

FUEL SELECTOR PROBLEMS on the CESSNA 120/140/140A

AND WHAT TO DO ABOUT THEM. (Information For Assisting Your A&E and A&I)

In the Beginning:

The original selectors were brass-bodied and had a brass spool and lasted forever with a dab of special grease every five or ten years, and then along came the new fuels, and...trouble. The special grease, at something like \$400 per pound, was magic for several decades and a little dab worked wonders; the stem/spool assembly could be lifted out from the top, greased, and put back in place. The new fuels leached the previously impervious special grease, allowing brass on brass, which led to galling. If let go long enough, it would be impossible to change tanks, even with the assistance of a big wrench. Once the mating surfaces of the spool and body are scored, they will never again be leak-free so that means a lot of us have to change out the entire selector.

Brass Spool



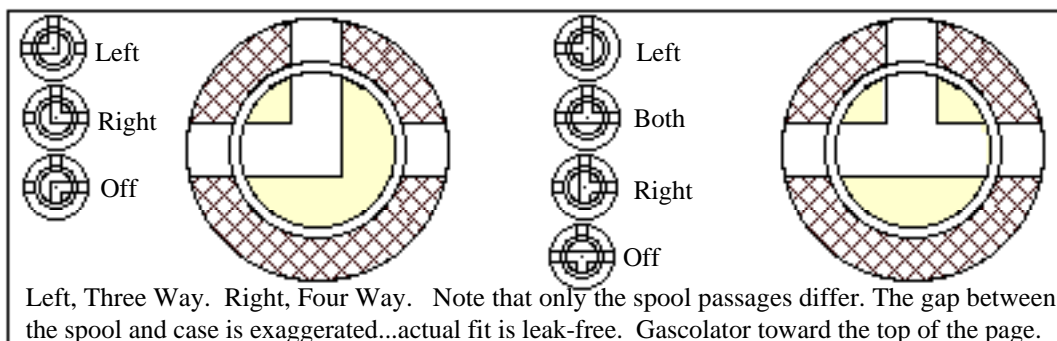
When the lubricant is leached by the new fuels, the brass spool and mating surface of the selector body become galled. This conflict causes the squeal, hard turning, and an unstoppable leak.



The initial symptoms of failure are a high-pitched squeal as the handle is turned, then greater and greater resistance to turning, and leaks. It won't get better, and the addition of more expensive grease may help for only a very short time although it is the only "cure" by many who don't know about the advances in the spool material. More than one of our members resorted to a bigger and bigger Crescent wrench, but there comes a day when too much force leaves the plane without a tank choice.

This article is to guide you for installing a replacement new selector. The guidelines are meant to be practical. The selector exchange, even on the plane we did first, was easy because we planned it, had the right tools at hand, and had the benefit of having assisted friends remove and replace theirs. All the hints served us well and we hope they do for you.

Although the original brass body, brass spool, and magic grease are readily available, most who wanted to get away from the recurring problem have chosen to use the Delrin spooled selector. This guide can be used for either. A less complete sequence for the 140A is outlined later.



Look at the figure of the spools and the selector bodies. One vendor calls these two way and three way; another vendor calls them two port or three port and we call them three-way and four-way. Note that each type in the figure has an inlet for the left tank, an inlet for the right tank, and an outlet to the gascolator. Only the spool passages in the selector determine whether it can be used as Left/Right/Off or Left/Both/Right/Off!!! At serial number 14005, the selector was changed from the three-way to the four-way which most define as Left, Both, Right, Off. Cessna fails to mention this little tidbit.

The reader will soon realize that, if you can only get a new three port Delrin-spooled selector with the Left/Right/Off combination, the spool can be carefully drilled to become a four way. It must be approved

by the A&X. Before you do anything, get the A&X's approval!!!! I accentuate this because some have done the exchange before getting the A&X's sanction and then find they can't get a signoff.

Modifications to the new Selector:

All of the new selectors I have run across have needed two modifications to match the handle-to-tank positions to which we are accustomed. Selectors with the Delrin spool come with a handle stem that is too long for our planes, and they come with the handle oriented 90 degrees to what is "correct" for our planes to match the tank position markings on the escutcheon. The A&X who does your replacement with your help has to plan on doing these things to it: a) cut off the stem to the length that puts it back on a par with that of the one removed, b) form a new flat on the stem so that the handle will be properly oriented, and c) drill and tap the stem to take the retaining screw to secure the handle. How much you cut off is dependent on the length of the new unit's stem and how high the rug/stop plate/escutcheon combination is...don't forget that there is about 0.3 of the stem in the handle recess; the stem is brass and so it is easy to cut with a hacksaw and easy to file the new orientation flat. On the most recent one we saw, the cut off left 0.31" from the "nut" of the selector to the bottom side of the handle plus the stem length needed inside the handle for a plane with a very thin or no rug under the stop plate. This height ensured that the handle would strike the stops on the stop plate and nest in the recess of the "Right" tank part of the stop plate.

An important step. Observe the passages in the spool through the openings and rotate the handle so that the spool is in a known position such as Off. Mark the stem and adjacent body to indicate the position of one to the other for the OFF position. The reason for this is to ensure that, as you work on cutting the stem and adding the handle orienting flat, the spool does not rotate to a position which would give you less than full flow. It is wise to prepare a dowel to put in an opening and into a passage such that the spool does not turn as you work on the stem. Check often.

Before cutting the stem, drill the handle screw hole deeper for the new threads you need after shortening the stem. Drill the stem with a #29 bit and be sure the new hole is straight and parallel with the stem axis. Tap to beyond where you will make the cut so that the threads are started in the extended hole.

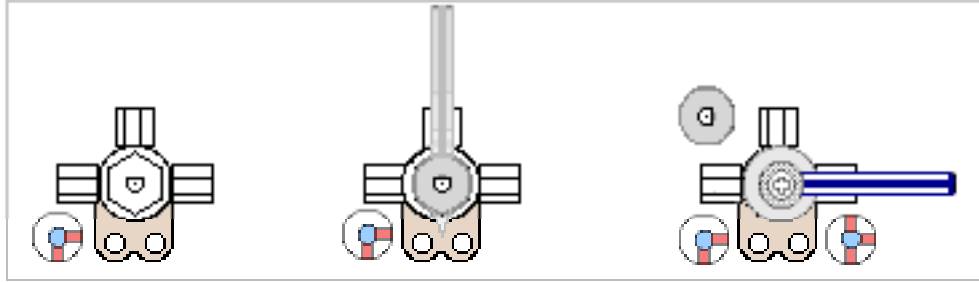
After cutting the stem, square the end so that the end flat is perpendicular to the center line of the stem and then chamfer the edge slightly if the handle recess corners require it.

Chamfer the hole, and tap the stem hole to a thread depth which allows full insertion of the handle retaining screw. Upend to remove all the chips created and left in the hole by tapping. Verify that your screw fits, does not bottom out, and holds the handle without wobble. The size of the screws we have seen are all 8-32, and the drill to use for pre-threading is #29. Don't cheat and use an "about" #29 size.

With the spool and stem properly aligned still at the OFF position, place the handle so that its long portion is pointed at the ship's OFF as well. Note the orientation of the flat in the handle recess and from that matchup, determine which side of the stem needs the flat. This is definitely a "measure twice and cut once" situation.

In case you want to use the old Gould/Imperial handle (see the figure on a later page) with the high arm (it does make turning easier) and three square sides plus one round side in the stem recess, shape slowly and get a good fit, so the handle and stem mate well. Whatever you do, make sure your handle-to-stem match will never allow an incorrect mating in the future, after annuals and such. When the handles are cast, there has to be a slight taper on every surface to allow the part to escape the die; therefore, a perfect match of "new sides" on the stem should have a slight taper as well. With a good file and patience, this is not hard.

As the new Delrin-spoiled selector comes to you, it is "wrong" in the sense the handle orientation is wrong with respect to the legend on our fuel selector position indication plate. See the sketch, and it will save a thousand words. And realize this is based on the Weatherhead 6749 type, not necessarily how your new one will show up! Rather than shorten and reshape the stem as noted, some users change the escutcheon to show the changed positions and others ignore the escutcheon because they "know what to choose". Both are dangerous to the unfamiliar.



Center: handle orientation as received with the spool in the Off position for the older planes with the three way selectors. Left: the stem with the flat as received. Right: as it must be to coincide with the Cessna piping layout for the Off position for three way units or the Right position for the four way unit. The small figures show the spool position and the new flat orientation on the stem and the changed handle position to match.



Left above, a figure of the new style handle with its single flat recess. Next, the new and original stems; one flat new and four flats old. Right, the handle revised to remove the pointer per the early Airworthiness Directive (AD will be used henceforth to mean Airworthiness Directive). Cessna designed all their planes to have the shank of the fuel selector handle indicate the tank in use. Although Cessna did not notice the "trivial" little pointer that was cast as part of the handles, the users did. Owners, not knowing what Cessna meant, were trained to consider the pointer of things to mean: "that which the pointer points at is the one being used", and so they tried to use the pointer end to indicate the tank being used. The inevitable result was that the Off and Left tank positions were reversed by those who didn't understand the rule. It was whoopee time for some planes which landed with silent engines and a full tank of gas on the left. This fault was repeated in 2005. There was a sudden service letter from Cessna to grind off the pointer of the selector handle, and that was shortly followed with an AD from the CAA to do the same thing, only hurry and do it. So, to be in compliance with the AD concerned with the handle of the selector, you must obliterate the pointer on the handle. Some people are misled by the serial number association with that AD, but the AD never considered that people would replace the selector and get a new handle. Cut off the pointer.

In the beginning, the stem was square-headed to fit the square indent of the handle so that the user could position the handle any of four ways and so all the customers and different plane makers could use the combination. Unfortunately, the result of a mismatch could be more severe than when used on a John Deere tractor with its tank of starting gasoline and running diesel fuel. That led to an AD which necessitated that a hole be drilled off center through the handle and the stem with a locking pin installed in the hole so that selector handles could be no longer be put on three "wrong" ways; all new selectors have been made with only one stem flat and with the handle stem indent having only one flat.

Replacement Sequence:

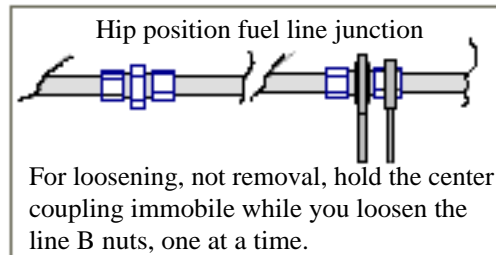
1. Remove the battery!!! Don't just disconnect the ground terminal; sometimes, the removed ground terminal flops back to give you a spark when you don't want it. Remove the battery or do a very good job of bagging the free cable end.

2. Plan ahead and have as little fuel in the plane as safe after the last flight. The tedious step before doing anything with a selector is to remove all the fuel from the tanks. Do this in the open air, never in a hangar. Lift the tail and support it with something like a padded sawhorse under the fuselage near the tail at a bulkhead juncture. Selector Off. Gas caps off. There are two ways to drain into a metal can, with a ground wire between the can and the plane: 1). via the gascolator (taking the gascolator stopcock out is even better) like the later figure, or 2). with the cowl off, remove the hose fitting at the carburetor and use it to guide the fuel into safe, approved gas cans. Tilt the wing tips in turn to make sure it is all out.

Note that the saw horse and cushion under the rear fuselage at a bulkhead seam creates a “level” surface in the cabin which makes subsequent work much easier. Use a good support, one that can take a little wiggle...make it solid.

Don't hurry this procedure. Leave the caps off and the drain open to dissipate all the fumes and the last drops.

3. Remove the seats, the selector handle, the selector stop plate and escutcheon, the rugs, etc.
4. Remove the floor tunnel in order to access the line coupler forward of the trim wheel and selector.
5. Remove the floor access plates of the hump outboard of the selector and the trim control wheel.
6. Remove the rug or covers over the fuel lines outboard of the seat pans, under the door sills.



7. With the 11/16 and 13/16 wrenches, break the fittings under the door sills. Note that there are three "nuts" in those combinations----the center one is the coupler. Hold the coupler nut still while you break the rear tube B nut (the rear has more clearance from the sill). Loosen the front B nut, too if you can access it with a wrench. Never permit yourself to apply stress to the "third" nut when working with the other two. To do so can cause the tube to twist and fracture. Loosen, but do not completely back off the B nuts.

There will be some residual fuel at these steps so use rags to pick up most of it and let it air out until there are no fumes. The greatest spark risk? A dropped trouble light so use flashlights only. Relocate soaked rags far from the plane immediately to dry.

8. Break and back off the fittings on the line to the gascolator, under the tunnel, forward of the hump in the floor on which the selector sits. A temptation to skip this step? Have faith. It will pay you back.
9. Via the access holes on the hump, break and completely back off the tube fittings to the selector.
10. Remove the four screws/nuts that hold the selector bracket to the floor.
11. Remove the assembly.
12. Mount the bracket and selector in the vise.
13. Remove the selector from the bracket.

Do not!! Remove the selector's 45 degree fittings!!!
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14. Mount the new selector (with the handle stem cut off and the mating handle flat filed) in the vise.
15. Thread sealant is not recommended. The reason no sealant is required is that these are “pipe” threads and that means a fuel-proof seal just by being tight. It is a temptation to use some sort of a sealant but that desire is a no-no in aircraft assembly and the reason can be seen in this picture of an actual selector. This installer did use some sort of a sealant and you can see where some ended up inside the threads of the body beyond the end of the fittings. Dangerous green stuff turned into a hazard.

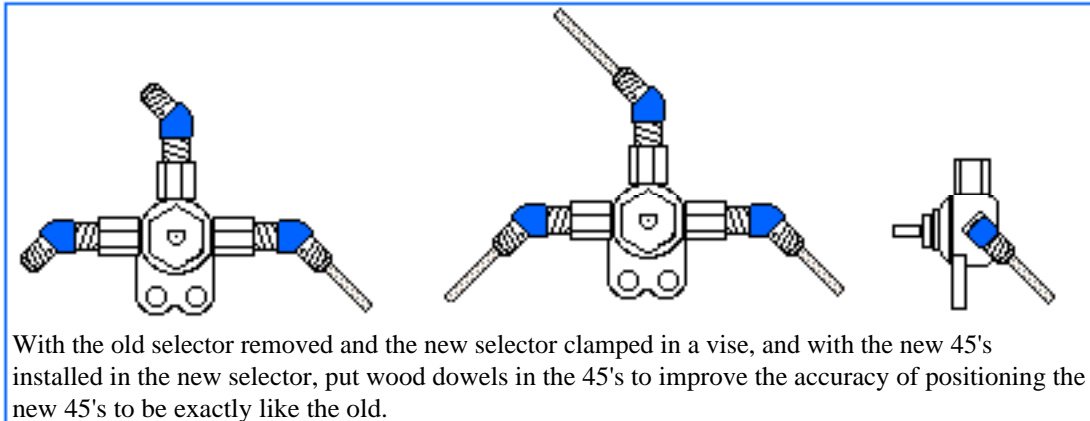


16. Start each of the new fittings, and turn to be hand tight.
17. Confirm that the selector is tightly held in the vise.



18. With your very best 9/16ths wrench that fits the 45 degree fittings, tighten the fittings so that they are snug. A poor wrench induces the damage which can make the fitting non-wrenchable as in this picture.

19. In turn, tighten each fitting, and match their tight positions to be as nearly exactly the same as the old ones. This is a very important step, one that will pay you back a hundred times over in subsequent operations, so take care. Use dowels, or anything straight that will fit well in the fittings; stick the rods in the fitting openings of both selectors----these extension rods permit a closer eye matching of the angles of the fittings. Don't give up until they are exactly matched. Quite a bit of force will be required to position and securely tighten the fittings and that's why you must mount the selector in the vise. Dowels of 5/16ths diameter slightly reduced in diameter to fit the holes work best.



20. Remove the new selector from the vise and install the bracket on the selector.

With air, blow out the selector in all positions or run fuel through it to remove the dust.

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21. Position the selector and bracket under the floor, and start the four nuts on the screws. Do not tighten.

Leave the selector bracket attachment screws loose, so as to allow a little more jiggle room when attaching the lines to the 45 degree fittings. Remember, the connections are blind, and must be done by feel, so the more care you take to align the 45 degree fittings while in the vise and the more allowances by leaving the selector loose and loosening the fittings in the lines at hipbone level and in the tunnel recess ahead of the selector, the better off you will be. Only after all the lines are attached should any tightening take place.

22. Connect the three line B nuts to the selector 45 degree fittings. This is where the precision of the positioning of the new fittings and the steps of loosening the other ends of these tubes really pays off. With everything loose, you can jiggle, adjust, wiggle, whatever, and get the tube fittings started. Don't snug any one until all are started. When all are started, snug them.

23. Tighten the bracket-to floor screws/nuts.

24. Tighten the B nuts at the selector.

25. Retighten each of the above-floor tube fittings to the right and left of the seats and forward under the tunnel, again remembering to hold the center nut such that it cannot rotate against a tight nut and so twist the tubing. Even if you did not loosen the "other" B nut, make sure it is tight before moving on.

26. Put a pail under the gascolator and open the gascolator. Add the handle to the selector. Move it to the Off position.

27. Put a gallon of fuel back in the right tank. Check for leaks, look and feel. Don't hurry.

28. Move the selector to the right tank. Note that flow starts from the gascolator drain. (If there is Both position, verify it as well.) Shut off the gascolator drain.

29. Put fuel in the other tank.

30. Move the selector handle to the left tank.

31. Check for leaks.

32. Verify flow from the gascolator drain. Shut off.

33. If there is Both position, verify it as well.

34. Verify Off.

35. If there are no leaks, and there won't be if you followed the instructions, let your A&X take a look and have a feel underneath. Reinstall all the bits and pieces and let the tail down.

Tools:

A vise.

A mirror, especially the mechanic's 2" X 3" remote control type sold by Snap-on, is priceless, unless you have eyes in your finger tips.

Flashlights (no extension cord light because you can drop the flashlights without danger of bulb breakage or inducing a spark).

Rags to sop up the fuel drool

Plastic (sandwich) bags to put the screws in as you remove them. And a Marks-A-Lot or Sharpie pen to mark which.

Thread sealer is not recommended and not necessary if fittings are tight (see text).

A clean fuel can (s) into which you drain the fuel and grounding wires and attachments

A hose and a funnel to route the fuel from the gascolator to the drain vessel...see sketch

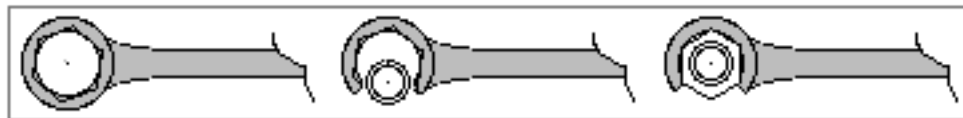
A cushioned sawhorse under the body of the tail is good. The higher, the closer to level and the better to drain and work on. Once up, be tender when tilting the wings to get the last fuel out.

Dowels which fit closely into the tube side of the 45 degree fittings (start with 5/16ths dowel material)

A fire extinguisher close by

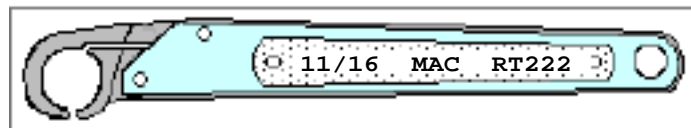
Wrenches:

One option is to convert some inexpensive box end wrenches in sizes 11/16ths and 13/16ths (and not both sizes on one wrench...you need two wrenches) into tube wrenches. The modification consists of cutting out a section of the "box" such that you can get the end over the tube and that allows you to move the wrench to slide up on the B nuts of the fittings. If you intend to do more than one, consider that you can buy wrenches already made this way, or special wrenches distributed by MAC which are made to open to go over the tube and close to work on the B nuts in a sliding ratcheting action which is much faster.



This sketch indicates the features of the MAC tubing tool. Note that the top toothed section will pivot open to go over the tube. When closed, it will fit the 11/16ths B nut of the fittings on the selector. In the position

shown, it would tighten if the heel is rotated clockwise and open up to act like a ratchet when turned counterclockwise to achieve a new grip. The moving portion of the jaws is spring loaded to the closed position; under the floor on the gas line fittings, magic! (All sizes available.)



9/16ths open end, the best fit you can get, for tightening the 45 degree fittings. Oddly, not all the 9/16th wrenches are the same; we had the Snap-on open end refuse to go over the flats of new 45's.

11/16ths and 13/16ths open end

an eight inch Crescent

11/16ths and 13/16ths tubing wrenches or converts as noted above

A 1/4 inch drive socket set and a 3/8's socket for it

a 3/8ths open end

a 3/8ths box end

#29 drill bit for the screw hole in the stem, pre-threading

8-32 tap for the screw threads

number two Phillips and 1/4 inch slot screwdrivers

The space under the selector is also home for pulleys and cables, so short wrenches are much more useful than long. If the wrenches you buy are cheap enough, consider cutting off one end to shorten the length but increase the turning segments. And then “long enough” to apply the necessary torque to be tight.

Order:

Three 45 degree fittings (AN 823-6D, aluminum, 3/8ths tube OD, 1/4” Pipe). It will be tempting to use the old ones but the text explains why leaving them in the old selector serves a much better purpose. New screws, washers and bolts for mounting the selector are a good idea, too.

Selector, all three-way:

Imperial-Gould 108HD-04, the three-way selector, same as the original three way used on 120/140’s, is still the Imperial-Gould 108HD-04 (1/4 NPT), brass body and brass spool with the “special” lubricant which is “impervious to fuel”. Available from Spruce for \$35, or Univair for \$41. The Cessna three way “original” is \$515 as of July 2002 and the original four way is \$6XX.xx.

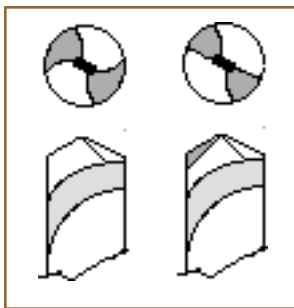
Parker V406P-4 which is identical to the Weatherhead except the Parker has the parts which make it index (click) every 90°. August ‘02, the retail cost was \$38.xx. This one, because of the indexing, is preferred.

Weatherhead valve as part number 6749, three way type with Delrin spool, available from Spruce for \$19.95 (does not index, so your position stop plate must be used for that purpose).

Anderson Brass Company,(ABCO) 843-332-4111 Hartsville SC <http://www.brassballvalves.com/> (selector valves) Model 210C-L (check that) is another resource, but they may ask you to buy through one of their distributors. That model has the index feature.

The Four-Way Valve:

The four-way valve, used on late 120/140’s and all the 140A’s, is also available, but more difficult to find and it is not available from Aircraft Spruce; it has been suggested that the readily available 3-way valve be made into a four way by drilling out the spool with a drill bit modified for plastic drilling and the same size as the existing holes in the Delrin spool. ..

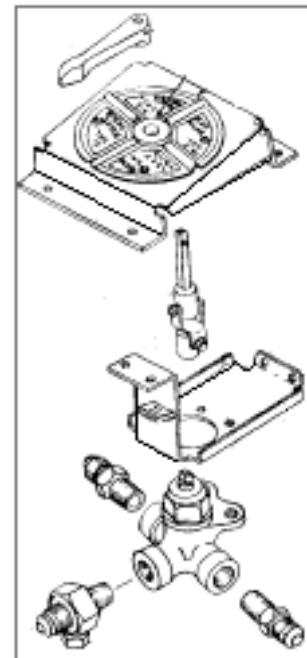


Using a bit specially ground for drilling in plastic to change a three way valve to a four way valve. You can buy drill bits already formed for drilling in plastic, but just in case, here is what to do. The bit will never again be used for anything but plastic. Grind the leading edges at the tip as shown. Magic difference, the left being the new bit and the right one with the new flats. Your A&I and A&E must be part of this modification! Spruce sells bits for making holes in plastics.

140A

The parts stackup of the 140A’s is different and yet largely the same. The extenders and four-way escutcheon are shown here. Note from the figure that 45 degree fittings are not used but two straight fittings are, making the conversion much easier. You should be able to re-use the fittings in the plane. The oddball “Tee” on the front side is very unique, with the bottom outlet leading to the belly drain. If you still have a 140A without the belly drain (not the gascolator drain), see the article explaining the importance of that and how Cessna and the FAA failed to alert 140A owners when they issued an AD for all the other Cessnas with the belly drain!

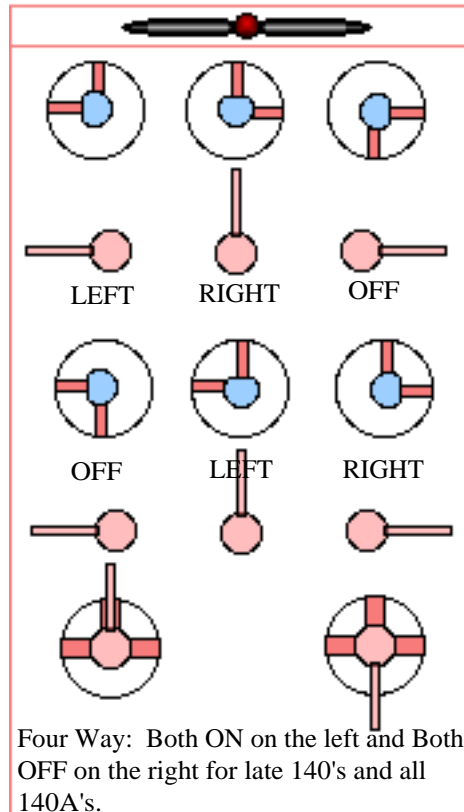
Modify the parts listed earlier for the 120/140’s to accommodate the parts the 140A’s need. The new length and key flat of the stem should be copied from the one in the plane.



Jensen STC-ed Plastic Spool:

The Jensen STC--ed Plastic spool is used (it may be Delrin or Teflon, not sure) . Since writing this in 2000, Jensen had a devastating fire in his shop/lab and was not sure if he was going to resurrect the business or not. Queries since have gone unanswered.

The Shortcut to Avoid:



Some replacement selectors have been left with the handles “90 off”. Some fuel selector escutcheons have been altered from the standard pattern of Left Right Off for our planes to be Off Left Right. The user of the new escutcheon will be able to use the altered pattern because he is used to it, but any other pilot who is accustomed to the standard is at risk in that plane. The hazard of being “different” cascades to the next owner; hopefully, somehow the plane will be returned to the standard to get rid of the hazard. A special, non-standard escutcheon seems a high price compared to forming a new flat on the stem by ten minutes of work with a file plus drilling and tapping a hole in the stem for the screw.

The figures show the relative positions of the fuel channels in the spools, the positions of the stem flats, the handle arrangements, and the escutcheon position legends. The top pattern, illustrating the Left Right Off arrangement, is correct for the three-way type. The figures show the normal relative positions of the escutcheon marking, handle position, stem flat relative to the handle, and the position of the spool and its channels when in the positions noted. The bottom series show the 90° degree offset of handle to stem, which causes the “flipping” of the relationships.

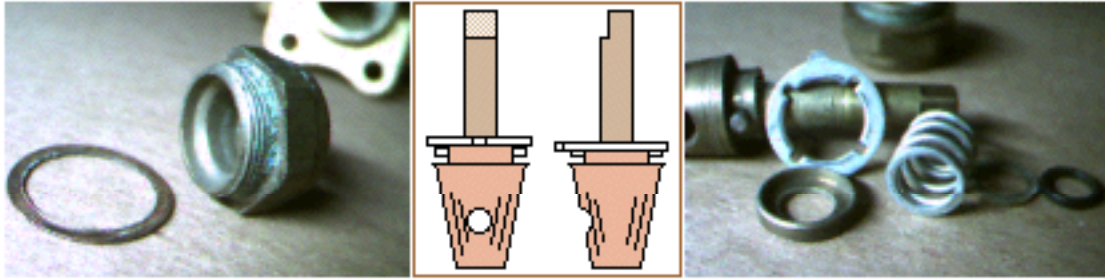
The Real Items:



The two handle bottoms illustrate the three flat side version of the intermediate units and the “single flat” version of today; I have none of the four flat side recess handles that got so many in trouble.

Note that the three-sided detent of the handle is really three flat sides and one curved, and that model could take a four-sided stem or three flat sides and one rounded side stem. Mistakes were easy.

The center picture is of the present single-sided stem, imprecisely made by the manufacturer, and the true original four-sided stem is on the right. Based on the projection of the stem from the body of the center new selector, you can see how the stem of the replacement units is too long and so needs shortening, and then the creation of a replacement flat surface 90 degrees from this one. Make sure you go the right way to make the new flat!



This is a picture of a newer-style selector's "guts". The O'ring replaced the packing made of compressible "stuff" on the originals. On the left is the crush washer which prevents leakage at the nut to body interface. On the right, the details of the pieces, with the cup washer open side shown and a better picture of the indexing washer. Note its anti-rotation projection and the four indexing cutouts; the index washer and the cup washer are replaced with a simple washer on those selectors which do not index. The center image shows how the index combination works.

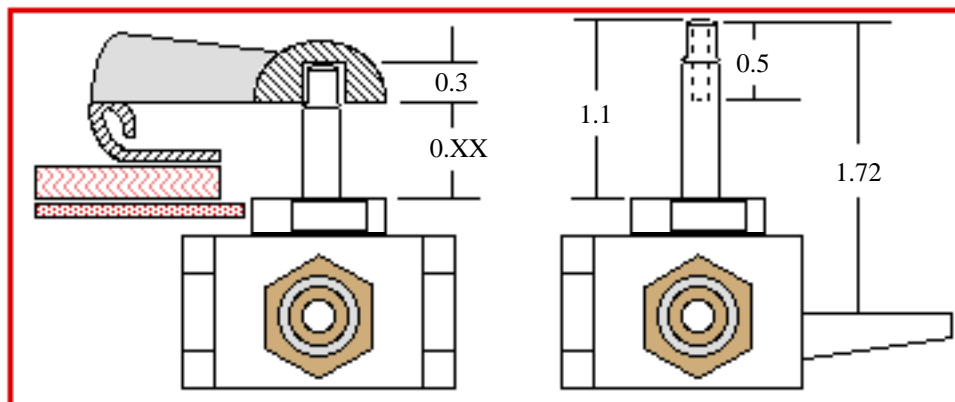
Other Notes:

To end up with no leaks, it is recommended that you make a "disconnect/remove/loosen" list that serves as a checkoff list on re-assembly.

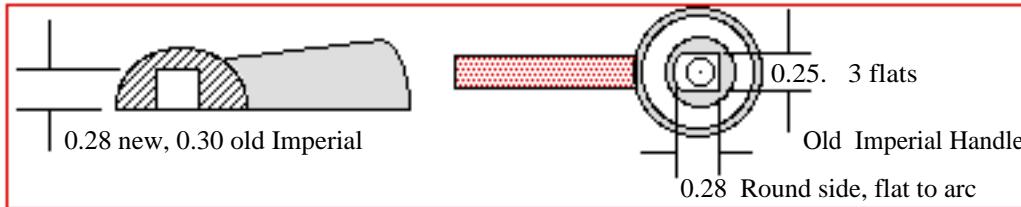
Some selectors today come with built-in detents for positive position selection, but the originals did not, and that was one of the reasons for the special shape of the stop plate with the stops and "dents", the latter of which flatten over time to be of no positioning help. The new selectors with the index feature are the best to use today.

To say: "Break" a fitting is plane maker shorthand for "break the fitting loose so it can be turned by hand" and does not mean to fracture the B nut. Usually, a quarter turn of a B nut "breaks" it and the "crack" noise as it comes free sounds as though it has truly broken.

Delrin is a trademark as is Teflon. Weatherhead is a maker of selectors. Imperial, the original maker of the selectors, is now Imperial-Gould. Parker (Parker-Hannifin) is the other maker of the unit. All the bodies of the various "makers" look identical with only small differences in the guts. Spruce or Aircraft Spruce refers to the catalog store whose web site is: www.Aircraft-Spruce.com ABCO, noted earlier, is a good resource as well.



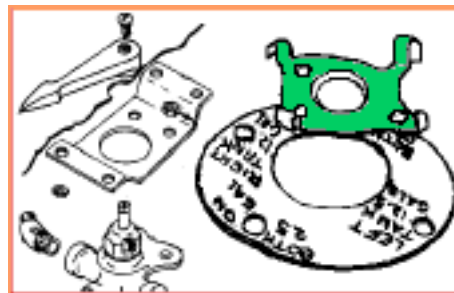
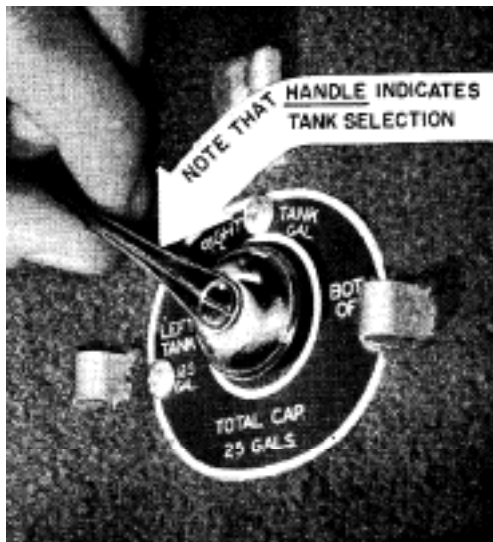
The 0.XX dimension varies according to the height of the stack of the compressed rug, the stop plate, and the escutcheon and whether used for the 120/140's or the late 140's and all 140A's. For a plane with a very thin rug, we used 0.31 and it worked fine..the handle hits the stops of the stop plate and is nestled by the two-humped portion of the stop plate. The 0.5 dimension is the depth of the original hole, with threads about 0.3 into the hole. By reducing the stem, the handle on the left would strike the stop shown.



Next, in case you have forgotten what the escutcheons display, the early 120/140 arrangement at the right and the early four-way version at the left. The 140A's four way valve arrangement is on a later page. Remember, the handle points at the tank in use.



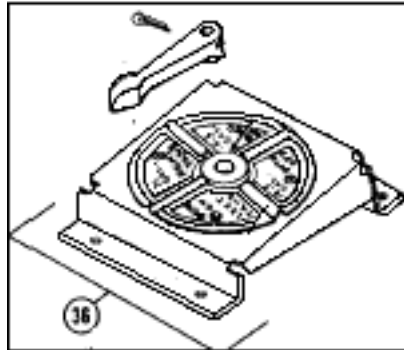
If you need a temporary escutcheon, print this page and take to a copy place and have it laminated. After, cut off the excess but leave a little rim of laminated material so the top sheet will bond to the bottom sheet and provide an edge seal and then punch out the screw holes with a single hole paper punch. The center hole can be made smaller than the white indicates, close to the stem diameter. If you can find a round punch for the center, so much the better because doing it with scissors is never round and looks jagged.



The figure above is copied from the 120/140 early POH and shows the positions of the selector handle for the planes which have the Left/Right/Off (three way) selectors. Cessna has some atrocious drawings in their parts manuals, and on the right is a classic example where they were trying to show the four way on the post 14005 serial planes. The four way selector's new style handle and the "new" four-way escutcheon are indicated. The escutcheon has been expanded to about 400 percent in order to let the observer note the tank positions. The floating stop plate above the escutcheon and detailed in green is a drafting error. As

shown, you would not be able to move the handle; the actual plate, if there was one, has yet to be seen so no picture here.

Next, the escutcheon for the Cessna 140A, all of which have the four way selector valve. Both to the front, Both Off to the rear (the handle is in the Off position), and Left and Right tank positions the same as for the earlier planes.



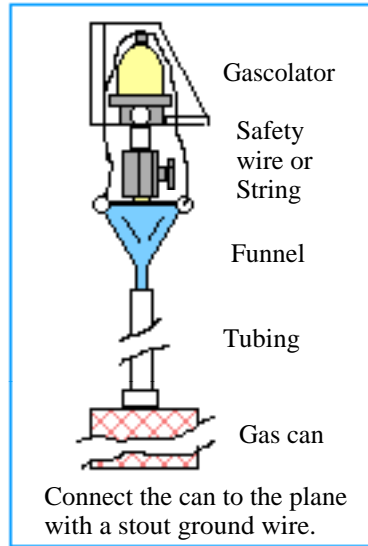
Shown below, the reason it has been recommended to put an aligning dowel in one of the holes in the Delrin spool before filing the handle alignment flat is...if the spool is not secured, it can rotate under the force of the filing and end up like this, half open and half closed when the handle is in "position".



Early handle recesses were made with four flats as illustrated here and the stem recess had four flats. Four flats meant you could mount the handle wrong three ways. This shows the angled hole in the selector stem. One of the first ADs cured the problem of incorrect reassembly after annuals. With the handle in the correct position to match the tanks, it mandated drilling a hole through the handle and the stem such that when assembled with a pin through the hole, the handle was guaranteed to be in the correct orientation relative to the tank. As recently as mid 2005, another member reported that his had been misassembled because the AD had been ignored, and the engine did not run on one tank position.

Inspection and Signoff:

Make sure the log book gets the entry and is signed off by the A&X. Save the old selector. Once you have correctly installed the new unit, you can remove the "45's" from the old one and clean them up for the next exchange, a long time from this change.



Typical ABCO or Weatherhead selectors.

Anderson Brass Company (ABCO)
 843-332-4111
 Hartsville SC
<http://www.brassballvalves.com/> (selector valves)
 model 210C-L

Neal

Neal F. Wright Filed as Fuel Selector Aug '05
 COUGARNFW@AOL.COM

Internet letters and confirmation:

Just at the time I started to update this guideline, there was a series of letters about the same subject in the Cessna140.com web site and parts of them are quoted here because they illustrate the points and conclusions in the prior text. I believe they are in the correct order.

1. FUEL VALVES From: DAVID PAYNE Does anyone have any experience with the company in Colorado that used to modify fuel valves with a "material" other than brass to help make the valve easier to turn, create a more positive shut off, and last longer than the old brass Imperial valves? I do not have the company name and number and longer. My current valve is only about two years old and it is getting very hard to turn already, and I recently learned it is not fully shutting off the fuel to the carb. I removed my carb and left the fuel line loose, fuel selector off, and came back about three weeks later to find about 17 gallons of fuel drained out and evaporated in the 100+ temperature Texas heat. Does anyone know of a better alternative....Thanks for any advice or suggestions...David

2. Letters from Cessna140 site Re: FUEL VALVE From: Rick Terrill
Jensen in Colorado is the source of the Delrin part and the STC.

David, Here's my story on fuel valves. Like everyone else, I had problems with the brass on brass Imperial valves. First I tried repacking the original valve. It still leaked. Then I tried fitting the spool to the body using lapping compound. It still leaked. I bought a new Imperial brass on brass valve from Aircraft Spruce and the leak was cured.

However, six months later I could hardly turn the new valve. Out came the spool and I lubed it with "fuel proof" grease. Once again, three months later I could barely change tanks.

(Neal: Note, this "special grease" is still being used by mechanics who do not realize (they are not the users) that ever since the advent of the reformulated fuels, it has not worked, but washes away, leaving behind brass on brass contact and the squeaks and extreme effort to turn.)

I didn't know about the Jensen spool at that time so I installed a Weatherhead Model No. 6749 selector from Aircraft Spruce at the amazing price of \$19.95. That was ten years ago and I haven't had a fuel valve problem in all that time. The body of the valve is identical to the Imperial. The spool in the Weatherhead valve is Delrin, the same stuff they make the carb needle valves from, so I'm not worried about its reaction to fuel and you can't beat the price. Rick Terrill (NC89205)

3. re: the Jensen solution From: John Craver I put the same valve (Weatherhead 6749. Spruce and Wicks have them. It probably is not legal.) in last week after making the same \$60.00+ mistake (the Jensen solution costs a bit over \$60). The Jensen plug instructions shows two types of valve. Their plug works with one, but not the other. I had "the other". My new selector valve went right in with no modifications. I used the selector handle that came with it. I am very happy with it.