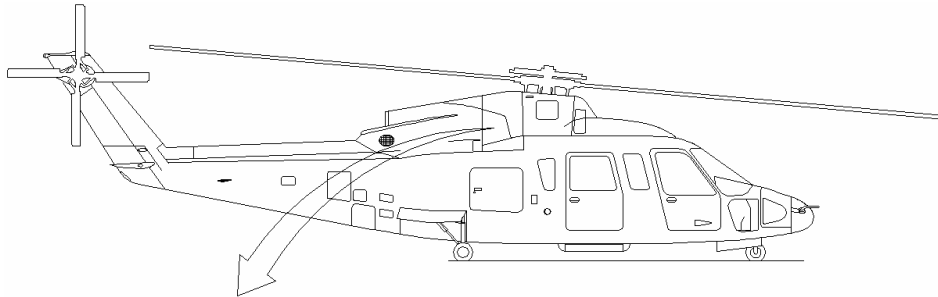




# INSTRUCTIONS FOR CONTINUED AIRWORTHINESS STC SR01616SE 1076-SERIES-ICA-1



## ENGINE INLET AIR FILTER SYSTEM SIKORSKY S-76 SERIES HELICOPTERS

This supplement must be attached to the applicable Sikorsky S76A+/A++/C/C+, FAA Approved Maintenance Manual when the Engine Inlet Air Filter System, P/N 1076T-1 or 1076T-5, is installed in accordance with Supplemental Type Certificate (STC) SR01616SE. Information in this manual supplements or supersedes the basic manual only in those areas listed.

**RECORD OF REVISIONS**

<b>REV</b>	<b>DATE</b>	<b>DESCRIPTION</b>	<b>BY</b>
IR	09/29/05	Initial Release	JW
A	08/15/07	<ul style="list-style-type: none"> <li>• Section 1.0, Added: “Each differential ...”</li> <li>• Section 2.0, Added: “Life Limit for the filter for the ‘ambient pressure’ port ...”</li> <li>• Section 2.0, Added: “The filter for the ‘ambient pressure’ port ...”</li> <li>• Section 3.1, In Item a, Added “and transducer filter”</li> <li>• Section 3.1, Added Item g</li> <li>• Section 4.1f), Added “filter”</li> <li>• Section 4.5b), Corrected Typo: IS: “coarse”, WAS: “course”</li> <li>• Added Section 4.10</li> <li>• Added Figure 1b</li> </ul>	RL
B	06/09/08	<ul style="list-style-type: none"> <li>• Updated format</li> <li>• Section 1.0, 4.8: Added text for S-76A+/A++/C filter system and monitor</li> <li>• Added Section 1.5</li> <li>• Minor text corrections</li> <li>• Updated Figure numbering and labels</li> </ul>	RL

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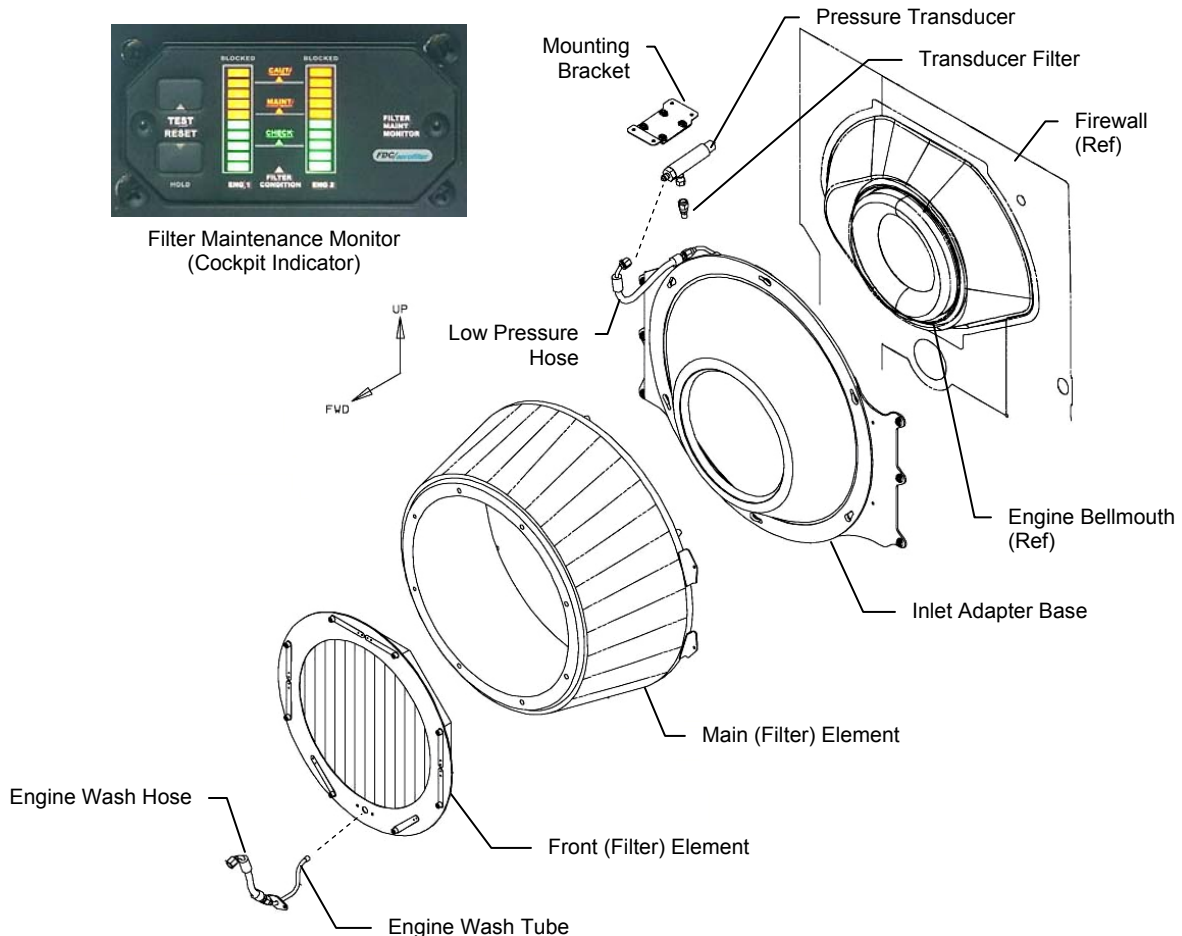
# 1.0 Introduction

The Engine Inlet Filter System consists of a filter element assembly installed in each engine inlet plenum on the forward firewall sealing to the engine bellmouth. Filter elements comprise of a specially formulated polymerized oil suspended by a pleated wire cloth and cotton fabric matrix for the purpose of attracting and holding airborne dust particles. These filter elements are serviced by cleaning and re-oiling at regular intervals, or as required, based on engine performance loss or by a visual determination that engine performance could be adversely affected prior to the next scheduled servicing interval.

Main components of the system include mounting base plates, face and main filter elements, pressure transducers and a cockpit display. Differential pressure transducers (one for each engine), located in the engine inlet compartment, measure the differential pressure across the filter and hence the level of blockage.

Each differential pressure transducer has a filter on the ‘ambient pressure’ port.

Power for the system is provided by a dedicated 28VDC, 1 Amp circuit breaker, labeled ‘IBF’, on the Essential Bus.



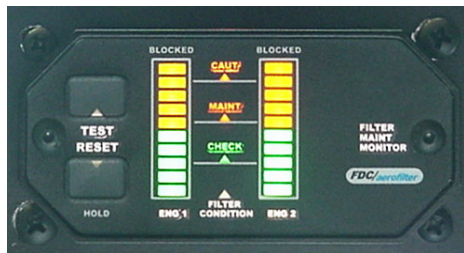
Filter blockage level is continuously monitored and displayed in the cockpit via the Filter Maintenance Monitor (see below). The monitor is used to indicate when the filter element(s) need servicing. Differential pressure across each barrier filter element is displayed as LED bar segments on the monitor. Each LED segment represents a pressure of 1.5 in-H<sub>2</sub>O (0.542 VDC) for the S-76C+ monitor or 1.0 in-H<sub>2</sub>O (0.361 VDC) for the S-76A+/A++/C monitor. Increasing pressure drop is displayed from the bottom up.

Three advisory indicators in the middle of the monitor indicate that filter element differential pressure drop has exceeded the following:

<u>Advisory</u>	<u>S-76C+ Monitor</u>	<u>S-76A+/A++/C Monitor</u>
“CHECK”	4.5 in-H <sub>2</sub> O	3.0 in-H <sub>2</sub> O
“MAINT”	9.0 in-H <sub>2</sub> O	6.0 in-H <sub>2</sub> O
“CAUT”	13.5 in-H <sub>2</sub> O	9.0 in-H <sub>2</sub> O

These advisory indications are magnetically latched and will be retained, even without electrical power, until reset. Corresponding aircraft IIDS (for S-76C+) or FDC Caution/Advisory Light (for S-76A+/A++/C) and Master Caution indications also illuminate as shown in Table 1 (page 18).

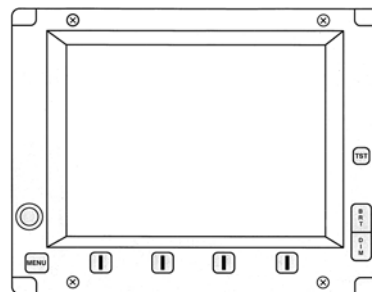
The TEST button on the monitor checks all aspects of the barrier filter system with the exception of applying pressure to the differential pressure transducers. Depressing the TEST button will light all LED segment and advisory indicators. Releasing the TEST button will clear all LED bar segments but not the advisory indicators, which can only be cleared by pressing and holding the RESET button for at least 5 seconds.



**Filter Maintenance Monitor**



**Caution/Advisory Light  
(S-76A+/A++/C Models Only)**



**IIDS Messages  
(S-76C+ Models Only)**

**Cockpit Displays**

Barrier Filter Maintenance Monitor Display

LED Segment No.	Monitor Advisory	<i>For S-76C+</i>	<i>For S-76A+/A++/C</i>
		$\Delta P$ (in-H <sub>2</sub> O)	$\Delta P$ (in-H <sub>2</sub> O)
10	CAUT	15.0	10.0
9	CAUT	13.5	9.0
8	MAINT	12.0	8.0
7	MAINT	10.5	7.0
6	MAINT	9.0	6.0
5	CHECK	7.5	5.0
4	CHECK	6.0	4.0
3	CHECK	4.5	3.0
2	---	3.0	2.0
1	---	1.5	1.0
(No Segment)		0.0	0.0

Green = (Bar segments 1 thru 5) Safe: Green “CHECK” advisory indication will illuminate, and latch until reset, when third green bar segment illuminates. This alerts an increasing level of blockage and to clean or replace the filter element(s) before next day’s flight.

Amber = (Bar segments 6 thru 10) Caution: Amber “MAINT” advisory indication will illuminate and latch until reset, when first amber bar segment illuminates. This advises of an increasing level of blockage and that the filter element(s) must be cleaned or replaced prior to next flight.

Amber “CAUT” advisory indication will illuminate and latch until reset, when fourth amber bar segment illuminates. IIDS amber messages (for S-76C+) or Caution/Advisory light (for S-76A+/A++/C) and the Master Caution light also illuminate as shown in Table 1 (page 18). This alerts that the filter element(s) must be cleaned and/or replaced prior to next flight.

**NOTE**

If either of the pressure transducers become disconnected (possibly through an engine area maintenance action, shorted cable, or other means), the Filter Maintenance Monitor amber “MAINT” advisory indication will illuminate, and cannot be reset before wiring is corrected.

## 1.1 Scope of ICA

This manual describes the airworthiness limitations, service instructions, inspection procedures, and testing of the engine filter system and its individual components. Adherence to the information given herein will assure maximum filtration benefit and increased component life. The data listed in this ICA is intended to aid the operator in formulating an acceptable maintenance program in accordance with FAR 91.403(c).

## 1.2 Precautions

The following precautions are used throughout this manual and are defined as follows:

**WARNING:** Maintenance procedure, practice, condition, etc. which if ignored could result in personal injury or loss of life.

**CAUTION:** Maintenance procedure, practice, condition, etc. which if ignored could result in damage or destruction of equipment.

**NOTE:** Maintenance procedure, practice, condition, etc. or a statement which needs to be highlighted.

## 1.3 Definitions, Abbreviations, Acronyms and Symbols

The following are used throughout the manual.

fl. oz.	Fluid Ounce
in-lb	Inch Pound (Torque)
$\Delta P$	Differential Pressure
in-H <sub>2</sub> O	Inches of Water (Pressure)
EFS	Engine Filter System
STC	Supplemental Type Certificate
FAR	Federal Aviation Regulation
IBF	Inlet Barrier Filter
ICA	Instructions for Continued Airworthiness
IIDS	Integrated Instrument Display System
FHM	Filter Maintenance Monitor (Filter Health Monitor)
DPT	Differential Pressure Transducer
RDAU	Remote Data Acquisition Unit

## 1.4 Distribution

From time to time it may be necessary to revise or update information contained in this ICA. Although best efforts will be made to distribute revisions and updates to the registered owner of the product, it is ultimately the responsibility of the current user to ensure he or she is using the most current information available. Additionally, you may register to receive these updates when they are released. When revised pages are received, insertions should be logged on the *Record of Revisions* page and the *List of Effective Pages* log should be updated.

Additional copies of this and other related documents, as well as revisions and up dates may be obtained by contacting the following:

Filtration Development Corporation (FDC)  
8 Digital Drive, Suite 104  
Novato, CA 94949  
Tel: 415-884-0555  
Fax: 415-883-8071  
<http://www.fdc-aerofilter.com>

## 1.5 Applicability

Eligible S-76 models for the installation of the Filter System:

Model	Description	Filter System P/N
S-76A+	S-76A equipped with Turbomeca Arriel 1S Engines (*)	1076T-5
S-76A++	S-76A equipped with Turbomeca Arriel 1S1 Engines (*)	1076T-5
S-76C	S-76C equipped with Turbomeca Arriel 1S1 Engines	1076T-5
S-76C+	S-76C equipped with Turbomeca Arriel 2S1 Engines and IIDS	1076T-1

Note (\*): Arriel 1S/1S1 engines installed via STC No. SH568NE

## 2.0 Airworthiness Limitations

The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under §43.16 and §91.403 of the Federal Aviation Regulations unless an alternate program has been approved.

*Life Limit of the filter element is 1500 hours of engine operation.*

The element must be removed from service if the wire mesh on the downstream side of the element is broken or damaged.

*Life Limit for the filter for the 'ambient pressure' port is 1500 hours of engine operation.*

The filter for the 'ambient pressure' port of the differential pressure transducer must be removed from service if the porous element is broken or damaged.

*No other limitations are associated with this STC.*

### 3.0 Inspection/Test Requirements

This section covers the basic maintenance, inspection and service requirements necessary for safe operation and continued airworthiness of the S-76 Engine Filter System. The service and inspection intervals designated herein are the maximum allowable and should not be exceeded.

#### 3.1 Service/Inspection/Test Intervals

## Service/Inspection/Test Intervals

ITEM		DAILY PREFLIGHT	100 HOUR INTERVAL	ANNUAL / 300 HR INTERVAL
a	Visual inspection of filter elements (installed) and transducer filter. Ref. 4.1	•		
b	Inspect, clean and re-oil filter element. Ref. 4.4, 4.7 for additional cleaning interval information.		•	•
c	Inspect engine intake area (plenum), lubrication lines, electrical wiring, bonding jumpers for condition and security. Ref. 4.5, 4.6.		•	•
d	Inspect filter housing structure and associated hardware for cracks and general security. Inspect inlet seal Ref. 4.5		•	•
e	Functional test differential pressure transducer / Filter Maintenance Monitor. Ref. 4.8			•
f	Leak test pressure sensing lines. Ref. 4.9			•
g	Inspect and clean transducer filter. Ref 4.10		•	•

## 4.0 Filter Element Servicing

To insure proper function and maintain a high level of filtration efficiency, great care should be taken when handling the element. The element is most likely to be damaged during servicing than in operation. Special care should be taken when removing and reinstalling the inlet cowling, as well as when removing and replacing the element from the duct. The pleated material's fragile wire mesh is easily damaged or deformed when allowed to scrape against other objects. Careful attention to the following section will assure full service from the filter element.

### NOTE

The filter elements should be replaced after no more than 1500 hours

When operating in the most severe conditions it is highly recommended that a serviceable set of pre-oiled elements are available. This will allow continued service while the previously installed set is being cleaned, inspected and re-oiled.

### 4.1 Visual / Preflight Inspection

- (a) Inspect filter element for large obstructions
- (b) Inspect for security of face element cam locks
- (c) Inspect for security and installation of screws on main element lock tab
- (d) Inspect for security of engine water wash flexible hose
- (e) Inspect DPT for electrical connection
- (f) Inspect DPT for obstructions to "ambient pressure" port filter.

### 4.2 Filter Element Removal

- (a) Gain access to the plenum of each engine.
- (b) Remove engine water wash line from bulkhead fitting.
- (c) Remove face element using the 8 installed winged  $\frac{1}{4}$  turn lock fasteners. Use caution not to allow the filter element to contact engine driveshaft.
- (d) Remove 2x 10-32 screws and washers on outboard main element lock tabs.
- (e) Grabbing the forward edge of the element, rotate main filter element **CLOCKWISE** to unlock from the base plate.

### 4.3 Filter Element Installation

- (a) Gain access to the plenum of each engine.
- (b) Position main filter element so that bayonet studs are aligned with slots in base plate. Rotate main filter assembly COUNTERCLOCKWISE until element lock tabs are aligned.
- (c) Install 2x 10-32 screws and washers on outboard main element lock tabs.
- (d) Install face element using the 8 installed winged ¼ turn lock fasteners. Use caution not to allow the filter element to contact engine driveshaft.
- (e) Connect and secure engine water wash line to bulkhead fitting.

### 4.4 Filter Element Cleaning

- (a) Holding the element clean side up, gently tap the element to dislodge any large imbedded debris and dirt.

#### CAUTION

Use only FDC filter cleaner, PN 40-15

**Severe conditions:** Soak element, dirt side down, in a pan of sufficient depth to allow complete coverage with FDC filter cleaner. Allow soak for 20 to 60 minutes, depending on condition. Remove element and shake thoroughly to remove dirty cleaner.

**Normal conditions:** Spray FDC filter cleaner liberally onto the entire element for ten minutes. Alternatively, soak element in a shallow pan of filter cleaner for ten minutes.

#### CAUTION

DO NOT use Gasoline  
DO NOT use Jet A or Kerosene  
DO NOT use Caustic Cleaning Solution  
DO NOT use Detergents  
DO NOT use Parts Cleaning Solvents  
DO NOT use Pressure or Steam Cleaners  
DO NOT use High Pressure Hose Nozzles

#### CAUTION

Failure to service the element correctly will harm the filter media by reducing its filtration efficiency, restricting airflow, and/or a reduction in service life.

- (b) Rinse the element with low pressure water from a garden hose. Always flush from the inside to the outside to avoid driving particles further into the filter media.

- (c) After rinsing, gently shake off the excess water and set filter aside. Allow the element to dry naturally. It is permissible to set in direct sunlight for drying.

**CAUTION**

DO NOT use Gasoline  
DO NOT use Compressed Air  
DO NOT use Open Flame  
DO NOT use Hair Dryers or Heat Guns

**4.5 Filter Element Inspection**

In severe environments, it may be necessary to clean and inspect the element more frequently than recommended in Section 3. Regardless of the actual time in service, the physical and operational condition of the element must remain the most important factor to determine the serviceability of the element.

At each cleaning, 100 hours of operation or upon activation of the low inlet pressure warning light, remove the elements and carefully inspect the elements as follows:

- (a) Inspect the fine mesh on the forward surface of the element pleats. Complete erosion of more than .50 in. is cause for element rejection.
- (b) Inspect the coarse mesh on the aft surface of the element. Any evidence of mesh wire wear or general signs of mesh deterioration are cause for element rejection.
- (c) After cleaning and before re-oiling, hold the element up to a light and check for holes in the element material greater than .020 (it is normal to observe pinholes in the filter media particularly at the pleat folds. These pinholes will not allow the passage of dirt once the element is oiled). Close the holes if present using a fine pick to reposition the media material to cover the hole.
- (d) Check the condition of the element assembly:
- Frames for security.
  - Seal strips for deterioration and evidence of gaps between the element and duct flange.
  - Fasteners for security, loose rivets, or worn pins.
  - Wash nozzle, tube and valve assembly for security.
  - Repair any defects as required.

**4.6 Inspection of inlet “P” Seal and Main Element Base Seal**

- (a) With elements removed, inspect inlet “P” Seal around bellmouth for condition.
- (b) Inspect main element base seal for areas of wear and de-bonding.
- (c) Note any seal that is cracked, torn, missing or showing abnormal wear
- (d) Remove and replace or repair seal(s) as necessary.

**NOTE**

If any seal requires replacement, contact FDC/aerofilter.

**4.7 Filter Element Oiling****CAUTION**

Use only FDC Oil, PN 40-10 or PN 40-10CW

AeroFilter oil is a compounded mineral based blend, formulated with special polymers to form the tack barrier. A dye has been added to show where the oil has been applied. Eventually the blue color will fade but the oil will remain.

**CAUTION**

Never use the filter element without AeroFilter oil.

DO NOT use Engine Oil  
DO NOT use Transmission Oil  
DO NOT use Hydraulic Fluid  
DO NOT use Lightweight Oils (WD 40, LPS, etc)

- (a) Fill sprayer with recommended quantity of Aerofilter oil (16 Fluid Ounces).
- (b) Charge sprayer with compressed air.
- (c) Apply oil to the filter element with smooth, complete passes parallel to pleats.
- (d) Repeat 90 degrees to pleats.
- (e) Use all of the measured quantity of oil.
- (f) Wait 30 minutes for proper wicking and *lightly* re-oil any light areas.

**NOTE**

Do not over-oil the element. Proper absorption is achieved when the filter media is completely wicked and any surplus oil has been allowed to drip from the element.

The filter element is now ready for installation, Ref. 4.3.

#### 4.8 Functional Check of DPT and FHM

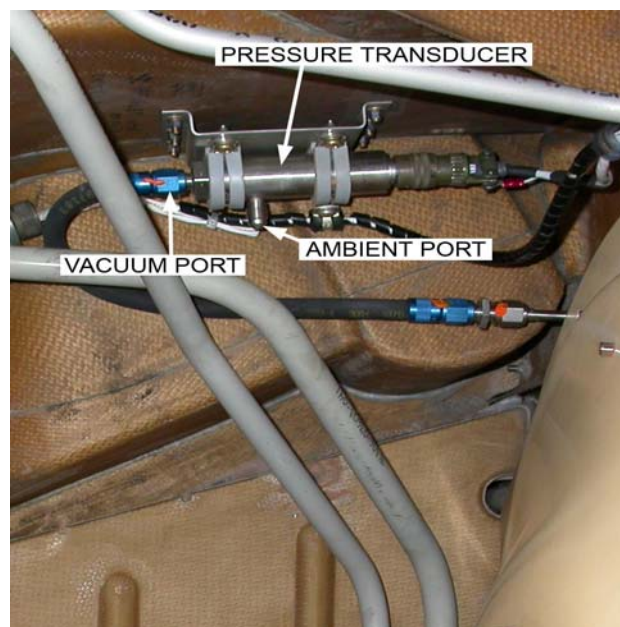
##### CAUTION

Do not apply over 25 in-H<sub>2</sub>O  $\Delta$ P to the DPT  
or apply pressure to ambient port.  
Damage to DPT could result.

##### CAUTION

Do not tap on FHM faceplate,  
damage to face plate and FHM could result.

- (a) Remove vacuum line from DPT.
- (b) Connect manometer to vacuum side of DPT (Ref. Figure 1)
- (c) Using Table 1, carefully apply LIGHT suction to transducer while noting manometer readings.
- (d) At each reading note associated FHM light segment and when advisory light illuminates.
- (e) Confirm operation of associated aircraft IIDS (for S-76C+ models) or FDC Caution/Advisory Light (for S-76A+/A++/C models) and Master Caution indications.
- (f) Remove manometer from DPT.
- (g) Re-connect vacuum line to DPT, torque -4 B nut to 75 inch pounds.



**Figure 1 – Differential Pressure Transducer Ports**

LED Segment No.	<u>S-76C+</u> ΔP (in-H <sub>2</sub> O)	<u>S-76A+/A++/C</u> ΔP (in-H <sub>2</sub> O)	Monitor Advisory	Aircraft System Advisory
10	15.0	10.0	CAUT	See Note 1
9	13.5	9.0	CAUT	See Note 1
8	12.0	8.0	MAINT	See Note 2
7	10.5	7.0	MAINT	See Note 2
6	9.0	6.0	MAINT	See Note 2
5	7.5	5.0	CHECK	See Note 3
4	6.0	4.0	CHECK	See Note 3
3	4.5	3.0	CHECK	See Note 3
2	3.0	2.0	---	---
1	1.5	1.0	---	---
(No Segment)	0.0	0.0		

Note 1: Caution Advisories:

- S-76C+ (\*): IIDS display = *EAPS FAIL*  
Master Caution = ON
- S-76A+/A++/C: FDC Caution/Advisory Light = *BAR FLTR*  
Master Caution = ON

Note 2: Maintenance Advisories:

- S-76C+ (\*): No IIDS message
- S-76A+/A++/C: FDC Caution/Advisory Light = *BAR FLTR*

Note 3: Check Advisories:

- S-76C+ (\*): No IIDS message
- S-76A+/A++/C: FDC Caution/Advisory Light = *PWR ASSR*

Note (\*):

IIDS Software Version 76450-01098-101 and RDAU Version 76450-01098-106 only

**Table 1 – FHM Light Segments and Advisories**

**4.9 Leak Test of Pressure Sensing Lines**

- (a) Disconnect vacuum line at DPT B nut fitting (See Figure 1).
- (b) Remove forward filter element, locate and cap off vacuum port on mounting base plate.
- (c) Apply light suction to the pressure sensing line at end disconnected from DPT
- (d) Ensure system maintains vacuum of 15 seconds.
- (e) Remove cap from base plate vacuum port.
- (f) Re-connect pressure sensing line, torque -4 B nut to 75 inch pounds.

#### 4.10 Transducer Filter Removal, Cleaning, and Installation

- (a) Disconnect transducer filter from 'ambient pressure' port of differential pressure transducer (See Figure 2).

**NOTE**

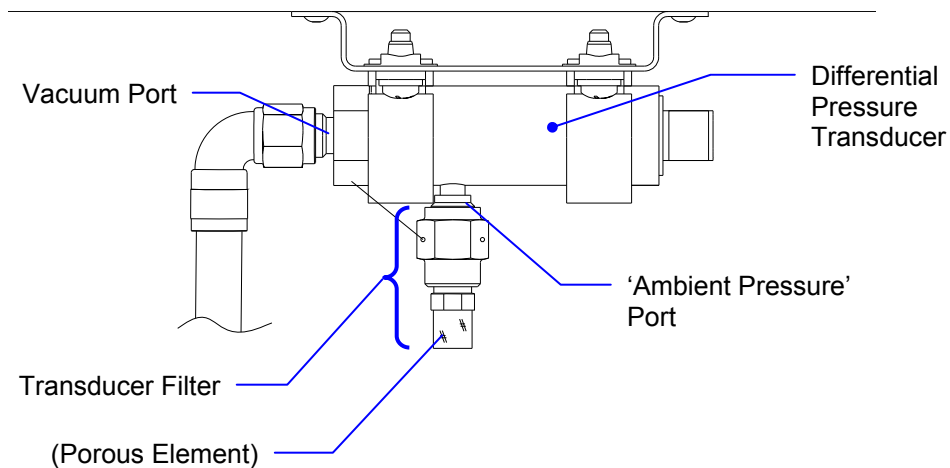
Porous element and B-nut fitting comprise an integral unit.  
Do NOT disassemble fitting and element.

- (b) Clean porous element with MEK or isopropyl alcohol, cleaning from the outside. Clean out any dirt or debris from inside the porous element. Gently wipe dry.
- (c) Re-install transducer filter onto transducer 'ambient pressure' port fitting (-4 size). Install with anti-seize compound per MIL-PRF-83483.

**CAUTION**

Do NOT block port or porous element.

- (d) Torque transducer filter on B-nut hex to 100 -140 in-lbs. Secure transducer filter to transducer with MS20995C32 lockwire.



**Figure 2 – Transducer Filter**

## 5.0 Filter Element Troubleshooting

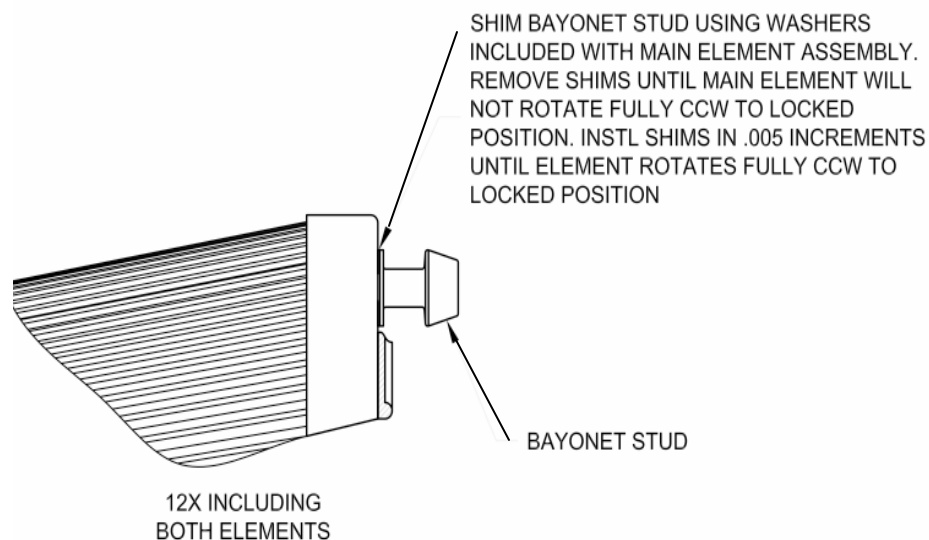
### 5.1 General

This section covers troubleshooting of the Engine Inlet Filter system. This information is to be used in conjunction with the installation and wiring schematics and drawings provided with the system. If additional copies are required, contact FDC/aerofilter. This section covers the most common problems that may arise in operation. Standard shop practices, aircraft manufacturer manuals and other approved data may be required to troubleshoot some system problems.

### 5.2 Filter Element

Filter Element difficult to lock in place or does not lock

- (a) Remove main filter from base plate.
- (b) Inspect bayonet fittings for condition and security, tighten or replace as necessary.
- (c) Add or remove bayonet fitting shims as necessary (Figure 3).
- (d) Re-install attaching hardware, torque attaching hardware to 45 inch pounds.
- (e) Re-install main filter element.
- (f) Repeat the procedure if required.



***Figure 3 – Bayonet Fitting Shims***

**5.3 Filter Maintenance Monitor**

Filter Maintenance Monitor shows full scale or will not reset

- (a) Check cannon plug connection to DPT.
- (b) Inspect pressure sensing lines for proper installation.
- (c) If symptoms persist replace faulty DPT.
- (d) If symptoms persist inspect wiring, repair as necessary.
- (e) If symptoms still persist replace FHM