

CHAPTER 13: GEAR & GEAR DOOR ADJUSTMENTS

REVISIONS

From time to time, revisions to this assembly manual may be deemed necessary. When such revisions are made, you should immediately replace all outdated pages with the revised pages. Discard the out dated pages. Note that on the lower right corner of each page is a "revision date". Initial printings will have the number "0" printed and the printing date. All subsequent revisions will have the revision number followed by the date of that revision. When such revisions are made, a "table of revisions" page will also be issued. This page (or pages) should be inserted in front of the opening page (this page) of each affected chapter. A new "table of revisions" page will accompany any revision made to a chapter.

Arrows

Most drawings will have arrows to show which direction the parts are facing, unless the drawing itself makes that very obvious. "A/C UP" refers to the direction that would be up if the part were installed in a plane sitting in the upright position. In most cases the part shown will be oriented in the same position as the part itself will be placed during that particular assembly step. However, time goes on and changes are made, so careful attention should be paid to the orientation arrows. That old cartoon of the guy agonizing over the plans for his canoe, built one end up, one end down, should not happen in real life. Especially to you.

CONTENTS

1. INTRODUCTION
2. DRAWING LIST
3. SPECIAL PARTS, TOOLS & SUPPLIES LIST
 - A. PARTS
 - B. TOOLS
 - C. MATERIALS & SUPPLIES
4. PROCEDURE
 - A. FINAL ASSEMBLY
 - B. NOSE GEAR DOOR
 - C. MAIN GEAR DOORS
 - D. MECHANICAL INBD DOOR SYSTEM
 - E. HYDRAULIC INBD DOOR SYSTEM (OPTIONAL)



1. **INTRODUCTION**

Refer back to chapter 5, section "D", "Main gear door cutouts", page 5-14. This previous section discussed cutting out the main gear doors and attaching them. Also Chapter 6, sections B & C, starting on page 6-14, discussed the main gear middle door and the nose gear door. This section will address the control systems and adjustments of these gear doors.



2. DRAWING LIST

| Drawing | Page | Title |
|---------|-------|---|
| 13-1 | 13-8 | Hydraulic cylinder stop assembly (gear actuator) |
| 13-2 | 13-10 | Nose gear door retract assembly (overview) |
| 13-3 | 13-11 | Positioning the nose gear door retract cylinder |
| 13-4 | 13-14 | Attachment plate, sequence valve |
| 13-5 | 13-16 | Positioning the nose gear sequence valve & micro switch |
| 13-6 | 13-19 | Cable exit ramp, Nyla-Flow guide tubing |
| 13-7 | 13-20 | Mechanical inbd gear door system |
| 13-8 | 13-23 | Positioning the retract cylinder |
| 13-9 | 13-24 | Hydraulic inbd gear door system |
| 13-10 | 13-26 | Positioning the main gear sequence valve |
| 13-11 | 13-28 | Attaching the main gear sequence valve |



3. EQUIPMENT REQUIRED - SPECIAL PARTS, TOOLS & SUPPLIES

A. Parts

- Parts for this chapter will depend upon options chosen for your particular plane.



B. Tools

- Ruler or tape measure
- Dremel™ type rotary grinder
- drill motor
- drill bits: 1/8"
#12
#30
- Small level or Smart-Level, or compass for measuring degrees of elevation
- Pencil
- 2) C-clamps, small
- Carpenter's square
- 1/4-28 tap



13-5

Chapter 13

REV. 0 / 11-1-91

GEAR & GEAR DOOR ADJUSTMENTS



C. Materials & supplies

- epoxy
- flox
- BID cloth
- micro
- 3/16" Nyla-Flow tubing
- sandpaper, assorted grit
- some 1/4" plywood
- Duct tape or release tape
- MC or acetone for cleaning
- 3/8" x .083" aluminum tubing
- Cardboard for templates
- Instant glue or hot glue
-
-
-



13-6

Chapter 13

REV. 0 / 11-1-91

GEAR & GEAR DOOR ADJUSTMENTS

4. PROCEDURE

A. Final assembly

Adjusting the gear up stops

Before the landing gear doors are adjusted for proper opening and closing, the gear legs **must** be adjusted with respect to their **up limit stops**. Without up limit stops, the full amount of hydraulic pressure would be pulling against the system at all times. The systems were not designed for such a condition.

WARNING: These gear up (or retract) limit stops are critical to safe operation of the landing gear mechanisms. Failure to establish proper limit stops would result in gear failure.

1. All three landing gear retract hydraulic cylinders must create "up stops" within themselves. These "stops" can be internal or external. Internal stops would result if the cylinder piston were to bottom out within the cylinder body. This may be achievable through adjustments of the rod end bearing on the shaft. Due to acceptable builder variations, this is not always possible so we therefore supply you with "cylinder stops" which can be slid over the shaft prior to attaching the check nut and rod end bearing. This will then create an external stop by jamming between the check nut and the face of the cylinder body. See figure 13-1 for these machined aluminum cylinder stops, three are required and supplied.
2. Retract the landing gear (the procedure is the same for either the main gear or the nose gear) and determine if the piston can be made to bottom out within the cylinder when the gear is fully retracted. You will have some amount of adjustment latitude by screwing the rod end bearing either in or out on the piston shaft.

NOTE: The bearing must have been threaded onto the shaft at least 5/16". It must also have sufficient threads remaining (when threaded on to the maximum) to allow for the check nut to thread on first.

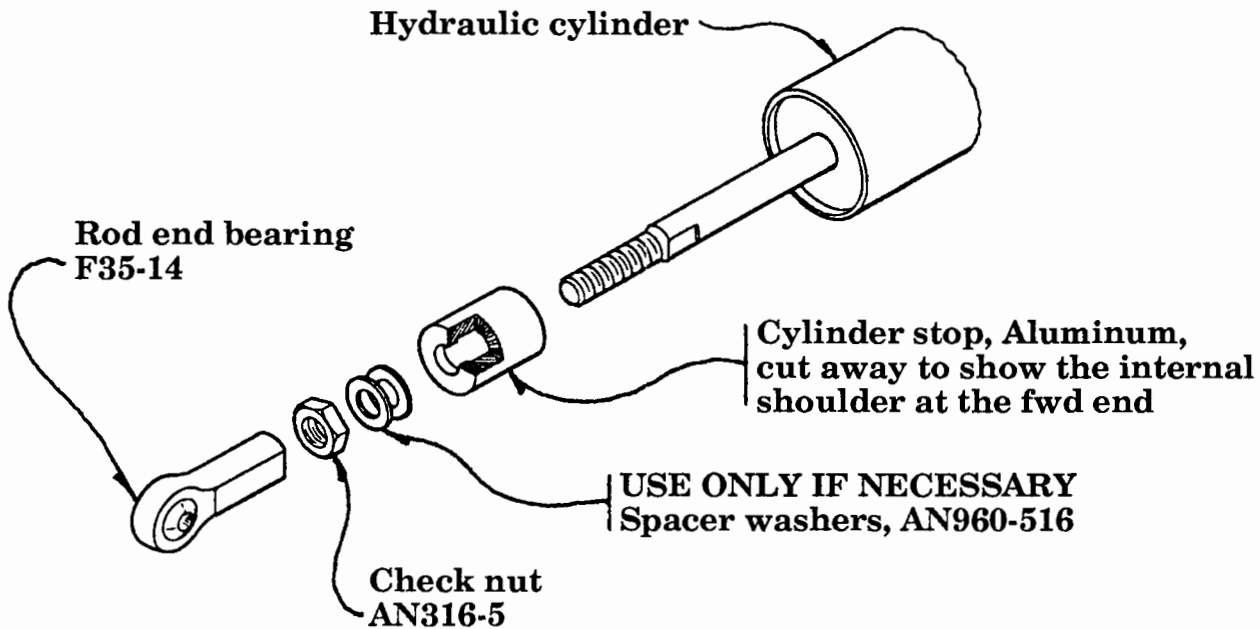
3. If adjustment can be made to create a "bottomed out" piston at full retract, then the "cylinder stop" will not be required.
4. If the above can not be achieved, then attach the cylinder stop sleeve by slipping it onto the piston shaft before the check nut and bearing are attached. The sleeve must be slid on such that its internal "shoulder" is AWAY from the cylinder body. This then allows the sleeve to slide over the shaft and the shoulder prevents it from freely sliding all the way up the shaft. The shoulder therefore functions as a "keeper" to keep the sleeve located at the threaded end of the shaft.
5. Next thread the check nut and bearing onto the shaft.



Hydraulic cylinder stop assembly

(Gear actuator)

Figure 13-1



6. Retract the gear again and establish an external stop by having the sleeve jam between the check nut and the cylinder body. This can be adjusted in two ways:
 - a. The sleeve can be cut down in length if the piston shaft must retract farther into the cylinder in order to achieve full retract position. This will be a trial and fit procedure requiring several on and off installations until the proper dimension is set.
 - b. If the sleeve is not yet tight when the gear is fully retracted, then the dimension will have to be increased. This can be accomplished using 5/16" washers (AN960-516). These washers **MUST** be positioned between the check nut and the sleeve body so that they too are contained at the threaded end of the shaft.

With both of the above adjustment approaches, the bearing can be used to somewhat fine tune the adjustment by threading it more or less onto the shaft. Be sure that the proper amount of threads are engaged, though.

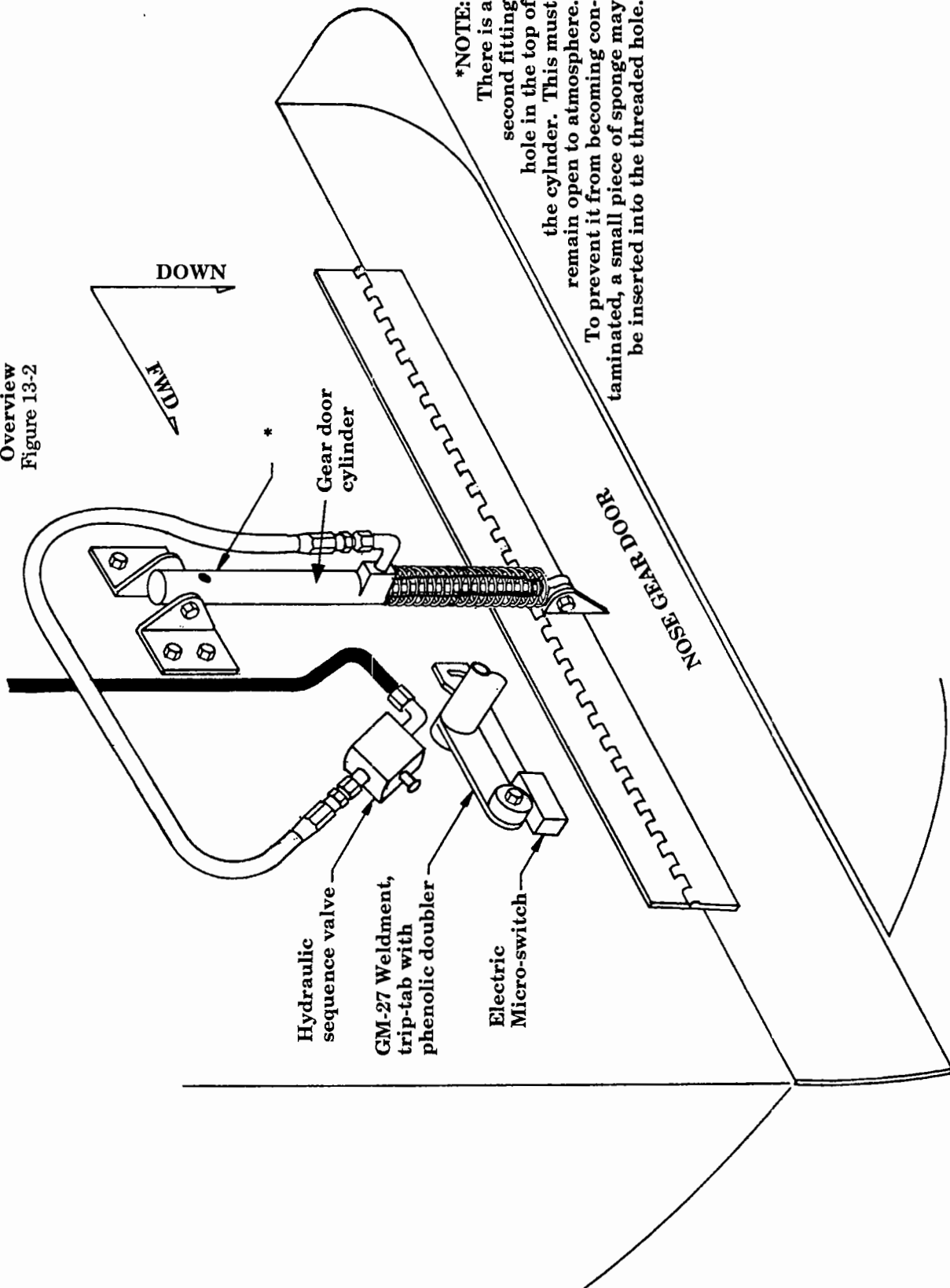
7. When the adjustment is correct, you will be able to (by hand only during this adjustment phase) push the gear into the full retract position and by feeling the sides of the sleeve, note that it is indeed jammed tightly between the check nut and the cylinder body. Tighten the check nut against the rod end bearing. This will complete the adjustment.

B. Nose gear door

The nose gear door is actuated by hydraulics. This system is comprised of one sequence valve and one retract cylinder. The door retract cylinder is much smaller than the actual landing gear retract cylinders and has a spring assembly over its shaft. The system is operated via hydraulic pressure from only the "gear up" side. This port is the one nearest the spring/shaft assembly. The upper port, nearest the bolt attachment, will not normally be used for the nose gear door. It will, however, be used for the two main gear doors if you purchase the main gear door hydraulic retract option.



NOSE GEAR DOOR RETRACT ASSEMBLY
 Overview
 Figure 13-2

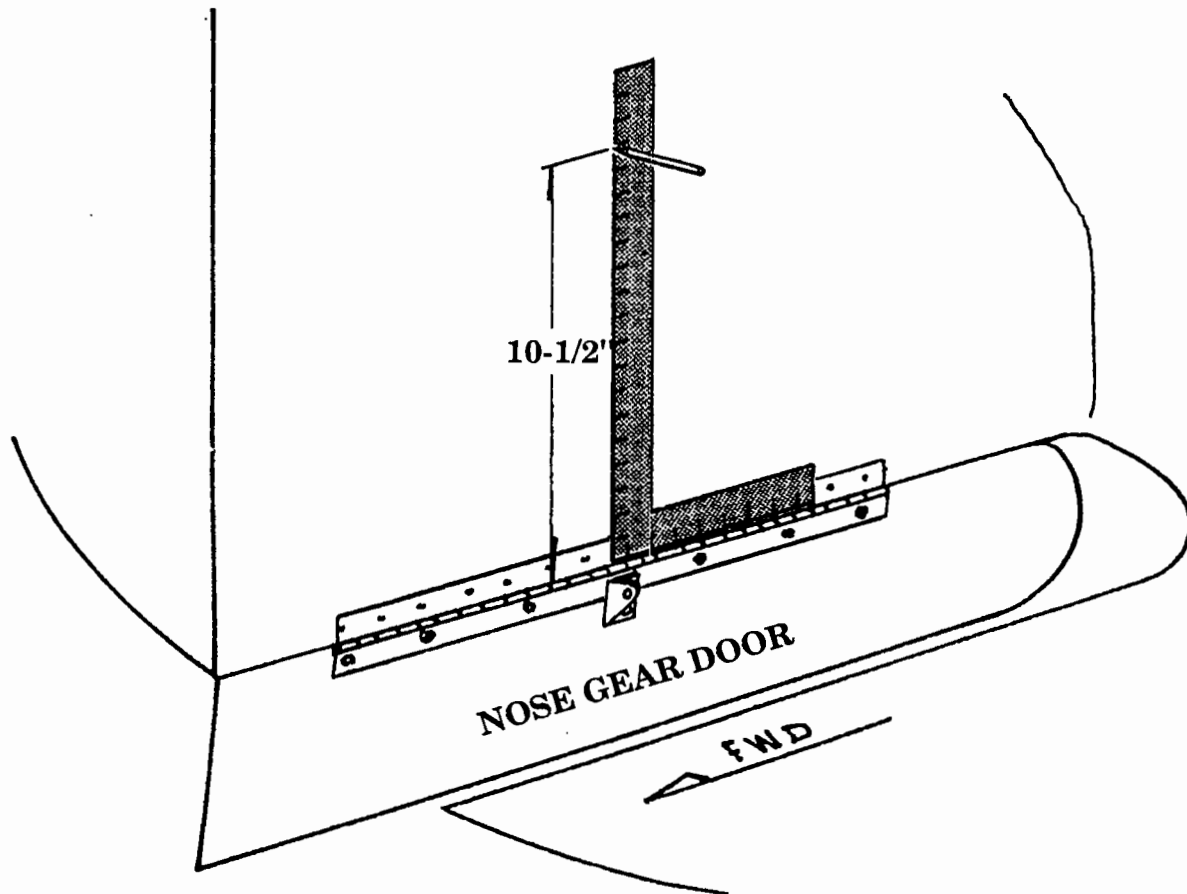


***NOTE:**
 There is a second fitting hole in the top of the cylinder. This must remain open to atmosphere. To prevent it from becoming contaminated, a small piece of sponge may be inserted into the threaded hole.

Positioning the nose gear door retract cylinder

(View inside tunnel)

Figure 13-3



NOTE: Use the rod end bearing, attached to the "cylinder control horn" on the nose gear door, to establish the vertical center line of the actuating cylinder. Also be sure to align the carpenter's square along the nose gear door hinge, NOT the firewall (the firewall and the hinge are not perpendicular to each other).

1. Refer back to figures 6-14 on page 6-23 and figure 6-15 on page 6-24. It is important that the cylinder be located **perpendicular** to the hinge line of the door. Otherwise the cylinder shaft will bind at one point or another during cycling.
2. With the door held in position, locate the point where the cylinder control horn is attached (9-1/2" back from the L.E. of the door). See figure 6-14.

3. Place a carpenter's square along the hinge piece on the inside of the tunnel to establish the perpendicularity for the cylinder orientation. Mark a pencil line on the side of the tunnel for reference. See figure 13-3.
4. Locate a point 10-1/2" up from the bottom of the fslg, this will be the location for the attach bolt center that holds the door retract cylinder onto its brackets. Mark this as well. Check to verify that you are, indeed, overtop of the 1/4" phenolic piece which was inserted onto the side of the nose gear tunnel during its assembly.
5. Per figure 6-16, make the two required brackets to attach the cylinder.
6. Position these brackets and drill the #12 through holes (4) and attach the two brackets. See figure 6-15.
7. Attach the gear door to the cylinder, see figure 13-2.

NOTE: It is advisable to create a mechanical "stop" for the retract cylinder when in the "door closed" position. This is to relieve the pressure exerted onto the door by the hydraulics. If this is not done, the door could slowly develop a bow due to the high pressures placed on it during retraction.

This "stop" can be easily made from the supplied piece of 7/16" dia. thin steel tubing. *Early Lancair kits were not supplied with this steel tube. If your kit does not contain the steel tube, please write and we'll ship it to you.*

Nose gear door cylinder "stop"

8. From the 7/16" steel tubing, cut a piece to slip over the shaft of the door cylinder. This will require some on and off trimming of the tube to establish the correct length. The tube itself will bottom out between the cylinder body and the bearing end cap. Fine adjustments can be made with the bearing itself however, that will affect the door angle when open. This door angle is not critical but must open beyond vertical.
9. To adjust the above "stop tube", first take the spring off the cylinder. Attach the bearing end to the door with about half of its threads engaged into the cylinder shaft. Close the door and from the fwd, open end of the tunnel (at the firewall), reach in and take a measurement of the shaft length with the door closed. This will be a good starting point for the tube length.
10. Saw the tube to length, file the ends smooth and slide it over the shaft, then replace the bearing with the machined spring aligner cap that slips over the shaft before the bearing.



11. Attach the bearing end to the gear door and again close the door. Reach into the tunnel and see if the tube is "snug" between the cylinder body and the spring aligner at the bearing end. The bearing can be adjusted somewhat to seal the door closed provided the door is allowed to extend beyond vertical when fully opened. If the door does not extend open beyond vertical, then the bearing will require less insertion into the shaft and the tube will require shortening to allow the door to fully close.

When the alignment is correct, the door will open past vertical and the door, when fully closed, will cause the tube to be snug between cylinder body and spring aligner. When this fit is satisfactory, snug up the check nut on the bearing - finger tight only.

12. Now remove the tube and note the location of the small through hole in the cylinder shaft (the bearings check nut will provide a notation for returning to the proper bearing location when the unit is re-assembled). The small through hole in the shaft is to allow you to slip a pin through (nail or whatever) which will hold the shaft from rotating so you can tighten the bearing check nut against the spring aligner. Now, since there is a tube over the shaft, you'll need to drill a hole in the tube at the approximate location so that you can access the hole in the shaft. This hole in the tube can be larger (1/8" dia.) so that it is not difficult to align (also, the tube will simply be floating on the shaft with the cylinder extended thus it should be easy to insert a pin through the assembly when tightening the check nut).

Fairing the nose gear door into the fuselage

14. Since the nose gear door sets ON the bottom of the fslg, it will require fairing. This is easily accomplished using micro. Close the door and apply a generous amount of micro around the perimeter. Taper this micro outward from the door about 3" - 4". Spread a smooth layer around then come back with the edge of a mixing stick, carved to a point, and run it around the edge of the door. This will form a separation in the micro around the door. Now you can carefully open the door and wipe off any micro that may have gotten under the door during application. Allow the micro to dry and then sand to blend.

Sequence valve for nose gear door

This sequence valve will route hydraulic fluid to the door retract cylinder, thus closing the door (the door is opened by the spring pressure alone which is created by the coil spring around the shaft).

15. Rotate the gear to the retracted position inside the tunnel. Note the tab on the right side of the GM27 weldment, it will be used to trip the sequence valve as the gear reaches full retract. It will require a small phenolic doubler on it to provide more surface area to contact the sequence valve shaft head, see figure 13-5. Note that this tab is the same one used to trip the gear "down" micro switch, see figures 5-36 and 5-37.

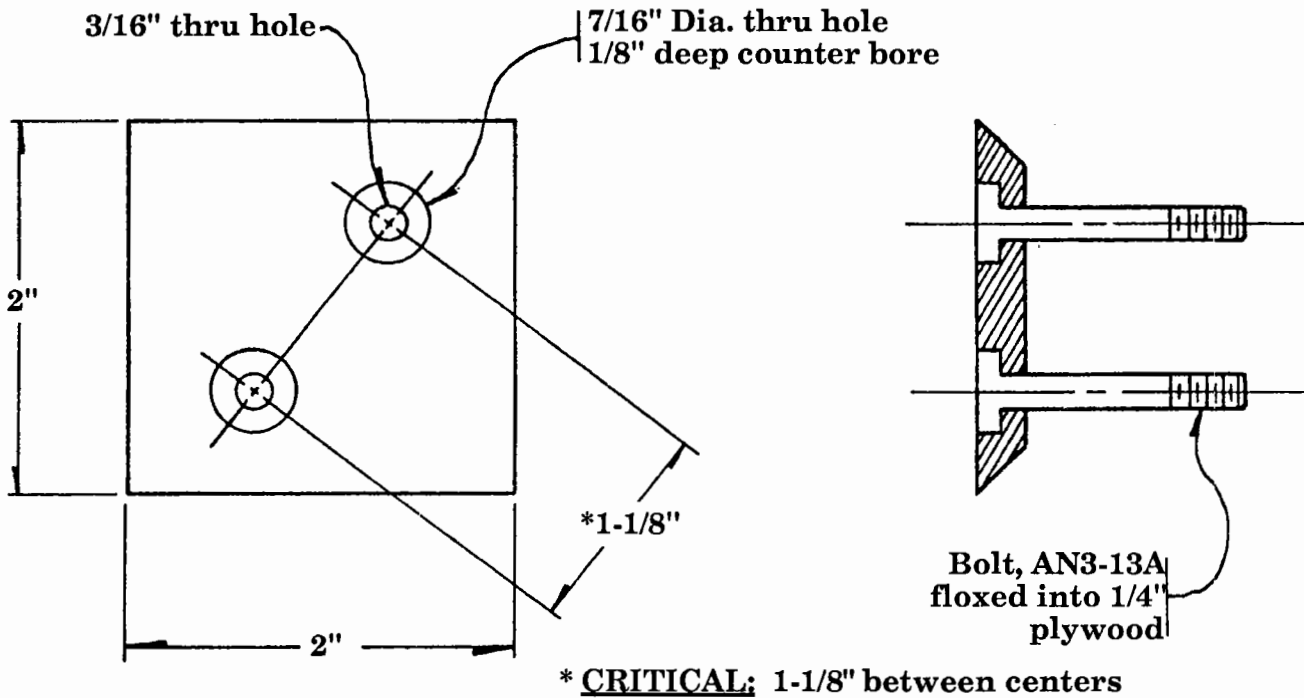


16. Make an attachment plate for the sequence valve per figure 13-4.
17. Temporarily attach the valve to the plate. The screw in the shaft should be in the middle range so it can be adjusted both in and out somewhat. Also be sure that there are sufficient threads for the check nut. Position this assembly in the tunnel to establish alignment with the GM27 tab. You can simply hold it with your hand while the gear is retracted. When the alignment is good, make a pencil reference mark around the plate.

WARNING: During alignment, it is very important to orientate the sequence valve such that the shaft is contacted and pressed "in line" with its natural plunging direction. **A side load on the shaft could bend it and cause a jam.** Take time to carefully position the sequence valve and align the valve shaft with the motion of the GM27 tab. See figure 13-5.

Attachment plate, sequence valve

(Nose gear)
Figure 13-4



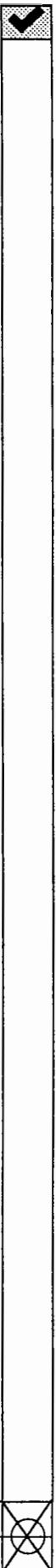
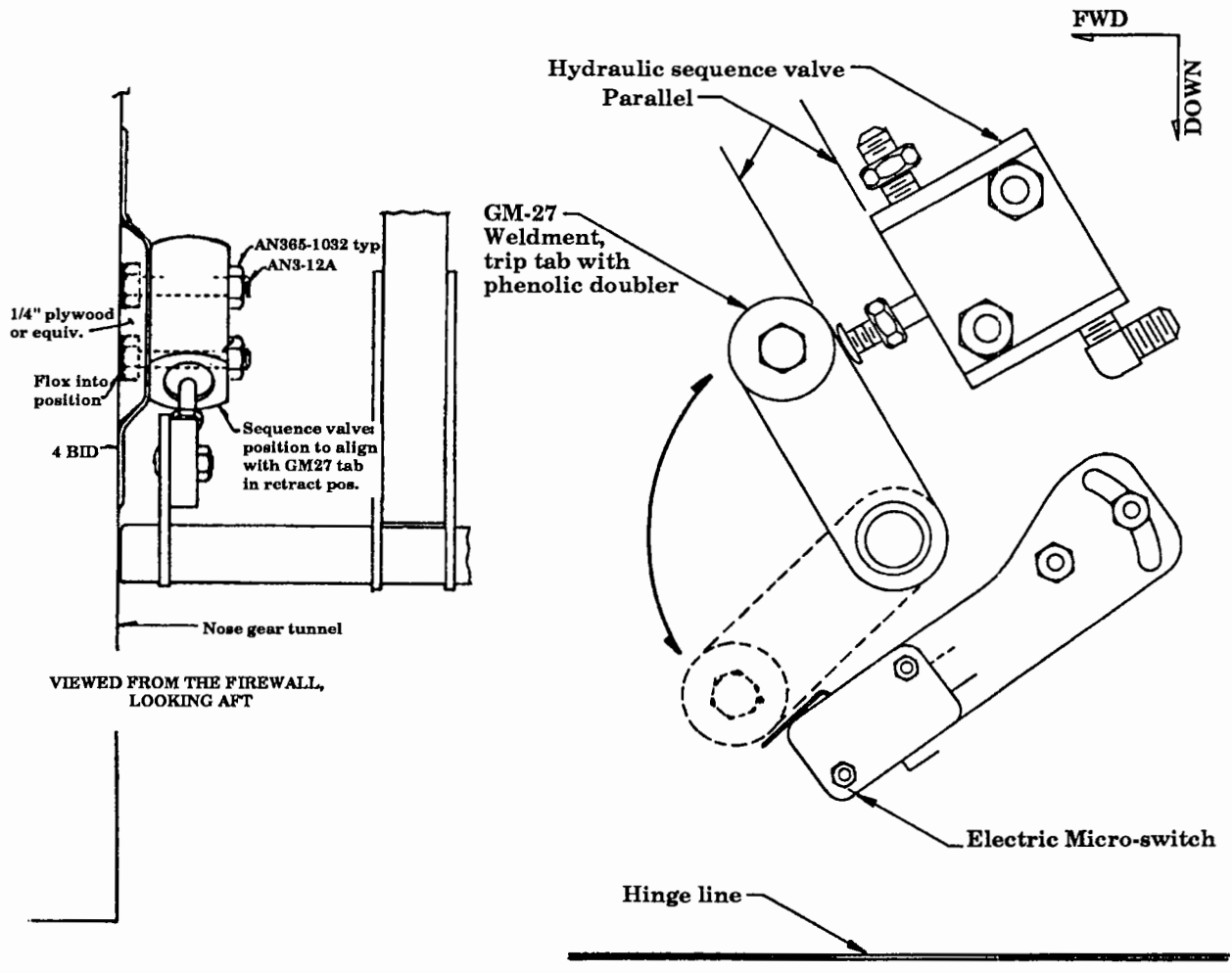
18. Now, clean the surface of the nose gear tunnel where you placed the reference pencil marks for the sequence valve attach, but be careful to not loose your reference marks. Bond the plate to the side of the tunnel wall using the pencil marks as a reference. Use epoxy/flox under the plate and add 4 BID over it. Cover the two bolts with tape to protect their threads from epoxy. The 4 BID must contact the tunnel walls 1.5" - 2" all around the plate.
19. Per figure 13-5, insert the hydraulic fittings into the sequence valve prior to permanently mounting it to the tunnel wall.

WARNING: It is very important that the sequence valve ports are correctly established. The valve will not operate properly if you put the lines into the wrong ports on the valve. See figure 13-5 for proper orientation of hydraulic lines. The "out" port is the one nearest the plunger shaft. The "out" line connects to the retract cylinder.



Positioning the nose gear sequence valve & micro switch

Figure 13-5



Lancair International Inc. Copyright © 1991, Redmond, OR 97756

C. Main gear doors - adjustments

The main gear have three doors each, which were cut from the belly pan. The outbd door hinges on the lower wing near BL-50 and is driven with the short push rod connected directly to the gear strut. The middle door is attached directly to the gear casting. The inbd door is attached via piano hinge to the belly pan / cockpit closeout rib and driven either mechanically, via a cable system, or optionally via hydraulics.

Main outbd gear door adjustment

Before the doors can be adjusted, the gear up stop must be established.

1. Refer to the push rod shown on figure 5-19. First set the rod to the 3-1/8" dimension shown. Attach it and slowly move the gear up into the well by hand. Note when the gear door closes, if the gear leg is not all the way up into the well, then the push rod will have to be lengthened. If the gear is fully into the well and the door is still cracked open, then shorten the rod.

WARNING: It is important to not only have the gear door tight *enough* but to also NOT have it too tight. If the door is too tight, the gear hydraulics will easily overpower the doors stiffness and eventually deform the door and possibly cause an attachment failure. An attachment failure could then lead to a jam and prevent the gear from extending down and locked.

Main gear middle door adjustment

2. Refer to page 6-14, Main Gear Middle Doors. The middle gear door is attached directly to the gear casting using three machine screws. The upper door adjustment is made by sizing of the bushing on the upper machine screw. This will move the top of the door panel either inward or outward from the gear casting.
3. The lower end of the door is adjusted by bending the aluminum attach plate or shimming under the two lower machine screw holes.

NOTE: As the gear starts down from the fully retracted position, there is a near "sliding" motion where the outbd door "slides" past the middle door. Often this action requires some sanding along that mating line between those two doors so that the outbd door does not get caught on the middle door. If required, sand a bevel onto the edge of the middle door adjacent to where the outbd door aligns.



Main gear inbd door actuation and adjustment

There are two methods of actuating the inbd gear doors. One method is "mechanical" via a cable. The other method is "hydraulic" via small actuating cylinders (the same cylinder type with sequence valve as used for the nose gear door system). The differences can be broken down to cost and reliability. Inbd gear doors are notorious for requiring constant adjustment since they are usually mechanical in nature. That is why we developed an optional "hydraulic" system. It is absolutely "positive" and once adjusted, will not require further adjustments.

D. Mechanical inbd door system

Refer to blueprint "L"

1. This cable operated mechanical system will operate directly off the main gear leg tab as shown on blueprint "L".
2. First locate on the cockpit closeout rib, the installation point for the 1/4" plywood (or phenolic) blocks. You will need to check for clearance from the tire when retracted and also from the aileron push rod. The clearances are rather close so a fit check is definitely required.
3. It is best to first make the control horn assembly which will fit between the two 1/4" plywood pieces so this assembly can be used to size the actual installation of the 1/4" plywood.
4. Cut out the two inner gear door bellcranks per blueprint "L". Note that one will require the #30 hole drilled into the tab while the other will not require the tab at all. This tab will pick up the spring. Use the 3/8" x .083" aluminum tubing as shim stock to space the bellcranks properly, per blueprint "L". This shim stock will first require drilling out with a 1/4" bit to accept the AN4-23 bolt (a .250" reamer is actually best for this operation).
5. Bond the 1/4" plywood pieces onto the cockpit closeout rib using 4 BID per side as indicated on blueprint "L". A dab of hot glue or instant glue in the corners will hold the pieces until the BID is applied.
6. Make and install the inner gear door control horn for the inbd gear doors per blueprint "L".
7. Make and install the gear door push rod by tapping a 1/4-28 thread into the 3/8" x .083 tubing at both ends. Position the M34-14 rod ends in their approximate mid range adjustment positions.
8. Start with the gear door in the vertical (open) position and the bellcrank assembly just over center in its travel rotation. The MS24694-S82 machine screw should be installed and will serve as the "stop" for this overcenter bellcrank when the spring pulls on it.

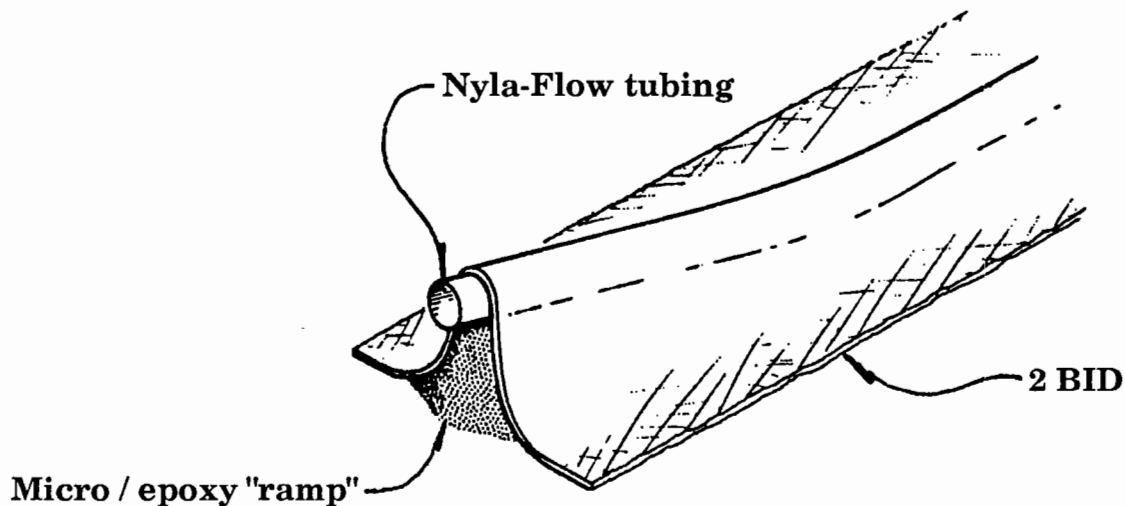
9. Attach the cable to the bellcrank assembly with a nico press sleeve and thimble. **Use only nico press clamps to set these nico press sleeves.** Run the cable through a length of nyla-flow line per blueprint "L". This line will be bonded to the inner, upper wing skin in a position such as to provide a clean straight pull from both ends (bellcrank and gear leg). This will require a slight "S".

NOTE: The nyla-flow line should be terminated in an aligning manner with the direction of pull on the cable (similar to the approach used when routing the rudder cables and guide tubes). See blueprint "L" for a depiction of this termination style. This will require a slight raising of the nyla-flow line at each end. A little micro will work well to form a slight ramp as shown on blueprint "L". Also see figure 13-6. Use dabs of hot or instant glue to temporarily position the line. Cover and secure it with 2 BID overtop.

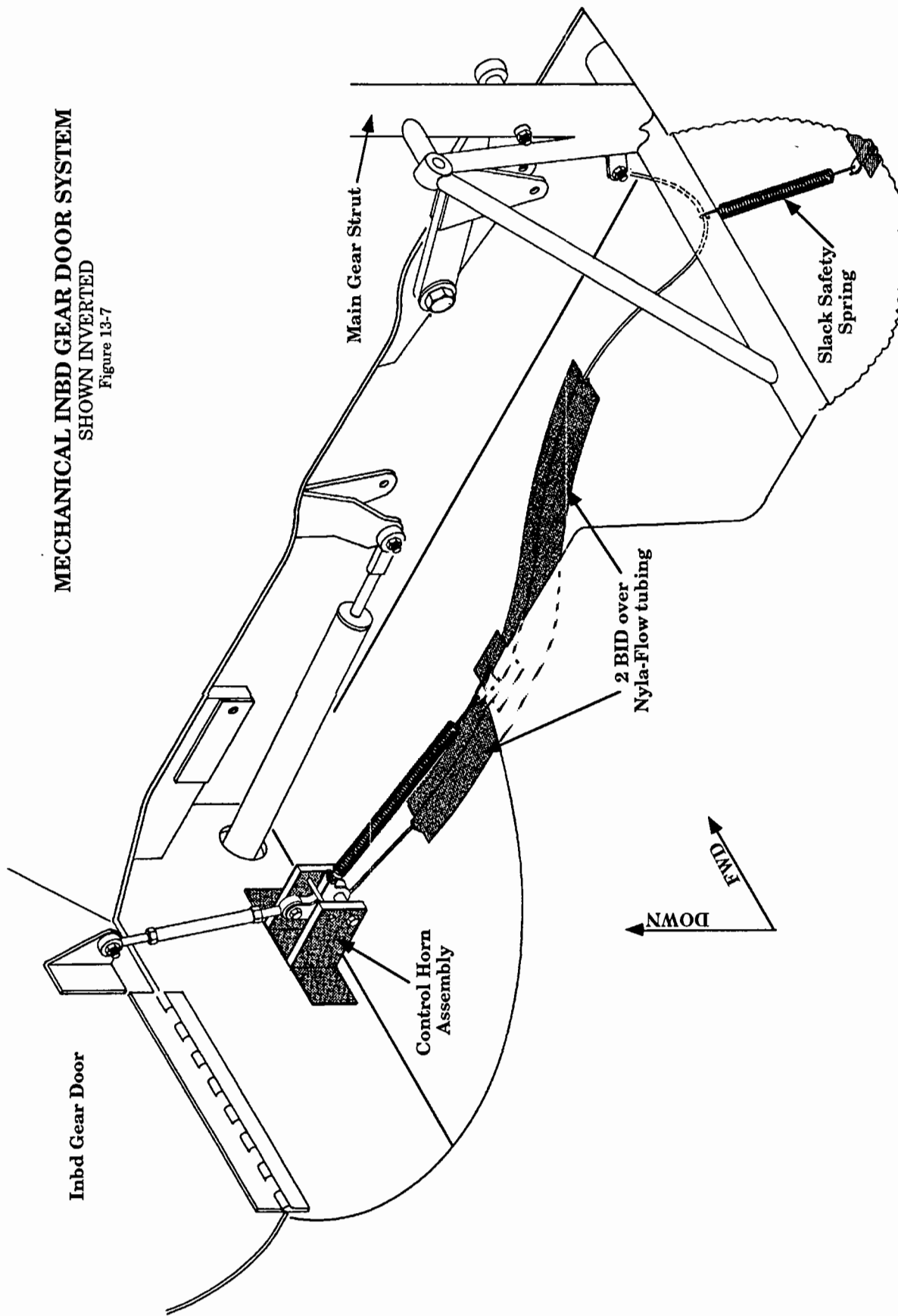
Cable exit ramp, Nyla-Flow guide tubing

Mech. inbd gear door system

Figure 13-6



**MECHANICAL INBD GEAR DOOR SYSTEM
SHOWN INVERTED**
Figure 13-7



WARNING: The cable will become slack as the gear extends down and the door opens. It may be necessary to attach a light spring to pull the slack cable and keep it away from the landing gear mechanism. See figure 13-7.

10. Prior to adjustment, remove the other two gear doors.
11. Retract the gear fully, close the inbd gear door tightly and pull the cable as tight as possible. Mark the cable at the gear leg end where it will attach to the tab on the leg. If you temporarily attach any bolt through the tab hole, then the cable can be pulled around that bolt from outside the wing box. This will make the measuring process a little easier. A piece of masking tape on the cable will make locating a reference mark a little easier as well. This is probably the toughest part of this whole installation.
12. With a reference mark made on the cable at the point where it will attach to the gear leg tab, install an AN111 thimble and nico press sleeve such that the dimension is approximately 1/4" shorter than marked previously. This will help account for the expected cable stretch and thus the required tension on the door will be achieved. (The tension desired is quite higher than your ability to pull on the cable.)
13. With the nico press sleeve attached, connect the unit and first back off one of the M34-14 rod end bearings about 1/4" prior to running the gear up for the first time with the door closure mechanism attached. Adjust this rod end as necessary until the door fits tightly with the gear all the way up (it's better to start loose and work your way up to a tight condition). When you are finished, the gear door would likely be positioned at an angle that is less than vertical - this is acceptable provided the gear clears by at least 1/4" - 3/8" at all positions.

Tightening up on the bearings (shortening the push rod) will of course tighten the door when closed but it will also leave it in a position which is less open when the gear is down. It is conceivable that this could take a couple of tries to get it right.
14. Attach the #5566 spring onto the door bellcrank and in the gear down (door open) position pull the spring (thus pulling the bellcrank assembly against the overcenter stop) to achieve the 7" dimension of the spring shown on blueprint "L". Mark this location on the upper wing skin. Check that the spring location will not interfere with the tire when retracted and adjust accordingly.
15. Check that the spring does in fact pull the bellcrank assembly overcenter thus locking the gear door pushrod in the open position. This is essential in preventing the door from partially closing and getting caught by the tire as it retracts into the well.



16. This door system will require periodic adjustment as the cable will always have a tendency to stretch and the gear tab will flex slightly. Thus, the aircraft should be jacked up periodically and the gear retracted to check for proper closure.



E. Hydraulic inbd main gear door system (optional)

This system will operate the main gear inbd doors via hydraulic pressure in a manner that is very similar to that used for the nose gear door. This optional system is much more positive, provides increased up load to hold the door shut during high speed cruise and requires virtually no adjustment after installation is completed. See figure 13-9 for hydraulic system drawing.

1. See blueprint "L" for installation drawings of this system. Locate and cut the access hole through the cockpit closeout ribs having first checked to verify that there will be sufficient clearances from the tire for the control horn which mounts to the inner gear door. There is some room for placement fwd / aft to aid in achieving adequate clearances. This control horn is designed to pass through the cockpit closeout rib just fwd of the piano hinge attachment. The cylinder will attach on the FWD face of the control horn to provide maximum clearance from the tire. Adjust the through hole in the closeout rib accordingly.

2. Fabricate and attach the control horn per blueprint "L" to the inner gear door. Note that there is a build up of BID under this control horn so as to achieve a flat surface. The control horn will also rest on top of the piano hinge section.

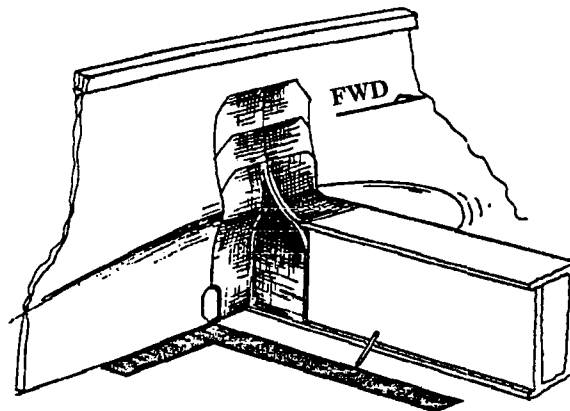
NOTE: The distance (radius) generated between the piano hinge center and the attachment hole in the end of the control horn is important. See blueprint "L", that dimension must be maintained to within 1/16". Placement of the control horn on the door will establish this dimension.

3. With the control horn attached, the small door retract cylinder will next be located. The cylinder **MUST** be positioned on the fslg floor (under the seating area) such that it's line of piston shaft travel is perpendicular to the piano hinge line of the door. Use a small carpenter's square against the inner side of the cockpit closeout rib to establish line of perpendicularity. See figure 13-8.

Positioning the retract cylinder

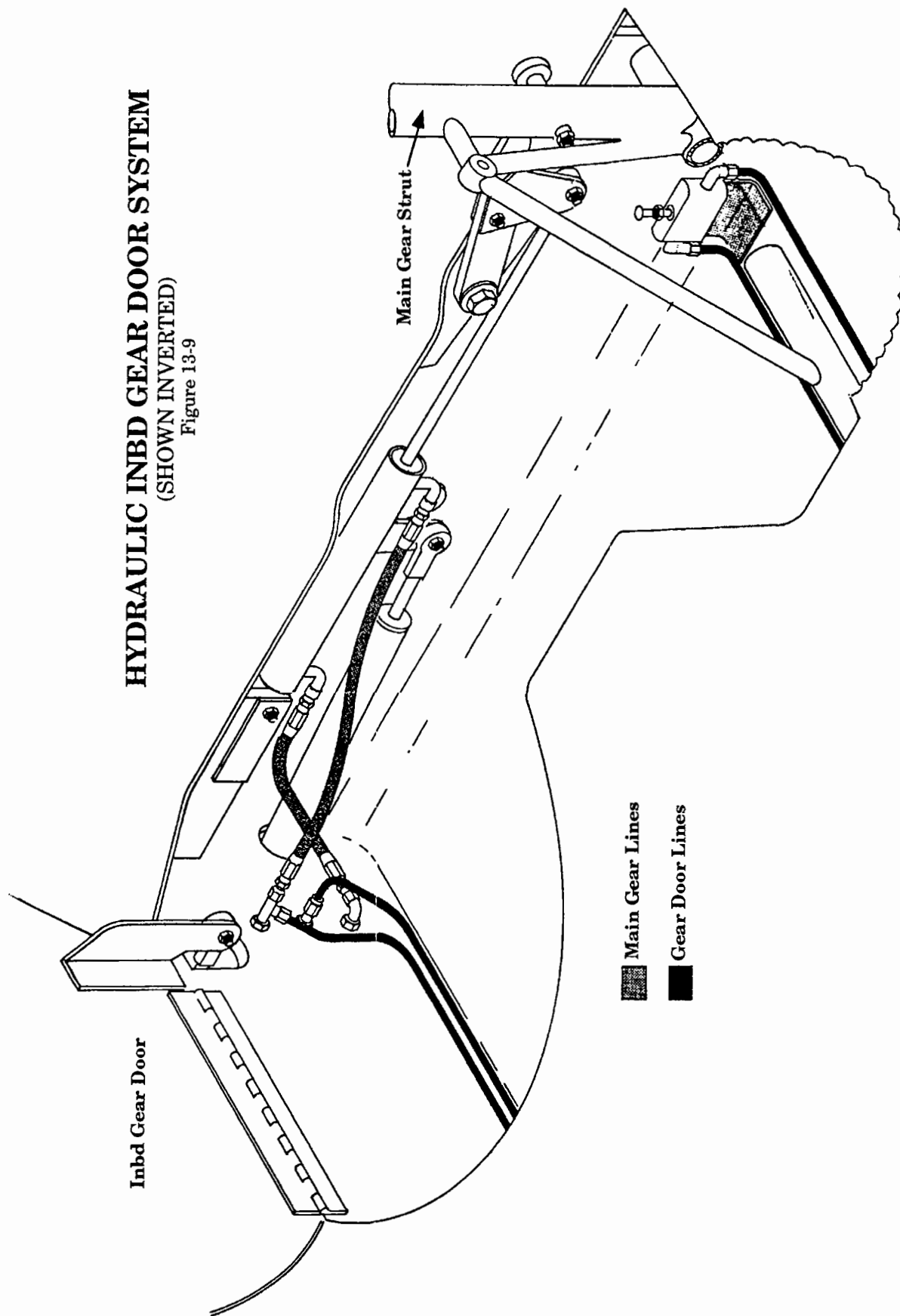
(Hydraulic inbd gear door)

Figure 13-8



HYDRAULIC INBD GEAR DOOR SYSTEM
 (SHOWN INVERTED)

Figure 13-9



Main Gear Lines
 Gear Door Lines

4. Before locating the mounting position of the cylinder attachment, the bearing on the end of the shaft must be securely positioned (the bearing, check nut and spring are only temporarily positioned for ease of shipping when they leave our stock room and the check nuts are not secured).

To secure the check nut and locate the rod end bearing, first remove the bearing from the shaft. With it off, position the check nut such that it provides for 5/16" of insertion into the shaft. This can be set by simply positioning the check nut 5/16" from the end of the threaded end of the bearing. Next, compress the spring by firmly grasping it and pulling down toward the cylinder base. Screw the bearing into the end with the check nut remaining in the pre-selected location. (Be sure that the spring retainer is also positioned.) Set the check nut by tightening it against the piston shaft. Hold the shaft from rotating by slipping a small pin through the hole drilled into the shaft.

5. To locate the cylinder assembly attach point on the fslg floor, temporarily attach the cylinder to the door control horn using an AN3 bolt. Locate the bearing on the FWD face of the door control horn. The through hole in the cockpit closeout rib can be ground to accommodate the passage of the shaft assembly.
6. Place the gear door in the open position. (The ideal open position is from vertical to not more than 3° short of vertical.)
7. Next place the cylinder base on the line which was made on the fslg floor that represents a perpendicular alignment to the door piano hinge.
8. Mark the location for the AN3 attachment bolt that will hold the cylinder assembly to its two attach brackets. Mark this reference line on the floor. Remove the cylinder assembly.
9. Fabricate and install the two attach brackets for the cylinder assembly per blueprint "L". This will require a BID lay up on the floor and then a BID lay up over the brackets per blueprint "L".
10. Next locate the sequence valve attachment location on the upper stub wing skin, see figure 13-10. This can be located by simply holding the gear in the retracted position and having someone position the valve and mark its relative position onto the inner wing skin surface. This alignment point should be such that the plunger shaft is contacting the vertical member of the GM1 weldment at dead center.

WARNING: the location of the valve plunger assembly is critical and should not be more than 1/16" off dead center on the GM1 weldment. Failure to establish this tolerance could result in gear system damage and / or failure.



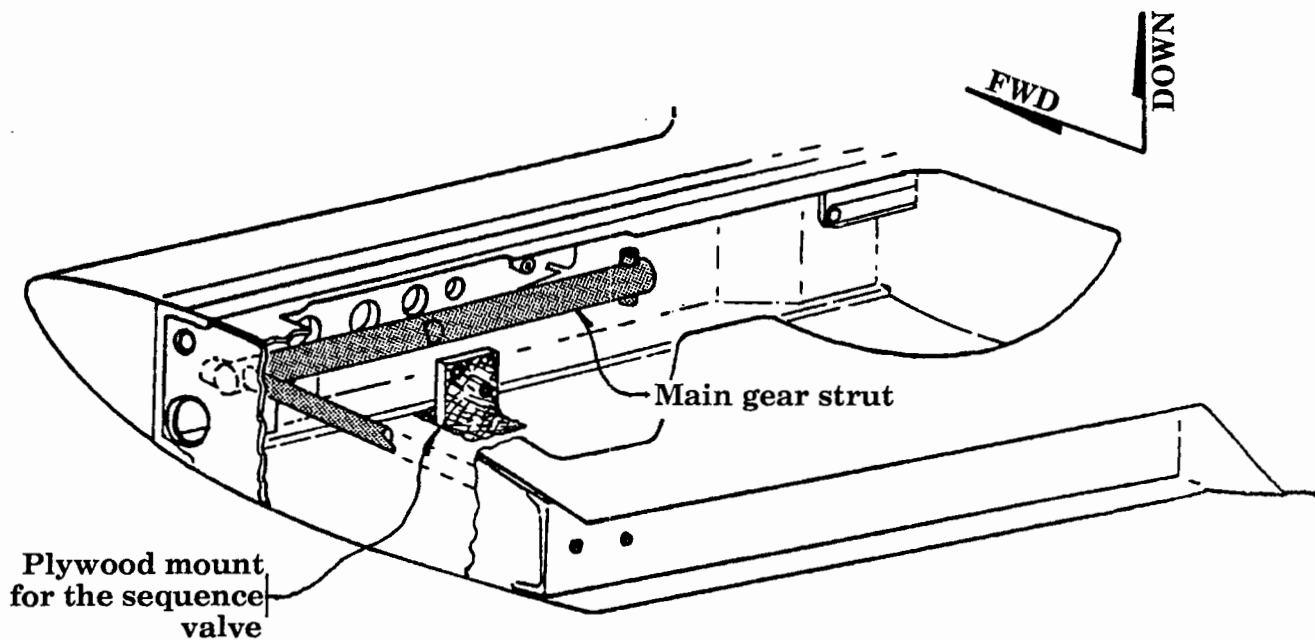
11. With the location marked, extend the reference marks far enough out so that the next BID ply lay ups will not hide them and you will thus be able to re-establish this location.
12. Add the BID lay ups to the skin first per blueprint "L".
13. Next add the 1/4" plywood (or phenolic) attach block and add the BID lay up schedule to it as well. See figure 13-11. Use either 5 min. epoxy or instant glue or a couple of dabs of hot glue to hold the blocks in position until the flox cures. When positioning the block, be sure to account for the thickness of the valve body itself since it will bolt up to ONE SIDE of the block thus the plunger center will be displaced that equivalent distance.

NOTE: This installation is a lot easier if the airframe is in the inverted position.

Positioning the main gear sequencing valve

(Shown inverted)

Figure 13-10



14. After cure, reposition the sequence valve. Set the small screw in the plunger shaft at a position that is about mid way in its available travel range. This will allow maximum potential adjustments after the valve is permanently located. Note the distance of travel required of the plunger (about 0.100"). Have someone hold the gear in the full retract position and with the valve placed against the attach block, locate it so that it contacts the GM1 at dead center of its diameter and also adjust the valve vertically such that the plunger is fully depressed when the gear is retracted. Mark this position on the attach block.
15. Now you can allow the gear to extend back down (getting it out of the way) and reposition the valve to the reference marks. Then drill for the two AN3 attachment bolts using a #12 drill bit.
16. Attach the valve and recheck plunger travel and alignment by retracting the gear by hand.

WARNING: Be absolutely sure that the plunger is not adjusted too long. If it were, then the gear leg would place its full pressure against the bottomed out plunger. This could either damage the valve assembly or possibly create a bulge in the upper wing skin at this location. The plunger should have just a few thousandths of an inch of free play with the gear fully retracted.



Attaching the main gear sequence valve

(shown inverted)

Figure 13-11

