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Mk 2/3/4 filter housing assembly

*Before beginning assembly, purchase a K/N E-0995 filter (MK3 and 4) or KA1000 (MK2). Be certain that you receive a newer version of the E-0995 filter. The older, now obsolete version has a steel base plate in the flange. The flange will not be flexible and is difficult to trim.
After "bagging" the filter against contamination, trim the perimeter of the rubber base to fit snugly inside of the filter housing., The filter housing may be used as a template to size the rubber flange. A metal cutting bandsaw blade shapes the rubber easily and a belt sander cleans up the perimeter nicely. Install the bagged filter for all fitting of components.
Airflow performance type servos (without the Bendix style, flat mounting flange) will require the FM approach ring for securing the filter kit to the servo. Please contact A.F.P. for this part.

*There are many possible combinations of sumps, engines and fuel servos. The backplate sent to you is one of two types available and will fit many of the possible combinations. If you find that the inlet of the filter housing is misaligned with the cowl, we have another backplate that is angle offset and will lower or raise the filter inlet by about 1-3/8ths. This works well with many cold-air type sumps. Try to decide about your situation before cutting parts. Any undamaged parts may be exchanged.

Please read the instructions above that are printed in blue. Please read all directions before doing anything else. If you have any questions please call to clarify.

There are three parts to consider: filter housing, transit duct and backplate.

The taller cone shaped part is the **filter housing**. This part will contain the filter. The rubber filter flange will rest on the ledge about ¾" inside the housing, with the pointed end of the filter facing the smaller opening in the housing.

The part that resembles a bowl is the **back plate**. After proper trimming, it will slide into the filter housing and will press against the rubber filter flange, around the perimeter, and will hold the filter in place. The flat section of the backplate is where the alternate air door will be located after cutting an opening for the door.

The smallest part looks like a funnel, it is the **transit duct**. It will direct the airflow from the back of the filter to the inlet of the fuel servo. When it is properly trimmed, it will rest on the bottom of the bowl, rough side down, smooth side visible. The smooth side will face the filter when the backplate is inside the filter housing. The "flat plate" edges of the transit duct will need to be trimmed to fit precisely inside the backplate. The transit duct will also be gradually trimmed at the bottom (smallest point in the funnel shape). This will gradually lower the transit duct down inside of the backplate. The correct height will allow the flat perimeter edges, trimmed earlier, to rest down inside of the backplate, just below the top edge of the backplate. The top line of photos below shows how this fits together and where to trim

Assemble Backplate: To begin assembly of the MK3 kit, place the bagged filter inside the housing. Carefully sand a slight bevel on the outside edge of the backplate where it enters the filter housing sidewall. Do not reduce the length of the side walls, only produce a slight chamfer, if needed, to assist in slipping the backplate inside the filter housing. The back plate is sized to fit exactly within the filter housing when the back plate is properly shaped and sanded. When fitting the backplate into the filter housing, first place the rounded wall just inside the filter housing, then insert and press down on the flat area of the backplate perimeter. The parts should fit snugly but slide together smoothly. Mark a reference line on the backplate and filter housing when they are joined so you will always match them at the same point around their circumference while continuing assembly.

Transit duct: The vertical height of the transit duct, resting inside the backplate, is decided by the length of the duct. When the transit duct is properly located in the backplate, the bottom of the transit duct may rest close to (or on) the bolt heads that will pass through the backplate for attachment to the fuel servo. Prior to drilling holes through the backplate for attachment to the servo, ¼" nuts may be used to approximate the bolt heads while trimming the duct to fit inside the backplate. When trim fitting the transit duct, you do not have to locate the temporary spacer nuts exactly. Tape four nuts to a piece of paper at about the same spacing as the bolt pattern in your servo, and set them into the bottom of the backplate. You can move them around as you sand the bottom of the transit duct, gradually lowering the duct into the backplate. . Slowly trim as necessary to obtain the correct placement. Eventually, the transit duct will come to rest on the two spacer nuts nearest to the flat, alternate air door area. At this point, the top of the transit duct will be in contact with the top edge of the backplate. Slowly sand the "flat plate," semicircular perimeter of the transit duct until it slips snugly inside the backplate (see photo). This flat area will support the filter and keep the exit opening to the servo locked in correct alignment. When the duct is sanded correctly, the flat perimeter will be flush with and inside of the backplate sidewall (see top left photo). Depending upon fuel servo type, the duct may or may not contact the spacer nuts beneath the duct. The bottom of the trimmed transit duct, where it contacts the backplate, should be in full contact with the backplate all the way around the opening. If either the bottom or sides of the transit duct are not accurately trimmed, they can be built back up with some glass and epoxy and reshaped. (When using the optional "angled" backplate you may need to add to the bottom length of the duct.) If you don't get it just right, lay a piece of saran wrap in the backplate, place a bead of epoxy on the bottom of the duct and place the duct inside the backplate. When it cures, lift it out and reshape the part. **Do not cut the opening through the backplate to the servo until this part fits in place, as described.** When the opening is cut, it should appear to be a continuation of the duct discharge wall, with the transit duct **supported by the backplate**. The transit duct will not touch the fuel servo. All bolt heads will be contained within the space below the transit duct. The actual bolt head spacing (C-C) will be the same as the bolt spacing on your fuel servo.

Alt air door: On the flat part of the backplate, where the door will be located, measure in 5/16" in from the radius where the flat area begins (See Photo). Draw a perimeter line to size the door. The forward edge of the door will be located along the 90 degree back wall (see photo of door opening) Use a 3/8" **radius,** rather than square corners on the door opening. This radius on the door corners works best for internal clearances near the transit duct. Later, while fitting the hinge / door assembly you will gradually open the back wall to receive the hinge (see photo). Assembling this door is as simple as it looks. Nothing tricky, no surprises. Before cutting, holding the part up to a light source that will allow you to see through the glass, to confirm that the scribed door will clear the transit duct when opening. **If you find that, due to the door sizing, the door will not clear the transit duct, the duct may be lowered to contact the bolt heads or the door made slightly smaller.** When the door opening smooth the the perimeter (opening and underside). Underlay a piece of .032 flat stock aluminum beneath the door opening and scribe a line to pattern the door opening. Cut outside of this line 1/4" and check your fit. This door will be slowly resized several times so don't waste a lot of time here. While resizing for final fit, the door and hinge will be clecoed in place. With the filter installed, slip the backplate into the filter housing and check for door swing clearance. Allow at least 1/8" clearance between the door and the transit duct sides.

Remove a section from the hinge and install a set of door return springs. (See photo). Create the required control arm for your installation. This will differ according to your unique combination of components and required access, but the end goal is an arm that will swing the door open when you need it. 1/8" mild steel works well for a control arm. If cable actuation is the

goal, cable retention brackets are made according to your specific needs. Use the photo for reference and arrange the parts with the door on the bottom of the stack, hinge next and then the control arm. Note that the control arm design should be designed and placed to allow maximum free range of motion, when actuated. Keep the arm relatively narrow at the area of contact with the filter canister to insure adequate travel (close to 90 degrees). Note (photo) that the hinge base is trimmed elliptically at the top corners to fit within the perimeter of the filter housing. The wide hinge serves to strengthen the backplate. Retaining “L” brackets can be installed at the ten and two o’clock position on the filter housing perimeter. These will contact the hinge, keeping it pressed against the filter base.

Springs provided are intended to be used along with a control cable. Alternate air doors operated only by “spring and vacuum,” without a control cable, have not been flight proven by James Aircraft. Each brand and type of injector has different airflow requirements. Alt-air doors not fully opened 90 degrees by a control cable may cause rough engine operation with some fuel servos. It is the builder’s responsibility to fully test any alternate air door, particularly those not operated by push / pull cable.

Use four -4 countersunk rivets to assemble the stacked door components. When the door parts are assembled, lay the free side of the hinge against the flat area on the back plate and gradually shape the door for fit. Make sure that the door seals flat around the door opening perimeter and is not contacting the transit duct when opening. About 1/8" overlap around the door opening for a final seal is sufficient.

Gradually remove material from the flat area where the hinge will be attached to the backplate until the hinge slips into place. The hinge pin is secured at each end by contact with the fiberglass at the end of the hinge pin opening. When the fit looks good, drill and cleco but do not rivet the hinge in place. If the final product does not seal precisely don't take it too hard. When the door is finished and fully functional, any areas that may leak can be sealed with RTV gasket seal. To accomplish this easily, apply a light coat of Vaseline or other parting compound (test it) to all areas where you don't want the RTV to adhere. Coat the edge of the door and apply a small bead of RTV to the inside area where the door will overlap. When cured overnight, you will have a tight, custom seal. Do the same thing anywhere a gap exists.

Bolt holes are to be drilled directly through the back plate. Use a template or a bright light to illuminate your bolt spacing through the backplate. The backplate is to be bolted directly to the servo with heads secured and safety wired. Use a gasket or thin bead of RTV on the flange to seal the backplate to the servo flange. When satisfied all is well, rivet the door assembly to the backplate.

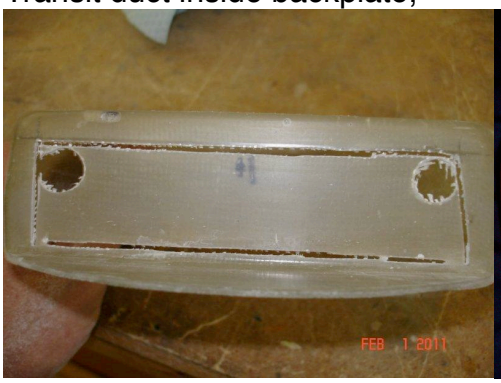
A minimum of four nut plates are to be installed around the filter housing perimeter. Insure that spacing allows for the fitting of the transit duct, which will cover the nut plates, containing them inside. The area of the backplate above the hinge is to be held in place by 90 degree ‘L” brackets, fastened with a screw and lock nut. The bracket will press the backplate against the filter base snugly.

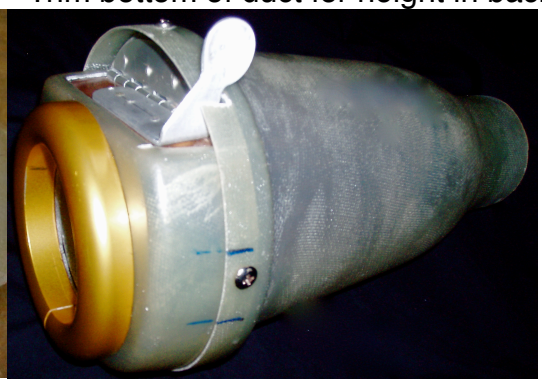
For attachment to airflow performance servos, use FM Approach Ring (purchase from Airflow performance) and secure as described above.

Please note that the opening through the backplate is not located on the centerline of the filter housing. This allows the unit to be located for best external clearance to starters, etc. along an eccentric axial rotation. Slight misalignments may be corrected by adding fiberglass layers to the back of the backplate and re-sanding, to form an offset angle.

Transit duct inside backplate,

Trim bottom of duct for height in backplate

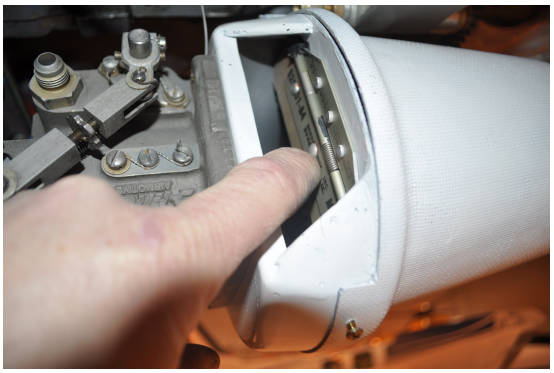




Begin alt air door

FM200 only, Ring installed, cable

Note bracing attachment



Bendix type installation, note spring actuated door without cable (builder modification).

Additional information, MK2 only: The provided circular ring locates filter inside filter housing. The “spinner,” located on top of KA-1000 is secured with a bead of RTV. After taping over filter, run a thick bead and press filter in place insuring level placement of the spinner.