SNOW ENGINEERING CO. WICHITA FALLS, TEXAS	ENGINEERING ORDER [ ] X	NUMBER #288
TITLE SERVICE LETTER #288	BY Kyle Schroeder CHK'D JH DATE 1/12/11	MODEL See Below SERIAL See Below PAGE 1 OF 10

SUBJECT:

Retrofitting Brackett Foam Air Filter to Existing Ram Air Systems

MODELS:

All AT-402, AT-402A, AT-402B, AT-502, and AT-502B aircraft with Air Tractor Ram Air Inlet System

PURPOSE:

The purpose of this service letter is to provide guidance for modifying the Air Tractor ram air system to allow installation of a Brackett Aircraft BA-409E air filter in place of the existing Donaldson P613731 filter. The BA-409E filter is a flexible oil-coated foam filter that has demonstrated better sealing, filtering, and airflow properties. This filter installs in the existing filter frame, which will be modified to properly support the flexible filter.

PROCEDURE:

It is estimated that this retrofit will take approximately 6 manhours to complete. This service letter is provided as guidance only. Final judgment about the proper installation and inspection details rests with the mechanic/inspector completing the retrofit. In some cases, other aircraft modifications may require departure from the steps listed in this service letter. If questions arise, please contact your Air Tractor Dealer or the Air Tractor Customer Service Department.

Use the methods outlined in FAA Advisory Circular AC43.13-1B for all aspects of this installation.

Install covers over all engine intakes or exhausts and cap any open connectors or fittings to prevent debris from entering any part of the engine, hoses, or electrical connectors. Keep the engine and all parts free of debris and metal shards.

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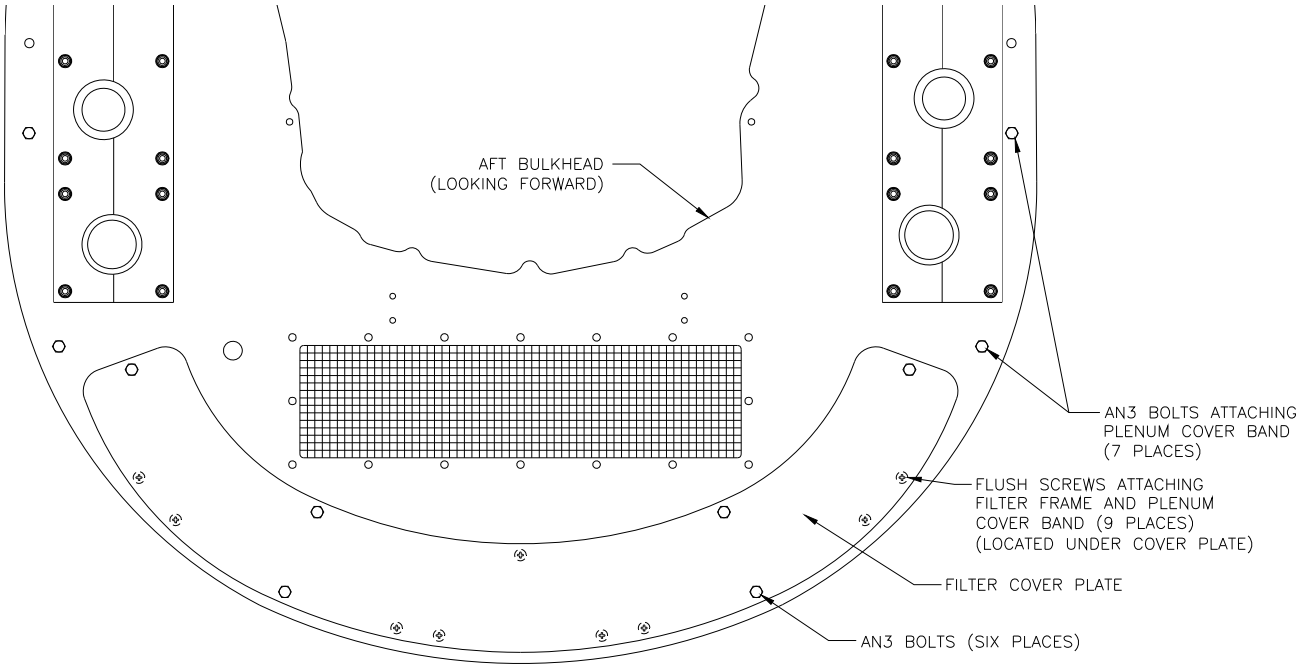
1. REMOVE COWLING

- ☐ Remove side cowl skins and the lower cowl skin.
- ☐ Remove only the L/H lower corner cowl skin. The R/H lower corner skin may be removed, but it is not necessary.
- ☐ Remove the lower engine plenum cover by loosening the four worm drive clamps.

2. REMOVE EXISTING FILTER AND FILTER FRAME

- ❖ **Do not discard any of the hardware removed during this step. All hardware that is removed will be reused when the filter frame is reinstalled. Keep hardware separated so that it can be properly reinstalled. Replace any damaged or unfit hardware as necessary.**
- ☐ Remove the six AN3 bolts that hold the filter cover plate to the aft engine bulkhead. Remove the filter cover plate.
- ☐ Remove the filter element through the opening in the aft bulkhead.
- ☐ Remove the lower plenum cover band by removing the four AN3 bolts and four flush screws along the perimeter of the aft bulkhead.
- ☐ Remove the existing stainless steel filter frame by removing the seven AN3 bolts holding it to the forward bulkhead and the five flush screws holding it to the aft bulkhead.
- ☐ Use a razor blade or scraper to remove any excess sealant from the bulkheads where the filter frame will reinstall. Inspect the interior of the engine plenum and remove/clean any debris that may be present.



3. MODIFY THE FILTER FRAME TO ACCEPT THE BRACKETT FILTER

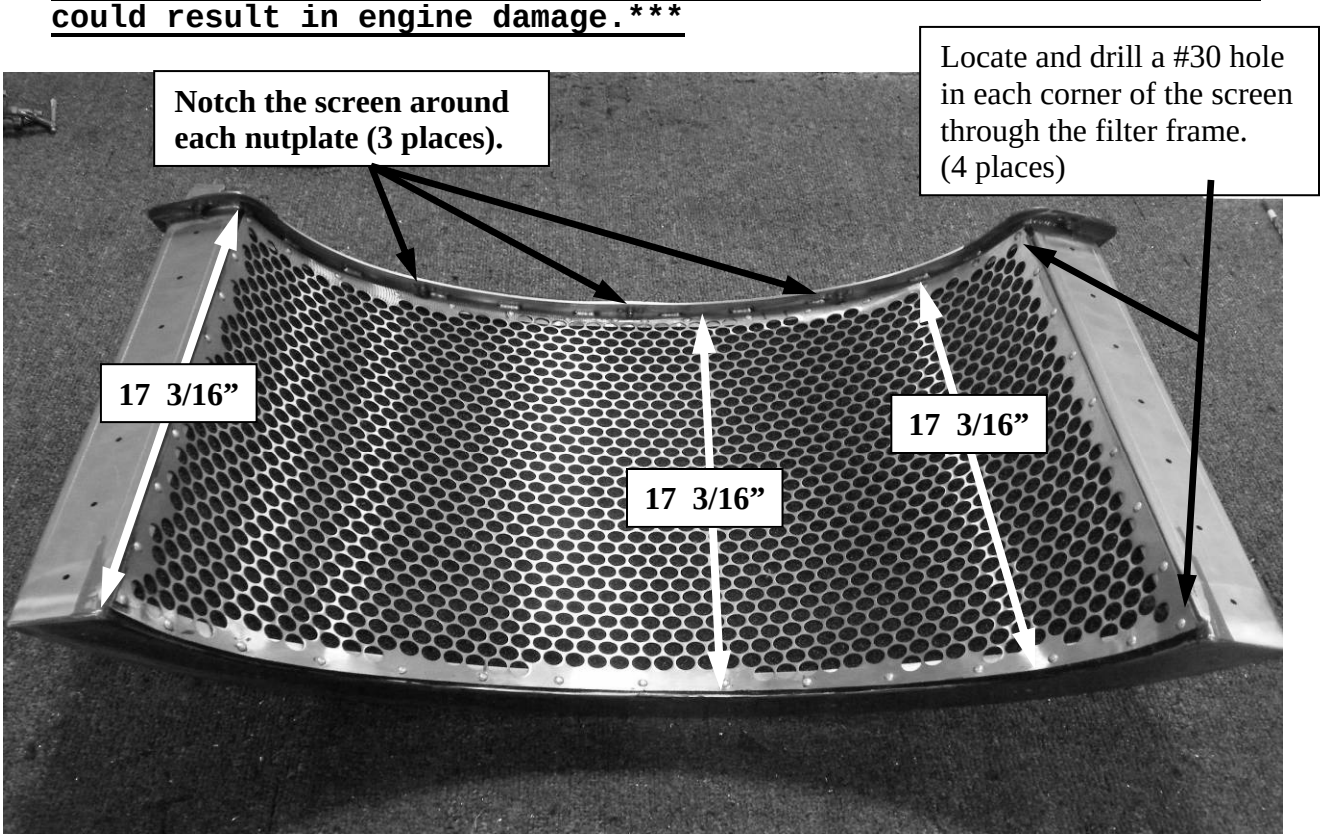
- ❖ **The new filter is a flexible foam filter made by Brackett Aero Filters. This filter must be supported in the filter frame by adding a screen to the rear (engine side) of the filter frame and by attaching removable bars to front side of the frame.**
- ❖ **This filter will not slide out through the aft bulkhead as the existing filter does, but will be installed/removed through the bottom of the plenum.**
- ❖ **In lieu of modifying the existing frame, you may purchase a new frame from your dealer that has the screen and support bars welded in place. Contact your dealer about a p/n 52550-15 filter frame.**

- ☐ Remove any excess sealant from the filter frame.
- ☐ When the filter frame was originally built, the welding process tends to warp the aft end of the frame. When installed, the bulkheads will pull the flexible portions of the filter into their correct shape. Once this filter frame is modified with the screen, it will too rigid to be pulled into place on installation. To ensure the frame takes the correct shape, bolt the filter cover plate (removed from the bulkhead in a previous step) to the open end of the frame.
- ☐ When measured per the picture on the next page, the length should be 17 3/16 ± 1/16″. These measurements should be taken parallel to the sides of the filter frame.
- ☐ Inspect the part number 19396 screen. Run your hand over both sides of this screen. The punch process will have left one side very smooth, while the other side will be slightly rougher. Mark the rougher side of the frame with tape or marker to indicate “This side out”. The filter will be a little easier to install if the smooth side is toward the filter.
- ☐ Lay the screen down on the filter frame. Ensure the “this side out” marking is facing away from the frame. It is ok to slightly hand-form the screen to help it lay down, but be careful not to kink the screen.
- ☐ The screen will need to be notched in three places on the aft edge to clear the three nutplates on the frame. Leave at least 3/16″ around the nutplate to allow for clearance when the screw/bolt is installed.
- ☐ Being careful to center the screen on the frame, backdrill all of the #30 holes from the screen into the frame. Insert a cleco in each hole as you drill to ensure that the screen is laying down flat and does not shift. Work carefully here. Every drilled hole needs to have at least 1/8″ of distance between the edge of the hole and the edge of the material it is being drilled in. **Ensure**

that every hole has adequate edge distance before drilling any holes. Clamp screen in place if necessary.

☐ Another #30 hole needs to be drilled in each corner of the screen. After all of the other holes have been drilled and cleco'd in place, locate a point in each corner of the screen that has equal edge distance for all the layers of metal that it penetrates. Be mindful of the overlap of the welded pieces that make up the filter frame. When these four points have been found, drill them #30 through all layers of metal.

☐ Remove the screen and deburr the drilled holes in the filter frame. Inspect the drilled holes for proper edge distance. Rivet the screen to the frame using MS20470AD4-4.5 solid rivets. Again, make sure that the screen is installed rougher-side-out. *****Do not use blind (pulled) rivets on this installation. This could result in engine damage.*****



☐ On the wide curved band on the forward side of the frame, drill the two #30 holes that are shown in the picture below. Use a flexible tape measure oriented perpendicular to the side channels of the frame. Start the measurements from the face of the side channel as shown below. Repeat this for both the left and right sides, resulting in a total of four #30 holes.

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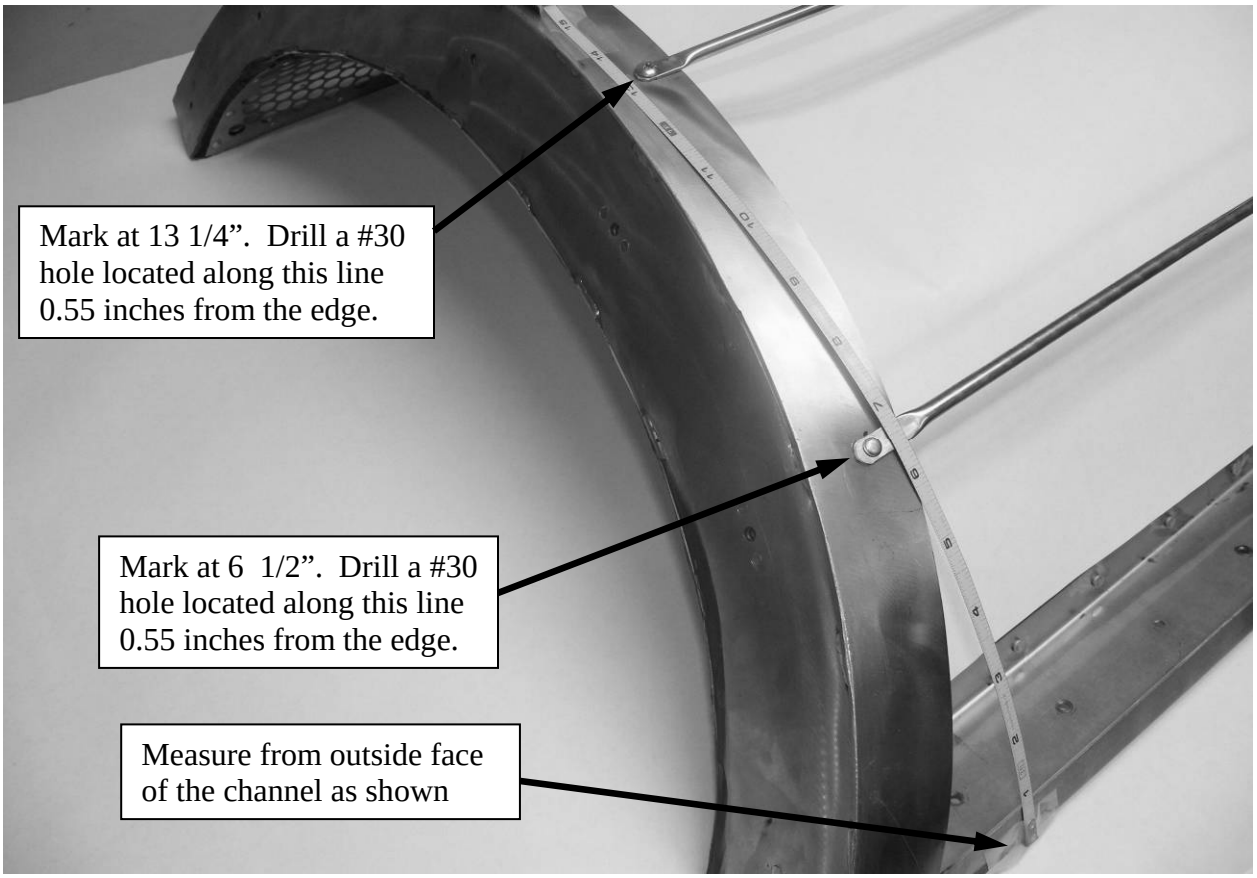
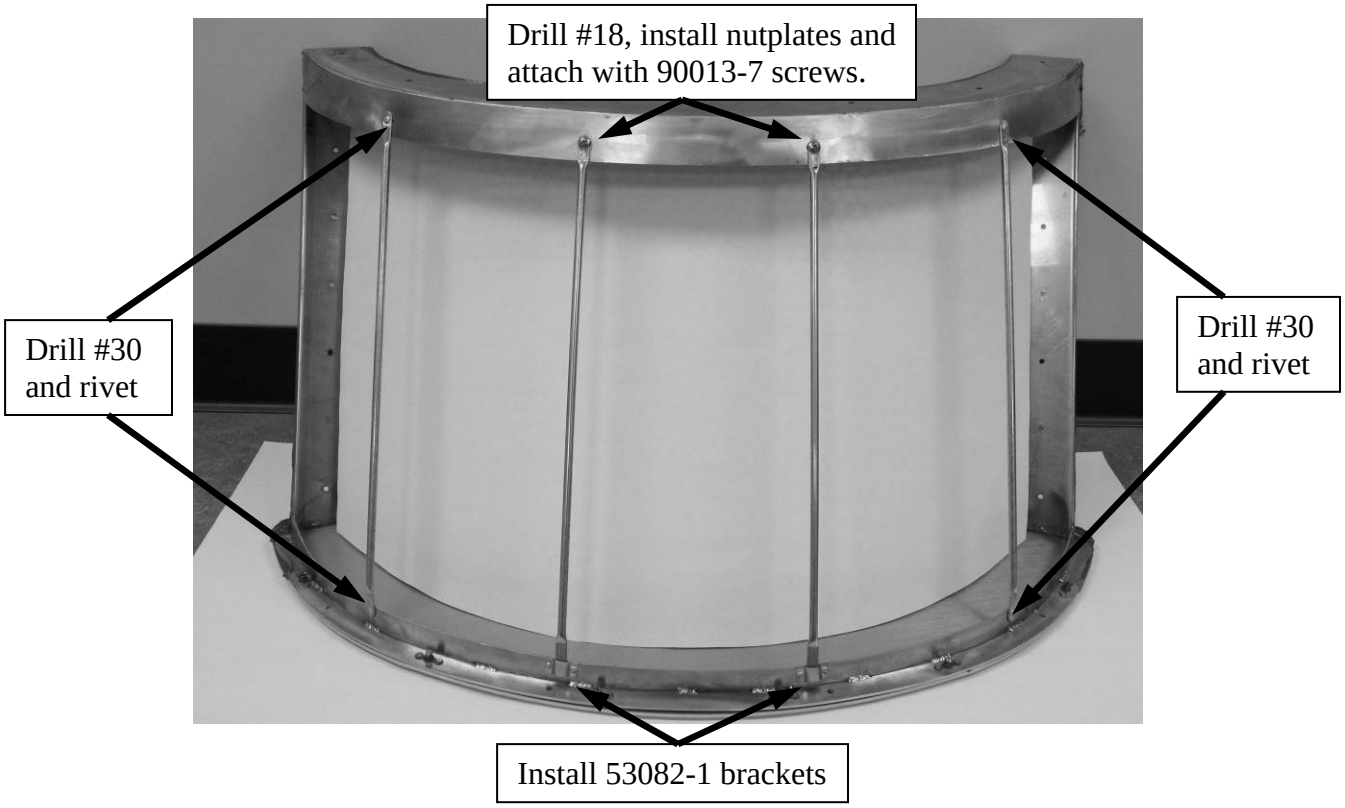
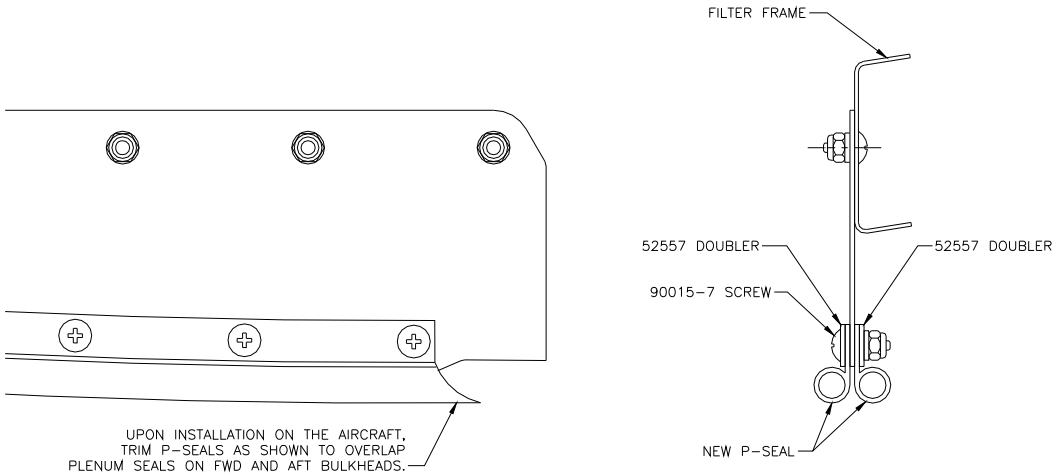


- ☐ Cleco each of the 53081-3 support rods in these holes. The support rods should be oriented so that they are parallel to the sides of the filter frame. (See picture on next page)
- ☐ For the two outside support rods, backdrill the frame #30 to match the hole in the end of the rod. Remove these two rods, deburr the holes and then reinstall these rods with MS20470AD4-4 or -4.5 rivets (as required).
- ☐ For the two middle support rods, install the 53082-1 brackets over the aft end of the rods. Drill the frame #30 to match these brackets and install with MS20470AD4-4 rivets. These brackets allow the rods to slide in and out.
- ☐ On the front end of these two middle support rods, enlarge the holes in the rod and the frame to #18. Using the NAS680A08 nutplates as a template, drill and countersink four #40 holes and install the nutplates using MS20426AD3-3.5 rivets.
- ☐ Install the center rods by first sliding them into the 53082-1 brackets and then screwing them into the nutplates using 90013-7 screws.



4. MODIFY SIDE SEALS ON THE FILTER FRAME

- ☐ The filter frame has two side seals that incorporate an orange silicon P-seal. These P-seals are attached to an aluminum plate with seven screws each. Remove the screws to remove the P-seals and the doublers. Discard the screws, but keep the nuts and washers to reuse in the next step.
- ☐ Install the four new P-seals (52556-1) as shown in the figure below.



5. REINSTALL THE FILTER FRAME

- ☐ Reinstall the filter frame in the airplane using the original hardware.
- ☐ Apply a bead of RTV-133 to the perimeter of the filter frame.
- ☐ Reinstall the plenum cover bands to the aft bulkhead using the original hardware.
- ☐ Replace the filter access plate on the aft bulkhead using the original hardware. This plate will no longer be removed for filter installation and removal. Apply a bead of RTV-133 around the perimeter of this plate to seal it closed.
- ☐ Seal any other areas where dirt or debris may get around the filter frame.

6. INSTALL NEW FILTER (BA-409E)

- ☐ Check the plenum interior to ensure that all systems are properly installed and that all temporary engine covers or plugs have been removed.
- ☐ Using a short Phillips screwdriver, remove the two screws that hold the center support rods in place. Remove these rods by sliding them out of the brackets on aft end of the filter frame.
- ☐ Remove the new filter from its packaging. The filter is a three-stage foam filter coated in a special oil. This oil is the key to the filters ability to clean the air. Do not try to wash the filter or it will remove this oil and prevent the filter from functioning properly. After handling the filter, the oil residue can be removed from your hands and clothing with normal washing.
- ☐ Through the front of the filter frame, install the filter. The dark, coarse side of the filter will be facing forward and the light colored side of the filter will be against the screen that was riveted on earlier. Maneuver the filter into place and ensure that it fits tightly in all of the corners and that none of the rivets are interfering with the fit of the filter.
- ☐ Replace the two support rods in their brackets and reattach them with the 90013-7 screws.
- ☐ Inspect the filter from above and below to ensure that the filter fills the frame completely.
- ☐ Reinstall the lower plenum cover and tighten securely with the worm drive clamps.
- ☐ Inspect the edges of the plenum covers for any gaps that may allow unfiltered air into the plenum. Seal these gaps with RTV-133.

7. REINSTALL COWLING

- ☐ Reinstall the lefthand cowling corner skin and reinstall all equipment and drains that attach or penetrate this skin.
- ☐ Inspect the entire engine installation to ensure that everything is installed properly and that no other problems exist. Ensure the entire engine compartment is clean and free of debris.
- ☐ Reinstall the lower cowl skin and the side cowl skins. Ensure that all hoses and wires are reconnected as necessary.

WEIGHT AND BALANCE INFORMATION:

The weight and balance change for this retrofit is as follows:

Subtract 6.4 lbs from Station -66.3 for the AT-502 series.
Subtract 6.4 lbs from Station -59.6 for the AT-402 series.

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CONTINUED AIRWORTHINESS INFORMATION:

These BA-409E filters are throw-away filters. There is no procedure for cleaning and reinstalling the filter. If cleaned, the filter will likely lose its ability to stop contaminants from passing through.

The engine air filter should be checked during every pre-flight inspection. Visually inspect the filter by looking into the engine inlet. Check the filter to ensure it is correctly seated in place and check the face for excess dirt caked on the face of the filter element. Excess dirt can be easily brushed off with a bristle brush and removed from the plenum with a vacuum hose or swept out of the plenum through the access cover in the bottom of the plenum cover.

As with any air filter, the length of service life for these filters depends entirely on the operating conditions. When the filter becomes dirty enough to illuminate the warning light, take it out and replace it as follows:

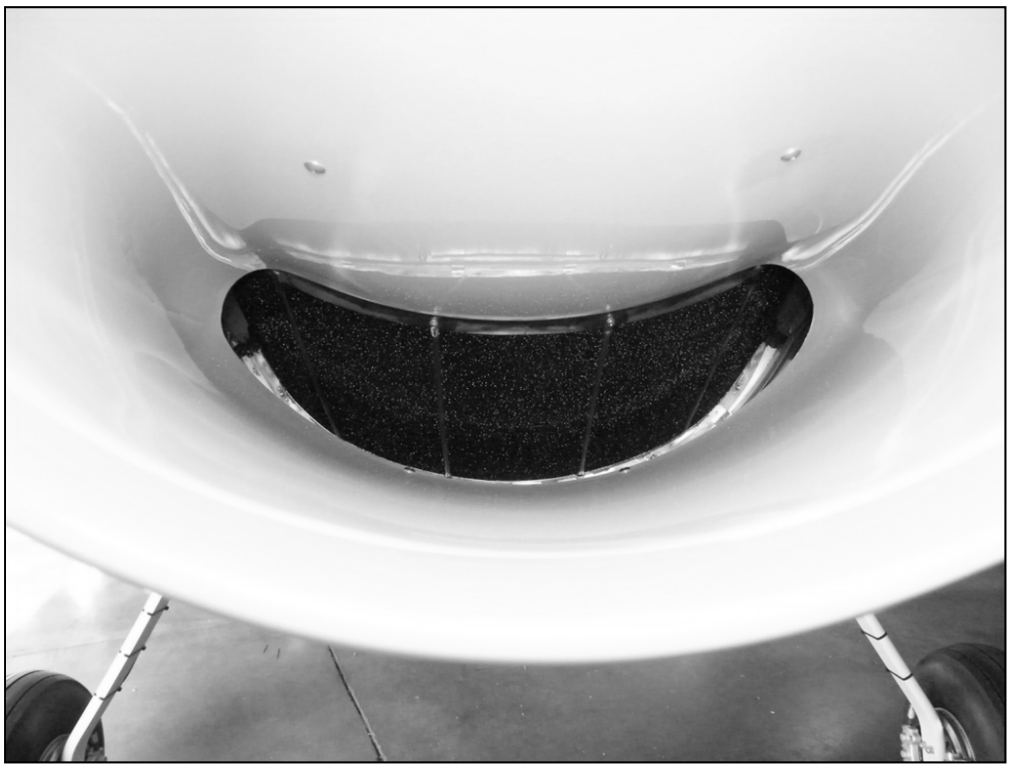
1. Remove the lower and side engine cowls and the lower engine plenum cover.
2. Remove the three center filter support rods by removing the screw on the forward end and sliding them out of their retaining brackets on the aft end.
3. Remove the old filter element from the filter frame.
4. Clean the filter frame and engine compartment as necessary. WD-40 does a good job of cleaning any residual filter oil.
5. Install the new filter element per Section 6 above.
6. Reinstall the three center filter support rods by sliding the aft end into their retaining brackets and installing the screw into the forward end.
7. Replace the lower plenum covers and seal any gaps with RTV-133.
8. Replace the side and lower engine cowl skins.

The foam filter element is required to be replaced at least every 12 calendar months regardless of actual flight time. The reason is to ensure acceptable levels of oil remain in the filter to adequately capture dust and debris.

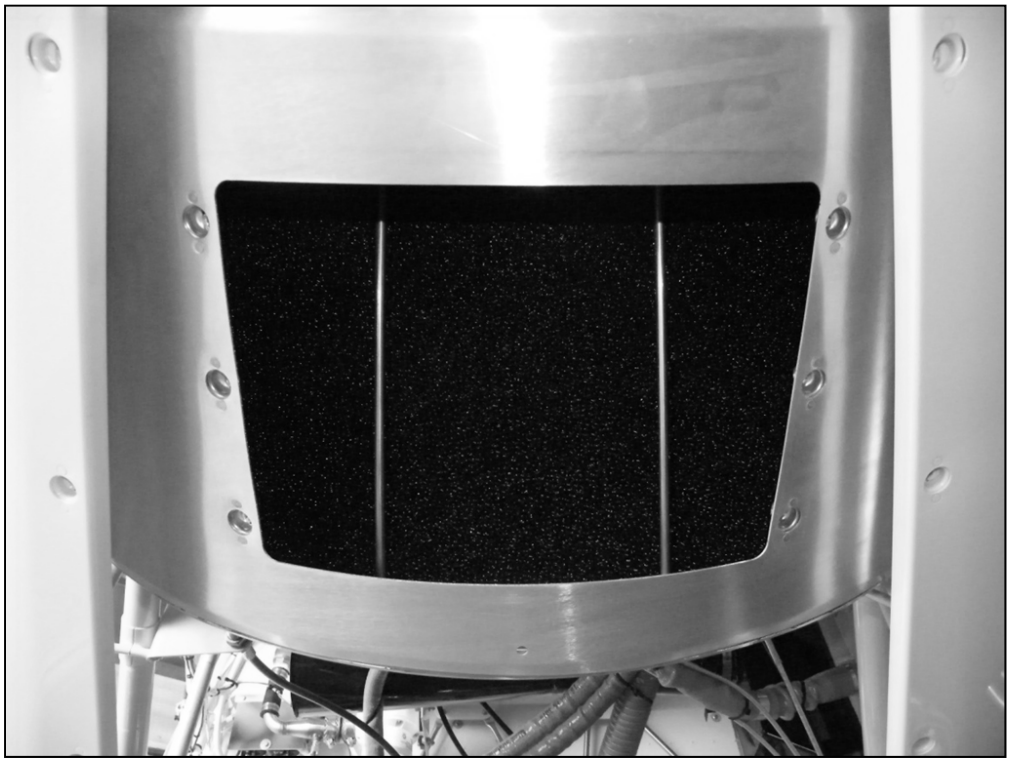
APPENDIX A –
Ram Air Filter Retrofit Kit Parts List

QTY	P/N	DESCRIPTION
1	BA-409E	Brackett Foam Filter
1	19396	Ram Air Retrofit Screen (Transland)
4	52556-1	Seal
2	52557-1	Doubler (for AT-402 only)
2	52557-2	Doubler (for AT-502 only)
4	53081-3	Support Rod
2	53082-1	Bracket
16	90013-7	Screw
10	MS20426AD3-3.5	Flush Rivet
10	MS20470AD4-4	Rivet
60	MS20470AD4-4.5	Rivet
2	NAS680A08	Nutplate
1 tube	RTV-133	Sealant

Additional Reference Pictures for Service Letter #288



This picture shows the view down the engine inlet looking toward the Brackett foam air filter. From this view, the pilot/mechanic can inspect the filter during preflight for proper installation, excess dirt/debris, or any damage to the filter or filter frame.



This picture shows the view through the access opening in the bottom of the lower plenum cover. This picture is with the access cover removed, exposing the filter element for cleaning or close-up inspection.