loosen the two aft screws [5].

(d) Loosen the fan duct panel [1] or [2] from the engine.

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AKS ALL PRE SB CFM56-7B-72-202

(e) Disengage the seals on the fan duct panel from the fan frame.

AKS ALL

END OF TASK

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Fan Duct Panels Installation
Figure 401/72-23-07-990-801-F00 (Sheet 1 of 2)

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1 BONDED SEAL:
PRE-CFMI-SB 72-202 ONLY

F81427 S0006582466_V2

Fan Duct Panels Installation
Figure 401/72-23-07-990-801-F00 (Sheet 2 of 2)

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TASK 72-23-07-400-801-F00

3. Fan Duct Panel Installation

(Figure 401)

A. References

Reference	Title
75-32-00-730-801-F00	VBV Actuation System - Manual Operation (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Consumable Materials

Reference	Description	Specification
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G	CFM CP2104

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Install the Fan Cowl Panel

SUBTASK 72-23-07-640-001-F00

(1) Do these steps to install the applicable fan cowl panels:

AKS ALL PRE SB CFM56-7B-72-202

(a) Do a check of the seals on the fan duct panels to make sure that they are in good condition.

AKS ALL

(b) Lubricate the threads of the screws [3], [4] and [5] with Molykote G lubricant, D00640 [CP2104].

SUBTASK 72-23-07-420-001-F00

(2) Do these steps to install the applicable fan duct panel [1] or [2]:

(a) Put the fan duct panel [1] or [2] in its position on the fan frame.

NOTE: Put the fan duct panel [1] with the scoop between struts 5 and 6.

AKS ALL PRE SB CFM56-7B-72-202

CAUTION: INSTALL THE TWO LONGER SCREWS ON THE REAR PART OF THE FAN DUCT PANEL WITH THE SCOOP. IF YOU DO NOT OBEY THE INSTRUCTIONS, DAMAGE TO EQUIPMENT CAN OCCUR.

1) Make sure the seals on the fan duct panel engage correctly.

AKS ALL

2) Tighten the screws [3], [4] and [5] to 60-65 pound-inches (6.6 - 7.3 Newton meters).

E. Put the Airplane Back to its Usual Condition

SUBTASK 72-23-07-710-002-F00

(1) Manually operate the VBV actuation system to open position (TASK 75-32-00-730-801-F00).

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SUBTASK 72-23-07-010-003-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

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FAN DUCT PANELS - INSPECTION/CHECK

1. **General**

A. This procedure has one task.

(1) The inspection of the fan duct panels and the LPTACC strut panel.

TASK 72-23-07-200-801-F00

2. **Fan Duct Panels Inspection**

(Figure 601)

A. General

(1) This task is to visually examine the fan duct panels, which are installed between the fan frame struts on the mid-box structure.

(a) The LPTACC strut panel at position 5 (with a scoop) between strut 5 and 6 is made from epoxy resin with carbon fabric material.

(b) The remaining 11 fan duct panels (referred to as strut panels) are made from titanium.

B. References

Reference	Title
72-23-07-000-801-F00	Fan Duct Panel Removal (P/B 401)
72-23-07-400-801-F00	Fan Duct Panel Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Inspection

SUBTASK 72-23-07-040-001-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE ABD THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-23-07-100-001-F00

(2) Clean dirt or unwanted material from the panels.

E. Procedure

SUBTASK 72-23-07-210-002-F00

(1) If you find damage that is not in the limits, replace the panels, unless you are given other instructions.

These are the tasks:

Fan Duct Panel Removal, TASK 72-23-07-000-801-F00,

Fan Duct Panel Installation, TASK 72-23-07-400-801-F00.

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SUBTASK 72-23-07-210-003-F00

(2) Examine the titanium strut panels for damage:

(a) A maximum service extension of 100 cycles is permitted with one missing fan duct panel. Check every 10 cycles that the VBV cavity is free of foreign objects. Remove the panel and all the attaching screws. Make sure all other panels are correctly tightened.

(b) Nicks, dents and scratches

1) There is no limit to the number of nicks, dents and scratches which are permitted with this condition:

a) Not more than 0.012 inch (0.3 mm) in depth.

(c) Missing material is not permitted

(d) ENGINES PRE-CFMI-SB 72-202;

Bonded seals

1) Missing or damaged seals are permitted.

a) There is no limit to the amount of missing or damaged seals.

2) Unbonded seal is permitted provided you cut and remove the pieces of unbonded seal.

a) There is no limit to the amount of unbonded seal.

(e) Loose captive bolts

1) Not permitted.

a) Tighten the bolts.

SUBTASK 72-23-07-210-004-F00

(3) Examine the LPTACC strut panel for damage:

(a) Punctures or tears

1) Not serviceable.

(b) Impact, marks and scratches

1) There is no limit to the number of impact, marks and scratches which are permitted with this condition:

a) Not more than 0.020 inch (0.5 mm) in depth.

(c) ENGINES PRE-CFMI-SB 72-202;

Bonded seal

1) Missing or damaged seal is permitted.

a) There is no limit to the amount of missing or damaged seal.

2) Unbonded seal is permitted provided you cut and remove the pieces of unbonded seal.

a) There is no limit to the amount of unbonded seal.

(d) VBV cascade vanes

1) Cracks

a) Not serviceable.

2) Looseness is not permitted.

(e) LPTACC Scoop

1) Cracks

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a) Not serviceable.

2) Impact, marks or scratches

a) There is no limit to the number of impact, marks or scratches which are permitted with these conditions:

b) Not more than 0.01 inch (0.25 mm) in depth

c) Not more than 0.59 inch (15 mm) in length

d) Not more than 0.39 inch (10 mm) between two defects.

3) Looseness of the LPTACC scoop is not permitted.

4) Missing or loose bolts are not permitted.

a) Replace or tighten the bolts.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-07-440-001-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, 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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POSITION OF FAN FRAME STRUTS AND FAN DUCT PANELS (VIEW IN THE FORWARD DIRECTION)

A-A

1 BONDED SEAL:
PRE-CFMI-SB 72-202 ONLY

A

S-M56-MM-03467-00-B

G23277 S0006582470_V3

Fan Duct Panels Inspection
Figure 601/72-23-07-990-802-F00 (Sheet 1 of 2)

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B

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

S-M56-MM-03904-00-B

H11406 S0006582471_V2

Fan Duct Panels Inspection
Figure 601/72-23-07-990-802-F00 (Sheet 2 of 2)

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FAN INLET CASE - INSPECTION/CHECK

1. General

A. This procedure has these tasks:

(1) A detailed inspection of the fan inlet case.

(2) An erosion inspection of the fan inlet case.

(3) A template inspection of the fan inlet case.

TASK 72-24-01-200-801-F00

2. Fan Inlet Case Inspection (Detail)

A. General

(1) This task is the detailed inspection of the fan inlet case.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (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

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For the Inspection

SUBTASK 72-24-01-040-001-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-040-002-F00

(2) Make sure that the start levers are in the CUTOFF position.

SUBTASK 72-24-01-040-004-F00

(3) Install a DO-NOT-OPERATE tag on the applicable start switch.

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SUBTASK 72-24-01-010-001-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU OPEN THE THRUST REVERSERS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-24-01-480-001-F00

CAUTION: MAKE SURE YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(5) Install a protective mat, STD-585, in the inlet cowl.

F. Examine the Fan Inlet Case

SUBTASK 72-24-01-210-001-F00

(1) Remove the high metal.

(2) Do a local swab etching before you examine the fan inlet case by Fluorescent Penetrant Inspection (FPI).

NOTE: See the CFM Standard Practices Manual for the local swab etching procedure.

(3) Do a FPI of the suspected areas (TASK 70-40-01-230-801-F00).

(4) Do a check of the fan inlet case for damage (Figure 601 or Figure 602):

(a) Cracks (except for holes 84/85 and 103/104 on B1 flange).

1) Cracks are not permitted.

2) Missing material is not permitted.

NOTE: No service extension is permitted if you find cracks or missing material (broken lug).

3) Cracked holes 84/85 on B1 flange, do SB 72-0780.

4) Cracked holes 103/104 on B1 flange, do SB 72-0580.

(b) Erosion on Areas 4, 5 and 6 (Figure 603).

1) Do the erosion inspection (TASK 72-24-01-270-801-F00).

AKS ALL POST SB 737-CFM56-7B-72-0553

2) Missing anti-erosion paint: Any amount.

AKS ALL

(c) Nicks, dents, and scratches on the fan inlet case (Figure 603).

NOTE: The trinomial inspection is the quickest method but gives you less margin in terms of limits. The template inspection takes more time but gives larger limits.

NOTE: For areas 4, 5 and 6 post CFM56-7B-SB 72-0553, the following inspections are applicable after removal of a 13.937 in. (354 mm) radius anti-erosion paint around the nick, dent or scratch to check if other ones are present below anti-erosion paint.

1) Alternate procedure available - Trinomial Inspection.

a) All damage is permitted with these limits:

NOTE: Take into account the distance between two damages all around the area without area restriction.

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Example: If the damage one [Depth = 0.010 inch; Length = 0.90 inch] is in Area 1 at 1.0 inch from Area 2, then no damage is permitted in Areas 1, 2 and 3 if the distance is less than 3.0 inch. See the figure.

NOTE: Damages in the opposite inner skin and outer skin are not permitted.

NOTE: Indications in radius or on flanges are not permitted

AKS ALL PRE SB 737-CFM56-7B-72-0032

Table 601/72-24-01-993-801-F00 Fan Inlet Case Damage Limits

Area	Max. Depth	Max. Length	Distance Between Two Damages
1	0.006 in. (0.15 mm)	1.0 in. (25.4 mm)	0.12 in. (3.048 mm)
1	0.012 in. (0.3 mm)	1.0 in. (25.4 mm)	3.0 in. (76.2 mm)
1	0.02 in. (0.508 mm)	0.40 in. (10.16 mm)	2.05 in. (52.07 mm)
1	0.031 in. (0.8 mm)	0.50 in. (12.7 mm)	10.0 in. (254 mm)
2	0.006 in. (0.15 mm)	1.0 in. (25.4 mm)	0.12 in. (3.048 mm)
2	0.0177 in. (0.45 mm)	1.0 in. (25.4 mm)	3.0 in. (76.2 mm)
2	0.02 in. (0.508 mm)	0.40 in. (10.16 mm)	2.05 in. (52.07 mm)
2	0.059 in. (1.5 mm)	1.0 in. (25.4 mm)	10.0 in. (254 mm)
3 (abradable)	NOT PERMITTED	NOT PERMITTED	NOT PERMITTED
4&5	0.0252 in. (0.64 mm)	1.0 in. (25.4 mm)	10.00 in. (254 mm)
4&5	0.0252 in. (0.64 mm)	0.394 in. (10.0 mm)	5.865 in. (149 mm)
4&5	0.04 in. (1.016 mm)	0.50 in. (12.7 mm)	9.055 in. (230 mm)
6	0.039 in. (1.0 mm)	1.0 in. (25.4 mm)	12.60 in. (320.04 mm)
6	0.039 in. (1.0 mm)	0.591 in. (15 mm)	9.06 in. (230 mm)

AKS ALL POST SB 737-CFM56-7B-72-0032 AND PRE SB 737-CFM56-7B-72-0931

Table 602/72-24-01-993-802-F00 Fan Inlet Case Damage Limits

Area	Max. Depth	Max. Length	Distance Between Two Damages
1	0.006 in. (0.15 mm)	1.0 in. (25.4 mm)	0.12 in. (3.048 mm)
1	0.012 in. (0.3 mm)	1.0 in. (25.4 mm)	3.0 in. (76.2 mm)
1	0.02 in. (0.508 mm)	0.40 in. (10.16 mm)	2.05 in. (52.07 mm)
1	0.031 in. (0.8 mm)	0.50 in. (12.7 mm)	10.0 in. (254 mm)
2	0.006 in. (0.15 mm)	1.0 in. (25.4 mm)	0.12 in. (3.048 mm)
2	0.0177 in. (0.45 mm)	1.0 in. (25.4 mm)	3.0 in. (76.2 mm)
2	0.02 in. (0.508 mm)	0.40 in. (10.16 mm)	2.05 in. (52.07 mm)
2	0.059 in. (1.5 mm)	1.0 in. (25.4 mm)	10.0 in. (254 mm)
3 (abradable)	0.0039 in. (0.1 mm)	ANY AMOUNT	ANY AMOUNT
4&5	0.0252 in. (0.64 mm)	1.0 in. (25.4 mm)	10.00 in. (254 mm)

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AKS ALL POST SB 737-CFM56-7B-72-0032 AND PRE SB 737-CFM56-7B-72-0931 (Continued)

Table 602/72-24-01-993-802-F00 Fan Inlet Case Damage Limits (Continued)

Area	Max. Depth	Max. Length	Distance Between Two Damages
4&5	0.0252 in. (0.64 mm)	0.394 in. (10.0 mm)	5.865 in. (149 mm)
4&5	0.04 in. (1 mm)	0.50 in. (12.7 mm)	9.055 in. (230 mm)
6	0.039 in. (1.0 mm)	1.0 in. (25.4 mm)	12.60 in. (320.04 mm)
6	0.039 in. (1.0 mm)	0.591 in. (15 mm)	9.06 in. (230 mm)

AKS ALL POST SB 737-CFM56-7B-72-0931

Table 603/72-24-01-993-803-F00 Fan Inlet Case Indication Limits

Area	Max. Depth	Max. Length	Distance Between Two Indications
1&2	0.019 in. (0.5 mm)	1.00 in. (25.40 mm)	0.57 in. (14.47 mm)
1&2	0.023 in. (0.6 mm)	1.00 in. (25.40 mm)	3.00 in. (76.20 mm)
1&2	0.053 in. (1.35 mm)	0.40 in. (10.16 mm)	2.80 in. (71.12 mm)

- Indications on areas 1 and 2 with a depth of less than 0.0118 in. (0.3 mm) are not taken into account and are considered as acceptable.
- All other indications are permitted on areas 1 and 2 within the limits listed above.

Table 604/72-24-01-993-804-F00 Fan Inlet Case Indication Limits

Area	Max. Depth	Max. Length	Distance Between Two Indications
4&5	0.023 in. (0.60 mm)	1.00 in. (25.40 mm)	1.00 in. (25.40 mm)
4&5	0.031 in. (0.80 mm)	0.393 in. (10.0 mm)	1.00 in. (25.40 mm)
4&5	0.039 in. (1.00 mm)	0.236 in. (6.0 mm)	1.00 in. (25.40 mm)

- Indications with a depth less than 0.0157 in. (0.4 mm) are not taken into account and are considered as acceptable.
- All other indications are permitted on area 4 and 5 within the limits listed above.

Table 605/72-24-01-993-805-F00 Fan Inlet Case Indication Limits

Area	Max. Depth	Max. Length	Distance Between Two Indications
6	0.039 in. (1.00 mm)	1.00 in. (25.40 mm)	12.60 in. (320.04 mm)
6	0.039 in. (1.00 mm)	0.591 in. (15.00 mm)	9.055 in. (230.00 mm)

- All indications are permitted on area 6 within the limits listed above.

AKS ALL

b) If you find nicks, dents or scratches into the parent material of the case, do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

NOTE: No protruded material is permitted in the air flow path after the spot touch-up.

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2) Alternative procedure: Do the Template Inspection (TASK 72-24-01-220-801-F00).

3) The Continue-In-Service (CIS) limit of 25 cycles is permitted with no maximum number of nicks, dents, or scratches as follows:

a) All damages are in the maximum depth limit for each area.

(d) Elongated holes on the fan inlet case flanges (Figure 601 or Figure 602):

1) There is no limit to the number of elongated holes for a single or double bracket configuration which are permitted with these conditions:

a) Not more than 0.279 inch (7.10 mm) in width and not more than 0.31 inch (8.0 mm) in length (unidirectional wear) and not more than 0.019 inch (0.5 mm) in depth.

b) Re-install the applicable bracket with the new bolts, washers and nuts following an initial installation procedure.

2) There is no limit to the number of elongated holes with a double bracket (bracket on each side of the flange) which are permitted with these conditions:

a) Not more than 0.279 inch (7.10 mm) in width and not more than 0.433 inch (11.0 mm) in length (unidirectional wear) and not more than 0.039 inch (1.0 mm) in depth.

b) Re-install the applicable new bracket with the new bolts, washers and nuts following an initial installation procedure.

c) A Continue-In-Service limit of 250 cycles is permitted to replace the bracket.

SUBTASK 72-24-01-390-001-F00

(5) Do a spot touch-up of the oxide film coating on the inspected areas (TASK 70-10-04-380-801-F00).

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-24-01-080-001-F00

WARNING: MAKE SURE THAT YOU REMOVE ALL TOOLS, PARTS OR UNWANTED MATERIAL FROM THE INLET COWL. THIS WILL PREVENT INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Remove the protective mat, STD-585, from the inlet cowl.

SUBTASK 72-24-01-410-001-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.

(2) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-24-01-080-002-F00

(3) Remove the DO-NOT-OPERATE tag from the applicable engine start switch.

SUBTASK 72-24-01-040-003-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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L45616 S0006582476_V2

Fan Inlet Case Inspection
Figure 601/72-24-01-990-801-F00

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MM-00240-00-B
436061 S0000141305_V2

Flange Elongated Holes
Figure 602/72-24-01-990-802-F00

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A-A

1921826 S0000360280_V2

Containment Case Flange Inspection
Figure 603/72-24-01-990-803-F00

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TASK 72-24-01-270-801-F00

3. **Fan Inlet Case Erosion Inspection**

(Figure 604)

A. **General**

(1) This procedure gives instructions to do an ultrasonic inspection of the remaining thickness of an eroded fan containment case.

(a) This procedure is applicable for erosion in Areas 4, 5 and 6 of the containment case. Measure the erosion in area 6 (the area with the most erosion).

B. **References**

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. **Tools/Equipment**

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Prepare for the Inspection**

SUBTASK 72-24-01-040-005-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-040-006-F00

(2) Make sure that the start levers are in the CUTOFF position.

SUBTASK 72-24-01-040-007-F00

(3) Install a DO-NOT-OPERATE tag on the applicable start switch.

SUBTASK 72-24-01-010-003-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

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WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

SUBTASK 72-24-01-480-002-F00

CAUTION: MAKE SURE THAT YOU INSTALL THE MATS IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL. WITHOUT MATS, TOOLS, PARTS OR UNWANTED MATERIAL CAN CAUSE DAMAGE TO THE INLET COWL.

(5) Install a protective mat, STD-585 in the inlet cowl.

F. Fan Inlet Case Erosion Inspection

SUBTASK 72-24-01-270-001-F00

(1) Do the calibration of the ultrasonic probe (NDT 51-00-00, Part 4).

(a) Calibrate the ultrasonic probe with the A1 flange at the 4 o'clock position.

SUBTASK 72-24-01-270-002-F00

(2) Measure the thickness of the flange with the ultrasonic probe (NDT 51-00-00, Part 4):

(a) Measure from the outer side of the containment case to prevent disruption because of the condition of the inner surface.

(b) Measure the area (9 o'clock ALF) between the B5 flange and OGV bolt holes.

1) Three different thickness measurements must be done approximately 2.75 inch (70 mm) from B5 flange, radially spaced one to each other by 0.39 inch (10 mm).

(c) Minimum Serviceable Limit: 0.311 inch (7.9 mm) for the three measurements.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-080-003-F00

CAUTION: MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the inlet cowl.

SUBTASK 72-24-01-410-003-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left thrust reverser:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Close the applicable left fan cowl panel (TASK 71-11-02-410-801-F00).

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(c) Do this task: Thrust Reverser Activation after Ground Maintenance,TASK 78-31-00-440-803-F00.

SUBTASK 72-24-01-440-001-F00

(3) Remove the DO-NOT-OPERATE tag from the applicable engine start switch.

SUBTASK 72-24-01-440-002-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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A1 FLANGE CALIBRATION AREA

B

LEGEND:

CALIBRATION AREA BETWEEN FREE BOLT HOLES

B0045700

2214445 S0000493922_V2

Fan Inlet Case Erosion Inspection
Figure 604/72-24-01-990-804-F00 (Sheet 1 of 2)

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NOTE:

DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES)

S-M56-SM-28065-00-B
2214451 S0000493988_V2

Fan Inlet Case Erosion Inspection
Figure 604/72-24-01-990-804-F00 (Sheet 2 of 2)

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TASK 72-24-01-220-801-F00

4. Fan Inlet Case Template Inspection

A. General

(1) This procedure gives instructions to perform a template inspection of the containment case.

(2) The template inspection is in alternative procedure to examine nicks, dents and scratches for Areas 1, 2, 4, 5 and 6.

(3) This procedure finds the most impacted area. This area is delimited by a template.

(a) The control area takes into account indications of the inner and outer skin.

(b) Examine all combinations and turn the mask in many directions. A combination is given by the depth and length of the indications on the inner and outer skin in the template.

(c) Measure the length and depth of each indication. Record these parameters in a table to find the severity of each indication.

(d) The sum of the severities gives the serviceable limits of the containment case.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Template Inspection

SUBTASK 72-24-01-040-008-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-01-040-009-F00

(2) Make sure that the start levers are in the CUTOFF position.

SUBTASK 72-24-01-040-010-F00

(3) Install a DO-NOT-OPERATE tag on the applicable start switch.

SUBTASK 72-24-01-010-004-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

SUBTASK 72-24-01-480-003-F00

CAUTION: MAKE SURE THAT YOU INSTALL THE MATS IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL. WITHOUT MATS, TOOLS, PARTS OR UNWANTED MATERIAL CAN CAUSE DAMAGE TO THE INLET COWL.

(5) Install a protective mat, STD-585, in the inlet cowl.

F. Fan Inlet Case Template Inspection

SUBTASK 72-24-01-220-001-F00

(1) Remove the high metal.

(2) Do a local swab etching before you examine the fan inlet case by Fluorescent Penetrant Inspection (FPI).

NOTE: See the CFM Standard Practices Manual for the local swab etching procedure.

(3) Do a FPI of the suspected areas (TASK 70-40-01-230-801-F00).

(4) Examine the fan inlet case for nicks, dents and scratches.

(a) The template inspection is a 360 degree inspection. Consider Areas 1, 2, and Areas 4, 5, 6 as one area to put the template on it, without taking into account the border between those areas.

(b) All the possible combinations must be considered (Figure 605 and Figure 606). The combination with the worst severity is the one that gives the serviceability status of the fan containment case.

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SUBTASK 72-24-01-220-002-F00

(5) Identify all the indications (nicks, dents, scratches) on the inner and outer skin that are more than 0.004 inch (0.1 mm) in depth.

SUBTASK 72-24-01-211-001-F00

(6) Identify the worst combination and try all the possible template positions. See the examples (Figure 605 and Figure 606).

SUBTASK 72-24-01-970-001-F00

(7) For each combination, record the depth and length of the indications that are more than 0.004 inch (0.1 mm) in depth in the table (Figure 607). If an indication is not fully in the template, include the full length of the indication even if that part extends out of the template.

(a) For Areas 1 and 2,

Make sure that there are less than 10 indications with a depth of 0.004 inch (0.1 mm) or less in the template. If such a combination is possible, this inspection procedure cannot be used.

NOTE: If an indication cannot be measured because it is too small, do not take it into account.

SUBTASK 72-24-01-970-002-F00

(8) Define the severity of each indication with the example chart (Figure 608).

(a) Go out to the indication depth up to the length indication curve (Figure 608, Sheet 1).

(b) Come back to the severity axis (Figure 608, Sheet 2).

(c) Use the applicable chart to determine each severity (Figure 610 and Figure 611).

(d) Record the severity value in the table of Figure 609. See the example in the table of Figure 607.

SUBTASK 72-24-01-970-003-F00

(9) Sum up all the severities. If the combination severity is equal to 100 percent or less, the fan case is serviceable.

(a) Record the sum in the table (Figure 609).

(b) The most impacted area is delimited by the template (Figure 612).

SUBTASK 72-24-01-390-002-F00

(10) Do a spot touch-up of the oxide film coating on the inspected areas (TASK 70-10-04-380-801-F00).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-080-004-F00

CAUTION: MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585, from the inlet cowl.

SUBTASK 72-24-01-410-004-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left thrust reverser:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

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(b) Close the applicable left fan cowl panel (TASK 71-11-02-410-801-F00).

(c) Do this task: Thrust Reverser Activation after Ground Maintenance,TASK 78-31-00-440-803-F00.

SUBTASK 72-24-01-440-003-F00

(3) Remove the DO-NOT-OPERATE tag from the applicable engine start switch.

SUBTASK 72-24-01-440-004-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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NOTE:

SCALE OF INDICATIONS NOT RESPECTED
FOR CLARITY PURPOSE.

NOTE:

DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

B0046500
2214583 S0000493929_V2

Example of Findings in Areas 1 and 2
Figure 605/72-24-01-990-805-F00

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NOTE:

SCALE OF INDICATIONS NOT RESPECTED
FOR CLARITY PURPOSE.

B0046600
2214590 S0000493931_V2

Example of Possible Combinations
Figure 606/72-24-01-990-812-F00

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DATE :	ESN	TSN	CSN
AIRLINE :	P/N	SN	ZONE 1-2 ☒

INDICATIONS CFM56-7B

USE ONE CHART PER COMBINATION

COMBINATION NUMBER	INDICATIONS NUMBER	LENGTH	DEPTH	SEVERITY
1	2	0.12 (3)	0.006 (0.15)	8%
	4	0.04 (1)	0.02 (0.5)	27%
	3	1.42 (36)	0.005 (0.12)	61%
			TOTAL =	96%

EACH COMBINATION IS INDEPENDENT

THE SAME INDICATIONS CAN BE REFERENCED IN DIFFERENT COMBINATIONS

SEVERITY SUM

COMBINATION STATUS:

COMBINATION SEVERITY EQUAL TO 100% OR LESS,
THE CONTAINMENT CASE IS SERVICEABLE.

NOTE: INDICATIONS 5 HAS BEEN IGNORED BECAUSE THE DEPTH IS BELOW 0.004 (0.1)

NOTE: DIMENSIONS ARE IN INCHES (MILLIMETERS ARE IN PARENTHESES)

B0046700
2214621 S0000493933_V1

Example Table for Combination 1
Figure 607/72-24-01-990-813-F00

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INDICATIONS CHART FOR CONTAINMENT CASE 7B - AREAS 1 AND 2

LEGEND:

L = INDICATIONS LENGTH

NOTE: DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES

B0046800
2214704 S0000493935_V1

Example of Severity Definition for Combination 1 Findings
Figure 608/72-24-01-990-814-F00 (Sheet 1 of 2)

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INDICATIONS CHART FOR CONTAINMENT CASE 7B - AREAS 1 AND 2

LEGEND:

L = INDICATIONS LENGTH

NOTE: DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

B0046900
2214722 S0000493936_V1

Example of Severity Definition for Combination 1 Findings
Figure 608/72-24-01-990-814-F00 (Sheet 2 of 2)

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DATE :	ESN	TSN	CSN
AIRLINE :	P/N	SN	☐ ZONE 1-2

INDICATIONS				CFM56-7B
USE ONE CHART PER COMBINATION				
COMBINATION NUMBER	INDICATIONS NUMBER	LENGTH	DEPTH	SEVERITY
	TOTAL =			

COMBINATION STATUS:

COMBINATION SEVERITY EQUAL TO 100% OR LESS,
THE CONTAINMENT CASE IS SERVICEABLE.

B0047000
2214725 S0000493937_V1

Table to Record the Length and Severity of Each Finding in the Template
Figure 609/72-24-01-990-815-F00

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INDICATIONS CHART FOR CONTAINMENT CASE 7B - AREAS 1 AND 2

LEGEND:

L = INDICATIONS LENGTH

NOTE: DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

B0047100
2214728 S0000493949_V1

Chart for the Definition of each Severity in relation to its Depth and Length, in Areas 1 and 2
Figure 610/72-24-01-990-816-F00

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INDICATIONS CHART FOR CONTAINMENT CASE 7B - AREAS 4,5 AND 6

LEGEND:
L = INDICATIONS LENGTH

NOTE: DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

B0047200
2214744 S0000493951_V1

Chart for the Definition of each Severity in relation to its Depth and Length, in Areas 4, 5, 6
Figure 611/72-24-01-990-817-F00

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FOR AREAS 1 AND 2
DIM. A: 2.79 (71)
DIM. B: 0.79 (20)

FOR AREAS 4, 5 AND 6
DIM. A: 9.84 (250)
DIM. B: 9.84 (250)

NOTE: SCALE NOT RESPECTED FOR CLARITY PURPOSE.

NOTE: DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

S-M56-SM-26975-01-B
2214768 S0000493990_V1

Template Dimensions for all the Areas
Figure 612/72-24-01-990-818-F00

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ABRADABLE SHROUD - INSPECTION/CHECK

1. **General**

A. This procedure has one task:

(1) A detailed inspection of the abradable shroud.

TASK 72-24-02-200-801-F00

2. **Abradable Shroud (Detail) Inspection**

(Figure 601)

A. General

(1) This task is the detailed inspection of the abradable shroud.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
72-24-02-200-802-F00	Local Recondition of the Abradable Shroud (P/B 801)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare For the Inspection

SUBTASK 72-24-02-040-001-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-24-02-040-002-F00

(2) Make sure that the start levers are in the CUTOFF position.

SUBTASK 72-24-02-040-006-F00

(3) Install a DO-NOT-OPERATE tag on the applicable start switch.

SUBTASK 72-24-02-480-001-F00

CAUTION: MAKE SURE YOU INSTALL THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(4) Install a protective mat, STD-585 in the inlet cowl.

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F. Examine the Abradable Shroud

SUBTASK 72-24-02-210-001-F00

(1) Do a visual check of the abradable shroud for damage:

(a) If you find damage that is more than these limits, do this task: Local Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00 unless you are given other instructions.

(b) Cracks

1) There is no limit to the number of cracks.

(c) Craters (length < 5 X width) and damage other than cracks, grooves, circumferential damage, or rub damage

1) All of the other types of damage are permitted with these limits:

a) The total of all damaged areas is not more than 160 square inches (1032 square centimeter).

b) Each damaged area is not more than 30 square inches (193 square centimeter).

c) Each damaged area is not more than 2.5 inches (63.5 mm) in axial width.

d) The minimum distance between damaged areas is equal to the maximum width of the nearest single damaged area.

e) The fan case parent metal does not show through.

2) If the fan case metal shows through, do these steps:

a) Re-protect the affected area as soon as possible and no later than 50 cycles or 75 hours. Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00 or application of Epoxy-Polyamide Paint for Touch-up per the CFM SPM.

b) A Continue-In-Service limit of 50 cycles or 125 hours is permitted if the fan case parent metal of the serviceable damage remains undamaged under visual inspection.

c) If the service extension limits are expired, do this task: Local Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00.

(d) Grooves (length > 5 X width and oriented 0-80 degrees from engine axis) in the abradable shroud

1) All groove damage is permitted with these limits:

a) The maximum width of one groove is not more than 0.32 inch (8.0 mm).

b) The total groove width is not more than 1.25 inch (32.0 mm) with a separation of not less than 0.1 inch (2.5 mm).

c) The fan case parent metal does not show through.

2) If the fan case metal shows through, do these steps:

a) Re-protect the affected area as soon as possible and no later than 50 cycles or 75 hours. Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00 or application of Epoxy-Polyamide Paint for Touch-up per the CFM SPM.

b) A Continue-In-Service limit of 50 cycles or 75 hours is permitted if the fan case parent metal of the serviceable grooves remains undamaged under visual inspection.

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c) If the service extension limits are expired, do this task: Local Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00.

(e) Circumferential defect (360 degrees or oriented within 80-90 degrees from engine axis)

1) All damage is permitted with these limits:

a) The maximum width of one or cumulative defect is not more than 1.5 inch (38.1 mm).

b) The fan case parent metal does not show through.

2) If the maximum axial width of one or cumulative defect is not more than 2.0 inches (51 mm) and the fan case metal does not show through, do these steps:

a) A Continue-In-Service of 50 cycles or 125 hours is permitted.

b) If the service extension limits are expired, do this task: Local Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00.

3) If the fan case metal shows through, do these steps:

a) Re-protect the affected area as soon as possible and no later than 50 cycles or 75 hours. Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00 or application of Epoxy-Polyamide Paint for Touch-up per the CFM SPM.

b) A Continue-In-Service limit of 50 cycles or 75 hours is permitted if the fan case parent metal of the serviceable grooves remains undamaged under visual inspection.

c) If the service extension limits are expired, do this task: Local Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00.

(f) Rear side strip erosion (Figure 601).

1) The maximum permitted dimension is 2.756 inches (70.0 mm) in axial width from the aft side of the abradable and 0.138 inch (3.5 mm) in depth.

2) If the maximum depth from the aft side of the abradable is not more than 0.157 inch (4.0 mm), do these steps:

a) A Continue-In-Service of 50 cycles or 125 hours is permitted.

b) If the service extension limits are expired, do this task: Local Recondition of the Abradable Shroud, TASK 72-24-02-200-802-F00.

(g) Fan Blade Rubs

1) There is no limit to the number of fan blade rubs.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-24-02-080-001-F00

WARNING: MAKE SURE THAT YOU REMOVE ALL TOOLS, PARTS, AND UNWANTED MATERIAL FROM THE INLET AREA. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT COULD OCCUR ON THE SUBSEQUENT ENGINE START.

(1) Remove the protective mat, STD-585 from the inlet cowl.

SUBTASK 72-24-02-080-002-F00

(2) Remove the DO-NOT-OPERATE tag from the applicable engine start switch.

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SUBTASK 72-24-02-040-003-F00

(3) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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Abradable Shroud Inspection
Figure 601/72-24-02-990-802-F00

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ABRADABLE SHROUD - REPAIRS

1. General

A. This procedure has one task:

(1) The repair of the abradable shroud.

TASK 72-24-02-200-802-F00

2. Local Recondition of the Abradable Shroud

(Figure 801)

A. General

(1) This task is an on-wing repair procedure for partial repair of the abradable epoxy liner on the containment case.

(a) You will fill these areas with a base and hardener mixture, and smooth to the initial contour.

(2) This task is only used on engines with PRE SB CFM56-7B-72-0931.

B. References

Reference	Title
70-10-04-380-801-F00	Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection (P/B 201)
72-21-02-000-802-F00	Fan Blade Replacement (Blade Pair) (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, 3/8 Inch (9.5 mm) Minimum Thickness, Minimum 42x60 Inches (1x1.5 meters) with Warning Streamers
STD-3949	Scalpel - X-ACTO Knife
STD-14319	Portable Rockwell Hardness Tester

D. Consumable Materials

Reference	Description	Specification
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G02314	Air - Compressed, Breathing	BB-A-1034 Source I Grade A
G02499 [CP2364]	Filler, Edge Sealing And Void Filling - Scotchweld EC 3524B/A	
G02502 [CP2239]	Cloth - Abrasive, Alumina, Size 80 Or 120 - 3M 301D	
G50320 [912-0041]	Cloth - Process Cleaning Absorbent Wiper	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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F. Locally Recondition the Abradable Shroud

SUBTASK 72-24-02-040-004-F00

CAUTION: MAKE SURE THAT YOU INSTALL THE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE FROM TOOLS, PARTS OR UNWANTED MATERIAL THAT FALL ON THE INLET COWL.

(1) Install the protective mat, STD-585 into the lower half of the inlet cowl.

SUBTASK 72-24-02-040-005-F00

(2) Remove a sufficient number of fan blades to get access to the repair area, do this task: Fan Blade Replacement (Blade Pair), TASK 72-21-02-000-802-F00.

(a) Tie the fan rotor to the OGV's, to prevent rotation.

SUBTASK 72-24-02-120-001-F00

(3) Remove partially the abradable liner of the containment case

NOTE: This is for partially reconditioning of the abradable liner.

NOTE: Apply appropriate protections to make sure no abradable residues enter the engine flowpath during blending and blowing.

(a) Remove the abradable to recondition as follows:

1) Remove the unbounded abradable to recondition with a X-ACTO knife scalpel, STD-3949.

NOTE: Do not remove the bounded abradable.

NOTE: Make sure that you pay close attention when you blend the abradable to prevent the damage of the containment case.

2) Smooth the interface between the remaining abradable and the area to recondition with 3M 301D abrasive cloth, G02502 [CP2239].

(b) If contamination is observed on the bounded abradable, remove it with 3M 301D abrasive cloth, G02502 [CP2239].

1) Make sure the contamination has been removed.

2) Smooth the abradable in order to remove all the sharp edges with 3M 301D abrasive cloth, G02502 [CP2239].

WARNING: YOU MUST WEAR EYE GOGGLES WHEN YOU USE COMPRESSED AIR. IF YOU DO NOT, AN INJURY TO YOUR EYES CAN OCCUR.

(c) Blow the part with dry air, G02314.

NOTE: Do not use more than 30 psi (207 kpa). Do not point compressed air at yourself or other persons.

SUBTASK 72-24-02-480-003-F00

(4) If parent metal shows recondition the sulfuric anodizing in that area:

(a) Do this task: Spot Touch-Up of Oxide Film Coating on Aluminum Alloys for Protection, TASK 70-10-04-380-801-F00.

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SUBTASK 72-24-02-120-002-F00

WARNING: DO NOT GET ACETONE IN YOUR EYES, IN YOUR MOUTH OR ON YOUR SKIN. USE GLOVES, EYE PROTECTION AND RESPIRATOR. WASH THE ACETONE AWAY WITH WATER. GET MEDICAL AID IMMEDIATELY. MAKE SURE THAT THE AREA HAS A GOOD FLOW OF AIR. ACETONE IS POISONOUS AND FLAMMABLE WHICH CAN CAUSE INJURY TO PERSONNEL AND DAMAGE EQUIPMENT.

(5) Clean the repaired area as follows:

(a) Clean the repair area with acetone solvent, B01058 [CP1039] and with a white cloth, G50320 [912-0041].

(b) Let the solvent fully evaporate at ambient temperature during at least one hour.

SUBTASK 72-24-02-480-004-F00

(6) Do these steps to prepare the Scotchweld EC 3524B/A filler, G02499 [CP2364] for the repair:

WARNING: PUT ON PROTECTIVE GLOVES WHEN YOU USE THE BASE AND HARDENER. IF YOU DO NOT OBEY THIS PRECAUTION, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Mix by weight, 100 parts of the base and 94 parts of the hardener.

1) Use the compound in less than 30 minutes.

NOTE: Polymerization occurs at 86 degrees F (30 degrees C) after 30 minutes. Prepare the compound in small quantities.

(b) Mix the base and hardener by hand until it becomes a pale blue homogeneous compound.

1) Mix the base and hardener slowly to prevent air bubbles in the mixture.

SUBTASK 72-24-02-350-001-F00

(7) Do these steps to apply the compound to the repair area:

NOTE: Use cotton gloves during the abradable process. This will be free of the talc or silicone in order to prevent contamination of the fan containment case or abradable compound.

(a) Apply the abradable material on the repaired area and the test specimen.

1) Apply a thin layer of abradable into the radius of the abradable liner.

2) Apply a thin layer of abradable into the abradable liner with a spatula.

NOTE: If the thin layer of abradable does not bond to the case, remove and apply it again.

3) Apply the abradable in the abradable liner.

NOTE: To ease the process, do not change the direction of abradable application and apply the abradable in multiple layers.

4) Make sure that there is no lack of abradable at the interface between the radius of the abradable liner and the fan containment case.

SUBTASK 72-24-02-480-005-F00

(8) Adjust the abradable with large spatula, flush to the flow path.

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SUBTASK 72-24-02-480-006-F00

WARNING: USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

(9) Alternative procedure available. Polymerize the abradable and the test specimen during 5 hours between 50 and 60°C (122-140 °F).

NOTE: Do not apply any solvent on the abradable before polymerization.

SUBTASK 72-24-02-480-007-F00

(10) Alternative procedure available. Polymerize the abradable and the test specimen during 24 hours at ambient temperature.

SUBTASK 72-24-02-210-002-F00

(11) Do a check on the hardness of the abradable material with a portable hardness tester, STD-14319.

(a) The hardness must be –140 < HR 15W < -75 or 40 < Shore D < 60.

SUBTASK 72-24-02-120-003-F00

(12) If it is necessary, blend the abradable to the final dimensions.

SUBTASK 72-24-02-210-003-F00

(13) Do an inspection of the abradable liner as follows:

NOTE: If the results are not satisfactory, do the repair procedure again.

(a) Do a visual inspection of the abradable liner for bubbles or missed areas.

1) Bubble or missed areas are not permitted.

(b) Control the dimension of the repair area with a template.

NOTE: The template has to be in contact in O1 and O2.

(c) Do a check of liner adherence with a mallet.

NOTE: A dull sound indicates that the liner is not correctly bonded.

SUBTASK 72-24-02-100-001-F00

(14) Clean the inlet area.

SUBTASK 72-24-02-100-002-F00

CAUTION: MAKE SURE THAT YOU FREE THE FAN ROTOR BEFORE THE SUBSEQUENT ENGINE START. DAMAGE TO EQUIPMENT COULD OCCUR.

(15) Free the fan rotor so that it can turn.

SUBTASK 72-24-02-410-001-F00

(16) Do this task: Fan Blade Replacement (Blade Pair), TASK 72-21-02-000-802-F00.

SUBTASK 72-24-02-020-001-F00

(17) Remove the mats from the lower half of the inlet cowl.

CAUTION: MAKE SURE THAT YOU REMOVE ALL TOOLS, EQUIPMENT, PARTS, AND UNWANTED MATERIAL. DAMAGE TO EQUIPMENT COULD OCCUR ON THE SUBSEQUENT START.

(a) Make sure that there are no tools or material in the inlet.

END OF TASK

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Abradable Shroud Repair
Figure 801/72-24-02-990-801-F00

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HIGH PRESSURE COMPRESSOR FRONT STATOR - INSPECTION/CHECK

1. **General**

A. This procedure has one task:

(1) High Pressure Compressor Front Stator Inspection.

TASK 72-32-00-200-801-F00

2. **High Pressure Compressor Front Stator Inspection**

(Figure 601)

A. General

(1) This task provides the instructions on how to do the inspection of the high pressure compressor front stator.

B. References

Reference	Title
71-00-02-000-801-F00	Power Plant Removal (P/B 401)
71-00-02-400-801-F00	Power Plant Installation (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-32-00-900-801-F00	Replace the Actuation Ring Flanged Bushing (Stage 1 and 2) (P/B 801)
72-32-00-900-802-F00	Replace the Lever Arms and Bushings (IGV and Stage 3) (P/B 801)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Inspection

SUBTASK 72-32-00-860-001-F00

(1) Make sure that the applicable start switch is off and install a DO-NOT-OPERATE tag.

SUBTASK 72-32-00-860-011-F00

(2) For Engine 1, open this circuit breaker and install a safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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SUBTASK 72-32-00-860-012-F00

(3) For Engine 2, open this circuit breaker and install a safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-32-00-010-005-F00

(4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

E. High Pressure Compressor Front Stator Inspection

SUBTASK 72-32-00-900-001-F00

(1) If you find damage that is not in the limits, replace the engine, unless you are given other instructions (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

SUBTASK 72-32-00-210-001-F00

(2) Look for damage to the Front Stator Case:

(a) Cracks

1) Cracks are not permitted.

2) A Continue-in-Service limit is 10 cycles or 25 hours, if the cracks in the skin are less than 0.17 inch (4.3 mm) in length and there are no cracks in the flanges.

(b) Nicks, pits, marks, and scratches

1) All nicks, pits, marks, and scratches are permitted if the damage is not more than 0.050 inch (1.3 mm) in depth.

2) The Continue-in-Service limit is 10 cycles or 25 hours for nicks, pits, marks, and scratches that are more than the limit.

SUBTASK 72-32-00-210-002-F00

(3) Look for damage to the actuation rings:

(a) Cracks

1) Cracks are not permitted.

2) The Continue-in-Service limits are as follows:

a) Do an inspection again in or less than 200 cycles if a crack is found but does not extend into adjacent transition radius.

b) Replace actuation ring in or less than 200 cycles if a crack is found that connects 2 adjacent ring sides.

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c) Replace actuation ring in or less than 5 cycles if a crack is found that connects 3 or more ring sides.

(b) Distortion, bends, or twists

1) Distortion, bends, or twists are not permitted.

2) A Continue-in-Service limit of 5 cycles is permitted, if there is no separation of the actuation rings.

(c) Separation

1) Separation is not permitted.

(d) Missing bushings on Stages 1 and 2

1) Up to three missing bushings for each stage permitted.

2) If four missing bushings for each stage are found, repair within 200 cycles (TASK 72-32-00-900-801-F00).

3) If five or more missing bushings for each stage are found, replace the actuation ring flange bushing (TASK 72-32-00-900-801-F00).

(e) Missing or broken bushing legs

1) Missing or broken bushing legs are permitted.

SUBTASK 72-32-00-210-003-F00

(4) Look for damage to the connecting links:

(a) Cracks in the connecting links on only one side of the engine

1) Cracks are not permitted.

2) A Continue-in-Service limit of 5 cycles is permitted, if the cracked connector link is replaced.

(b) Cracks in the connecting links on the two sides of the engine

1) Cracks are not permitted.

SUBTASK 72-32-00-220-001-F00

(5) Look for damage to the IGV and stage 3 lever arms:

(a) Broken IGV and stage 3 lever arms

1) Broken arms are not permitted.

2) A Continue-in-Service limit for the engine of 10 cycles or 25 hours is permitted, if you replace the broken lever arm.

(b) Lever arms that are not engaged in the actuation ring or connecting link

1) This condition is not permitted.

(c) Cracked, bent or twisted lever arms

1) Cracked, bent or twisted lever arms are not permitted.

2) Do these steps:

a) Remove the lever arm.

b) Compare the removed lever arm with a new lever arm in an optical comparator (P/N: 2202500) to find the angle of the bend or twist.

c) For a removed lever arm that has a bent or twisted angle of less than 4 degrees; install a new lever arm and put the engine back into service.

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d) For a removed lever arm that have a bent or twisted angle of 4 degrees or more, install a new lever arm before you put the engine back into service and replace the engine before 10 cycles or 25 hours.

(d) Nicks, dents, and scratches

1) Replace the lever arm if the damage is more than the limits that follow.

2) Nicks, dents, and scratches in Area A are not permitted.

3) All nicks, dents, and scratches in Area B that are not more than 0.010 inch (0.25 mm) in depth are permitted after you remove the high metal.

a) Sharp points at the bottom of the nicks, dents, and scratches are not permitted.

4) All nicks, pits, marks, and scratches in area C that are not more than 0.002 inch (0.05 mm) in depth are permitted after you remove the high metal.

NOTE: The limits do not apply to the pin.

(e) Do a check for loose variable stator vanes.

1) There is no maximum limit of radial and side motion if the bushing is in place and if there is no metal-to-metal contact.

NOTE: Shake the vane stem. Listen for metal-to-metal contact.

a) Replace the bushing if it is missing (TASK 72-32-00-900-802-F00).

SUBTASK 72-32-00-220-002-F00

(6) Look for damage to the stage 1 and 2 lever arms:

(a) Cracked, broken, bent, or twisted lever arms

1) This condition is not permitted.

(b) Lever arms that are not engaged into the actuation ring or connector link

1) This condition is not permitted.

(c) Nicks, dents, and scratches in the lever arms

1) Replace the engine if these limits are more than permitted.

2) Nicks, dents, and scratches in Area A are not permitted.

3) All nicks, dents, and scratches in Area B that are not more than 0.010 inch (0.25 mm) in depth are permitted after you remove the high metal.

a) Sharp points at the bottom of the nicks, dents, and scratches are not permitted.

4) All nicks, pits, marks, and scratches in area C that are not more than 0.002 inch (0.05 mm) in depth are permitted after you remove the high metal.

NOTE: The limits do not apply to the pin.

(d) Do a check for loose variable stator vanes.

1) There is no maximum limit of radial and side motion if the bushing is in place and if there is no metal-to-metal contact.

NOTE: Shake the vane stem. Listen for metal-to-metal contact.

2) If you hear metal-to-metal contact, replace the engine (TASK 71-00-02-000-801-F00 and TASK 71-00-02-400-801-F00).

3) A maximum service extension of 10 cycles or 25 hours is permitted if there is metal-to-metal contact on no more than 50% of the vanes.

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SUBTASK 72-32-00-220-003-F00

(7) Examine the bellcrank assemblies (two locations):

(a) Cracks

1) Cracks are not permitted.

(b) Nicks, pits, scores, and scratches

1) All nicks, pits, scores, and scratches that are not more than 0.030 inch (0.80 mm) in depth are permitted after you remove the high metal.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-32-00-410-005-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

SUBTASK 72-32-00-860-004-F00

(2) For the applicable engine, remove the DO-NOT-OPERATE tag on the engine START switch.

SUBTASK 72-32-00-860-013-F00

(3) For Engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-860-014-F00

(4) For Engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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GMM-1140866-00-A

G82562 S0006582487_V2

High Pressure Compressor Front Stator Inspection
Figure 601/72-32-00-990-801-F00 (Sheet 1 of 2)

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1146409-00-A
G90584 S0006582488_V2

High Pressure Compressor Front Stator Inspection
Figure 601/72-32-00-990-801-F00 (Sheet 2 of 2)

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HIGH PRESSURE COMPRESSOR FRONT STATOR - REPAIRS

1. General

A. This procedure has two tasks:

(1) The replacement of the actuation ring flanged bushing (Stage 1 and 2).

(2) The replacement of the lever arms and bushings (IGV and Stage 3).

TASK 72-32-00-900-801-F00

2. Replace the Actuation Ring Flanged Bushing (Stage 1 and 2)

A. General

(1) This task is to replace the actuation ring flanged bushings (stage 1 and 2) on the HPC front stator.

B. References

Reference	Title
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A00081	Adhesive - Silicone Rubber - RTV 106	BAC5010 Type 74

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Procedure

SUBTASK 72-32-00-860-007-F00

(1) Make sure that the applicable start switch is off and install a DO-NOT-OPERATE tag.

SUBTASK 72-32-00-865-001-F00

(2) For engine 1;

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-865-002-F00

(3) For engine 2;

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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SUBTASK 72-32-00-010-002-F00

WARNING: OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

F. Procedure

SUBTASK 72-32-00-020-001-F00

CAUTION: DO NOT REMOVE THE LEVER ARMS TO DO THIS REPAIR. IF YOU REMOVE THE LEVER ARMS, THE VANE CAN TURN BEFORE YOU INSTALL THE LEVER ARMS AGAIN. IF THE VANE IS IN THE INCORRECT POSITION, IT CAN CAUSE AN IN-FLIGHT SHUTDOWN, AND ENGINE DAMAGE.

(1) If it is necessary, remove and clean the pieces of old bushing [1] from the actuation ring.

SUBTASK 72-32-00-420-001-F00

(2) Do these steps to install the new bushing [1]:

(a) Carefully break off the legs of the new bushing [1].

NOTE: The new bushing cannot be inserted on the lever arm with the legs attached.

NOTE: The actuation ring is assembled with different types of bushing. Make sure you select the correct bushing.

(b) Install the new bushing [1] from the outboard side of the actuation ring.

(c) Apply approximately 0.125 inch (3.18 mm) RTV 106 adhesive, A00081 to the outer flange of the bushing.

1) Permit the RTV to cure for not less than 24 hours before you operate the engine.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-32-00-410-002-F00

WARNING: OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-32-00-860-008-F00

(2) For the applicable engine, remove the DO-NOT-OPERATE tag on the engine START switch.

SUBTASK 72-32-00-865-003-F00

(3) For engine 1;

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-865-004-F00

(4) For engine 2;

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Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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Actuation Ring Flanged Bushing (Stage 1and 2)
Figure 801/72-32-00-990-802-F00

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TASK 72-32-00-900-802-F00

3. **Replace the Lever Arms and Bushings (IGV and Stage 3)**
(Figure 802)

A. **General**

(1) This procedure is for the lever arms and bushings to the inlet guide vane and the 3rd-stage stator vane.

(2) The removal of the actuation rings (which are not LRU's) is necessary for the removal of the lever arm for the 1st- and 2nd-stage stator vane.

B. **References**

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. **Tools/Equipment**

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-9071	Lever - Anti-Torque, HPC Stator Actuator Arm Part #: 856A1012G01 Supplier: 58828
SPL-9072	Puller - Lever Arm Part #: 856A1051G02 Supplier: 58828

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Prepare for the Procedure**

SUBTASK 72-32-00-860-009-F00

(1) Make sure that the applicable start switch is off and install a DO-NOT-OPERATE tag.

SUBTASK 72-32-00-865-005-F00

(2) For engine 1;

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-865-006-F00

(3) For engine 2;

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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SUBTASK 72-32-00-010-003-F00

(4) Open the right and left fan cowl panels (TASK 71-11-02-010-801-F00).

SUBTASK 72-32-00-010-004-F00

WARNING: OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Open the right and left thrust reversers (TASK 78-31-00-010-801-F00).

F. Procedure

SUBTASK 72-32-00-020-003-F00

(1) Remove the lever arm and bushing.

(a) Hold the lever arm with the anti-torque lever, SPL-9071 to make sure the vane does not turn.

(b) Remove the nut and washer from the vane stem.

(c) Use the lever arm puller, SPL-9072 to remove the lever arm from the vane.

(d) If it is necessary, remove the bushing from the stator case.

(e) If you install the shims, remove and discard the shims from the 3rd-stage vanes.

SUBTASK 72-32-00-420-002-F00

(2) Install the lever arm and bushing.

(a) If it is necessary, install a new bushing in the stator case.

(b) Install the lever arm as follows:

CAUTION: YOU MUST ALIGN THE ROUNDED END OF THE LEVER ARM SLOT WITH THE ROUNDED END OF THE VANE TRUNNION. IF YOU DO NOT ALIGN THE VANE CORRECTLY, ENGINE DAMAGE WILL OCCUR.

1) Align the rounded end of the lever arm slot with the rounded end of the vane stem.

a) If the vane stem has a witness mark, the lever arm is installed correctly when the mark is on the same side as the rounded end of the lever arm slot.

2) Put the lever arm on the vane stem.

3) Engage the lever arm pin in the actuation ring.

4) Make sure the lever arm fully engages with the vane stem tang.

(c) While you hold the lever arm with the anti-torque lever, SPL-9071 to make sure the vane does not turn, install the nut and washer from the vane stem.

1) Tighten the nut to 55-70 pound-inches (6.0-8.0 N.m).

(d) Make sure that two or three threads of the vane stem comes out of the nut.

1) Make sure the lever arm correctly engages the vane.

2) If the lever arm does not engage the vane stem tang, do the removal and installation procedures again.

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G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-32-00-410-003-F00

WARNING: OBEY THE INSTRUCTIONS IN THIS PROCEDURE WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Close the right and left thrust reversers (TASK 78-31-00-010-804-F00).

SUBTASK 72-32-00-410-004-F00

(2) Close the right and left fan cowl panels (TASK 71-11-02-410-801-F00).

SUBTASK 72-32-00-860-010-F00

(3) For the applicable engine, remove the DO-NOT-OPERATE tag on the engine START switch.

SUBTASK 72-32-00-865-007-F00

(4) For engine 1;

Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-32-00-865-008-F00

(5) For engine 2;

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

——— END OF TASK ———

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Stator Vane Lever Arm and Bushing Installation
Figure 802/72-32-00-990-803-F00 (Sheet 1 of 2)

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CORRECT

NOT CORRECT

**EXAMPLE OF VARIABLE STATOR VANE (VSV)
AND LEVER ARM ENGAGEMENT
(1ST-STAGE IS SHOWN)**

1261520-00
1485007 S0000270789_V3

**Stator Vane Lever Arm and Bushing Installation
Figure 802/72-32-00-990-803-F00 (Sheet 2 of 2)**

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COMBUSTION CASE - INSPECTION/CHECK

1. **General**
   A. This procedure has one task:
      (1) An inspection of the combustion case.

TASK 72-41-00-200-801-F00

2. **Combustion Case Inspection**
   (Figure 601)

A. General

(1) This task gives you the instructions to visually examine the combustion case of the engine.

(2) The combustion case is at the center of the engine.

B. References

Reference	Title
71-00-02-000-801-F00	Power Plant Removal (P/B 401)
71-00-02-400-801-F00	Power Plant Installation (P/B 401)
72-00-00-200-805-F00	Combustion Section Borescope Inspection (P/B 601)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Inspection

SUBTASK 72-41-00-860-001-F00

(1) For the applicable engine, install a DO-NOT-OPERATE tag on the engine start lever.

SUBTASK 72-41-00-860-002-F00

(2) For engine 1;

Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-41-00-860-003-F00

(3) For engine 2;

Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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SUBTASK 72-41-00-010-001-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

E. Examine the Combustion Case for Damage

SUBTASK 72-41-00-900-001-F00

(1) If you find damage that is not in the limits, replace the engine, unless you are given other instructions.

These are the tasks:

Power Plant Removal, TASK 71-00-02-000-801-F00,

Power Plant Installation, TASK 71-00-02-400-801-F00.

SUBTASK 72-41-00-220-001-F00

(2) Look for damage on the outer case:

(a) Cracks

1) Not serviceable.

(b) Nicks, marks and scratches

1) There is no limit to the number of nicks, marks, and scratches which are permitted with these conditions:

a) Not more than 0.03 inch (0.8 mm) in depth, after you remove the high metal.

(c) Dents

1) All dents with a maximum depth of 0.10 inch (2.5 mm) are permitted if they have a smooth contour.

(d) Bends, bulges, or distortion

1) Not permitted.

CAUTION: IF YOU FIND DISCOLORATION, EXAMINE THE INTERIOR OF THE COMBUSTOR WITH A BORESCOPE. DISCOLORATION ON THE OUTER CASING IS AN INDICATION OF A DAMAGED COMBUSTOR. MORE DAMAGE TO THE ENGINE COULD OCCUR.

(e) Discoloration

1) Discoloration is permitted only if the metal is not crazed.

2) If you find hot spots in the outer case, then do the applicable task:

a) Do this task: Combustion Section Borescope Inspection, TASK 72-00-00-200-805-F00.

SUBTASK 72-41-00-220-002-F00

(3) Look for damage on the forward and aft flanges:

(a) Cracks that extend from the bolt holes to the outer edge of the flange.

1) It is permitted to have only one crack from a bolt hole.

2) It is permitted to have not more than two cracks on each flange.

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(b) Cracks that extend radially from the bolt holes into the case

1) Not serviceable.

2) A Continue-In-Service limit of 10 cycles is permitted.

SUBTASK 72-41-00-220-003-F00

(4) Look for damage to the midflange of the case:

(a) Broken bolts

1) All damage is permitted with these limits:

a) Not more than 10 damaged bolts.

b) Not more than two broken bolts, in a group of 20 bolts.

c) A minimum of 5 bolts that are not damaged on each side of the broken bolt.

d) A Continue-In-Service limit of 25 cycles is permitted for 10 damaged bolts, with a maximum of 4 broken bolts in a group of 20 bolts.

SUBTASK 72-41-00-220-004-F00

(5) Look for damage to the fuel nozzle pads (20 locations) when the fuel nozzles are removed for other maintenance:

(a) Damage to the threads

1) Chasing of the threads is permitted with this limit:

a) There must be more than 4 threads that were not damaged after you chased the threads.

(b) Damage to the sealing surface

1) Nicks, marks, scratches and pitting

a) There is no limit to the number of nicks, marks, scratches and pitting after you remove the high metal.

b) The damage is not more than 0.03 inch (0.8 mm) in depth after you remove the high metal.

c) The damage must not be spread over more than 50 percent of the seal surface after you remove the high metal.

(c) Particles on the sealing surface

1) Remove all of the particles.

SUBTASK 72-41-00-220-005-F00

(6) Look for damage to the igniter ports when the igniters are removed for other maintenance:

(a) Damage to the threads

1) Chasing of the threads is permitted with this limit:

a) There must be more than 3 threads that are not damaged after you chased the threads.

SUBTASK 72-41-00-220-006-F00

(7) Look for damage to the borescope ports when the borescope plugs are removed for other maintenance:

(a) Damage to the threads

1) Chasing of the threads is permitted with this limit:

a) There must be more than 3 threads that are not damaged after you chased the threads.

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SUBTASK 72-41-00-220-007-F00

(8) Look for damage to the HPT shroud cooling air pad when the HPT shroud is removed for other maintenance:

(a) Damage to the sealing surface

1) Nicks, marks, scratches and pitting

a) There is no limit to the number of nicks, marks, scratches and pitting after you remove the high metal.

b) The damage is not more than 0.03 inch (0.8 mm) in depth after you remove the high metal.

c) The damage must not be spread over more than 75 percent of the seal surface after you remove the high metal.

(b) Cracks in the bolt holes

1) Not serviceable.

a) A Continue-In-Service limit of 10 cycles is permitted for one crack that is not more than 0.6 inch (1.5 mm) in length in each bolt hole.

SUBTASK 72-41-00-220-008-F00

(9) Look for damage to the CDP bleed pads when the CDP LRU is removed for other maintenance:

(a) Damage to the sealing surface

1) Nicks, marks, scratches and pitting

a) There is no limit to the number of nicks, marks, scratches and pitting after you remove the high metal.

b) The damage is not more than 0.03 inch (0.8 mm) in depth after you remove the high metal.

c) The damage must not be spread over more than 75 percent of the seal surface after you remove the high metal.

(b) Cracks in the bolt holes

1) Not serviceable.

a) A Continue-In-Service limit of 10 cycles is permitted for one crack no longer than 0.6 inch (1.5 mm) in length in each bolt hole.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-41-00-410-001-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-41-00-860-004-F00

(2) For the applicable engine, remove the DO-NOT-OPERATE tag on the engine start lever.

SUBTASK 72-41-00-860-005-F00

(3) For engine 1;

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Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 72-41-00-860-006-F00

(4) For engine 2;

Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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Combustion Case Inspection
Figure 601/72-41-00-990-801-F00

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LOW PRESSURE TURBINE CASE - INSPECTION/CHECK

1. **General**

A. This procedure has one task:

(1) An inspection of the low pressure turbine case.

TASK 72-54-00-200-801-F00

2. **Low Pressure Turbine Case Inspection**

(Figure 601, Figure 602, and Figure 603)

A. References

Reference	Title
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
72-00-00-290-801-F00	Borescope Inspection of the Stage 1 Low-Pressure Turbine Nozzle Outer Air Duct Condition (P/B 601)
72-54-00-300-801-F00	Replacement of Broken Studs on the T49.5 Probe Bracket Assembly (P/B 801)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

B. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

C. Prepare for the Inspection

SUBTASK 72-54-00-010-001-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION OF THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

D. Low Pressure Turbine Case Inspection

SUBTASK 72-54-00-210-001-F00

(1) Look for damage on the aft flange (Figure 601):

(a) Cracks that connect the bolt holes

1) Not serviceable.

a) A Continue-In-Service limit of 10 cycles is permitted for one crack, if the crack connects two bolt holes and does not go into the outer skin of the pressure vessel.

(b) Cracks that extend from the bolt holes to the outer edge of the flange

1) It is permitted to have 5 cracks with a minimum of 5 holes of separation between the cracks.

(c) Cracks that extend from the bolt holes to the casing skin

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1) Not serviceable.
   a) A Continue-In-Service limit of 10 cycles is permitted for one crack that extends 0.4 inch (10.2 mm) into the skin.

(d) Cracks in other areas of the flange
   1) It is permitted to have 5 cracks on each flange if they are not more than 0.25 inch (6.35 mm) in length with this condition:
      a) A minimum of 5.0 inches (127.0 mm) of separation between all other cracks.

(e) Cracks in the skin radius of the flange and case
   1) Not serviceable.

(f) Nicks, scores and scratches
   1) There is no limit to the number of nicks, scores, scratches with these limits:
      a) Not more than 1.0 inch (25.4 mm) long.
      b) Not more than 0.01 inch (0.25 mm) in depth after you remove the high metal.
      c) There is a minimum separation of 1.0 inch (25.4 mm) with other damage.

SUBTASK 72-54-00-210-002-F00

(2) Look for damage on the casing skin:
   (a) Cracks in the parent metal
      1) All cracks that are not more than 0.04 inch (1.0 mm) in length and have a minimum separation of 2.0 inches (50.8 mm).
         a) A Continue-In-Service limit of 10 cycles is permitted for one crack which is not more than 0.4 inch (10.16 mm) in length.
   (b) Nicks and scratches
      1) All nicks and scratches 0.01 inch (0.25 mm) in depth are permitted after you remove the high metal.
   (c) Dents
      1) All dents with a maximum depth of 0.02 inch (0.5 mm) are permitted if they have a smooth contour.

SUBTASK 72-54-00-210-003-F00

(3) Look for damage on all ports that have threads:
   (a) Damage to the threads
      1) No more than one complete thread can be removed or the total damage for all threads cannot be more than one thread, after you chase the threads.

SUBTASK 72-54-00-210-013-F00

(4) Look for indications on the cap assembly (Figure 603):
   (a) Cracks
      1) Not serviceable.
   (b) Finding on threads
      1) Any amount not more than 1/2 full thread after removal of high metal.
   (c) Defective spring
      1) Not serviceable.
         a) A Continue-In Service limit of 10 cycles is permitted.

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SUBTASK 72-54-00-210-004-F00

(5) Look for damage on the ring sector support:

(a) Cracks

1) All cracks are permitted if the parts which attach the ring sector support are not loose.

SUBTASK 72-54-00-210-005-F00

(6) Look for damage on the angle brackets:

(a) Broken bracket

1) Not serviceable.

a) A Continue-In-Service limit of 10 cycles or 10 hours is permitted.

(b) Cracks

1) All cracks are permitted if the cooling air tubes and the fasteners are not loose.

SUBTASK 72-54-00-210-009-F00

(7) Look for damage on the T49.5 probe thermocouple studs:

(a) Broken or missing stud

1) Not serviceable.

a) Do the repair of the broken stud (TASK 72-54-00-300-801-F00).

b) A continue in service limit of 20 cycles is permitted until the broken stud is repaired with these conditions:

<1> Damage is limited to one stud per T49.5 sensor.

NOTE: Each T49.5 sensor has two probes, each probe is attached to two studs on the LPT.

<2> A visual inspection of the area of the broken stud shows no indication of air leak.

<3> A visual check makes sure there is no obvious gap between the probe attachment flange and the LPT case.

SUBTASK 72-54-00-210-006-F00

(8) Look for damage on the cooling air manifold (Figure 602):

(a) Cracks in the forward mounting lug

1) One crack on each side of a lug is permitted.

(b) A broken forward mounting lug

1) Breakage on one side of a mounting lug is permitted.

2) Breakage or a crack on each side of a forward lug is permitted if the two adjacent cooling air tube supports are not broken or have a crack that is not more than 0.591 inch (15.0 mm) in length.

3) If there is breakage or a crack on each side of a forward lug, and the two adjacent cooling air tube supports are broken or have a crack that is more than 0.591 inch (15.0 mm), these are the Continue-In-Service limits:

a) A Continue-In-Service limit of 10 hours or 10 cycles is permitted if one adjacent support is broken.

b) If one or two adjacent supports have a crack that is more than 0.591 inch (15.0 mm) long, examine the part at not more than 10 hours or 10 cycles to see if the crack length increases.

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c) If you find that the crack length did not increase, then repeat the check at not more than 50 hours or 50 cycles, and then at each 100 hours or 100 cycles until the part is repaired or the crack length increases.

d) If you find that the crack length increases, a Continue-In-Service limit of 30 hours or 30 cycles is permitted.

(c) Cracks in the sheet metal

1) All cracks are permitted with these limits:

a) The cracks are not longer than 0.5 inch (12.7 mm).

b) The total length of all cracks is not longer than 3.0 inches (76.2 mm).

c) The cracks have a minimum separation of 1.0 inch (25.4 mm) between each crack.

(d) Dents

1) All dents are permitted if they have a smooth contour and are not more than 0.03 inch (0.76 mm) in depth.

(e) Nick, scratch and chafing (wear) on tube external surface

1) Maximum finish depth after you make the defect smooth is 0.008 inch (0.20 mm).

a) Make the defect smooth by hand blending (CFMI CFM56 Standard Practices Manual 70-41-11) if necessary to remove sharp edges.

b) Make sure there is no crack. Do this task: Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

SUBTASK 72-54-00-210-007-F00

(9) Look for damage on the cooling air tubes:

(a) Cracks in tubes

1) All cracks are permitted if not longer than 2.0 inch (50.8 mm) and separated by at least one support member.

(b) Dents

1) All dents are permitted if they have a smooth contour and are not more than 20 percent of the tube outside diameter.

(c) Cracks in tube clamps

1) All cracks are permitted if the tubes are correctly attached.

SUBTASK 72-54-00-210-008-F00

(10) Look for damage on the tube supports for the cooling air:

(a) Cracks at the mounting flanges

1) All cracks are permitted if the supports are not loose.

(b) Cracks in all other areas

1) All cracks are permitted if the cooling air tubes and fasteners are not loose.

(c) Breakage of the forward mount lug

1) One broken lug is permitted for one-half of the distribution manifold.

SUBTASK 72-54-00-210-011-F00

(11) Look for damage on the LPTACC cooling air manifold:

(a) Cracks in the tubes

1) No cracks are permitted.

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(b) Dents or flat areas

1) All dents or flat areas are permitted if they have a smooth contour and are not more than 20 percent of the original tube outside diameter.

SUBTASK 72-54-00-210-012-F00

(12) Look for damage on the LPTACC cooling air duct:

(a) Cracks in the tubes

1) No cracks are permitted.

(b) Dents or flat areas

1) All dents or flat areas are permitted if they have a smooth contour and are not more than 20 percent of the original tube outside diameter.

SUBTASK 72-54-00-290-001-F00

(13) If the visual inspection is not satisfactory, do the borescope inspection Borescope Inspection of the Stage 1 Low-Pressure Turbine Nozzle Outer Air Duct Condition, TASK 72-00-00-290-801-F00.

E. Put the Airplane Back to Its Usual Condition

SUBTASK 72-54-00-010-002-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

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Low Pressure Turbine Case Inspection
Figure 601/72-54-00-990-801-F00 (Sheet 1 of 2)

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COOLING AIR MANIFOLD

B

S-M56-MM-03685-00-B
G11401 S0006582499_V2

Low Pressure Turbine Case Inspection
Figure 601/72-54-00-990-801-F00 (Sheet 2 of 2)

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H13358 S0006582500_V2

Mounting Lugs Inspection
Figure 602/72-54-00-990-802-F00 (Sheet 1 of 2)

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Mounting Lugs Inspection
Figure 602/72-54-00-990-802-F00 (Sheet 2 of 2)

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2443653 S0000568179_V1

Borescope Plugs Inspection
Figure 603/72-54-00-990-807-F00

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LOW PRESSURE TURBINE CASE - REPAIR

1. **General**

A. This procedure has one task:

(1) The replacement of the broken studs on the T49.5 probe bracket assembly.

TASK 72-54-00-300-801-F00

2. **Replacement of Broken Studs on the T49.5 Probe Bracket Assembly**

(Figure 801, Figure 802, Figure 803, Figure 804)

A. General

(1) This procedure contains one task: to replace the broken studs on the T49.5 Probe Bracket Assembly.

(2) If you find a broken stud on the bracket assembly, replace the broken stud if there is sufficient access.

NOTE: The replacement of the broken studs depend on accessibility.

NOTE: Make sure that free access is available for the drilling and tapping procedure.

NOTE: You must discard the repaired bracket assembly at the first LPT rotor/stator disassembly.

(3) The T49.5 probe (and thermocouple) bracket assemblies are installed on the LPT case at 2:00, 5:00, 7:30 and 10: 00 o'clock position and below the air cooling tubes.

B. References

Reference	Title
70-20-01-800-804-F00	Lockwire Installation (P/B 201)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
77-21-01-000-801-F00	T49.5 Probe Removal (P/B 401)
77-21-01-400-801-F00	T49.5 Probe Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D50068 [CP2544]	Lubricant - Molykote P37, Paste	
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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E. Procedure

SUBTASK 72-54-00-010-003-F00

WARNING: DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-54-00-010-004-F00

WARNING: DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING: DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING: DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND OTHER EQUIPMENT FOR PROTECTION, OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

CAUTION: DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

NOTE: The engine oil is poisonous. Use the personal protection equipment. Put the lubrication unit on the clean bench in a good ventilated area.

(2) Do this task: T49.5 Probe Removal, TASK 77-21-01-000-801-F00.

SUBTASK 72-54-00-010-005-F00

WARNING: DO NOT BREATHE THE PARTICLES, OR GET THEM IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES AND OTHER EQUIPMENT FOR PROTECTION. THESE PARTICLES CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

WARNING: USE EYE PROTECTION WHEN YOU USE COMPRESSED AIR TO CLEAN, COOL, OR DRY PARTS OR TOOLS. PARTICLES CAN CAUSE AN INJURY TO YOUR EYES. DO NOT USE MORE THAN 30 PSI (207 KPA). DO NOT POINT COMPRESSED AIR AT YOURSELF OR OTHER PERSONS.

(3) Use a square access to remove the nuts and the bulkheads.

NOTE: It is easier to use a square access to remove the nuts, with bulkheads removed.

SUBTASK 72-54-00-320-001-F00

(4) Do these steps to prepare for the broken stud drilling.

(a) Calculate the length of the remaining broken tack welded stud shank with the serviceable remaining tack welded stud.

(b) Do these steps to install a locally manufactured tool on the serviceable remaining tack welded stud.

1) Make sure that you correctly engaged the center pin of the tooling in the bore of the T49.5 probe location.

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2) Tighten the tooling to the LPT case with the original nut on the serviceable remaining tack welded stud.

3) Make sure that the tooling is correctly installed against the LPT case.

(c) Make a selection to get the correct drill guide sleeve for a 0.25 inch (6.35 mm) drill.

NOTE: You can identify the sleeve as the clearance guide.

(d) Install the retaining screw between the drill guide sleeve and the tooling.

(e) Do a check from the top of the drill guide sleeve to the T49.5 probe location of the LPT case.

SUBTASK 72-54-00-910-001-F00

NOTE: Do not drill into the stud head when you remove the broken stud shank. Refer to the Standard Practices Manual (Refer to CFMI SPM, Task 70-44-50-320-006) before you drill the hole into the stud head.

NOTE: When you do the drilling and tapping operation, use a minimum pressure to do these operations. If you put too much pressure, you can push the fitting away from the inside of the LPT case, as it is only safe tied by a good tack welded stud on one side.

(5) Do these steps to drill the broken stud shank.

(a) Calculate the necessary drill depth with the dimensions given in the above step and the dimensions shown in the figure to remove the broken stud shank.

(b) Make a selection to get the correct drilling stop ring for the 0.25 inch (6.35 mm) drill.

(c) Attach the stop ring to the 0.25 inch (6.35 mm) diameter drill.

1) Set it to the depth as calculated as in the above steps.

(d) Put the drill into the tooling sleeve.

(e) Drill to a depth permitted by the stop ring to remove the remaining broken stud shank.

SUBTASK 72-54-00-910-002-F00

(6) Do these steps to prepare for tack welded stud head drilling.

(a) Remove the drill guide sleeve (identified as “clearance guide”).

(b) Replace it with the other drill guide sleeve (identified as “tapping drill guide”) for a 0.211 inch (5.36 mm) drill.

(c) Do a check from the top of the drilling sleeve to the T49.5 probe location of the LPT case.

(d) Calculate the drill depth (use the dimensions given before and the dimensions shown in the Figure) to drill through the tack welded stud head and the back plate.

NOTE: You must be careful when you drill, and make sure that it does not break through the back plate.

SUBTASK 72-54-00-910-003-F00

NOTE: If you do an incorrect calculation of the drill depth and setting of the drill depth stop ring, you may have a risk to go through the insulation blanket. In this case, you must do the full disassembly of the LPT rotor/stator.

(7) Do these steps to drill the tack welded stud head.

(a) Install a correct stop ring to drill a 0.211 inch (5.36 mm) diameter hole.

NOTE: The stop ring is identified with a drill size of 0.211 inch (5.36 mm).

NOTE: Set it to the depth specified as calculated in the “Drilling of the broken stud shank” as in the paragraph above.

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(b) Put the drill into the tooling sleeve.

NOTE: When you perform the drilling operation, and if you find that you have too much depth, you go to drill through the insulation blanket.

(c) Drill to a depth permitted by the stop ring to drill the stud head and the back plate.

(d) Remove the drill guide sleeve (identified as “tapping drill guide”).

(e) Replace it with the other drill guide sleeve (identified as “clearance guide”).

SUBTASK 72-54-00-910-004-F00

(8) Do these steps to tap the tack welded stud head.

(a) Do a check from the top of the drill guide sleeve to the T49.5 probe location of the LPT case.

(b) Calculate the specified tap depth with the dimensions given before and the dimensions shown in the figure, to tap through the tack welded stud head and the back plate only.

(c) Set the 0.25 inch (6.35 mm) stop ring to the specified depth with the tap given in the tooling.

(d) Put the tap into the tooling sleeve.

(e) Tap the head of the tack welded stud and the back plate.

NOTE: Refer to CFMI SPM, Task 70-44-60-320-007.

(f) Make sure that you vacuum all the unwanted particles.

(g) Remove the nut.

(h) Remove the tooling.

SUBTASK 72-54-00-470-001-F00

(9) Do these steps to install the T49.5 probe on the reworked bracket.

(a) To identify the repair, write the bulletin number CFM 56-7B-72-0423 on the locally manufactured washer (Refer to CFMI SPM, Task 70-10-12-350-005).

(b) Do this task: T49.5 Probe Installation, TASK 77-21-01-400-801-F00.

(c) Install the locally manufactured washer with the lockwire hole below the nut at the location adjacent to the modified broken tack welded stud.

(d) Apply a light layer of the lubricant, D50068 [CP2544] on the remaining stud thread and on the new bolt thread.

(e) Install the bolt (GE part number J644P09B) on the modified tapped tack welded stud head.

NOTE: Make sure that you have the washer correctly located to the lockwire adjacent bolt.

(f) Tighten the nut and bolt to 100.0-110.0 Pound-inches (11.5-12.5 Newton-meters).

(g) Lock the bolt to the washer below the nut with a safety wire, G02345 [CP8001] or the cable, G50065 [CP8006] (Lockwire Installation, TASK 70-20-01-800-804-F00).

NOTE: If you have the second stud broken, in addition to the already replaced stud, you can do this repair to replace this second broken stud by a bolt. You must safety the bolts together with a lockwire in the head bolt holes. Keep the locally manufactured washer already installed on the first bolt to identify the repair.

(h) Do a check from the top of the T49.5 probe to the LPT case.

NOTE: You must not have lack of protrusion between the bolt end and the tapped stud head.

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(i) Make sure that the value of the protrusion is correct.

NOTE: You must calculate the protrusion of the bolt thread through the modified tack welded stud head with the dimension used to find the bolt length in the figures.

SUBTASK 72-54-00-970-001-F00

(10) Record the Service Bulletin number on the applicable Log Book.

SUBTASK 72-54-00-210-010-F00

(11) Do the test that it listed in the T49.5 Probe Installation, TASK 77-21-01-400-801-F00.

SUBTASK 72-54-00-410-002-F00

(12) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-54-00-700-001-F00

(13) Do this task: Power Plant Test Reference Table, TASK 71-00-00-800-811-F00.

END OF TASK

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1323126 S0000231522_V2

Replacement of the Defective Studs on LPT Case
Figure 801/72-54-00-990-803-F00

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NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

1323655 S0000231523_V2

Dimensional Measures of Working of Studs and Back Plate
Figure 802/72-54-00-990-804-F00

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1324165 S0000231524_V2

Locally Tooling for Replacement of the Defective Studs on LPT Case
Figure 803/72-54-00-990-805-F00

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NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

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Lockwire of Bolt after Replacement of the Defective Studs on LPT Case
Figure 804/72-54-00-990-806-F00

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LOW PRESSURE TURBINE SHAFT - MAINTENANCE PRACTICES

1. General

A. This procedure has these tasks:

(1) The replacement of the LPT Shaft Plug O-rings.

(2) The replacement of the O-rings and Damper Seals on the center vent tube (CVT).

TASK 72-55-00-941-801-F00

2. Replacement of the LPT Shaft Plug O-ring

(Figure 201)

A. General

(1) This task is the replacement procedure for the LPT Shaft-Plug O-ring.

(2) ENGINES PRE-CFM-SB 72-0124;
This procedure is for engines without a removable forward CVT (center vent tube).

(3) The LPT Shaft-Plug is located in the front of the LPT Shaft.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-6180	Kit - Puller Adapter Part #: 856A2668G02 Supplier: 58828
SPL-11207	Puller - Adapter, Component Removal Part #: 856A2632G01 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
E50001	Solvent - Acetone	ASTM D 329 (Supersedes O-A-51)

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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F. Prepare for the Removal

SUBTASK 72-55-00-040-003-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-55-00-040-001-F00

(2) Make sure the engine start lever is in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable engine start lever.

SUBTASK 72-55-00-010-001-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-55-00-010-002-F00

(4) Do this task: Spinner Cones Removal, TASK 72-21-01-000-801-F00.

G. LPT Shaft-Plug O-ring Replacement

SUBTASK 72-55-00-020-001-F00

WARNING: DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING: DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING: DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND OTHER EQUIPMENT FOR PROTECTION, OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

CAUTION: DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

(1) Do these steps to replace the LPT Shaft-Plug O-rings (3), (4) and (5).

(a) Remove the retaining ring (6) from forward end of the LPT shaft (1), with a scribe.

(b) Remove the LPT shaft plug (2) with the puller adapter, SPL-6180 or puller, SPL-11207.

(c) Remove and discard O-ring (3), (4) and (5) located in the forward/aft grooves of the LPT shaft-plug (2).

(d) Remove the puller adapter, SPL-6180 or puller, SPL-11207 from the LPT shaft-plug.

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WARNING: ACETONE IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN ACETONE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET ACETONE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

(e) Clean the oil stains on the plug grooves with acetone solvent, E50001

(f) Install the LPT shaft-plug (2) in the storage box.

WARNING: DO NOT LET THE ENGINE OIL STAY ON YOUR SKIN. ENGINE OIL IS POISONOUS. DO NOT BREATHE THE FUMES. USE ENGINE OIL IN AN AREA WITH GOOD AIRFLOW. DO NOT GET ENGINE OIL ON YOUR CLOTHES OR ON THE AIRPLANE. ENGINE OIL CAN CAUSE INJURIES.

CAUTION: MAKE SURE THAT YOU CORRECTLY INSTALL NEW O-RING IN THE SEAL GROOVES AT THE FORWARD END AND THE AFT END OF THE LPT SHAFT-PLUG. IF THE O-RING IS NOT CORRECTLY INSTALLED, DAMAGE TO THE ENGINE CAN OCCUR.

(g) Lightly coat new O-ring (3), (4), and (5) with oil, D00599 [CP2442] and install into the seal grooves of the LPT shaft-plug (2).

(h) Install the LPT shaft-plug (2) assembly into the forward end of the LPT shaft (1) and onto the center vent tube.

NOTE: Insert the lug of the LPT shaft-plug (2) in aligned slots of the LPT coupling nut and the LPT shaft.

(i) Install the retaining ring (6) onto the LPT shaft (1).

(j) Do a visual inspection to make sure the correct installation of the retaining ring (6).

SUBTASK 72-55-00-410-001-F00

(2) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-55-00-410-002-F00

(3) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-55-00-440-001-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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LPT Shaft Plug O-Rings Replacement
Figure 201/72-55-00-990-801-F00 (Sheet 1 of 2)

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A-A

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LPT Shaft Plug O-Rings Replacement
Figure 201/72-55-00-990-801-F00 (Sheet 2 of 2)

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TASK 72-55-00-941-802-F00

3. **Replacement of the CVT O-ring and Damper Seals**
(Figure 202)

A. **General**

(1) This task is the replacement procedure for the O-ring and damper seals on the center vent tube (CVT).

(2) ENGINES POST-CFM-SB 72-0124;

This procedure is for engines with a forward removable CVT. There is no LPT Shaft-plug in this configuration.

(3) The CVT goes into the LPT Shaft.

B. **References**

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-21-01-000-801-F00	Spinner Cones Removal (P/B 401)
72-21-01-400-801-F00	Spinner Cones Installation (P/B 401)

C. **Tools/Equipment**

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-6182	Pusher/Puller - CVT Part #: 856A3793G01 Supplier: 58828
SPL-6183	Ring - Protective Part #: 856A3907P02 Supplier: 58828 Opt Part #: 856A3907P01G Supplier: 58828

D. **Consumable Materials**

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G	CFM CP2104
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	
E50001	Solvent - Acetone	ASTM D 329 (Supersedes O-A-51)

E. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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F. Prepare for the Removal

SUBTASK 72-55-00-040-002-F00

(1) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-55-00-040-004-F00

(2) Make sure the engine start lever is in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the applicable engine start lever.

SUBTASK 72-55-00-010-003-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-55-00-010-004-F00

(4) Do this task: Spinner Cones Removal, TASK 72-21-01-000-801-F00.

G. CVT O-rings and Damper Seals Replacement

SUBTASK 72-55-00-020-002-F00

WARNING: DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING: DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING: DO NOT LET HOT OIL GET ON YOU. PUT ON CLOTHES, GOGGLES, AND OTHER EQUIPMENT FOR PROTECTION, OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

CAUTION: DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

(1) Do these steps to replace the CVT O-rings (4) and damper seals (5).

(a) Install the protective ring, SPL-6183 in position in the fan disk hole.

(b) Remove the retaining ring (3) from the forward end of the LPT shaft (1) with a scribe.

(c) Do these steps to install the pusher/puller, SPL-6182:

1) Screw the tube of the pusher/puller, SPL-6182 into the center vent tube (2).

2) Install the support of the pusher/puller, SPL-6182 on the fan disk flange with four knurled screws.

3) Engage the plate of the pusher/puller, SPL-6182 in the slot of the screw and attach it with the knurled nut.

(d) Do these steps to remove the center vent tube (2):

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1) Manually turn clockwise the screw of fixture of the pusher/puller, SPL-6182 to

NOTE: You can use a wrench if the counter torque is important.

2) Remove the support of the pusher/puller, SPL-6182 from the fan disk flange.

3) Remove the center vent tube (2) equipped with the tube of the pusher/puller, SPL-6182 from the LPT Shaft.

4) Remove the tube of the pusher/puller, SPL-6182 from the center vent tube (2).

(e) Remove and discard the O-rings (4) located in the forward/aft grooves of the center vent tube (2).

(f) Remove and discard the damper seals (5) located in the other grooves of the center vent tube (2).

(g) Remove the protective ring, SPL-6183 in position in the fan disk hole.

WARNING: ACETONE IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN ACETONE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET ACETONE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

(h) Clean the oil stains with acetone solvent, E50001 on the center vent tube (2), in the O-ring and damper seal grooves and in the inner diameter of the fan disk with a lint free cloth.

(i) Install the center vent tube (2) in the storage box.

WARNING: DO NOT LET THE ENGINE OIL STAY ON YOUR SKIN. ENGINE OIL IS POISONOUS. DO NOT BREATHE THE FUMES. USE ENGINE OIL IN AN AREA WITH GOOD AIRFLOW. DO NOT GET ENGINE OIL ON YOUR CLOTHES OR ON THE AIRPLANE. ENGINE OIL CAN CAUSE INJURIES.

CAUTION: MAKE SURE THAT YOU CORRECTLY INSTALL NEW DAMPER SEALS IN THE SEAL GROOVES OF THE CENTER VENT TUBE. YOU MUST HAVE THE PLATE FACE OF THE DAMPER SEALS POINTED TO OUTER OF THE CENTER VENT TUBE. IF THE DAMPER SEALS ARE NOT CORRECTLY INSTALLED, DAMAGE TO THE ENGINE CAN OCCUR.

(j) Lightly coat new damper seals (5) with oil, D00599 [CP2442] and install into the seal grooves of the center vent tube (2).

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WARNING: DO NOT LET THE ENGINE OIL STAY ON YOUR SKIN. ENGINE OIL IS POISONOUS. DO NOT BREATHE THE FUMES. USE ENGINE OIL IN AN AREA WITH GOOD AIRFLOW. DO NOT GET ENGINE OIL ON YOUR CLOTHES OR ON THE AIRPLANE. ENGINE OIL CAN CAUSE INJURIES.

CAUTION: MAKE SURE THAT YOU CORRECTLY INSTALL THE NEW O-RING IN THE SEAL GROOVE AT THE FORWARD END OF THE CENTER VENT TUBE. IF THE O-RING IS NOT CORRECTLY INSTALLED, DAMAGE TO THE ENGINE CAN OCCUR.

(k) Lubricate the mating face of the rear vent tube with Molykote G lubricant, D00640 [CP2104] or Dow Corning 321 lubricant, D00641 [CP5062].

(l) Lightly coat new O-ring (4) with oil, D00599 [CP2442] and install into the seal grooves of the center vent tube (2).

(m) Install the protective ring, SPL-6183 in position in the fan disk hole.

(n) Do these steps to pre-install the center vent tube (2):

1) Screw the tube of the pusher/puller, SPL-6182 in the center vent tube (2).

CAUTION: BE CAREFUL WHEN YOU INSTALL THE CENTER VENT TUBE. IF YOU CAUSE DAMAGE TO THE LPT SHAFT INTERNAL SUPPORTS AND PAINT, DAMAGE TO THE ENGINE CAN OCCUR.

2) Align and install the center vent tube (2) into the LPT Shaft (1).

3) Align the lug of the center vent tube (2) with the aligned slots of the LPT Shaft (1) and the LPT coupling.

(o) Do these steps to install the pusher/puller and CVT:

1) Manually turn counter-clockwise the screw of fixture of the pusher/puller, SPL-6182 to engage the center vent tube (2) into the slot of the LPT Shaft (1).

NOTE: Be sure to stop turning the screw of the fixture of the pusher/puller before the lug of the Center Vent Tube (2) touches the slot of the LPT Shaft.

NOTE: You can use a wrench if the counter torque is important.

2) Remove the support of the pusher/puller, SPL-6182 from the fan disk flange.

3) Remove the tube of the pusher/puller, SPL-6182 from the center vent tube (2).

(p) Install the retaining ring (3) onto the LPT shaft (1).

(q) Remove the SPL protective ring, SPL-6183 from the fan disk hole.

(r) Do a visual inspection to make sure of the correct installation of retaining ring (3).

SUBTASK 72-55-00-410-003-F00

(2) Do this task: Spinner Cones Installation, TASK 72-21-01-400-801-F00.

SUBTASK 72-55-00-410-004-F00

(3) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-55-00-440-002-F00

(4) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

END OF TASK

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Center Vent Tube O-Rings and Damper Seals Replacement
Figure 202/72-55-00-990-802-F00 (Sheet 1 of 3)

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C

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Center Vent Tube O-Rings and Damper Seals Replacement
Figure 202/72-55-00-990-802-F00 (Sheet 2 of 3)

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D

INCORRECT INSTALLATION OF DAMPER SEAL

E

CORRECT INSTALLATION OF DAMPER SEAL

E

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Center Vent Tube O-Rings and Damper Seals Replacement
Figure 202/72-55-00-990-802-F00 (Sheet 3 of 3)

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LOW PRESSURE TURBINE SHAFT - INSPECTION

1. General

A. This procedure has one task.

(1) The inspection of the air/oil separator.

TASK 72-55-00-200-801-F00

2. Low Pressure Turbine Shaft Assembly Inspection

(Figure 601)

A. General

(1) This task gives the instructions on how to examine the low pressure turbine shaft.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)
72-56-01-000-801-F00	Air/Oil Separator Removal (P/B 401)
72-56-01-400-801-F00	Air/Oil Separator Installation (P/B 401)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-02-000-802-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-400-802-F00	Primary Plug Assembly Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the inspection

SUBTASK 72-55-00-010-009-F00

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

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WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

SUBTASK 72-55-00-010-006-F00

(2) Do this task:Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00.

SUBTASK 72-55-00-010-007-F00

(3) Do this task:Primary Plug Assembly Removal, TASK 78-11-02-000-802-F00.

SUBTASK 72-55-00-010-008-F00

(4) Do this task:Turbine Rear Frame (TRF) Oil Inlet Cover Removal, TASK 72-56-00-000-802-F00.

E. Low Pressure Turbine Shaft Assembly Inspection

SUBTASK 72-55-00-200-001-F00

(1) Examine the air/oil separator as follows:

(a) Examine all areas that you can see for:

1) Corrosion or pitting

a) All quantities permitted.

2) Cracks in the welds

a) Not permitted.

SUBTASK 72-55-00-900-001-F00

(2) If you find cracks, replace the air/oil separator, unless you are given other instructions (TASK 72-56-01-000-801-F00 and TASK 72-56-01-400-801-F00).

SUBTASK 72-55-00-211-001-F00

(3) Examine the seal teeth of the center vent tube rear extension duct.

(a) Seizure marks, scratches, nicks and dents.

1) Permitted, if the depth is not more than of 0.003 inch (0.08 mm).

(b) Bent seal tooth

1) All quantities permitted, if the cumulative length of the bent tooth is not more than 1/12 of the circumference.

(c) High metal

1) Not permitted.

(d) Waviness

1) All quantities permitted, if the amplitude of indication is not more than 0.015 in. (0. 4 mm).

2) Cracks are not permitted.

(e) Crack or missing (worn away)

1) Not permitted.

(f) Worn outer diameter

1) All quantities permitted, if the seal tooth outer diameter is between 2.0768 inch (52.75 mm) and 2.079 inch (52.60 mm).

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F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-55-00-010-010-F00

(1) Do this task: Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00.

SUBTASK 72-55-00-410-005-F00

(2) Do this task:Primary Plug Assembly Installation, TASK 78-11-02-400-802-F00.

SUBTASK 72-55-00-400-001-F00

(3) Do this task:Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00.

SUBTASK 72-55-00-020-003-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

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Air/Oil Separator Exposed Areas Inspection
Figure 601/72-55-00-990-803-F00

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TURBINE FRAME ASSEMBLY - REMOVAL/INSTALLATION

1. **General**

A. This procedure has two tasks:

(1) Turbine Rear Frame (TRF) Oil Inlet Cover Removal

(2) Turbine Rear Frame (TRF) Oil Inlet Cover Installation.

TASK 72-56-00-000-802-F00

2. **Turbine Rear Frame (TRF) Oil Inlet Cover Removal**

(Figure 401)

A. General

(1) This task provides the instructions to remove the turbine rear frame (TRF) oil inlet cover.

(2) The TRF oil inlet cover is referred to as oil inlet cover.

B. References

Reference	Title
71-00-00-800-806-F00	Engine Operation Limits (P/B 201)
72-56-00-000-801-F00	Oil Supply Line Cleaning (P/B 701)
72-56-00-200-801-F00	Turbine Frame Assembly Inspection (P/B 601)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-02-000-802-F00	Primary Plug Assembly Removal (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8854	Adapter - Puller, Oil Inlet Cover Part #: 856A3419G02 Supplier: 58828

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Removal

SUBTASK 72-56-00-010-027-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU OPEN THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-56-00-010-028-F00

(2) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00.

SUBTASK 72-56-00-010-029-F00

(3) Do this task: Primary Plug Assembly Removal, TASK 78-11-02-000-802-F00.

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F. Turbine Rear Frame (TRF) Oil Inlet Cover Removal

SUBTASK 72-56-00-010-030-F00

(1) Do these steps to remove the flame arrestor [2]:

(a) Remove the six bolts [3] that attach the flame arrestor [2] to the flange assembly [1] and the oil inlet cover [9].

(b) Remove the flame arrestor [2].

SUBTASK 72-56-00-210-003-F00

(2) Examine the flame arrestor [2] for filiform slivers:

(a) If you find filiform slivers in the flame arrestor [2], examine the condition of the oil inlet cover [9] abradable coating (TASK 72-56-00-200-801-F00).

(b) If you find loose parts, replace the oil inlet cover [9].

(c) If you do not find loose parts, remove all debris before you reinstall the flame arrestor [2].

(d) Make sure that the oil consumption is in the limits (TASK 71-00-00-800-806-F00).

SUBTASK 72-56-00-010-031-F00

(3) Do these steps to remove the flange assembly [1]:

AKS ALL PRE SB CFM56-7B-72-169 AND PRE SB CFM56-7B-72-254

(a) Remove the thirty-two bolts [4] which attach the flange assembly [1] to the TRF inner flange.

AKS ALL POST SB CFM56-7B-72-169 OR POST SB CFM56-7B-72-254

(b) Remove the twenty-four bolts [4] which attach the flange assembly [1] to the TRF middle flange.

AKS ALL POST SB 737-CFM56-7B-72-0676

(c) Remove the eight bolts [4] which attach the flange assembly [1] to the TRF middle flange.

AKS ALL

(d) Remove the flange assembly [1] from the TRF.

(e) Remove and discard the gasket seal [14].

SUBTASK 72-56-00-020-001-F00

(4) Do these steps to remove the oil inlet cover [9]:

CAUTION: USE TWO WRENCHES TO LOOSEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(a) Remove the damping oil tube [12].

(b) Remove the oil supply tube [11].

(c) Remove the oil inlet cover [9]:

1) Remove the twelve bolts [8] which attach the oil inlet cover [9] to the No. 5 bearing support.

2) Install the oil inlet cover puller adapter, SPL-8854 on the rear face of the oil inlet cover [9].

3) Use the puller to remove the oil inlet cover [9].

4) Remove the oil inlet cover puller adapter, SPL-8854 from the oil inlet cover [9].

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(d) Remove the O-ring [7] and the gasket seal [6] and discard them.

(e) If it is necessary, examine and clean the sump area to make sure that there is no unwanted material.

NOTE: When you remove the oil inlet cover, some pieces of gasket seal may detach and fall into the sump. Make sure that the sump is free of any unwanted material.

(f) Clean the mating faces of the oil inlet cover [9].

(g) Remove the nipple [10] from the oil inlet cover [9] remove the O-ring [13] and discard.

SUBTASK 72-56-00-110-007-F00

(5) If it is necessary, clean the removed parts of oil and coking deposits.

SUBTASK 72-56-00-212-001-F00

(6) If it is necessary, do an inspection of the oil supply tube [11] in the TRF with a white light or borescope for coking deposits.

(a) Coking deposits are not permitted.

(b) If you find coking deposits, do this task: Oil Supply Line Cleaning, TASK 72-56-00-000-801-F00.

END OF TASK

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U66801 S0000212855_V3

Turbine Rear Frame (TRF) Oil Inlet Cover Installation
Figure 401/72-56-00-990-804-F00 (Sheet 1 of 3)

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Turbine Rear Frame (TRF) Oil Inlet Cover Installation
Figure 401/72-56-00-990-804-F00 (Sheet 2 of 3)

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LPT FRAME

A

MM-00173-00-B

U66805 S0000212857_V4

Turbine Rear Frame (TRF) Oil Inlet Cover Installation
Figure 401/72-56-00-990-804-F00 (Sheet 3 of 3)

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(VIEW IN THE FORWARD DIRECTION)

2435481 S0000564599_V1

Torque Sequence for Oil Inlet Cover Installation
Figure 402/72-56-00-990-804-F01

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TASK 72-56-00-400-801-F00

3. Turbine Rear Frame (TRF) Oil Inlet Cover Installation
(Figure 401, Figure 402)

A. General

(1) This task provides the instructions on how to install the turbine rear frame (TRF) oil inlet cover.

(2) The TRF oil inlet cover is referred to as oil inlet cover.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-02-400-802-F00	Primary Plug Assembly Installation (P/B 401)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-13625	Slide hammer for component removal (1 lb) Part #: CG240-8 Supplier: 55719 Part #: CG240-9 Supplier: 5K761
SPL-8854	Adapter - Puller, Oil Inlet Cover Part #: 856A3419G02 Supplier: 58828
SPL-14685	Pins Guide - No. 5 Bearing Outer Race Installation Part #: 856A3108G01 Supplier: 58828
STD-583	Mallet - Non-metallic
STD-664	Pliers - Teflon-jawed (or Equivalent Soft-Jawed)

D. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D00623 [CP5066]	Oil - Fuel System, Corrosion Preventive	MIL-PRF-6081, Grade 1010
D00672 [CP5070]	Grease - Petrolatum	VV-P-236
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Turbine Rear Frame (TRF) Oil Inlet Cover Installation

SUBTASK 72-56-00-420-001-F00

(1) Do these steps to install the oil inlet cover [9]:

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(a) Lubricate a new O-ring [7] with grease, D00672 [CP5070].

(b) Install the new O-ring [7] on the oil inlet cover [9].

(c) Install a new gasket seal [6] on the No. 5 bearing support. Use pins guide, SPL-14685, to hold the gasket seal until the oil inlet cover [9] is attached.

(d) Install the oil inlet cover puller adapter, SPL-8854 on the rear flange of the oil inlet cover [9].

(e) Install the oil inlet cover [9] with the oil inlet cover puller adapter, SPL-8854 on the No. 5 bearing support.

1) Match the position of the cover flange with the oil supply and scavenge tube [5] which comes out at the bottom of the No. 5 bearing support.

(f) Apply a thin layer of graphite compound, D00601 [CP2101] on the threads of the twelve bolts [8].

(g) Install the twelve bolts [8] that attach the oil inlet cover [9] to the No. 5 bearing support. Tighten the bolts [8] manually.

(h) With hand pressure on oil inlet cover [9], use a slide hammer puller, COM-13625 on oil inlet cover puller adapter, SPL-8854 or a non-metallic mallet, STD-583 to install the oil inlet cover flange against the No. 5 bearing support.

(i) Remove the oil inlet cover puller adapter, SPL-8854 from the oil inlet cover [9].

(j) Initially, torque the bolts [8] to 35 in-lb (4 N·m), for correct installation of the O-ring [7].

(k) Torque the bolts [8] to 70 in-lb (8 N·m) in a criss-cross pattern. Refer to Figure 402.

(l) Torque the bolts [8] between 110.0 in-lb (12.4 N·m) to 120.0 in-lb (13.6 N·m) in a criss-cross pattern. Refer to Figure 402.

(m) Wait for 5 minutes minimum.

(n) Loosen all bolts [8] by approximately 180°.

(o) Torque the bolts [8] between 110.0 in-lb (12.4 N·m) to 120.0 in-lb (13.6 N·m) in a criss-cross pattern. Refer to Figure 402.

(p) Wait for 5 minutes minimum.

(q) Loosen all bolts [8] by approximately 180°.

(r) Torque the bolts [8] between 110.0 in-lb (12.4 N·m) to 120.0 in-lb (13.6 N·m) in a criss-cross pattern. Refer to Figure 402.

(s) Torque the bolts [8] clockwise, starting with bolt No. 1, between 110.0 in-lb (12.4 N·m) to 120.0 in-lb (13.6 N·m).

(t) Do these steps to install the nipple [10] on the oil inlet cover [9]:

1) Lubricate a new O-ring [13] with oil, D00623 [CP5066].

2) Install the new O-ring [13] on the nipple [10].

3) Install the nipple [10] on the oil inlet cover [9]. Tighten the nipple [10] manually to seat.

a) Tighten the nipple [10] between 110.0 in-lb (12.4 N·m) to 120.0 in-lb (13.6 N·m).

(u) Install the oil supply tube [11], and tighten the coupling nuts manually.

NOTE: You tighten the oil supply tube after you connect the damping oil tube.

(v) Install the damping oil tube [12].

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1) Connect the damping oil tube [12] to the No. 5 bearing support nipple, and to the oil supply tube [11]. Tighten the coupling nuts manually.

CAUTION: USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

2) Make sure that the oil tubes are installed without strain.

3) Tighten the coupling nuts of oil supply tube [11] between 270.0 in-lb (30.5 N·m) to 300.0 in-lb (33.9 N·m).

4) Tighten the coupling nuts of damping oil tube [12] as follows:

CAUTION: DO NOT USE PLIERS WITH METAL JAWS TO DISCONNECT, OR CONNECT THE PARTS. THE METAL JAWS WILL CAUSE DAMAGE TO THE PARTS.

a) Hold the damping oil tube with soft nose pliers and tighten the damping oil tube [12] coupling nut connected to the No. 5 bearing support nipple between 90.0 in-lb (10.2 N·m) to 100.0 in-lb (11.3 N·m).

b) Make sure that the damping oil tube [12] is installed without strain as follows:

<1> Loosen the coupling nut of the damping oil tube [12] connected on the oil supply tube [11].

<2> Make sure that the damping oil tube [12] is installed without strain, and aligned with the nipple [10] of the oil supply tube [11].

<3> If it is necessary, bend the damping oil tube [12] in bent sections.

NOTE: Do not bend the tube near the end fittings.

c) Reconnect the coupling nut of the damping oil tube [12] to the oil supply tube [11]. Tighten the coupling nut manually.

CAUTION: DO NOT USE PLIERS WITH METAL JAWS TO DISCONNECT, OR CONNECT THE PARTS. THE METAL JAWS WILL CAUSE DAMAGE TO THE PARTS.

d) Hold the damping oil tube [12] with teflon-jawed pliers, STD-664 and tighten the damping oil tube [12] coupling nut between 90.0 in-lb (10.2 N·m) to 100.0 in-lb (11.3 N·m).

(w) Safety the oil inlet cover bolts, the nipples and the coupling nuts of the tubes with safety wire, G02345 [CP8001] or cable, G50065 [CP8006].

SUBTASK 72-56-00-410-008-F00

(2) Do these steps to install the flange assembly [1]:

(a) Apply a thin layer of oil, D00623 [CP5066] on a new gasket seal [14] to be installed on the rear flange of the oil inlet cover [9].

(b) Install the new gasket seal [14] on the rear flange of the oil inlet cover [9].

(c) Apply a thin layer of graphite compound, D00601 [CP2101] on the threads of the bolts [4].

(d) Put the flange assembly [1] in position on the TRF.

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AKS ALL PRE SB CFM56-7B-72-169 AND PRE SB CFM56-7B-72-254

(e) Install the thirty-two bolts [4] that attach the flange assembly [1] to the TRF. Tighten the bolts [4] manually.

1) Tighten all of the bolts [4] between 110.0 in-lb (12.4 N·m) to 120.0 in-lb (13.6 N·m).

AKS ALL POST SB CFM56-7B-72-169 OR POST SB CFM56-7B-72-254

(f) Install the twenty-four bolts [4] that attach the flange assembly [1] to the TRF. Tighten the bolts [4] manually.

1) Tighten all of the bolts [4] between 110.0 in-lb (12.4 N·m) to 120.0 in-lb (13.6 N·m).

AKS ALL POST SB 737-CFM56-7B-72-0676

(g) Install the eight bolts [4] that attach the flange assembly [1] to the TRF. Tighten the bolts [4] manually.

1) Tighten all of the bolts [4] between 110.0 in-lb (12.4 N·m) to 120.0 in-lb (13.6 N·m).

AKS ALL

SUBTASK 72-56-00-420-002-F00

(3) Do these steps to install the flame arrestor [2]:

(a) Apply a thin layer of graphite compound, D00601 [CP2101] on the threads of the bolts [3].

(b) Install the flame arrestor [2] in position on the flange assembly [1].

(c) Install the six bolts [3] that attach the flame arrestor [2] to the flange assembly [1] and tighten the bolts [3] manually.

1) Tighten the bolts [3] between 110.0 in-lb (12.4 N·m) to 120.0 in-lb (13.6 N·m).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-420-003-F00

(1) Do this task: Primary Plug Assembly Installation, TASK 78-11-02-400-802-F00.

SUBTASK 72-56-00-420-004-F00

(2) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00.

SUBTASK 72-56-00-410-009-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

H. Turbine Rear Frame (TRF) Oil Inlet Cover Test

SUBTASK 72-56-00-710-003-F00

(1) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Look for oil leaks at the turbine frame.

SUBTASK 72-56-00-612-004-F00

(2) Do a check of the engine oil quantity.

(a) If it is necessary, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

END OF TASK

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TURBINE FRAME ASSEMBLY - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure contains two tasks:
      (1) Turbine Frame Assembly Inspection
      (2) Turbine Frame Assembly Engine Mounting Lugs Inspection.

TASK 72-56-00-200-801-F00

2. **Turbine Frame Assembly Inspection**
(Figure 601 and Figure 602)

A. General

(1) This task provides the instructions on how to examine the turbine frame assembly.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-56-00-300-801-F00	Oil Supply Tube Replacement (P/B 801)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-02-000-802-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-400-802-F00	Primary Plug Assembly Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-802-F00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-803-F00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Inspection

SUBTASK 72-56-00-010-039-F00

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Do this task: Thrust Reverser Deactivation for Ground Maintenance, TASK 78-31-00-040-802-F00.

(b) Open the left and right fan cowl panels (TASK 71-11-02-010-801-F00).

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WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Open the left and right thrust reversers (TASK 78-31-00-010-801-F00).

SUBTASK 72-56-00-010-002-F00

(2) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00.

SUBTASK 72-56-00-010-003-F00

(3) Do this task: Primary Plug Assembly Removal, TASK 78-11-02-000-802-F00.

E. Turbine Frame Assembly Inspection

SUBTASK 72-56-00-200-001-F00

(1) Examine the forward outer flange and the aft outer flange for damage:

(a) Cracks that connect the bolt holes

1) Not permitted.

2) A continue-in-service limit of 10 cycles is permitted for one crack that connects two bolt holes.

(b) Cracks that extend from the bolt holes to the outer edge of the flange

1) One crack 0.20 inch (5.1 mm) in length from a bolt hole is permitted, with this limit:

a) There is a minimum separation of five holes between cracks.

(c) Cracks that extend from the bolt holes to the casing skin

1) Five axial cracks 0.20 inch (5.1 mm) in length on each flange is permitted with this limit:

a) There is a minimum separation of 10 holes between cracks.

2) No circumferential cracks are permitted.

(d) Cracks in other areas of the flange

1) Five cracks on each flange 0.20 inch (5.1 mm) in length are permitted with this limit:

a) There is a minimum separation of 5.0 inches (127 mm) between all other cracks.

(e) Nicks, scores and scratches

1) All damage is permitted with these limits:

a) It is permitted to have five nicks, scores or scratches that are not more than 1.0 inch (25.4 mm) long on each flange.

b) Damage is not more than 0.020 inch (0.50 mm) in depth after you remove the high metal.

c) There is a minimum separation of 1.0 inch (25.4 mm) between each nick, score or scratch.

SUBTASK 72-56-00-200-002-F00

(2) Examine the engine mounting lug area and strut attach points for this damage:

NOTE: Includes the adjacent welds and those heat affected areas.

(a) Cracks that extend from the bolt holes

1) Not permitted.

2) A continue-in-service limit of 10 cycles is permitted for one crack that goes out of one mounting lug bolt hole and is not more than 0.25 inch (6.35 mm) in length.

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(b) Cracks in the areas of the engine mounting lugs (includes the welds):

1) Not permitted.

2) A continue-in-service limit of 10 cycles is permitted for one crack that is not more than 0.25 inch (6.35 mm) in length.

(c) Nicks, scores and scratches

1) There is no limit to the number of nicks, scores, and scratches which are permitted with these conditions:

a) Not more than 1.0 inch (25.4 mm) in length

b) Not more than 0.02 inch (0.51 mm) in depth, after you remove the high metal

c) Minimum separation of 1.0 inch (25.4 mm) between each nick, score, or scratch.

SUBTASK 72-56-00-200-003-F00

(3) Examine all other areas of outer casing skin for damage:

(a) Cracks

1) Not permitted.

2) A continue-in-service limit of 10 cycles is permitted for one crack that is not more than 0.25 inch (6.35 mm) in length.

(b) Nicks, scores, and scratches

1) There is no limit to the number of nicks, scores, and scratches which are permitted with these conditions:

a) Not more than 1.0 inch (25.4 mm) in length

b) Not more than 0.02 inch (0.51 mm) in depth, after you remove the high metal

c) Minimum separation of 1.0 inch (25.4 mm) between each nick, score, or scratch.

SUBTASK 72-56-00-200-004-F00

(4) Examine the oil supply and scavenge tubes for damage:

(a) Cracks

1) Not permitted.

(b) Nicks, scores, and scratches

1) There is no limit to the number nicks, scores, and scratches if each is not more than 0.01 inch (0.25 mm) in depth after you remove the high metal.

(c) Dents

1) Two dents for each tube are permitted if they have a smooth contour and are not more than 0.05 inch (1.27 mm) in depth.

SUBTASK 72-56-00-200-005-F00

(5) Examine the struts for damage:

(a) Cracks in the parent metal

1) Not permitted.

(b) Cracks in the welds

1) Not permitted.

(c) Nicks, scores, and scratches

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1) There is no limit to the number nicks, scores, and scratches with no limit to length, with this condition:

a) Not more than 0.02 inch (0.51 mm) in depth after you remove the high metal.

(d) Dents

1) There is no limit to the number of dents with a maximum depth of 0.02 inch (0.51 mm), if they have a smooth contour.

(e) Broken stud or damaged threads

1) Not permitted.

(f) Oil mark on the No. 7 strut

1) Oil marks are permitted.

SUBTASK 72-56-00-200-006-F00

(6) Examine the flame arrestor for damage:

(a) All cracks are permitted in the flame arrestor and in the metal retaining strip.

(b) Missing retaining strips

1) Permitted, only if one strip stays.

(c) Honeycomb grid plug for clogging

1) Not more than 50 percent of clogging is permitted.

(d) Honeycomb missing

1) Not permitted, replace the flame arrestor within the next 10 cycles (TASK 72-56-00-300-801-F00).

SUBTASK 72-56-00-212-002-F00

(7) Examine the abradable coating of the inlet cover (if removed):

(a) Rub marks from the seal teeth

1) All quantities are permitted if the average is 0.010 inch (0.25 mm) in depth over the entire circumference.

SUBTASK 72-56-00-220-006-F00

(8) Examine the no. 5 bearing support (Figure 602):

(a) Cracks in area C (View B-B)

1) Permitted any amount.

AKS ALL POST SB 737-CFM56-7B-72-0676 OR POST SB 737-CFM56-7B-72-0169

SUBTASK 72-56-00-200-010-F00

(9) Examine the flange assembly for damage (Figure 601, View B):

(a) Look for cracks at hole locations on the intermediate flange.

1) Any amount of cracks if no missing material (not including stop drill), and no cracks between bolt holes are permitted.

2) A maximum service extension of 10 cycles or 25 hours is permitted for crack with missing material or cracks between two bolt holes.

AKS ALL

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-410-001-F00

(1) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00.

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SUBTASK 72-56-00-410-002-F00

(2) Do this task: Primary Plug Assembly Installation, TASK 78-11-02-400-802-F00.

SUBTASK 72-56-00-410-023-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left and right thrust reversers:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

(b) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

(c) Do this task: Thrust Reverser Activation after Ground Maintenance, TASK 78-31-00-440-803-F00.

END OF TASK

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Turbine Frame Assembly Inspection
Figure 601/72-56-00-990-801-F00 (Sheet 1 of 2)

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1 POST-SB 72-0676
2 POST-SB 72-0169

2203929 S0000491333_V2

Turbine Frame Assembly Inspection
Figure 601/72-56-00-990-801-F00 (Sheet 2 of 2)

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No. 5 Bearing Support Inspection
Figure 602/72-56-00-990-822-F00 (Sheet 1 of 3)

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A-A

MM-00176-00-B

2275667 S0000513264_V2

No. 5 Bearing Support Inspection
Figure 602/72-56-00-990-822-F00 (Sheet 2 of 3)

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B-B

B0045800

2244144 S0000502267_V3

No. 5 Bearing Support Inspection
Figure 602/72-56-00-990-822-F00 (Sheet 3 of 3)

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TASK 72-56-00-200-802-F00

3. **Turbine Frame Assembly Engine Mounting Lugs Inspection**
(Figure 601)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task gives the procedure to do a visual check of the engine mounting lugs on the turbine frame assembly.

(2) The turbine frame assembly is at the aft end of the engine.

B. References

Reference	Title
72-56-00-300-802-F00	Bushings in the Clevis Mounts of the TRF Assembly Replacement (P/B 801)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-56-00-010-004-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-56-00-200-007-F00

(2) Do a visual check of the engine mounting lugs for damage:

(a) Cracks that extend from the bolt holes

1) Not serviceable.

2) A Continue-In-Service limit of 10 cycles is permitted for one crack that goes out of one mounting lug bolt hole, not more than 0.25 inch (6.35 mm) in length.

(b) Cracks in the areas of the engine mounting lugs (includes the welds)

1) Not serviceable.

2) A Continue-In-Service limit of 10 cycles is permitted for one crack 0.25 inch (6.35 mm) in length.

(c) Nicks, scores, and scratches

1) There is no limit to the number of nicks, scores, and scratches which are permitted with these conditions:

a) Not more than 1.0 inch (25.4 mm) in length

b) Not more than 0.02 inch (0.51 mm) in depth, after you remove the high metal

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c) Minimum separation of 1.0 inch (25.4 mm) between each nick, score or scratch.

(d) Disengaged, loose, or missing bushings in the clevis mount TRF:

1) On-Wing;

a) Disengaged bushings are serviceable

2) Off-Wing;

a) If the aft mount is removed, do the check for disengaged, loose or missing bushings (TASK 72-56-00-300-802-F00).

SUBTASK 72-56-00-410-004-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

——— END OF TASK ———

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TURBINE FRAME ASSEMBLY - CLEANING/PAINTING

1. General

A. This procedure has these tasks to clean oil coking deposits at the turbine frame:

(1) Oil Inlet Cover Cleaning

(2) Rear Sump Oil Supply Tube Cleaning

(3) Rear Sump Oil Scavenge Tube Cleaning

TASK 72-56-00-100-801-F00

2. Oil Inlet Cover Cleaning

A. General

(1) This task give the instructions to clean coking deposits from the oil inlet cover.

(2) It is necessary to remove the oil inlet cover to do this task.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Procedure

SUBTASK 72-56-00-020-002-F00

(1) Turbine Rear Frame (TRF) Oil Inlet Cover Removal, TASK 72-56-00-000-802-F00

(a) Make sure you remove the oil nipple from the oil inlet cover.

1) Loosen and remove the nipple from the oil inlet cover.

NOTE: Make sure that the nipple is clean. If not, keep the nipple for cleaning or replace the part.

2) Remove and discard O-ring from the nipple.

E. Oil Inlet Cover Cleaning

SUBTASK 72-56-00-110-008-F00

(1) Do one of these tasks to degrease the oil inlet cover:

NOTE: Make sure you obey the Warnings and Cautions in the applicable task.

(a) Do this task :Solvent degreasing of all materials, except Titanium Alloys CFMI SPM (70 21 11).

(b) Alternate task;

Do this task :Vapor degreasing CFM SPM (70 21 12).

SUBTASK 72-56-00-110-009-F00

(2) (1) To clean the oil inlet cover, do this task : Descalling ferrous alloys CFM SPM (70 21 31).

NOTE: Make sure you obey the Warnings and Cautions in the applicable task.

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(a) Make sure that there is no sign of oil coking on the oil inlet cover at the 6 o'clock position.

1) If it is necessary, do a mechanical cleaning of the oil inlet cover at this position to remove the particles/contamination.

SUBTASK 72-56-00-210-001-F00

(3) Do a visual inspection to make sure that the oil nozzle is clean and clear of unwanted material.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-420-005-F00

(1) Do this task (Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00)

SUBTASK 72-56-00-710-001-F00

(2) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Look for oil leaks at the turbine frame.

SUBTASK 72-56-00-612-001-F00

(3) Do a check of the engine oil quantity, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801

——— END OF TASK ———

TASK 72-56-00-000-801-F00

3. Oil Supply Line Cleaning

(Figure 702)

A. General

(1) This task give the instructions to clean coking deposits from the oil supply line at the turbine frame.

(a) The oil supply line includes the oil supply tube installed through the No. 10 turbine frame strut, the oil tube, the damping oil tube and the nipples.

AKS ALL PRE SB CFM56-7B-72-339 AND PRE SB CFM56-7B-72-169 AND PRE SB CFM56-7B-72-254

(b) Do a mechanical cleaning or a chemical cleaning with the non-removable oil supply tube.

NOTE: It is recommended to do a mechanical cleaning prior to the chemical cleaning for the non-removable oil supply tube.

AKS ALL POST SB CFM56-7B-72-169 OR POST SB CFM56-7B-72-254 OR POST SB CFM56-7B-72-339

(c) Do the removal of the removable oil supply tube before the cleaning.

AKS ALL

(d) For all removable oil supply tubes: do a chemical cleaning on the bench.

(2) It is necessary to remove the oil inlet cover to do this task.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)

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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
SPL-8853	Fixture - Removal and Installation, Removable Retaining Ring Part #: 856A2677G01 Supplier: 58828
STD-1400	Borescope - Flexible, 4mm, Direct View

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
C00174	Compound - Corrosion Preventive, Solvent Cutback, Cold Application	MIL-PRF-16173 (Supersedes MIL-C-16173)
D00139	Lubricant - Oil - WD-40	
D00623 [CP5066]	Oil - Fuel System, Corrosion Preventive	MIL-PRF-6081, Grade 1010
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G	CFM CP2104
G50611 [CP1065]	Kerosene	MIL-DTL-5624 (Supersedes MIL-T-5624)

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Procedure

SUBTASK 72-56-00-010-036-F00

(1) Do this task:Turbine Rear Frame (TRF) Oil Inlet Cover Removal, TASK 72-56-00-000-802-F00

G. Oil Supply Line Cleaning

SUBTASK 72-56-00-010-008-F00

(1) Do these steps to remove the oil nipple from the rear face of No. 5 bearing support:

(a) Loosen and remove the nipple from the No. 5 bearing support rear face for cleaning.

(b) Remove and discard O-ring from the nipple.

AKS ALL POST SB CFM56-7B-72-169 OR POST SB CFM56-7B-72-254 OR POST SB CFM56-7B-72-339

SUBTASK 72-56-00-010-009-F00

(2) Do these steps to remove the oil supply tube assembly from the TRF for cleaning on the bench (Figure 702)

(a) Remove the removable retaining ring from the coupling nut. Use the retaining ring removal and installation fixture, SPL-8853 to remove the retaining ring.

(b) Remove the coupling nut from the oil supply tube assembly.

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AKS ALL POST SB CFM56-7B-72-169 OR POST SB CFM56-7B-72-254 OR POST SB CFM56-7B-72-339 (Continued)

(c) Disengage the guide bushing of oil supply tube from the boss of TRF No. 10 strut outer case.

(d) Remove the oil supply tube from the outer case of the TRF.

(e) Install the coupling nut on the oil supply tube.

(f) Insert the retaining ring in the coupling nut. Use the retaining ring removal and installation fixture, SPL-8853 to install the retaining ring.

1) Make sure that the retaining ring is fully inserted into the coupling nut.

2) Make sure that the coupling nut rotates freely after the installation of the retaining ring

AKS ALL

SUBTASK 72-56-00-110-001-F00

WARNING: ACETONE IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN ACETONE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET ACETONE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: KEROSENE IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN KEROSENE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET KEROSENE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

(3) If you use the old nipples, clean them with acetone solvent, B01058 [CP1039] or kerosene, G50611 [CP1065].

(a) Do an inspection of the nipples after cleaning to make sure that they are free of any particles/contamination before you use them again.

1) No oil coked particles/contamination is permitted.

2) Repeat the cleaning task until nipples are free of particles/contamination.

SUBTASK 72-56-00-110-002-F00

(4) Do this task to clean each of these removed oil supply line tubes

(a) The oil tube and damping oil tube

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AKS ALL POST SB CFM56-7B-72-169 OR POST SB CFM56-7B-72-254 OR POST SB CFM56-7B-72-339

(b) the oil supply tube

AKS ALL

(c) Attach the steel tubing and the pump to the removed oil supply line tube.

NOTE: You must use steel tubing and an acceptable pump to do this procedure.

(d) Do this task to clean internal oil tubes per CFM SPM.

(e) Do a visual inspection of the cleaned oil tubes with a 4mm direct view flexible borescope, STD-1400 and a light source, after cleaning to make sure that it is free of any particles/contamination before re-installation.

1) No oil coked particles/contamination is permitted.

2) Repeat the cleaning task until the tube is free of particles/contamination.

(f) Disconnect the cleaned tube from the steel tubing and the pump.

AKS ALL POST SB CFM56-7B-72-169 OR POST SB CFM56-7B-72-254 OR POST SB CFM56-7B-72-339

(g) Do these steps to prepare the oil supply tube for re-installation.

1) Remove the retaining ring from the coupling nut of the removable oil supply tube with the retaining ring removal and installation fixture, SPL-8853.

2) Remove the coupling nut from the oil supply tube.

3) Lubricate all coupling nuts of the rear sump oil supply tubes with oil, D00623 [CP5066].

AKS ALL PRE SB CFM56-7B-72-339 AND PRE SB CFM56-7B-72-169 AND PRE SB CFM56-7B-72-254

SUBTASK 72-56-00-110-003-F00

(5) Do one of these tasks to clean the non-removable oil supply tube (Figure 703)

NOTE: It is recommended to do a mechanical cleaning prior to the chemical cleaning for the non-removable oil supply tube

(a) Degrease and chemical cleaning

1) Put protection on the No. 5 bearing to prevent any contamination by the material.

NOTE: Be careful to put protection equipment on the No. 5 bearing before you start a cleaning of the oil supply line.

2) Put protection on all the cavities and tube ends to prevent any contamination by the material.

3) Attach the steel tubing and the pump to the removed oil scavenge tube.

NOTE: You must use steel tubing and an acceptable pump to do this procedure.

4) Do this task to clean internal oil tubes per CFM SPM.

5) Do a visual inspection of the cleaned oil tubes with a 4mm direct view flexible borescope, STD-1400 and a light source, after cleaning to make sure that it is free of any particles/contamination before re-installation.

a) No oil coked particles/contamination is permitted.

b) Repeat the cleaning task until the tube is free of particles/contamination.

6) Disconnect the steel tubing and the pump from the cleaned tube.

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7) Remove the protection from the No. 5 bearing and tubes.

(b) Mechanical cleaning

NOTE: This is a mechanical cleaning because the tube is non-removable.

1) Put protection on the No. 5 bearing to prevent any contamination by the material.

NOTE: Be careful to put protection equipment on the No. 5 bearing before you start a mechanical cleaning of oil supply line.

2) Put protection on all the cavities and tube ends to prevent any contamination by the material.

3) Put a cap for the oil supply tube on the outer case side.

4) Put a sufficient quantity of WD-40 lubricant, D00139, penetrant corrosion inhibitor compound, C00174 to fill the tube and keep it to get effect on coking in the concerned area for a sufficient time.

5) Put a container under the tube to collect the penetrant corrosion inhibitor.

6) Remove the cap from the tube and collect the penetrant corrosion inhibitor.

7) Turn the tube in its position to get access to the ends of tube.

8) Introduce a cylinder-brush tool through the tube ends and move the tool to the coked area.

9) Put a small quantity of kerosene, G50611 [CP1065] with a filler tool in the tube.

NOTE: Do not permit the kerosene to touch your skin or clothes. Remove your clothes if the fuel touches them. Rinse your skin fully with water where the fuel touched you. Fuel can burn your skin.

Kerosene is flammable, an irritant, an allergen, and has poisonous deterioration. Use personal protection equipment. Use vapor/fume control or respirator

10) Do an alternative movement of rotation on the tool to break the coking contamination.

11) Extract the tool and use lint-free cloths to collect the coked particle.

12) Clean the cylinder-brush tool with kerosene, G50611 [CP1065].

a) Repeat the cleaning until tube is free of particles/contamination.

NOTE: No oil coked particles/contamination is permitted.

NOTE: Be careful to not introduce any particles/contamination to the internal side of bearing support to prevent bearing contamination. If not, you can cause damage to engine.

13) Do a flushing of the tube with kerosene, G50611 [CP1065] or alcohol, B00676 [CP1041].

14) Dry the tube with a compressed clean air source or nitrogen source.

15) Do a visual inspection of the cleaned tube with a 4mm direct view flexible borescope, STD-1400 and a light source, after cleaning to make sure that it is free of any particles/contamination before you use it again.

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AKS ALL PRE SB CFM56-7B-72-339 AND PRE SB CFM56-7B-72-169 AND PRE SB CFM56-7B-72-254 (Continued)

16) Remove the protection from the No. 5 bearing and tubes.

AKS ALL

SUBTASK 72-56-00-410-014-F00

(6) Do these steps to install the oil nipple on the rear face of No. 5 bearing support.

(a) Lubricate a new O-ring with oil, D00623 [CP5066].

(b) Install the nipple on the No. 5 bearing support.

1) Tighten the nipple to 95-105 pound-inches (11-12 Newton meters).

AKS ALL POST SB CFM56-7B-72-169 OR POST SB CFM56-7B-72-254 OR POST SB CFM56-7B-72-339

SUBTASK 72-56-00-410-015-F00

(7) Do these steps to install the oil supply tube in the TRF strut No. 10 (Figure 702):

NOTE: This Subtask is necessary to install the removable oil supply tube assembly in the TRF strut after cleaning.

(a) Apply a thin layer of Molykote G lubricant, D00640 [CP2104] with a spray gun on the guide bushing of oil supply tube.

(b) Install the oil supply tube in the TRF No. 10 strut at the 7 o'clock position.

(c) Engage the guide bushing of oil supply tube into the boss of the TRF outer case.

(d) Put in position the coupling nut on the oil supply tube. Make sure to align the groove on the tube and on the coupling nut.

(e) Insert a new retaining ring in the coupling nut. Use the retaining ring removal and installation fixture, SPL-8853 to install the retaining ring.

NOTE: Be careful to hold the coupling nut in place with a lock wrench when you engage and clamp the retaining ring with combination pliers.

NOTE: Make sure that the retaining ring is fully inserted into the coupling nut when its outer diameter base is in contact with nut.

Make sure that the coupling nut rotates freely after the installation of retaining ring.

AKS ALL

SUBTASK 72-56-00-410-016-F00

(8) Reconnect the oil supply line

(a) The damping oil tube, oil tube, and the TRF outer case connection of the oil supply line are done in the task:Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-410-017-F00

(1) Do this task Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00.

SUBTASK 72-56-00-790-001-F00

(2) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Look for oil leaks at the turbine frame.

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SUBTASK 72-56-00-612-003-F00

(3) Do a check of the engine oil quantity, do this task: (Replenish the Engine Oil, TASK 12-13-11-600-801)

——— END OF TASK ———

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Oil Supply Tube Cleaning
Figure 701/72-56-00-990-802-F00 (Sheet 1 of 2)

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B

C

484438 S0000144616_V2

Oil Supply Tube Cleaning
Figure 701/72-56-00-990-802-F00 (Sheet 2 of 2)

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MATERIAL:

1 INCONEL 718 (NC19FeNB)

2 AISI 321 (Z10CNT18)

484452 S0000144575_V2

Oil Supply Line (Removable) Cleaning
Figure 702/72-56-00-990-805-F00 (Sheet 1 of 2)

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MATERIAL:

1 INCONEL 718 (NC19FeNB)

2 AISI 321 (Z10CNT18)

Oil Supply Line (Removable) Cleaning
Figure 702/72-56-00-990-805-F00 (Sheet 2 of 2)

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MATERIAL:

1 INCONEL 718 (NC19FeNB)

2 AISI 321 (Z10CNT18)

484474 S0000144579_V2

Oil Supply Line (Non-Removable) Cleaning
Figure 703/72-56-00-990-806-F00

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MATERIAL:

1 INCONEL 718 (NC19FeNB)

3 AISI 321 (Z10CNT18)

484806 S0000144582_V2

Oil Scavenge Line Cleaning
Figure 704/72-56-00-990-807-F00 (Sheet 1 of 2)

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MATERIAL:

1 INCONEL 718 (NC19FeNB)

3 AISI 321 (Z10CNT18)

484816 S0000144583_V2

Oil Scavenge Line Cleaning
Figure 704/72-56-00-990-807-F00 (Sheet 2 of 2)

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MATERIAL:

4 AISI 321 (Z10CNT18)

5 17-4-PH (Z5CNU17)

484902 S0000144587_V2

Oil Inlet Cover
Figure 705/72-56-00-990-808-F00

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MATERIAL:

6 AISI 321 (Z10CNT18)

7 AISI 321 (Z10CNT18)

484919 S0000144589_V2

Oil Tube, Damping Oil Tube and Nipple
Figure 706/72-56-00-990-809-F00

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TASK 72-56-00-100-802-F00

4. Oil Scavenge Line Cleaning

(Figure 704)

A. General

(1) This task give the instructions to clean coking deposits from the rear sump oil scavenge line and related parts.

(a) The scavenge line includes the rear sump scavenge tube installed through the No. 7 turbine frame strut, the rear sump oil scavenge tube and the No. 5 bearing support nipple.

(b) The scavenge tube installed through the No. 7 strut is not removable, do a mechanical cleaning of the scavenge tube (not removed).

(c) The rear sump oil scavenge tube is removable, if it is necessary, do a chemical cleaning of the removed tube.

(2) It is necessary to remove the oil inlet cover to do this task.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-4968	Wrench - Nipple Line, No. 5 Bearing Support Part #: 856A3492G04 Supplier: 58828 Part #: 856A3492G06 Supplier: 58828
STD-1400	Borescope - Flexible, 4mm, Direct View

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
D00139	Lubricant - Oil - WD-40	
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00623 [CP5066]	Oil - Fuel System, Corrosion Preventive	MIL-PRF-6081, Grade 1010
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G	CFM CP2104
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A
G50611 [CP1065]	Kerosene	MIL-DTL-5624 (Supersedes MIL-T-5624)

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E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Procedure

SUBTASK 72-56-00-010-032-F00

(1) Do this task: Turbine Rear Frame (TRF) Oil Inlet Cover Removal, TASK 72-56-00-000-802-F00.

G. Oil Scavenge Line Cleaning

SUBTASK 72-56-00-010-033-F00

CAUTION: USE TWO WRENCHES TO LOOSEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(1) At the No. 7 TRF strut, disconnect the rear sump oil scavenge tube from the oil scavenge tube.

SUBTASK 72-56-00-030-001-F00

(2) Disconnect the oil scavenge tube from the nipple of No. 5 bearing support (Figure 707).

(a) Cut and remove the safetywire between the nipple, at the 6 o'clock position of No. 5 bearing support nipple and the coupling nut of the oil scavenge tube.

CAUTION: USE THE COUNTER WRENCH TO LOOSEN THE TUBE COUPLING NUTS. OTHER WRENCHES CAN CAUSE DAMAGE TO THE HARDWARE.

(b) Install the counter wrench, SPL-4968 on the TRF flange:

1) Loosen the four counter wrench bolts.

2) Install the wrench on the No. 5 bearing support nipple.

3) Tighten the two support bolts on the turbine rear frame.

4) Do a clockwise rotation on the counter wrench to take up and tighten the four counter wrench bolts.

(c) Disconnect the oil scavenge tube from the nipple of No. 5 bearing support using the oil scavenge tube nut wrench.

(d) Remove the counter wrench from the TRF flange.

(e) Disengage the guide bushing of the oil scavenge tube from 5 o’clock boss of the TRF outer case to get access to oil scavenge tube upper end.

SUBTASK 72-56-00-290-001-F00

(3) Do a visual inspection of the oil scavenge tube with a 4mm direct view flexible borescope, STD-1400 and a light source.

(a) Make sure that it is free of any particles/contamination. If you find any sign of oil coking, remove the oil scavenge tube to do a chemical cleaning.

SUBTASK 72-56-00-110-010-F00

(4) If the borescope check of the oil scavenge tube shows coking contamination, do these steps to degrease and clean the tube:

(a) Attach the steel tubing and the pump to the removed oil scavenge tube.

NOTE: You must use steel tubing and an acceptable pump to do this procedure.

(b) Do this task : Clean Internal Oil Tubes (CFM SPM 70-21-17).

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(c) Do a visual inspection of the cleaned oil scavenge tube with a 4mm direct view flexible borescope, STD-1400 and a light source, after cleaning to make sure that it is free of any particles/contamination before re-installation.

1) No oil coked particles/contamination is permitted.

2) Repeat the cleaning task until the tube is free of particles/contamination.

(d) Disconnect the cleaned tube from the steel tubing and the pump.

SUBTASK 72-56-00-110-011-F00

WARNING: KEROSENE IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN KEROSENE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET KEROSENE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

(5) Do these steps to degrease and mechanically clean the oil scavenge tube (not removable):

NOTE: This is a mechanical cleaning because the tube is non-removable.

(a) Put protection on the No. 5 bearing to prevent any contamination by the material.

NOTE: Be careful to put protection equipment on the No. 5 bearing before you start a mechanical cleaning of oil scavenge line.

(b) Put protection on all the cavities and tube ends to prevent any contamination by the material.

(c) Put a cap for the oil scavenge tube on the outer case side.

(d) Put a sufficient quantity of WD-40 lubricant, D00139 (CP2554) to fill the tube and keep it to get effect on coking in the concerned area for a sufficient time.

(e) Put a container under the tube to collect the penetrant corrosion inhibitor.

(f) Remove the cap from the tube and collect the penetrant corrosion inhibitor.

(g) Turn the tube in its position to get access to the ends of tube.

(h) Introduce a cylinder-brush tool through the tube ends and move the tool to the coked area.

(i) Put a small quantity of kerosene, G50611 [CP1065] with a filler tool in the tube.

NOTE: Do not permit the kerosene to touch your skin or clothes. Remove your clothes if the fuel touches them. Rinse your skin fully with water where the fuel touched you. Fuel can burn your skin.

Kerosene is flammable, an irritant, an allergen, and has poisonous deterioration. Use personal protection equipment. Use vapor/fume control or respirator.

(j) Do an alternative movement of rotation on the tool to break the coking contamination.

(k) Extract the tool and use lint-free cloths to collect the coked particle.

(l) Clean the cylinder-brush tool with kerosene, G50611 [CP1065].

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1) Repeat the cleaning until tube is free of particles/contamination.

NOTE: No oil coked particles/contamination is permitted.

NOTE: Be careful do not introduce any particles/contamination to the internal side of bearing support to prevent bearing contamination. If not, you can cause damage to engine.

(m) Do a flushing of the tube with kerosene, G50611 [CP1065] or alcohol, B00676 [CP1041]

(n) Dry the tube with a compressed clean air source or nitrogen source.

(o) Do a visual inspection of the cleaned tube with a 4mm direct view flexible borescope, STD-1400 and a light source, after cleaning to make sure that it is free of any particles/contamination before you use it again.

(p) Do a mechanical cleaning of the nipple of the No. 5 bearing support at 6 o'clock position to remove any sign of oil coking.

(q) Dry and clean the nipple with a compressed air source or nitrogen source.

(r) Do a visual inspection of the cleaned nipple with a 4mm direct view flexible borescope, STD-1400 and a light source, after cleaning to make sure that it is free of any particles/contamination before the installation of oil scavenge tube again.

1) Repeat the cleaning until nipple is free of particles/contamination.

NOTE: No oil coked particles/contamination is permitted.

SUBTASK 72-56-00-410-012-F00

(6) Do these steps to reconnect the oil scavenge line

(a) Remove the protection from the No. 5 bearing cavity and tube ends.

(b) Lubricate all coupling nuts of the rear sump oil supply tubes with oil, D00623 [CP5066].

(c) Apply a thin layer of Molykote G lubricant, D00640 [CP2104] with a spray gun on the guide bushing of the oil scavenge tube.

(d) Engage the guide bushing of the oil scavenge tube into the boss of the TRF at 5 o'clock position.

(e) Connect the coupling nut of oil scavenge tube to the 6 o'clock nipple on the No. 5 bearing support. Tighten the coupling nut by hand.

CAUTION: ALWAYS INSTALL THE COUNTER WRENCH ON THE NIPPLE OF THE NUMBER-5 BEARING SUPPORT. THEN LOOSEN OR TIGHTEN THE COUPLING NUT OF THE OIL SCAVENGE TUBE. THIS WILL HELP TO PREVENT DAMAGE TO THE NIPPLE.

(7) Install the counter wrench, SPL-4968 on the TRF flange.

(a) Loosen the four counter wrench bolts.

(b) Install the counter wrench on the No. 5 bearing support nipple.

(c) Tighten the two support bolts on the turbine rear frame.

(d) Do a clockwise rotation on the counter wrench to take up and tighten the four counter wrench bolts.

SUBTASK 72-56-00-860-001-F00

(8) Tighten the coupling nut of the oil scavenge tube to 443 in-lb (50 N·m) - 531 in-lb (60 N·m) with the oil scavenge tube nut wrench.

(a) Attach with safety wire, G02345 [CP8001] or cable, G50065 [CP8006].

SUBTASK 72-56-00-090-001-F00

(9) Remove the counter wrench from the TRF flange.

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SUBTASK 72-56-00-430-001-F00

(10) Reconnect the rear sump oil scavenge tube to the oil scavenge tube (Figure 704).

WARNING: DO NOT GET ENGINE OIL ON YOUR SKIN FOR A LONG TIME. FLUSH THE OIL FROM YOUR SKIN WITH WATER. THE OIL IS POISONOUS AND CAN GO THROUGH YOUR SKIN AND IN TO YOUR BODY.

(a) Apply a layer of engine oil, D00599 [CP2442] on the threads of the rear sump oil scavenge tube.

CAUTION: USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(b) Tighten the coupling nuts to 900 in-lb (102 N·m)-1100 in-lb (124 N·m).

(c) Safety the coupling nut to the nipple with safety wire, G02345 [CP8001] or cable, G50065 [CP8006].

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-410-013-F00

(1) Do this task: Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00.

SUBTASK 72-56-00-710-002-F00

(2) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Look for oil leaks at the turbine frame.

SUBTASK 72-56-00-612-002-F00

(3) To do a check of the engine oil quantity, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

——— END OF TASK ———

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TURBINE REAR FRAME
(VIEW IN THE FORWARD DIRECTION)

J72898 S0000177061_V2

Oil Scavenge Tube Nut
Figure 707/72-56-00-990-813-F00 (Sheet 1 of 2)

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TURBINE REAR FRAME AT 6 O' CLOCK
(VIEW IN THE FORWARD DIRECTION)

B0030901
J72863 S0000177063_V3

Oil Scavenge Tube Nut
Figure 707/72-56-00-990-813-F00 (Sheet 2 of 2)

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TURBINE FRAME ASSEMBLY - REPAIRS

1. General

A. This procedure has these tasks:

(1) The replacement of oil supply tube at the turbine frame.

(2) The replacement of the bushings in the clevis mounts of the TRF assembly.

(3) The replacement of the defective studs on the aft face of the inner hub of the turbine frame.

TASK 72-56-00-300-801-F00

2. Oil Supply Tube Replacement

(Figure 801)

A. General

(1) This procedure is for Engines Post-CFMI-SB 72-0339, which have non-symmetrical struts (twisted) on the turbine rear frame (TRF).

(a) The oil supply tube is installed in the No.10 strut of the TRF.

(b) The oil supply tube has a removable retaining ring.

(2) Do this procedure if the oil flow through oil supply tube is blocked by oil coking.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-700-801-F00	Test 3A - Idle-Power Leak Check (P/B 501)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-02-000-802-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-400-802-F00	Primary Plug Assembly Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D00623 [CP5066]	Oil - Fuel System, Corrosion Preventive	MIL-PRF-6081, Grade 1010
D00640 [CP2104]	Lubricant - Molybdenum Disulfide, Solid - Molykote G	CFM CP2104
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687
G02495 [CP8002]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8002, AMS5689

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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E. Prepare for the Procedure

SUBTASK 72-56-00-010-016-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-56-00-010-017-F00

(2) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00.

SUBTASK 72-56-00-010-018-F00

(3) Do this task: Primary Plug Assembly Removal, TASK 78-11-02-000-802-F00.

F. Procedure

SUBTASK 72-56-00-010-019-F00

(1) Do these steps to remove the flame arrestor [8]:

(a) Remove the bolts [9] that attach the flame arrestor [8] to the flange assembly [12] and the oil inlet cover [20].

(b) Remove the flame arrestor [8].

SUBTASK 72-56-00-010-020-F00

(2) Do these steps to remove the flange assembly [12]:

(a) Remove the bolts [15] and washers [14] that attach the sleeve [13] to the flange assembly [12].turbine frame.

(b) Remove the sleeve [13] from the flange assembly [12]. and keep the seal [7].

(c) Remove the bolts [16] that attach the flange assembly [12] to the aft outer frame.

(d) Remove the flange assembly [12] and discard the seal [7].

SUBTASK 72-56-00-010-021-F00

(3) Do these steps to disconnect the oil supply tube assembly [6] from the rear sump oil supply tube [5]:

WARNING: DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(a) Put a container under the engine to collect the drained oil.

CAUTION: USE TWO WRENCHES TO LOOSEN THE COUPLING NUT. USE ONE TO HOLD THE FITTING, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(b) Loosen the coupling nut [4] which attaches the rear oil supply tube [5] to the oil supply tube assembly [6].

(c) Remove the bolt [1] that attaches the clamp [2] and heatshield [3] to the TRF.

(d) Disconnect the coupling nut [4] which attaches the rear oil supply tube [5] to the oil supply tube assembly [6].

SUBTASK 72-56-00-110-004-F00

(4) Do these steps to remove the oil supply tube assembly [6]:

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(a) Remove the lockwire from the coupling nuts.

(b) Loosen the coupling nut between the damping oil tube [10] and the oil tube [11].

(c) Loosen the coupling nut between the oil supply tube assembly [6] and the oil tube [11].

(d) Loosen the coupling nut between the oil tube [11] and the nipple [21] on the oil inlet cover [20].

(e) Disconnect and remove the oil tube [11]

(f) Pull and remove the retaining ring [17] from the coupling nut [18]

1) Use the tool 856A2677 to remove the retaining ring [17].

(g) Remove the coupling nut [18] from the oil supply tube [19].

(h) Pull the oil supply tube [19] down through the No.10 strut to fully disengage the guide bushing from the boss..

(i) Remove the oil supply tube assembly [6] the TRF outer case.

SUBTASK 72-56-00-110-005-F00

(5) Clean the TRF inner hub area with a clean lint free cloth.

SUBTASK 72-56-00-010-022-F00

(6) Do these steps to install the oil supply tube assembly [6]:

(a) Apply a thin layer of Molykote G lubricant, D00640 [CP2104] with a spray gun on the guide bushing of the oil supply tube assembly [6].

(b) Insert the oil tube [11] into the No.10 strut of the TRF.

(c) Engage the guide bushing of the oil supply tube assembly [6] in the boss.

(d) Put the coupling nut [18] on the oil supply tube [19 and make sure to align the groove on the tube end and on the coupling nut.

CAUTION: BE CAREFUL TO HOLD THE COUPLING NUT IN PLACE WITH A LOCK WRENCH WHEN YOU ENGAGE AND CLAMP THE RETAINING RING WITH A COMBINATION PLIERS. AN INCORRECT INSTALLATION CAN CAUSE OIL LEAKAGE.

(e) Insert the retaining ring [17] in the coupling nut [18]

1) Use the tool 856A2677 to install the retaining ring [17].

2) Make sure the retaining ring is fully inserted into the coupling nut when its outer diameter base is in contact with the nut.

3) Make sure the coupling nut rotates freely after the installation of the retaining ring.

SUBTASK 72-56-00-400-001-F00

(7) Install the oil tube [11] to the damping oil tube [10] as follows:

(a) Apply a thin layer of oil, D00599 [CP2442] on the nipple [21] on the oil inlet cover [20] and on the threads of the oil tube [11].

(b) Connect the oil tube [11] between the nipple [21] and the oil tube assembly [6].

1) Tighten the coupling nuts with your hand.

(c) Connect the damping oil tube [10] to the oil tube [11].

1) Tighten the coupling nuts with your hand and make sure the installed tubes are unstrained.

(d) Connect the oil supply tube [19] to the oil tube [11].

1) Tighten the coupling nuts with your hand.

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CAUTION: USE TWO WRENCHES TO TIGHTEN THE COUPLING NUT. USE ONE TO HOLD THE FITTING, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(e) Tighten the coupling nut of the damping oil tube [10] to 90-100 pound-inches (10.5-11.5 Newton meters).

1) Safety the coupling with safety wire, G02345 [CP8001] or lockwire, G02495 [CP8002].

(f) Tighten the coupling nut of the oil tube [11] to 270-300 pound-inches (30.5-33.5 Newton meters).

1) Safety the coupling with safety wire, G02345 [CP8001] or lockwire, G02495 [CP8002].

(g) Tighten the coupling nut of the oil supply tube [19] to 270-300 pound-inches (30.5-33.5 Newton meters).

1) Safety the coupling with safety wire, G02345 [CP8001] or lockwire, G02495 [CP8002].

SUBTASK 72-56-00-400-002-F00

(8) Install the oil supply tube assembly [6] to the rear sump oil supply tube [5] as follows:

(a) Lubricate all coupling nuts of the rear sump oil supply tubes with oil, D00623 [CP5066].

(b) Connect the rear sump oil supply tube [5] to the oil supply tube assembly [6].

1) Tighten the coupling nut [4] with your hand and make sure the rear sump oil supply tube [5] is unstrained.

(c) Apply a thin layer of graphite compound, D00601 [CP2101] to the threads of the bolt [1].

(d) Attach the rear sump oil supply tube [5] to the TRF outer case with the clamp [2], heatshield [3], bolt [1] and nut.

1) Tighten the nut to 62-71 pound-inches (7.2-8.1 Newton meters).

(e) Tighten the coupling nut [4] to 270-300 pound-inches (30.5-33.5 Newton meters).

SUBTASK 72-56-00-010-023-F00

(9) Do these steps to install the flange assembly [12]:

(a) Apply a thin layer of oil, D00599 [CP2442] on a new seal [7].

(b) Install the seal [7] on the rear flange of the oil inlet cover assembly [20].

(c) Install the flange assembly [12] with the bolts [16] and tighten the bolts with your hand.

1) Tighten the bolts [16] to 110-120 pound-inches (12.5-13.5 Newton meters).

(d) Apply a thin layer of graphite compound, D00601 [CP2101] to the threads of the bolts [15].

(e) Install the sleeve [13] on the flange assembly [12] with the bolts [15] and washers [14]. Tighten the bolts with your hand.

1) Tighten the bolts [15] to 110-120 pound-inches (12.5-13.5 Newton meters).

SUBTASK 72-56-00-410-006-F00

(10) Do these steps to install the flame arrestor [8]:

(a) Apply a thin layer of graphite compound, D00601 [CP2101] on the threads of the bolts [9].

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(b) Install the flame arrestor [8] on the flange assembly [12] with the bolts [9]. Tighten the bolts with your hand.

1) Tighten the bolts [9] to 110-120 pound-inches (12.5-13.5 Newton meters).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-010-024-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 72-56-00-410-007-F00

(2) Do this task: Primary Plug Assembly Installation, TASK 78-11-02-400-802-F00.

SUBTASK 72-56-00-010-025-F00

(3) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00.

SUBTASK 72-56-00-010-026-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

SUBTASK 72-56-00-790-002-F00

(5) Do this task: Test 3A - Idle-Power Leak Check, TASK 71-00-00-700-801-F00.

(a) Look for oil leaks at the turbine frame.

SUBTASK 72-56-00-610-001-F00

(6) Do a check of the engine oil quantity.

(a) If it is necessary, do this task: Replenish the Engine Oil, TASK 12-13-11-600-801

END OF TASK

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Oil Supply Tube Assembly Replacement
Figure 801/72-56-00-990-803-F00 (Sheet 1 of 3)

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MM-00175-00-B

N89082 S0006582515_V2

Oil Supply Tube Assembly Replacement
Figure 801/72-56-00-990-803-F00 (Sheet 2 of 3)

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MM-00176-00-B
N89175 S0006582516_V2

Oil Supply Tube Assembly Replacement
Figure 801/72-56-00-990-803-F00 (Sheet 3 of 3)

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TASK 72-56-00-300-802-F00

3. Bushings in the Clevis Mounts of the TRF Assembly Replacement

(Figure 802, Figure 803 and Figure 804)

A. General

(1) You can use this procedure to replace the bushings in the clevis mounts on the engine assembly.

(2) This repair is permitted with special inspections, in particularly when you do the installation of locally manufactured bushings.

B. References

Reference	Title
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
70-40-01-910-801-F00	Fluorescent Penetrant Inspection (Water Washable) (P/B 201)
71-21-03-000-801-F00	Aft Engine Mount Removal (P/B 401)
71-21-03-400-801-F00	Aft Engine Mount Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-8386	Re-engagement Tool - Bushing Part #: 856A3924G01 Supplier: 58828
SPL-8403	Tool - Bushing Puller Part #: 856A3925G01 Supplier: 58828
STD-618	Oven

D. Consumable Materials

Reference	Description	Specification
B00676 [CP1041]	Alcohol - Isopropyl	CFM CP1041, TT-I-735
B00682 [CP2011]	Solvent - Stoddard	P-D-680 Type I, II or III
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
G00262	Nitrogen - Liquid	A-A-59503 Type II, MIL-PRF-27401 Type II
G01043	Cloth - Lint-free	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Replacement

SUBTASK 72-56-00-010-037-F00

(1) Do this task: Aft Engine Mount Removal, TASK 71-21-03-000-801-F00.

SUBTASK 72-56-00-211-001-F00

(2) Examine the TRF clevis mount for disengaged, loose, or missing bushings and wear:

(a) Disengaged bushings are not serviceable.

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1) Re-engage the bushing with CFM bushing re-engagement tool, SPL-8386 or equivalent.

(b) Loose or missing bushings are not permitted.

1) Replace the loose or missing bushings, do the repair task in this procedure.

(c) Wear in the clevis mount TRF bushing ID is permitted with these limits Figure 802:

1) Dia W: Any amount with dia maximum serviceable limit: 1.254 inch (31.9 mm) as long as clearance between bushings ID and TRF mount pin OD does not exceed 0.006 inch (0.2 mm).

a) If you find dia or clearance that is more than these limits, do the repair task in this procedure.

2) Dia U: Any amount with dia maximum serviceable limit: 1.004 inch (25.6 mm) as long as clearance between bushings ID and TRF mount pin OD does not exceed 0.006 inch (0.2 mm).

a) If you find dia or clearance that is more than these limits, do the repair task in this procedure.

3) Dia T: Any amount within dimensional inspection limits: 0.8765–0.8775 inch (22.27 mm-22.29 mm) as long as clearance between bushings ID and TRF mount pin OD does not exceed 0.006 inch (0.2 mm).

a) If you find dia or clearance that is more than these limits, do the repair task in this procedure.

G. Procedure

SUBTASK 72-56-00-010-038-F00

(1) Remove the defective bushing or the defective locally manufactured bushing from the clevis mounts as follows:

(a) Install the applicable yoke with the applicable nut or the applicable pusher of the CFM bushing puller tool, SPL-8403 on the clevis mount of the bushing to be removed.

(b) Make sure that you have correctly engaged the nut or the pusher of the CFM bushing puller tool, SPL-8403 in the internal diameter of the bushing.

(c) Make sure that you have the yoke of the CFM bushing puller tool, SPL-8403 against the clevis mount of the bushing to be removed.

(d) Use the screw of the CFM bushing puller tool, SPL-8403 to remove the bushing from the clevis mount.

(e) Disengage the nut or the pusher and the screw from the clevis mount to remove the CFM bushing puller tool, SPL-8403.

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SUBTASK 72-56-00-160-001-F00

WARNING: HYDROCARBON SOLVENTS ARE FLAMMABLE AND TOXIC. AVOID PROLONGED CONTACT WITH THE SKIN AND OBSERVE PRECAUTIONS AGAINST FIRE.

WARNING: DO NOT GET ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE GAS FROM ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN. KEEP ACETONE, ISOPROPYL ALCOHOL AND CLEANING SOLVENT DESOCLEAN AWAY FROM SPARKS, FLAME, AND HEAT. ACETONE, ISOPROPYL ALCOHOL AND CLEANING SOLVENT DESOCLEAN ARE POISONOUS AND FLAMMABLE SOLVENTS WHICH CAN CAUSE INJURY OR DAMAGE.

CAUTION: DO NOT USE HYDROCARBON SOLVENTS ON PLASTICS AND RUBBER-BASED MATERIALS. HYDROCARBON SOLVENTS CAN CAUSE DAMAGE TO PLASTICS AND RUBBER-BASED MATERIALS.

(2) Clean the surfaces and the internal diameter of the clevis mount as follows:

(a) Apply acetone solvent, B01058 [CP1039], solvent, B00682 [CP2011] or alcohol, B00676 [CP1041] with a hand spray bottle or use a soaked rag.

(b) Remove the accumulation with a soft cloth.

(c) Wipe the cleaned area dry with a clean cloth.

SUBTASK 72-56-00-230-001-F00

(3) Make sure that the clevis mount is not damaged, do this task: Fluorescent Penetrant Inspection (Water Washable), TASK 70-40-01-910-801-F00.

SUBTASK 72-56-00-220-001-F00

(4) Do a dimensional inspection of the clevis mount (Table 801) and (Figure 802):

(a) If the inner diameter of the clevis mount has scratches

1) Defects more than 0.0019 inch (0.05 mm) deep after blending are not permitted.

2) Inner diameter values more than the maximum in-process dimension limit after blending are not permitted (refer to paragraph below).

(b) Blend by hand the inner diameter to remove the defects.

(c) Do a dimensional inspection of the inner diameter repaired.

1) If the dimension of the inner diameter is more than the maximum in-process limit, replace the engine to remove the TRF for repair the clevis mount.

(d) If the inner diameter of the clevis mount has no scratches and it is in the maximum in-process dimension limit:

1) Make sure that the surfaces of the clevis mount are not damaged and clean.

2) Do the procedure of this task to machine a locally manufactured bushing.

(e) If the inner diameter of the clevis mount has not scratches and it is in the finish dimension:

1) Make sure that the surfaces of the clevis mount are not damaged and clean.

2) Do the procedure of this task to install a new bushing.

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Table 801/72-56-00-993-801-F00 Repair Dimensions

Description	Type of Bushing	Minimum Finish Dimension	Maximum Finish Dimension	Maximum In-Process Dimension
DIA L	TYPE 1	1.44488 inch (36.700 mm)	1.44591 inch (36.726 mm)	1.51575 inch (38.100 mm)
DIA F	TYPE 2	1.19685 inch (30.400 mm)	1.19787 inch (30.426 mm)	1.25276 inch (31.820 mm)
DIA O	TYPE 3	1.07480 inch (27.300 mm)	1.07559 inch (27.320 mm)	1.12598 inch (28.600 mm)

SUBTASK 72-56-00-320-001-F00

WARNING: DO NOT BREATHE THE PARTICLES, OR GET THEM IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES AND OTHER EQUIPMENT FOR PROTECTION. THESE PARTICLES CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

WARNING: DO NOT GET ACETONE IN YOUR EYES, IN YOUR MOUTH OR ON YOUR SKIN. USE GLOVES, EYE PROTECTION AND RESPIRATOR. WASH THE ACETONE AWAY WITH WATER. GET MEDICAL AID IMMEDIATELY. MAKE SURE THAT THE AREA HAS A GOOD FLOW OF AIR. ACETONE IS POISONOUS AND FLAMMABLE WHICH CAN CAUSE INJURY TO PERSONNEL AND DAMAGE EQUIPMENT.

(5) Make a locally manufactured bushing (Figure 804):

(a) Find the dimensions and the type of the locally manufactured bushing to machine in (Table 802) and (Figure 802).

(b) Grind the locally manufactured bushing (CFM CFM56 Standard Practices Manual 70-44-30).

(c) Measure the inner diameter dimension of the clevis mount.

1) Record the value.

(d) Machine the outer diameter of the locally manufactured bushing to get an interference fit of 0.00008 to 0.000118 inch (0.002 to 0.030 mm) with the inner diameter of the clevis mount.

Table 802/72-56-00-993-802-F00 Repair Dimensions

DESCRIPTION	TYPE OF BUSHING	MINIMUM FINISH DIMENSION	MAXIMUM FINISH DIMENSION
DIA Y	TYPE 1	DIA L + 0.00008 inch (0.002 mm)	DIA L + 0.00118 inch (0.030 mm)
DIA W		1.25000 inch (31.750 mm)	1.25102 inch (31.776 mm)
DIA X	TYPE 2	DIA F + 0.00008 inch (0.002 mm)	DIA F + 0.00118 inch (0.030 mm)
DIA U		1.00000 inch (25.400 mm)	1.00102 inch (25.426 mm)
DIA Z	TYPE 3	DIA O + 0.00008 inch (0.002 mm)	DIA O + 0.00118 inch (0.03 mm)
DIA T		0.87650 inch (22.263 mm)	0.87752 inch (22.289 mm)

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(e) Break sharp angles.

(f) Do a heat treatment of the locally manufactured bushing to 430 ± 14 °F (150 ± 5 °C) during 2 hours minimum, using an oven, STD-618.

(g) Do this task: Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

1) No cracks are permitted.

(h) Clean the bushing with lint-free cloth, G01043 soaked with alcohol, B00676 [CP1041] or acetone solvent, B01058 [CP1039].

SUBTASK 72-56-00-410-020-F00

(6) Install the new bushing or the locally manufactured bushing as follows:

(a) Put the bushing fully into nitrogen, G00262 liquid for 30 to 40 seconds.

(b) Engage the bushing in the inner diameter of the clevis mount by the internal face.

(c) Make sure that the bushing is fully engaged and is against the internal face of the clevis mount.

(d) Make sure that you can fully install the pawl pin in the two bushings.

(e) Make sure that you can remove the pawl pin without restrain.

SUBTASK 72-56-00-160-002-F00

WARNING: HYDROCARBON SOLVENTS ARE FLAMMABLE AND TOXIC. AVOID PROLONGED CONTACT WITH THE SKIN AND OBSERVE PRECAUTIONS AGAINST FIRE.

WARNING: DO NOT GET ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE GAS FROM ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE ACETONE, ISOPROPYL ALCOHOL OR CLEANING SOLVENT DESOCLEAN. KEEP ACETONE, ISOPROPYL ALCOHOL AND CLEANING SOLVENT DESOCLEAN AWAY FROM SPARKS, FLAME, AND HEAT. ACETONE, ISOPROPYL ALCOHOL AND CLEANING SOLVENT DESOCLEAN ARE POISONOUS AND FLAMMABLE SOLVENTS WHICH CAN CAUSE INJURY OR DAMAGE.

CAUTION: DO NOT USE HYDROCARBON SOLVENTS ON PLASTICS AND RUBBER-BASED MATERIALS. HYDROCARBON SOLVENTS CAN CAUSE DAMAGE TO PLASTICS AND RUBBER-BASED MATERIALS.

(7) Clean the surfaces of the clevis mount and the bushing as follows:

(a) Apply acetone solvent, B01058 [CP1039], solvent, B00682 [CP2011] or alcohol, B00676 [CP1041] with a hand spray bottle or use a soaked rag.

(b) Remove the accumulation with a soft cloth.

(c) Wipe the cleaned area dry with a clean cloth.

SUBTASK 72-56-00-220-002-F00

(8) Measure the distance between the internal surfaces of the bushings (Table 803) and (Figure 802).

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Table 803/72-56-00-993-803-F00 Repair Dimensions

DESCRIPTION	TYPE OF BUSHING	MINIMUM FINISH DIMENSION	MAXIMUM FINISH DIMENSION
DIMENSION B	TYPE 1 (PRE CFMI SB 72-0169) (PRE CFMI SB 72-0254)	1.34228 inch (34.094 mm)	1.34827 inch (34.246 mm)
DIMENSION B	TYPE 1 (POST CFMI SB 72-0169) (POST CFMI SB 72-0254)	1.34937 inch (34.274 mm)	1.35929 inch (34.526 mm)
DIMENSION H	TYPE 2 (PRE CFMI SB 72-0169) (PRE CFMI SB 72-0254)	1.11000 inch (28.194 mm)	1.11598 inch (28.346 mm)
DIMENSION H	TYPE 2 (POST CFMI SB 72-0169) (POST CFMI SB 72-0254)	1.12024 inch (28.454 mm)	1.13016 inch (28.706 mm)
DIMENSION J	TYPE 3 (PRE CFMI SB 72-0169) (PRE CFMI SB 72-0254)	1.11000 inch (28.194 mm)	1.11598 inch (28.346 mm)
DIMENSION J	TYPE 3 (POST CFMI SB 72-0169) (POST CFMI SB 72-0254)	1.12024 inch (28.454 mm)	1.13016 inch (28.706 mm)

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-410-021-F00

(1) Do this task: Aft Engine Mount Installation, TASK 71-21-03-400-801-F00

END OF TASK

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1376848 S0000249833_V2

Bushing Installation
Figure 802/72-56-00-990-815-F00 (Sheet 1 of 4)

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BUSHINGS TYPE 1

A-A

BUSHINGS REMOVED

A-A

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.
ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1376920 S0000249834_V2

Bushing Installation
Figure 802/72-56-00-990-815-F00 (Sheet 2 of 4)

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BUSHINGS TYPE 2

B-B

BUSHINGS REMOVED

B-B

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.
ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1376985 S0000249835_V2

Bushing Installation
Figure 802/72-56-00-990-815-F00 (Sheet 3 of 4)

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BUSHINGS TYPE 3

C-C

BUSHINGS REMOVED

C-C

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.
ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1376991 S0000249836_V2

Bushing Installation
Figure 802/72-56-00-990-815-F00 (Sheet 4 of 4)

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TOLL FOR AFT CLEVIS MOUNT

TOLL FOR FORWARD CLEVIS MOUNT

1377614 S0000249838_V2

Extraction of the Bushings
Figure 803/72-56-00-990-816-F00

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BUSHING TYPE 1

ROUGHNESS: 32 (0.8)
MATERIAL: INCONEL 718 (NC19FeNb)
HARDNESS: 346 to 450HB

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.
ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1378297 S0000249839_V2

Locally Manufactured Bushing
Figure 804/72-56-00-990-817-F00 (Sheet 1 of 3)

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BUSHING TYPE 2

ROUGHNESS: 32 (0.8)
MATERIAL: INCONEL 718 (NC19FeNb)
HARDNESS: 346 to 450HB

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.
ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1378301 S0000249841_V2

Locally Manufactured Bushing
Figure 804/72-56-00-990-817-F00 (Sheet 2 of 3)

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BUSHING TYPE 3

ROUGHNESS: 32 (0.8)
MATERIAL: INCONEL 718 (NC19FeNb)
HARDNESS: 346 to 450HB

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.
ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESIS.

1378313 S0000249843_V2

Locally Manufactured Bushing
Figure 804/72-56-00-990-817-F00 (Sheet 3 of 3)

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TASK 72-56-00-300-803-F00

4. **Defective Studs on the AFT Face of the Inner Hub of the Turbine Frame Replacement**
(Figure 805, Figure 806, Figure 807, Figure 808)

A. **General**

(1) This procedure is for Engines Post-CFMI-SB 72-0169 or Post-CFMI-SB 72-0254 or Post-CFMI- SB 72-0676, which have symmetrical struts on the Turbine Rear Frame (TRF).

(2) You can use this procedure to replace the defective studs on the aft face of the inner hub of the turbine frame only on wing, or on Low Pressure Turbine (LPT) major module.

B. **References**

Reference	Title
70-40-01-230-801-F00	Fluorescent Penetrant Inspection (Portable Post-Emulsifiable) (P/B 201)
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)
78-11-01-000-802-F00	Primary Nozzle Assembly Removal (P/B 401)
78-11-01-400-802-F00	Primary Nozzle Assembly Installation (P/B 401)
78-11-02-000-802-F00	Primary Plug Assembly Removal (P/B 401)
78-11-02-400-802-F00	Primary Plug Assembly Installation (P/B 401)
78-31-00-010-801-F00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-010-804-F00	Close the Thrust Reverser (Selection) (P/B 201)

C. **Consumable Materials**

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
412	Engine 1 - Nose Inlet Cowl

E. **Prepare for the Procedure**

SUBTASK 72-56-00-010-040-F00

WARNING: DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-801-F00.

SUBTASK 72-56-00-010-041-F00

(2) Do this task: Primary Nozzle Assembly Removal, TASK 78-11-01-000-802-F00.

SUBTASK 72-56-00-010-042-F00

(3) Do this task: Primary Plug Assembly Removal, TASK 78-11-02-000-802-F00.

SUBTASK 72-56-00-010-043-F00

(4) Remove the flame arrestor [2]. Refer to TASK 72-56-00-000-802-F00.

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SUBTASK 72-56-00-010-044-F00

(5) Remove the flange assembly [1]. Refer to TASK 72-56-00-000-802-F00.

F. Procedure

SUBTASK 72-56-00-010-045-F00

(1) Do these steps to remove the lock plate which is on the defective stud:

(a) Remove the bolts [6] that attach the lock plate [5] to the aft outer frame.

(b) Remove the lock plate [5].

SUBTASK 72-56-00-020-008-F00

(2) Do these steps to replace defective studs (Figure 805, Figure 806):

(a) If the pin was installed, replace it with a new pin.

WARNING: DO NOT BREATHE THE PARTICLES FROM GRINDING OR LET THE PARTICLES TOUCH YOU. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

CAUTION: BE CAREFUL NOT TO CUT INTO THE METAL OF THE FRAME WHEN YOU DO THE GRINDING. DAMAGE TO THE PART CAN OCCUR.

1) Do the counterboring of the stop pin with the locally manufactured tool.

2) Loosen and remove the stud. Discard it.

3) Do an inspection of the pin hole with a gage.

(b) If no pin was installed, remove the defective studs from the aft face of the inner hub as follows:

WARNING: DO NOT BREATHE THE PARTICLES FROM GRINDING OR LET THE PARTICLES TOUCH YOU. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

CAUTION: BE CAREFUL NOT TO CUT INTO THE METAL OF THE FRAME WHEN YOU DO THE GRINDING. DAMAGE TO THE PART CAN OCCUR.

1) Remove the tack weld which attaches the defective stud to the frame with the small narrow grinding wheel. Refer to TASK 70-41-12 (70-41-12, Power Blending) CFM Standard Practices Manual.

2) Loosen and remove the stud. Discard it.

3) Complete the removal of the remaining tack weld material with a small manual grinding tool and grind the tack weld beads to have a continuous surface with the adjacent areas. Refer to TASK 70-41-12 (70-41-12, Power Blending) CFM Standard Practices Manual.

WARNING: USE EYE PROTECTION WHEN YOU USE COMPRESSED AIR TO CLEAN, COOL, OR DRY PARTS OR TOOLS. PARTICLES CAN CAUSE AN INJURY TO YOUR EYES. DO NOT USE MORE THAN 30 PSIG (200 KPA). DO NOT POINT COMPRESSED AIR AT YOURSELF OR OTHER PERSONS.

4) Blow the areas adjacent to the hole for the stud with shop air.

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5) Do the Fluorescent-Penetrant Inspection of the machined area on the turbine frame. Refer to Fluorescent Penetrant Inspection (Portable Post-Emulsifiable), TASK 70-40-01-230-801-F00.

a) Cracks are not permitted.

(c) Do an inspection of the tapped hole with a gage.

1) Indications are not permitted.

2) If there is any indication in the tapped hole, this repair is not applicable to the part.

(d) Install the new studs as follows:

1) Apply a thin layer of graphite compound, D00601 [CP2101] on the stud threads which go into the hole of the frame.

2) Tighten the new stud as follows:

a) Screw the new stud by hand on the turbine frame.

b) Tighten with the wrench to complete the installation. Refer to TASK 70-70-11 (70-70-11, Tightening Methods) CFM Standard Practices Manual.

c) Torque the stud to 925 in-lb (104.5 N·m)-1022 in-lb (115.5 N·m).

d) Loosen the stud.

e) Torque the stud a second time to 925 in-lb (104.5 N·m)-1022 in-lb (115.5 N·m).

WARNING: METAL PARTICLES FROM MACHINING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT.

(e) Machine the pin hole with the locally manufactured tool. Refer to TASK 70-44-50 (70-44-50, Drilling) CFM Standard Practices Manual (Figure 806 and Figure 808).

(f) Machine the locally manufactured pin. Refer to TASK 70-44-00 (70-44-00, Machining General) CFM Standard Practices Manual (Figure 807).

NOTE: The pin must be machined in relation to the pin hole to have a tightening of 0.0008 in. (0.02 mm) to 0.0012 in. (0.03 mm) minimum.

(g) Install the pin and grind the pin flush with the flange of the stud with the locally manufactured tool (Figure 808).

1) If there is a bushing, put the new stop pin at 0.394 in. (10.0 mm) minimum from the existing stop pin.

(3) Do these steps to install the lock plate which is on the new stud:

(a) Install the lock plate [5] on the flow path fairing [7] flange.

(b) Apply a thin layer of graphite compound, D00601 [CP2101] on the threads of the bolts [6].

(c) Install two bolts [6] at each end of the lock plate [5].

(d) Check that there is a minimum clearance of 0.024 in. (0.6 mm) all around between the flow path fairing and the struts of LPT frame.

(e) Install the remaining bolts [6] on the lock plate [5].

(f) Tighten all bolts [6] to 110 in-lb (12.5 Nm)–120 in-lb (13.5 Nm).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-00-410-024-F00

(1) Install the flange assembly [1]. Refer to TASK 72-56-00-400-801-F00.

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SUBTASK 72-56-00-410-025-F00

(2) Install the flame arrestor [2]. Refer to TASK 72-56-00-400-801-F00.

SUBTASK 72-56-00-410-026-F00

(3) Do this task: Primary Plug Assembly Installation, TASK 78-11-02-400-802-F00.

SUBTASK 72-56-00-410-027-F00

(4) Do this task: Primary Nozzle Assembly Installation, TASK 78-11-01-400-802-F00.

SUBTASK 72-56-00-410-028-F00

WARNING: OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-010-804-F00.

END OF TASK

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2461248 S0000573038_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 1 of 6)

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FLANGE ASSEMBLY

B 1

FLANGE ASSEMBLY

B 2

1 POST SB 72-0169 AND 72-0254

2 POST SB 72-0676

2461269 S0000573211_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 2 of 6)

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2461519 S0000573212_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 3 of 6)

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2461421 S0000573213_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 4 of 6)

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(VIEW IN THE FORWARD DIRECTION)

E

CROSSING FOR PLUG CENTERING PIN

F

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES.

2461503 S0000573214_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 5 of 6)

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NOTE:

3 MATERIAL: INCONEL 718 (NC19FeNb)

4 2 TACKWELDS IN CIRCUMFERENTIAL POSITION

2461527 S0000573215_V1

Defective Studs On The Turbine Frame Replacement
Figure 805/72-56-00-990-823-F00 (Sheet 6 of 6)

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NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES.

2461768 S0000573039_V1

Machining Of The Pin Hole
Figure 806/72-56-00-990-824-F00 (Sheet 1 of 3)

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(WITH BUSHING)

SECTION

A-A

ROUGHNESS: 63 (1,6)

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES.

2463996 S0000573216_V1

Machining Of The Pin Hole
Figure 806/72-56-00-990-824-F00 (Sheet 2 of 3)

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(WITHOUT BUSHING)

SECTION

A-A

ROUGHNESS: 63 (1,6)

NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES.

2464289 S0000573217_V1

Machining Of The Pin Hole
Figure 806/72-56-00-990-824-F00 (Sheet 3 of 3)

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ROUGHNESS: 126 (3,2)

NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES. ROUGHNESS IS IN MICROINCHES WITH MICROMETERS IN PARENTHESES.

1 MATERIAL : INCONEL 718 (NC19FeNb).

2 TO BE MACHINED IN RELATION TO THE PIN HOLE TO HAVE A TIGHTENING OF 0.0008 - 0.0012 (0.02 - 0.03).

2464291 S0000573040_V1

Locally Manufactured Pin
Figure 807/72-56-00-990-825-F00

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NOTE:

DIMENSIONS ARE IN INCHES WITH
MILLIMETERS IN PARENTHESES.

2464295 S0000573041_V1

Locally Manufactured Tool
Figure 808/72-56-00-990-826-F00

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TURBINE FRAME AIR/OIL SEPARATOR - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) Air/oil separator removal

(2) Air/oil separator installation.

TASK 72-56-01-000-801-F00

2. Air/Oil Separator Removal

(Figure 401, Figure 402 and Figure 403)

A. General

(1) This task provides the instructions on how to remove the air/oil separator.

B. References

Reference	Title
72-56-00-000-802-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-13625	Slide hammer for component removal (1 lb) Part #: CG240-8 Supplier: 55719 Part #: CG240-9 Supplier: 5K761
SPL-14016	Wrench - Torque Aft Rotating Air Oil Separator Part #: 856A3392G01 Supplier: 58828
SPL-14020	Puller - Aft Rotating Air Oil Separator Part #: 856A2661G01 Supplier: 58828

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Removal

SUBTASK 72-56-01-010-001-F00

(1) Do his task: Turbine Rear Frame (TRF) Oil Inlet Cover Removal, TASK 72-56-00-000-802-F00.

F. Air/Oil Separator Removal

SUBTASK 72-56-01-020-001-F00

(1) Remove the air/oil separator self -locking nut [2] with a wrench [3] (Wrench, SPL-14016) as follows:

CAUTION: MAKE SURE THAT THE LUGS OF THE WRENCHES ENGAGE THE SELF-LOCKING NUT CORRECTLY. IF THE LUGS DO NOT ENGAGE THE SELF-LOCKING NUT, DAMAGE TO THE PARTS CAN OCCUR.

(a) Engage the guide in the center vent tube rear extension duct [8].

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(b) At the same time, engage the wrench [3] and the countertorque wrench [4] into the slots of the self -locking nut [2] and of the center vent tube rear extension duct [8].

(c) Install the torque multiplier [5] on the countertorque wrench [4] and the lever arm of the torque multiplier [5] on the fork arm of the wrench [3].

(d) Remove the self -locking nut [2].

(e) Remove the countertorque wrench [4] and the torque multiplier [5].

SUBTASK 72-56-01-020-002-F00

(2) Remove the air/oil separator [1] with puller [6] (Puller, SPL-14020) as follows:

(a) Install the protector [9], detail of the tool, on the center vent tube rear extension duct seal teeth.

(b) Loosen the knurled knobs to retract the finger grips.

(c) Position the tool over the center vent tube rear extension duct against the air/oil separator [1].

(d) Tighten the knurled knobs to engage the finger grips into the rear flange of the air/oil separator [1].

(e) Install the slide hammer [7] (slide hammer puller, COM-13625) on the Puller, SPL-14020.

(f) Remove air/oil separator [1].

(g) Loosen the knurled knobs and remove the air/oil separator from the slide hammer puller, COM-13625.

——— END OF TASK ———

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B0046100

2241846 S0000501960_V2

AFT Rotating Air/Oil Separator Nut Installation
Figure 401/72-56-01-990-801-F00

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B0046200

2241877 S0000501962_V2

Rotating Air/Oil Separator Installation
Figure 402/72-56-01-990-802-F00

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CALCULATION OF AIR/OIL SEPARATOR SEATING DIMENSION: (A - B - C)

(CENTER VENT TUBE REAR EXTENSION DUCT) DIMENSION A=	
(AFT AIR/OIL SEPARATOR) DIMENSION B=	
DIMENSION CALCULATED C=	
ACTUAL DIMENSION C=	

	TORQUE
RUNNING	
FINAL	

(CONFIGURATION 1)

B0045900

2241904 S0000501964_V3

LPT Air/Oil Separator Assembly Installation
Figure 403/72-56-01-990-803-F00 (Sheet 1 of 2)

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CALCULATION OF AIR/OIL SEPARATOR SEATING DIMENSION: (A - B - C)

(CENTER VENT TUBE REAR EXTENSION DUCT) DIMENSION A=	
(AFT AIR/OIL SEPARATOR) DIMENSION B=	
DIMENSION CALCULATED C=	
ACTUAL DIMENSION C=	

	TORQUE
RUNNING	
FINAL	

(CONFIGURATION 2)

B0046000

2241906 S0000501965_V3

LPT Air/Oil Separator Assembly Installation
Figure 403/72-56-01-990-803-F00 (Sheet 2 of 2)

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TASK 72-56-01-400-801-F00

3. Air/Oil Separator Installation

(Figure 401, Figure 402 and Figure 403)

A. General

(1) This task provides the instructions on how to install the air/oil separator.

B. References

Reference	Title
72-56-00-400-801-F00	Turbine Rear Frame (TRF) Oil Inlet Cover Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-14016	Wrench - Torque Aft Rotating Air Oil Separator Part #: 856A3392G01 Supplier: 58828
SPL-14020	Puller - Aft Rotating Air Oil Separator Part #: 856A2661G01 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00641 [CP5062]	Lubricant - Corrosion Inhibiting, Dry Film - Molykote D 321 R or Dow Corning 321	

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Air/Oil Separator Installation

SUBTASK 72-56-01-420-001-F00

(1) Install the air/oil separator [1] as follows:

(a) Remove protector [9] (856A3234P01) from the center vent tube rear extension duct [8].

(b) Install the protector (856A3234P05) of the puller [6] (Puller, SPL-14020) on the center vent tube rear extension duct seal teeth.

(c) Measure and record the values A and B.

WARNING: DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(d) Lightly coat the threads of the center vent tube rear extension duct [8] and the journal of the separator with engine oil, D00599 [CP2442].

(e) Lightly coat the mating surfaces of the center vent tube rear extension duct and of the separator with Dow Corning 321 lubricant, D00641 [CP5062].

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WARNING: WHEN YOU DO WORK WITH DRY ICE, MAKE SURE YOU USE SAFETY GOGGLES AND INSULATED GLOVES. IF DRY ICE TOUCHES YOUR EYES OR SKIN, FROSTBITE CAN OCCUR.

(f) Chill the forward end of the air/oil separator [1] in dry ice for a minimum of five minutes.

WARNING: WHEN YOU DO WORK WITH DRY ICE, MAKE SURE YOU USE SAFETY GOGGLES AND INSULATED GLOVES. IF DRY ICE TOUCHES YOUR EYES OR SKIN, FROSTBITE CAN OCCUR.

(g) Remove the air/oil separator [1] from the dry ice and install it over the center vent tube rear extension duct [8] as follows:

1) Engage the air/oil separator slots with the center vent tube lugs.

2) Turn the air/oil separator [1] by hand to make sure that the lugs engage in the slots.

NOTE: Engage the air/oil separator offset slot with the center vent tube offset lug. The air/oil separator offset slot and center vent tube offset lug have spherical indentation for identification.

3) Make sure that you fully seat the air/oil separator [1].

(h) Measure and record the actual Dimension C.

(i) Calculate the air/oil separator seating dimension (A - B= Calculated Dimension C).

(j) If the difference between the calculated dimension C and the actual dimension C is more than 0.003 inch (0.075 mm), do these steps:

1) Remove the parts.

2) Find the cause for the difference.

SUBTASK 72-56-01-420-002-F00

(2) Install air/oil separator self -locking nut [2] as follows:

WARNING: DO NOT LET THE ENGINE OIL STAY ON YOUR SKIN. ENGINE OIL IS POISONOUS. DO NOT BREATHE THE FUMES. USE ENGINE OIL IN AN AREA WITH GOOD AIRFLOW. DO NOT GET ENGINE OIL ON YOUR CLOTHES OR ON THE AIRPLANE. ENGINE OIL CAN CAUSE INJURIES.

(a) Lightly coat the threads of self-locking nut with engine oil, D00599 [CP2442].

1) Engage the self-locking nut with your hand.

(b) Remove the protector (856A3234P05) of the puller [6] from the center vent tube rear extension duct.

1) Engage the self-locking nut with your hand.

CAUTION: MAKE SURE THAT THE LUGS OF THE WRENCHES ENGAGE THE SELF-LOCKING NUT CORRECTLY. IF THE LUGS DO NOT ENGAGE THE SELF-LOCKING NUT, DAMAGE TO THE PARTS CAN OCCUR.

CAUTION: EXERCISE EXTREME CARE WHEN USING TORQUE MULTIPLIER. IMPROPER USE CAN RESULT IN DAMAGE TO ENGINE OR TOOLS. DOUBLE CHECK ALL TORQUE CALCULATIONS. IF TORQUE SHOULD INCREASE SIGNIFICANTLY PRIOR TO FINAL SEATING, REMOVE ROTOR AND INSPECT FOR CAUSE OF TORQUE INCREASE.

(c) Install the wrench [3] (Wrench, SPL-14016) as follows:

1) Engage the guide in the center vent tube rear extension duct.

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2) At the same time, engage the wrench [3] and the countertorque wrench [4] into these slots of the self -locking nut [2] and of the center vent tube rear extension duct [8]:

(d) Seat the self -locking nut [2].

1) Make sure that the self-locking torque value is between 245-830 lb inches. (28-93 N.m).

(e) Tighten the self -locking nut [2] as follows:

1) Tighten the self-locking nut to 856-940 lb inches (95-105 N.m) in addition to the self-locking torque value of between 245-830 lb inches. (28-93 N.m).

2) Matchmark the self-locking nut position in relation to the shaft.

3) Loosen the self-locking nut, then tighten again to the same value in the previous step.

4) Examine the matchmarks as follows:

a) If the matchmark on the self-locking nut does not reach the mark on the shaft, disassemble the air/oil separator [1] and examine the condition of parts.

b) If the matchmark on the self-locking nut goes past the mark on the shaft do this step:

<1> Loosen the self-locking nut, then tighten again to 856-940 lb inches (95-105 N.m) in addition to the self-locking torque value.

NOTE: The self-locking value is the value between 245-830 lb inches. (28-93 N.m).

c) If the alignment is not possible after the second torque, do these steps:

<1> Remove the air/oil separator (TASK 72-56-01-000-801-F00).

<2> Make sure that the installation and condition of the applicable parts are correct.

(f) If the matchmarks are in line, remove the wrench [3] and the torque multiplier [5].

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-56-01-410-001-F00

(1) Do this task: Turbine Rear Frame (TRF) Oil Inlet Cover Installation, TASK 72-56-00-400-801-F00..

——— END OF TASK ———

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ACCESSORY DRIVES - MAINTENANCE PRACTICES

1. **General**

A. This procedure has four tasks:

(1) To remove a magnetic seal

(2) To install a magnetic Seal

(3) To remove a Sealol seal

(4) To install a Sealol seal.

B. The seals are installed on the accessory gearbox (AGB) at these accessory drives:

(1) fuel pump.

(2) hydraulic pump.

(3) integrated drive generator (IDG).

AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(4) N2 rotor drive pad.

AKS ALL

C. The magnetic seals and Sealol seals of the fuel pump, hydraulic pump and IDG are interchangeable.

AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

D. A Sealol seal is only installed on the N2 drive pad (behind the handcranking cover).

AKS ALL

TASK 72-60-00-000-801-F00

2. **Magnetic Seal Removal**

(Figure 201, Figure 202, Figure 203)

A. References

Reference	Title
24-11-11-000-801	Integrated Drive Generator (IDG) Removal (P/B 401)
29-11-11-000-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
73-11-01-000-801-F00	Fuel Pump Package Removal (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2262	Set - Tool, Jackscrew, Engine Disassembly Part #: 856A1130P12 Supplier: 58828
SPL-10797	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals (Commercial Only) Part #: 856A3576G02 Supplier: 58828

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C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for The Magnetic Seal Removal

SUBTASK 72-60-00-010-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-60-00-010-002-F00

(2) Do one of these applicable tasks to get access to the magnetic seal:

(a) Do this task: Fuel Pump Package Removal, TASK 73-11-01-000-801-F00.

(b) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal, TASK 29-11-11-000-801-001.

(c) Do this task: Integrated Drive Generator (IDG) Removal, TASK 24-11-11-000-801.

E. Magnetic Seal Removal

SUBTASK 72-60-00-010-003-F00

CAUTION: REPLACE ALL OF THE SEAL, IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. MAGNETIC SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(1) To remove the magnetic seal [1], do these steps (Figure 202):

(a) Remove the three nuts and washers.

(b) Remove the seal housing assembly with the tool set, SPL-2262.

1) Remove and discard the O-ring [2] from the outer diameter of the seal housing assembly.

(c) To remove the rotating ring (with the carbon seal), do these steps (Figure 203):

1) Do these steps to install the pusher/puller, SPL-10797:

a) Engage the claws of the pusher/puller behind the rotating ring.

b) Push and hold the pusher/puller sleeve against the front of the rotating ring.

c) Tighten the pusher/puller nut until the rotating ring is held tight by the claws.

d) Tighten the pusher/puller screw.

2) Attach the impact puller to the pusher/puller.

3) Operate the impact puller to remove the rotating ring.

4) Remove the rotating ring from the pusher/puller.

a) Loosen the pusher/puller nut and screw.

b) Remove and discard the O-ring [3].

END OF TASK

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Accessory Drives
Figure 201/72-60-00-990-811-F00

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B0049100

G37583 S0006582522_V3

Magnetic Seal Installation
Figure 202/72-60-00-990-803-F00

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Magnetic or Sealol Seal Removal with Seal Pusher/Puller
Figure 203/72-60-00-990-804-F00 (Sheet 1 of 2)

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Magnetic or Sealol Seal Removal with Seal Pusher/Puller
Figure 203/72-60-00-990-804-F00 (Sheet 2 of 2)

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TASK 72-60-00-400-801-F00

3. Magnetic Seal Installation

(Figure 201, Figure 202, Figure 203)

A. References

Reference	Title
24-11-11-400-801	Integrated Drive Generator (IDG) Installation (P/B 401)
29-11-11-400-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation (P/B 401)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
73-11-01-400-801-F00	Fuel Pump Package Installation (P/B 401)

B. Consumable Materials

Reference	Description	Specification
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

C. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Magnetic seal	72-63-00-04-025	AKS ALL
2	O-ring	72-63-00-04-095	AKS ALL
3	O-ring	72-63-00-04-100	AKS ALL

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the installation

SUBTASK 72-60-00-100-001-F00

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE. IT CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Clean the area of the rotating ring in the gear area with solvent, B00062:

(a) Remove all of the oil solids that stay on the gear area.

NOTE: This will prevent possible damage to the O-ring when you install it.

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F. Install the Magnetic Seal

SUBTASK 72-60-00-410-001-F00

CAUTION: USE CLEAN, LINT-FREE GLOVES WHEN YOU TOUCH THE MAGNETIC SEALS. THIS WILL PREVENT CONTAMINATION.

CAUTION: REPLACE ALL OF THE SEAL, IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. MAGNETIC SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(1) Do these steps to install the magnetic seal [1]:

(a) Install the new O-ring [2] and O-ring [3]:

1) Apply a light layer of clean oil, D00599 [CP2442] on the O-rings.

2) Install the new O-ring [2] on the seal housing assembly (OD).

3) Install the new O-ring [3] on the rotating ring (ID).

CAUTION: MAKE SURE THE POLISHED FACE OF THE SEAL CASE AND THE CARBON FACE OF THE ROTATING RING ARE CLEAN. LEAKS WILL RESULT IF PARTICLES, EVEN OF A VERY SMALL SIZE, ARE BETWEEN THESE PARTS DURING THE INSTALLATION.

(b) Apply a layer of clean oil, D00599 [CP2442] to the carbon seal face of the rotating ring and the polished face of the seal case.

(c) Carefully install the rotating ring on the seal housing assembly:

1) Make sure the carbon seal touches the polished surface of the seal case.

2) Align the rotating ring with the internal diameter of the seal housing assembly.

(d) Apply a light layer of clean oil, D00599 [CP2442] to the bearing surface of the gear shaft that will touch the rotating ring and the O-ring.

CAUTION: DO NOT HIT THE MAGNETIC SEAL INTO THE GEARBOX RECESS. THE ROTATING RING AND SEAL HOUSING ASSEMBLY CAN MOVE APART AND THE CARBON SEAL CAN BE DAMAGED.

CAUTION: INSTALL THE ROTATING RING AND THE SEAL HOUSING ASSEMBLY TOGETHER ONTO THE GEAR SHAFT, UNTIL THE SEAL HOUSING ASSEMBLY TOUCHES THE GEARBOX. DO NOT SEPARATELY SLIDE THE ROTATING PART OF THE SEAL ONTO THE SHAFT. IF YOU INSTALL THE ROTATING RING AND SEAL HOUSING ASSEMBLY SEPARATELY, OIL LEAKAGE COULD OCCUR.

(e) Put the magnetic seal on the gear shaft.

1) Make sure the outer O-ring of the seal housing assembly touches the gearbox bearing housing.

(f) Apply a light layer of graphite compound, D00601 [CP2101] to the three gearbox studs.

(g) Install the nuts and washers on the studs:

1) Tighten the nuts with your fingers.

2) Make sure the washers touch the seal housing assembly.

(h) Tighten the nuts in a sequence until the seal housing assembly moves fully into its position in contact with the gearbox housing.

(i) Tighten the nuts to 29.2-32.7 pound-inches (3.3-3.7 Newton meters).

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SUBTASK 72-60-00-410-002-F00

(2) Do the applicable installation task that follows:

(a) Do this task: Fuel Pump Package Installation, TASK 73-11-01-400-801-F00.

(b) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation, TASK 29-11-11-400-801-001.

(c) Do this task: Integrated Drive Generator (IDG) Installation, TASK 24-11-11-400-801.

SUBTASK 72-60-00-200-001-F00

(3) Do the tests that are listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

SUBTASK 72-60-00-010-004-F00

(4) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

——— END OF TASK ———

TASK 72-60-00-000-802-F00

4. Sealol Seal Removal

(Figure 201, Figure 203, Figure 204, Figure 205, Figure 206, Figure 207, Figure 208)

A. References

Reference	Title
24-11-11-000-801	Integrated Drive Generator (IDG) Removal (P/B 401)
29-11-11-000-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
72-63-01-000-801-F00	Handcranking Drive Cover Removal (P/B 201)
73-11-01-000-801-F00	Fuel Pump Package Removal (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2262	Set - Tool, Jackscrew, Engine Disassembly Part #: 856A1130P12 Supplier: 58828
SPL-10797	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals (Commercial Only) Part #: 856A3576G02 Supplier: 58828
SPL-11935	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals Part #: 856A2961G03 Supplier: 58828 Opt Part #: 856A2961G02 Supplier: 58828
SPL-14642	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals Part #: 856A2961G03 Supplier: 58828

C. Consumable Materials

Reference	Description	Specification
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)

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D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Procedure

SUBTASK 72-60-00-400-002-F00

(1) Use the table below to identify applicable tasks.

NOTE: Tasks for removal and installation of N2 drive pad Sealol seals differ based on Accessory Gearbox part number. AC effectivity may not reflect installed AGB.

Table 201/72-60-00-993-802-F00

Accessory Gearbox P/N	Post SB	N2 Drive Sealol Seal Assy P/N	Oil Seal – *[1]Matched Parts P/N	Oil Seal P/N	Mating Ring P/N	AIPC 72-63-00-02	SUBTASK
340-046-503-0	base	N/A	-	-	-	N/A	N/A
340-046-504-0	72-0316	N/A	-	-	-	N/A	N/A
340-046-505-0	72-0689	N/A	-	-	-	N/A	N/A
340-046-508-0	72-0564	340-155-304-0	340-155-404-0	340-155-504-0	340-155-601-0	Item 270, 280, 290, 285	72-60-00-020-001-F00
340-046-509-0	72-0879	340-155-305-0	340-155-405-0	340-155-505-0	340-155-601-0	Item 270, 280, 290, 285	72-60-00-020-002-F00

*[1] Matched parts consist of 1 each Oil Seal, and 1 each Mating Ring

SUBTASK 72-60-00-010-005-F00

(2) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-60-00-010-006-F00

(3) Do one of these applicable tasks to get access to the Sealol seal:

(a) Do this task: Fuel Pump Package Removal, TASK 73-11-01-000-801-F00.

(b) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal, TASK 29-11-11-000-801-001.

(c) Do this task: Integrated Drive Generator (IDG) Removal, TASK 24-11-11-000-801.

AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(d) Do this task: Handcranking Drive Cover Removal, TASK 72-63-01-000-801-F00.

AKS ALL

SUBTASK 72-60-00-010-007-F00

CAUTION: DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(4) Remove the Sealol seal [11] (Except N2 Drive Pad):

(a) Remove the three nuts and washers that attach the seal housing assembly in the drive pad on the accessory gearbox housing.

(b) Remove the seal housing assembly with the tool set, SPL-2262.

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1) Remove and discard the O-ring [12] from the outer diameter of the seal housing assembly.

(c) To remove the magnetic rotating ring (with the carbon seal) do these steps (Figure 203):

1) Install the seal pusher/puller, SPL-10797.
2) Push and hold the seal pusher/puller sleeve against the front of the rotating ring.
3) Engage the claws behind the rotating ring and move the sleeve against the rotating ring.
4) Tighten the seal pusher/puller nut until the rotating ring is held tight by the claws.
5) Tighten the seal pusher/puller screw.
6) Attach the impact puller to the seal pusher/puller.
7) Operate the impact puller to remove the rotating ring.
8) Remove the rotating ring from the tool
   a) Loosen the pusher/puller nut and the screw.
   b) Remove and discard the O-ring [13].

AKS ALL; CFM ALL, POST CFM SB 72-0564 AND PRE CFM SB 72-0879

SUBTASK 72-60-00-020-001-F00

CAUTION: DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(5) Remove the Sealol seal [21] from the N2 drive pad (Figure 205):

(a) Remove the two bolts and washers that attach the seal housing assembly in the N2 drive pad.

(b) Remove the seal housing assembly with the tool set, SPL-2262.

NOTE: You can feel resistance when you remove the seal housing assembly because of the silicone sealant.

1) Remove and discard the O-ring [22] from the outer diameter of the seal housing assembly.

(c) To remove the rotating ring (with the carbon seal), do these steps (Figure 206):

1) Install the centering guide from the pusher/puller, SPL-11935 on the N2 drive pad with the three bolts.
2) Loosen the knurled nut and the grip to put the claws in the open position.
3) Install the pusher/puller, SPL-11935 in the centering guide.
4) Push and hold the pusher/puller assembly against the front of the rotating ring.
5) Tighten the grip and the knurled nut until the rotating ring is held tight by the claws.
6) Tighten the sleeve to lock the rotating ring in the claws.
7) Attach the impact puller to the seal pusher/puller.
8) Operate the impact puller to remove the rotating ring.
9) Remove the rotating ring from the tool.
   a) Loosen the sleeve.
   b) Loosen the knurled nut and the grip.
10) Remove and discard the O-ring [23] from the inner diameter of the rotating ring.

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AKS ALL; CFM ALL, POST CFM SB 72-0564 AND PRE CFM SB 72-0879 (Continued)

11) Loosen the three bolts to remove the centering guide from the N2 drive pad.

(d) Install a blanking tool (local manufacture) with two standard O-rings (non engine parts) on the gearshaft (Figure 207, Figure 208):

1) Push the blanking tool in contact with the gearshaft.

(e) Carefully remove the existing silicone sealant deposits from the N2 drive pad with a plastic spatula.

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(f) Clean the mating surface of the N2 drive pad with solvent, B00062.

1) Make sure that the silicone sealant is removed from the mating ring of the N2 drive pad.

(g) Remove the blanking tool from the gearshaft.

AKS ALL; CFM ALL, POST CFM SB 72-0879

SUBTASK 72-60-00-020-002-F00

CAUTION: DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(6) Remove the Sealol seal [21] from the N2 drive pad (Figure 205):

(a) Remove the two bolts and washers that attach the seal housing assembly in the N2 drive pad.

(b) Remove the seal housing assembly with the tool set, SPL-2262.

1) Remove and discard the O-ring [24] and the O-ring [22] from the outer diameter of the seal housing assembly.

(c) To remove the rotating ring (with the carbon seal), do these steps (Figure 206):

1) Install the centering guide from the pusher/puller, SPL-14642 on the N2 drive pad with the three bolts.

2) Loosen the knurled nut and the grip to put the claws in the open position.

3) Install the pusher/puller, SPL-14642 in the centering guide.

4) Push and hold the pusher/puller assembly against the front of the rotating ring.

5) Tighten the grip and the knurled nut until the rotating ring is held tight by the claws.

6) Tighten the sleeve to lock the rotating ring in the claws.

7) Attach the impact puller to the seal pusher/puller.

8) Operate the impact puller to remove the rotating ring.

9) Remove the rotating ring from the tool.

a) Loosen the sleeve.

b) Loosen the knurled nut and the grip.

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AKS ALL; CFM ALL, POST CFM SB 72-0879 (Continued)

10) Remove and discard the O-ring [23] from the inner diameter of the rotating ring.

11) Loosen the three bolts to remove the centering guide from the N2 drive pad.

AKS ALL

——— END OF TASK ———

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B0049400
G37699 S0006582529_V4

Sealol Installation at IDG, Fuel Pump and Hydraulic Pump Pads
Figure 204/72-60-00-990-805-F00

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B0049500

2337959 S0000532662_V1

Sealol Seal of the N2 Drive Pad
Figure 205/72-60-00-990-807-F00 (Sheet 1 of 2)

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S-M5B-SB-04B12-00-B

2425931 S0000561171_V1

Sealol Seal of the N2 Drive Pad
Figure 205/72-60-00-990-807-F00 (Sheet 2 of 2)

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B0049600

1931548 S0000365093_V3

Sealol Seal Rotating Ring of the N2 Drive Pad
Figure 206/72-60-00-990-806-F00 (Sheet 1 of 2)

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B0049700
1931634 S0000365094_V3

Sealol Seal Rotating Ring of the N2 Drive Pad
Figure 206/72-60-00-990-806-F00 (Sheet 2 of 2)

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WARNING:

HARD PLASTIC

NOTE:

DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

B0049800
2337962 S0000532663_V2

Local Manufacture Blanking Tool
Figure 207/72-60-00-990-808-F00

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B0049900
2337968 S0000532664_V2

Blanking Tool Installation
Figure 208/72-60-00-990-809-F00

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NOTE:

DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

B0050000

2337969 S0000532665_V2

RTV Sealant Application
Figure 209/72-60-00-990-810-F00

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TASK 72-60-00-400-802-F00

5. **Sealol Seal Installation**

(Figure 201, Figure 203, Figure 204, Figure 205, Figure 206, Figure 209)

A. **References**

Reference	Title
24-11-11-400-801	Integrated Drive Generator (IDG) Installation (P/B 401)
29-11-11-400-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation (P/B 401)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-63-01-400-801-F00	Handcranking Drive Cover Installation (P/B 201)
73-11-01-400-801-F00	Fuel Pump Package Installation (P/B 401)

B. **Tools/Equipment**

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-10797	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals (Commercial Only) Part #: 856A3576G02 Supplier: 58828
SPL-11935	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals Part #: 856A2961G03 Supplier: 58828 Opt Part #: 856A2961G02 Supplier: 58828
SPL-14642	Pusher/Puller - CFM56-7 Sealol and Magnetic Seals Part #: 856A2961G03 Supplier: 58828

C. **Consumable Materials**

Reference	Description	Specification
A01077 [CP2266]	Adhesive - Silicone Rubber - RTV 102	
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B01058 [CP1039]	Solvent - Acetone, Reagent Grade	
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
D00672 [CP5070]	Grease - Petrolatum	VV-P-236

D. **Expendables/Parts**

AMM Item	Description	AIPC Reference	AIPC Effectivity
11	Sealol seal	72-63-00-04-025	AKS ALL
12	O-ring	72-63-00-04-020	AKS ALL
13	O-ring	72-63-00-04-030	AKS ALL
21	Sealol seal	72-63-00-02-270	AKS ALL
22	O-ring	72-63-00-02-099	AKS ALL
23	O-ring	72-63-00-02-275	AKS ALL
24	O-ring	72-63-00-02-098	AKS ALL

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E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Procedure

SUBTASK 72-60-00-410-003-F00

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE. IT CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Clean the gear area, that will touch the rotating ring, with solvent, B00062.

(a) Remove all of the oil solids that stay on the gear area.

NOTE: This will prevent possible damage to the O-ring when you install it.

G. Install the Sealol Seal

SUBTASK 72-60-00-400-001-F00

(1) Use the table below to identify applicable tasks.

NOTE: Tasks for removal and installation of N2 drive pad Sealol seals differ based on Accessory Gearbox part number. AC effectivity may not reflect installed AGB.

Table 202/72-60-00-993-801-F00

Accessory Gearbox P/N	Post SB	N2 Drive Sealol Seal Assy P/N	Oil Seal – *[1]Matched Parts P/N	Oil Seal P/N	Mating Ring P/N	AIPC 72-63-00-02	SUBTASK
340-046-503-0	base	N/A	-	-	-	N/A	N/A
340-046-504-0	72-0316	N/A	-	-	-	N/A	N/A
340-046-505-0	72-0689	N/A	-	-	-	N/A	N/A
340-046-508-0	72-0564	340-155-304-0	340-155-404-0	340-155-504-0	340-155-601-0	Item 270, 280, 290, 285	72-60-00-420-001-F00
340-046-509-0	72-0879	340-155-305-0	340-155-405-0	340-155-505-0	340-155-601-0	Item 270, 280, 290, 285	72-60-00-420-002-F00

*[1] Matched parts consist of 1 each Oil Seal, and 1 each Mating Ring

SUBTASK 72-60-00-410-004-F00

CAUTION: MAKE SURE THAT YOU USE CLEAN, LINT-FREE GLOVES WHEN YOU TOUCH THE SEALOL SEALS. THIS WILL PREVENT CONTAMINATION. CONTAMINATION CAN CAUSE DAMAGE TO THE SEALS.

CAUTION: DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(2) Do these steps to install the Sealol seal [11] (Except N2 Drive Pad):

(a) Install the new O-rings:

1) Apply a light layer of clean oil, D00599 [CP2442] on the O-rings.

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2) Install the new O-ring [12] in the grooves on the seal housing assembly (OD).

3) Install the new O-ring [13] in the grooves on the rotating ring (ID).

(b) Apply a light layer of clean oil, D00599 [CP2442] on bearing surfaces of the gear shaft:

1) Apply the oil on the bearing surfaces of the gear shaft which will touch the O-ring on the rotating ring.

CAUTION: MAKE SURE THAT THE POLISHED FACE OF THE ROTATING RING AND THE CARBON FACE OF THE SEAL HOUSING ARE CLEAN. LEAKS WILL OCCUR IF SMALL PARTICLES ARE BETWEEN THESE PARTS WHEN YOU INSTALL THEM.

(c) Apply a layer of clean oil, D00599 [CP2442] to the carbon seal face of the seal housing assembly.

(d) Install the rotating ring on the gear shaft with the pusher/puller, SPL-10797, (Figure 203):

1) Loosen the pusher/puller nut and screw.

2) Put the rotating ring on the tool and against the sleeve.

3) Tighten the pusher/puller screw, then tighten the pusher/puller nut to make sure the rotating ring will not turn in the sleeve.

4) Install the rotating ring on the gear shaft:

a) Turn the pusher/puller, with the handle, until the slots in the rotating ring align with the lugs in the bearing.

b) Turn the pusher/puller in each direction to make sure the rotating ring slots are engaged with the bearing lugs.

5) Loosen the pusher/puller screw and nut.

6) Remove the tool.

CAUTION: DO NOT TAP THE SEALOL SEAL INTO THE GEARBOX RECESS. THE ROTATING RING AND SEAL CASE CAN MOVE APART AND CAUSE DAMAGE TO THE CARBON SEAL.

(e) Put the seal housing assembly on the gear shaft (Figure 204).

1) Make sure the outer O-ring of the seal housing assembly touches the gearbox bearing housing.

(f) Apply a light layer of graphite compound, D00601 [CP2101] to the three gearbox studs.

(g) Install the nuts and washers on the studs:

1) Tighten the nuts with your fingers.

2) Make sure the washers touch the seal housing assembly.

(h) Tighten the nuts in a sequence until the seal housing goes fully into its position in contact with the gearbox housing assembly.

(i) Torque the nuts to 29.2-32.7 pound-inches (3.3-3.7 Newton meters).

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AKS ALL; CFM ALL, POST CFM SB 72-0564 AND PRE CFM SB 72-0879

SUBTASK 72-60-00-420-001-F00

CAUTION: MAKE SURE THAT YOU USE CLEAN, LINT-FREE GLOVES WHEN YOU TOUCH THE SEALOL SEALS. THIS WILL PREVENT CONTAMINATION. CONTAMINATION CAN CAUSE DAMAGE TO THE SEALS.

CAUTION: DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(3) Do these steps to install the Sealol seal [21] on the N2 Drive Pad:

CAUTION: MAKE SURE THAT THE POLISHED FACE OF THE ROTATING RING AND THE CARBON FACE OF THE SEAL HOUSING ARE CLEAN. LEAKS WILL OCCUR IF SMALL PARTICLES ARE BETWEEN THESE PARTS WHEN YOU INSTALL THEM.

(a) Clean the mating surface of the rotating ring and the carbon seal glazed surface of the seal housing assembly with acetone solvent, B01058 [CP1039].

(b) Clean the surfaces of the gear shaft which will touch the O-ring on the rotating ring with acetone solvent, B01058 [CP1039].

(c) Install the new O-ring [23] on the rotating ring:

1) Apply a light layer of grease, D00672 [CP5070] on the O-ring.

2) Install the O-ring in the groove on the rotating ring (ID).

(d) Apply a layer of clean oil, D00599 [CP2442] on the mating surface of the rotating ring.

(e) Apply a light layer of clean oil, D00599 [CP2442] on the bearing surface of the gear shaft:

1) Apply the oil on the bearing surfaces of the gear shaft which will touch the O-ring on the rotating ring.

(f) Install the rotating ring on the gear shaft with the pusher/puller, SPL-11935, (Figure 206):

1) Install the centering guide on the N2 drive pad with the three bolts.

2) Loosen the knurled nut and the grip.

3) Install the rotating ring on the claws of the grip.

4) Put the rotating ring on the tool and against the sleeve.

5) Tighten the grip and the knurled nut. Make sure that the position of the rotating ring is correct in the claws of the grip.

6) Tighten the sleeve to lock the rotating ring in the claws.

7) Insert the pusher/puller assembly into the centering guide to install the rotating ring on the gear shaft.

8) Turn the pusher/puller until the lugs of the rotating ring engage into the slots of the ball bearing inner race.

9) Make sure that the rotating ring is correctly installed.

a) Make sure that the bottom face of the sleeve window is in line with the AGB forward face.

10) Loosen the sleeve.

a) Push the seal pusher/puller to make sure the rotating ring stays in place.

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CAUTION: MAKE SURE THAT THE GRIP CLAWS ARE FULLY DISENGAGED. DO NOT PULL AND DISENGAGE THE ROTATING RING WITH THE SEAL PUSHER/PULLER. DAMAGE TO THE RING AND OIL LEAKAGE CAN OCCUR.

11) Loosen the knurled nut and the grip.

12) Remove the pusher/puller from the centering guide.

13) Loosen the three bolts and remove the centering guide from the N2 drive pad.

(g) Apply a light layer of graphite compound, D00601 [CP2101] to the polished face of the rotating ring.

CAUTION: DO NOT TAP THE SEALOL SEAL INTO THE GEARBOX RECESS. THE ROTATING RING AND SEAL CASE CAN MOVE APART AND CAUSE DAMAGE TO THE CARBON SEAL.

(h) Prepare the seal housing assembly for installation (Figure 205, Figure 209):

1) Apply RTV 102 adhesive, A01077 [CP2266] to the oil seal assembly at the angle formed by the centering diameter and the mating face, and to the mating ring where there is no mating face.

NOTE: This operation does not need any surface preparing, hand blending or primary coating application.

a) Smooth the RTV 102 sealant on all the diameter with a 0.118 x 0.118 in (3 x 3 mm) plastic spatula, except in the area where there is no mating face.

2) Install the new O-ring [22] on the seal housing assembly:

a) Apply a light layer of grease, D00672 [CP5070] to the O-ring.

b) Install the O-ring in the groove on the seal housing assembly (OD).

(i) Install the seal housing assembly on the gear shaft.

1) Make sure that the outer O-ring of the seal housing assembly touches the gearbox bearing housing.

(j) Make sure that the seal housing assembly is correctly engaged with the centering pin on the N2 drive pad.

(k) Remove any unwanted RTV 102 sealant around the seal housing assembly with a dry cloth and a spatula (no solvent).

1) Examine the N2 Pad cover side to make sure that the drain cavity is not clogged by residual RTV 102 sealant.

(l) Let the RTV 102 sealant cure for 3 hours before starting the engine.

(m) Apply a light layer of graphite compound, D00601 [CP2101] to the threads of the two attaching bolts.

(n) Attach the seal housing assembly with the two bolts on the N2 drive pad.

(o) Make sure that the seal is correctly installed with the checking tool of the pusher/puller, SPL-11935.

(p) Torque the bolts to 49 in-lb (5.5 N·m) - 58 in-lb (6.5 N·m).

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AKS ALL; CFM ALL, POST CFM SB 72-0879

SUBTASK 72-60-00-420-002-F00

CAUTION: MAKE SURE THAT YOU USE CLEAN, LINT-FREE GLOVES WHEN YOU TOUCH THE SEALOL SEALS. THIS WILL PREVENT CONTAMINATION. CONTAMINATION CAN CAUSE DAMAGE TO THE SEALS.

CAUTION: DO NOT REPLACE ONE COMPONENT OF THE SEAL IF YOU CAUSED DAMAGE TO A COMPONENT OF THE SEAL. SEALOL SEALS ARE MATCHED ASSEMBLIES. IF YOU MIX COMPONENTS, OIL LEAKAGE COULD OCCUR.

(4) Do these steps to install the Sealol seal [21] on the N2 Drive Pad:

CAUTION: MAKE SURE THAT THE POLISHED FACE OF THE ROTATING RING AND THE CARBON FACE OF THE SEAL HOUSING ARE CLEAN. LEAKS WILL OCCUR IF SMALL PARTICLES ARE BETWEEN THESE PARTS WHEN YOU INSTALL THEM.

(a) Clean the mating surface of the rotating ring and the carbon seal glazed surface of the seal housing assembly with acetone solvent, B01058 [CP1039].

(b) Clean the surfaces of the gear shaft which will touch the O-ring on the rotating ring with acetone solvent, B01058 [CP1039].

(c) Install the new O-ring [23] on the rotating ring:

1) Apply a light layer of grease, D00672 [CP5070] on the O-ring.

2) Install the O-ring in the groove on the rotating ring (ID).

(d) Apply a layer of clean oil, D00599 [CP2442] on the mating surface of the rotating ring.

(e) Apply a light layer of clean oil, D00599 [CP2442] on the bearing surface of the gear shaft:

1) Apply the oil on the bearing surfaces of the gear shaft which will touch the O-ring on the rotating ring.

(f) Install the rotating ring on the gear shaft with the pusher/puller, SPL-14642, (Figure 206):

1) Install the centering guide on the N2 drive pad with the three bolts.

2) Loosen the knurled nut and the grip.

3) Install the rotating ring on the claws of the grip.

4) Put the rotating ring on the tool and against the sleeve.

5) Tighten the grip and the knurled nut. Make sure that the position of the rotating ring is correct in the claws of the grip.

6) Tighten the sleeve to lock the rotating ring in the claws.

7) Insert the pusher/puller assembly into the centering guide to install the rotating ring on the gear shaft.

8) Turn the pusher/puller until the lugs of the rotating ring engage into the slots of the ball bearing inner race.

9) Make sure that the rotating ring is correctly installed.

a) Make sure that the bottom face of the sleeve window is in line with the AGB forward face.

10) Loosen the sleeve.

a) Push the seal pusher/puller to make sure the rotating ring stays in place.

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AKS ALL; CFM ALL, POST CFM SB 72-0879 (Continued)

CAUTION: MAKE SURE THAT THE GRIP CLAWS ARE FULLY DISENGAGED. DO NOT PULL AND DISENGAGE THE ROTATING RING WITH THE SEAL PUSHER/PULLER. DAMAGE TO THE RING AND OIL LEAKAGE CAN OCCUR.

11) Loosen the knurled nut and the grip.

12) Remove the pusher/puller from the centering guide.

13) Loosen the three bolts and remove the centering guide from the N2 drive pad.

(g) Apply a light layer of oil, D00599 [CP2442] to the polished face of the rotating ring.

CAUTION: DO NOT TAP THE SEALOL SEAL INTO THE GEARBOX RECESS. THE ROTATING RING AND SEAL CASE CAN MOVE APART AND CAUSE DAMAGE TO THE CARBON SEAL.

(h) Prepare the seal housing assembly for installation (Figure 205):

1) Install the new O-ring [22] on the seal housing assembly:

a) Apply a light layer of oil, D00599 [CP2442] to the O-ring.

b) Install the O-ring in the groove on the seal housing assembly (OD).

2) Install the new O-ring [24] on the seal housing assembly:

a) Apply a light layer of oil, D00599 [CP2442] to the O-ring.

b) Install the O-ring in the groove on the seal housing assembly (OD).

(i) Install the seal housing assembly on the gear shaft.

1) Make sure that the outer O-ring of the seal housing assembly touches the gearbox bearing housing.

(j) Make sure that the seal housing assembly is correctly engaged with the centering pin on the N2 drive pad.

(k) Apply a light layer of graphite compound, D00601 [CP2101] to the threads of the two attaching bolts.

(l) Attach the seal housing assembly with the two bolts on the N2 drive pad.

(m) Make sure that the seal is correctly installed with the checking tool of the pusher/puller, SPL-14642.

(n) Tighten the bolts to 49 in-lb (5.5 N·m) - 58 in-lb (6.5 N·m).

AKS ALL

SUBTASK 72-60-00-410-005-F00

(5) Do the applicable installation task that follows:

(a) Do this task: Fuel Pump Package Installation, TASK 73-11-01-400-801-F00.

(b) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation, TASK 29-11-11-400-801-001.

(c) Do this task: Integrated Drive Generator (IDG) Installation, TASK 24-11-11-400-801.

(d) Do this task: Handcranking Drive Cover Installation, TASK 72-63-01-400-801-F00.

SUBTASK 72-60-00-200-003-F00

(6) Do the tests that are listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

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SUBTASK 72-60-00-010-008-F00

(7) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

END OF TASK

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ACCESSORY DRIVES - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has two tasks:
      (1) A visual check of the mounts for the accessory gearbox and transfer gearbox
      (2) A visual check for oil leakage from the accessory gearbox, the transfer gearbox and the horizontal drive shaft.

TASK 72-60-00-200-801-F00

2. **Accessory Gearbox and Transfer Gearbox Mount Inspection**
(Figure 601 and Figure 602)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This is a visual check of the mounts on the transfer gearbox (TGB) housing and the accessory gearbox housing (AGB).

(2) The AGB is on the left side of the fan case and the TGB is at the 9:00 o'clock position on the fan frame.

B. References

Reference	Title
71-00-02-000-801-F00	Power Plant Removal (P/B 401)
71-00-02-400-801-F00	Power Plant Installation (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-62-00-000-801-F00	Transfer Gearbox Assembly Removal (P/B 401)
72-62-00-400-801-F00	Transfer Gearbox Assembly Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-60-00-210-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-60-00-210-002-F00

(2) Do a visual check of the AGB clevis mounts for damage (Figure 601):

(a) If you find damage that is more than the limits, replace the engine, unless you are given other instructions.

These are the tasks:

Power Plant Removal, TASK 71-00-02-000-801-F00,

Power Plant Installation, TASK 71-00-02-400-801-F00.

(b) Cracks

1) Not serviceable.

(c) Loose bushing in the clevis mounts

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1) Not permitted.

(d) Loose mount pin

1) Not permitted.

a) Tighten the mount pin if it is loose.

SUBTASK 72-60-00-210-003-F00

(3) Do a visual check of the TGB mounts for damage (Figure 602):

(a) If you find damage that is more than the limits, replace the TGB, unless you are given other instructions.

These are the tasks:

Transfer Gearbox Assembly Removal, TASK 72-62-00-000-801-F00,

Transfer Gearbox Assembly Installation, TASK 72-62-00-400-801-F00.

(b) Cracks

1) Not serviceable.

(c) Loose attachment bolts

1) Not permitted.

a) Tighten the attachment nut (TASK 72-62-00-400-801-F00).

SUBTASK 72-60-00-210-004-F00

(4) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

END OF TASK

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G28311 S0006582533_V2

Accessory Gearbox Inspection
Figure 601/72-60-00-990-801-F00

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B0018700
G28331 S0006582534_V3

Transfer Gearbox Inspection
Figure 602/72-60-00-990-802-F00

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TASK 72-60-00-200-802-F00

3. Accessory Gearbox, Transfer Gearbox, and Horizontal Drive Shaft - Oil Leakage Inspection

A. General

(1) This is a visual check for oil leaks from the transfer gearbox (TGB) housing, the accessory gearbox housing (AGB) and the horizontal drive shaft housing (HDS). This is a scheduled maintenance task.

(2) The AGB is on the left side of the fan case and the TGB is at the 9:00 o'clock position on the fan frame.

(3) The HDS housing is between the AGB and the TGB.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-60-00-010-009-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-60-00-210-005-F00

(2) Do a visual check of the AGB for oil leakage.

SUBTASK 72-60-00-210-006-F00

(3) Do a visual check of the TGB for oil leakage.

SUBTASK 72-60-00-210-007-F00

(4) Do a visual check of the HDS housing for oil leakage.

SUBTASK 72-60-00-900-001-F00

(5) If you find evidence of oil leakage, repair or replace components as it is necessary to stop the leakage.

SUBTASK 72-60-00-410-006-F00

(6) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

——— END OF TASK ———

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TRANSFER GEARBOX ASSEMBLY - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of the transfer gearbox

(2) The installation of the transfer gearbox.

TASK 72-62-00-000-801-F00

2. Transfer Gearbox Assembly Removal

(Figure 401, Figure 402)

A. General

(1) For this procedure the transfer gearbox will be referred to as the TGB.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
72-63-01-000-801-F00	Handcranking Drive Cover Removal (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2192	Wrench - Horizontal Drive Shaft Nut Part #: 856A3604P01 Supplier: 58828
SPL-11931	Core Engine Sealing Plate and Locking Adapter Part #: 856A3728G01 Supplier: 58828
SPL-11934	Core Engine Sealing Plate and Locking Adapter Part #: 856A3728G02 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for Removal

SUBTASK 72-62-00-040-001-F00

(1) Do this step:

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-62-00-040-002-F00

(2) Set the start levers in the CUTOFF position:

(a) Install DO-NOT-OPERATE tags on the start levers.

SUBTASK 72-62-00-010-001-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

G. TGB Removal

SUBTASK 72-62-00-020-001-F00

(1) Do these steps to disconnect the top-mounted connections from the TGB (Figure 401):

AKS ALL PRE SB CFM56-7B-72-0133

(a) Remove the bolt [21], the nut [22], and the two clamps [23] and [24].

NOTE: The clamps hold the oil supply tube [6] and the vent tube [7] to the bracket [20] on the fan frame.

AKS ALL POST SB CFM56-7B-72-0133

(b) Remove the bolt [21], the nut [22] and clamp [23].

NOTE: The clamp holds the vent tube [7] to the bracket [20] on the fan frame.

AKS ALL

CAUTION: USE TWO WRENCHES TO LOOSEN THE TUBE COUPLING NUT. USE ONE TO HOLD THE NIPPLE, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBE AND NIPPLE CAN OCCUR.

(c) Disconnect the TGB tubes as follows:

1) Disconnect the oil supply tube [6] from the TGB [11].

2) Disconnect the vent tube [7] from the TGB [11].

(d) Remove the two bolts [28] that attach the bracket [29] to the square flange of the vent nipple square flange [30].

SUBTASK 72-62-00-020-002-F00

(2) Do these steps to disconnect the bottom-mounted connections from the TGB:

(a) Remove the two bolts [12] that attach the bracket [13] to the TGB housing [11].

(b) Do these steps to disconnect the oil return tube [15]:

1) Remove the four bolts [14] which attach the oil return tube [15] to the TGB [11].

2) Disconnect the oil return tube [15] from the TGB [11].

3) Keep the gasket [16] for the installation.

(c) Put blanking plugs and caps on the openings.

SUBTASK 72-62-00-480-001-F00

(3) Do these steps to lock the AGB [1].

NOTE: This step is necessary to make sure the AGB does not turn.

(a) Do this task: Handcranking Drive Cover Removal, TASK 72-63-01-000-801-F00.

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AKS ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

(b) Lock the AGB [1] with the Locking Adapter, SPL-11931.

AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(c) Lock the AGB [1] with the Locking Adapter, SPL-11934.

AKS ALL

SUBTASK 72-62-00-020-003-F00

(4) Do these steps to disconnect the TGB [11] from the AGB [1]:

(a) Remove the V-clamp nut [3] on the V-clamp [2] (Figure 402).

(b) Remove the V-clamp [2] at the interface between the AGB [1] and the TGB [11].

(c) Lubricate the horizontal drive shaft housing [5] with oil, D00599 [CP2442].

(d) Put a container below the TGB and AGB interface.

WARNING: DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING: DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE SHUTDOWN. A PRESSURIZED ENGINE CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING: DO NOT LET HOT OIL GET ON YOU. PUT ON GOGGLES AND OTHER EQUIPMENT FOR PROTECTION OR LET THE ENGINE BECOME COOL. HOT OIL CAN BURN YOU.

WARNING: DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION: DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

CAUTION: DO NOT LET ALKALINE CLEANING FLUID GET INTO THE ENGINE OIL. VERY SMALL QUANTITIES OF THIS FLUID CAN CHANGE THE ENGINE OIL. DAMAGE TO EQUIPMENT COULD OCCUR.

(e) Move the TGB sleeve [4] rearward on the horizontal drive shaft housing [5] to get access to the locking nut [25] on the horizontal drive shaft (Figure 402).

CAUTION: THE HORIZONTAL DRIVE SHAFT LOCKING NUT HAS LEFT-HAND THREADS. DO NOT APPLY A COUNTERCLOCKWISE TORQUE TO THE NUT. IF YOU DO, DAMAGE TO THE SHAFT CAN OCCUR.

(f) Use the wrench, SPL-2192 to loosen the locking nut [25].

(g) Disengage the horizontal drive shaft [26] from the AGB [1] and fully retract it in the TGB [11].

SUBTASK 72-62-00-020-004-F00

(5) Remove the TGB [11] from the engine as follows (Figure 401):

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WARNING: BE CAREFUL WHEN YOU MOVE THE TGB. BECAUSE THE TGB WEIGHS APPROXIMATELY 44 POUNDS (20 KG), INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(a) Remove two nuts [19], the washers [18] and the bolts [17] that attach the TGB [11] to the fan frame.

(b) While you hold the TGB [11], remove the two nuts [10], the washers [9], and the bolts [8] that attach the TGB [11] to the fan frame.

(c) As you keep the TGB [11] in a horizontal position, remove it from the engine.

(d) Remove and discard the O-ring [27].

(e) Put blanking plugs and caps on the openings.

SUBTASK 72-62-00-020-005-F00

(6) Remove the outer radial drive shaft from the fan frame strut.

——— END OF TASK ———

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1 AIRPLANES WITH SEMI-RIGID AIR TUBES (POST-CFMI-SB 72-133)
2 AIRPLANES WITH RIGID AIR TUBES (PRE-CFMI-SB 72-133)

F76662 S0006582540_V2

Transfer Gearbox Installation
Figure 401/72-62-00-990-802-F00 (Sheet 1 of 2)

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B

FWD

(VIEW IN THE FORWARD DIRECTION)

A-A

S-M56-MM-03479-00-B

F76683 S0006582541_V2

Transfer Gearbox Installation
Figure 401/72-62-00-990-802-F00 (Sheet 2 of 2)

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Transfer Gearbox and Accessory Gearbox Coupling
Figure 402/72-62-00-990-803-F00 (Sheet 1 of 2)

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L59355 S0006582543_V2

Transfer Gearbox and Accessory Gearbox Coupling
Figure 402/72-62-00-990-803-F00 (Sheet 2 of 2)

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TASK 72-62-00-400-801-F00

3. Transfer Gearbox Assembly Installation

(Figure 401, Figure 402)

A. General

(1) For this procedure the transfer gearbox will be referred to as the TGB.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-63-01-400-801-F00	Handcranking Drive Cover Installation (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2192	Wrench - Horizontal Drive Shaft Nut Part #: 856A3604P01 Supplier: 58828
SPL-11931	Core Engine Sealing Plate and Locking Adapter Part #: 856A3728G01 Supplier: 58828
SPL-11934	Core Engine Sealing Plate and Locking Adapter Part #: 856A3728G02 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for Installation

SUBTASK 72-62-00-420-001-F00

WARNING: DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION: DO NOT LET ALKALINE CLEANING FLUID GET INTO THE ENGINE OIL. VERY SMALL QUANTITIES OF THIS FLUID CAN CHANGE THE ENGINE OIL. DAMAGE TO EQUIPMENT COULD OCCUR.

(1) Do these steps to prepare the TGB for the installation:

(a) Lubricate a new O-ring [27] with oil, D00599 [CP2442] and install it in the sleeve groove (Figure 402).

(b) Lubricate the horizontal drive shaft housing [5] with oil, D00599 [CP2442].

(c) Fully retract the TGB sleeve [4] on the horizontal drive shaft housing [5] and the horizontal drive shaft [26] in the TGB [11].

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(d) Lubricate the radial drive shaft splines with oil, D00599 [CP2442] (Figure 401).

(e) Lubricate the threads of the bolts [8] and the bolts [17] that attach the TGB [11] to the engine with graphite compound, D00601 [CP2101].

(f) Make sure that the ring on the TGB [11] is serviceable (View A-A).

(g) Make sure that the gasket [16] of the oil return tube is serviceable.

SUBTASK 72-62-00-420-009-F00

(2) Install the outer radial drive shaft into the fan frame strut.

SUBTASK 72-62-00-420-002-F00

(3) Do these steps to install the TGB [11] (Figure 401):

CAUTION: BE CAREFUL WHEN YOU ENGAGE THE OUTER RADIAL DRIVE SHAFT WITH THE INPUT BEVEL GEAR OF THE TGB. IF YOU ARE NOT CAREFUL, DAMAGE TO THE SEALS AND SPLINES COULD OCCUR.

(a) Engage horizontally the outer radial drive shaft splines in the input bevel gear of the TGB [11]; and, put the TGB [11] in its position on the fan frame.

(b) While you hold the TGB [11] in its position, install the top two bolts [8], the washers [9], and the nuts [10] that attach the TGB [11] to the fan frame.

1) Tighten the nuts [10] but do not apply the final torque.

(c) Install the bottom two bolts [17], the washers [18], and the nuts [19] that attach the TGB [11] to the fan frame.

1) Tighten the nuts [19] but do not apply the final torque.

SUBTASK 72-62-00-420-003-F00

(4) Engage the horizontal drive shaft [26] as follows (Figure 402):

(a) Lubricate the splines on the horizontal drive shaft with oil, D00599 [CP2442].

(b) Move the horizontal drive shaft [26] forward and carefully engage it in the AGB input gear.

1) If the splines do not align, handcrank the AGB to match and engage the horizontal drive shaft splines with the AGB gear splines.

a) Remove the locking cover of the locking adapter to turn the AGB geartrain.

(c) Lubricate the threads of the AGB [1] input gear with oil, D00599 [CP2442].

(d) Install the locking nut [25] on the AGB input gear.

NOTE: The locking nut has left-hand threads.

1) Tighten the locking nut [25] with your hand.

(e) If you removed the locking cover from the locking adapter, re-install the locking cover before you do the subsequent step.

(f) Tighten the nuts [10] and [19] that attach the TGB [11] to the fan frame to 176-195 pound-inches (20-22 Newton meters).

(g) Tighten the locking nut [25] of the horizontal drive shaft [26] to 1330-1590 pound-inches (150-180 Newton meters).

1) Use the wrench, SPL-2192.

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CAUTION: MAKE SURE THE RETAINING RING IS IN ITS CORRECT POSITION. IF THE RETAINING RING IS NOT IN ITS CORRECT POSITION, THE HORIZONTAL DRIVE SHAFT COULD DISENGAGE AND CAUSE AN ENGINE FLAME OUT.

(h) Use a mirror to look through the three visualization holes to make sure that the retaining ring is in its position in the locking nut groove.

SUBTASK 72-62-00-420-004-F00

(5) Install the TGB sleeve [4] as follows (Figure 402):

(a) Move the TGB sleeve [4] forward to its position on the AGB [1].

(b) Install the V-clamp [2].

(c) Install the V-clamp nut [3] and tighten to 50-60 pound-inches (5.7-6.8 Newton meters)

SUBTASK 72-62-00-420-005-F00

CAUTION: USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUT. USE ONE TO HOLD THE NIPPLE, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBE AND NIPPLE CAN OCCUR.

(6) Do these steps to connect the tubes to the TGB (Figure 401):

(a) Lubricate the threads of the TGB nipples with oil, D00599 [CP2442].

(b) Connect the oil supply tube [6] to the TGB nipple.

1) Tighten the coupling nut to 270-300 pound-inches (30-35 Newton meters).

(c) Connect the vent tube [7] to the TGB nipple.

1) Tighten the coupling nut to 135-150 pound-inches (15.5-17 Newton meters).

(d) Lubricate the gasket [16] with oil, D00599 [CP2442].

(e) Lubricate the four bolts [14] which attach the oil return tube [15] to the TGB [11] with graphite compound, D00601 [CP2101].

(f) Use the four bolts [14] to connect the oil return tube [15] with the gasket [16] to the TGB [11].

1) Tighten the bolts [14] to 49-53 pound-inches (5.5-6 Newton meters).

SUBTASK 72-62-00-420-006-F00

(7) Do these steps to attach the oil supply tube [6] and the vent tube [7] (Figure 401):

(a) Lubricate the threads of the bolt [21] with graphite compound, D00601 [CP2101].

AKS ALL PRE SB CFM56-7B-72-0133

(b) Attach the oil supply tube [6] and the vent tube [7] to the bracket [20] with the clamps [23] and [24], the bolt [21] and the nut [22].

AKS ALL POST SB CFM56-7B-72-0133

(c) Attach the oil supply tube [6] and the vent tube [7] to the bracket [20] with the clamp [23], the bolt [21] and the nut [22].

AKS ALL

(d) Tighten the bolt [21] to 98-110 pound-inches (11-12.5 Newton meters).

SUBTASK 72-62-00-420-007-F00

(8) Install the two bolts [28] which attach the bracket [29] to the vent nipple square flange [30] (Figure 401).

(a) Tighten the two bolts [28] to 55-60 pound-inches (6.2-6.8 Newton meters).

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SUBTASK 72-62-00-420-008-F00

(9) Do these steps to attach the bracket [13] to the TGB [11] (Figure 401):

(a) Lubricate the threads of the two bolts [12] with graphite compound, D00601 [CP2101]

(b) Attach the bracket [13] to the TGB [11] with the bolts [12].

(c) Tighten the bolts [12] to 98-110 pound-inches (11-12.5 Newton meters).

AKS ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

SUBTASK 72-62-00-080-001-F00

(10) Remove the Locking Adapter, SPL-11931 from the AGB [1].

AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

SUBTASK 72-62-00-080-002-F00

(11) Remove the Locking Adapter, SPL-11934 from the AGB [1].

AKS ALL

SUBTASK 72-62-00-410-001-F00

(12) Do this task: Handcranking Drive Cover Installation, TASK 72-63-01-400-801-F00.

G. TGB Installation test

SUBTASK 72-62-00-160-001-F00

(1) Carefully clean the horizontal drive shaft housing of oil and other unwanted materials.

SUBTASK 72-62-00-790-001-F00

(2) Do the tests that are given in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

(a) Do a check for leaks in these areas:

1) The handcranking drive cover

2) The tubes connections

3) The TGB/AGB interface

4) The TGB/fan frame interface.

SUBTASK 72-62-00-610-001-F00

(3) Do this task: Replenish the Engine Oil, TASK 12-13-11-600-801.

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-62-00-410-002-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-62-00-040-003-F00

(2) Do this step:

Close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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SUBTASK 72-62-00-040-004-F00

(3) Remove the DO-NOT-OPERATE tags from the start levers.

END OF TASK

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TRANSFER GEARBOX - INSPECTION/CHECK

1. General

A. This procedure has two tasks:

(1) An inspection of the transfer gearbox (TGB) of the external surfaces.

(2) An inspection of the transfer gearbox (TGB) of the internal surfaces.

TASK 72-62-00-200-801-F00

2. Transfer Gearbox External Inspection

(Figure 601)

A. General

(1) This is a visual inspection of the transfer gearbox (TGB) housing, its mounts, the horizontal drive shaft (HDS) housing, the HDS sleeve and lockwire.

(2) The transfer gearbox (TGB) housing is aft of the accessory gearbox on the left side of the power plant at the 9:00 position.

B. References

Reference	Title
70-20-01-800-804-F00	Lockwire Installation (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-62-00-000-801-F00	Transfer Gearbox Assembly Removal (P/B 401)
72-62-00-400-801-F00	Transfer Gearbox Assembly Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-62-00-210-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-62-00-210-002-F00

(2) If you find damage that is more than the limits, replace the TGB, unless you are given other instructions.

These are the tasks:

Transfer Gearbox Assembly Removal, TASK 72-62-00-000-801-F00,

Transfer Gearbox Assembly Installation, TASK 72-62-00-400-801-F00.

SUBTASK 72-62-00-210-003-F00

(3) Do a visual check of the TGB housing for damage as follows:

(a) Cracks

1) Not permitted.

(b) Nicks, dents, and scratches

1) All damage is permitted with these limits:

a) Not more than 0.035 inch (0.9 mm) in depth after you remove the high metal.

(c) Leakage

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1) Not permitted.
   a) Tighten the fittings.
   b) If this does not stop the leakage, replace the gaskets or seals.

(d) Loose attach fittings.
   1) Not permitted (refer to the installation task to tighten the attach fittings).

SUBTASK 72-62-00-210-004-F00

(4) Do a check of the TGB mounts as follows:
   (a) Cracks
      1) Not permitted.
   (b) Loose bushings
      1) Not permitted.

SUBTASK 72-62-00-210-007-F00

(5) Do a check of the horizontal drive shaft (HDS) housing as follows:
   (a) Nicks, dents, and scratches on non-machined surfaces
      1) Any amount is permitted.
   (b) Local bent surface on non-machined surfaces is not permitted.

SUBTASK 72-62-00-210-008-F00

(6) Do a check of the horizontal drive shaft (HDS) sleeve as follows:
   (a) Nicks, dents, and scratches on non-machined surfaces
      1) Any amount is permitted.
   (b) Local bent surface on non-machined surfaces is not permitted.

SUBTASK 72-62-00-210-005-F00

(7) Look for damage to the lockwire:
   (a) Broken, missing or loose lockwire
      1) Not permitted.
         a) Do this task: Lockwire Installation, TASK 70-20-01-800-804-F00.

SUBTASK 72-62-00-210-006-F00

(8) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

END OF TASK

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B0018700
G23174 S0006582547_V2

Transfer Gearbox Inspection
Figure 601/72-62-00-990-801-F00 (Sheet 1 of 3)

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HORIZONTAL DRIVE SHAFT HOUSING

B

00188-00-B
W23054 S0006582548_V2

Transfer Gearbox Inspection
Figure 601/72-62-00-990-801-F00 (Sheet 2 of 3)

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HORIZONTAL DRIVE SHAFT HOUSING SLEEVE

C

00189-00-B

W11203 S0006582549_V2

Transfer Gearbox Inspection
Figure 601/72-62-00-990-801-F00 (Sheet 3 of 3)

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TASK 72-62-00-200-802-F00

3. Transfer Gearbox Internal Inspection

A. General

(1) This inspection use a borescope to examine the internal surfaces of the Transfer Gearbox (TGB).

(2) If you find the metal bearing particles in the magnetic chips detectors, do the internal inspection. The borescope equipment will permit you to see if the rollers bearing for the input or output bevel gear is damaged.

B. References

Reference	Title
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-00-02-400-801-F00	Power Plant Installation (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-62-00-400-801-F00	Transfer Gearbox Assembly Installation (P/B 401)
79-21-05-000-806-F00	Magnetic Chip Detector (MCD) Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2196	Set - Borescope Fiber, 6 mm diameter Part #: 856A1321P05 Supplier: 58828 Part #: 856A1321P06 Supplier: 58828 Opt Part #: 856A1321P03 Supplier: 58828
SPL-2197	Light Source - Borescope, Lenox (150W) Part #: 856A1322P02 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Procedure

SUBTASK 72-62-00-210-009-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-62-00-020-006-F00

(2) Do this task: Magnetic Chip Detector (MCD) Removal, TASK 79-21-05-000-806-F00.

SUBTASK 72-62-00-240-002-F00

(3) Do a check of the AGB/TGB magnetic chip detector (MCD) for metal bearing particles.

(a) The inspection (that follows) looks for damage to the input bevel gear roller bearing.

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(b) If the MCD inspection was done for a scheduled maintenance program, this is the continue-in-service limit before the TGB replacement.

1) A continue-in-service limit of 2 cycles is permitted if there were no pilot reports of vibration or abnormal noise.

SUBTASK 72-62-00-290-001-F00

(4) If you find the metal bearing particles, do a borescope inspection of the roller bearing for the input bevel gear as follows.

(a) Disconnect the vent air tube from the vent nipple on the TGB.

(b) Remove the four bolts that attach the vent nipple to the TGB housing.

1) Keep the gasket for the installation.

SUBTASK 72-62-00-020-007-F00

(5) Remove the five bolts that attach the N2 drive pad cover to the AGB.

(a) Remove the N2 drive pad cover.

1) Discard the o-rings.

SUBTASK 72-62-00-200-001-F00

(6) Examine the roller bearing for the input bevel gear as follows.

(a) Connect a light source, SPL-2197 to a 110 Volt AC 60 Hz ground power source and connect the ground.

(b) Connect the 0.24 inch (6.0 mm) flexible borescope to the borescope, COM-2196 and to the port on the light source, SPL-2197.

(c) Turn on the light source, SPL-2197.

1) Install the borescope, COM-2196 through the vent nipple port of the TGB.

(d) Manually turn the TGB.

1) Examine the roller bearing for the input bevel gear for the damage.

(e) If the roller bearing is damaged.

1) Do this task: Transfer Gearbox Assembly Installation, TASK 72-62-00-400-801-F00.

a) Replace the roller bearing.

2) See the continue-in-service limit above for the detail.

(f) If the roller bearing is not damage.

1) Do this task: Power Plant Installation, TASK 71-00-02-400-801-F00.

a) Replace the engine.

SUBTASK 72-62-00-420-010-F00

(7) Install the gasket lubricated with the engine oil, D00599 [CP2442] on the vent nipple.

SUBTASK 72-62-00-640-001-F00

(8) Lubricate the four bolts with the graphite compound, D00601 [CP2101].

(a) Install the vent nipple on the TGB housing.

SUBTASK 72-62-00-420-011-F00

(9) Tighten the bolts to 50 - 60 pound-inches (6 - 7 Newton-meters).

(a) Install the lockwire.

(b) Attach the lockwire to the bolts.

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SUBTASK 72-62-00-640-002-F00

(10) Lubricate the threads of the vent nipple with the engine oil, D00599 [CP2442].

(a) Connect the air tube to the vent nipple.

SUBTASK 72-62-00-640-003-F00

(11) Lubricate the new o-ring with the engine oil, D00599 [CP2442].

(a) Install the new o-ring on the N2 pad drive cover.

SUBTASK 72-62-00-640-004-F00

(12) Lubricate the five bolts with the graphite compound, D00601 [CP2101].

(a) Install the N2 drive pad cover on the AGB.

SUBTASK 72-62-00-420-012-F00

(13) Tighten the bolts to 95 - 105 Pound-inches (11 -12 Newton-meters).

(a) Install the lockwire to the bolts.

SUBTASK 72-62-00-290-002-F00

(14) If you find the metal bearing particles, do a borescope inspection of the roller bearing for the output bevel gear as follow.

(a) Remove the bolts that attach the plug and oil nozzle to the TGB housing.

(b) Remove the plug and oil nozzle.

1) Discard the o-rings.

SUBTASK 72-62-00-240-001-F00

(15) Examine the roller bearing for output bevel gear as follows.

(a) Connect a light source, SPL-2197 to a 110 Volt AC 60 Hz ground power source and connect the ground.

(b) Connect the 0.24 inch (6.0 mm) flexible borescope to the borescope, COM-2196 and to the port on the light source, SPL-2197.

(c) Turn on the light source, SPL-2197.

1) Install the borescope, COM-2196 through the vent nipple port of the TGB.

(d) Manually turn the TGB.

1) Examine the roller bearing for the output bevel gear for the damage.

(e) If the roller bearing is damaged.

1) Do this task: Transfer Gearbox Assembly Installation, TASK 72-62-00-400-801-F00.

a) Replace the roller bearing.

2) See the continue-in-service limit above for the detail.

(f) If the roller bearing is not damage.

1) Do this task: Power Plant Installation, TASK 71-00-02-400-801-F00.

a) Replace the engine.

SUBTASK 72-62-00-420-013-F00

(16) Install the three o-rings on the plug and oil nozzle lubricated with the engine oil, D00599 [CP2442] on the TGB housing.

SUBTASK 72-62-00-640-005-F00

(17) Lubricate the bolts with the graphite compound, D00601 [CP2101].

(a) Install the bolts on the TGB housing.

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SUBTASK 72-62-00-420-014-F00

(18) Tighten the bolts to 95 - 105 Pound-inches (11 - 12 Newton-meters).

SUBTASK 72-62-00-210-010-F00

(19) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-62-00-790-002-F00

(20) Do this task: Power Plant Test Reference Table, TASK 71-00-00-800-811-F00.

——— END OF TASK ———

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398621-6

1308022 S0000226584_V2

Transfer Gearbox Internal Inspection
Figure 602/72-62-00-990-804-F00 (Sheet 1 of 2)

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1308071 S0000226585_V2

Transfer Gearbox Internal Inspection
Figure 602/72-62-00-990-804-F00 (Sheet 2 of 2)

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ACCESSORY GEARBOX - MAINTENANCE PRACTICES

1. General

A. This procedure contains these tasks:

(1) Axial link end dampers removal

(2) Axial link end dampers installation

(3) Axial link end or upper (lower) mount link removal

(4) Axial link end or upper (lower) mount link installation.

TASK 72-63-00-000-802-F00

2. Axial Link End Dampers Removal

(Figure 201)

A. General

(1) For this procedure the accessory gearbox is referred to as the AGB.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
73-11-06-000-801-F00	IDG Oil Cooler Removal (P/B 401)
73-11-07-000-801-F00	Servo Fuel Heater Removal (P/B 401)
79-21-01-000-801-F00	Lubrication Unit Removal (P/B 401)
79-21-02-000-801-F00	Main Oil/Fuel Heat Exchanger Removal (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 72-63-00-040-005-F00

(1) Do this step:

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-040-006-F00

(2) Make sure the applicable start lever is in the CUTOFF position.

(a) Install DO-NOT-OPERATE tags on the start lever.

SUBTASK 72-63-00-020-004-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

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E. Procedure

WARNING: DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING: DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING: DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION: DO NOT LET OIL GET ON THE ENGINE, OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE AREAS THAT OIL FALLS ON. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

CAUTION: DO NOT LET ALKALINE CLEANING FLUIDS TOUCH THE OIL WHICH WILL GO INTO THE ENGINE. VERY SMALL AMOUNTS OF ALKALINE CLEANING FLUIDS WILL DAMAGE THE ENGINE OIL.

DO NOT PUT THE OIL THAT IS DRAINED FROM THE ENGINE BACK INTO THE ENGINE.

SUBTASK 72-63-00-922-003-F00

(1) Obey the above warnings and cautions throughout this task.

(a) For the references, obey the warnings and cautions in those tasks.

SUBTASK 72-63-00-020-005-F00

CAUTION: DO NOT REMOVE THE TWO LINKS FROM THE ENGINE AT THE SAME TIME. THIS WILL CAUSE DAMAGE TO THE AGB MODULE.

(2) Do these steps to remove the dampers [12] on the end of the AGB upper mount link [1].

(a) Disconnect the lines from the servo fuel heater (TASK 73-11-07-000-801-F00).

(b) Remove the main oil/fuel heat exchanger with the servo fuel heater together (TASK 79-21-02-000-801-F00).

CAUTION: USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

(c) Remove the two cotter pins [4], two nuts [2] and two washers [3] to remove the two straight pin assemblies [5].

(d) Remove the AGB upper mount link [1] from the AGB upper clevis mount and the fan case clevis.

(e) Remove the dampers [12]

SUBTASK 72-63-00-020-006-F00

CAUTION: DO NOT REMOVE THE TWO LINKS FROM THE ENGINE AT THE SAME TIME. THIS WILL CAUSE DAMAGE TO THE AGB MODULE.

(3) Do these steps to remove the dampers [10] on the end of the AGB lower mount link [11].

(a) Do this task: Lubrication Unit Removal, TASK 79-21-01-000-801-F00.

(b) Disconnect the fuel-in tube from the IDG oil cooler (TASK 73-11-06-000-801-F00).

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CAUTION: USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

(c) Remove the two cotter pins [8], the two nuts [6] and the two washers [7] to remove the two straight pin assemblies [9].

(d) Remove the AGB lower mount link [11] from the AGB lower clevis mount and the fan case clevis.

(e) Remove the dampers [12].

SUBTASK 72-63-00-020-007-F00

CAUTION: DO NOT FULLY REMOVE THE AGB TURNBUCKLE FROM THE ENGINE. INSTALL THE FIRST END AGAIN BEFORE YOU REMOVE THE OTHER END FROM THE ENGINE. IF YOU DO NOT OBEY THIS INSTRUCTION, YOU WILL CAUSE DAMAGE TO THE ENGINE.

CAUTION: DO NOT CHANGE THE AGB TURNBUCKLE LENGTH DURING THE PROCEDURE, THIS CAN CAUSE DAMAGE TO THE CORRECT ALIGNMENT OF THE AGB MODULE.

CAUTION: USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

(4) Do these steps to remove the dampers [14] on the end of the AGB turnbuckle [16].

(a) Remove the cotter pin [20], nut [17] and washer [18] to remove the straight pin assembly [13] which attaches the left link [15] of the AGB turnbuckle [16] to the AGB clevis.

(b) Disconnect the left link [15] from the AGB clevis.

(c) Remove the cotter pin [20], nut [17] and washer [18] to remove the straight pin assembly [13] which attaches the right link [19] of the AGB turnbuckle [16] to the fan frame clevis.

(d) Disconnect the right link [19] from the fan frame clevis.

(e) Remove the dampers [14].

END OF TASK

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AGB Axial Link End Dampers Installation
Figure 201/72-63-00-990-805-F00 (Sheet 1 of 2)

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AGB Axial Link End Dampers Installation
Figure 201/72-63-00-990-805-F00 (Sheet 2 of 2)

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TASK 72-63-00-400-802-F00

3. **Axial Link End Dampers Installation**

(Figure 201)

A. **General**

(1) For this procedure the accessory gearbox is referred to as the AGB.

B. **References**

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
73-11-06-400-801-F00	IDG Oil Cooler Installation (P/B 401)
73-11-07-400-801-F00	Servo Fuel Heater Installation (P/B 401)
79-21-01-400-801-F00	Lubrication Unit Installation (P/B 401)
79-21-02-400-801-F00	Main Oil/Fuel Heat Exchanger Installation (P/B 401)

C. **Consumable Materials**

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

D. **Location Zones**

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. **Prepare for the Installation**

SUBTASK 72-63-00-922-004-F00

WARNING: DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION: DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

CAUTION: DO NOT LET ALKALINE CLEANING FLUID GET IN THE ENGINE OIL. VERY SMALL QUANTITIES OF THIS FLUID CAN CHEMICALLY CHANGE THE OIL. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(1) Obey the above warnings and cautions throughout this task.

(a) For the references, obey the warnings and cautions in those tasks.

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SUBTASK 72-63-00-020-008-F00

CAUTION: IF YOU HAVE ALREADY REMOVED AN AXIAL LINK, DO NOT REMOVE THE OTHER BECAUSE YOU MUST DO THE INSTALLATION OF THE DAMPER SUCCESSIVELY ON EACH AXIAL LINK. THUS, DO NOT REMOVE THE TWO LINKS FROM THE ENGINE AT THE SAME TIME, IT CAN DAMAGE THE CORRECT ALIGNMENT OF THE AGB MODULE.

CAUTION: WHEN YOU INSTALL THE DAMPER ON THE LINK END, MAKE SURE THAT IT IS IN THE CORRECT POSITION. MAKE SURE THAT IT IS CENTERED AROUND THE BALL END OF THE LINK. IF YOU DO NOT ALIGN IT CORRECTLY, IT WILL CAUSE DAMAGE TO EQUIPMENT.

(2) Obey the above cautions for this task.

F. Procedure

SUBTASK 72-63-00-420-005-F00

(1) Do these steps to install the dampers [12] on the end of the AGB upper mount link [1].

(a) Install one damper [12] on each extremity of the AGB upper mount link [1].

(b) Install the AGB upper mount link [1] on the AGB upper clevis mount and the fan case clevis.

(c) Lubricate the threads of the two straight pin assemblies [5] that attach the AGB upper mount link [1] with the AGB upper clevis mount and the fan case clevis to the engine with graphite compound, D00601 [CP2101].

(d) Install the two straight pin assemblies [5] that attach the AGB upper mount link [1] with the AGB upper clevis mount and the fan case clevis.

(e) Install the two washers [3] and the two nuts [2] that attach the straight pin assemblies [5] with the AGB upper mount link [1].

CAUTION: USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

(f) Tighten the two nuts [2] to 840 in-lb (95 N·m)-930 in-lb (105 N·m).

(g) Install the two cotter pins [4] on the straight pin assemblies [5].

(h) Install the main oil/fuel heat exchanger with the servo fuel heater together (TASK 79-21-02-400-801-F00).

(i) Reconnect the lines from the servo fuel heater (TASK 73-11-07-400-801-F00).

SUBTASK 72-63-00-420-006-F00

(2) Do these steps to install the dampers [10] on the end of the AGB lower mount link [11].

(a) Install one damper [10] on each extremity of the AGB lower mount link [11].

(b) Install the AGB lower mount link [11] on the AGB lower clevis mount and the fan case clevis.

(c) Lubricate the threads of the two straight pin assemblies [9] that attach the AGB lower mount link [11] with the AGB lower clevis mount and the fan case clevis to the engine with graphite compound, D00601 [CP2101].

(d) Install the two straight pin assemblies [9] that attach the AGB lower mount link [11] with the AGB lower clevis mount and the fan case clevis.

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(e) Install the two washers [7] and the nuts [6] that attach the straight pin assemblies [9] with the AGB lower mount link [11].

CAUTION: USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

(f) Tighten the nuts [6] to 840 in-lb (95 N·m)-930 in-lb (105 N·m).

(g) Install the two new cotter pins [8] on the straight pin assemblies [9].

(h) Reconnect the fuel-in tube to the IDG oil cooler (TASK 73-11-06-400-801-F00).

(i) Do this task: Lubrication Unit Installation, TASK 79-21-01-400-801-F00.

SUBTASK 72-63-00-420-007-F00

CAUTION: DO NOT FULLY REMOVE THE AGB TURNBUCKLE FROM THE ENGINE. INSTALL THE FIRST END AGAIN BEFORE YOU REMOVE THE OTHER END FROM THE ENGINE. IF YOU DO NOT OBEY THIS INSTRUCTION, YOU WILL CAUSE DAMAGE TO THE ENGINE.

CAUTION: DO NOT CHANGE THE AGB TURNBUCKLE LENGTH DURING THE PROCEDURE, THIS CAN CAUSE DAMAGE TO THE CORRECT ALIGNMENT OF THE AGB MODULE.

(3) Do these steps to install the damper [14] on the end of the AGB turnbuckle [16].

(a) Install one damper [14] on the left link [15] and on the right link [19].

(b) Install the left link [15] of the AGB turnbuckle [16] on the AGB clevis and the right link [19] of the AGB turnbuckle [16] on the fan frame clevis.

(c) Lubricate the threads of the two straight pin assemblies [13] that attach the left link [15] and right link [19] of the AGB turnbuckle [16] with the AGB clevis and the fan frame clevis to the engine with graphite compound, D00601 [CP2101].

(d) Install the straight pin assemblies [13] that attach the left link [15] and right link [19] with the AGB clevis and the fan frame clevis.

(e) Install the two washers [18] and the nuts [17] that attach the straight pin assemblies [13] with the left link [15] and the right link [19].

CAUTION: USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

(f) Tighten the nuts [17] to 840 in-lb (95 N·m)-930 in-lb (105 N·m).

(g) Install the two new cotter pins [20] on the straight pin assemblies [13]straight pin assemblies [13].

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-63-00-410-003-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-63-00-040-007-F00

(2) Do this step:

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Close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-040-008-F00

(3) Remove the DO-NOT-OPERATE tag from the start lever.

H. AGB Installation Test

SUBTASK 72-63-00-790-002-F00

(1) Do a test of the AGB installation.

(a) Carefully clean the horizontal drive shaft housing of oil and other unwanted materials.

(b) Do the test given in the Power Plant Test Reference Table, TASK 71-00-00-800-811-F00.

1) Do a check for leaks in these areas:

a) The handcranking drive cover

b) The tubes connections

c) The TGB/AGB interface

d) The TGB/fan frame interface.

(c) If it is necessary, do this task:Replenish the Engine Oil, TASK 12-13-11-600-801.

——— END OF TASK ———

TASK 72-63-00-000-803-F00

4. Axial Link End or Upper (Lower) Mount Link Removal

A. General

(1) This procedure is to replace an axial link end or an upper (lower) mount link.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)

C. Consumable Materials

Reference	Description	Specification
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Removal

SUBTASK 72-63-00-020-013-F00

(1) Do this step:

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Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-860-001-F00

(2) Make sure the applicable start lever in the CUTOFF position.

(a) Install a DO-NOT-OPERATE tag on the start lever.

SUBTASK 72-63-00-020-014-F00

(3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

F. Procedure

SUBTASK 72-63-00-020-011-F00

(1) Do these steps to remove an upper or lower mount link.

(a) Do this task: Axial Link End Dampers Removal, TASK 72-63-00-000-802-F00.

NOTE: The same procedure above is applicable for the mount link ends without dampers.

(b) After the removal of the mount link, discard it.

SUBTASK 72-63-00-020-012-F00

(2) Do these steps to remove an axial link end.

(a) Do this task: Axial Link End Dampers Removal, TASK 72-63-00-000-802-F00.

NOTE: The same procedure above is applicable for the mount link ends without dampers.

(b) Cut the safety wire, G02345 [CP8001] or which safety the nuts of the axial link ends to the rod link.

(c) Loosen the nut and unscrew the axial link end to be replaced, if it is necessary.

NOTE: You must be careful when you loosen the nut . One link end has left hand threads.

(d) Remove the axial link end from the rod link and discard it.

(e) Remove the nut.

END OF TASK

TASK 72-63-00-400-803-F00

5. Axial Link End or Upper (Lower) Mount Link Installation

A. General

(1) This procedure is a replacement of an axial link end or an upper (lower) mount link.

B. References

Reference	Title
12-13-11-600-801	Replenish the Engine Oil (P/B 301)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)

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(Continued)

Reference	Title
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-63-00-400-804-F00	Accessory Gearbox Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Installation

SUBTASK 72-63-00-020-009-F00

CAUTION: IF YOU HAVE ALREADY REMOVED AN AXIAL LINK, DO NOT REMOVE THE OTHER BECAUSE YOU MUST DO THE INSTALLATION OF THE DAMPER SUCCESSIVELY ON EACH AXIAL LINK. THUS, DO NOT REMOVE THE TWO LINKS FROM THE ENGINE AT THE SAME TIME, IT CAN DAMAGE THE CORRECT ALIGNMENT OF THE AGB MODULE.

CAUTION: IF YOU HAVE ALREADY REMOVED AN AXIAL LINK, DO NOT REMOVE THE OTHER BECAUSE YOU MUST DO THE INSTALLATION OF THE DAMPER SUCCESSIVELY ON EACH AXIAL LINK. THUS, DO NOT REMOVE THE TWO LINKS FROM THE ENGINE AT THE SAME TIME, IT CAN DAMAGE THE CORRECT ALIGNMENT OF THE AGB MODULE.

(1) Obey the CAUTIONS above for this task.

F. Procedure

SUBTASK 72-63-00-420-008-F00

(1) Do these steps to install an upper or lower mount link.

(a) Lightly coat the link ends with graphite compound, D00601 [CP2101].

CAUTION: WHEN YOU INSTALL THE DAMPER ON THE LINK END, MAKE SURE THAT IT IS IN THE CORRECT POSITION. MAKE SURE THAT IT IS CENTERED AROUND THE BALL END OF THE LINK. IF YOU DO NOT ALIGN IT CORRECTLY, IT WILL CAUSE DAMAGE TO EQUIPMENT.

(b) Do this task: Axial Link End Dampers Installation, TASK 72-63-00-400-802-F00.

NOTE: The same procedure above is applicable for the mount link end without dampers.

(c) Do the installation test after the adjustment of the AGB position.

SUBTASK 72-63-00-420-009-F00

(2) Do these steps to install an axial link end.

(a) Attach the nut on the new axial link end.

NOTE: You must be careful when you tighten the nut. One link end has left hand threads.

(b) Install the new axial link end on the rod link.

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1) Adjust the link end until the dimension of the link is equal to the removed link.

NOTE: The steps to torque and safety the nuts is done in the AGB position adjustment.

(c) Lightly coat the axial link ends with graphite compound, D00601 [CP2101].

(d) Do this task: Axial Link End Dampers Installation, TASK 72-63-00-400-802-F00.

NOTE: The same procedure above is applicable for the mount link end without dampers.

(e) Do the installation test after the adjustment of the AGB position.

SUBTASK 72-63-00-820-002-F00

(3) Adjust the AGB position on the fan case, refer to this task Accessory Gearbox Installation, TASK 72-63-00-400-804-F00.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-63-00-410-006-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 72-63-00-440-005-F00

(2) Do this step:

Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-440-006-F00

(3) Remove the DO-NOT-OPERATE tag from the start lever.

H. AGB Installation Test

SUBTASK 72-63-00-790-005-F00

(1) Do a test of the AGB installation.

(a) Carefully clean the horizontal drive shaft housing of oil and other unwanted materials.

(b) Do the test given in the Power Plant Test Reference Table, TASK 71-00-00-800-811-F00.

1) Do a check for leaks in these areas:

a) The handcranking drive cover

b) The tubes connections

c) The TGB/AGB interface

d) The TGB/fan frame interface.

(c) If it is necessary, do this task:Replenish the Engine Oil, TASK 12-13-11-600-801.

END OF TASK

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ACCESSORY GEARBOX - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) The removal of the accessory gearbox.

(2) The installation of the accessory gearbox.

TASK 72-63-00-000-804-F00

2. Accessory Gearbox Removal

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, and Figure 406)

A. General

(1) For this procedure the accessory gearbox is referred to as the AGB.

B. References

Reference	Title
24-11-11-000-801	Integrated Drive Generator (IDG) Removal (P/B 401)
29-11-11-000-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal (P/B 401)
71-11-01-000-801-F00	Remove the Inlet Cowl (P/B 401)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
72-62-00-000-801-F00	Transfer Gearbox Assembly Removal (P/B 401)
73-11-01-000-801-F00	Fuel Pump Package Removal (P/B 401)
73-11-06-000-801-F00	IDG Oil Cooler Removal (P/B 401)
73-21-06-000-801-F00	Fan Wiring Harness Removal (P/B 401)
73-21-08-000-801-F00	EEC Alternator and Alternator Rotor Removal (P/B 401)
77-11-02-000-801-F00	N2 Speed Sensor Removal (P/B 401)
79-21-01-000-801-F00	Lubrication Unit Removal (P/B 401)
79-21-04-000-801-F00	Scavenge Oil Filter Assembly Removal (P/B 401)
79-32-01-000-801-F00	Oil Pressure Sensor Removal (P/B 401)
80-11-01-000-801-F00	Starter Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-9144	Sling - 3-Leg, Accessory Gearbox Handling Part #: 856A3519G05 Supplier: 58828
SPL-9145	Cradle - Removal/Installation, Accessory Gearbox Part #: 856A3525G03 Supplier: 58828
SPL-9146	Container - Shipping, Accessory Gearbox Module Part #: 856A3588G01 Supplier: 58828
SPL-9147	Protector - Mounting Pin, Accessory Gearbox Part #: 856A3591G01 Supplier: 58828

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D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Prepare for the Removal

SUBTASK 72-63-00-922-001-F00

WARNING: DO NOT TOUCH THE COMPONENTS OF THE OIL SYSTEM IF THE ENGINE IS HOT. THESE COMPONENTS STAY HOTTER THAN OTHER COMPONENTS. HOT COMPONENTS CAN BURN YOU.

WARNING: DO NOT OPEN THE OIL SYSTEM UNTIL THE PRESSURE GOES TO ZERO. THE PRESSURE GOES TO ZERO APPROXIMATELY 5 MINUTES AFTER AN ENGINE STOPS. A PRESSURIZED OIL SYSTEM CAN RELEASE A SPRAY OF HOT OIL THAT CAN BURN YOU.

WARNING: DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION: DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

CAUTION: DO NOT LET ALKALINE CLEANING FLUIDS TOUCH THE OIL WHICH WILL GO INTO THE ENGINE. VERY SMALL AMOUNTS OF ALKALINE CLEANING FLUIDS WILL DAMAGE THE ENGINE OIL.

DO NOT PUT THE OIL THAT IS DRAINED FROM THE ENGINE BACK INTO THE ENGINE.

(1) Obey the above warnings and cautions throughout this procedure.

(a) For the references, obey the warnings and cautions in those tasks.

SUBTASK 72-63-00-040-009-F00

(2) Do this step:

Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-040-010-F00

(3) Make sure the applicable start lever is in the CUTOFF position:

(a) Install DO-NOT-OPERATE tags on the start lever.

SUBTASK 72-63-00-010-003-F00

(4) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-63-00-010-004-F00

(5) Do this task: Remove the Inlet Cowl, TASK 71-11-01-000-801-F00.

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SUBTASK 72-63-00-030-001-F00

(6) Remove the J5, J6, J7 and J8 Wiring Harnesses. Refer to this task Fan Wiring Harness Removal, TASK 73-21-06-000-801-F00.

SUBTASK 72-63-00-030-002-F00

(7) Disconnect the TGB assembly from the AGB. Refer to this task Transfer Gearbox Assembly Removal, TASK 72-62-00-000-801-F00.

SUBTASK 72-63-00-030-003-F00

(8) Do this task: Integrated Drive Generator (IDG) Removal, TASK 24-11-11-000-801.

SUBTASK 72-63-00-030-004-F00

(9) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Removal, TASK 29-11-11-000-801-001.

SUBTASK 72-63-00-030-005-F00

(10) Do this task: Oil Pressure Sensor Removal, TASK 79-32-01-000-801-F00.

F. AGB Removal

SUBTASK 72-63-00-030-008-F00

(1) Do these steps to remove the bonding strap [36] from the fan frame (Figure 401):

(a) Remove the nut [45], washers [37] and [44], and the bolt [38] that attach the bonding strap [36] at Flange B5, hole position No 83.

(b) Remove the bonding strap [36] from the fan frame.

SUBTASK 72-63-00-030-009-F00

CAUTION: USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

CAUTION: DO NOT CHANGE THE AGB TURNBUCKLE LENGTH DURING THE PROCEDURE, THIS CAN CAUSE DAMAGE TO THE CORRECT ALIGNMENT OF THE AGB MODULE.

(2) Do these steps to remove the AGB turnbuckle [4] (Figure 401):

(a) Remove and discard the cotter pins [5] and [8].

(b) Remove the nuts [6] and [9], and washers [7] and [10].

(c) Remove the straight pin [1].

(d) Remove the straight pin [11].

(e) Remove the turnbuckle [4].

SUBTASK 72-63-00-030-010-F00

(3) Do this task: IDG Oil Cooler Removal, TASK 73-11-06-000-801-F00.

SUBTASK 72-63-00-030-011-F00

(4) Do this task: Fuel Pump Package Removal, TASK 73-11-01-000-801-F00.

SUBTASK 72-63-00-030-012-F00

(5) Do this task: Scavenge Oil Filter Assembly Removal, TASK 79-21-04-000-801-F00..

SUBTASK 72-63-00-030-013-F00

(6) Do this task: Lubrication Unit Removal, TASK 79-21-01-000-801-F00.

SUBTASK 72-63-00-030-014-F00

(7) Do this task: EEC Alternator and Alternator Rotor Removal, TASK 73-21-08-000-801-F00.

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SUBTASK 72-63-00-030-015-F00

(8) Do this task: Starter Removal, TASK 80-11-01-000-801-F00.

SUBTASK 72-63-00-030-016-F00

(9) (9) Do this task: N2 Speed Sensor Removal, TASK 77-11-02-000-801-F00.

SUBTASK 72-63-00-020-016-F00

CAUTION: USE TWO WRENCHES TO LOOSEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO LOOSEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(10) Remove the drain tube from the AGB (Figure 402):

(a) Loosen the coupling nut of the drain tube from the nipple.

(b) Remove the bolt [1] and the nut [2] which attach the clamp [3] on the bracket [4].

(c) Remove the two bolts [5] and the two nuts [6] which attach the two clamps [7] on the bracket [8].

(d) Remove the bolt [9] and the nut [10] which attach the clamp [11] on the bracket [12].

(e) Remove the drain tube [13].

(f) Remove the clamps [3], [7] and [11] from the drain tube [13].

SUBTASK 72-63-00-030-017-F00

(11) Do these steps to remove the brackets from the AGB (Figure 403):

(a) Remove the two bolts [6] which attach the bracket [7] on the Input AGB location.

(b) Remove the brackets [2] and [3] on the Input AGB location.

1) Remove the two bolts [8] and washers [9] which attach the bracket [2].

2) Remove the three bolts [4] and nuts [1] which attach the bracket [3].

(c) Remove the two bolts [32] which attach the bracket [31] on the Alternator Drive Pad.

(d) Remove the three bolts [32] which attach the bracket [31] on the Alternator Drive Pad.

(e) Remove the two bolts [12] and washers [13] and the two bolts [11] which attach the bracket [10] on the Fuel Pump Drive Pad.

(f) Remove the two bolts [34] which attach the bracket [33] on the Starter Drive Pad.

(g) Remove the two bolts [21] which attach the bracket [22] on the Fuel Pump Drive Pad.

(h) Remove the two bolts [20] which attach the bracket [19] on the Fuel Pump Drive Pad.

(i) Remove the bolts [16], washers [17] and nuts [14] and the two bolts [15] which attach the bracket [18] on the Fuel Pump Drive Pad.

(j) Remove the two bolts [36] which attach the bracket [35] on the Starter Drive Pad.

(k) Remove the two bolts [23] which attach the bracket [24] on the Fuel Pump Drive Pad.

(l) Remove the two bolts [38], washers [37] and two bolts [40] which attach the bracket [39] on the Hydraulic Pump Drive Pad.

(m) Remove the two bolts [27] which attach the bracket [28] on the Cover Filter.

(n) Remove the two bolts [25] which attach the bracket [26] on the Cover Filter.

(o) Remove the two bolts [29] which attach the bracket [30] on the Lubrication Unit Drive.

(p) Remove the two bolts [42] which attach the bracket [41] on the Hydraulic Pump Drive Pad.

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(q) Remove the four bolts [43] which attach the bracket [44] and the AGB tube [45] on the AGB housing.

(r) Remove the AGB tube [45].

(s) Remove and examine the gasket [46].

NOTE: Use the gasket if it is in good condition.

(t) Discard the gasket [46], if it is in unsatisfactory condition.

(u) Remove the two bolts [47] which attach the bracket [48] on the Hydraulic Pump Drive Pad.

(v) Remove the two bolts [49] which attach the bracket [50] on the Starter Drive Pad.

SUBTASK 72-63-00-020-015-F00

(12) Do these steps to remove the AGB from the engine (Figure 404 and Figure 405):

(a) Install the accessory gearbox cradle, SPL-9145, on the AGB [1] as follows (Figure 404):

1) Set the adjustment rack of the cradle support to position 4 and attach a hoist to the support shackle.

2) Remove the assembly from the cradle mount support.

3) Put the cradle support on the AGB [1].

4) Engage the two end lock pins given which hold the cradle support to the AGB.

5) Install the third lock pin in the AGB. Adjust the yoke with the screw (Figure 405 Detail B)

6) Apply a slight tension to the hoist.

CAUTION: USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

(b) Remove the upper rear link [16] and lower rear link [35] as follows (Figure 401):

1) Remove and discard the cotter pins [17] and [22].

2) Remove the nuts [18] and [23] and washers [19] and [24].

3) Remove the straight pins [14] and [20].

4) Remove the upper rear link [16] from the AGB and from the containment case.

5) Remove and discard the cotter pins [25] and [30].

6) Remove the nuts [26] and [31] and washers [27] and [32].

7) Remove the straight pins [28] and [33].

8) Remove the lower rear link [35] from the AGB and from the containment case.

CAUTION: USE TWO WRENCHES TO REMOVE THE STRAIGHT PINS. ONE TO HOLD THE STRAIGHT PIN, THE OTHER TO LOOSEN THE NUT. DO NOT TURN THE STRAIGHT PINS, THIS CAN CAUSE DAMAGE TO THE PART.

(c) Remove the attachment hardware from the AGB as follows (Figure 401):

1) Remove and discard the cotter pins [39] and [48].

2) Remove the nuts [40] and [49], washer [50] and special washer assy [42] with nut [43], bolt [41] and bonding strap [36].

3) Install the mounting pin protector, SPL-9147 on the straight pin [46].

4) Remove the straight pin [46] from the upper clevis mount.

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5) Remove the pin protector from the straight pin [46].

6) Install the mounting pin protector, SPL-9147 on the straight pin [47].

7) Remove the straight pin [47] from the lower clevis mount.

8) Remove the pin protector from the straight pin [47] and store the pin protector in the container.

(d) Remove the AGB and the cradle support assembly from the engine (Figure 405).

(e) Install the assembly on the cradle mount support and hold it with the lock pins of the tool.

(f) Install the covers and caps for protection on all drive pads and equipment holes of the AGB.

SUBTASK 72-63-00-550-001-F00

(13) Do these steps to install the AGB in the storage position (Figure 405):

(a) Install the accessory gearbox sling, SPL-9144, as follows:

1) Install the two sectors at each end of the AGB and hold them with the two lockpins of the tool.

2) Attach a hoist to the 3-leg sling. Apply a slight tension to the hoist.

(b) Remove the three lock pins and remove the AGB from the cradle support. Disengage the yoke.

(c) Install the AGB in the accessory gearbox shipping container, SPL-9146, and remove the 3-leg sling.

END OF TASK

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B0036500
1508305 S0000276278_V2

AGB Upper and Lower Links Installation
Figure 401/72-63-00-990-806-F00 (Sheet 1 of 4)

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AGB Upper and Lower Links Installation
Figure 401/72-63-00-990-806-F00 (Sheet 2 of 4)

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AGB Upper and Lower Links Installation
Figure 401/72-63-00-990-806-F00 (Sheet 3 of 4)

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B0036800
1508355 S0000276281_V2

AGB Upper and Lower Links Installation
Figure 401/72-63-00-990-806-F00 (Sheet 4 of 4)

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2421899 S0000559371_V1

Drain Tube Installation
Figure 402/72-63-00-990-811-F00 (Sheet 1 of 2)

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2422051 S0000559380_V1

Drain Tube Installation
Figure 402/72-63-00-990-811-F00 (Sheet 2 of 2)

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B0035200
1508326 S0000276284_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 1 of 11)

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B0035300
1508208 S0000276285_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 2 of 11)

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B0035400

1508217 S0000276286_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 3 of 11)

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H0035500
1508222 S0000276287_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 4 of 11)

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E

F

B0035600

1508240 S0000276288_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 5 of 11)

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B0035701

1508249 S0000276290_V3

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 6 of 11)

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H0035800
1508257 S0000276291_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 7 of 11)

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H0035900
1508267 S0000276293_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 8 of 11)

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K

L

B0036000

1508285 S0000276295_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 9 of 11)

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B0036100
1508303 S0000276297_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 10 of 11)

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N

B0036200
1508312 S0000276299_V2

AGB Brackets Installation
Figure 403/72-63-00-990-807-F00 (Sheet 11 of 11)

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B0036300

1508277 S0000276300_V2

AGB Cradle Installation
Figure 404/72-63-00-990-808-F00 (Sheet 1 of 2)

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B

C

B0036400
1508295 S0000276301_V2

AGB Cradle Installation
Figure 404/72-63-00-990-808-F00 (Sheet 2 of 2)

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B0036900
1508286 S0000276302_V2

AGB Installation and Storage
Figure 405/72-63-00-990-809-F00 (Sheet 1 of 2)

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B0037000
1508283 S0000276312_V2

AGB Installation and Storage
Figure 405/72-63-00-990-809-F00 (Sheet 2 of 2)

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B0037100
1508368 S0000276305_V2

AGB (on Fan Case) Adjustment
Figure 406/72-63-00-990-810-F01 (Sheet 1 of 2)

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B0037200
1508361 S0000276306_V2

AGB (on Fan Case) Adjustment
Figure 406/72-63-00-990-810-F01 (Sheet 2 of 2)

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TASK 72-63-00-400-804-F00

3. Accessory Gearbox Installation

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, and Figure 406)

A. General

(1) For this procedure the accessory gearbox is referred to as the AGB.

B. References

Reference	Title
24-11-11-400-801	Integrated Drive Generator (IDG) Installation (P/B 401)
29-11-11-400-801-001	Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation (P/B 401)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-01-400-801-F00	Install the Inlet Cowl (P/B 401)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-62-00-400-801-F00	Transfer Gearbox Assembly Installation (P/B 401)
73-11-01-400-801-F00	Fuel Pump Package Installation (P/B 401)
73-11-06-400-801-F00	IDG Oil Cooler Installation (P/B 401)
73-21-06-400-801-F00	Fan Wiring Harness Installation (P/B 401)
73-21-08-400-801-F00	EEC Alternator and Alternator Rotor Installation (P/B 401)
77-11-02-400-801-F00	N2 Speed Sensor Installation (P/B 401)
79-21-01-400-801-F00	Lubrication Unit Installation (P/B 401)
79-21-04-400-801-F00	Scavenge Oil Filter Assembly Installation (P/B 401)
79-32-01-400-801-F00	Oil Pressure Sensor Installation (P/B 401)
80-11-01-400-801-F00	Starter Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-9144	Sling - 3-Leg, Accessory Gearbox Handling Part #: 856A3519G05 Supplier: 58828
SPL-9145	Cradle - Removal/Installation, Accessory Gearbox Part #: 856A3525G03 Supplier: 58828
SPL-9146	Container - Shipping, Accessory Gearbox Module Part #: 856A3588G01 Supplier: 58828
SPL-9147	Protector - Mounting Pin, Accessory Gearbox Part #: 856A3591G01 Supplier: 58828
SPL-9148	Fixture - Alignment, Accessory Gearbox Part #: 856A3709G01 Supplier: 58828

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518
G02345 [CP8001]	Wire - Safety, 0.032 Inch (0.8 mm) Diameter	CFM CP8001, AMS 5687

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(Continued)

Reference	Description	Specification
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.032 inch (0.813 mm) Diameter	M50 TF 9 CL-A

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Accessory Gearbox Installation

SUBTASK 72-63-00-922-002-F00

WARNING: DO NOT LET OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION: DO NOT LET HOT OIL GET ON THE ENGINE OR OTHER COMPONENTS. IMMEDIATELY CLEAN THE COMPONENT IF OIL FALLS ON IT. OIL CAN CAUSE DAMAGE TO PAINT AND RUBBER.

CAUTION: DO NOT LET ALKALINE CLEANING FLUIDS TOUCH THE OIL WHICH WILL GO INTO THE ENGINE. VERY SMALL AMOUNTS OF ALKALINE CLEANING FLUIDS WILL DAMAGE THE ENGINE OIL.

DO NOT PUT THE OIL THAT IS DRAINED FROM THE ENGINE BACK INTO THE ENGINE.

(1) Obey the above warnings and cautions throughout this procedure.

(a) For the references, obey the warnings and cautions in those tasks.

SUBTASK 72-63-00-490-001-F00

(2) Do these steps to remove the AGB from the storage position (Figure 405).

(a) Install the accessory gearbox sling, SPL-9144 on the AGB as follows:

1) Install the two sectors at each end of the AGB and hold them with the two lockpins of the tool.

2) Attach a hoist to the 3-leg sling.

3) Apply a slight tension to the hoist.

(b) Remove the AGB from the accessory gearbox shipping container, SPL-9146.

1) Remove the AGB above the accessory gearbox cradle, SPL-9145.

SUBTASK 72-63-00-420-013-F00

(3) Do these steps to install the AGB on the engine (Figure 404):

(a) Install the AGB [1] on the accessory gearbox cradle, SPL-9145 as follows:

1) Set the AGB [1] on the cradle with the cradle support.

2) Slowly lower the AGB [1] onto the cradle support.

3) Engage the two end lock pins of the tool which hold the cradle support to the AGB.

4) Install the third lock pin in the AGB. Adjust the yoke with the screw.

5) Set the adjustment rack of the cradle support to position 4 and attach a hoist to the support shackle.

(b) Remove the covers and caps from all drive pads and equipment holes of the AGB.

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(c) Apply a slight tension to the hoist.

(d) Remove the AGB and the cradle support assembly from the cradle mount support.

(e) Install the AGB and the cradle support assembly on the engine (Figure 405 and Figure 401).

1) Align the upper and lower clevis mounts on the AGB and fan case.

CAUTION: USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

(f) Install the attachment hardware on the AGB as follows:

1) Lightly coat the straight pin [46] and the straight pin [47] with graphite compound, D00601 [CP2101].

2) Install the mounting pin protector, SPL-9147 on the straight pin [47].

3) Install the straight pin [47] at the lower clevis mount.

4) Remove the pin protector from the straight pin [47].

5) Install the mounting pin protector, SPL-9147 on the straight pin [46].

6) Install the straight pin [46] at the upper clevis mount.

7) Remove the pin protector from the straight pin [46] and store the protector in the accessory gearbox shipping container, SPL-9146.

8) Install the nut [40] and nut [49], washer [50] and special washer [42] with nut [43], bolt [41] and bonding strap [36].

9) Tighten the nut [40] and nut [49] to 840-930 pound-inches (95-105 Newton meters).

10) Install the new cotter pin [39] and cotter pin [48].

CAUTION: USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

(g) Install the upper rear link [16] and lower rear link [35] as follows (Figure 401):

1) Lightly coat the straight pin [28] and the straight pin [33] with graphite compound, D00601 [CP2101].

2) Install the lower rear link [35] on the AGB and on the containment case.

3) Install the straight pin [28] and the straight pin [33].

4) Install the nut [26] and nut [31] and washer [27] and washer [32].

5) Tighten the nut [26] and nut [31] to 840-930 pound-inches (95-105 Newton meters).

6) Install the new cotter pin [25] and cotter pin [30].

7) Lightly coat the straight pin [14] and the straight pin [20] with graphite compound, D00601 [CP2101].

8) Install the upper rear link [16] on the AGB and on the containment case.

9) Install the straight pin [14] and the straight pin [20].

10) Install the nut [18] and nut 23] and washer [19] and washer [24].

11) Tighten the nut [18] and nut [23] to 840-930 pound-inches (95-105 Newton meters).

12) Install the new cotter pin [17] and cotter pin [22].

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(h) Remove the lock pins which hold the AGB cradle to the AGB.

(i) Remove the AGB cradle from the AGB (Figure 404).

SUBTASK 72-63-00-430-001-F00

(4) Do these steps to install the brackets on the AGB (Figure 403).

AKS ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

(a) Lightly coat the threads of the bolts [4], [5], [6], [8], [11], [12], [15], [16], [20], [21], [23], [25], [27], [29], [32], [34], [34], [36], [38], [40] and [42] with graphite compound, D00601 [CP2101].

AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(b) Lightly coat the threads of the bolts [4], [5], [6], [8], [11], [12], [15], [16], [20], [21], [23], [25], [27], [29], [32], [34], [36], [38], [40], [42], [43], [47] and [49] with graphite compound, D00601 [CP2101].

(c) Install the bracket [50] on the Starter Drive Pad and attach with the two bolts [49].

(d) Install the bracket [48] on the Hydraulic Pump Drive Pad and attach with the two bolts [47].

(e) Install the gasket [46] on the AGB housing.

(f) Install the AGB tube [45] and the bracket [44] and attach with the four bolts [43].

AKS ALL

(g) Install the bracket [41] on the Hydraulic Pump Drive Pad and attach with the two bolts [42].

(h) Install the bracket [30] on the Lubrication Unit Drive and attach with the two bolts [29].

(i) Install the bracket [26] on the Cover Filter and attach with the two bolts [25].

(j) Install the bracket [28] on the Cover Filter and attach with the two bolts [27]

(k) Install the bracket [39] on the Hydraulic Pump Drive Pad and attach with the two bolts [38] and washers [37] and the two bolts [40].

(l) Install the bracket [24] on the Fuel Pump Drive Pad and attach with the two bolts [23].

(m) Install the bracket [35] on the Starter Drive Pad and attach with the two bolts [36].

(n) Install the bracket [18] on the Fuel Pump Drive Pad and attach with the two bolts [16], washers [17] and nuts [14] and the two bolts [15].

(o) Install the bracket [19] on the Fuel Pump Drive Pad and attach with the two bolts [20].

(p) Install the bracket [22] on the Fuel Pump Drive Pad and attach with the two bolts [21].

(q) Install the bracket [33] on the Starter Drive Pad and attach with the two bolts [34].

(r) Install the bracket [10] on the Fuel Pump Drive Pad and attach with the two bolts [12] and washers [13] and the two bolts [11].

(s) Install the brackets [2] and [3] on the Input AGB location.

1) Attach the bracket [2] with the two bolts [8] and washers [9].

2) Attach the bracket [3] with the three bolts [4] and nuts [1].

AKS ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

(t) Install the bracket [31] on the Alternator Drive Pad and attach with the two bolts [32].

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AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(u) Install the bracket [31] on the Alternator Drive Pad and attach with the three bolts [32].

AKS ALL

(v) Install the bracket [7] on the Input AGB location and attach with the two bolts [6].

AKS ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

(w) Torque the bolts [4], [5], [6], [8], [11], [12], [15], [16], [20], [21], [23], [25], [27], [29], [32], [34], [34], [36], [38], [40], [42] and nuts [1], [14] to 95-105 pound-inches (11-12 Newton meters).

AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

(x) Torque the bolts [4], [5], [6], [8], [11], [12], [15], [16], [20], [21], [23], [25], [27], [29], [32], [34], [36], [38], [40], [42], [47], [49] to 95-105 pound-inches (11-12 Newton meters).

(y) Torque the bolts [43] to 49-53 pound-inches (5.5-6.0 Newton meters).

SUBTASK 72-63-00-420-014-F00

CAUTION: USE TWO WRENCHES TO TIGHTEN THE TUBE COUPLING NUTS. USE ONE TO HOLD THE MATING PART, AND THE OTHER TO TIGHTEN THE COUPLING NUT. IF YOU DO NOT USE TWO WRENCHES, DAMAGE TO THE TUBES AND MATING PART CAN OCCUR.

(5) Install the drain tube on the AGB (Figure 402).

(a) Lightly coat the threads of the nipple of the AGB with oil, D00599 [CP2442].

(b) Lightly coat the threads of the bolts [1], [5] and [9] with graphite compound, D00601 [CP2101].

(c) Install the four clamps [3], [7] and [11], on the drain tube [13].

(d) Tighten by hand the coupling nut of the drain tube [13] on the nipple.

(e) Tighten by hand the bolt [1] and the nut [2] to attach the clamp [3] on the bracket [4].

(f) Tighten by hand the two bolts [5] and the two nuts [6] to attach the two clamps [7] on the bracket [8].

(g) Tighten by hand the bolt [9] and the nut [10] to attach the clamp [11] on the bracket [12].

(h) Torque the bolts [1], [5], [9] to 63-72 pound-inches (7-8 Newton meters).

(i) Make sure that the drain tube [13] is installed without strain.

(j) Torque the coupling nut of the drain tube [13] to 270-315 pound-inches (30-35 Newton meters).

AKS ALL

SUBTASK 72-63-00-430-002-F00

(6) Do these steps to install the bonding strap on the fan frame (Figure 401).

(a) Put the bonding strap [36] on the fan frame.

(b) Install the bonding strap [36] on the Flange B5 at hole position No 83 and attach with the nut [45], washers [37] and [44], and the bolt [38].

(c) Tighten the nut [45] to 95-105 pound-inches (11-12 Newton-meters).

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SUBTASK 72-63-00-430-003-F00

CAUTION: USE TWO WRENCHES TO INSTALL THE STRAIGHT PINS. HOLD THE STRAIGHT PIN WITH ONE, AND TIGHTEN THE NUT WITH THE OTHER WRENCH. DO NOT TURN THE STRAIGHT PINS. IF YOU TURN THE STRAIGHT PINS, YOU WILL CAUSE DAMAGE.

CAUTION: DO NOT CHANGE THE AGB TURNBUCKLE LENGTH DURING THE PROCEDURE, THIS CAN CAUSE DAMAGE TO THE CORRECT ALIGNMENT OF THE AGB MODULE.

(7) Do these steps to install the AGB turnbuckle [4] (Figure 401).

(a) Lightly coat the straight pins [1] and [11] with graphite compound, D00601 [CP2101].

(b) Install the turnbuckle [4].

(c) Install the straight pin [11].

(d) Install the straight pin [1].

(e) Install the nuts [6] and [9], and washers [7] and [10].

(f) Tighten the nuts [6] and [9] to 840-930 pound-inches (95-105 Newton-meters).

(g) Install the new cotter pins [5] and [8].

SUBTASK 72-63-00-820-001-F00

(8) Do these steps to adjust the AGB position on the fan case (Figure 406).

(a) Install the base of the accessory gearbox alignment fixture, SPL-9148 on the fan case and attach it with the three knurled buttons.

(b) Install the depth gage, 856A3709P06, in the guide rail, 856A3709P05, of the AGB alignment fixture.

(c) Put the depth gage on the IDG pad (fan case side)

(d) Measure the dimension (DIM A).

(e) Remove the depth gage and put it on the IDG pad (opposite side).

(f) Measure the dimension (DIM B).

(g) For the correct alignment of the AGB, make sure that you have these dimensions:

1) Dimension (DIM B) = Dimension (DIM A) +/- 0.0020 inch (0.05 mm).

2) If not, adjust the dimensions (DIM A) and (Dim B) as follows:

a) Cut the lockwire or the cable which safety the nuts of the axial links ends.

b) Loosen the nuts of the axial link ends.

c) Turn the link rod.

d) Measure the dimensions (DIM A) and (DIM B) again.

<1> Make sure that the dimensions are correct.

<2> If it is necessary, adjust the dimensions again.

<3> If the dimensions are correct, continue to the next step.

e) Hold the link rod in position and tighten the nuts

f) Torque the nuts to 675-745 pounds inches (76-85 Newton meters).

(h) Make sure that the dimensions (DIM A) and (DIM B) are not changed.

1) If it is necessary, do the steps to adjust and measure the dimensions again

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(i) Safety the nuts of the turnbuckle with safety wire, G02345 [CP8001] or cable, G50065 [CP8006].

(j) Remove the AGB alignment fixture from the fan case.

SUBTASK 72-63-00-430-004-F00

(9) Do this task: N2 Speed Sensor Installation, TASK 77-11-02-400-801-F00.

SUBTASK 72-63-00-430-005-F00

(10) Do this task: Starter Installation, TASK 80-11-01-400-801-F00.

SUBTASK 72-63-00-430-006-F00

(11) Do this task: EEC Alternator and Alternator Rotor Installation, TASK 73-21-08-400-801-F00.

SUBTASK 72-63-00-430-007-F00

(12) Do this task: Lubrication Unit Installation, TASK 79-21-01-400-801-F00.

SUBTASK 72-63-00-430-008-F00

(13) Do this task: Scavenge Oil Filter Assembly Installation, TASK 79-21-04-400-801-F00.

SUBTASK 72-63-00-430-009-F00

(14) Do this task: Fuel Pump Package Installation, TASK 73-11-01-400-801-F00.

SUBTASK 72-63-00-430-010-F00

(15) Do this task: IDG Oil Cooler Installation, TASK 73-11-06-400-801-F00.

SUBTASK 72-63-00-430-011-F00

(16) Do this task: Oil Pressure Sensor Installation, TASK 79-32-01-400-801-F00.

SUBTASK 72-63-00-430-014-F00

(17) Do this task: Hydraulic Systems A and B Engine-Driven Pump (EDP) Installation, TASK 29-11-11-400-801-001.

SUBTASK 72-63-00-430-015-F00

(18) Do this task: Integrated Drive Generator (IDG) Installation, TASK 24-11-11-400-801.

SUBTASK 72-63-00-430-016-F00

(19) Connect the TGB assembly from the AGB (TASK 72-62-00-400-801-F00).

SUBTASK 72-63-00-430-017-F00

(20) Install the J5, J6, J7 and J8 Wiring Harnesses (TASK 73-21-06-400-801-F00).

SUBTASK 72-63-00-410-004-F00

(21) Do this task: Install the Inlet Cowl, TASK 71-11-01-400-801-F00.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-63-00-440-003-F00

(1) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 72-63-00-440-004-F00

(2) Remove the DO-NOT-OPERATE tags from the start levers.

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SUBTASK 72-63-00-410-005-F00

(3) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

H. Post-Installation Test

SUBTASK 72-63-00-790-003-F00

(1) Do the tests (fuel pump package and AGB) that are given in the Power Plant Test Reference Table, TASK 71-00-00-800-811-F00.

(a) Do a check for leaks in these areas:

1) The handcranking drive cover
2) The tube connections
3) The TGB/AGB interface
4) The TGB/fan frame interface.
5) All connections with components, pads and cover.

END OF TASK

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ACCESSORY GEARBOX - INSPECTION/CHECK

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. This procedure has one task:
      (1) The inspection of the accessory gearbox (AGB).

TASK 72-63-00-200-801-F00

2. **Accessory Gearbox Inspection**
(Figure 601)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This is a visual inspection of the accessory gearbox (AGB) housing, clevis mounts, mount links, turnbuckle, and lockwire.

B. References

Reference	Title
70-20-01-800-804-F00	Lockwire Installation (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
72-63-00-000-802-F00	Axial Link End Dampers Removal (P/B 201)
72-63-00-000-803-F00	Axial Link End or Upper (Lower) Mount Link Removal (P/B 201)
72-63-00-000-804-F00	Accessory Gearbox Removal (P/B 401)
72-63-00-400-802-F00	Axial Link End Dampers Installation (P/B 201)
72-63-00-400-803-F00	Axial Link End or Upper (Lower) Mount Link Installation (P/B 201)
72-63-00-400-804-F00	Accessory Gearbox Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 72-63-00-010-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 72-63-00-210-001-F00

(2) If you find damage that is more than the limits, replace the AGB, unless you are given other instructions.
   (a) These are the tasks:Accessory Gearbox Removal, TASK 72-63-00-000-804-F00, Accessory Gearbox Installation, TASK 72-63-00-400-804-F00.

SUBTASK 72-63-00-210-006-F00

(3) Visually examine the mount fittings on the fan frame (Figure 601, Sheet 3):
   (a) Cracks that extend from the bolt holes in the mount lugs
      1) Not serviceable.

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2) A Continue-In-Service limit of 10 cycles is permitted for one crack that goes through one mounting lug bolt hole, not more than 0.25 inch (6.35 mm) in length.

(b) Cracks in the areas of the mount lugs

1) Not serviceable.

2) A Continue-In-Service limit of 10 cycles is permitted for one crack 0.25 inch (6,35 mm) in length.

(c) Nicks, marks, and scratches

1) There is no limit to the number of nicks, marks, and scratches which are permitted with these conditions:

a) Not more than 1.0 inch (25.4 mm) in length

b) Not more than 0.02 inch (0.51 mm) in depth, after you remove the high metal

c) Minimum separation of 1.0 inch (25.4 mm) between areas of damage.

SUBTASK 72-63-00-210-002-F00

(4) Examine the AGB housing for damage:

NOTE: If you find AGB displacement while working on any of the AGB mounted equipment, it is recommended to do an inspection of the AGB mounts and rod links within the next 200 hours or 100 cycles.

(a) If you find AGB displacement when you do work on the AGB mount equipment, do this step:

1) It is recommended to do an inspection of the AGB mounts and rod links in the subsequent 200 hours or 100 cycles.

(b) Cracks

1) Not serviceable.

(c) Nicks, dents, or scratches

1) All damage is permitted with this limit:

a) Not more than 0.035 in. (0.89 mm) in depth after you remove the high metal.

SUBTASK 72-63-00-210-003-F00

(5) Examine the AGB clevis mounts for damage:

(a) Cracks

1) Not serviceable.

(b) Loose bushing in the clevis mounts

1) Not permitted.

(c) Loose mount pin

1) Not permitted.

a) Tighten the mount pin if it is necessary.

(d) Cracks or crazing in the AGB mount rubber are permitted.

(e) Eccentricity of the mounting pin axis relative to the axis of the outer bushing of the rubber damper.

1) Maximum Serviceable Limit: Maximum allowed eccentricity (half of the difference between the minimum and maximum clearance) is 0.06 in. (1.5 mm) (Figure 601, Sheet 4).

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2) A continue in service limit of 10 cycles or 25 hours is permitted to replace the dampers (ESM repair), if there is no contact metal against metal.

SUBTASK 72-63-00-210-005-F00

(6) Examine the AGB upper and lower mount links, turnbuckle, and associated clevis for damage (Figure 602):

(a) Axial looseness of mount link or turnbuckle

1) Any amount is permitted if there is no contact between the mount links or turnbuckle extremity and associated clevis.

CAUTION: THE MOUNT LINKS OR TURNBUCKLES SURFACES MUST BE PARALLEL AS FAR AS POSSIBLE TO THE CLEVIS SURFACES DURING THE CLEARANCE CHECK. DO NOT ROTATE THE ROD LINK OR TURNBUCKLE. THE CLEARANCE CHECK MUST BE DONE AT THE EXTREMITY OF THE LINKS. AN INCORRECT CHECK CAN LEAD TO EQUIPMENT DAMAGE.

(b) If a mount link or turnbuckle extremity is in contact with the AGB or engine clevis, 500 cycles operation maximum in service extension is permitted before you do the installation of a damper.

NOTE: On engine POST CFM56-7B-SB 72-0465, you already have a damper at each link end.

1) Do these tasks for each link to replace the dampers:

a) Axial Link End Dampers Removal, TASK 72-63-00-000-802-F00.,

b) Axial Link End Dampers Installation, TASK 72-63-00-400-802-F00.

(c) For the AGB and engine clevis of the mount links

1) Impacts, marks, wear or fretting

a) Any amount permitted if less than 0.008 in. (0.2 mm) in depth.

(d) For the AGB upper and lower mount links, turnbuckle (if removed during damper installation). (Figure 602, Sheet 2)

1) Spherical bearing axial wear

a) Dim X = 0.1799 inch max (4.57 mm)

2) Spherical bearing radial wear

a) Any amount

3) Ball groove and corrosion

a) Any amount

4) External ring with missing lubricating lining

a) Any amount

5) External ring tears

a) Not serviceable

6) If you find damage that is more than the limits, replace the axial link end(s) or the mount link.

a) These are the tasks:Axial Link End or Upper (Lower) Mount Link Removal, TASK 72-63-00-000-803-F00

Axial Link End or Upper (Lower) Mount Link Installation, TASK 72-63-00-400-803-F00.

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<1> This task includes an adjustment of the AGB position.

SUBTASK 72-63-00-212-001-F00

(7) Examine the axial link ends dampers for damage (Figure 602):

NOTE: You must do this procedure only for engine POST CFM56-7B-SB 72-0465.

(a) Tears, cut.

1) Any amount is permitted.

(b) Missing dampers straps.

1) Any amount is permitted.

SUBTASK 72-63-00-210-004-F00

(8) Look for damage to the lockwire:

(a) Broken, missing or loose lockwire

1) Not permitted.

a) Do this task: Lockwire Installation, TASK 70-20-01-800-804-F00.

SUBTASK 72-63-00-410-001-F00

(9) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

END OF TASK

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Accessory Gearbox Inspection
Figure 601/72-63-00-990-801-F00 (Sheet 1 of 4)

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Accessory Gearbox Inspection
Figure 601/72-63-00-990-801-F00 (Sheet 2 of 4)

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Accessory Gearbox Inspection
Figure 601/72-63-00-990-801-F00 (Sheet 3 of 4)

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Accessory Gearbox Inspection
Figure 601/72-63-00-990-801-F00 (Sheet 4 of 4)

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Accessory Gearbox Mounts Inspection
Figure 602/72-63-00-990-802-F00 (Sheet 1 of 2)

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Accessory Gearbox Mounts Inspection
Figure 602/72-63-00-990-802-F00 (Sheet 2 of 2)

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HANDCRANKING DRIVE COVER - MAINTENANCE PRACTICES

1. General

A. This procedure has these tasks:

(1) The removal of the handcranking drive cover

(2) The installation of the handcranking drive cover.

TASK 72-63-01-000-801-F00

2. Handcranking Drive Cover Removal

(Figure 201)

A. General

(1) The handcranking drive cover (referred to as the cover) is on the forward side of the accessory gearbox, just below the EEC alternator.

(2) For this procedure the accessory gearbox will be referred to as the AGB.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for Removal

SUBTASK 72-63-01-010-001-F00

(1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

E. Procedure

AKS ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

SUBTASK 72-63-01-020-001-F00

(1) Do these steps to remove the cover [3] from the drive pad:

(a) Remove the four bolts [1] and the four washers [2] that attach the cover [3] to the AGB [5].

(b) Install three of the removed bolts [1] in the three threaded holes of the cover [3].

1) Turn the three bolts [1] until you can remove the cover [3] from the AGB [5].

(c) Remove and discard the two O-rings [4].

(d) Move the cover [3] until it is away from the drive pad on the AGB [5].

NOTE: Do not remove the lanyard that attaches the cover [3] to the AGB [5].

AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

SUBTASK 72-63-01-020-004-F00

(2) Do these steps to remove the cover [3] from the drive pad:

(a) Remove the three bolts [1] and three washers [2] that attach the cover [3] to the AGB [5].

NOTE: Do not remove the lanyard that attaches the cover [3] to the AGB [5].

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AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE (Continued)

(b) Remove and discard the O-ring [4].

AKS ALL

——— END OF TASK ———

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Handcranking Drive Cover Installation
Figure 201/72-63-01-990-801-F00 (Sheet 1 of 2)

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Handcranking Drive Cover Installation
Figure 201/72-63-01-990-801-F00 (Sheet 2 of 2)

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TASK 72-63-01-400-801-F00

3. Handcranking Drive Cover Installation

(Figure 201)

A. General

(1) For this procedure, the accessory gearbox will be referred to as the AGB.

B. References

Reference	Title
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-0001)	CFM CP2442
D00601 [CP2101]	High-temperature graphite compound	SAE AMS 2518

D. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

E. Procedure

AKS ALL; FOR ALL NON 7BE PRE CFM SB 72-0564 OR PRE SB 72-0879

SUBTASK 72-63-01-420-001-F00

CAUTION: INSTALL THE COVER ON THE AGB. WITHOUT THE COVER, OIL LEAKS WILL OCCUR. THIS CAN CAUSE DAMAGE TO THE ENGINE.

CAUTION: INSTALL NEW O-RINGS ON THE COVER OF THE AGB. USED O-RINGS CAN CAUSE OIL LEAKS. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(1) Do these steps to attach the cover [3] to the handcranking drive pad of the AGB:

NOTE: Installation of the AGB hand-cranking cover must be classified as “flight safety sensitive maintenance”. An independent inspection of the correct installation of the hand-cranking cover must be carried out prior to release to service of the aircraft or the engine, as applicable.

(a) Lubricate two new O-rings [4] with oil, D00599 [CP2442].

(b) Put the two new O-rings [4] on the cover [3].

(c) Install the cover [3] on the handcranking drive pad of the AGB [5].

(d) Lightly lubricate the threads of the bolt [1] with graphite compound, D00601 [CP2101].

(e) Install the four bolts [1] and four washers [2].

1) Tighten the bolts to 97-106 pound-inches (11-12 Newton meters).

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AKS ALL; FOR ALL NON 7BE POST CFM SB 72-0564 OR POST SB 72-0879 OR CFM56-7BE

SUBTASK 72-63-01-420-002-F00

CAUTION: INSTALL THE COVER ON THE AGB. WITHOUT THE COVER, OIL LEAKS WILL OCCUR. THIS CAN CAUSE DAMAGE TO THE ENGINE.

CAUTION: INSTALL NEW O-RINGS ON THE COVER OF THE AGB. USED O-RINGS CAN CAUSE OIL LEAKS. THIS CAN CAUSE DAMAGE TO THE ENGINE.

(2) Do these steps to attach the cover [3] to the handcranking drive pad of the AGB:

(a) Lubricate the new O-ring [4] with oil, D00599 [CP2442].

(b) Put the new O-ring [4] on the cover [3].

(c) Install the cover [3] on the handcranking drive pad of the AGB [5].

(d) Lightly lubricate the threads of the bolts [1] with graphite compound, D00601 [CP2101].

(e) Install the three bolts [1] and three washers [2].

1) Tighten the bolts to 97-106 pound-inches (11-12 Newton meters).

AKS ALL

F. Handcranking Driver Cover Installation Test

SUBTASK 72-63-01-790-001-F00

(1) Do the test that is listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-63-01-410-001-F00

(1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

END OF TASK

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ENGINE MODULES - REMOVAL/INSTALLATION

1. **General**
   A. This procedure contains scheduled maintenance task data.
   B. These 15 tasks are for life limited components and modules to be removed and discarded at scheduled intervals.

TASK 72-99-99-000-801-F00

2. **Discard the Fan Disk**

   A. Procedure

   SUBTASK 72-99-99-020-001-F00

   (1) Remove and discard the fan disk.

END OF TASK

TASK 72-99-99-000-802-F00

3. **Discard the Booster Spool**

   A. Procedure

   SUBTASK 72-99-99-020-002-F00

   (1) Remove and discard the booster spool.

END OF TASK

TASK 72-99-99-000-803-F00

4. **Discard the Fan Shaft**

   A. Procedure

   SUBTASK 72-99-99-000-001-F00

   (1) Remove and discard the fan shaft.

END OF TASK

TASK 72-99-99-000-804-F00

5. **Discard the Stages 1 and 2 Spool**

   A. Procedure

   SUBTASK 72-99-99-020-003-F00

   (1) Remove and discard the stages 1 and stage 2 spool.

END OF TASK

TASK 72-99-99-000-805-F00

6. **Discard the Stage 3 Disk**

   A. Procedure

   SUBTASK 72-99-99-020-004-F00

   (1) Remove and discard the stage 3 disk.

END OF TASK

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TASK 72-99-99-000-806-F00

7. Discard the Stages 4 thru 9 Spools

A. Procedure

SUBTASK 72-99-99-020-005-F00

(1) Remove and discard the stages 4 thru 9 spools.

END OF TASK

TASK 72-99-99-000-807-F00

8. Discard the Front Shaft

A. Procedure

SUBTASK 72-99-99-020-006-F00

(1) Remove and discard the front shaft.

END OF TASK

TASK 72-99-99-000-808-F00

9. Discard the Rear Rotation (CDP) Seal

A. Procedure

SUBTASK 72-99-99-020-007-F00

(1) Remove and discard the rear rotating (CDP) seal.

END OF TASK

TASK 72-99-99-000-809-F00

10. Discard the HPT Front Shaft

A. Procedure

SUBTASK 72-99-99-020-008-F00

(1) Remove and discard the HPT front shaft.

END OF TASK

TASK 72-99-99-000-810-F00

11. Discard the HPT Front Rotating Air Seal

A. Procedure

SUBTASK 72-99-99-020-009-F00

(1) Remove and discard the HPT front rotating air seal.

END OF TASK

TASK 72-99-99-000-811-F00

12. Discard the HPT Disk

A. Procedure

SUBTASK 72-99-99-020-010-F00

(1) Remove and discard the HPT disk.

END OF TASK

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TASK 72-99-99-000-812-F00

13. Discard the HPT Front and Rear Shafts

A. Procedure

SUBTASK 72-99-99-020-011-F00

(1) Remove and discard the HPT front and rear shafts.

END OF TASK

TASK 72-99-99-000-813-F00

14. Discard the LPT Rotor Support

A. Procedure

SUBTASK 72-99-99-000-002-F00

(1) Remove and discard the LPT rotor support.

END OF TASK

TASK 72-99-99-000-814-F00

15. Discard the LPT Shaft

A. Procedure

SUBTASK 72-99-99-000-003-F00

(1) Remove and discard the LPT shaft.

END OF TASK

TASK 72-99-99-000-815-F00

16. Discard the LPT Stage Disks

A. Procedure

SUBTASK 72-99-99-000-004-F00

(1) Remove and discard the LPT stage 1 disk, the stage 2 disk, the stage 3 disk, and the stage 4 disk.

END OF TASK

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