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Instructions for Continued Airworthiness

INLET BARRIER FILTER SYSTEM

for

Model 205A-1 and UH-1H Helicopters



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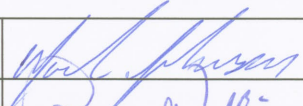
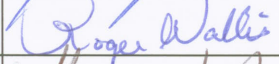
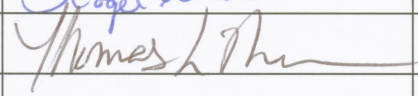
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SIGNATURES

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A	Removed 111001-101 from applicability	October 23, 2006
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PROPRIETARY DATA STATEMENT

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EFFECTIVITY

Effectivity for this ICA is for all Bell Helicopter, Inc. model 205A-1, S.M. & T Aircraft model UH-1H, Williams Helicopter Corporation model UH-1H, Garlick Helicopters, Inc. model UH-1H, Hagglund Helicopter, LLC model UH-1H, Global Helicopter Technology, Inc. model UH-1H, and Arrow Falcon Exporters, Inc. model UH-1H helicopters with the Aerospace Filtration Systems, Inc. (AFS) Inlet Barrier Filter (IBF) System installed.

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INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

For the Aerospace Filtration Systems Engine Inlet Barrier Filter System
Installed on Model 205A-1 and UH-1H Helicopters

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1 INTRODUCTION

1.1 SCOPE OF THIS MANUAL

These Instructions for Continued Airworthiness (ICA) provide the information required to do the maintenance and repair of the AFS Inlet Barrier Filter (IBF) system installation on Model 205A-1 and UH-1H helicopters. The ICA should be used in conjunction with all pertinent Model 205A-1 and UH-1H manuals and all publications listed in the List of Applicable Publications (LOAP).

NOTE

Thoroughly review and become familiar with the Appendix A – Illustrated Parts Breakdown section of this ICA before performing maintenance on the IBF system.

1.2 USE OF THIS MANUAL

The instructions that are given in this manual and those that have been changed by revisions, bulletins and/or alerts issued by Aerospace Filtration Systems, Inc. (AFS), the aircraft manufacturer or the Airworthiness Directives issued by the local Aviation Authority, shall be strictly followed.

1.3 DEFINITIONS / TERMINOLOGY

Actuator	An electromechanical actuator used to open / close the bypass door.
Air induction screen	Screen installed in the engine inlet on baseline configuration aircraft in lieu of the IPS or the IBF, to prevent engine foreign object damage.
Air induction system	This represents the major kit components including the IBF filter assemblies, upper and lower plenums, bypass door assembly, bellmouth duct assembly, driveshaft covers, and associated wiring.
Brownout	A brownout condition is a zero visibility condition usually caused by hovering in a dusty environment.
Bypass	The bypass is an alternate air inlet used only when the main engine air inlet through the filter becomes clogged or blocked.

Bypass doors	Doors located in the Bypass Door Assembly on each side of the air induction cowling that when opened by the actuator allows unfiltered air for the engine to be drawn from the aircraft transmission bay.
Bypass door mechanism	The mechanism that enables one actuator to open the two doors on each side of the air induction cowling.
Cockpit Switch	Cockpit switch located on overhead panel within easy reach of the pilot and labeled "IBF BYPASS". The switch is used to energize the actuator by flipping the switch to "OPEN" to open the bypass doors and flipping it to "CLOSED" to close the bypass doors.
Cockpit Indicator Light	The indicator light labeled IBF FILTER is located in view of the pilot in the instrument panel will illuminate any time the differential pressure reaches or exceeds a preset limit.
Differential pressure	The difference between the ambient pressure and the pressure inside the plenum chamber, which is measured by the differential pressure switch and the filter maintenance aid.
Filter	Barrier type filter media made of multi-layers of cotton gauze saturated with specially formulated oil that forms a tack barrier that increases the capture efficiency of the filter.
Filter assembly	Filter media supported by pleated stainless steel screen on both sides and the filter assembly frame components around the perimeter of the filter media.
Filter downstream side	Clean side of the filter media (i.e. the side of the filter facing aft)
Filter media	A wet media consisting a multi-layered cotton gauze.
Filter pleats	Stainless steel screen is used to form the pleats and hold the filter media in place
Filter upstream side	Dirty side of the filter media (i.e. the side facing forward into the air stream on which the dirt collects).
Inches of water	Unit of measure used for the differential pressure measured across the filter, as measured with a water manometer or similar apparatus.
Oiling	Process used to apply a uniform amount of oil on filter media.

On-condition	Indicates that servicing of the filter is based on a Filter Maintenance Aid (FMA) indication in the area marked in “RED”, Power Assurance Check (PAC) results (where a failed PAC is the result of a dirty Filter Assembly), and / or any “IBF FILTER” light indication on the cockpit switch / indicator.
Plenum chamber	Area contained inside the upper plenum and lower plenum.
Service cycle	Period starting when a filter is cleaned, oiled and placed into service and ending when the filter is removed for its next cleaning and oiling.

1.4 ACRONYMS

AFS	= Aerospace Filtration Systems, Inc.
ATA	= Air Transport Association of America, Inc.
FAR	= Federal Aviation Regulation
FMA	= Filter Maintenance Aid
FMS	= Flight Manual Supplement
FOD	= Foreign Object Damage
IBF	= Inlet Barrier Filter
OMM	= Operations & Maintenance Manual
IP	= Installation Procedures
IPB	= Illustrated Parts Breakdown
IPS	= Improved Particle Separator
LOAP	= List of Applicable Publications
MGT	= Measured Gas Temperature
OAT	= Outside Air Temperature
PAC	= Power Assurance Check
RFM	= Rotorcraft Flight Manual
SAE	= Society of Automotive Engineers
TCDS	= Type Certificate Data Sheet
TIS	= Time In Service

1.5 WARNINGS, CAUTIONS, AND NOTES

Warnings, cautions and notes are used throughout this manual to emphasize important and critical instructions.

WARNING

IF YOU DO NOT FOLLOW THE INSTRUCTIONS THAT ARE GIVEN IN A WARNING, PERSONAL INJURY CAN OCCUR.

CAUTION

IF YOU DO NOT FOLLOW THE INSTRUCTIONS THAT ARE GIVEN IN A CAUTION, YOU CAN CAUSE DAMAGE TO THE HELICOPTER OR TO THE COMPONENTS.

NOTE

A note includes supplemental data about the procedure, the practice, the condition, etc for the maintenance task.

1.6 UNITS OF MEASURE

U.S. Standard units of measure have been used in preparation of this manual. Typical units used in this manual include: inches of water measuring differential pressure, inch-pounds of torque, etc.

1.7 REFERENCE PUBLICATIONS

Reserved for future use.

1.8 LIST OF APPLICABLE PUBLICATIONS

Aircraft Manufacturers Technical Publications

FAA

FAA Advisory Circular, AC 43.13-1B, Acceptable Methods, Techniques, and Practices – Aircraft Inspection and Repair

1.9 DISTRIBUTION OF CHANGES

Changes shall be distributed by posting them on the AFS webpage www.afsfilters.com. Each customer must register to receive access to the webpage via a personalized log-in/password.

NOTE

This webpage should be checked prior to the performance of any maintenance actions on the IBF system to confirm possession of the latest FAA approved revision. If access to the internet is not possible, contact AFS at (636) 300-5200 for assistance.

1.10 INDICATION OF CHANGES

All changes will be complete revisions with all pages marked with the latest revision letter. All changes since the last revision shall be marked with a black vertical bar in the left side of the page.

1.11 SYSTEM DESCRIPTION AND OVERVIEW

- a. The 205A-1 & UH-1H IBF system includes an upper plenum with four filter assemblies (four FOD screen assemblies can be used in lieu of filter assemblies), bypass doors and mechanism, a lower plenum, a driveshaft cover and electrical hardware.
- b. The IBF system is located in the same location and in lieu of the Improved Particle Separator (IPS). The IBF provides aircraft owner/operators a high performance engine air filtration option that significantly improve filtration efficiency over the IPS. The IBF will increase the life of the engine through a dramatic reduction in erosion resulting from the substantial increase in filtration efficiency without degrading engine performance. The AFS IBF filters provide dust separation efficiencies exceeding 99% for Society of Automotive Engineers (SAE) AC Coarse and AC Fine dust as defined in specification SAE J726, Air Cleaner Test Code.
- c. The IBF system does not interfere with any of the commercial items installed in the 205A-1 & UH-1H production aircraft. The IBF is a complete system in which safety, functionality and serviceability were major considerations in the design process. The major kit components include the filter assemblies, cockpit switch and indicator light, bellmouth duct with engine wash assembly, bypass door mechanism (which includes the bypass door assembly, actuator, differential pressure switch, and filter maintenance aid), upper and lower plenums and upper and lower driveshaft covers. Located at the end of this chapter is an exploded view of the major kit components with the exception of the cockpit hardware. For a detailed illustration of all kit components, see the Appendix A – Illustrated Parts Breakdown.
- d. The major components making up the bypass system include the bypass doors, actuator, electrical, cockpit switch/indicator light, and differential pressure switch. The cockpit switch energizes the actuator to open and close the bypass doors. The cockpit indicator light alerts the pilot that the differential pressure has reached its preset limit.
- e. The IBF system provides a means of monitoring the condition of the filter both in-flight and on the ground, and a bypass capability should flow through the filter become restricted. In-flight, a differential pressure switch continuously measures the drop in pressure across the filter, and triggers the cockpit indicator light cautioning the pilot any time the differential pressure across the filter reaches or exceeds a preset limit. At this point, the IBF is operating at approximately the same inlet differential pressure normally experienced with the IPS installed. The

electromechanically actuated bypass doors permit unfiltered air to enter the engine inlet plenum chamber should the filter media become obstructed, and can be opened or closed as required. On the ground, a Filter Maintenance Aid, mounted in the front of the Upper Plenum, displays the maximum differential pressure across the filter reached during the last flight. It is accessible only on the ground, providing the pilot or mechanic the ability to visually gauge the current condition of the filter. This gives the mechanic the ability to forecast the timing of the next service cycle. The Filter Maintenance Aid can be reset by depressing the yellow button marked "PUSH TO RESET" located on the end of the Filter Maintenance Aid (See Pictures 1 & 2).

- f. The design of the bypass system allows the ground crew to cycle the bypass doors with power on the aircraft. The switch can be flipped to actuate the bypass doors open, and then flipped again to actuate it closed. Full functional verification of the bypass system including all electromechanical components and the filter maintenance aid is possible during routine maintenance (see Chapter 8).
- g. Removal of each filter assembly for servicing is easily achieved by removal of eight captive fasteners, which are accessible from the outside of the Upper Plenum.
- h. The nozzles on the engine bellmouth assembly provides the equivalent engine wash capability as currently provided by similar nozzles mounted on the IPS installations.

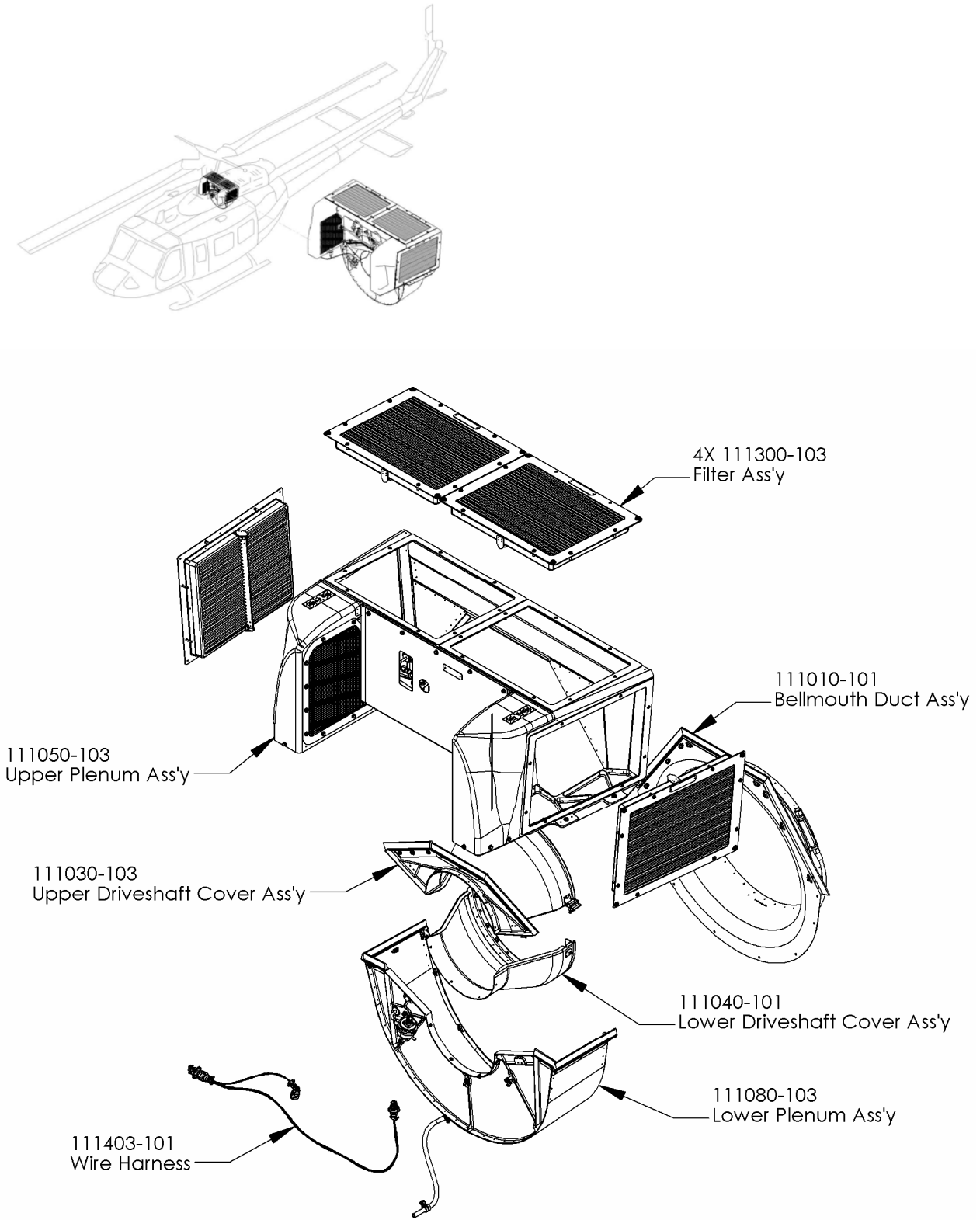


Figure 1: IBF System and Installation

2 AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations Section is FAA approved and specifies maintenance required under Secs. 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

Revision	Date of FAA Signature	FAA Signature
Initial Release		Superseded
A	13 Dec. 2006	Ty D. Krolicki
B	This section not affected by this revision	

2.1 GENERAL

The Airworthiness Limitations for the AFS Inlet Barrier Filtration system (IBF) as installed on Bell Helicopter model 205A-1 series and UH-1H helicopters are FAA approved.

NOTE

The retirement life given or the failure to give a retirement life to a component does not constitute a warranty of any kind. The only warranty applicable to any component is the warranty included in the Purchase Agreement for the helicopter or the component.

2.2 FILTER RETIREMENT LIFE

After fifteen (15) cleaning and oiling cycles, the filter must be removed from service at the next servicing interval. The filter data tag is scribed after each cleaning and oiling cycle (see Section 6-2). When all numerals (1-15) on the data tag have been scribed out, the filter shall be removed from service at the next service interval. No further cleaning cycles are authorized.

2.3 LIFE LIMITED COMPONENTS

The only life limited component features are the number of cleanings of the filter assembly. See Section 2.3.

3 INSPECTION REQUIREMENTS AND OVERHAUL

3.1 INSPECTION REQUIREMENTS

3.1.1 GENERAL REQUIREMENTS

- a. Inspection of the IBF system consists of, in general terms, inspection of the filter assembly, inspection of the structural components, inspection of electrical and system components. The components of the system are divided, generally as a scope of work, into Filter Assembly / Seal, Structural Components, and Systems and Electrical components as is done throughout the manual.
- b. Refer to the Appendix A – Illustrated Parts Breakdown for component illustrations that provide supplemental information relative to proper assembly configuration, orientation, and locations for all components to be inspected per Chapter 3 and Table 3-1.
- c. Table 3-1 gives a recommended inspection schedule for the components of the system. The Trouble-Shooting Guide, Table 8-2 found near the end of Chapter 8, also gives additional guidance when performing inspections and encountering trouble with the system. Chapter 8 also provides specific inspection guidance and removal/installation procedures for each component and is structured in the same three major groups as discussed above.

3.1.2 FILTER ASSEMBLY INSPECTION

- a. The following inspections pertain to the barrier filter assembly and associated components, which include the filter assembly (i.e. filter frame and filter media).
- b. ON-CONDITION UP TO TIS LIMIT: Any FMA indication in the “RED”, “IBF FILTER” light indication of the IBF cockpit indicator light or failed PAC requires a conditional inspection in accordance with Table 3-1.
- c. VISUAL: All filter assembly components (including engine wash assembly, seals and fasteners) are to be visually inspected at every annual in accordance with Table 3-1 checking for the following: filter media for tears, punctures, uneven or damaged pleats; seals for tears/damage; frame components for corrosion, cracks, distortions near holes, and check for missing or damaged fasteners.

3.1.3 STRUCTURAL COMPONENT INSPECTIONS

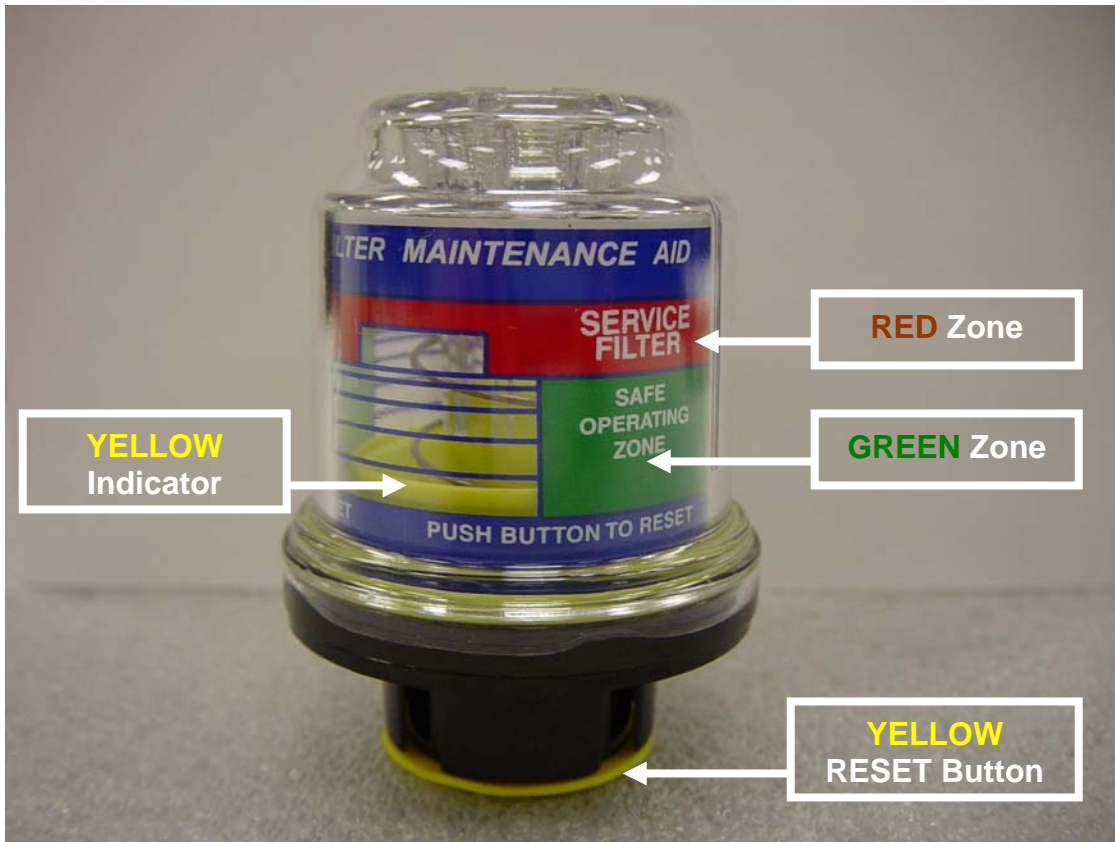
VISUAL: All structural IBF components are to be inspected in accordance with Table 3-1 every 100 hours and annual. These components include the following: Filter Frames, Upper Plenum, Lower Plenum, Bellmouth Duct Assembly, and Driveshaft Cover Assembly.

3.1.4 SYSTEMS AND ELECTRICAL COMPONENT INSPECTIONS

- a. **VISUAL:** The systems and electrical components are to be visually inspected in accordance with Table 3-1 every 100 hours and annual. These components include the following: Connectors, Backshells, Circuit Breaker, Cockpit Switch/Indicator Light, Differential Pressure Switch, Filter Maintenance Aid, and Actuator.
- b. **FUNCTION CHECK:** Certain systems and electrical components are also to be function checked in accordance with Table 3-1. These components include the following: Cockpit Switch/Indicator Light, Differential Pressure Switch, and Actuator.
- c. **FMA CHECK:** The FMA check is performed to ascertain the current condition of the filter or to gauge the trend in accumulation of dirt. The FMA check is only a check of the indicator reading (See Pictures 1 & 2). As such it is not considered an inspection of the FMA. The inspection Table 3-1 does not require a specific “inspection” interval of the FMA. The condition of the Filter Assembly and its accumulation of dirt will show up as an indication on the FMA. Thus operational environment, more so than time in service, dictate how often the FMA should be checked in order to help determine the next Filter Assembly service requirement. It is an aid in scheduling the Filter Assembly servicing. At any time prior to an FMA indication in the “RED” (See Picture 1), a failed PAC, or an “IBF FILTER” indication on the cockpit indicator, when maintenance or flight personnel see a trend based on the FMA readings over time that would warrant servicing of the filter due to operational considerations, such as when the aircraft will be operated in a remote or off-site location without the ability to readily service the filter, the filter may be serviced, or replaced. See section 7.2 for a further description of the use of the FMA as it relates to the Filter Assembly service interval. See filter servicing Section 7.3.

NOTE

The Filter Maintenance Aid is designed to hold the highest differential pressure across the filter assembly reached during the last flight, and should be reset after servicing of the filter assembly by depressing the yellow button marked “PUSH TO RESET” located on the end of the filter maintenance aid (See Pictures 1 & 2).



Picture 1: Filter Maintenance Aid

“YELLOW Indicator” position relative to SAFE OPERATING ZONE (“GREEN Zone”) or SERVICE FILTER (“RED Zone”) markings defines current filter condition, and pushing “YELLOW RESET Button” resets indicator.



Picture 2: Filter Maintenance Aid

FMA unit is mounted to forward side of the Upper Plenum and is accessed through access cutout in the cover plate.

3.2 OVERHAUL REQUIREMENTS

There are no overhaul intervals or requirements applicable to this product at this time.

Table 3-1: Inspection Intervals

Components	Inspection Type	Inspection	Inspection Intervals			
			Scheduled		Time In Service	Notes
			100 Hrs.	Annual		
Filter Assembly as defined in sec. 3.1.2.	Conditional	1. On-Condition up to TIS Limit			300 hrs / 1 yr	2, 3, 4, 5, 7
	Scheduled	2. Visual		X		1, 2, 4, 6, 7
Structural Components as defined in sec. 3.1.3.	Scheduled	1. Visual	X	X		1, 2, 4, 6
Systems and Electrical Components as defined in sec. 3.1.4.	Scheduled	1. Visual	X	X		1, 2, 4, 6
	Scheduled	2. Function Check		X		1, 2, 4, 5

Notes.

1. Refer to Chapter 8 for specific inspection requirements and functional check procedures.
2. Refer to Chapter 4 for access information.
3. IBF FILTER light or failed PAC. This inspection is required any time an IBF FILTER light indication or failed PAC is reported by the pilot.
4. Reference Appendix A – Illustrated Parts Breakdown.
5. Reference Trouble-Shooting Guide, Table 8-2 of this manual.
6. Perform a visual inspection checking for deformation, buckling, corrosion, cracks, dents, tears, or other signs of damage and repair in accordance with the procedures in Chapter 8.
7. The maximum filter service interval between cleanings under any conditions is 300 flight hours or 1 year TIS, whichever comes first. Up to the TIS limit, the inspection of the Filter Assembly is “On-Condition” based on an FMA indication in the “RED”, any “IBF FILTER” light indication on the Cockpit Indicator, and / or upon a failed PAC (where the failed PAC is the result of a dirty Filter Assembly).

4 ACCESS PANELS

4.1 GENERAL DESCRIPTION

This chapter addresses how to access the IBF system installation for servicing or maintenance.

4.2 ACCESS FOR MAINTENANCE

4.2.1 ACCESS OF BYPASS MECHANISM ASSEMBLY

Access for maintenance of the system components located in the front of the Upper Plenum (i.e. filter maintenance aid, actuator, bypass door linkage, etc.), when AFS IBF Kit No. 111002-101 is installed, requires removal of the Bypass Mechanism Cover (Figure 2). See Chapter 8 for component removal/installation procedures, inspection, troubleshooting guide, adjustment/calibration/repair procedures.

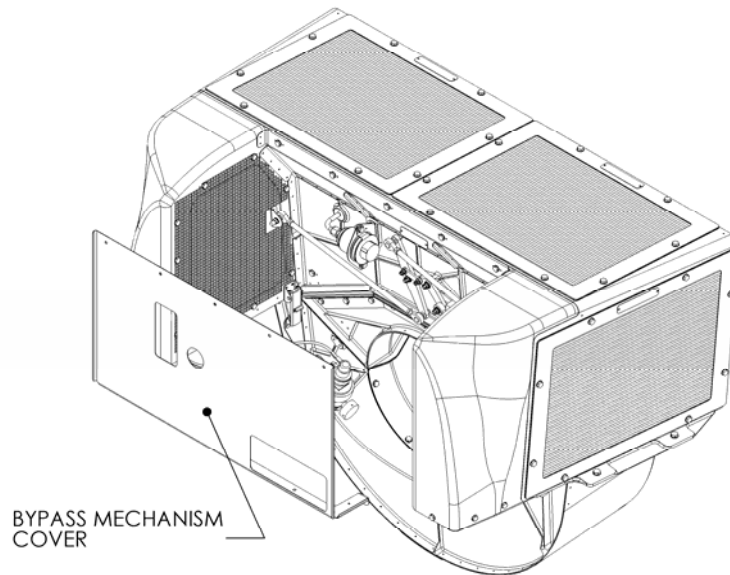


Figure 2: Bypass Mechanism Cover

4.2.2 ACCESS OF ENGINE WATER WASH

The engine water wash connection is located on the top side of the Bellmouth Duct Assembly on the aft side of the forward firewall. Access to this connection is obtained through the engine access door.

5 STORAGE

CAUTION

NEVER INSTALL A FILTER ASSEMBLY AND/OR OPERATE AN AIRCRAFT WITH A FILTER INSTALLED WHERE THE FILTER MEDIA HAS NOT BEEN PROPERLY OILED.

Long-term storage has no effect on filter assembly reliability if stored unoiled (dry) in a cool, dry location to discourage possible fungus growth. After storage, the only maintenance to be performed on the filter before installation on the aircraft shall be oiling of the filter media. Refer to filter servicing Section 7.3.

6 PLACARDS, DATA PLATES, AND MARKINGS

6.1 MARKING – PART NUMBER / SERIALIZATION

The IBF system information is attached on a data plate mounted on the bypass mechanism cover, which contains the top level part number, the serial number of the system

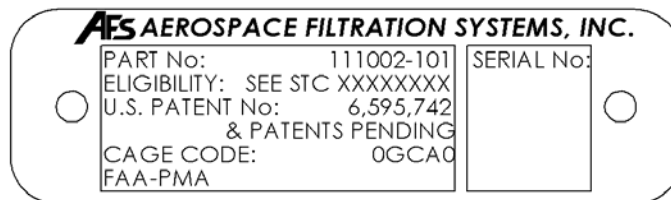


Figure 3: System Assembly Data Plate

6.2 DATA PLATE – FILTER ASSEMBLY

After the filter assembly has been serviced an "X" is marked through one of the unmarked boxes on the serviceability tag. When the last unmarked box is crossed through the filter assembly will have to be replaced at the next servicing. See Chapter 7 for servicing procedures.



Figure 4: Filter Assembly Data Plate

6.3 PLACARDS / MARKINGS - COCKPIT

6.3.1 -103 CONFIGURATION

- a. The IBF utilizes a cockpit switch/indicator labeled “IBF” on the aircraft instrument panel. The top half illuminates an amber “FILTER” message when the IBF differential pressure has reached a preset value. The bottom half illuminates an amber “BYPASS” message when the actuator has been energized and the bypass door is open. See Picture 3 (A) for markings.
- b. The IBF circuit breaker in the overhead console is marked “IBF”. See Picture 3 (B) for markings.



(A)



(B)

Picture 3: -103 Configuration IBF Markings

7 SERVICING

7.1 AUTHORIZED MATERIALS

Service AFS Filter Assembly with only AFS Air Filter Oil, (squeeze bottle – AFS P/N 100100-065, gallon container – AFS P/N 100101-000), AFS Air Filter Cleaner (gallon container – AFS P/N 100201-000) or AFS authorized substitutes.

NOTE

Refer to Chapter 8 for removal, inspection, repair and installation of filter assembly. Upon satisfactory inspection and any required maintenance of the filter assembly proceed with the rest of the servicing instructions for the filter assembly.

7.2 FILTER SERVICE INTERVALS

The filter service interval is based on the specific aircraft operating environment. The filter service intervals section is broken up in three parts: general requirements pertaining to all operations, specific recommendations for operations on prepared fields, and for operations in severe environments.

7.2.1 GENERAL REQUIREMENTS

NOTE

The maximum filter service interval between cleanings under any conditions is 300 flight hours or 1 year TIS, whichever comes first. Up to the TIS limit, the filter is considered an “on-condition” item.

NOTE

The FMA is an aid to help maintenance personnel and pilots to ascertain the condition of the filter at any point in time or to trend the accumulation of dirt on the Filter Assembly over a period of time.

- a. Up to the 300 hours / 1 year TIS limit, the “on condition” requirement for servicing the Filter Assembly is based on a FMA indication, an “IBF Filter” light indication on the Cockpit Switch Indicator, or upon a failed PAC (where the failed PAC is the result of a dirty Filter Assembly).
- b. Any “IBF FILTER” indication, where the pressure sensor and indicating system are working properly, requires servicing of the filter assembly. See filter servicing Section 7.3.
- c. The gradual increase in differential pressure across the IBF filter assembly causes an increase in the measured gas temperature (MGT) required to produce a specified torque as measured during the PAC. A failed PAC due to an increase in differential pressure across the filter is cause for servicing of the filter assembly. See filter servicing Section 7.3.
- d. Any FMA indication in the area marked in “RED” requires servicing of the filter assembly. See filter servicing Section 7.3.
- e. At any time prior to a “IBF FILTER” indication on the cockpit switch indicator, an FMA indication in the “RED”, or a failed PAC, when maintenance or flight personnel see a trend on the FMA that would warrant servicing of the filter due to operational considerations, such as when the aircraft will be operating in a remote or off-site location without the ability to readily service the filter, the filter may be serviced, or replaced. See filter servicing Section 7.3.

- f. The maximum number of service cycles for the filter assembly (i.e., cleaning / oiling) is limited to 15 for each filter assembly. Each filter assembly includes a data plate that must be scribed to track filter service cycles in accordance with Section 6.2.

7.2.2 PREPARED FIELD OPERATIONS

- a. During typical operations in and out of prepared airfields and landing sites, the IBF filter assembly will not require frequent servicing. AFS recommends that the filter maintenance aid (FMA) be checked about every 25 aircraft operating hours following the first installation and operation of an IBF system on an aircraft. This should be done to gauge the rate of engine performance degradation due to changes in engine inlet differential pressure as the filters accumulate dirt in operations considered “prepared fields” operations. Once an interval of time in flight hours is determined that provided discrete changes in the FMA, this interval can be repeated as long as there is no change in the environmental operating conditions.
- b. This interval can be extended after sufficient flight data has been accumulated to establish a greater interval. Upon seeing increases in MGT and associated decreases in temperature margin / available power, the inspection interval should again be shortened to about every 25 hours or less to enable scheduling of filter servicing without interruption of normal operations.
- c. Ensure all filter servicing requirements defined in Section 7.2.1 are followed. Refer to Section 7.3 for servicing of the filter assembly.

7.2.3 SEVERE ENVIRONMENT OPERATIONS

- a. When operating in an environment of high sand and dust levels, frequent servicing of the filter assembly may be required based on the time exposure and severity of the environment. Any operations in an environment that can result in “brownout” conditions should therefore be minimized or avoided to the maximum extent possible within the constraints of the operation. If extended time is accumulated operating in brownout conditions, monitoring of the FMA between shut down and start up will give an indication of the differential pressure trend based on the severe environment being flown in. Once an interval of time in flight hours is determined that provided discrete changes in the FMA, this interval can be repeated as long as the initial readings remain typical of the current operations.
- b. Ensure all filter servicing requirements defined in Section 7.2.1 are followed. Refer to Section 7.3 for servicing of the filter assembly.

7.3 FILTER ASSEMBLY SERVICING

The filter assembly servicing section defines the procedures for pre-cleaning, cleaning, drying, and oiling the filter media in the filter assembly.

7.3.1 FILTER PRE-CLEANING

- a. Servicing of the filter assembly is determined by the inspection requirements found in Chapter 3.

- b. Prior to any cleaning operation gently brush the dirty side of the filter with a soft bristle brush similar to a soft paintbrush. Remove as much debris as practical from the filter before proceeding to the cleaning procedure.

7.3.2 FILTER CLEANING

CAUTION

DO NOT CLEAN AFS FILTER ASSEMBLIES WITH GASOLINE, SOLVENTS, PARTS CLEANERS, STRONG DETERGENTS, OR CAUSTIC CLEANING SOLUTIONS.

CAUTION

DO NOT STEAM CLEAN OR USE HIGH-PRESSURE WASHERS TO CLEAN THE AFS FILTER ASSEMBLY.

CAUTION

ANY OF THESE PROCESSES WILL DAMAGE FILTER MEDIA AND/OR THE FILTER FRAMES.

- a. Spray K&N Air Filter Cleaner liberally onto the entire filter media (both sides) until the filter media is thoroughly soaked. If procured in bulk, transfer a smaller quantity to a spray bottle. A spray bottle provides a more uniform distribution of the cleaning agent.
- b. Let the cleaner soak into the contaminants and filter media for 10 minutes.
- c. Rinse the filter with low-pressure water. Use water out of a faucet or hose (without nozzle). Rinse in the opposite the direction of airflow, i.e., from the clean side to the dirty side. Arrange the filter so the pleats are vertical, and begin to rinse in a gradual side-to-side motion starting at the top and working downward. Adjust the pace to correspond with the cleanliness of the water runoff. As long as the runoff is filled with debris and oil, do not proceed downward.
- d. Upon completion, adjust the filter to clean from the dirty side to the clean side, pleats still vertical.
- e. Repeat the rinsing procedure once again, until there is no visible debris on the surface and the runoff water is relatively clean.
- f. When finished, flip the filter once again and repeat the rinse from clean side to dirty side.
- g. Finally, rotate the filter from top to bottom, and perform the final rinse until the runoff water is free of all debris and oil.

7.3.3 FILTER DRYING

CAUTION

DO NOT USE COMPRESSED AIR TO DRY THE FILTER ASSEMBLY. IT MAY DAMAGE THE FILTER MEDIA.

CAUTION

DO NOT USE HEAT FROM ANY SOURCE TO DRY THE AFS FILTER ASSEMBLY. HEAT MAY SHRINK THE FILTER MEDIA AND MAY DAMAGE THE CORING MATERIAL WITHIN THE FILTER FRAMES.

- a. After rinsing, shake off the excess water and let the Filter Assembly dry at room or outside air temperature (above freezing).
- b. Ensure dirt or debris does not enter or contact the Filter Assembly while drying.
- c. After the Filter Assembly dries, mark the service cycle on data plate in accordance with the Section 6.2.

7.3.4 FILTER OILING

CAUTION

NEVER PUT AN AFS FILTER ASSEMBLY IN SERVICE WITHOUT OILING IT.

CAUTION

USE ONLY K&N OR AFS FILTER OIL OR AN AFS APPROVED SUBSTITUTE.

NOTE

A squeeze bottle capable of accurately measuring out six and one half (6.5) fluid ounces should be used, per filter, when applying the oil to the filter as directed below.

- a. The filter will not function properly if other types of oil are used. AFS approved Air Filter Oil is a unique blend of mineral and organic oil base stocks and special polymers that form a very efficient “tack barrier.” Red dye is added to show areas of oil application. Do not use transmission fluid, any kind of motor oil, or diesel fuel to oil the AFS filter. Do not use “WD-40,” “LPS,” or any other type of lightweight spray lubricants to oil the AFS filter. Any of those

products will damage the filter or degrade its filtering ability. A squeeze bottle allows for the controlled application of a specific amount of oil to the filter (See Picture 4).

- b. Apply approximately $\frac{1}{2}$ of the six and $\frac{1}{2}$ (6.5) fluid ounces that is to be applied to each clean, dried Filter Assembly. Gently squeeze a small stream of oil along the entire length of each pleat peak, then flip the filter over and repeat this on the backside. Apply sparingly to ensure coverage of the entire filter.
- c. Let the Filter Assembly sit for 20 minutes as the oil “wicks” into the surrounding filter media. Apply any remaining filter oil to any areas that are still white and to complete the application of the 6.5 fluid ounces from the squeeze bottle.



Picture 4: Oiling Filter Media

7.4 STRUCTURAL COMPONENT SERVICING

There are no structural components requiring periodic servicing. See Chapter 6 for inspection requirements and Chapter 8 for maintenance requirements.

7.5 SYSTEMS AND ELECTRICAL SERVICING

There are no system and electrical components requiring periodic servicing. See Chapter 6 for inspection requirements and Chapter 8 for maintenance requirements.

NOTE

The Filter Maintenance Aid is designed to hold the highest differential pressure across the filter assembly reached during the last flight, and should be reset after servicing of the filter assembly by depressing the yellow button marked “PUSH TO RESET” located on the end of the filter maintenance aid (See Picture 2).

7.6 ENGINE WATER WASH

NOTE

It is not necessary to remove the IBF filter prior to conducting an engine wash.

It is recommended the engine water wash frequency be in accordance with the current Honeywell requirements for operation in a standard environment, desert environment or salt-water environment.

7.7 AIRCRAFT WASHING

During aircraft washing the IBF system, including the filter assemblies, should be protected or removed to avoid damaging the filter media with high pressure spray nozzles or to prevent solvents rinsing away the oil in the filter media.

8 TROUBLESHOOTING AND MAINTENANCE

8.1 MAINTENANCE GENERAL

CAUTION

THOROUGHLY REVIEW AND BECOME FAMILIAR WITH THE APPENDIX A – ILLUSTRATED PARTS BREAKDOWN BEFORE PERFORMING MAINTENANCE ON THE IBF SYSTEM.

NOTE

Except where otherwise indicated, all torque values shall be in accordance with Chapter 7 of FAA Advisory Circular AC 43.13-1B.

- a. The components of the system are divided, generally as a scope of work, into Filter Assembly/ Seal, Structural Components, and Systems and Electrical components throughout the manual. Refer to Appendix A, Diagram 1 (less the filter assemblies) and their associated components for items considered structural components. Refer to Appendix A, Diagram 13 - 14 for items considered electrical and systems components. Table 3-1 gives a recommended inspection schedule for the components of the system. The troubleshooting guide in Table 8-2 provides additional guidance for performing inspections when encountering trouble with the system.
- b. The maintenance chapter is organized by removal, inspection, troubleshooting, adjustment, calibration and / or repair, and installation for the major components noted above, as applicable to the particular component. For some components a functional check is included. Not all components will require adjustment, or calibration, or have any approved functional check or repair procedures. Contact AFS for possible repairs when not listed in this manual. In some cases defective components will require replacement.

- c. In general, visually inspect all structural components for oversized or elongated holes, deformation, cracks, corrosion, missing fasteners or components, fretting, galling, etc. Any component exhibiting these conditions requires repair or replacement.
- d. In general, visually inspect fasteners for damaged or missing threads, in both the bolt or screw and the nut or nut plate. If a self-locking fastener can be fully threaded by hand, replace the self-locking fastener.
- e. In general, visually inspect all electrical connections for security, corrosion, arcing, breakdown of insulation, and overheating. Repair or replace components exhibiting defects. Inspect and repair components per Bell Helicopter technical manuals or AC 43.13-1B, Chapter 11.

8.2 COMPONENTS - GENERAL DESCRIPTION

8.2.1 FILTER ASSY / FILTER SEAL

(Refer to Appendix A, Diagram 1)

- a. Filter Assembly - The Filter Assembly is composed of the filter media (stainless steel mesh covering cotton gauze) bonded into the aluminum alloy filter frame assembly.
- b. Seal - The Seal is expanded foam with adhesive backing.

8.2.2 STRUCTURAL COMPONENTS

(Refer to Appendix A, Diagrams 1, 2, 3, 4, 5)

- a. Upper Plenum Assembly – This assembly is a composite and aluminum structure that incorporates the bypass doors and mechanism and the four filter assemblies. The Upper Plenum Assy bolts to the roof of the aircraft and clamps to the Lower Plenum Assy.
- b. Lower Plenum Assembly – The Lower Plenum Assy is made up from machined aluminum and aluminum sheet. The Bellmouth Duct Assy and the Lower Driveshaft Cover Assy secure to this assembly.
- c. Bellmouth Duct Assembly – The Bellmouth Duct Assembly consists of a machined aluminum engine inlet interface, a stainless steel duct, mounting flange and engine wash provisions. It is secured to the engine inlet, forward firewall, and the Lower Plenum Assy.
- d. Upper Driveshaft Cover Assembly – The Upper Driveshaft Cover is composite cover with an aluminum forward plate that clamps to the Lower Driveshaft Cover as well as the Lower Plenum. This assembly creates an airtight seal between the Upper Plenum and the Lower Driveshaft Cover to keep unfiltered air from entering the engine inlet.

- e. Lower Driveshaft Cover Assembly – This component is also a composite structure and has an aluminum ring riveted to the aft end. The Lower Driveshaft Cover Assy is bolted to the Lower Plenum Assy and the engine inlet.

8.2.3 SYSTEMS AND ELECTRICAL COMPONENTS

- a. Cockpit Switch/ Indicator Light - The cockpit switch provides the switching function for the bypass doors. The construction details of the component do not warrant field maintenance. Repair or servicing of this component requires the component to be sent back to AFS for disposition or replaced. The indicator light illuminates when the differential pressure between ambient and the plenum chamber has reached its preset limit. Replacement of the bulb is the only maintenance that can be performed in the field, for any other repairs this component must be sent back to AFS for disposition or replaced.
- b. Differential Pressure Switch - The Differential Pressure Switch provides a signal to the cockpit indicator for annunciation of the “FILTER” light to signal the differential pressure across the Filter Assembly has reached a preset limit. The construction details of the component do not warrant field maintenance. Repair of this component requires the component to be sent back to AFS for disposition or replaced.
- c. Filter Maintenance Aid - The Filter Maintenance Aid provides an indication to maintenance personnel as to the trend of the differential pressure across the Filter Assembly. The construction details of the component do not warrant field maintenance. Repair of this component requires it to be sent back to AFS for disposition, or replaced. The FMA is an aid to help maintenance personnel and pilots to ascertain the current condition or trend in accumulation of dirt on the Filter Assembly.
- d. Actuator - The Actuator provides mechanical actuation of the Bypass Door should the pilot actuate the cockpit switch. The construction details of the component do not warrant field maintenance. Repair of this component requires the component to be sent back to AFS for disposition or replaced.
- e. Wiring, Connectors, Backshells, Circuit Breaker – The wiring utilizes wire per Military Specification Mil-W-22759/41. The gauge and marking identification is specified on the wiring diagram. The connectors, backshells, and circuit breaker are military specification components, or where applicable, vendor designed components. The construction details of these components (other than wiring) do not warrant field maintenance.

8.3 FILTER ASSY / FILTER SEAL

(Refer to Figures 9 & 10 and Appendix A, Diagram 1 & 6)

8.3.1 FILTER ASSY

8.3.1.1 REMOVAL – FILTER ASSY

CAUTION

UPON REMOVAL OF THE FILTER ASSEMBLY, COVER THE ENGINE INLET TO ENSURE IT IS PROTECTED FROM FOREIGN OBJECT DAMAGE (FOD).

- a. Remove hardware that retains the Filter Assembly to the Upper Plenum Assembly.
- b. Use a plastic scraper to gently break any seal between the Filter Assembly and the Seal itself. The Filter Assembly must be carefully removed so as not to damage the Filter Seal.
- c. Inspect the Filter Seal. Refer to “Filter Seal” procedures.

8.3.1.2 INSPECTION – FILTER ASSY

NOTE

After servicing of the Filter Assembly or at any time the Filter Assembly is inspected, the pleats may require straightening or crimping. If you cannot see the bottom of the pleat, the airflow will be restricted and/or the pleats will adhere to one another when dirt loaded. Any restriction to the flow through the pleats will result in increased differential pressure and reduction in dirt loading capacity. In order to insure ideal flow characteristics through the filter media, the pleats must be straightened or crimped with a hand seamer.

- a. Visually inspect the pleats on both sides of the filter. If you cannot see the bottom of the pleat, when sighting the length, or depth of the pleat, straightening of the pleat is required. Refer to “Adjustment” for pleat straightening procedures.
- b. If this inspection is in response to an IBF FILTER light indicator or failed PAC, perform troubleshooting per Table 8-2. If troubleshooting indicates a dirty filter, service filter per Section 7.3.
- c. Inspect the Filter Assembly frame for cracks, gouges, distortion or deformation, corrosion, loose or missing fasteners, and missing or deteriorated protective coating. Refer to “Repair” for criteria / disposition.
- d. Inspect the Filter Seal. Refer to “Filter Seal” procedures.

8.3.1.3 TROUBLESHOOTING – FILTER ASSY

See Table 8-2 for troubleshooting guide.

8.3.1.4 ADJUSTMENT - FILTER

CAUTION

HAND SEAMER MUST BE LIMITED TO A MAXIMUM JAW DEPTH OF 1 1/4 INCH. A DEEPER JAW DEPTH CAN RESULT IN DEFORMATION OR DAMAGE TO THE ADJOINING PLEATS.

CAUTION

DO NOT OVER CRIMP AND CRUSH PLEAT; CARE MUST BE TAKEN TO SQUEEZE THE PLEATS WITHOUT DAMAGING THE PLEATED SCREEN. THE RADIUS AT THE TOP OF THE PLEAT SHOULD REMAIN INTACT, NOT CREASED.

- a. If you cannot see the bottom of a pleat, use a hand seamer (See Special Tools / Special Equipment, Section 8.8.) to crimp the pleat and to straighten the pleat. Sight down the length and depth of the pleat to confirm the pleat is straightened (See Picture 5).
- b. Once one side is crimped, flip the filter over and crimp the other side as required following the guidance above. Use caution not to crush the pleats when straightening them. Use care to maintain the original radius, as much as possible, at the top of the pleat.



Picture 5: Hand Seamer used to Straighten or Crimp Pleats

8.3.1.5 CALIBRATION

Not applicable.

8.3.1.6 REPAIR - FILTER MEDIA, GENERAL

WARNING

ADHESIVE VAPORS (MAY BE CONTAINED IN SEALING MATERIAL AMS 3276 OR MIL-S-8802), MAY CAUSE IRRITATION OF EYES, NOSE, AND RESPIRATORY SYSTEM. EYE AND SKIN CONTACT WITH MATERIAL MAY CAUSE IRRITATION. IF INGESTED, MAY CAUSE GASTRIC DISTRESS. FLUSH EYES WITH WATER FOR 15 MINUTES. WASH SKIN WITH SOAP AND WATER. IF INHALED, MOVE TO FRESH AIR. IN ALL CASES GET IMMEDIATE MEDICAL ATTENTION. WORK IN A WELL-VENTILATED AREA. WEAR GLOVES AND SAFETY GLASSES.

NOTE

Repair filter media damage after cleaning but prior to oiling of filters.

8.3.1.7 REPAIR - FILTER MEDIA, SMALL RUPTURES, TEARS, or HOLES

- a. In the event of damage to the filter media, ruptures in the filter media may be repaired. Small ruptures defined as smaller than .500 inch diameter or length can be sealed shut without degradation of performance to the Filter Assembly. Each Filter Assembly may have up to 3 small ruptures that may be repaired, but no repair may be within 1” of an adjacent repair.
- b. Prior to performing any of these repairs, the filter material must be cleaned of contamination and oil. Refer to Chapter 7 for cleaning of the Filter Assembly. Perform the repair to a cleaned and dry Filter Assembly. Each time the entire Filter Assembly is cleaned, repaired, and oiled, a mark shall be scribed on the Filter Assembly data plate in accordance with Section 6.2 indicating a cleaning cycle was performed.
- c. Trim ruptures, tears, or holes in the filter media up to .500 inches in length or diameter to remove loose material (wire or cotton gauze).
- d. Seal the affected area using two-part Sealant, AMS 3276 or MIL-S-8802. Allow the Sealant to bleed into the filter material and cure. Follow manufacturer’s directions for proper mixing, application, and curing of the two-part Sealant.
- e. Proceed with oiling the filter. Refer to Chapter 7.

8.3.1.8 REPAIR - FILTER MEDIA, LARGE RUPTURES, TEARS, or HOLES

Larger ruptures exceeding .500 inch in size are not repairable in the field. Contact AFS for disposition and possible repair procedures, or discard the Filter Assembly.

8.3.1.9 REPAIR – FILTER ASSY, OTHER DAMAGE

- a. The repair procedures defined above are for damage resulting in ruptures, tears, or holes in the filter media. The following is for field repairable damage to the Filter Assembly frame. Field repairable damage to the Filter Assembly frame is limited to blending of scratches and gouges, and / or the re-application of protective coatings. See Table 8-1 for application of protective coatings.
- b. Any damage to the filter frames such as cracking requires the Filter Assembly to be returned to AFS for evaluation and disposition, or replacement. Any damage to the filter frames such as warping or distortion (to the extent that the Filter Frame, when installed against the Upper Plenum and torqued, do not permit the Filter Assembly to sit flush against the Upper Plenum) requires the Filter Assembly be returned to AFS for evaluation and disposition, or be replaced.

8.3.2 FILTER SEAL

8.3.2.1 REMOVAL

- a. Gain access to the Filter Seal by removing the Filter Assembly. Refer to Sections 8.3.1.1
- b. Carefully remove the Seal by peeling it away from the Upper Plenum. Use a plastic scraper or other suitable tool that is softer than aluminum to peel the Seal from the Upper Plenum. Discard the removed Seal.

8.3.2.2 INSPECTION

Inspect the Filter Seal for any tears, nicks, gouges, missing pieces or a permanent set or flattening of the Seal. If the Seal exhibits any of these conditions, repair or replace the Seal.

8.3.2.3 REPAIR

WARNING

ADHESIVE VAPORS (IN SEALANT SUCH AS RTV 736) MAY CAUSE IRRITATION OF EYES, NOSE, AND RESPIRATORY SYSTEM. EYE AND SKIN CONTACT WITH MATERIAL MAY CAUSE IRRITATION. IF INGESTED, MAY CAUSE GASTRIC DISTRESS. FLUSH EYES WITH WATER FOR 15 MINUTES. WASH SKIN WITH SOAP AND WATER. IF INHALED, MOVE TO FRESH AIR. IN ALL CASES GET IMMEDIATE MEDICAL ATTENTION. WORK IN A WELL-VENTILATED AREA. WEAR GLOVES AND SAFETY GLASSES.

- a. Small tears, nicks, or gouges in the Seal may be repaired using RTV 736 Sealant. Use a wooden tongue depressor, cotton swab, or similar tool to dab a small amount of Sealant on the damage to repair tears, nicks, or gouges in the Seal. Smooth over Sealant to create a smooth flush repair similar to the original Seal cross section. Allow to dry before re-installing filter. If the repair does not allow sealing of the Filter Assembly to the Upper Plenum replace the Seal.
- b. If the Seal exhibits extensive tears, deep nicks or gouges, or missing pieces that would prevent the filter from properly sealing, replace the Seal.

8.3.2.4 INSTALLATION

- a. Gain access to the Filter Seal. Refer to Filter Assembly removal and Filter Seal removal.
- b. To install the Seal, remove the adhesive backing from the Seal. Locate and apply the Seal to a clean dry surface on Upper Plenum Assembly and press in place.

8.4 STRUCTURAL COMPONENTS

8.4.1 UPPER PLENUM ASSEMBLY

(Refer to Appendix A, Diagrams 1, 5-9)

8.4.1.1 REMOVAL

- a. Disconnect electrical Actuator Connector.
- b. Remove fasteners from Upper Plenum attaching to aircraft roof.
- c. Remove Upper Plenum from aircraft.

8.4.1.2 INSPECTION

- a. The Upper Plenum interfaces with the roof of the aircraft, the Lower Plenum, and the Upper Driveshaft Cover. At these locations inspect for chafing or fretting, elongation of fastener holes, damage to nut plates and fasteners, corrosion, cracking, and deformation.
- b. Inspection for the above conditions and any other conditions that may be applicable are defined in the Aircraft technical manuals.

8.4.1.3 TROUBLESHOOTING

Not applicable.

8.4.1.4 ADJUSTMENT

Not applicable.

8.4.1.5 CALIBRATION

Not applicable

8.4.1.6 REPAIR

For repairs contact AFS for disposition and possible repair procedures, or replacement of Upper Plenum structure.

8.4.1.7 INSTALLATION

- a. Place Upper Plenum on the roof of the aircraft.
- b. Secure to airframe with four NAS6204-6 bolts and NAS1149D0432 washer, locate the washers between the airframe and the Upper Plenum.
- c. Connect Bypass System electrical disconnect.

8.4.2 UPPER DRIVESHAFT COVER ASSEMBLY

(Refer to Appendix A, Diagrams 1 & 3)

8.4.2.1 REMOVAL

- a. Remove Upper Plenum Assembly per section 8.4.1.1
- b. Release two latches securing Upper Driveshaft Cover Assembly to the Lower Driveshaft Cover Assembly and two latches securing the Upper Driveshaft Cover Assembly to the Lower Plenum Assembly.
- c. Remove Upper Driveshaft Cover Assembly.

8.4.2.2 INSPECTION

- a. Cracking. Visually inspect the Upper Driveshaft Cover Assembly for cracking using 10x magnification at the corners, radiuses, and transitions in part thickness. Inspect suspect areas carefully using the 10x magnification. No cracks are allowed in the Lower Driveshaft Cover Assembly. If cracks are found, Lower Driveshaft Cover Assembly must be replaced.
- b. Reserved.
- c. Protective Coatings. Visually inspect the Upper Driveshaft Cover Assembly for missing, damaged, or “scratched through” protective coatings. Re-apply protective coatings per Table 8-1 of this chapter.
- d. Corrosion. Visually inspect the Upper Driveshaft Cover Assembly for corrosion in accordance with AC 43.13-1, Chapter 6 and Table 8-1.
- e. Missing, damaged or loose associated components. Visually inspect the Upper Driveshaft Cover Assembly for missing damaged or loose components.

8.4.2.3 TROUBLESHOOTING

Not applicable.

8.4.2.4 CALIBRATION / ADJUSTMENT

Not applicable.

8.4.2.5 REPAIR

- a. Cracks. No cracks are allowed in the Upper Driveshaft Cover Assembly. Cracks are not repairable. If cracks exist, Upper Driveshaft Cover Assembly must be replaced.

- b. Warping or distortion. Visually inspect the Lower Driveshaft Cover Assembly for warping or distortion. Any warping or distortion that keeps the Upper Driveshaft Cover Assembly from creating a seal to the Lower Driveshaft Cover Assembly requires disposition instructions from AFS or replacement of the Upper Driveshaft Cover Assembly.
- c. Protective Coatings. Re-apply protective coatings per Table 8-1 of this chapter.
- d. Corrosion. Treat corrosion in accordance with Chapter 6 of AC 43.13-1, and Table 8-1.
- e. Missing, damaged or loose associated components. Replace missing or damaged components. Secure loose components.

8.4.2.6 INSTALLATION

- a. Position the Upper Driveshaft Assembly on the Lower Driveshaft Cover Assembly.
- b. Latch the two aft latches to the Lower Driveshaft Cover Assembly and latch the two forward latches to the Lower Plenum Assembly.

8.4.3 LOWER DRIVESHAFT COVER ASSEMBLY

(Ref. Appendix A, Diagrams 1 & 4)

8.4.3.1 REMOVAL

- a. Remove Upper Plenum Assembly per section 8.4.1.1.
- b. Remove Upper Driveshaft Cover Assembly per section 8.4.2.1
- c. Remove driveshaft.
- d. Remove the four bolts attaching the forward side of the Lower Driveshaft Cover Assembly to the Lower Plenum.
- e. Remove the four nuts that secure the aft side of the Lower Driveshaft Cover Assembly to the engine inlet.
- f. Slide the Lower Driveshaft Cover Assembly forward and remove.

8.4.3.2 INSPECTION

- a. Cracking. Visually inspect the Lower Driveshaft Cover Assembly and related parts for cracking using 10x magnification at the corners, radiuses, and transitions in part thickness. Inspect suspect areas carefully using the 10x magnification. No cracks are allowed in the Lower Driveshaft Cover Assembly. If cracks are found, Lower Driveshaft Cover Assembly must be replaced.

- b. Warping or distortion. Visually inspect the Lower Driveshaft Cover Assembly for warping or distortion. Any warping or distortion that keeps the Lower Driveshaft Cover Assembly from creating a seal to the Upper Driveshaft Cover Assembly requires disposition instructions from AFS or replacement of the Lower Driveshaft Cover Assembly.
- c. Protective Coatings. Visually inspect the Lower Driveshaft Cover Assembly for missing, damaged, or “scratched through” protective coatings. Re-apply protective coatings per Table 8-1 of this chapter.
- d. Corrosion. Visually inspect the Bypass Door and related parts for corrosion in accordance with AC 43.13-1, Chapter 6, and Table 8-1.
- e. Missing, damaged or loose associated components. Visually inspect for missing, damaged, or loose components.

8.4.3.3 TROUBLESHOOTING

N/A

8.4.3.4 ADJUSTMENT

Not applicable

8.4.3.5 CALIBRATION

Not applicable.

8.4.3.6 REPAIR

- a. Cracks. No cracks are allowed in the Lower Driveshaft Cover Assembly. Cracks are not repairable. If cracks exist, Lower Driveshaft Cover Assembly must be replaced.
- b. Warping or distortion. Visually inspect the Lower Driveshaft Cover Assembly for warping or distortion. Any warping or distortion that keeps the Lower Driveshaft Cover Assembly from creating a seal to the Upper Driveshaft Cover Assembly requires disposition instructions from AFS or replacement of the Lower Driveshaft Cover Assembly.
- c. Protective Coatings. Visually inspect the Bypass Door for missing, damaged, or “scratched through” protective coatings. Re-apply protective coatings per Table 8-1 of this chapter.
- d. Corrosion. Treat corrosion in accordance with AC 43.13-1, Chapter 6 and Table 8-1.
- e. Missing, damaged or loose associated components. Replace missing or damaged components. Secure loose components.

8.4.3.7 INSTALLATION

- a. Place the aluminum ring on the engine inlet, secure using existing nuts. Torque nuts to 70–80 in-lbs.
- b. Bolt forward end of Lower Driveshaft Cover to the Lower Plenum Assy.

8.4.4 LOWER PLENUM & BELLMOUTH DUCT ASSEMBLY

(Ref. Appendix A, Diagrams 1, 2, & 12)

8.4.4.1 REMOVAL

- a. Remove Upper Plenum Assembly (Refer to Section 8.4.1.1).
- b. Remove Upper Driveshaft Cover (Refer to Section 8.4.2.1).
- c. Remove driveshaft (Refer to Aircraft Maintenance Manual).
- d. Remove Lower Driveshaft Cover from engine and Lower Plenum Assy (Refer to Section 8-4.3.1).
- e. Remove the V-band clamp from the engine.
- f. Remove Nut Ring.
- g. Rotate Lower Plenum 180°.
- h. Remove eight NAS6203-03 bolts securing the Lower Plenum Assy to the Bellmouth Assy and remove Lower Plenum Assy.
- i. Remove Bellmouth Assy.

8.4.4.2 INSPECTION

- a. Inspect seals for proper compression upon installation of Upper Plenum. The Seal should be compressed approximately .200 inches from its non-compressed height. Adjust the seals to attain correct seal compression.
- b. Inspect the Bypass Door Seal for any nicks, gouges, missing pieces or a permanent set or flattening of the Seal. If the Seal exhibits any of these conditions that would prevent the door from properly sealing, replace the Seal.

8.4.4.3 TROUBLESHOOTING

N/A

8.4.4.4 ADJUSTMENT / CALIBRATION / REPAIR

Perform adjustment to attain proper seal compression.

8.4.4.5 INSTALLATION

- a. Remove Seal Assemblies from Bellmouth Duct Assy and Lower Plenum.
- b. Place existing firewall nut ring on the Bellmouth Duct Assy on the forward side of the flange with the nutplates on the forward side.
- c. Insert Bellmouth Duct Assy thru firewall opening and with center flat edge facing down (upside down), onto the engine inlet.
- d. Place the lower plenum in the transmission bay upside down.
- e. Line up holes on Lower Plenum with the holes on the Bellmouth Duct Assy.
- f. Secure Bellmouth Duct Assy to the Lower Plenum using eight NAS6203-3 bolts and NAS1149D0363J washers.
- g. Rotate Lower Plenum Assy and Bellmouth Duct Assy counter-clockwise (looking aft) until drain on Lower Plenum is at the bottom.
- h. Re-install the Seal Assemblies on the Bellmouth Duct Assy and Lower Plenum.
- i. Secure Bellmouth Duct Assy to engine inlet using V-band coupling.
- j. Secure firewall nut ring to firewall using existing hardware.

8.4.5 FILTER ASSEMBLY

(Refer to Appendix A, Diagram 1)

8.4.5.1 REMOVAL

- a. Loosen the four captive fasteners securing the filter to the Upper Plenum.
- b. Remove the filter taking care not to damage the filter seal.

8.4.5.2 INSPECTION

- a. Cracking. Visually inspect the Filter Frame for cracking using 10x magnification at the corners, radiuses, and transitions in part thickness. Any fretting of faying surfaces, such as those at a crack may emit a black or grey dust or soot like material indicative of a crack.

Inspect suspect areas carefully using the 10x magnification. Refer to adjustment / calibration / repair for disposition of cracks in the Filter Frame.

- b. Warping or distortion. Visually inspect the Filter for distortion. Any warping or distortion causing the Filter Assembly not to seal requires disposition instructions from AFS, or replacement of the component.
- c. Protective Coatings. Visually inspect the Filter Frame Adapter for missing, damaged, or “scratched through” protective coatings. Re-apply protective coatings per Table 8-1.
- d. Corrosion. Visually inspect the Filter Frame Adapter and related parts for corrosion in accordance with Chapter 6 of AC 43.13-1 and Table 8-1.
- e. Media Damage. Look for holes, punctures and tears in the Filter media.
- f. Missing, damaged or loose associated components. Visually inspect for missing, damaged, or loose components.

8.4.5.3 TROUBLESHOOTING

Not applicable.

8.4.5.4 ADJUSTMENT / CALIBRATION / REPAIR

- a. Cracks. No crack repair is allowed in the Filter Frame without disposition from AFS.
- b. Warping or distortion. Contact AFS for disposition and possible repair, or replace component.
- c. Protective Coatings. Visually inspect the Filter Frame for missing, damaged, or “scratched through” protective coatings. Re-apply protective coatings Table 8-1 of this chapter.
- d. Corrosion. Treat corrosion in accordance with Chapter 6 of AC 43.13-1 and Table 8-1.
- e. Media Damage. In the event of damage to the filter media, ruptures in the filter media may be repaired. Small ruptures defined as smaller than .500 inch diameter or length can be sealed shut without degradation of performance to the Filter Assembly. Up to 8 small ruptures in the filter media may be repaired on a single filter, but no repair may be within 1” of an adjacent repair. Prior to performing any of these repairs, the filter material must be cleaned of contamination and oil. Refer to Section 7.3.2 for cleaning of the Filter Assembly. Perform the repair to a cleaned and dry Filter Assembly. Each time the entire Filter Assembly is cleaned, repaired, and oiled, a mark shall be scribed on the Filter Assembly data plate in accordance with Paragraph 6-2 indicating a cleaning cycle was performed. Trim ruptures, tears, or holes in the filter media up to .500 inches in length or diameter to remove loose material (wire or cotton gauze). Seal the affected area using two-part Sealant, AMS 3276 or MIL-S-8802. Allow the Sealant to bleed into the filter material and cure. Follow manufacturer’s directions for proper mixing, application, and curing of the two-part Sealant.

- f. Missing, damaged or loose associated components. Replace missing, or damaged components. Secure loose components.

8.4.5.5 INSTALLATION

- a. Locate the Filter Assy in the filter hole in the Upper Plenum Assy, be sure there is a seal in place.
- b. Secure the Filter Assy to the Upper Plenum Assy using the eight captive fasteners.

8.5 SYSTEMS AND ELECTRICAL COMPONENTS

(Refer to Appendix A, Diagram 13 - 14)

8.5.1 -103 COCKPIT SWITCH/INDICATOR



Picture 6: -103 Cockpit switch/indicator

8.5.1.1 REMOVAL

- a. Gain access to the back of the instrument panel.
- b. Remove connector at back of Cockpit Switch / Indicator.
- c. Remove Cockpit Switch / Indicator cover.
- d. Turn lug ¼ turn counter clockwise to unlock Cockpit Switch / Indicator from panel.
- e. Slide Cockpit Switch / Indicator out of panel.
- f. Tag and secure wiring.

8.5.1.2 INSPECTION

- a. Inspect Cockpit Switch/Indicator for proper functioning. Refer to Section 8.5.2.5, and to Table 8-2 for troubleshooting.

- b. Inspect Cockpit Indicator for security, damage, overheating, corrosion, or distortion. Replace defective component or contact AFS for disposition.

8.5.1.3 TROUBLESHOOTING

See Table 8-2 for troubleshooting guide.

8.5.1.4 ADJUSTMENT / CALIBRATION / REPAIR

Not applicable. Contact AFS for disposition of defective component or replace.

8.5.1.5 FUNCTION CHECK

CAUTION

THIS PROCEDURE INTRODUCES THE POSSIBILITY OF ENGINE FOD.

- a. Verify the Bypass Door is closed and aircraft electric power is ON.
- b. Depress Cockpit Switch / Indicator to open the Bypass Door.
- c. The word "BYPASS" should illuminate on the lower part of the Cockpit Switch / Indicator segment when the door reaches the full open position.
- d. Verify the Bypass Door is open.
- e. Depress the Cockpit Switch / Indicator again to close the Bypass Door.
- f. The word "BYPASS" should extinguish on the lower part of the Cockpit Switch / Indicator segment.
- g. Verify the Bypass Door is closed and aircraft electric power is OFF.
- h. Perform Differential Pressure Switch function check per Section 8.5.4.5.
- i. Verify Cockpit Switch / Indicator "FILTER" amber light illuminates.

8.5.1.6 INSTALLATION

- a. Slide Cockpit Switch / Indicator into panel opening in correct orientation.
- b. Open switch cover. Turn lug ¼ turn clockwise to lock Cockpit Switch / Indicator into panel.
- c. Attach connector at rear of Cockpit Switch / Indicator.

d. Perform Cockpit Switch / Indicator Function Check.

8.5.2 DIFFERENTIAL PRESSURE SWITCH

(Refer to Appendix A, Diagram 13 & 14)

8.5.2.1 REMOVAL

- a. Remove hoses, fittings, and attaching hardware from the Differential Pressure Switch.
- b. Disconnect and secure connector.
- c. Remove Differential Pressure Switch.

8.5.2.2 INSPECTION

Inspect for general serviceability, damage, corrosion, and missing components. Inspect the attaching hardware for security.

8.5.2.3 TROUBLESHOOTING

See Table 8-2 for troubleshooting guidance.

8.5.2.4 ADJUSTMENT / CALIBRATION / REPAIR

The construction details of the component do not warrant field maintenance. Repair of this component requires the component to be sent back to AFS for disposition.

8.5.2.5 FUNCTION CHECK

CAUTION

THIS PROCEDURE INTRODUCES THE POSSIBILITY OF ENGINE FOD.

CAUTION

IMPROPER USE OF THE ALTIMETER TEST SET OR PRESSURE CALIBRATOR COULD RESULT IN DAMAGE TO THE SWITCH CALIBRATION.

CAUTION

IMPROPER USE OF THE ALTIMETER TEST SET OR PRESSURE CALIBRATOR COULD RESULT IN DAMAGE TO THE SWITCH.

CAUTION

INDUCING EXCESSIVE PRESSURES WITH THE ALTIMETER TEST SET OR PRESSURE CALIBRATOR WILL DAMAGE THE DIFFERENTIAL PRESSURE SWITCH.

- a. Gain access to the inside of the Lower Plenum Assembly by removing the Upper Plenum.
- b. Connect the low pressure calibrator or altimeter test set to the plenum side of the DP switch by slipping a piece of 3/16 inch ID vinyl tubing over the end of the differential pressure switch static port. Ensure that the fit between the tube and the static port is tight, i.e. no leakage.
- c. Ensuring that aircraft electrical power is ON, operate the test set to an indicated altitude above the field elevation and gradually increase altitude. The differential pressure switch should actuate and send a signal to the Cockpit Indicator illuminating the IBF “FILTER” light within the following range:

Test Method	Test Station Elevation (ft)					
	0	2000	4000	6000	8000	10000
Low Pressure Calibrator (in. of H ₂ O)	17.0 ± 1.7 inches of H ₂ O					
Altimeter Test Set (ft above test station elevation)	1180 ±120 ft	1250 ±130 ft	1330 ±130 ft	1410 ±140 ft	1510 ±150 ft	1610 ±160 ft

- d. If the Cockpit Indicator Light does not illuminate, pull IBF circuit breaker. Repeat item c above and check for continuity across the terminals of the Differential Pressure Switch. If continuity is present, the Differential Pressure Switch function is acceptable and the rest of the circuit is suspect. Upon completion of testing, ensure that aircraft electrical power is OFF. Refer to Table 8-2.

Warning

Applying a vacuum greater than 221 in-H₂O (8 psi) may result in damaging the DP switch.

- e. This will functionally check both the differential pressure switch and the Cockpit Indicator Light.

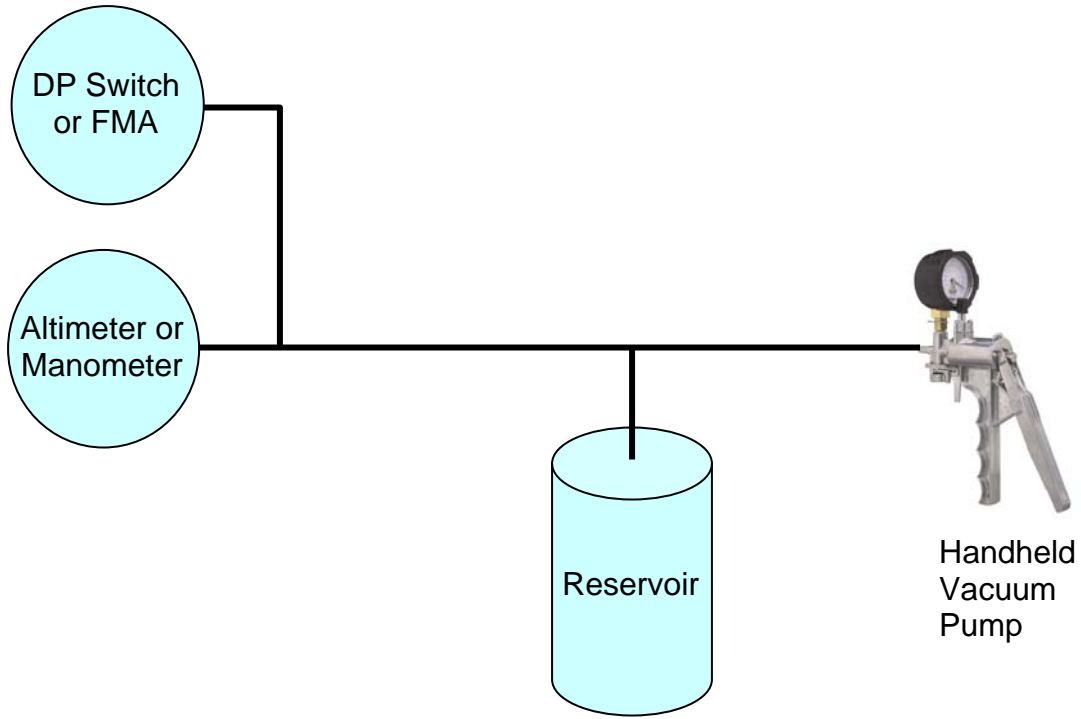


Figure 5: Test Equipment Setup



Picture 7: Test Setup with Manometer

8.5.2.6 INSTALLATION

- a. Gain access to the inside of the Lower Plenum Assembly by removing the Upper Plenum (Refer to Section 8.4.1.1)
- b. Place Differential Pressure Switch in position.
- c. Attach hoses, fittings, and attaching hardware.
- d. Connect and secure connector.
- e. Perform Function Check of Differential Pressure Switch (Refer to Section 8.5.4.5).

8.5.3 FILTER MAINTENANCE AID (Refer to Appendix A, Diagrams 5 & 10)

8.5.3.1 REMOVAL

- a. Gain access to the Filter Maintenance Aid by removing the cover plate.
- b. Disconnect Tube Assembly from Filter Maintenance Aid.
- c. Remove hardware and Mount Frame from Filter Maintenance Aid.
- d. Remove Filter Maintenance Aid.

8.5.3.2 INSPECTION

- a. Inspect the Filter Maintenance Aid and associated mounting for discoloration affecting readability, cracks, deformation, missing or damaged components, and serviceability.
- b. Inspect the Filter Maintenance Aid Plenum Tube Assembly for debris and insure that the tube is clear and unobstructed.
- c. Inspect the associated components, such as the Mount Assembly and hardware for missing components, cracks, distortion or deformation, scratches or gouges, or missing protective coatings.

8.5.3.3 TROUBLESHOOTING

See Troubleshooting Guide, Table 8-2.

8.5.3.4 ADJUSTMENT / CALIBRATION / REPAIR

The construction details of the component do not warrant field maintenance. Repair of this component requires the component to be sent back to AFS for disposition, or replaced.

8.5.3.5 ADJUSTMENT

The Filter Maintenance Aid is designed to hold the highest differential pressure across the filter assembly reached during the last flight, and can be reset by depressing the yellow button marked "PUSH TO RESET" located on the end of the filter maintenance aid (See Pictures 2).

8.5.3.6 REPAIR

- a. The construction details of the component do not warrant field maintenance. Repair of this component requires the component to be sent back to AFS for disposition, or replaced.
- b. If the Filter Maintenance Aid fails the function check, disconnect the plenum tube assembly from the Filter Maintenance Aid, and inspect for damage or blockage of the tube assembly. Inspect the opening on the Filter Maintenance Aid for obstructions. Remove obstructions as required. Reattach tube assembly and perform function check (Refer to Section 8.5.4.7). If it fails function check, replace FMA.
- c. Replace damaged sheet metal components of the Mount Assembly and missing or damaged hardware.
- d. Re-apply corrosion protection to Mount Hardware per Table 8-1.

8.5.3.7 FUNCTION CHECK

CAUTION

THIS PROCEDURE INTRODUCES THE POSSIBILITY OF ENGINE FOD.

CAUTION

IMPROPER USE OF THE ALTIMETER TEST SET OR PRESSURE CALIBRATOR COULD RESULT IN DAMAGE TO THE FILTER MAINTENANCE AID.

CAUTION

INDUCING EXCESSIVE PRESSURES WITH THE ALTIMETER TEST SET OR PRESSURE CALIBRATOR WILL DAMAGE THE DIFFERENTIAL PRESSURE SWITCH

- a. Gain access to the inside of the Upper Plenum Assembly (Refer to Section 8.4.1.1)

- b. Connect the low pressure calibrator or altimeter test set to the plenum side of the FMA by slipping a piece of 3/16 inch ID vinyl tubing over the end of the FMA static port. Ensure that the fit between the tube and the static port is tight, i.e. no leakage.
- c. Reset the Filter Maintenance Aid by depressing the yellow button marked “PUSH TO RESET” located on the end of the filter maintenance aid (See Picture 2).
- d. The maintenance aid should indicate in the red zone within the following range:

Test Method	Test Station Elevation (ft)					
	0	2000	4000	6000	8000	10000
Low Pressure Calibrator (inches of H ₂ O)	12.0 ± 1.2					
Altimeter Test Set (ft above test station elevation)	830 ±80 ft	880 ±90 ft	930 ±90 ft	990 ±100 ft	1060 ±110 ft	1130 ±110 ft

8.5.3.8 INSTALLATION

- a. Gain access to the area by removing the cover plate.
- b. Position the Filter Maintenance Aid into the Mount Assembly.
- c. Install hardware and connect Tube Assembly.

8.5.4 ACTUATOR

(Refer to Appendix A, Diagram 11)

8.5.4.1 REMOVAL

- a. Gain access to the area by removing the cover plate.
- b. Disconnect and secure circular connector at Actuator.
- c. Remove hardware securing the bellcrank to the Actuator Rod End.
- d. Remove hardware attaching the Actuator to the Mechanism Wall.
- e. Remove Actuator.

8.5.4.2 INSPECTION

- a. Inspect Actuator for cracks, damage, security of installation, corrosion, and serviceability.
- b. Inspect the Circular Connector for damage, security, corrosion and serviceability.

8.5.4.3 TROUBLESHOOTING

- a. Refer to Table 8-2 for troubleshooting guidance.
- b. Perform Function Check. If Function Check indicates a discrepancy with the Actuator replace the actuator.

8.5.4.4 ADJUSTMENT

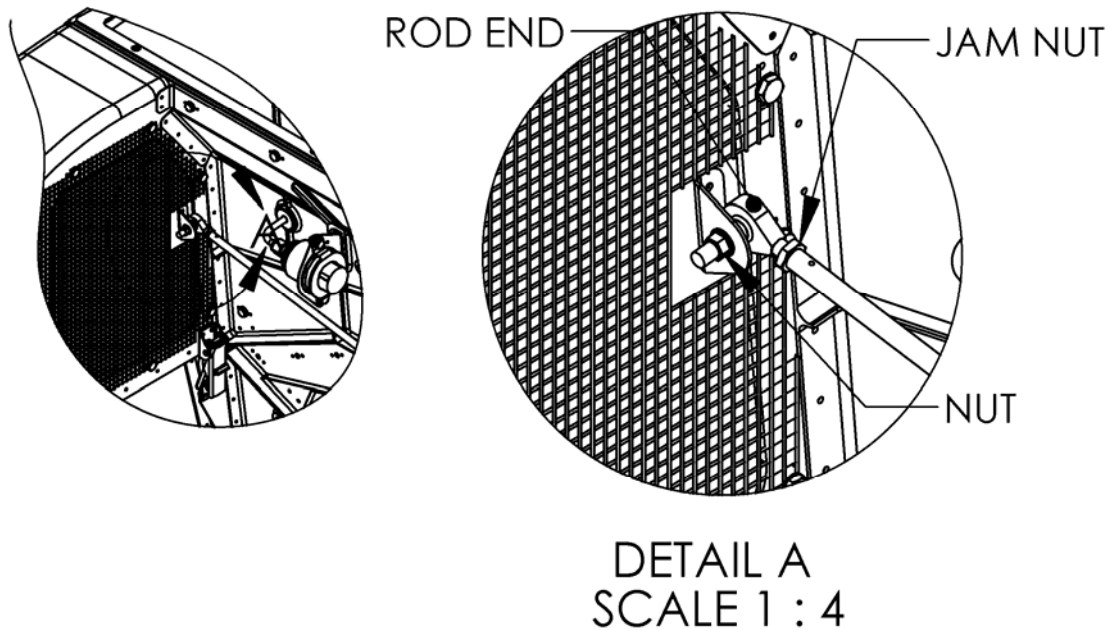


Figure 6: Actuator / Bypass Door Adjustment

- a. Clear the area of the Bypass Door of any tools, hardware, or other obstructions.
- b. After ensuring that aircraft power is ON, cycle the Bypass Doors by switching the Cockpit Switch from the closed position to the open position and back. Verify the Bypass Door is closed and the seal is compressed between 10% and 15%. If Bypass Door is not compressing the seal between 10% and 15% the linkage rod will have to be adjusted as follows:
- c. Disconnect actuator ram from bellcrank.
- d. Remove nut from Rod End bolt and remove from door bracket. Refer to Figure 13, Detail A.
- e. Loosen jamb nut and adjust rod end in or out, until both R/H and L/H Bypass Door Seals are compressed 10% to 15% when overcenter bellcrank goes overcenter.
- f. Repeat steps b through e until the Seal is compressed correctly.

- g. Ensure longer leg of overcenter bellcrank is pointed down before reconnecting Actuator Ram.
- h. Permanently install hardware to attach the Actuator rod end to the Bellcrank. Torque jamb nut **25 TO 30 INCH-POUNDS**. Torque nut **30 TO 40 INCH-POUNDS**.
- i. Perform function check per Section 8.5.6.7.
- j. Switch the Cockpit Switch closed position to signal the Actuator to close the bypass door and then ensure that aircraft power is OFF.

8.5.4.5 CALIBRATION

Not applicable.

8.5.4.6 REPAIR

- a. Repair of the actuator is limited to removal of minor surface corrosion from the actuator shaft using fine sandpaper or crocus cloth (Table 8-3).
- b. Damage to the actuator, such as cracking of the attachment lug, distortion, warping, or failure to actuate requires disposition by AFS or replacement.
- c. The Actuator rod end and attachment hardware can also be replaced if they are damaged, corroded, or unserviceable. Replace the Actuator rod end by loosening the jamb nut and removing / replacing the rod end. Perform the Actuator / Bypass Door Adjustment procedure per Section 8.5.6.4.

8.5.4.7 FUNCTION CHECK

- a. Clear the area of the Bypass Door of any tools, hardware, or other obstructions.
- b. Ensure that aircraft power is ON, and then turn the Cockpit Switch to the closed position to signal the Actuator to close the bypass door.
- c. Perform Seal compression inspection per the Actuator / Bypass Door Adjustment procedures, Section 8.5.6.4.
- d. Turn the Cockpit Switch to the open position to signal the Actuator to open the bypass door (this fully extends the actuator rod). Verify that both Bypass Doors are opened approximately the same distance.
- e. If conditions are not met refer to Troubleshooting guide, Table 8-2, and Adjustment procedures, Section 8.5.6.4.

8.5.4.8 INSTALLATION

CAUTION

THIS PROCEDURE INTRODUCES THE POSSIBILITY OF ENGINE FOD.

CAUTION

TO PREVENT INTERNAL DAMAGE TO THE ACTUATOR, HOLD THE ROD END WHILE LOOSENING, TIGHTENING, OR APPLYING TORQUE TO THE JAMB NUT.

- a. Gain access to the area by removing the cover plate.
- b. Clear the area of the Bypass Door of any tools, hardware, or other obstructions.
- c. Install hardware attaching the Actuator to the Mechanism Wall.
- d. Temporarily install the bolt attaching the Actuator to the Overcenter Bellcrank.
- e. Perform functional check per Actuator / Bypass Door Function Check procedures (See Section 8.5.5.7).
- f. Upon completion of Bypass Door Adjustment procedures confirm the permanent installation of hardware securing the Actuator rod end to the Overcenter Bellcrank.
- g. Secure Actuator Circular Connector to aircraft power located on Lower Plenum. Ensure that aircraft power is OFF.

8.5.5 WIRING, WIRING HARNESS, CONNECTORS, BACKSHELLS, CIRCUIT BREAKER, RELAY

(Refer to Appendix A, Diagram 13-14)

8.5.5.1 REMOVAL

- a. Prepare aircraft for work performed on the electrical system by disconnecting the battery.
- b. Remove hardware, clamps, spiral wrap from component, as applicable. Tag interfacing components for later installation. Remove affected components.

8.5.5.2 INSPECTION

The IBF wiring, wiring harness, and associated components is constructed of standard aircraft wire and connectors. Standard aircraft maintenance procedures should be used for inspections and repair of the harness and connectors. Routine aircraft maintenance should include visual

inspection for evidence of chafing, damage, corrosion and insuring the circuit breaker and all pins, connectors, and backshells are secure. Inspect wiring, wiring harness and associated components per AC 43.13-1, Chapter 11.

8.5.5.3 TROUBLESHOOTING

- a. See Table 8-2 for troubleshooting guidance.
- b. See Appendix A, Diagram 13-14 for wiring diagram, wire marking and identification, routing, and installation information.

8.5.5.4 ADJUSTMENT / CALIBRATION

Not applicable.

8.5.5.5 REPAIR

Standard aircraft maintenance procedures should be used for repair of the wiring, wire harness and associated components. See Appendix A, Diagram 13-14 for wiring diagram, wire marking and identification, routing, and installation information. Perform repairs to affected components per AC 43.13-1, Chapter 11.

8.5.5.6 INSTALLATION

- a. Prepare aircraft for work performed on the electrical system by disconnecting the battery.
- b. Install affected component using appropriate hardware. Connect wiring per wiring diagram. Install clamps, spiral wrap and heat shrink as applicable to affected components per AC 43.13-1, Chapter 11.

8.6 PROTECTIVE TREATMENT

- a. The fairing assembly and structural components of the IBF system is composed primarily of aluminum alloy materials, except for standard hardware components and fasteners, and vendor components. Aluminum components are coated with an epoxy primer. Scratched or damaged aluminum components should be touched up with a small paint brush dipped in epoxy primer. Prepare epoxy primer per manufacturers instructions.
- b. Aircraft finishes scratched or damaged should be recoated with the finish specified in the aircraft maintenance records and maintenance manual.
- c. For the systems and electrical components, there are no protective treatments specified. Contact AFS for disposition of damaged components, or replace the damaged component.

Table 8-1: Protective Treatment for Components

Component	Material	Limits of Damage	Protective Treatment
Filter Assembly	Alum. Alloy Sheet Stk.	Scratches, pitting, gouges must be less than 20% of part thickness. See note 1.	Re-apply Epoxy Primer Ref Table 8-3
Engine Wash Nozzles	Machined Alum Alloy	Scratches, pitting, gouges must be less than 20% of part thickness. See note 1.	Chemical conversion coating. Ref Table 8-3
Bypass Mechanism Assembly			
Bypass Doors	Alum. Alloy Sheet Stk.	Scratches, pitting, gouges must be less than 10% of part thickness. See note 1.	Re-apply Epoxy Primer Ref Table 8-3
Mechanism Wall	Machined Alum Alloy	Scratches, pitting, gouges must be less than 10% of part thickness. See note 1.	Re-apply Epoxy Primer Ref Table 8-3
Filter Maint Aid Bracket	Alum. Alloy Sheet Stk.	Inspect for Serviceability	Re-apply Epoxy Primer Ref Table 8-3

Notes:

1. Contact AFS for disposition instructions for components with more severe discrepancies or replace.

8.7 TROUBLESHOOTING GUIDE

The following table defines the probable cause, remedy, and OMM reference to the applicable procedure for correcting the trouble listed in the table. Multiple failures are not addressed in this table such as a failed actuator and failed wiring existing at the same time.

Table 8-2: Troubleshooting Guide

ITEM	TROUBLE	PROBABLE CAUSE	REMEDY	ICA REF
1	FILTER light fails to illuminate	Faulty connector Faulty circuit Faulty cockpit indicator Faulty delta P switch	Check connectors to aircraft power, cockpit indicator light, and actuator. Check circuit continuity and repair circuit. Verify using caution light function check; replace cockpit indicator light. Replace differential pressure switch.	Para. 8.5.1. Para. 8.5.5. Para. 8.5.1. Para. 8.5.2.
2	FILTER light is dim	Failed LED(s) in indicator	Verify using caution light press-to-test; replace cockpit indicator light.	Para. 8.5.1.
3	FILTER light stays illuminated	Bypass obstructed Faulty delta P switch	Clear bypass path. Replace differential pressure switch.	Para. 8.5.2.
7	Bypass doors fail to close	Actuator misrigged Faulty connector Faulty circuit Faulty cockpit switch Faulty actuator	Check actuator rigging. Check connectors to aircraft power, cockpit switch, and actuator. Check circuit continuity and repair circuit. Check switch continuity in CLOSE position; replace cockpit switch. Replace actuator.	Para. 8.5.4. Para. 8.5.5. Para. 8.5.5. Para. 8.5.1. Para. 8.5.4.
8	Bypass doors fail to open	Actuator misrigged Faulty connector Faulty circuit Faulty cockpit switch Faulty actuator	Check actuator rigging. Check connectors to aircraft power, cockpit switch, and actuator. Check circuit continuity and repair circuit. Check switch continuity in OPEN position; replace cockpit switch. Replace actuator.	Para. 8.5.4. Para. 8.5.5. Para. 8.5.5. Para. 8.5.1. Para. 8.5.4.
9	FILTER light illuminates	Obstructed inlet Dirty filter	Clear engine inlet. Verify by checking FMA & inspect filter; service filter.	Para. 7.3.
10	Engine fails PAC	Obstructed inlet Dirty filter	Clear engine inlet. Verify PAC results, check FMA, & inspect filter; service filter. NOTE: If engine still fails PAC - check engine.	Para. 7.3.
11	Engine wash spray pattern not uniform	Spray nozzles clogged	Inspect & clear tube/nozzle to remove dirt / debris.	Para. 8.4.4.

8.8 SPECIAL TOOLS / SPECIAL EQUIPMENT

NOTE

Standard Aircraft Mechanic Tools are not listed.

- a. Hand Seamer – 1 1/4 inch maximum jaw depth. Hand seamers are available through many commercial aircraft supply stores and also through commercial heating and air conditioning supply stores. Recommend the following: Malco Tools “Hand Seamer with Forged Steel Jaw”, Catalog # S2, S3 and S6. The S3 model is also available through Wicks Aircraft Supply, Part Number TP44-0, “Offset Hand Seamer”.
- b. Barfield or Equivalent Manufacturer Altimeter Test Set

8.9 CONSUMABLE MATERIALS, SUPPLIES, AND PROTECTIVE TREATMENT SPECS

Table 8-3: Consumable Materials, Supplies and Protective Treatment Specifications

Item	Description	Spec / Part No.
Consumables		
1	Sealant	AMS 3276
2	Sealant	MIL-S-8802
3	Sealant	RTV 736
4	Sand paper 400-600 grit	Commercial avail.
5	Crocus Cloth	Commercial avail.
Supplies		
6	Air Filter Oil	Squeeze bottle – AFS P/N 100100-065
6.1	Air Filter Oil	Gallon container – AFS P/N 100101-000
7	Air Filter Cleaner	Gallon container – AFS P/N 100201-000
Protective Treatment Specs		
8	Epoxy Primer.	MIL-PRF-23337
9	Chemical Conversion Coating	MIL-C-5541 (One commercial trade name, “Alodine”)
10	Aircraft Finish	See Aircraft Records for appropriate Finish / Top Coat.

APPENDIX A - Illustrated Parts Breakdown

LIST OF DIAGRAMS

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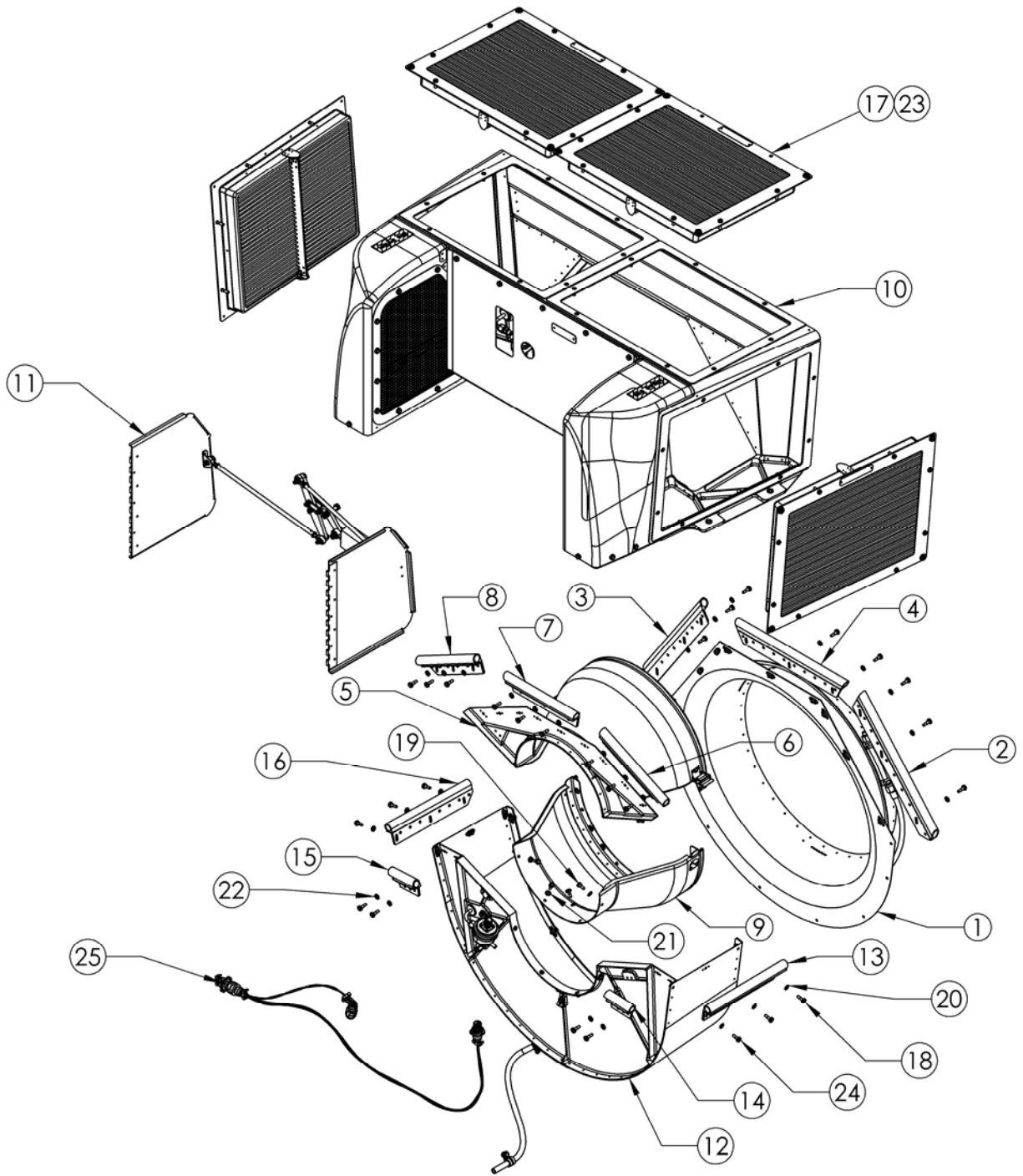


Diagram 1: Inlet Barrier Filter Assembly

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		Diagram 1: IBF Kit Installation w/ Access Door		
	111002-101	Installation - IBF, Bell 205		
1	111010-101	Assy - Duct, Bellmouth	1	P
2	111135-101	Assy -Seal, Plenum, Aft, Outbd	1	P
3	111135-102	Assy -Seal, Plenum, Aft, Outbd	1	P
4	111130-101	Assy -Seal, Plenum, Aft, Center	1	P
5	111030-103	Assy - Cover, Driveshaft, Upper	1	P
6	111150-101	Assy - Seal, Plenum, Fwd, Inbd	1	P
7	111145-101	Assy - Seal, Plenum, Fwd, Center	1	P
8	111150-102	Assy - Seal, Plenum, Fwd, Inbd	1	P
9	111040-101	Assy - Cover, Driveshaft, Lower	1	P
10	111050-103	Assy - Plenum, Upper	1	P
11	111070-101	Instl - Mechanism, Bypass	1	P
12	111080-103	Assy - Plenum, Lower	1	P
13	111140-101	Assy - Seal, Plenum, Side	1	P
14	111155-101	Assy - Seal, Plenum, Fwd, Outbd	1	P
15	111155-102	Assy - Seal, Plenum, Fwd, Outbd	1	P
16	111140-102	Assy - Seal, Plenum, Side	1	P
17	111300-103	Filter - Assembly (Used on -103 Configuration)	4	P
18	NAS6203-05	Bolt	26	SP
19	NAS6203-03	Bolt	4	SP
20	NAS1149D0332J	Washer	6	SP
21	NAS549L10	Washer	4	SP
22	NAS1149D0363J	Washer	22	SP
23	111350-101	FOD Screen - Assembly (Used on -105 Configuration)	4	P
24	NAS6203-04	Bolt	2	SP
25	111403-101	Assy - Wire Harness	1	P
		AVAIL CODE DEFINITION P Procurable NP Non Procurable SP Normal stock/procurable See introduction on availability codes for additional information.		

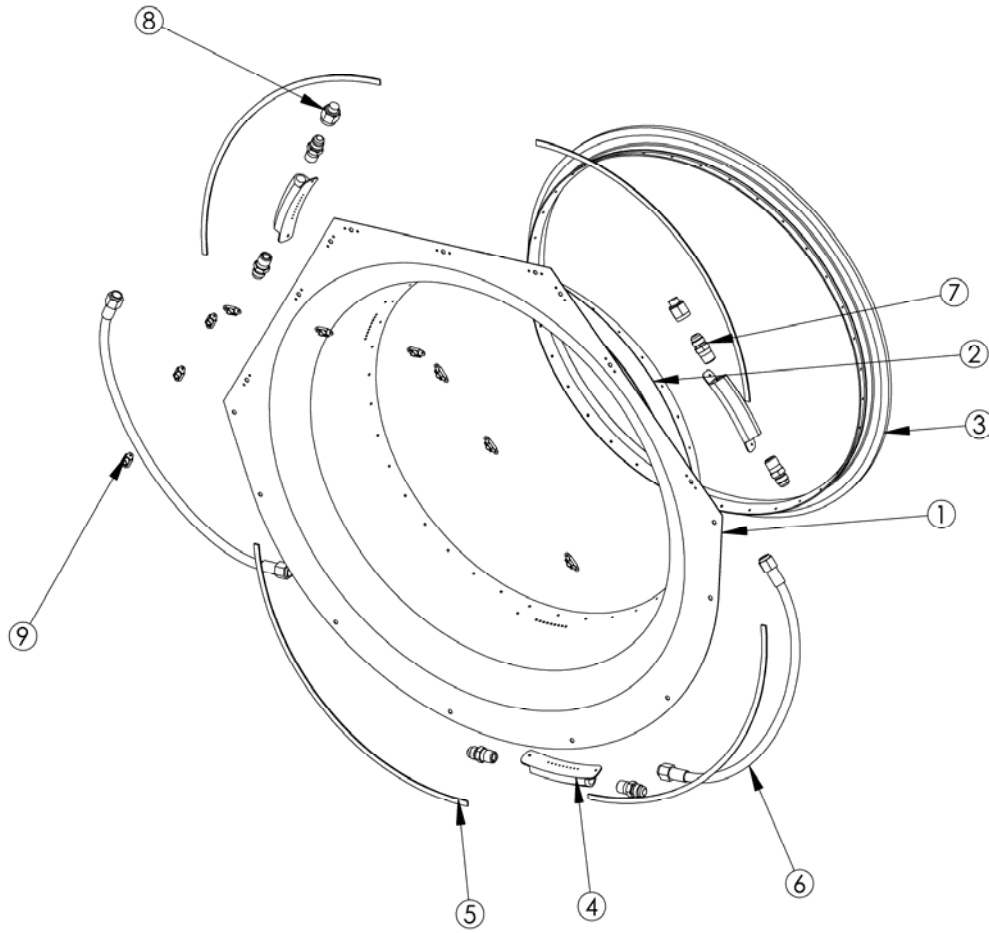


Diagram 2: Bellmouth Duct Assembly

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		DIAGRAM 2: IBF Bellmouth Duct Assembly		
	111010-101	Assy - Duct, Bellmouth		P
1	111011-201	Duct - Bellmouth	1	NP
2	111012-201	Flange - Firewall	1	NP
3	111013-201	Adapter - Engine, Bellmouth	1	NP
4	111020-205	Nozzle, Wash, Engine	3	BP
5	111022-201	Seal - Firewall	4	P
6	MS8005G165A	Hose Assy	2	P
7	AN816-6D	Adapter	6	P
8	AN929-6J	Cap	2	P
9	MS21059L3	Nutplate	9	SP
		AVAIL CODE DEFINITION		
		P Procurable		
		NP Non Procurable		
		SP Normal stock/procurable		
		See introduction on availability codes for additional information.		

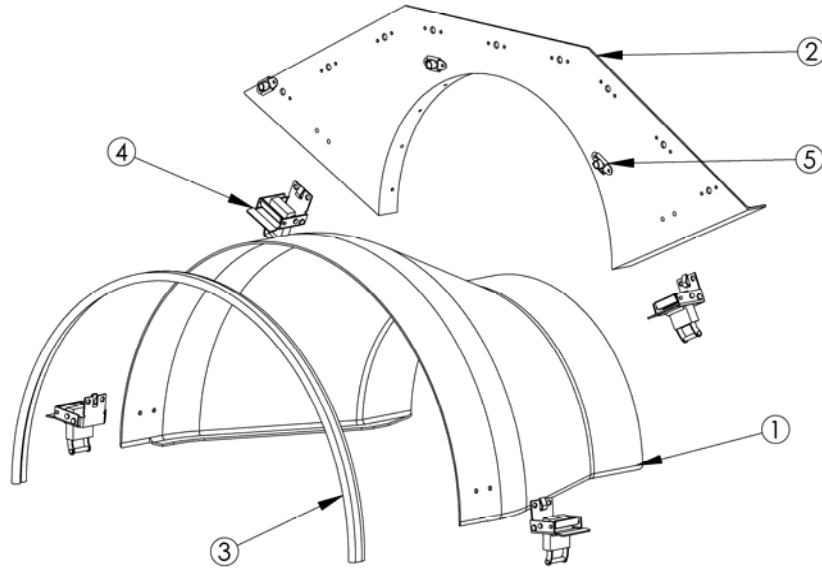


Diagram 3: Upper Driveshaft Cover

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		DIAGRAM 3: Upper Driveshaft Cover		
	111030-103	Assy -Cover, Driveshaft, Upper		P
1	111031-201	Cover - Driveshaft	1	NP
2	111032-203	Wall - Fwd, Closeout	1	NP
3	111033-201	Seal - Cover, Driveshaft	1	P
4	HC83314-2LALBSS130-03	Latch	4	NP
5	MS21059L3	Nutplate	9	P
		AVAIL CODE DEFINITION		
		P Procurable		
		NP Non Procurable		
		SP Normal stock/procurable		
		See introduction on availability codes for additional information.		

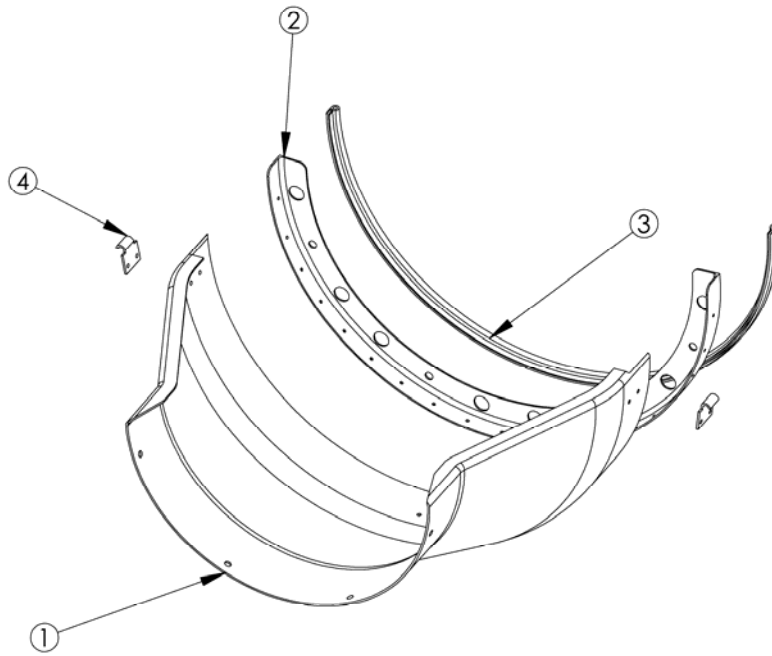


Diagram 4: Lower Driveshaft Cover Assy

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		DIAGRAM 10: Lower Driveshaft Cover Assembly		
	111040-101	Assy - Cover, Driveshaft, Lower		P
1	111031-201	Cover - Driveshaft	1	NP
2	111041-205	Adapter - Engine, Cover, Driveshaft	1	NP
3	111033-201	Seal - Cover, Driveshaft	1	P
4	HS179286-SS130	Strike	2	NP
		AVAIL CODE DEFINITION		
		P Procurable		
		NP Non Procurable		
		SP Normal stock/procurable		
		See introduction on availability codes for additional information.		

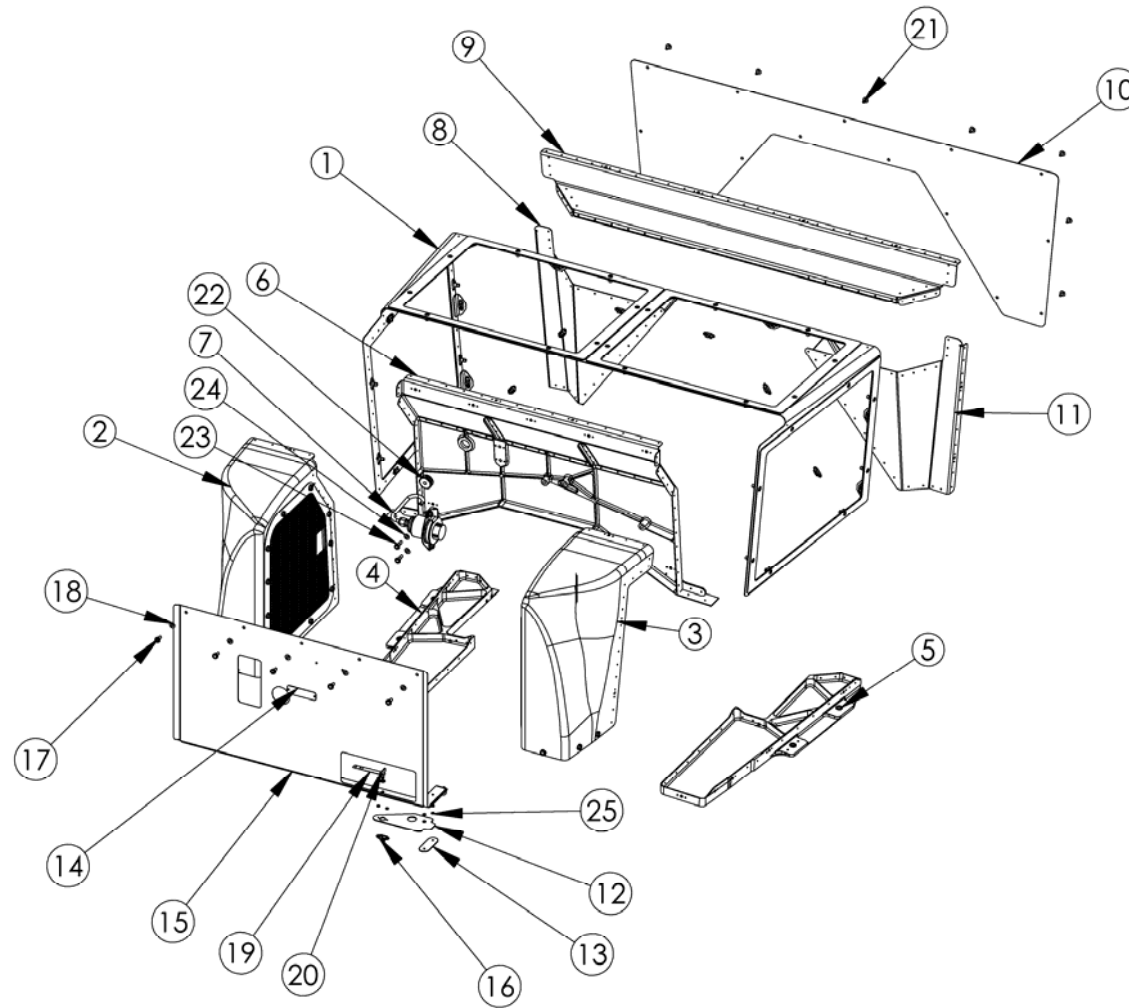


Diagram 5: Upper Plenum Assembly

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		DIAGRAM 5: Upper Plenum Assembly		
	111050-103	Assy - Plenum, Upper		P
1	N/A	See Fig 6	1	N/A
2	N/A	See Fig 8	1	N/A
3	N/A	See Fig 9	1	N/A
4	111055-102	Assy - Mount, Plenum, Upper	1	P
5	111055-101	Assy - Mount, Plenum, Upper	1	P
6	N/A	See Fig 7	1	N/A
7	111067-101	Assy - Indicator, Maintenance	1	P
8	111061-202	Wall - Plenum, Upper, Aft, Outbd	1	NP
9	111060-201	Wall - Plenum, Upper, Aft, Center	1	NP
10	111114-201	Cover - Plenum, Upper, Aft	1	P
11	111061-201	Wall - Plenum, Upper, Aft, Outbd	1	NP
12	111057-201	Bracket	1	P
13	111098-201	Plate	1	P
14	111045-203	Data Plate	1	NP
15	111069-203	Cover - Mechanism, Bypass	1	P
16	RF35	Receptacle	1	P
17	NAS6203-02	Bolt	5	SP
18	NAS1149D0332J	Washer	5	SP
19	X-1031	Blade	1	NP
20	AW35T15	Stud	1	AP
21	AN525-10R	Bolt	15	SP
22	MS35489-94	Grommet	1	SP
23	NAS6203-05	Bolt	2	SP
AVAIL CODE DEFINITION				
P Procurable				
NP Non Procurable				
SP Normal stock/procurable				
See introduction on availability codes for additional information.				

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	A V A I L
		DIAGRAM 5: Upper Plenum Assembly		
24	NAS1149D0316J	Washer	2	SP
25	NAS620-05	Washer	4	SP
		<p>AVAIL CODE DEFINITION</p> <p>P Procurable NP Non Procurable SP Normal stock/procurable</p> <p>See introduction on availability codes for additional information.</p>		

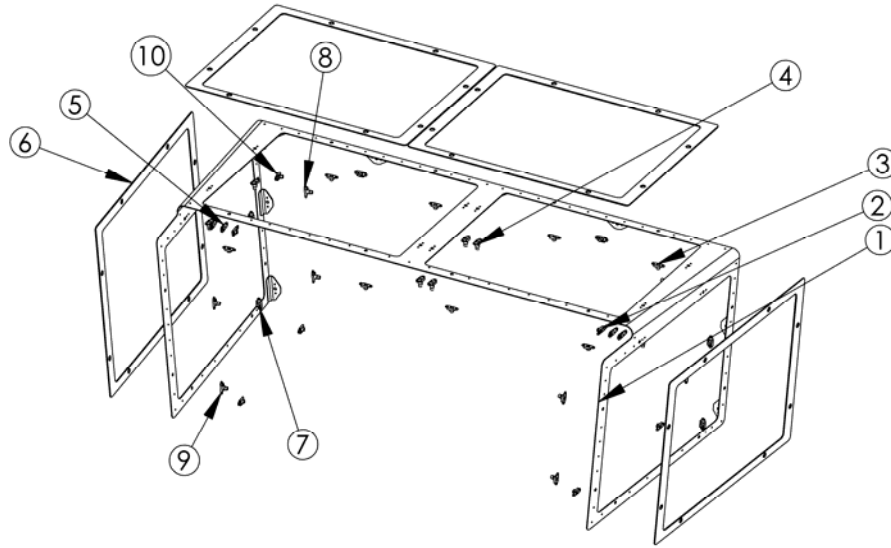


Diagram 6: Upper Plenum Assy (Cont.)

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		DIAGRAM 6: Upper Plenum Assy (Cont.)		
1	111051-201	Frame	1	NP
2	MS21061L3	Nutplate	2	SP
3	NAS1870-3-2	Nutplate	6	SP
4	NAS1870-3-6	Nutplate	8	SP
5	NAS463YD10	Shim	4	SP
6	111066-201	Seal	4	P
7	MS21059L3	Nutplate	15	SP
8	NAS1870-3-5	Nutplate	4	SP
9	NAS1870-3-4	Nutplate	4	SP
10	NAS1870-3-3	Nutplate	2	SP
AVAIL CODE DEFINITION				
P Procurable NP Non Procurable SP Normal stock/procurable				
See introduction on availability codes for additional information.				

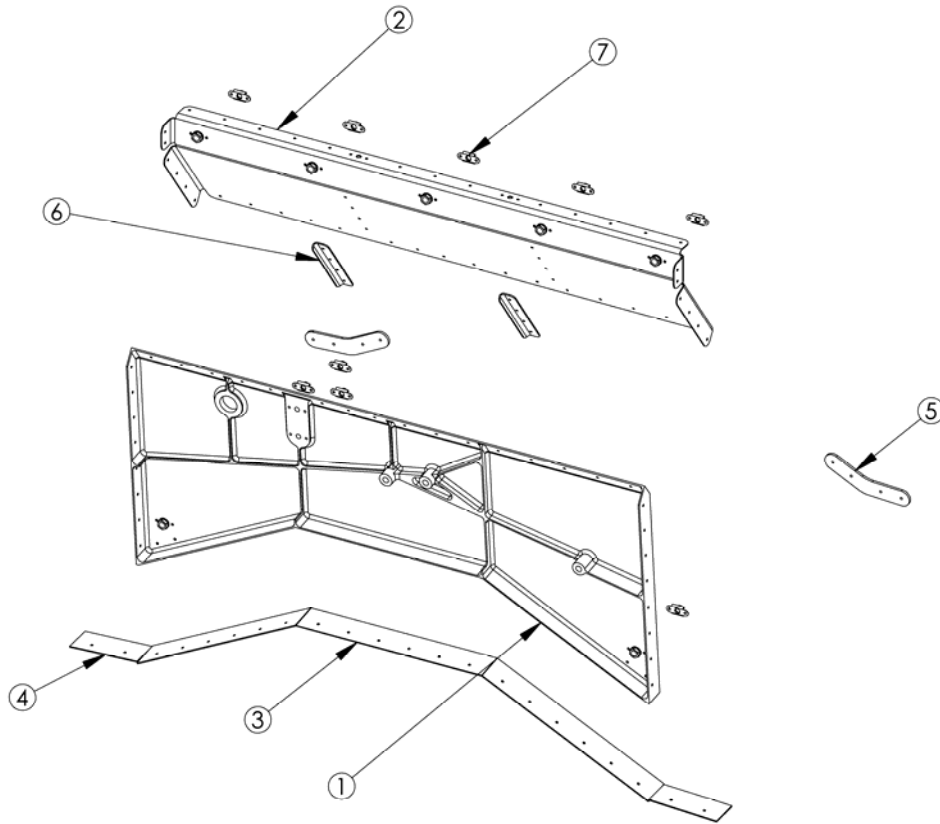


Diagram 7: Upper Plenum Assy (Cont.)

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		DIAGRAM 7: Upper Plenum Assy (Cont.)		
1	111053-203	Wall	1	P
2	111052-203	Wall	1	NP
3	111112-201	Plate	3	NP
4	111113-201	Plate	2	NP
5	111058-201	Plate	2	NP
6	111054-201	Stiffener	2	NP
7	MS21059	Nutplate	9	SP
		AVAIL CODE DEFINITION		
		P Procurable		
		NP Non Procurable		
		SP Normal stock/procurable		
		See introduction on availability codes for additional information.		

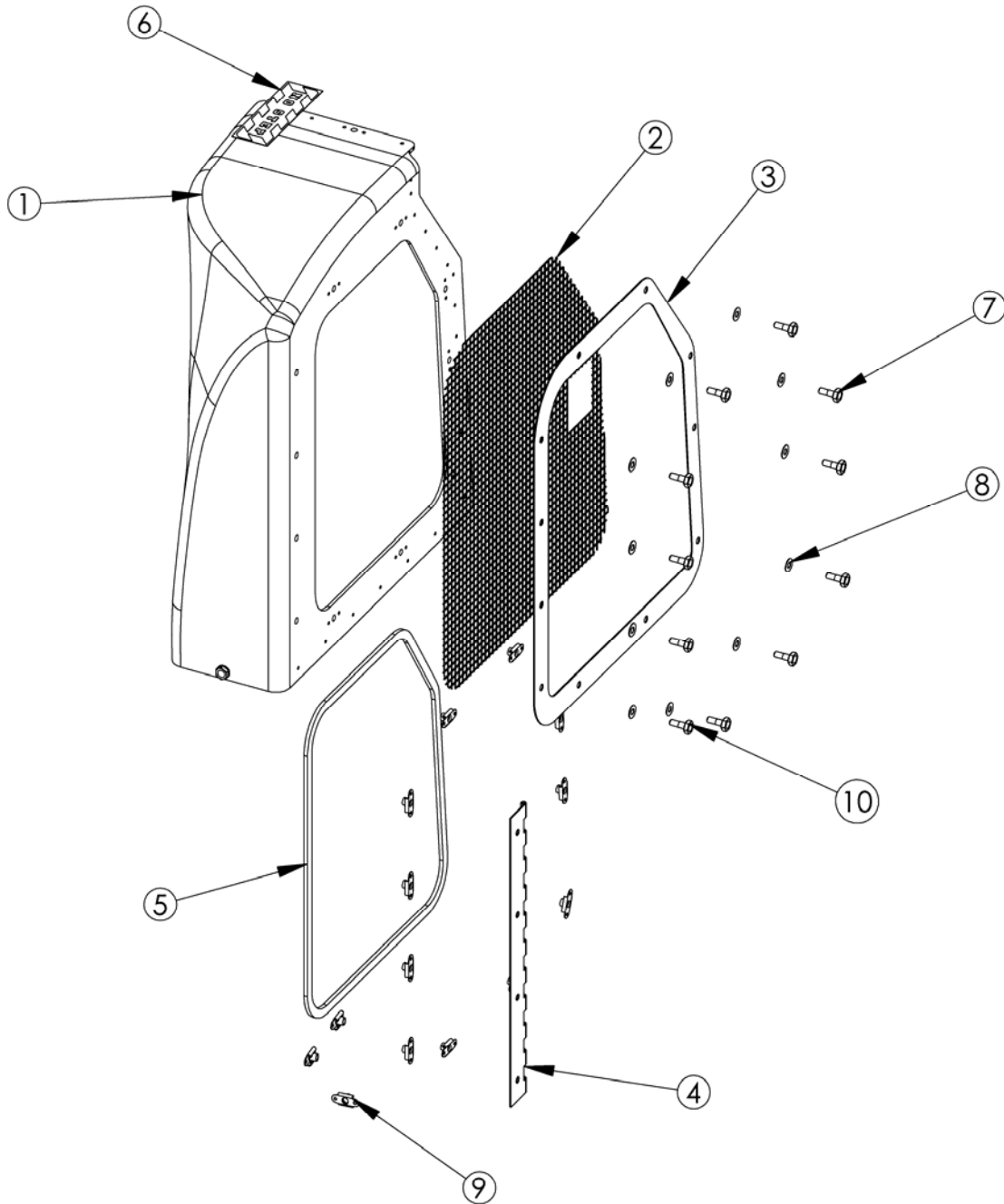


Diagram 8: Upper Plenum Assy (Cont.)

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		DIAGRAM 8: Upper Plenum Assy (Cont.)		
1	111056-201	Extension	1	P
2	111064-203	Screen	1	P
3	111079-201	Retainer	1	P
4	111059-201	Hinge	1	P
5	111065-201	Seal	1	P
6	PC100-024	Placard	1	SP
7	NAS6203-04	Bolt	7	SP
8	NAS1149D0316J	Washer	11	SP
9	MS21059L3	Nutplate	14	P
10	NAS6203-05	Bolt	4	SP
AVAIL CODE DEFINITION				
P Procurable				
NP Non Procurable				
SP Normal stock/procurable				
See introduction on availability codes for additional information.				

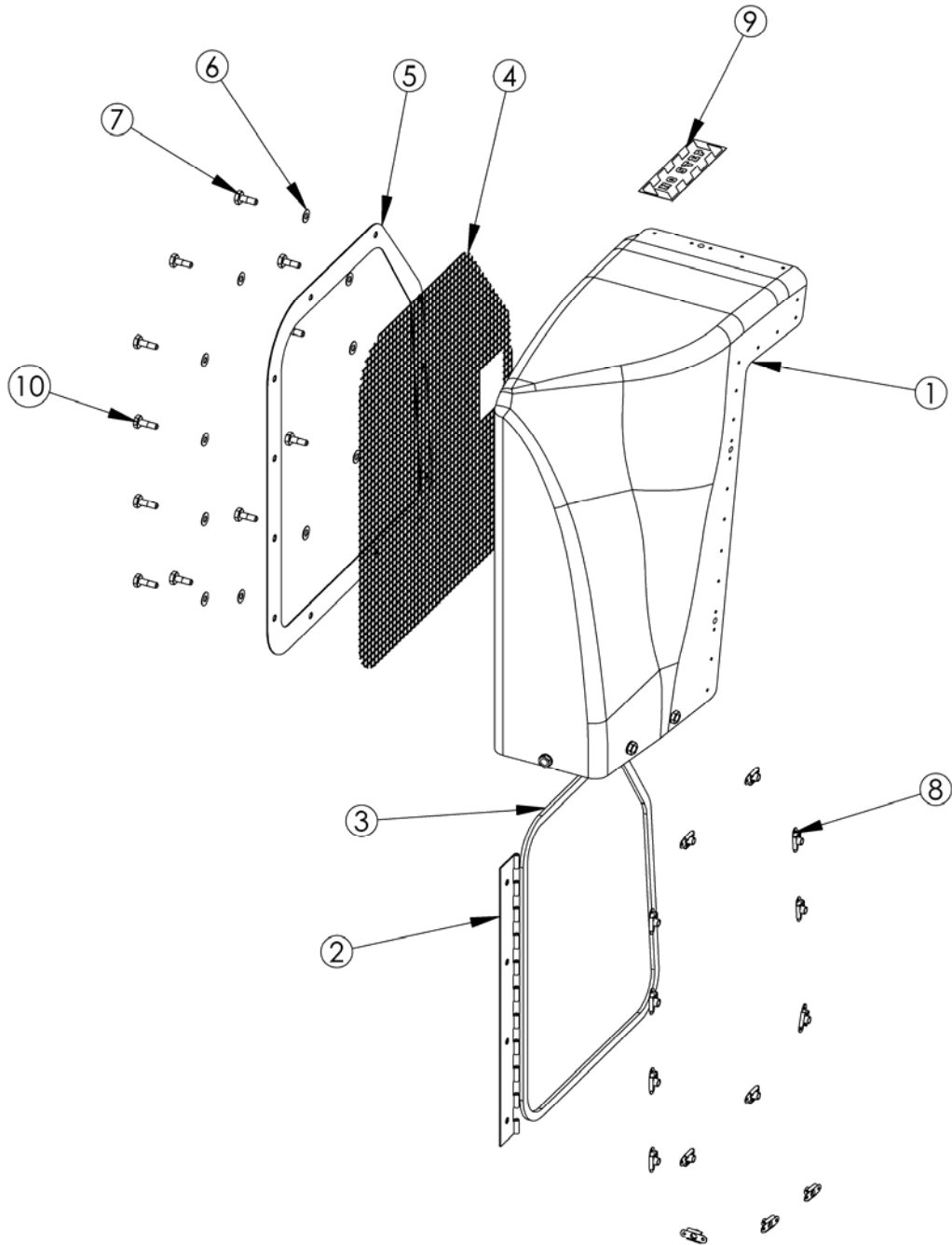


Diagram 9: Upper Plenum Assy (Cont.)

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		DIAGRAM 9: Upper Plenum Assy (Cont.)		
1	111056-202	Extension	1	P
2	111059-201	Hinge Half	1	P
3	111065-202	Seal	1	P
4	111064-203	Screen	1	P
5	111079-201	Retainer	1	P
6	NAS1149D0316J	Washer	11	SP
7	NAS6203-04	Bolt	7	SP
8	MS21059L3	Nutplate	14	SP
9	PC100-024	Placard	1	P
10	NAS6203-05	Bolt	4	SP
AVAIL CODE DEFINITION				
P Procurable				
NP Non Procurable				
SP Normal stock/procurable				
See introduction on availability codes for additional information.				

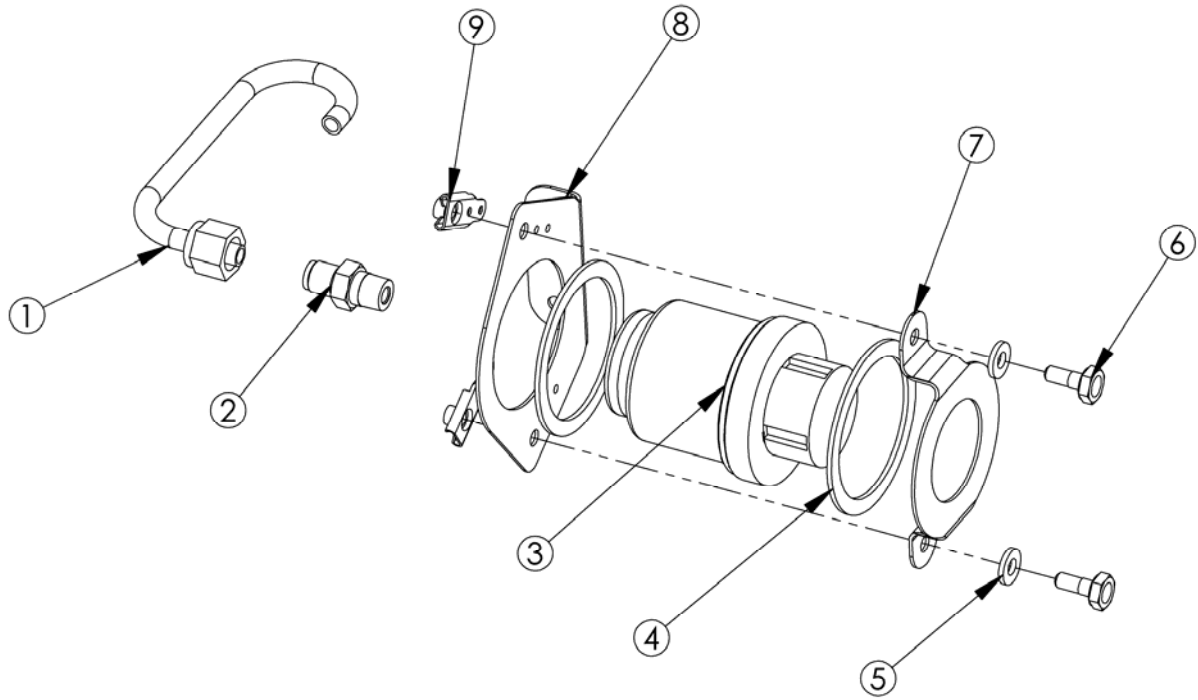


Diagram 10: Filter Maintenance Aid

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		DIAGRAM 10: Filter Maintenance Aid		
	111067-101	Maintenance Indicator Assembly	1	P
1	106117-101	Tube Assembly	1	P
2	A-401-1	Adapter	1	P
3	104441-205	Indicator	1	P
4	104444-201	Cushion	2	P
5	NAS1149D0363J	Washer	2	SP
6	NAS6203-03	Bolt	2	SP
7	104442-205	Retainer	1	P
8	111068-201	Mount	1	P
9	MS21061L3	Nutplate	2	SP
AVAIL CODE DEFINITION				
P Procurable				
NP Non Procurable				
SP Normal stock/procurable				
See introduction on availability codes for additional information.				

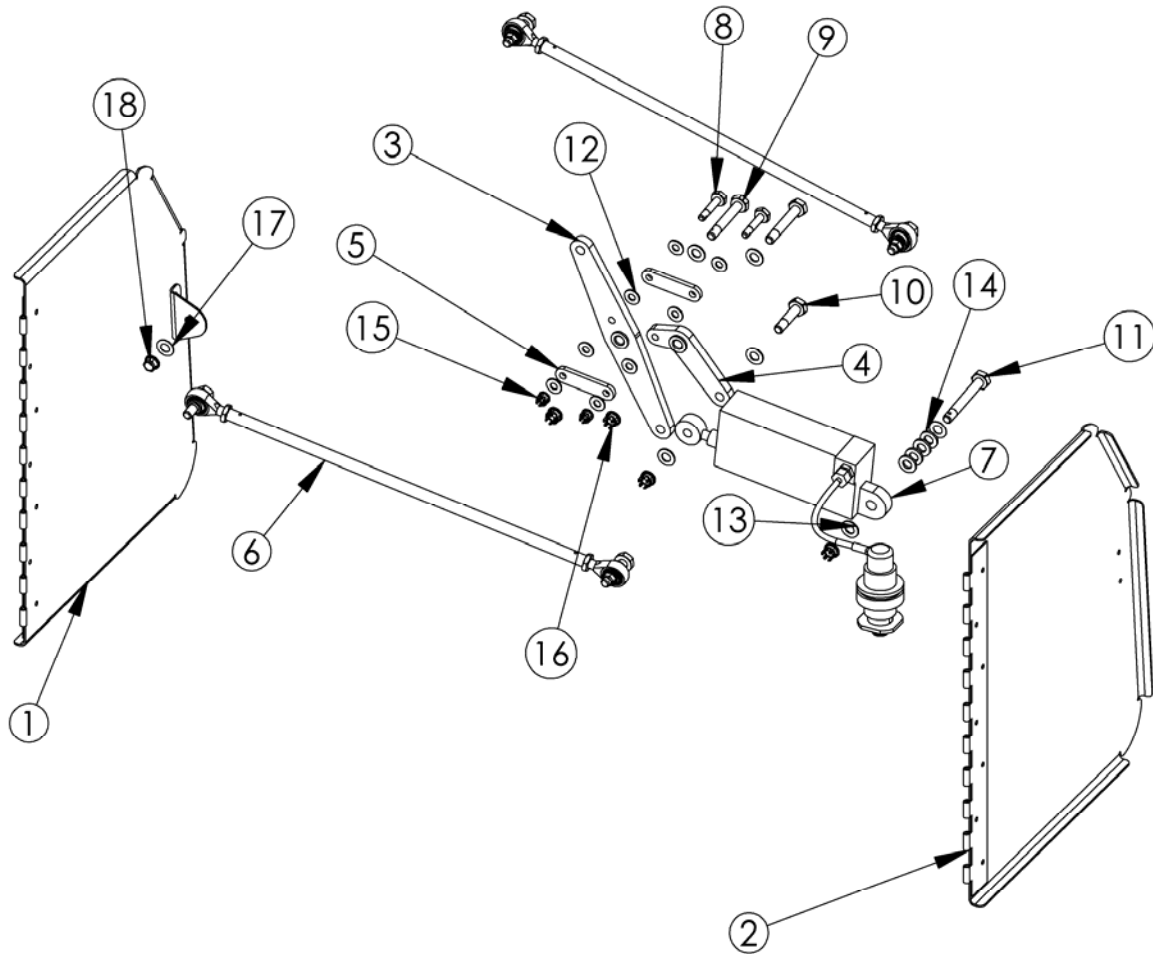


Diagram 11: Bypass Door Mechanism Assy

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		DIAGRAM 11: Bypass Door Mechanism		
	111070-101	Instl - Mechanism, Bypass		NP
1	111071-102	Assy - Door, Bypass	1	P
2	111071-101	Assy - Door, Bypass	1	P
3	111075-101	Assy - Bellcrank	1	P
4	111076-101	Assy - Bellcrank, Overcenter	1	P
5	111077-203	Link - Bellcrank, Bypass	2	P
6	111078-103	Assy - Link, Door	2	P
7	106113-203	Actuator - Door, Bypass	1	P
8	NAS6203-10D	Bolt	2	SP
9	NAS6204-19D	Bolt	2	SP
10	NAS6204-11D	Bolt	1	SP
11	NAS6204-24D	Bolt	1	SP
12	NAS1149D0332J	Washer	8	SP
13	NAS1149D0432J	Washer	5	SP
14	NAS1149D0463J	Washer	4	SP
15	MS14144L3	Nut	2	SP
16	MS14144L4	Nut	4	SP
17	NAS1149D0416J	Washer	6	SP
18	MS21042L4	Nut	2	SP
AVAIL CODE DEFINITION				
P Procurable				
NP Non Procurable				
SP Normal stock/procurable				
See introduction on availability codes for additional information.				

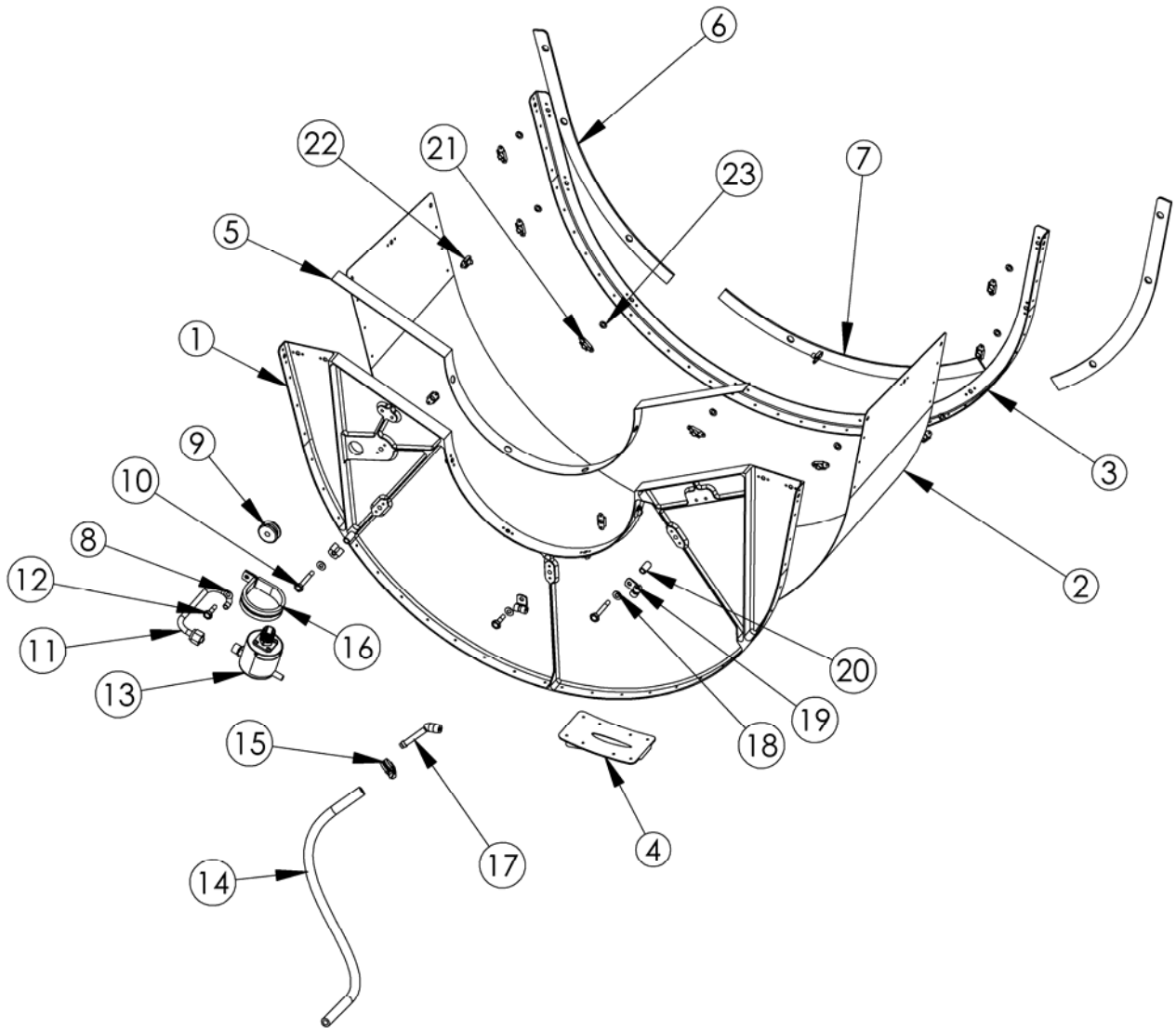


Diagram 12: Lower Plenum Assy

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	AVAIL
		DIAGRAM 12: Lower Plenum Assy		
	111080-103	Assy - Plenum, Lower		P
1	111081-203	Wall - FWD, Plenum, Lwr	1	NP
2	111082-201	Skin - Plenum, Lwr	1	NP
3	111083-201	Former - Plenum, Lwr, Aft	1	NP
4	111087-203	Fitting - Drain	1	NP
5	111085-201	Seal - Frame, Lwr, Fwd	1	P
6	111086-201	Seal - Former, Lwr, Aft	2	P
7	111089-201	Seal - Ctr, Former, Lwr, Aft	1	P
8	NAS1149D0316J	Washer	1	SP
9	MS35489-94	Grommet	1	SP
10	NAS6203-16	Bolt	2	SP
11	106117-101	Assy - Tube, Plenum	1	P
12	NAS6203-06	Bolt	2	SP
13	111120-201	Switch - Pressure, Differential	1	P
14	111099-201	Tube	1	P
15	ABA-4	Clamp	1	SP
16	MS21919WDG28	Clamp	1	SP
17	AN844-4D	Elbow	1	SP
18	NAS1149D0332J	Washer	3	SP
19	MS21919WDG2	Clamp	3	SP
20	NAS43DD3-38FC	Spacer	2	SP
21	MS21059L3	Nutplate	12	SP
22	NAS1870-3-2	Nutplate	2	SP
23	NAS620-10L	Washer	7	SP
AVAIL CODE DEFINITION				
P Procurable				
NP Non Procurable				
SP Normal stock/procurable				
See introduction on availability codes for additional information.				

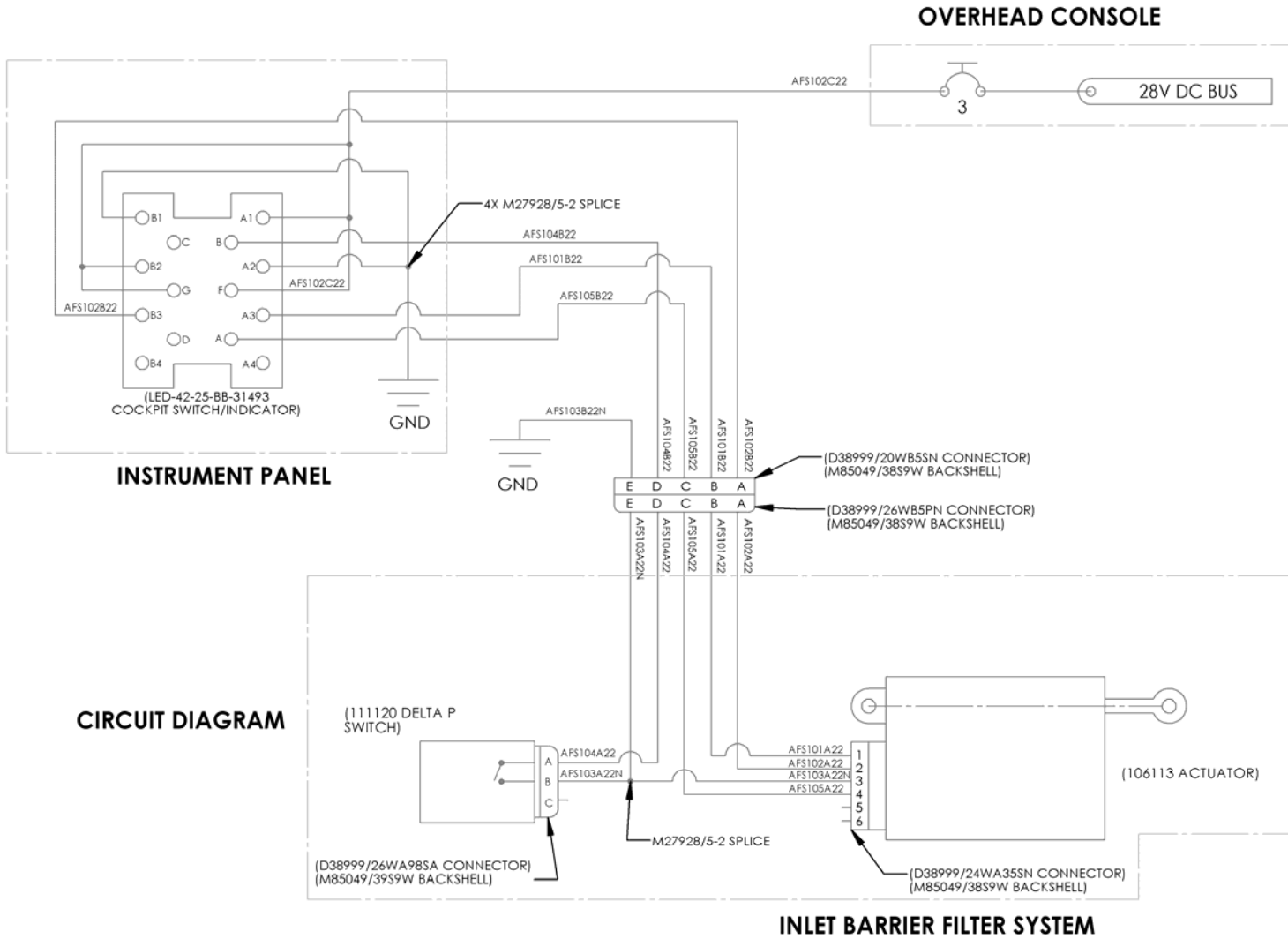


Diagram 13: -103 Electrical Schematic

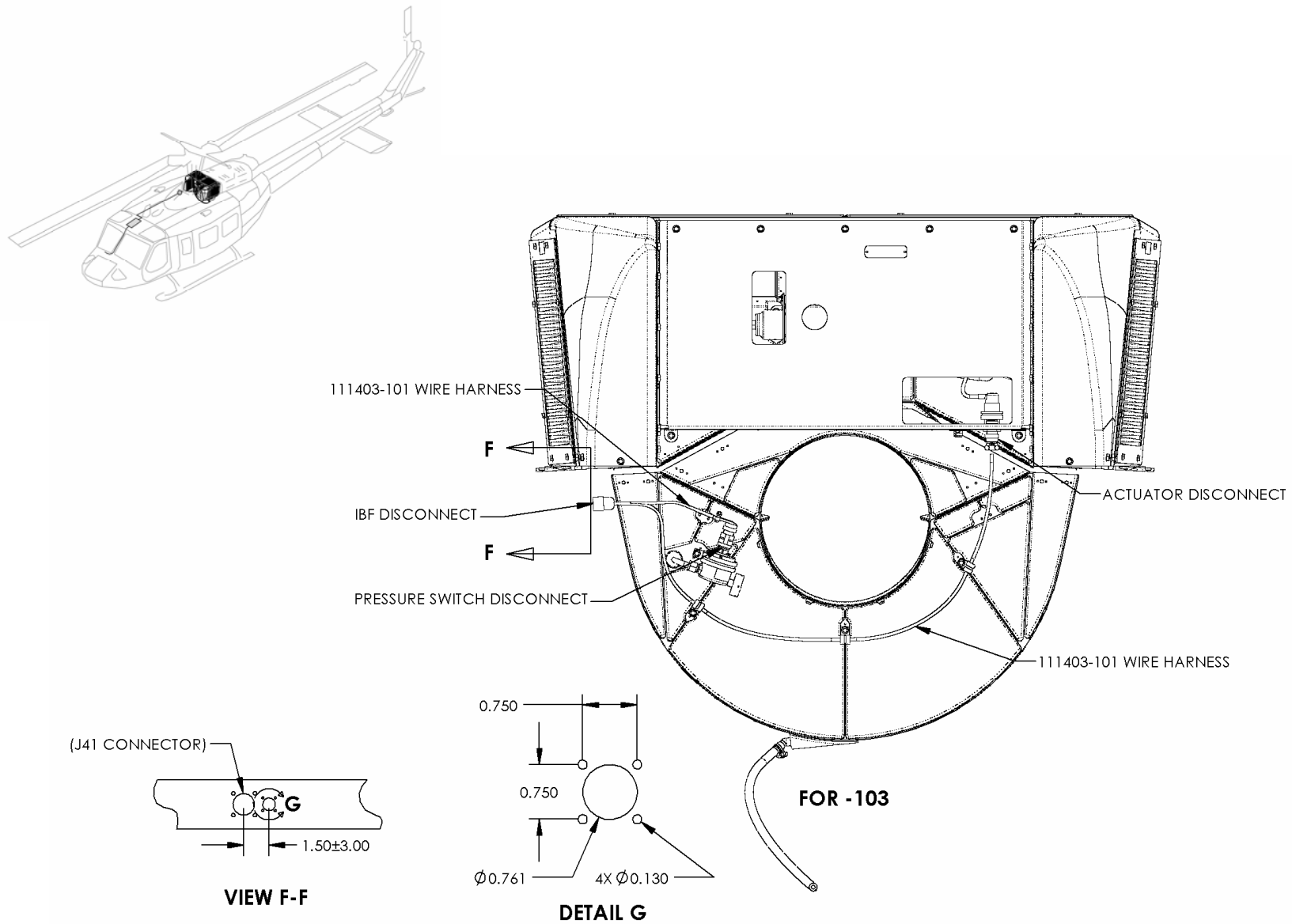


Diagram 14: -103 Wire Routing and Connections