RE: Leading Edge Fuel Tanks on the Super ZODIAC CH 601 HDS
Date: 3/2000
From: Nicholas Heintz, Tech Support, Zenith Aircraft Company
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1) Your web pages indicate that the leading edge fuel tanks of the Zenith XL are available for the Zodiac HDS. What is the cost of this option?

Though the tanks are installed in a similar location, these are not the same tanks used on the XL: the XL wing is not interchangeable with the HDS.
The LE tanks are priced at $875.00 for the set.

2) What is the capacity of the 'tapered' tank?

Each tank is 10 gallon.

3) Is there less baggage capacity in the wings with these LE tanks?

No, the wing locker baggage compartment do not interfere with the LE tanks.

4) Can it be used with an 8 gallon header tank?

Yes, with the Rotax 912 or 912S the 8 gallon header tanks can be used with the LE tanks.

5) One thing that could use clarification is what the fuel tank options are on the 601 HDS. I read somewhere about leading wing tanks but have never see a reference to them again anywhere else.

The standard tank is the 16 gallon header tank. A small 8 gallon tank is used when planning to install panel mount avionics where 13" clearance is required. It is common to use wing locker tanks with the smaller header tank (7.5 gallons each). The tanks can be installed in both wing locker or just one leaving room
in the other wing for baggage. A new option are leading wing tank that fit in front of the main spar.
These tanks are 10gallons in each wing.

6) My drawings do not have leading edge fuel tank show do I get them?

At this time we do not have detail drawing on how to make the tanks, the installation instructions show the rib station at nose ribs #8 and #7A at each end of the tank.

7) Does the "leading edge wing tank kit" have, or available with flush mounted fuel caps?

Flush caps are standard.

8) One question I forgot, do I need any more or different parts for the leading edge fuel tanks, or can I build the wing including tanks with the HDS outboard wing kit?

Nose Rib 6SV1-S7 is replaced by a new Nose Rib part number 6SV1-S7A, abbreviated as 7A

Cork

9) In the manual it calls for 'cork' around the fuel tank; I did not receive any in the kit; if this is not included, where can I purchase this...

Local Home Depo, hardare store or lumber yard. By Mail order from McMaster Carr in 1" x50ft role with a self adhesive strip on one side part number: 93305K63

10) Are the leading edge tanks designed to have cork around them? If so, what thickness?

Recommend thickness for around the nose skin is 1/8. "

11) How much clearance is there between the tank and the nose skin?

The tank is shaped like the wing and fits tightly against the nose skin

12) When I purchase the cork to insulate the tanks, am I going to wrap the entire tank? Or do I simply need to put the cork at the points of contact (with skin, ribs, etc)?

Glue long strips of cork starting at the top, along the front and end at the bottom of the tank. The cork is to protect the tanks from direct contact with the airframe. Glued to the top and bottom. Build up on the inboard end to cushion past the welded flanges.

Tank Installation

13) How and where to install the LE wing tanks?

Install the ribs to the Spar, check the tanks fits inbetween the two nose ribs #7A and #8! Remove the tank to install the Leading Edge: rivet the bottom side, drill and Cleco the top side to the nose rib into the top side to the Spar extrusion. Open the top side of the leading edge to install the tank.

14) I'm not sure of the placement of nose rib 7A supplied with the LE tanks. What is done with rivets in the spar extrusion at that location, since they prevent the rib flange from lying flush against the web at that point?

The Nose rib is install outboard of the L angle; drill out the solid rivet in the spar. Back drill through the spar into the rear flange of the nose rib and either replace the solid rivet with another solid rivet or with a 3/16" bolt through the spar and the Nose Rib 7A. Add 5xA5 rivets into the Spar web.

15) I'm still not sure about the location of the "U" channel, however. Is it mounted vertically at the rear of Nose Rib #8? Riveted to NR8, or to the rear flange of NR8 through the spar web?

Trim the length of the supplied " U" to fit inbetween the top and bottom flange of the Nose Rib #8, the
Channel is riveted to the rib web. The purpose of the channel is to keep the rib flange clear of the tank: to prevent the tank from shifting into the rib flange

16) How is the tank anchored or attached inside the wing cavity? How do you secure the leading edge tanks in the wing?

The tanks is positioned on the bottom portion of the Leading Edge with the front in line the leading edge. Angles on the spar keep the tank from shifting back. The top portion of the Skin wraps around the curvature of the tank to help keep it in place.

17) Is the leading edge skin cut closely around the gas cap and held down by it, or do we need to make a flip-up door in the skin to access the filler cap?

The top of the cap will protrude above the skin by a few millimeters. The cutout is slightly larger than the 3inch diameter of the filler neck. Seal the gap with silicon, it has good adhesive properties to aluminum and remains flexible and is impermeable to fuel.

18) I want to install LE tanks. I understand that I have to install a new LE rib at stn 170 and move the 650 rib at stn 960. The tank is about 760mm wide. The question: what is the proper position and size for the fuel line hole in the 130 and 170 ribs? I read on page 38 of the construction manual some minimum dimensions when drilling holes in ribs holes; not be less than 38mm from a flange and should be at most ½". The LE tanks have the outlet fitting hole close to the bottom rear of the tank. This requires a hole be drilled in nose rib 7A to accommodate the fitting/hose: the nipple, as it is presently, will put the 20mm hole nearly on an overlap with the rear rib flange.

Use a unit bit to drill the hole in Nose Rib 6SV1-S6 in line with the outlet welded on the side of the tank. The above is for most holes regardless of their location. You are right, the edge of the hole in Rib 7A above the bottom of the rib. Run the fuel hose through the lightening hole in the inboard Nose Rib #6

Mounting Fuel Sensor

19) I am working on the outboard wing structure and have some confusing information regarding the LE fuel tanks. There are four holes and I wanted to check: outboard side – a Vent pipe on bottom, on filler hole on top inboard – a drain the on the bottom, and a fuel supply hole on the inboard side. I had read in the BB that someone had holes available for the fuel gauge sending unit, but my LE tank does not have any. Does the "leading edge wing tank kit" have provisions for mounting fuel gauge? Please describe.

No separate mounting flange is necessary. We use the mounting bracket supplied with the VDO senders part number 226-002. The location of the sender on the inboard end of the tank is in line with the lightening hole in nose rib 7A. First practice in a piece of .025"material to fly cut the hole, drill a centering hole (usually a 1/4" hole)
set the fly cutter for a 59MM diameter. IMPORTANT: turn the tool by hand. (only drill the hole once you have the sender unit).

20) What need to be done to the tank if I have to cut a hole for the sender - reinforcement?

None

21) Will a sensor fit under the top skin?

No

22) Is there a recommended place to put the sender, and what type of sender should be used?

Yes, align the sender with the lightning hole on the Nose Rib #7A The fuel sender will be mounted on the inboard end of the tank (side mount). We have been using the VDO sender. Part of the VDO mount hardware is a steel threaded plate that fits inside the tank to secure the sender unit with 5 screws.
Side mounted on the inboard side of the tank in line with the lightening hole. VDO unit screwed into an internal mounting plate. Calibration of unit, shim under the tank to set the tank in the level flight attitude, fill with water and calibrate the fuel sender unit, make certain there are no leaks.

23) I ordered leading edge tanks for the HDS and shipping list state welded tab for ground and welded flange for fuel sender. I have tab for ground but no welded flange for sender. Is this an error or have you changed your specifications?

When installing the VDO sender unit a welded flanges on the tank are not necessary: the sender unit is supplied with a steel mounting flange that fits on the back side of the tank. For other
units, a similar mounted flange can be used a by welding a flange on the tank. You are right, on the earlier tanks we did weld a mounted plate on the inboard side of the tank. If you need this mounting flange the tanks will have to be exchanged.

The welded tab at the end of each tank is to add a grounding cable to the airframe (the cork may electrically isolate the tank!).

Plumbing for LE fuel tanks

24) Are fuel quantity gauges, fuel pressure gauge, check value, and lines/wires needed in addition to the 2 LE tanks?

Supplied with the tanks are the fittings, Nose Rise #7A, hose and 2 Facet automotive fuel pumps. The selector valve and the check valves are not included.

25) What should be the preferred type of sealer to ensure no leaks? When I screw the fuel strainer into the appropriate flange on the wing tanks there is a good amount of thread showing, even with the appropriate coating (the Fuel Stop Leak I picked up at Stoddard Aviation). The question is, should I tighten the strainer only up to the point where it starts to bind? Or should I tighten it into the tank until the thread has disappeared? I don't want to strip the threads in the tank. When I screw the fuel strainer into the tank, how much should I tighten down on it. In other words, how far should it screw in? I am afraid of stripping the threads, yet I could sure use the

added clearance should it need to screw in all the way. The same goes for the nipple as it screws into the strainer?

NPT fittings, it is normal for the thread to show. Screw in by hand, then tighten with a wrench. The fittings have course threads and will offer a noticeable resistance when tight.

26) Do I need to put anything on the threads of the fuel line fittings? I know not to use any typical plumbing compounds, but is there something else that I should be using for that application?

Install gaskets dry. For the NPT fittings avoid Teflon
tape. On the threads it is common to use Sealube, available from Aircraft Spruce.

27) Also, what sealer should be used were the fuel tank cap, drain, and vent come though the leading-edge skin.

Around the fuel cap we generally use silicon cocking.

28) Can't find any info on running the fuel lines, etc. Also, do you have any sketches or diagram on running fuel lines and holes in skin for drain, vent, etc.?

To locate the center of the 3" hole in the skin, clamp a pies of clear Plexiglas flush with the rear edge of the Spar Extrusion (the tank is installed). With a hole finder drill the Plexiglas to Cleco it to the Spar. With a compass set at 3"+ find the center of the filler cap and drill it through the Plexiglas. Remove the sheet and Cleco the leading closed , Cleco the Plexiglas sheet on the skin and mark the center hole.

29) Where do you place the fuel pump(s)... is it necessary to have a pump between the gascolator and the engine?

The gascolator is a the bottom of the firewall. In addition to the mechanical pump on the engine (912) an auxiliary electric pump can be mounted in parallel to the engine pump. Keep the pump way from any heat source at an elevation less than 12 inches above the tank outlet.

30) Will check valves be necessary?

The Facet pump have a built in check valve.

31) What is the recommended hookup of the fuel system? I was thinking a selector valve for left/right/both/off from the two LE tanks. The two electric fuel pumps in parallel after the selector valve.

Keep the pump close the tank.

32) I have considered putting a small header tank (4-8gal) to also provide gravity feed into the carbs - if I decide to do that I will have to re-think my system.

On the 912 and also on the Stratus E-81 the carbs are on top of the engine, a header tank will not gravity feed to the engine. The engine relies on a fuel pump at all times.

33) Do you have available a drawing showing the best way to run the plumbing for the leading edge fuel tanks? Or, could you answer a few questions about same? My fuel set up will be: 2 LE tanks and 1 8gal header tank. (601HDS) 1. How many fuel pumps will I need and where should they be placed?

One pump at base of each tank mounted on Nose Rib #6

34) Can I run both wing tanks to a tee and into the gascolator? And if so, do I also tee the main (8gal) tank into the gascolator?

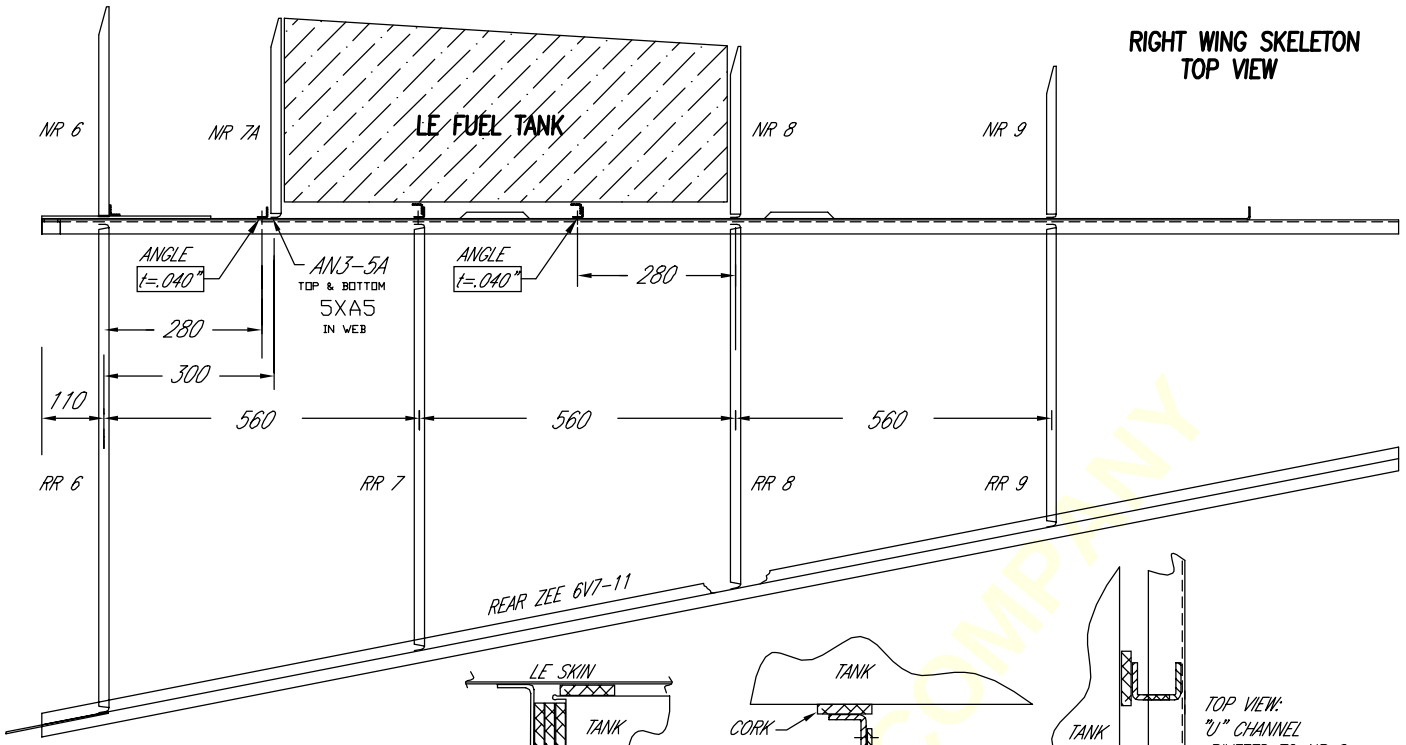
This was the suggested way when using the wing locker tanks. When the LE tanks are used without the header tank the preferred method is to have a selector between right and left tank.

Weight and Balance

35) How do they affect the center of gravity and the weight allowed for an engine? I hope to install an 0-200 in order to have a shorter take-off and a higher rate of climb.

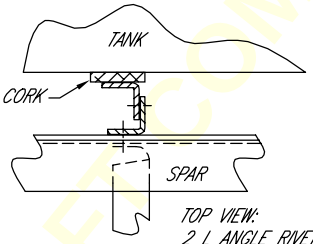
The center of gravity for the LE wing tanks is approximately 270mm rear of the reference datum line leading edge of the wing center section.

RIGHT WING SKELETON TOP VIEW



GLUE STRIPS OF CORK 1/8"THICK BY 1" WIDE TO THE TANK TO PREVENT CHAFFING WITH THE AIRFRAME. LAYER AS REQUIRED ON THE EDGES OF THE TANK OR L ANGLE TO KEEP THE TANK FIRMLY IN THE LEADING EDGE.

SIDE VIEW: INBOARD END OF TANK.



TOP VIEW: 2 L ANGLE RIVETED TOGETHER AND TO THE SPAR

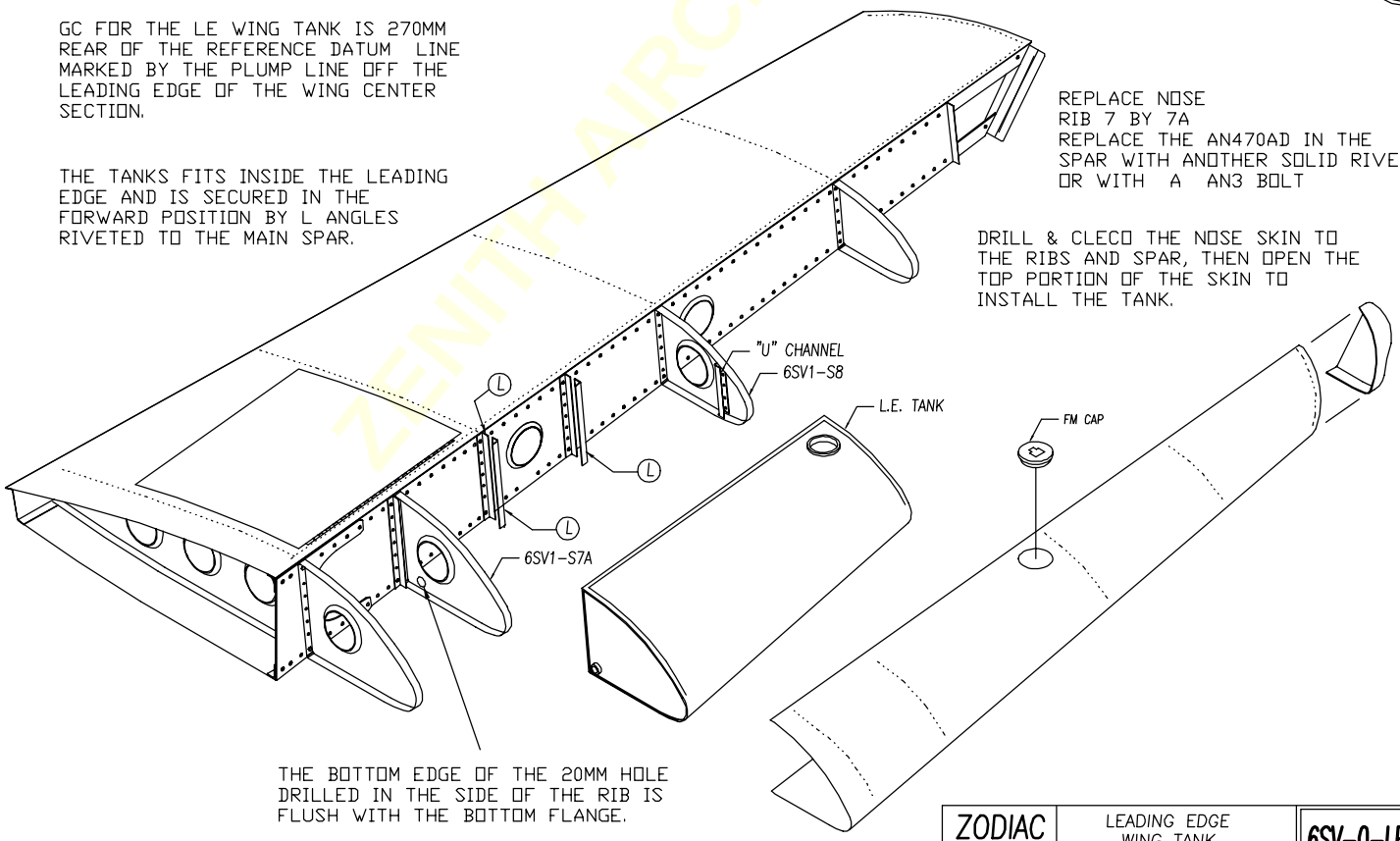
TOP VIEW: "U" CHANNEL RIVETED TO NR 8 TO HOLD THE O/B END OF THE TANK CLEAR OF THE RIB FLANGE.

GC FOR THE LE WING TANK IS 270MM REAR OF THE REFERENCE DATUM LINE MARKED BY THE PLUMP LINE OFF THE LEADING EDGE OF THE WING CENTER SECTION.

THE TANKS FITS INSIDE THE LEADING EDGE AND IS SECURED IN THE FORWARD POSITION BY L ANGLES RIVETED TO THE MAIN SPAR.

REPLACE NOSE RIB 7 BY 7A
REPLACE THE AN470AD IN THE SPAR WITH ANOTHER SOLID RIVET OR WITH A AN3 BOLT

DRILL & CLECO THE NOSE SKIN TO THE RIBS AND SPAR, THEN OPEN THE TOP PORTION OF THE SKIN TO INSTALL THE TANK.



THE BOTTOM EDGE OF THE 20MM HOLE DRILLED IN THE SIDE OF THE RIB IS FLUSH WITH THE BOTTOM FLANGE.

ZODIAC CH 601 HDS	LEADING EDGE WING TANK	6SV-0-LE

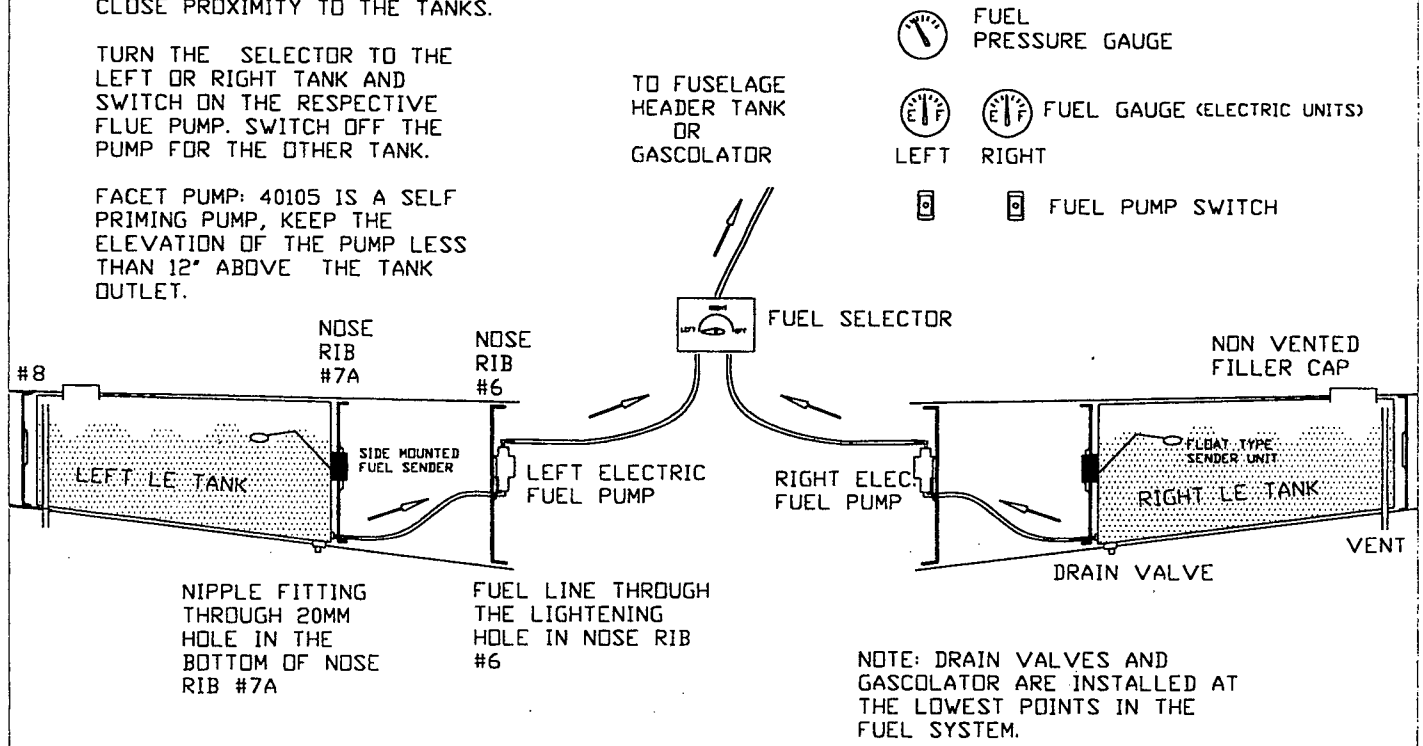
 EDITION 4th 01/00

SYSTEM A

THE PUMPS ARE LOCATED IN CLOSE PROXIMITY TO THE TANKS.

TURN THE SELECTOR TO THE LEFT OR RIGHT TANK AND SWITCH ON THE RESPECTIVE FLUE PUMP. SWITCH OFF THE PUMP FOR THE OTHER TANK.

FACET PUMP: 40105 IS A SELF PRIMING PUMP, KEEP THE ELEVATION OF THE PUMP LESS THAN 12" ABOVE THE TANK OUTLET.



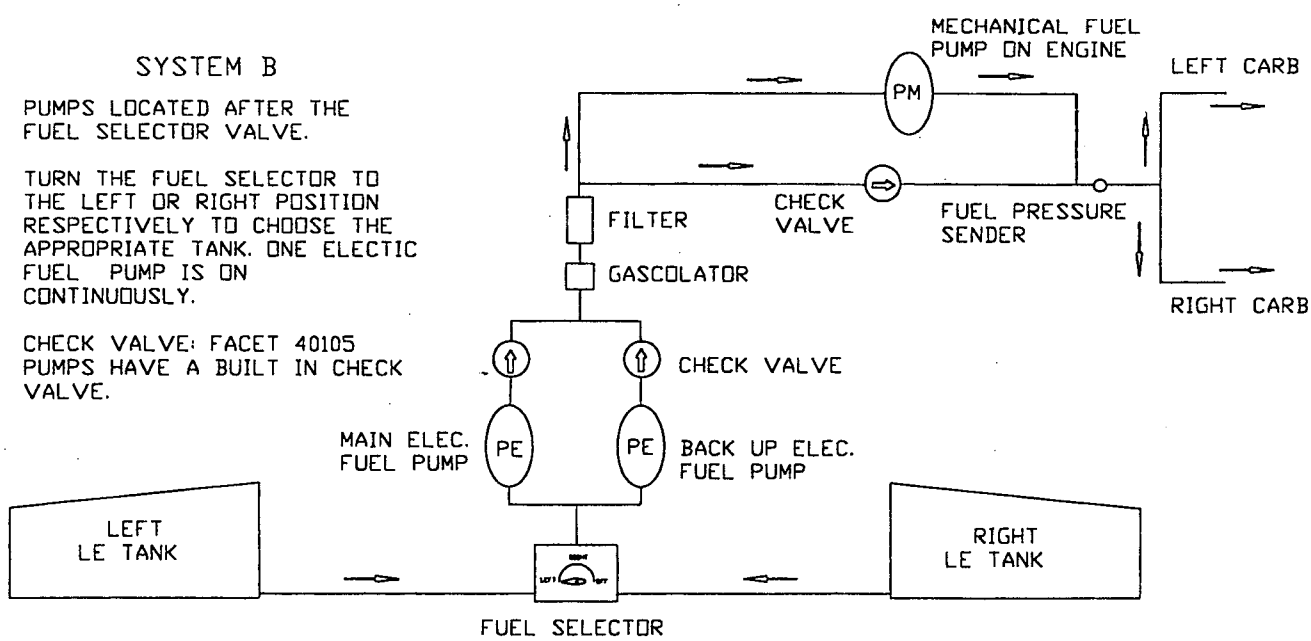
CAUTION: WHEN USING A 4 WAY FUEL SELECTOR VALVE ON THE "BOTH" POSITION THE SYSTEM WILL FAIL WHEN ONE OF THE TANKS IS EMPTY. FOR THE TWO TANKS TO WORK AS INTERCONNECTED THE GASCOLATOR/CONNECTOR JOINING THE TWO TANKS MUST BE BELOW THE TANK OUTLETS. FURTHERMORE, THERE MUST NOT BE ANY HIGH POINTS OR LOW POINTS IN THE FUEL LINE LEADING FROM THE TANK OUTLET TO THE GASCOLATOR/CONNECTOR (WATER MAY DEPOSIT AND FREEZE IN ANY LOW POINT).

SYSTEM B

PUMPS LOCATED AFTER THE FUEL SELECTOR VALVE.

TURN THE FUEL SELECTOR TO THE LEFT OR RIGHT POSITION RESPECTIVELY TO CHOOSE THE APPROPRIATE TANK. ONE ELECTIC FUEL PUMP IS ON CONTINUOUSLY.

CHECK VALVE: FACET 40105 PUMPS HAVE A BUILT IN CHECK VALVE.



SUGGESTED SYSTEM A AND B ARE JUST SOME OF THE WAYS TO PLUMB THE TANKS

FUEL FLOW

ZENITH AIRCRAFT COMPANY, NH 04/00