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# INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

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## INLET BARRIER FILTER SYSTEM

for the  
MD Helicopters, Inc. (MDHI)

Model MD900 Helicopters

FAA STC No. SR02526CH

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**Donaldson**<sup>®</sup>  
FILTRATION SOLUTIONS  
**AFS | LE BOZEC | WESTERN FILTER**

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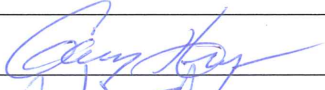


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## SIGNATURES

Revision		Name	Signature	Date
Initial Release	Prepared By:	Gary Heyne	Original Signed By	20 Oct 06
	Reviewed By:	Mark Johnson	Original Signed By	20 Oct 06
	Approved By:	Robert Stenberg	Original Signed By	20 Oct 06
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## LOG OF REVISIONS

Revision No.	Revision Description	Release Date
IR	Initial Release	20 Oct 06
A	Increased filter cleaning interval from 100 hours to 300 hours, aligned the structural inspection times with the filter cleaning times and updated AFS Oil and Cleaner Part Numbers	30 Jun 10
B	Revised amount of filter oil to be applied to the filter, updated oil and cleaner callouts	17 Mar 14

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## EFFECTIVITY

Effectivity for this ICA is for all MD Helicopter (MDHI) model MD900 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 the MDHI Model MD900 Helicopters

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# 1 INTRODUCTION

## 1.1 SCOPE OF THIS MANUAL

These Instructions for Continued Airworthiness (ICA) provide the information required to perform the maintenance and repair of the AFS Inlet Barrier Filter (IBF) system installation on the MD Helicopters, Inc. (MDHI) Model MD900 series helicopters. This ICA should be used in conjunction with all pertinent MDHI Model MD900 manuals and all publications listed in the List of Applicable Publications (LOAP).

### NOTE

Thoroughly review and become familiar with the Appendix A – Parts Figures 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), MDHI or the Airworthiness Directives issued by the local Aviation Authority, shall be strictly followed.

## 1.3 DEFINITIONS / TERMINOLOGY

Inlet 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, plenums, bypass door assembly, 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 IPS or IBF becomes clogged or blocked.
Bypass door	An existing door that is located below each IPS or IBF assembly. The bypass opening assures airflow if the screen becomes clogged.
Integrated Instrumentation Display System	The IIDS provides for the monitoring and display of various aircraft parameters and for caution/warning annunciation. The display is a color, Liquid Crystal Display (LCD) panel which allows the

	flexibility of integrating the specified sensor data and caution/warning information onto a display packaged as one unit.
Differential pressure	The difference between the ambient pressure and the pressure inside the plenum chamber, which is measured by the differential pressure switch.
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 toward the engine)
Filter media	Multi-layered cotton gauze compressed between two layers of pleated stainless steel screen and saturated with specially formulated oil which allows the air to pass through with a very low drop in pressure but traps a high percentage of the dust/dirt particles.
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 of the filter facing the incoming 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 Power Assurance Check (PAC) results (where a failed PAC is the result of a dirty Filter Assembly), and/or any "IPS BYPASS" message on the IIDS display.
Plenum chamber	Area contained inside the IBF assembly.
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.
DP	= Differential Pressure
EGT	= Exhaust Gas Temperature
FAR	= Federal Aviation Regulation
FMS	= Flight Manual Supplement
FOD	= Foreign Object Damage
IBF	= Inlet Barrier Filter
ICA	= Instructions for Continued Airworthiness
IIDS	= Integrated Instrument Display System
IP	= Installation Procedures
IPB	= Illustrated Parts Breakdown
IPS	= Inlet Particle Separator
LOAP	= List of Applicable Publications
MDHI	= MD Helicopters, Inc.
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

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

### **WARNING**

**AN OPERATING PROCEDURE, PRACTICE, ETC., WHICH, IF NOT CORRECTLY FOLLOWED, COULD RESULT IN PERSONAL INJURY OR LOSS OF LIFE.**

### **CAUTION**

**AN OPERATING PROCEDURE, PRACTICE, ETC., WHICH, IF NOT STRICTLY OBSERVED, COULD RESULT IN DAMAGE TO OR DESTRUCTION OF EQUIPMENT.**

### **NOTE**

An operating procedure, condition, etc., which it is essential to highlight.  
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

MD HELICOPTERS, INC  
MD900 Series Technical Publications

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

FAA Advisory Circular, AC 27-1B, Certification of Normal Category Rotorcraft

### **NOTE**

**Unless otherwise specified use standard torque values when tightening bolts.  
(Refer to AC 43.13-1B, Chapter 7)**

## **1.9 DISTRIBUTION OF CHANGES**

Changes shall be distributed by posting them on the AFS webpage [www.afsfilters.com](http://www.afsfilters.com). Each customer will be registered and provided access to the webpage via a personalized log-in/password established at the time of kit purchase.

### **NOTE**

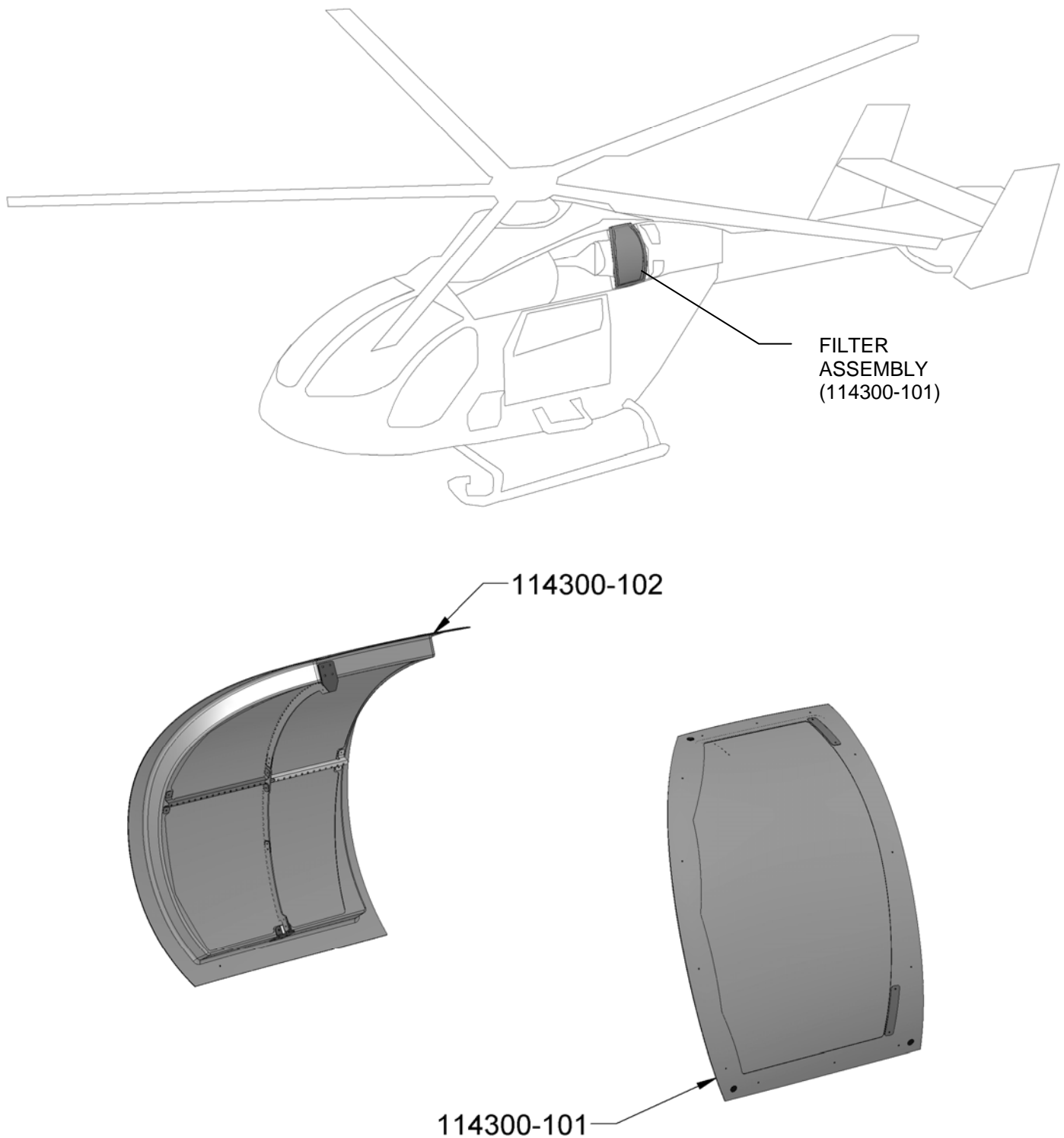
**This webpage should be checked prior to the performance of any maintenance actions on the IBF system to confirm possession of the latest FAA approved revision. If access to the internet is not possible, contact AFS at (636) 300-5200 for assistance.**

## **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 right side of the page.

## **1.11 SYSTEM DESCRIPTION AND OVERVIEW**

- a. The MDHI IBF system is offered to operators in one kit (AFS Kit No. 114001-101) an air filter system that includes two filter assemblies.
- b. The IBF system is located in the same location and in lieu of the Inlet 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 system provides 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 MD900 production aircraft. The IBF is a complete system in which safety, functionality and serviceability were major considerations in the design process. The kit consists of two filter assemblies (P/Ns 114300-101 and 114300-102). Located at the end of this chapter is an exploded view of the kit components. For a detailed illustration the kit components, see the Appendix A - Parts Figures.
- d. The MD900 aircraft has an existing system that provides a means of monitoring the air ingestion both in-flight and on the ground, and a bypass capability should the air flow through the filter become restricted. In-flight, aircraft systems monitor the air flow into the engine continuously and the IIDS displays a message "IPS BYPASS" to notify the pilot any time the air flow is restricted or a pressure differential reaches or exceeds a preset limit and the bypass doors are automatically opened.
- e. The removal of each filter assembly for servicing is easily achieved by removing twenty two (22) bolts on each filter then removing each filter.



P/N: 114300-101 (LH) & 114300-102 (RH)

**Figure 1: IBF 114001-101 SYSTEM AND INSTALLATION**

## 2 AIRWORTHINESS LIMITATIONS

### AIRWORTHINESS LIMITATIONS FAA APPROVAL BLOCK

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	28 DECEMBER 2007	Michael Downs
A	14 SEPTEMBER 2010	Timothy Smyth
B	4/16/2014	



## **2.1 GENERAL**

The Airworthiness Limitations for the AFS Inlet Barrier Filtration system (IBF) as installed on MD Helicopters, Inc. model MD900 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 filters 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 numbers (1-15) on the data tag have been scribed out, the filters 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 assemblies. See Section 2.2.

## 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 assemblies. These assembly/component inspection intervals are based on hours after initial installation or on condition as required.
- b. Refer to the Appendix A - Parts Figures 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. Refer to Appendix A, Figure A-2 for the primary components included in Kit No. 114001-101.
- 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 and is structured in the same 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), and all associated fasteners.
- b. ON-CONDITION UP TO TIS LIMIT: Any "IPS BYPASS" message displayed on the IIDS or failed PAC requires a conditional inspection in accordance with Table 3-1.
- c. VISUAL: All filter assembly components (structure, media, 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; frame components for corrosion, cracks, distortions near holes, and check for missing or damaged fasteners.

#### 3.1.3 STRUCTURAL COMPONENT INSPECTIONS

VISUAL: The IBF Filter Frames are to be inspected in accordance with Table 3-1 every 300 hours/annually.

**Table 3- 1: Inspection Intervals**

Components	Inspection Type	Inspection	Inspection Intervals			
			Scheduled		Time In Service	Notes
			300 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, 6
	Scheduled	2. Visual	X	X		1, 2, 4, 6
Structural Components as defined in sec. 3.1.3.	Scheduled	1. Visual	X	X		1, 2, 4, 5, 6
	Special	2. Visual				7

Notes.

1. Refer to Chapter 8 for specific inspection requirements.
2. Refer to Chapter 4 for access information.
3. IPS BYPASS message on IIDS or failed PAC. This inspection is required any time an IPS BYPASS message is displayed on the IIDS or failed PAC is reported by the pilot.
4. Reference Appendix A - Parts Figures.
5. 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.
6. 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 any "IPS BYPASS" message on the IIDS and/or upon a failed PAC (where the failed PAC is the result of a dirty Filter Assembly).
7. For IBF Serial Number 0002 ONLY, 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 for every 25 hours up to the first 100 hours, then resume normal 300 hour inspection intervals.

## 3.2 OVERHAUL REQUIREMENTS

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

## 3.3 SPECIAL INSPECTIONS (CONDITIONAL INSPECTIONS)

The following unscheduled special inspections/checks must be performed after encountering the following condition(s).

### 3.3.1 HARD LANDING

If a hard landing is suspected or has occurred, the following inspections/checks shall be complied with:

- a. Visually inspect filter assembly and surrounding structure for cracks, warping/distortion, and loose hardware. Refer to Sections 8.3 and 8.4 of this document for inspection guidance. If evidence of damage is found, contact AFS for disposition or replacement.

## 4 ACCESS PANELS

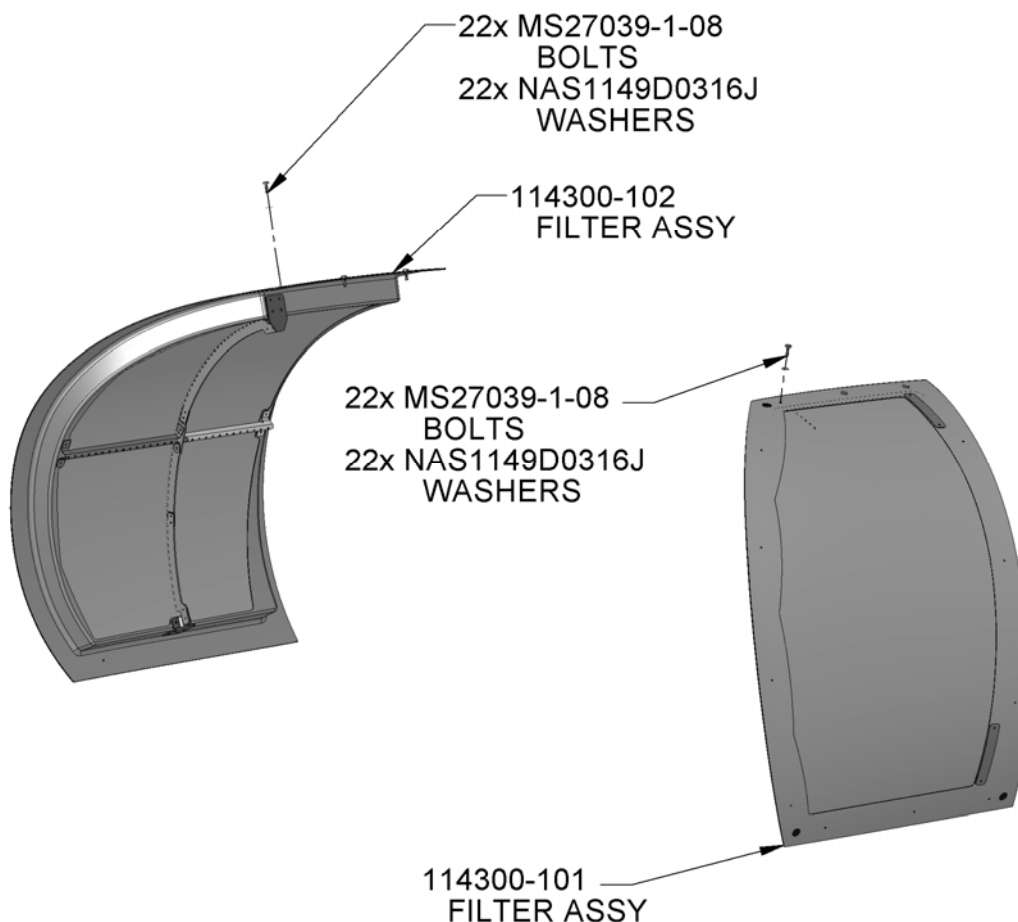
### 4.1 GENERAL DESCRIPTION

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

### 4.2 ACCESS FOR MAINTENANCE

#### 4.2.1 ACCESS OF FILTER ASSEMBLIES

Access for maintenance/inspection of the interior surface of the filter assemblies and structure, is accomplished by removing the twenty two (22) bolts on each filter then removing the filter assembly. See Chapter 8 for component removal/installation procedures, inspection, troubleshooting guide, and repair procedures.



**Figure 2: COMPONENT ACCESS**

## 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 un-oiled (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 / PMA / SERIALIZATION

The IBF system is marked on the forward frame assembly to contain the top level part number, the serial number of the system, and the FAA PMA markings.

### 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.

AFS AEROSPACE FILTRATION SYSTEMS, INC.																
PART No: 114300-101	SERIAL No:															
NAME: FILTER ASSY	Record No. of Cleanings:															
U.S. PATENT No: 6,595,742	<table border="1"><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td></tr></table>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	2	3	4	5	6	7										
8	9	10	11	12	13	14	15									
CAGE CODE: 0GCA0																

Figure 3: EXAMPLE OF FILTER ASSEMBLY DATA PLATE

## 7 SERVICING

### 7.1 AUTHORIZED MATERIALS

Service AFS Filter Assembly with only AFS Filter Oil (gallon container – P/N 100101-000) or K&N Air Filter Oil, (gallon container – K&N P/N 99-0551), AFS Cleaner (gallon container – P/N 100201-000) or Zok 27.

#### 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.**

- a. Up to the 300 hour/1 year TIS limit, the “on condition” requirement for servicing the Filter Assembly is based on an “IPS BYPASS” message displayed on the IIDS or upon a failed PAC (where the failed PAC is the result of a dirty Filter Assembly).
- b. Any “IPS BYPASS” message indicates the bypass doors have opened and unfiltered air is entering the engine. This may allow debris to be ingested into the engine. Service the filter as soon as practical. See filter servicing Section 7.3. It is also recommended to perform any service/checks outlined in the aircraft maintenance manual for opened bypass door conditions.
- c. The maximum number of service cycles for the filter assembly (i.e., cleaning/oiling) is limited to 15 for each filter assembly. The 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.
- 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.

## 7.2.3 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.
- 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 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 filter media for at least 10 minutes. In severe environmental conditions (high dirt/debris) the entire filter may be soaked in cleaner for an extended period of time as needed.
- 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. Ensure the filter is completely dry prior to the application of oil.

### 7.3.4 FILTER OILING

#### CAUTION

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

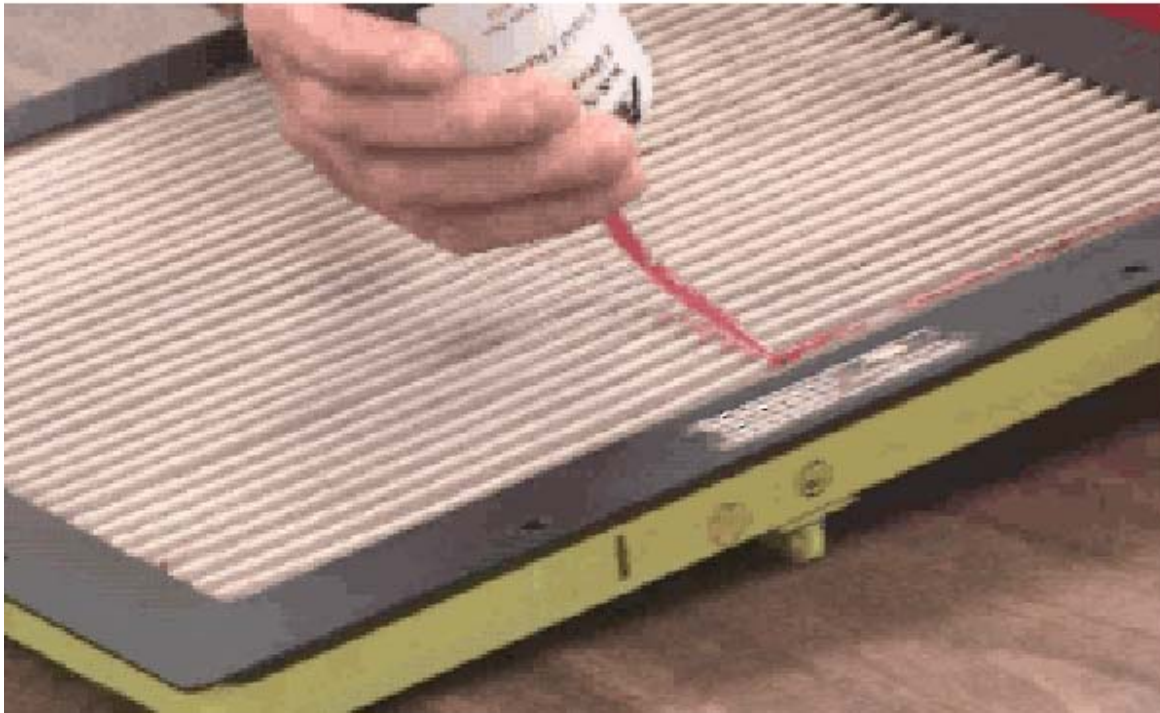
#### CAUTION

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

#### NOTE

**A squeeze bottle capable of accurately measuring out thirteen (10.4) fluid ounces should be used 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 and K&N Air Filter Oil are 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 Figure 7).
- b. Each filter requires a total of 10.4 fl oz per filter. Apply approximately ½ of the filter oil to the front side of the clean, dry 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 appropriate amount of oil from the squeeze bottle.



**Figure 4: OILING 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**

Not Applicable

#### **7.6     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 - PARTS FIGURES BEFORE PERFORMING MAINTENANCE ON THE IBF SYSTEM.**

**IT IS STRONGLY SUGGESTED, THAT FOR ANY MAINTENANCE OTHER THAN ROUTINE INSPECTIONS, THAT THE COMPLETE FILTER ASSEMBLY BE REMOVED BEFORE PERFORMING MAINTENANCE AND/OR REPAIRS.**

#### 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 only components of the system are filter assemblies and attaching hardware. Refer to Appendix A, Figures A-1 thru A-3. 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, repair, and installation for the filter assemblies and related components. 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 plate. If a self-locking fastener can be fully threaded by hand, replace the self-locking fastener.

## **8.2 COMPONENTS - GENERAL DESCRIPTION**

### **8.2.1 FILTER ASSEMBLY**

(Refer to Appendix A, Figures A-1 thru A-3)

- 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.

## **8.3 FILTER ASSEMBLY**

(Refer to Appendix A, Figures A-1 thru A-3)

### **8.3.1 FILTER ASSY**

#### **8.3.1.1 REMOVAL – FILTER ASSY**

#### **CAUTION**

**UPON REMOVAL OF ANY FILTER ASSEMBLY COVER THE ENGINE INLET (AS SOON AS THERE IS ACCESS TO THE INLET), TO PREVENT FOREIGN OBJECT DAMAGE (FOD).**

- a. Remove the twenty two (22) MS27039-1-08 bolts and NAS1149D0316J washers from the filter assembly.
- b. Remove filter assembly (P/N 114300-101 and/or 114300-102).
- c. Use a plastic scraper to gently break any seal between the aircraft structure seal and the filter assembly. The filter assembly must be carefully removed so as not to damage the seal on the aircraft.
- d. Place protective cover over engine inlet to prevent FOD ingestion.
- e. Repeat for other filter assembly (if required).

#### **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 IPS BYPASS message 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.

### 8.3.1.3 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 8.5) 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 Figure 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.



Figure 5: HAND SEAMER

#### 8.3.1.4 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.**

### 8.3.1.5 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.

### 8.3.1.6 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.

### 8.3.1.7 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 a good seal of the filter frame, when installed and/or torqued, do not permit the filter assembly to sit flush against the forward, aft, and/or the upper frame assembly) requires the filter assembly be returned to AFS for evaluation and disposition, or be replaced.



### 8.3.1.9 INSTALLATION

- a. Remove each engine inlet protective covering just prior to each filter installation.
- b. Locate and secure the 114300-101 filter (into the LH engine inlet opening) using twenty two (22) MS27039-1-08 bolts and NAS1149D0316J washers. (Refer to Appendix A, Figures A-2 and A-3)
- c. Locate and secure the 114300-102 filter (into the RH engine inlet opening) using twenty two (22) MS27039-1-08 bolts and NAS1149D0316J washers. (Refer to Appendix A, Figures A-2 and A-3)

**Table 8- 1 Protective Treatment for Components**

Component	Material	Limits of Damage	Protective Treatment
Filter Assembly(s) (Frames)	Alum. Alloy	Scratches, pitting, gouges must be less than 20% of part thickness. See note 1.	Re-apply Epoxy Primer Ref Table 8-3

Notes:

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

## 8.4 TROUBLESHOOTING GUIDE

The following table defines the probable cause, remedy, and ICA 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	IPS BYPASS message displayed on IIDS	Obstructed inlet Dirty filter	Clear engine inlet. Verify by checking bypass doors, inspect filter; service filter.	Para. 7-3.
2	Engine fails PAC	Obstructed inlet Dirty filter	Clear engine inlet. Verify PAC results, check bypass doors, inspect filter; service filter. NOTE: If engine still fails PAC - check engine.	Para. 7-3.

## 8.5 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”.

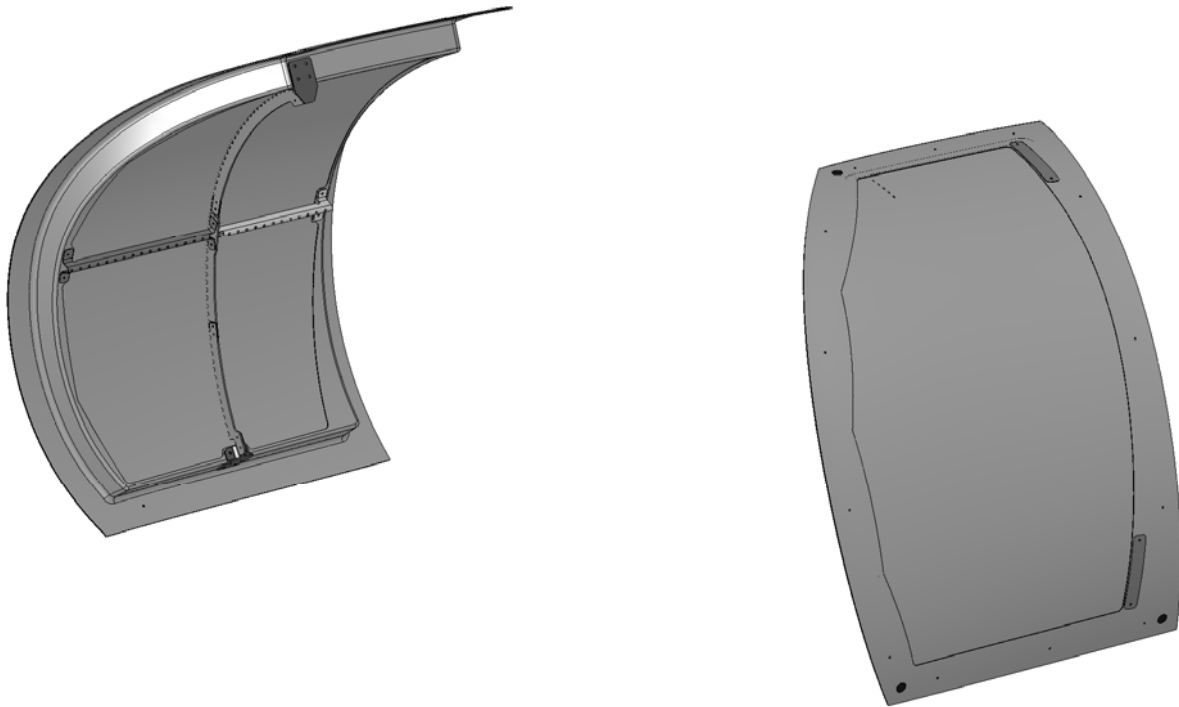
## 8.6 CONSUMABLE MATERIALS, SUPPLIES, AND PROTECTIVE TREATMENT SPECIFICATIONS

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

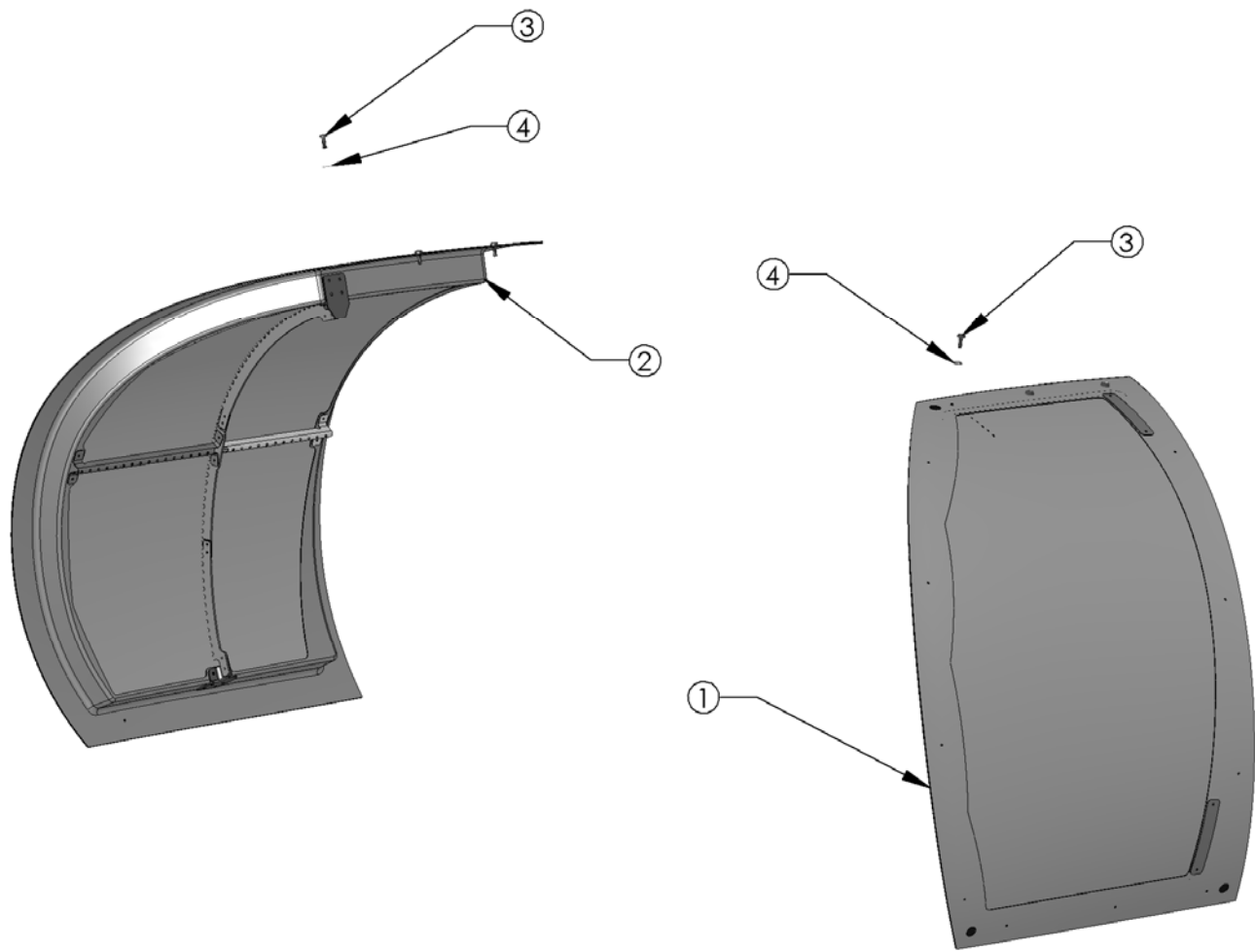
Item	Description	Spec / Part No.
	<b>Consumables</b>	
1	Sealant	AMS 3276
2	Sealant	Mil-S-8802
3	Sealant	RTV 736
4	Sand paper 400-600 grit	Commercial avail.
5	Crocus Cloth	Commercial avail.
	<b>Supplies</b>	
6	Air Filter Oil	Squeeze bottle assy. – AFS P/N 100100-104
6.1	Air Filter Oil	Gallon container – AFS P/N 100101-000 or K&N P/N 99-0551
6.2	Air Filter Oil	16oz squirt bottle – AFS P/N 2099-0016
6.3	Air Filter Oil	Nozzle – AFS P/N 712401-0001
7	Air Filter Cleaner	Gallon container – AFS P/N 100201-000
7.1	Air Filter Cleaner	25 Liter or 6.6 Gallon – Zok 27
7.2	Air Filter Cleaner	2 gallon sprayer – AFS P/N 32C31
	<b>Protective Treatment Specs</b>	
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

## PARTS FIGURES

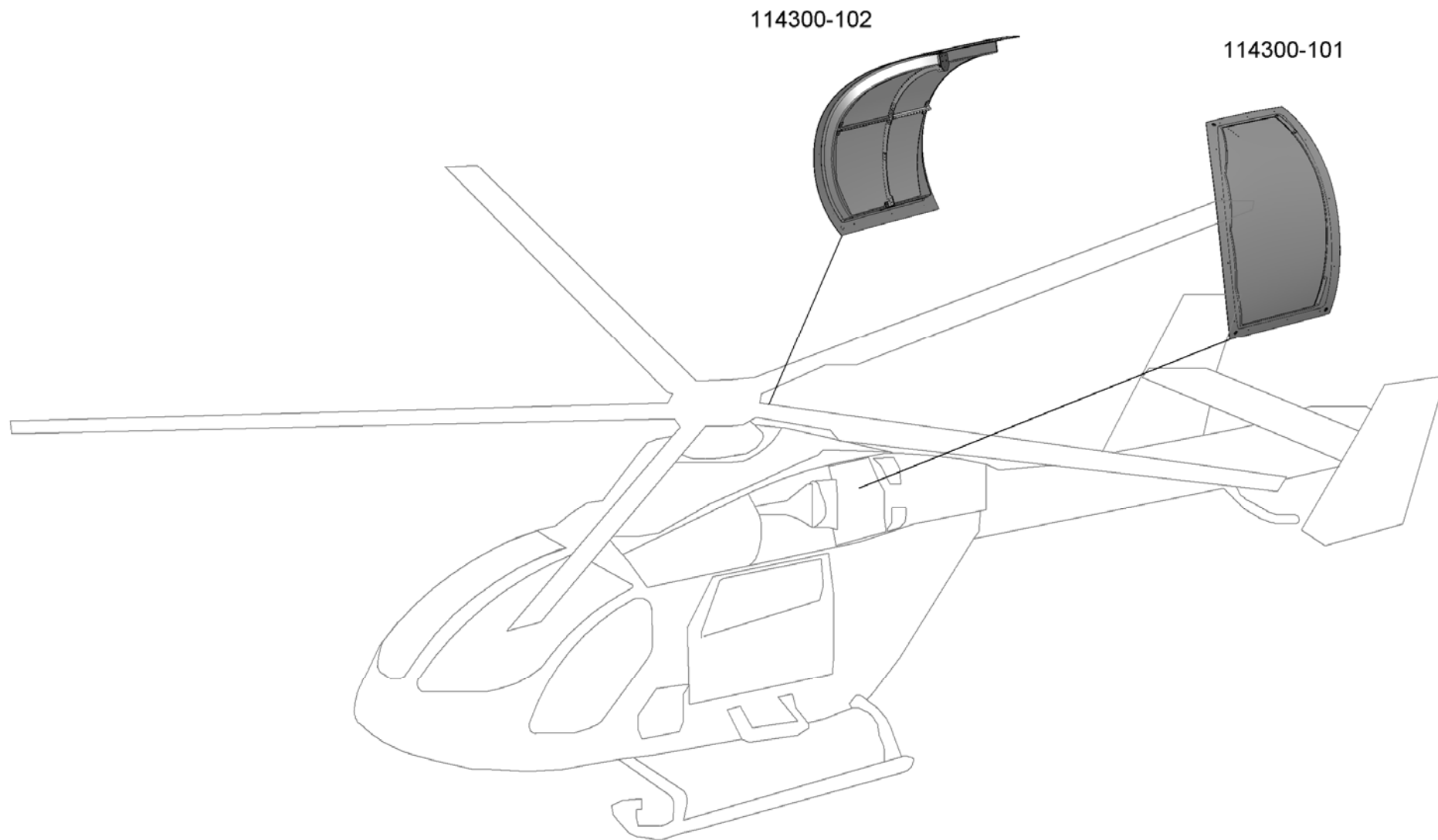


**Figure A-1: IBF System**



**Figure A-2: Major Assemblies**

INDEX NUMBER	PART NUMBER	ITEM NAME	UNIT PER ASSY	A V A I L
		<b>Figure A-2:</b> Inlet Barrier Filter Major Assembly		
	114001-101	IBF - Kit (MD900)		P
1	114300-101	Assembly - Filter	1	P
2	114300-102	Assembly - Filter, RH	1	P
3	MS27039-1-08	Bolt	44	SP
4	NAS1149D0316J	Washer	44	SP
		<b>AVAIL CODE DEFINITION</b>		
		P           Procurable		
		NP         Non Procurable		
		SP         Normal stock/procurable		
		See introduction on availability codes for additional information.		



**Figure A-3: Filter Location**