CHAPTER 20
REVISION LIST

The following list of revisions will allow you to update the Lancair IV construction manual chapter listed above.

Under the "Action" column, "R&R" directs you to remove and replace the pages affected by the revision. "Add" directs you to insert the pages shown and "R" to remove the pages.

Page(s) affected	Current Rev.#	Action	Description
20-1 thru 20-10	0	None	
20-11 & 20-12	C9	R&R	Removed reference to Matco
20-13	C4	R&R	Revised Step C7 Added NOTE after Step C7
20-14	C9	R&R	Removed reference to Matco
20-15	C9	R&R	Changedbolt size
20-16	0	None	
20-17	C16	R&R	Added note to Fig. 20:C:6
20-18 thru 20-20	0	None	
20-21	C14	R&R	Edited part no. in Fig. 20:D:4 Added Note to Fig. 20:D:4
20-22	0	None	
20-23	C9	R&R	Edited Fig. 20:D:6
20-24 thru 20-25	0	None	
20-26	C1	R&R	Changed Steps E2 & E3 Changed Figure 20:E:2
20-27	0	None	
20-28	C4	R&R	Revised Steps F1 & F2 Revised Figure 20:F:2
20-29	C11	R&R	Edited Fig. 20:G:1.
20-30	C11	R&R	Added to text and Fig. 20:G:2.
20-31	C11	R&R	Edited Fig. 20:G:3.
20-32	C4	R&R	Revised step G4, &G5 Revised Figure 20:G:3 & 4
20-33 & 20-34	0	None	
20-35	C12	R&R	Edited Fig. 20:G:7
20-37	C11	R&R	Edited Fig. 20:G:9.
20-38 thru 20-39	C5	R&R	Revised Figures 20:G:10 & 11 Revised Step G21

CHAPTER 20
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Page(s) affected	Current Rev.#	Action	Description
20-40	0	None	
20-41	C4	R&R	Changed Step G23 Changed Figure 20:G:13
20-42 thru 20-44	0	None	
20-45	C16	R&R	Edited G27 (Ten is now eight tabs).
20-46 thru 20-48	C6	Add	Added Sections H & I

CHAPTER 20
NOSE GEAR INSTALLATION

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 When such revisions are made, you should immediately replace all outdated pages with the revised pages.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 assembly step. However, time goes on and changes are made, so careful attention should be paid to the orientation arrows.

CONTENTS

1. INTRODUCTION

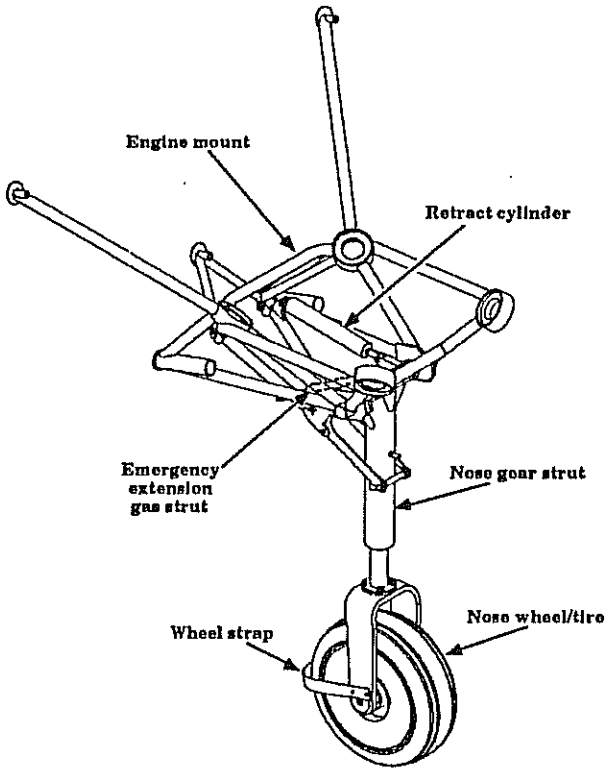
The nose gear of the Lancair IV is mounted on the engine mount. Hence, the engine mount must be installed first. The actual mounting of the nose gear is very straight forward.

Many builders are curious how Lancair can use such a simple looking nose gear strut and still have adequate shock absorption and shimmy dampening (notice that there are no scissor linkages or external dampeners on your nose gear strut). Internal oil dampening is the key to the strut's simplicity. Typical nitrogen pressurization is used for shock absorption but an internal oil wiper system takes care of the shimmy, unlike the usual (ugly) external shimmy prevention systems.

Emergency nose gear extension is accomplished with a gas strut that forces the drag linkage over center. This system eliminates the need to plumb emergency hydraulics all the way to the engine compartment.

When you complete this chapter, you will be able to set your Lancair IV on the landing gear. We recommend leaving the fuselage in the jig until it is finished, but if need be, you can roll the fuselage shell around your shop.

Nose gear/ engine mount
Figure 20:i:1



2. SPECIAL PARTS, TOOLS, & SUPPLIES LIST

A. PARTS

Fuselage assembly
Engine mount
Nose gear strut
Nose gear bearing blocks
Nose wheel strap
Nose wheel axle
Nose wheel
5.00 x 5 tire
5.00 x 5 tube
Upper drag link (on later kits this part is preinstalled on engine mount)
Lower drag links
Gas strut
Nose gear hydraulic cylinder

B. TOOLS

Clamps
Drill
Rivet squeezer
Cleco pliers
Clecoes
Air pressure gauge
Files
Band saw (helpful)

C. SUPPLIES

Epoxy
Flox
Mixing sticks
Mixing cups
Paper towels
MC
Sandpaper

3. CONSTRUCTION PROCEDURE

A. INSTALLING ENGINE MOUNT

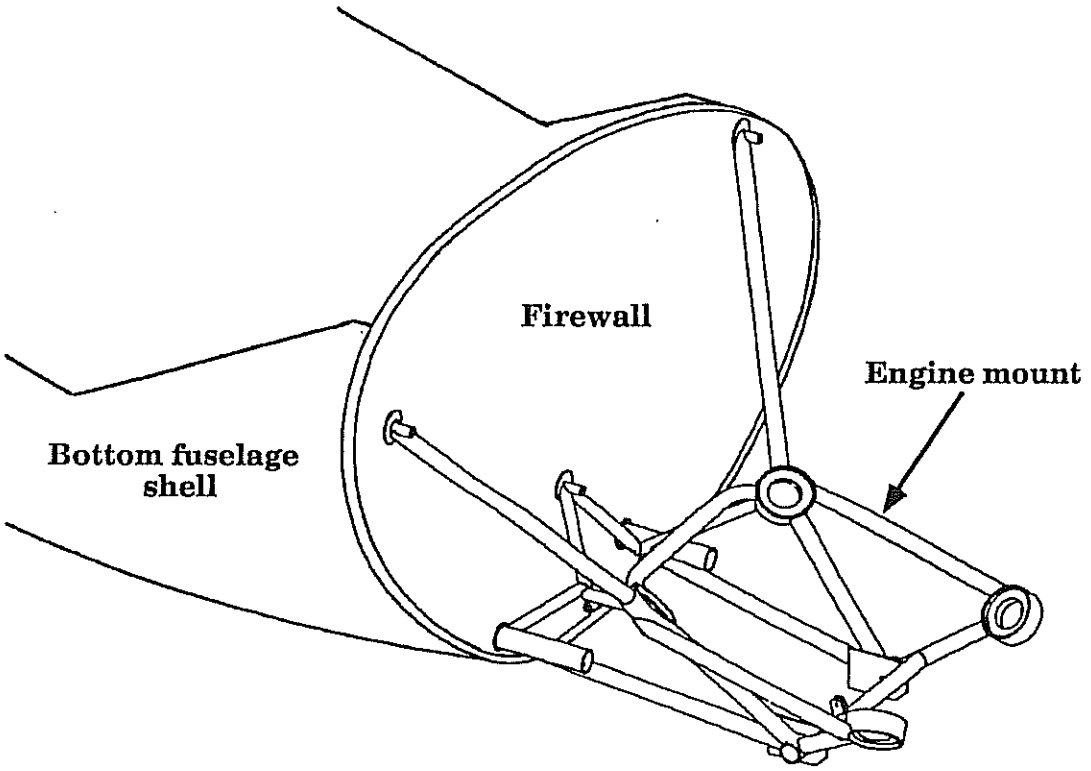
The engine mount included in your Lancair IV kit is designed for the Continental 550 series engines. The mount also supports the nose gear structure. A few changes in the engine mount have been incorporated as we progressed with the kit.

*Later engine mounts have the upper over-center linkage prematched for better bolt alignment. Earlier mounts may have to be reamed slightly for better alignment of the two mounting bolts.

*Later engine mounts also have predrilled mounting plates for the nose gear bearing blocks. The mounting plate on earlier engine mounts will have to be drilled by the builder.

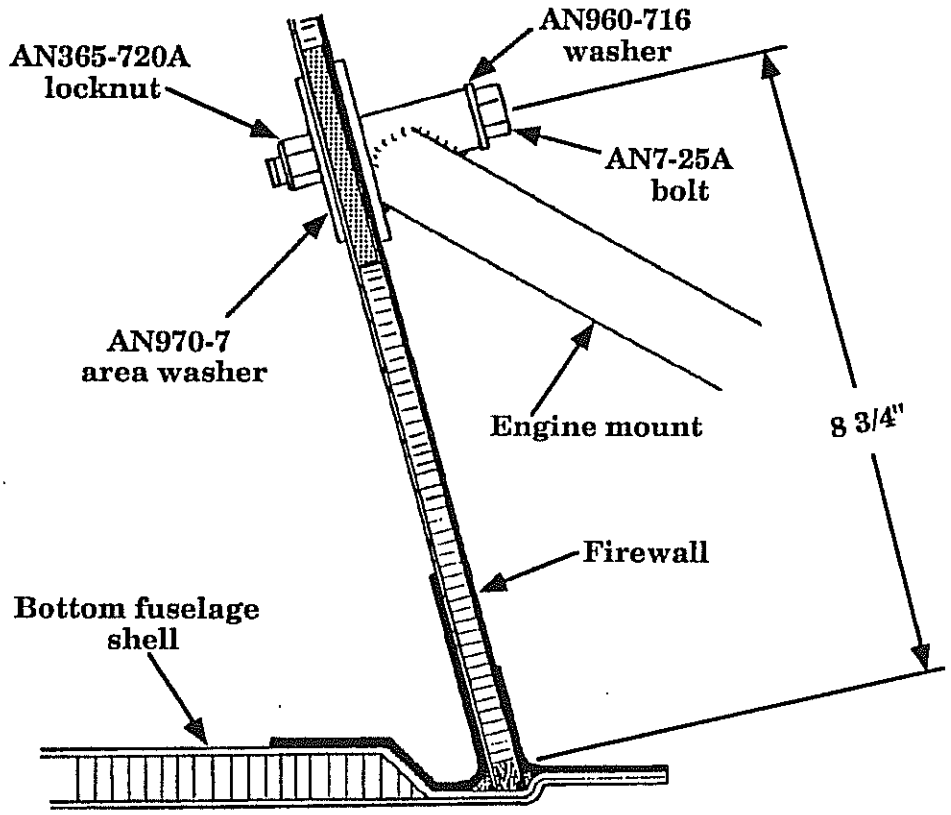
We will describe the minor differences in the engine mounts at the appropriate steps.

Engine mount
Figure 20:A:1



A1. Your firewall was sent with predrawn reference points for the engine mount. You probably eliminated these points when you installed the phenolic hardpoints, but never fear, they were only for general reference anyway. Draw a reference mark on the centerline of the firewall 8 3/4" from the bottom cowling flange, as shown in Figure 20:A:2. You'll have to lay a straight piece of wood across the cowling joggle to find the proper height because of the nose strut cutout.

Drilling for center engine mount bolt
Figure 20:A:2



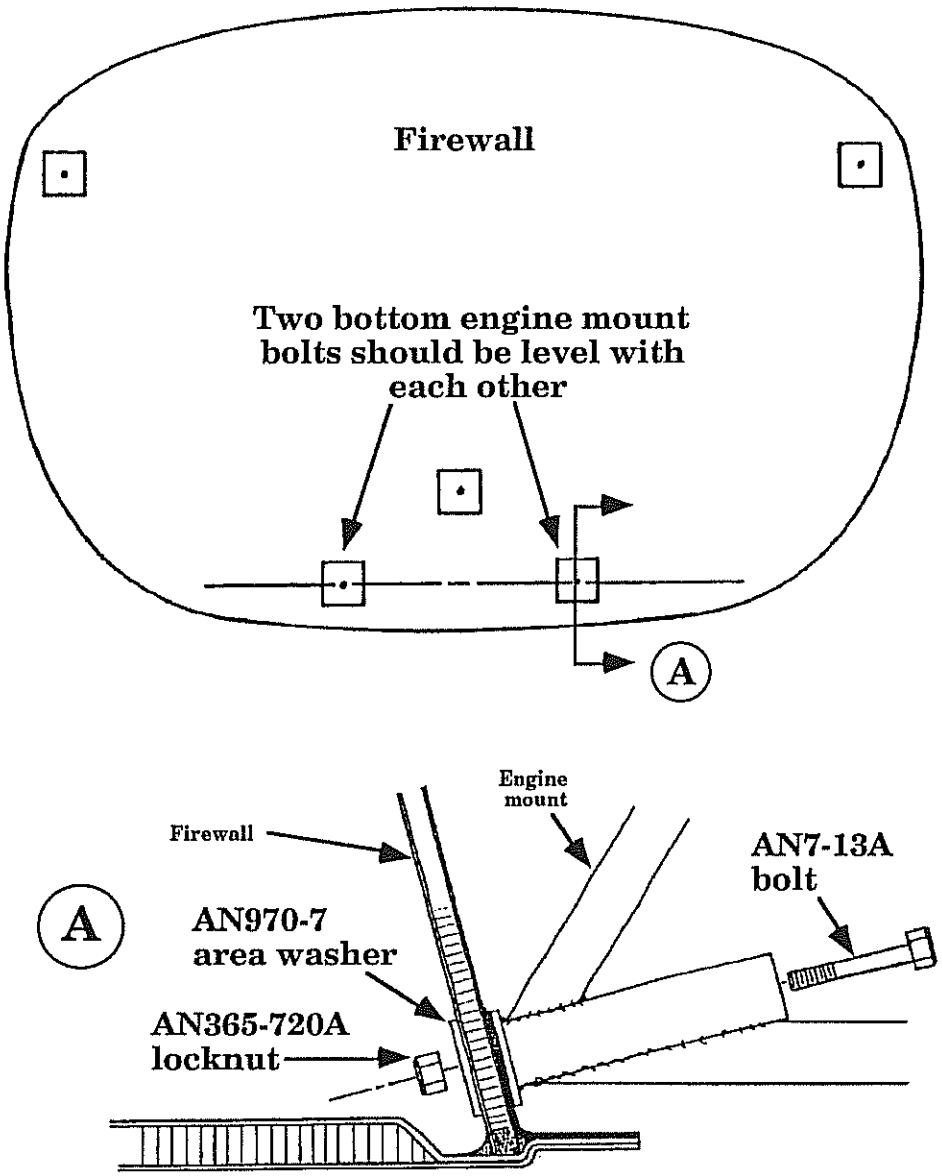
A2. Drill a 7/16" diameter hole through the firewall at the point you determined in Step A1. This hole will be for the center engine mount bolt. Be sure the hole is drilled perpendicular to the firewall surface. A pilot hole helps maintain the larger drill's alignment. Do not use the engine mount as a drilling jig. We don't want to wallow out the bottom three engine mount holes because they are important for alignment.

A3. Temporarily secure the engine mount to the firewall using just the center AN7-25A bolt.

Note: Now is a good time to double check that your fuselage is level in the jig.

A4. Rotate the engine mount on the firewall until the bottom two bolt holes are level. A carpenter's level held across the two lower engine mount tube, as shown in Figure 20:A:3, is the easiest way to level these bolt holes. When level, draw a circular outline of the bottom two engine mount pads onto the firewall.

Leveling bottom engine mount holes
Figure 20:A:3



A5. Remove the engine mount from the firewall.

A6. Included in the kit is a round washer that has the same outer and inner diameter as the bottom engine mount pads. Place the washer in outlines you made of the lower engine mount pads. Use the washer as a guide to draw the two bottom engine mount bolt locations.

A7. Drill the bottom engine mount bolt holes through the firewall. Again, use a pilot hole and a 7/16" drill, and keep the drill perpendicular to the firewall surface. The holes do not have to be perfectly centered in the phenolic hardpoint (but if they are *way* off, you know something went wrong).

A8. Temporarily secure the engine mount to the firewall with the center and bottom bolts.

A9. Use the top two mounting holes in the engine mount as guides to drill the remaining two 7/16" diameter holes through the firewall. Be careful not to gouge the metal of the engine mount. You may want to just start the holes using the mount as a guide, then remove the mount and continue drilling through the firewall. If the top two bolt holes in the firewall are not centered between the plywood reinforcements, this is okay as long as you have room for the area washers on the aft face of the firewall.

NOTE: Do not bolt the engine mount permanently in place until you have installed the firewall blanket (Section B).

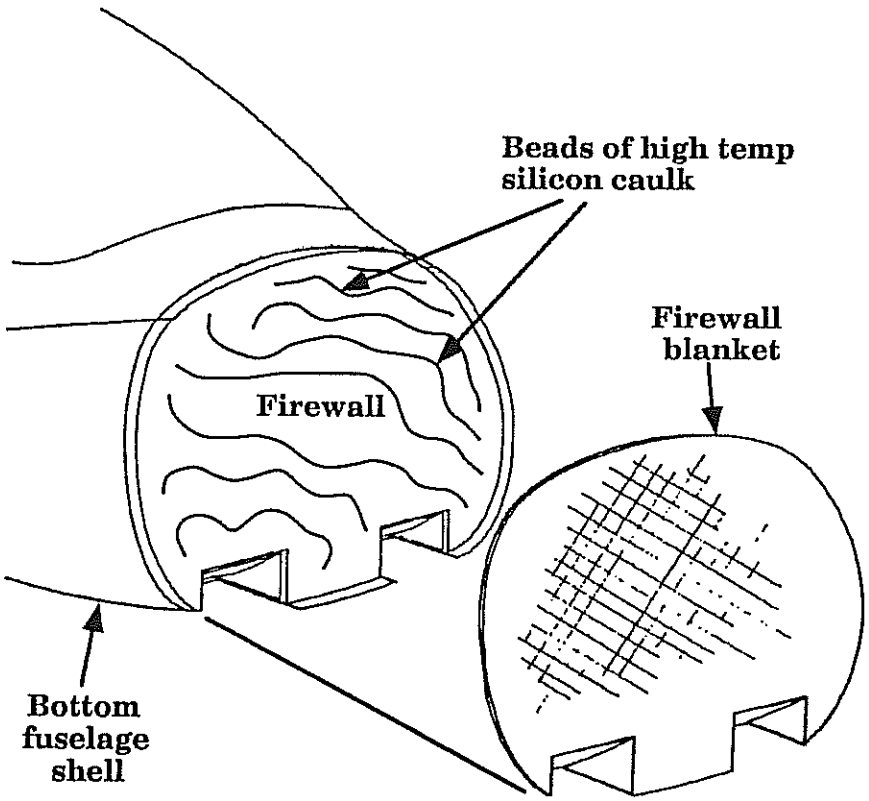
A10. The firewall is bolted permanently to the firewall using these bolts.

Top two bolts: AN7-25A
Center bolt: AN7-25A
Bottom two bolts: AN7-13A

B. INSTALLING FIREWALL BLANKET

The protective barrier on the firewall of the Lancair IV is composed of a *"silicon matrix with a ceramic weave and an aluminized surface"*. From now on we'll just call it the firewall blanket. We use this material because of its light weight, excellent fire resistance, simplicity and good looks. The blanket is premolded to the firewall to protect the exhaust tunnels.

Firewall blanket
Figure 20:B:1



B1. Hold the firewall blanket against the firewall. Does the blanket fit snugly into the exhaust tunnels? Do the edges of the blanket come within 1/4" of the cowling flanges? Good, then you're ready to bond the blanket to the firewall.

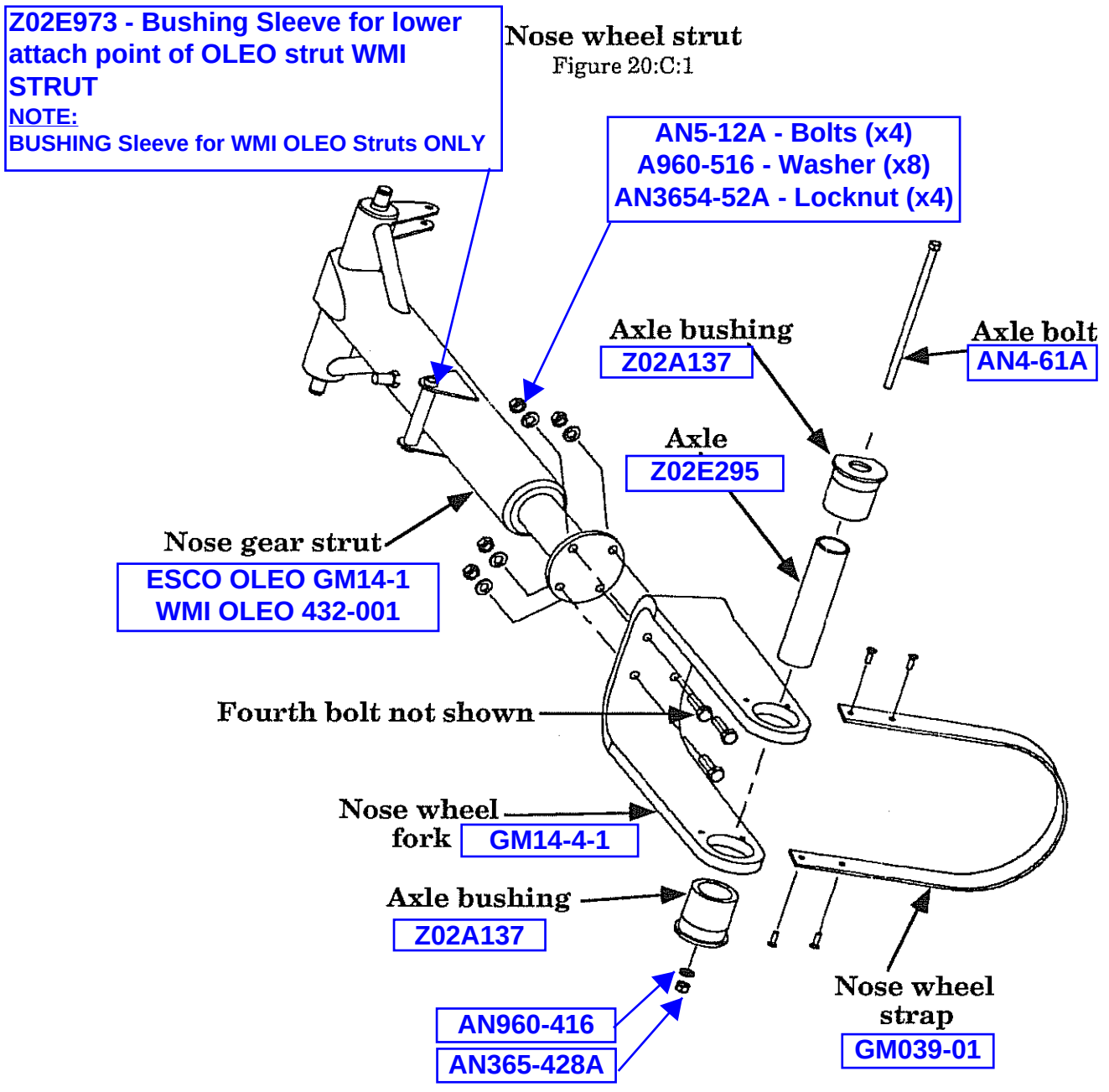
B2. Clean the forward face of the firewall with MC.

B3. Apply a bead of high temperature silicon caulk (available at most auto parts stores) to the forward face of the firewall where the blanket will be bonded. Carefully press the firewall blanket into position.

C. ASSEMBLING NOSE WHEEL STRUT

The Lancair IV uses a 5" wide rim as a nose wheel with a 5.00 x 5, 6 ply tire. Do not confuse the 5.00 x 5 tire and rim with the 6.00 x 6 main gear tires and rims.

Nose wheel strut
Figure 20:C:1



C1. Disassemble the 5" nose wheel rim, bearings and all.

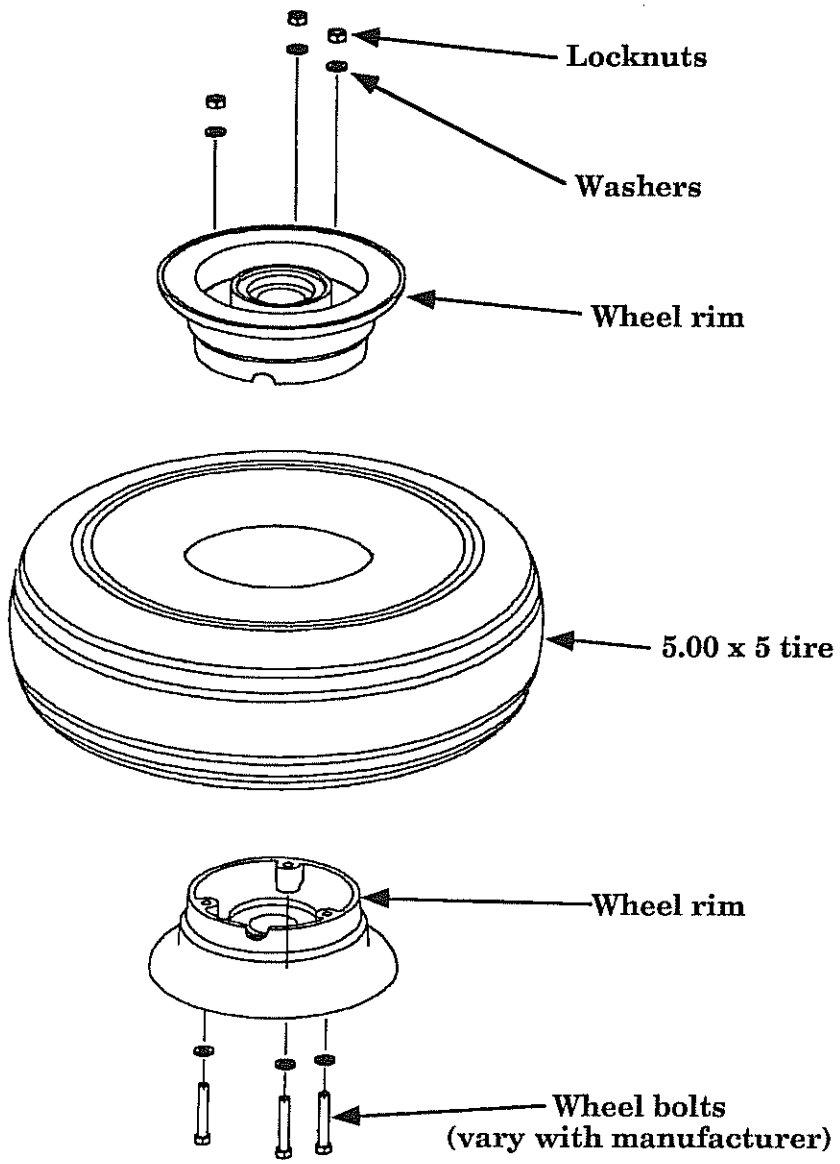
C2. Place the half of the rim without the valve stem hole on a bench with the outbd face of the rim down.

C3. Insert the 5.00 x 5 tube into the tire. Inflating the tube with a very small amount of air (just enough to unfold it) helps ease assembly.

C4. Place the tire and tube onto the rim you have set on your bench. Push the tire down onto the rim, always avoiding pinching the tube. You will not push the tire all the way onto the rim, the tire will be seated with air pressure.

Assembling tire and wheel

Figure 20:C:2



C5. Place the other half of the rim onto the tire, aligning the valve stem hole and the three bolt holes. Pull the valve stem through the rim as you work the rim down. Here is where most people damage the tube. If you're not careful when pushing the rims together, you can easily pinch the tube or stem between the rims. Instant leak! This problem can be avoided by just being careful and aware of the danger.

C6. Secure the rim halves together with the bolts and nuts provided with the wheel. Again, be careful to avoid pinching the tube and/or valve stem.

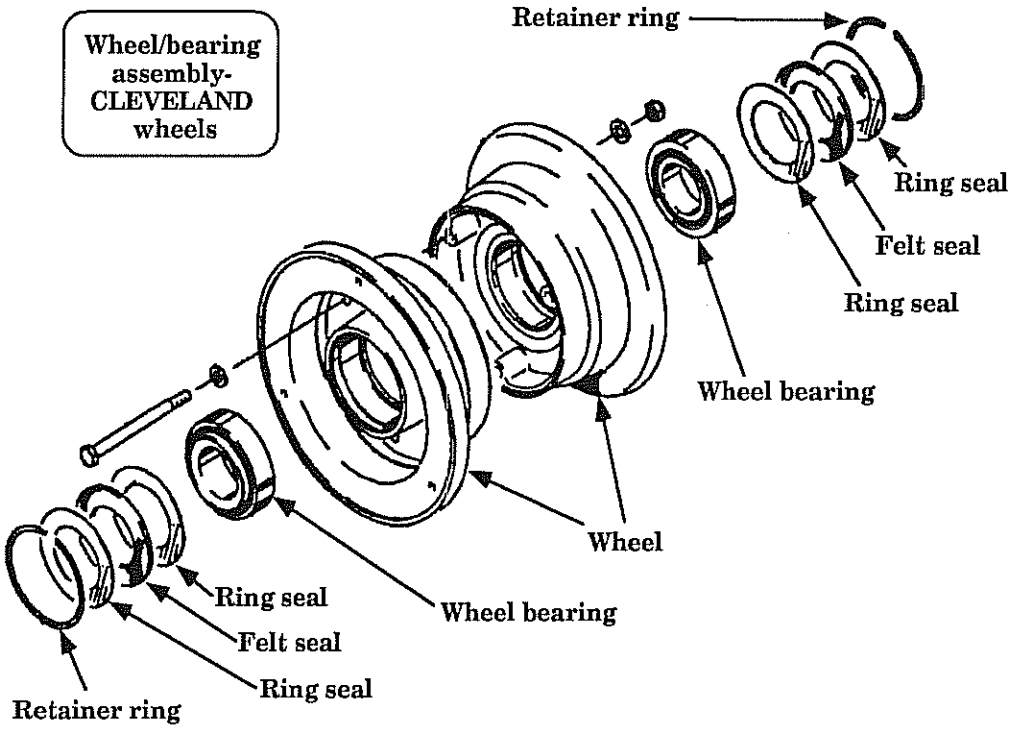
C7. Inflate the tire to 28-30 psi. Do not inflate the tire over 32 psi.

NOTE: Early Lancair IV kits used a Condor brand nose gear tire. Later kits were shipped with a McCreary tire. Both tires are 5.00x5 size and are interchangeable.

C8. Grease the two wheel bearings with a quality grease. Be sure the grease is pushed all the way through the bearings.

C9. Place the bearings into the races of the wheel. After the bearings are placed into the race, a seal consisting of two thin steelwashers and a felt washer is secured with a retainer ring. The seals and rings retain the bearings in the wheel.

Wheel/ bearing assembly
Figure 20:C:3



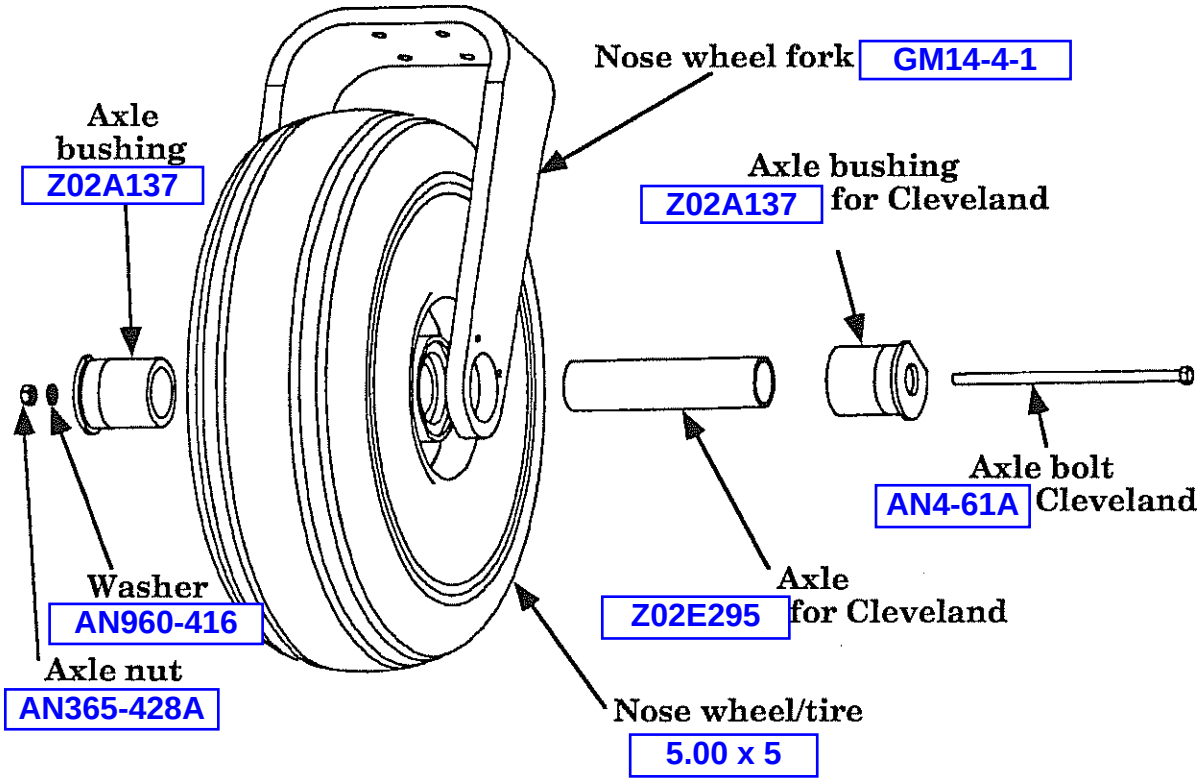
C10. Slide the GM483-2 axle through the nose wheel bearings.

C11. Slide the nose wheel and axle between the nose wheel fork. Grease the outer diameter and push the axle bushings through the fork to secure the axle. Use GM483-3A bushings for Cleveland.

C12. Slide an AN4-61A bolt through the entire nose wheel assembly and tighten with an AN960-416 washer and AN365-428A locknut. Tighten the locknut only enough so when the tire is spun by hand, it will only complete one revolution. (This is easier when the fork is mounted to the nose gear strut).

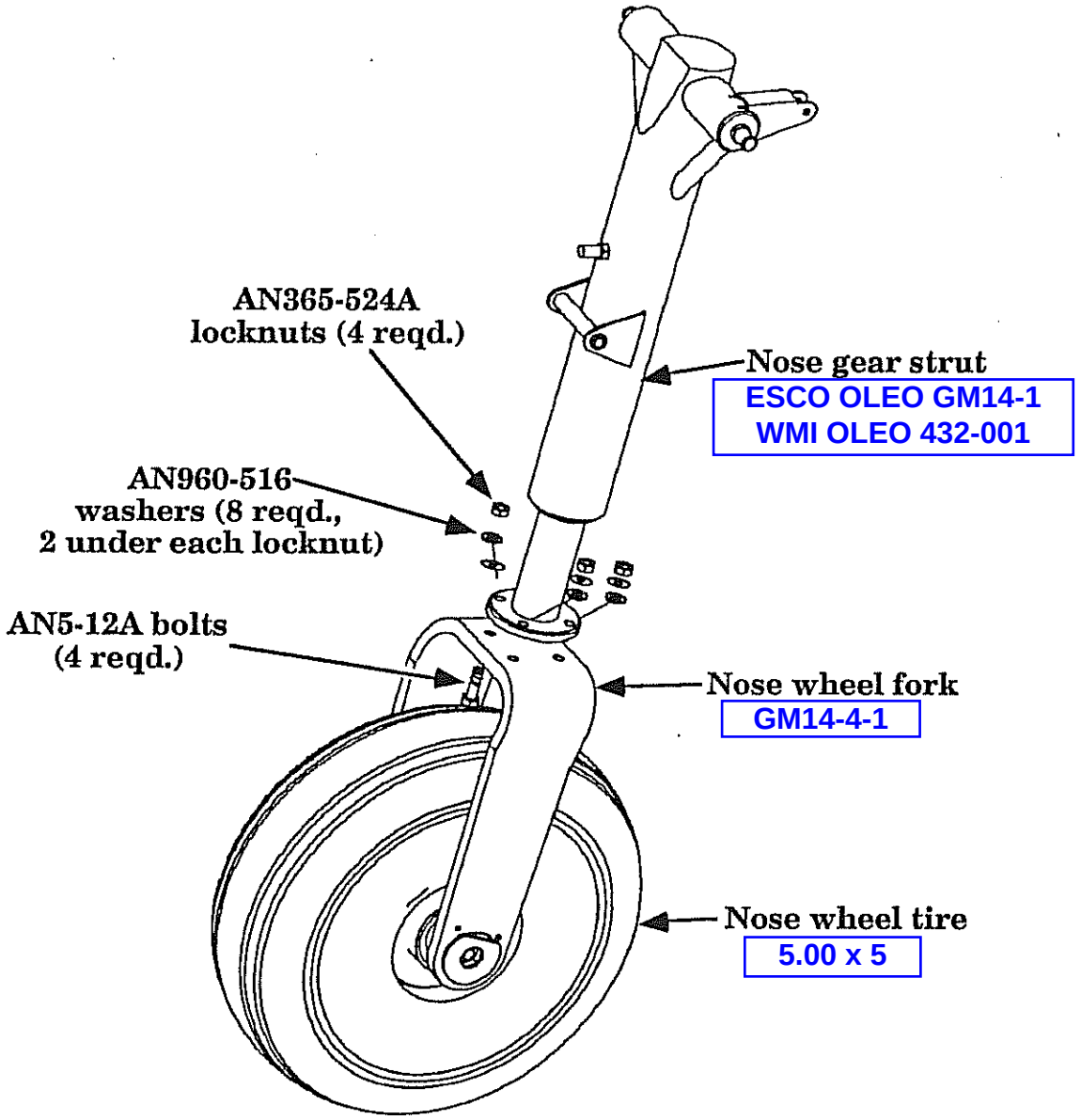
NOTE: To aid the rotational positioning of the axle bushings, first position the guide bar on the fork and draw a line, in pencil, on the sides of the fork. This provides a visual guide for the flats on the side of the bushings.

Installing nose wheel on fork
Figure 20:C:4



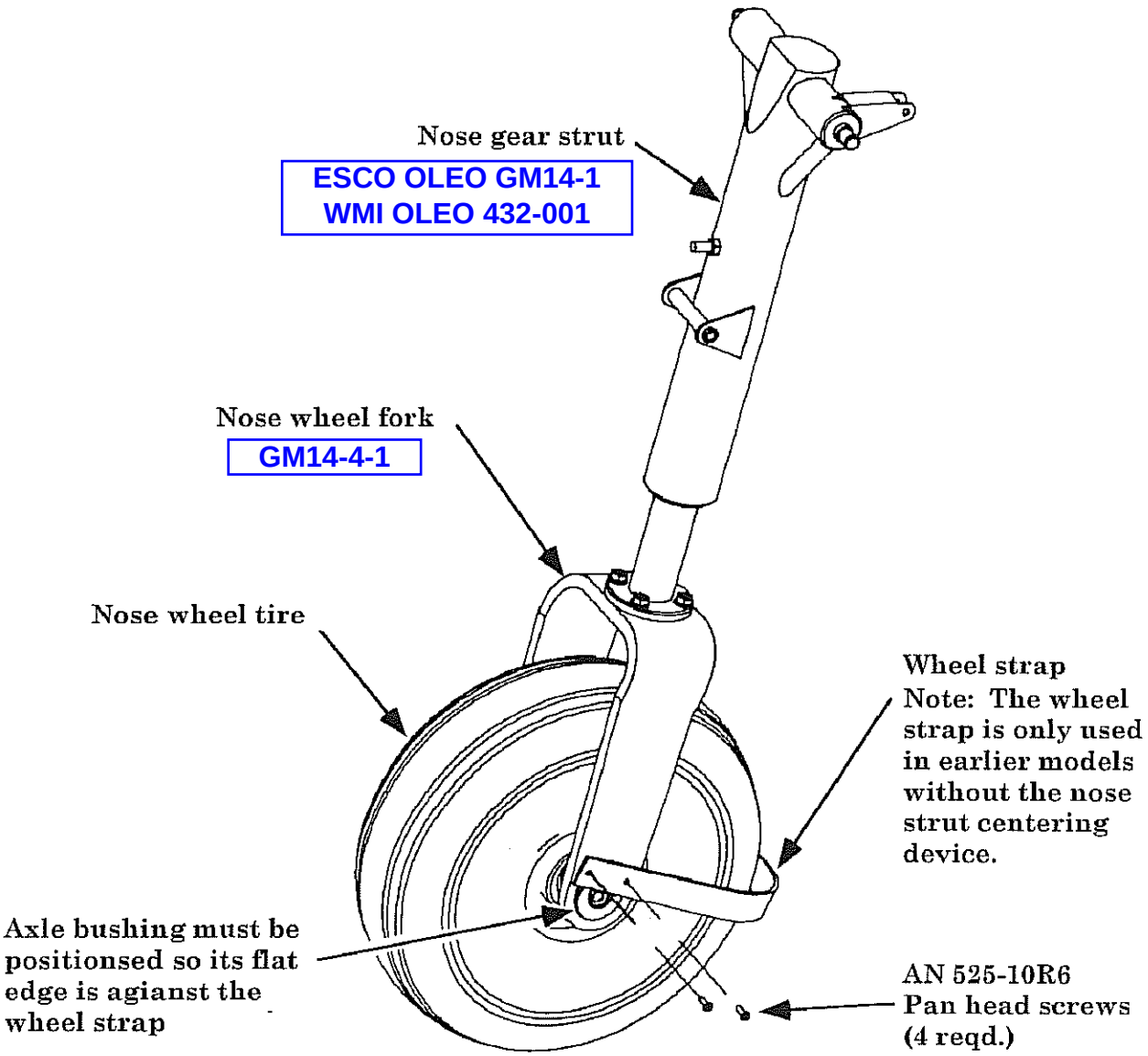
C13. Secure the nose wheel and fork to the nose gear strut with AN5-12A bolts, AN960-516 washers, and AN365-524A locknuts. The bolts should be oriented so the heads are on the tire side of the fork.

Securing fork to nose gear strut
Figure 20:C:5



C14. Secure the wheel strap to the nose wheel fork with AN525-10R6 pan head screws. The flat edges of the axle bushings must be up to accomodate the strap. This strap will guide the nose wheel into the gear tunnel if the strut has cocked slightly one way or another.

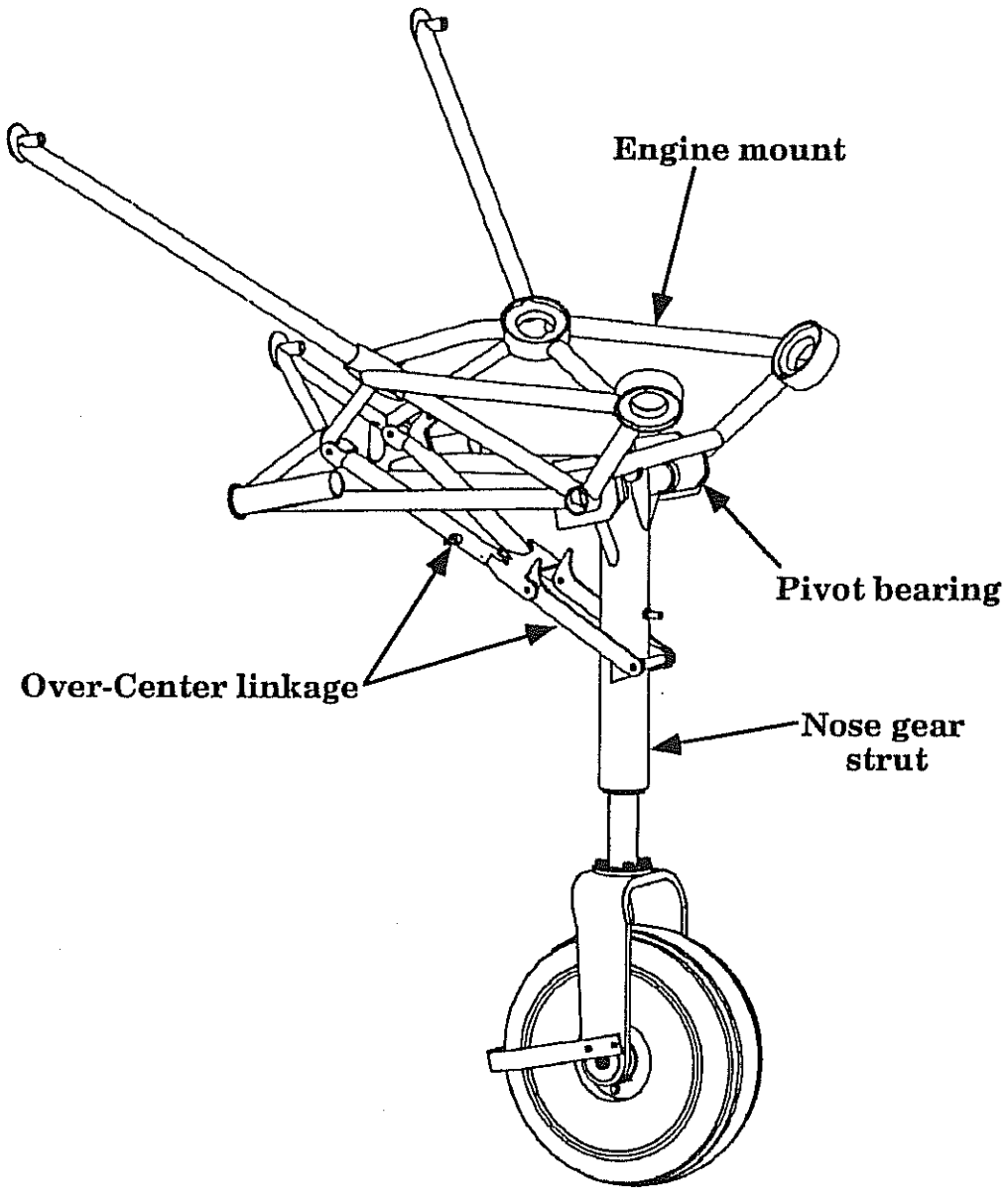
Securing wheel strap to fork
Figure 20:C:6



D. INSTALLING NOSE GEAR STRUT

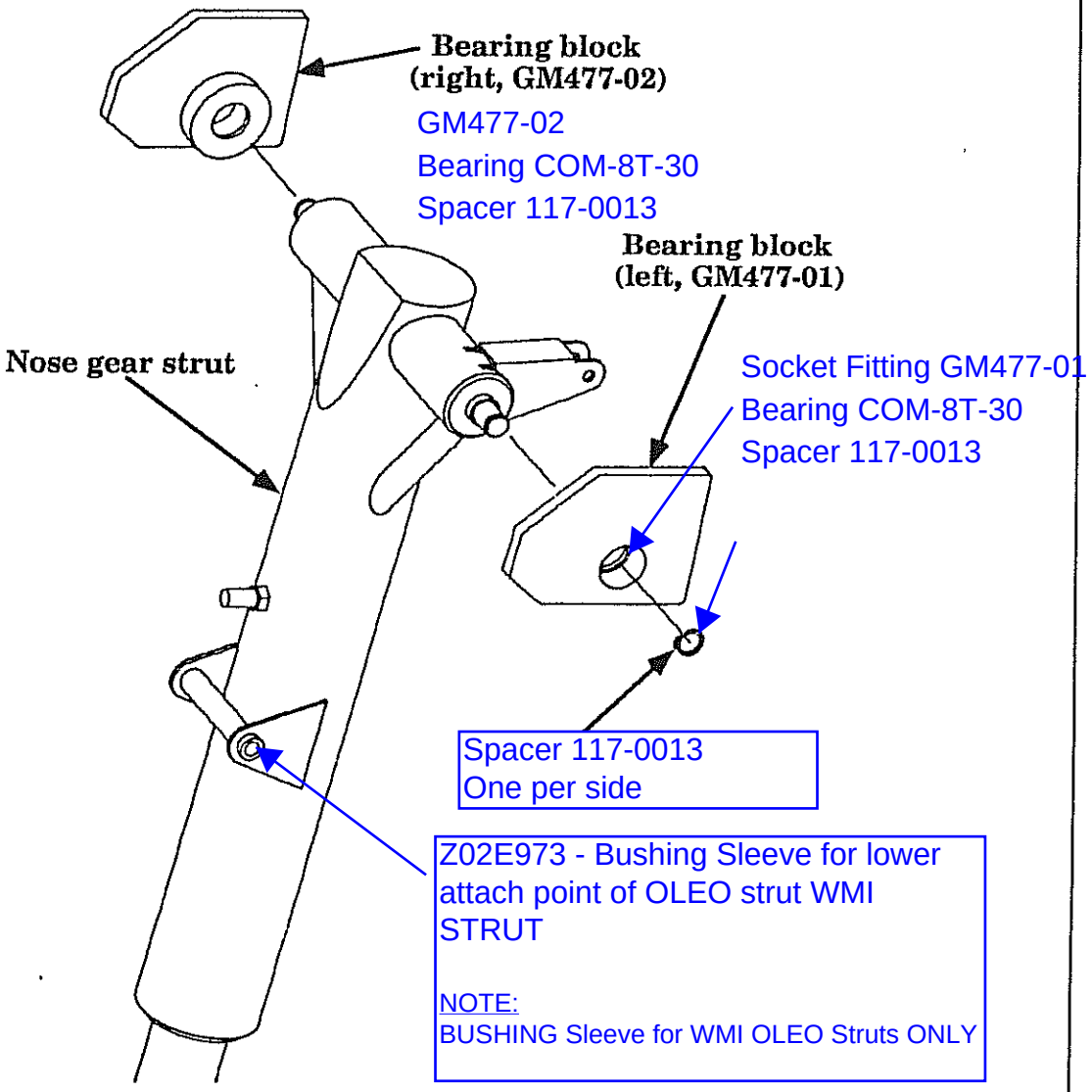
The nose gear strut pivots on two spherical bearings that are bolted to the engine mount. A down link assembly is also secured to the engine mount and locks over center when the gear is down.

Nose gear strut installation
Figure 20:D:1



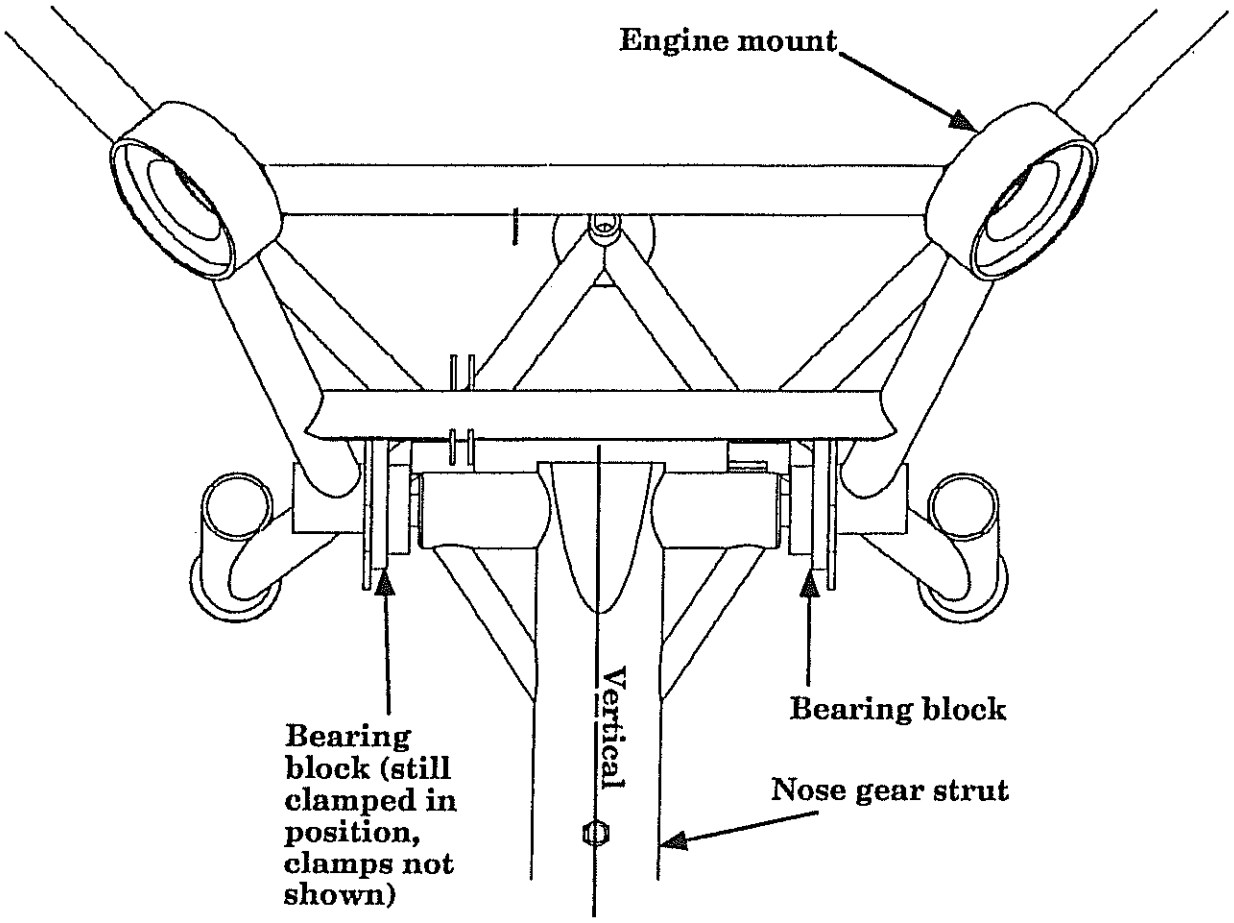
D1. Secure the bearing blocks to the nose gear strut with retaining clips (circlips). There is a left (GM477-01) and right (GM477-02) bearing block. Refer to the drawings to make sure your blocks are oriented correctly.

Securing nose gear bearing blocks to strut
Figure 20:D:2



D2. Use a couple small "C" clamps to temporarily secure the nose gear bearing blocks to the engine mount plates. The bearing blocks and plates have roughly the same shape. The plate surface on the engine mount will probably be uneven. This is an unavoidable consequence of the welding procedure. *Do not* forcibly clamp the bearing blocks against the engine mount plate. Use light clamping pressure, just enough to hold the bearing blocks in place.

Clamping bearing blocks to mount
Figure 20:D:3

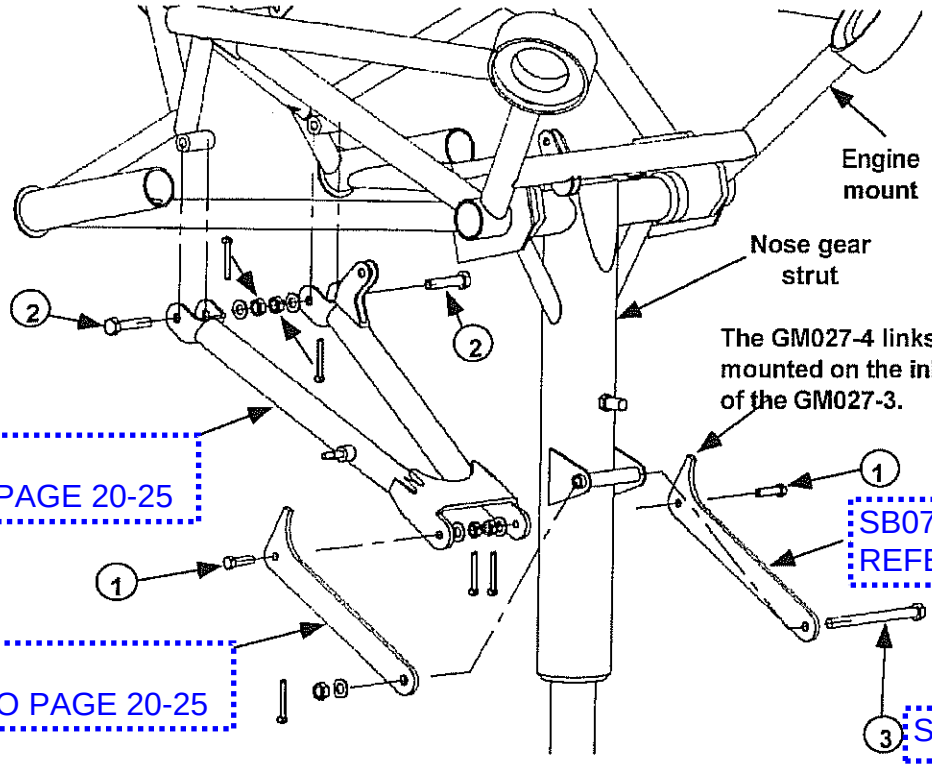


D3. Connect the lower over-center links (GM027-4's) with the upper link (GM027-3) with AN4-7 bolts, AN960-416 washers, AN310-4 castle nuts, and small cotter pins. The castle nuts should be tightened just enough so the links are not bound up against each other.

D4. Connect the upper over-center link (GM027-3) to the engine mount with AN5-20 bolts, AN960-516 washers, AN310-5 castle nuts, and small cotter pins. On some early mounts, you might have to ream the bushing holes in the engine mount with a 5/16" reamer to get a smooth bolt fit and better alignment. Again, tighten the castle nuts just enough so there is no bind between the upper link and engine mount bushings.

Assembling nose gear linkage

Figure 20:D:4



4720-1010
REFER TO PAGE 20-25

SB077-01
REFER TO PAGE 20-25

SB077-01
REFER TO PAGE 20-25

SEE NOTE ***

1 - Lower to upper pivot links. Use AN4-7 bolts, AN960-416 washers, AN310-4 castle nuts, and small cotter pins.

2 - Upper pivot link to engine mount. Use AN5-20 bolts, AN960-516 washers, AN310-5 castle nuts, and small cotter pins.

3 - Lower pivot link to nose gear strut. Use AN5-41 bolt, AN960-516 washer, AN310-5 castle nut, and small cotter pin.

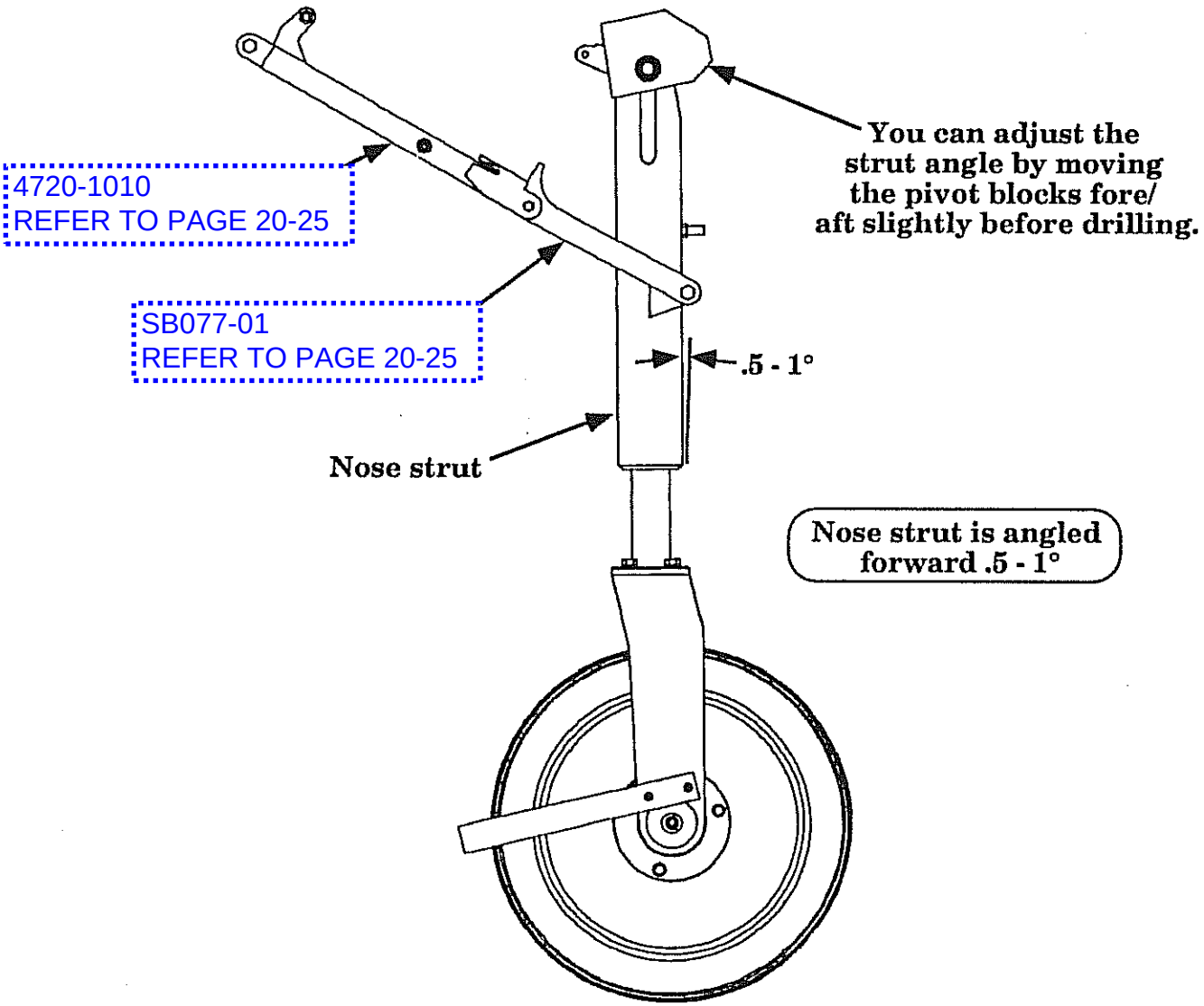
*NOTE: The retract yoke for the nose gear doors mounts using the same AN5-20 bolts that secure GM027-3. Do not secure cotter pin until yoke is installed.

NOTE ***
Z02E973 - BEARING (BUSHING) LINK ATTACH - WMI OLEO STRUTS

D5. Connect the lower over center links (GM027-4's) to the nose gear strut using an AN5-36 bolt, AN960-516 washer, AN310-5 castle nut, and a small cotter pin. Loosen the clamps and rotate the nose gear, if necessary, so the AN5-36 bolt slides easily through the strut bushing. You don't want any bind in the nose gear linkage.

D6. Check the fore/aft angle of the nose gear strut. The strut should be angled forward .5 - 1°. Loosen your "C" clamps and adjust the bearing blocks fore/aft, if necessary, to change the strut angle.

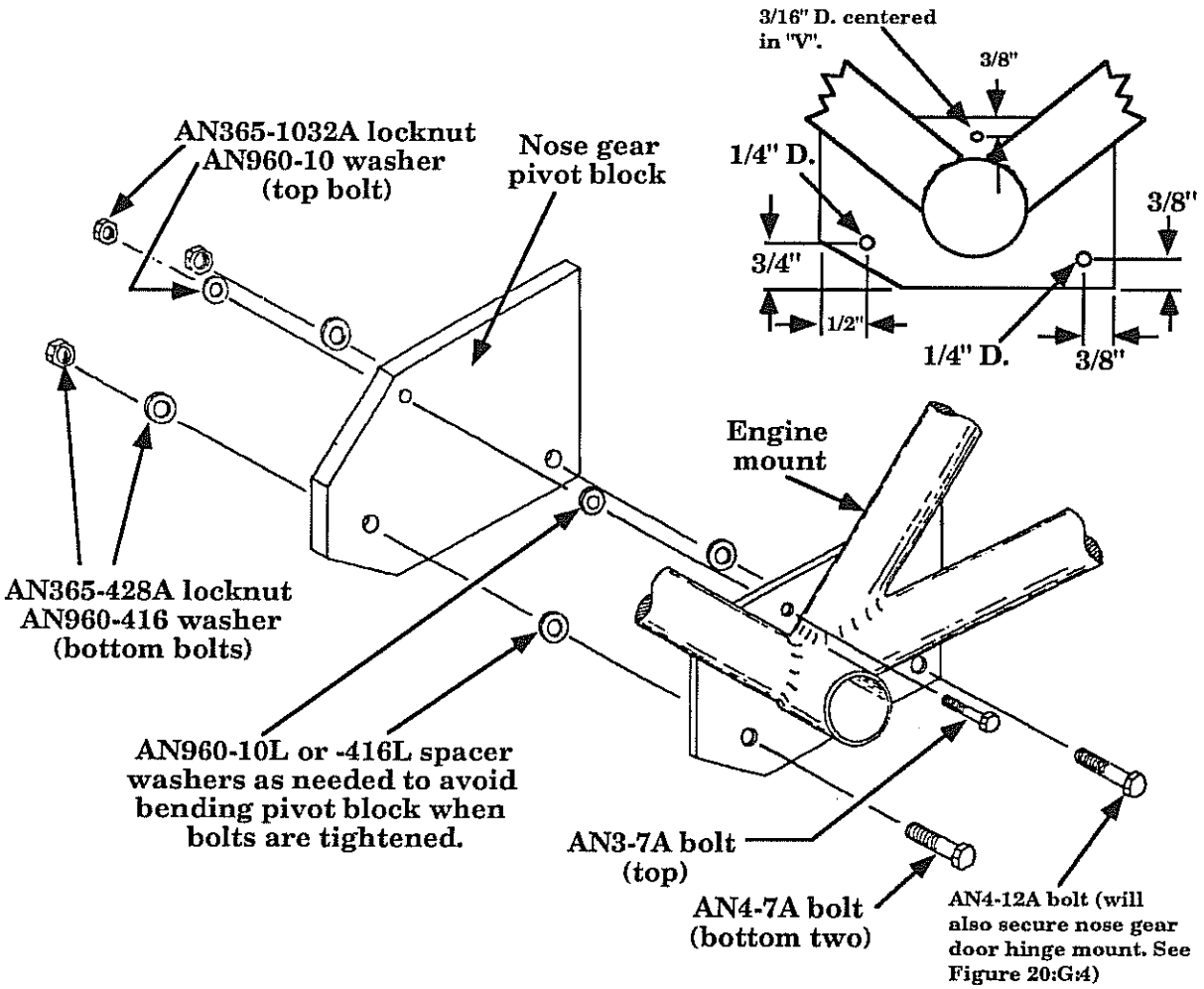
Setting proper strut angle
Figure 20:D:5



D7. Retract the nose gear into the tunnel. The strut should be in the center of the tunnel. One area to watch closely during the retraction is the joint between the upper and lower over-center links. This joint comes very close to the strut during retraction. If it hits the strut, loosen the "C" clamps once again and shift the strut downward slightly until there is a gap. You can even slide a tongue depressor between the joint and the strut, retract the strut, and you'll end up with about a .050" gap.

D8. The position of the nose gear bearing blocks should now be fixed. Later engine mounts have predrilled pilot holes in the engine mount plates. Use these holes as guides to drill two 1/4" diameter holes through the bottom of each bearing plate. The top mounting hole is 3/16" diameter. If you have an early mount, you will have to drill through both the engine mount plates and the bearing blocks. Use the dimensions in Figure 20:D:6 to find the hole centers

Securing bearing blocks to engine mount
Figure 20:D:6

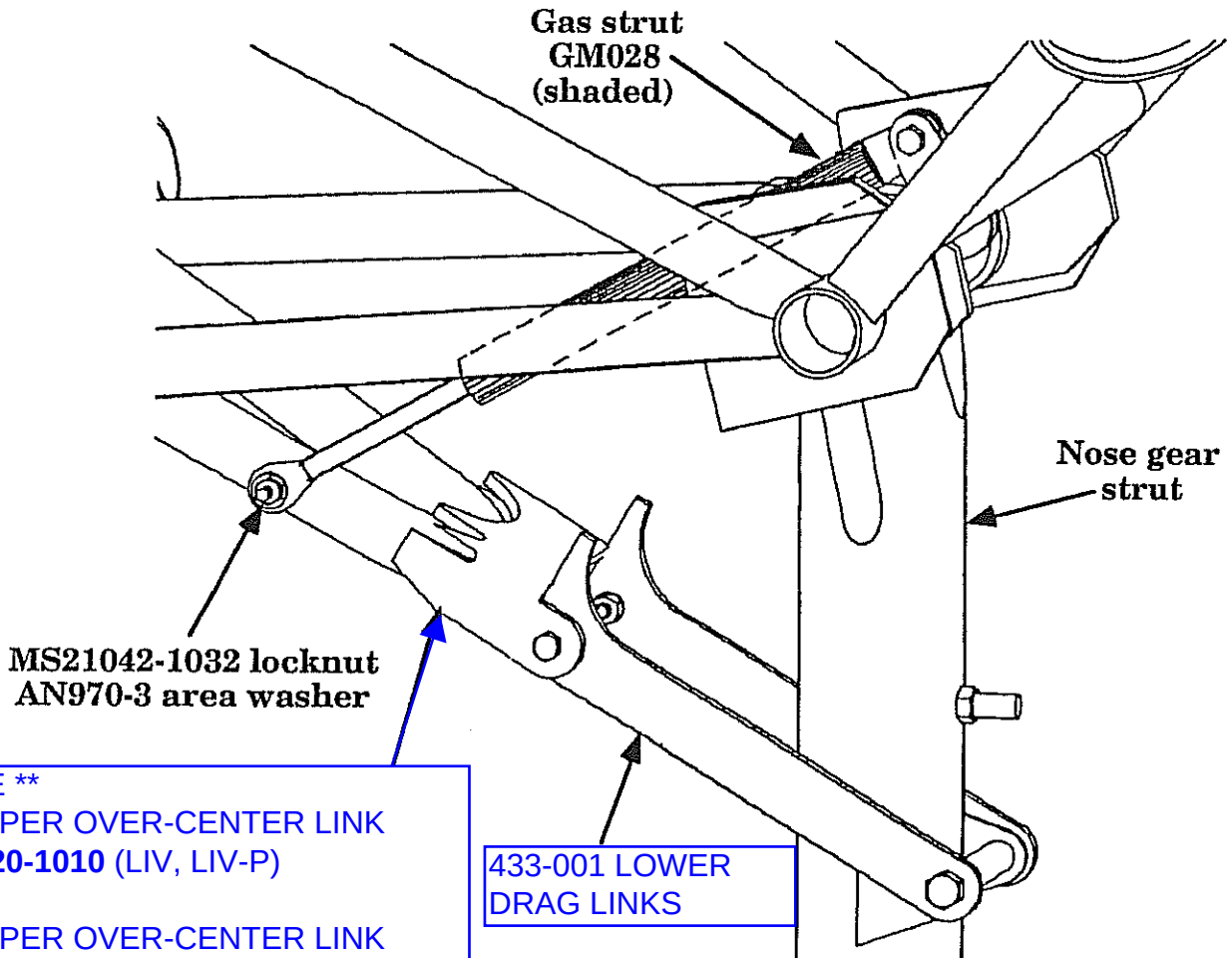


D9. Bolting the bearing blocks to the engine mount should be done with care because of the uneven mounting surfaces previously mentioned. Look closely at the gaps between the bearing blocks and the engine mount plates. You should be able to slip a thin washer (AN960-10L or AN960-416L) between these parts at one or two of the bolt locations. These washers will basically fill the gaps and prevent you from bending the bearing blocks when tightening the bolts.

E. GAS STRUT ATTACHMENT

The Lancair IV uses a pressurized gas strut for emergency extension of the nose gear. The gas strut is connected to the over-center linkage to ensure the gear is down and locked. This system has proven to be simple and reliable on all Lancair models.

Emergency gas strut
Figure 20:E:1



NOTE **
1) UPPER OVER-CENTER LINK
4720-1010 (LIV, LIV-P)

2) UPPER OVER-CENTER LINK
5520-1010
(LIV-PT, WALTERS TURBINE)

433-001 LOWER
DRAG LINKS

SB077 -01 -LOWER DRAG LINK
(SUPERSEDED PRIOR PART)

SUB ASSEMBLY
* 433-001 - DRAG LINK
* 4722 - BUSHING
* AN363-428 - NUT
* AN4-11A - BOLT
* AN960-416 - WASHERS

E1. Disconnect the lower over-center linkages (GM027-4's) from the nose strut.

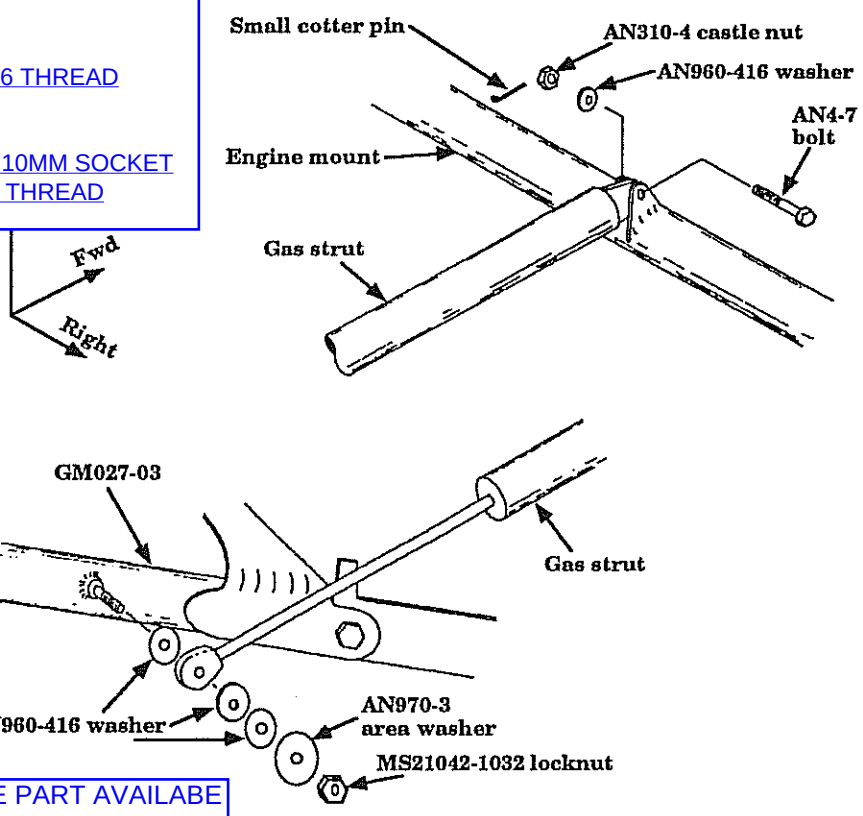
E2. The GM028 gas strut has 5/16" diameter mounting holes in each end. Push a GM028-01 bushing into each hole. Notice that the bushing is wider than the gas strut ends. After pushing the bushing flush with one side of the hole, file the other side of the bushing until it too is flush. These bushings will decrease the hole diameters to 1/4".

E3. Connect the gas strut (GM028) to the over-center linkage and the engine mount as shown in Figure 20:E:2. Do not connect the wrong end of the gas strut to the linkage. The fixed end of the gas strut is connected to the engine mount.

NOTE:
IF NEW 4720-1010 UPPER DRAGLINK IS USED,,,, THE NEW RECOMMEDED GAS STRUT IS 160-002 WITH BALL STUD AND CAP CONNECTION

ASSEMBLY
160-002 - GAS SPRNG 100# M6 THREAD
198-0006 - BALL STUD 10MM
198-0003 - SOCKET 10MM M6
198-0004 - CLIP SAFETY FOR 10MM SOCKET
198-0005 - EYE BOLT FOR M6 THREAD

Installing gas strut
Figure 20:E:2



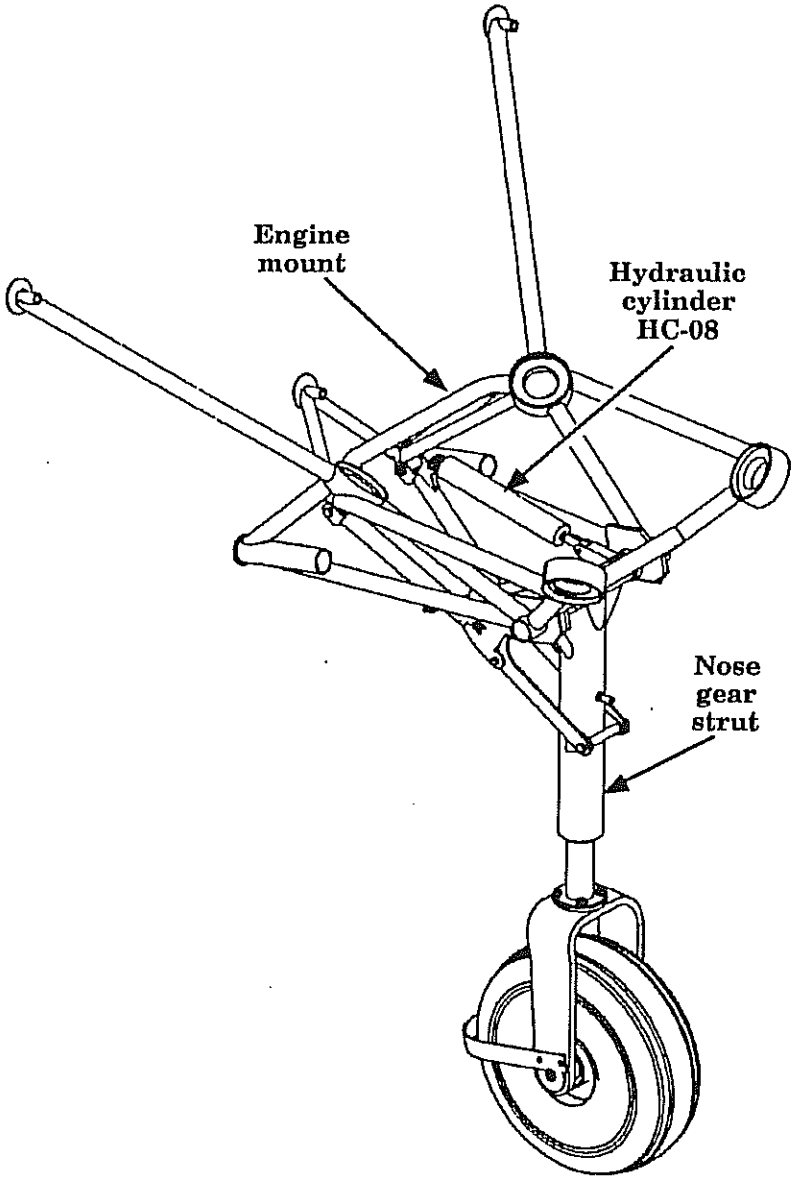
ALTERNATE PART AVAILABE
SEE NOTE >>>

E4. Now the pressure in the gas strut is holding the over-center linkage below where it should be. Push the over-center linkage back into position and reconnect the lower linkages to the nose strut using the proper hardware. A helper on this step is a good idea because of the pressure against the linkage. To retract the nose gear, you now have to push in the over-center linkage up and forward to break the down lock force. Once the over-center linkage begins to fold, it is fairly easy to retract the nose strut.

F. NOSE GEAR HYDRAULIC CYLINDER

A single hydraulic cylinder (HC-08) actuates the nose gear retraction. This section will deal with the installation of the hydraulic cylinder, but the plumbing of the hydraulic system will be described in a later chapter

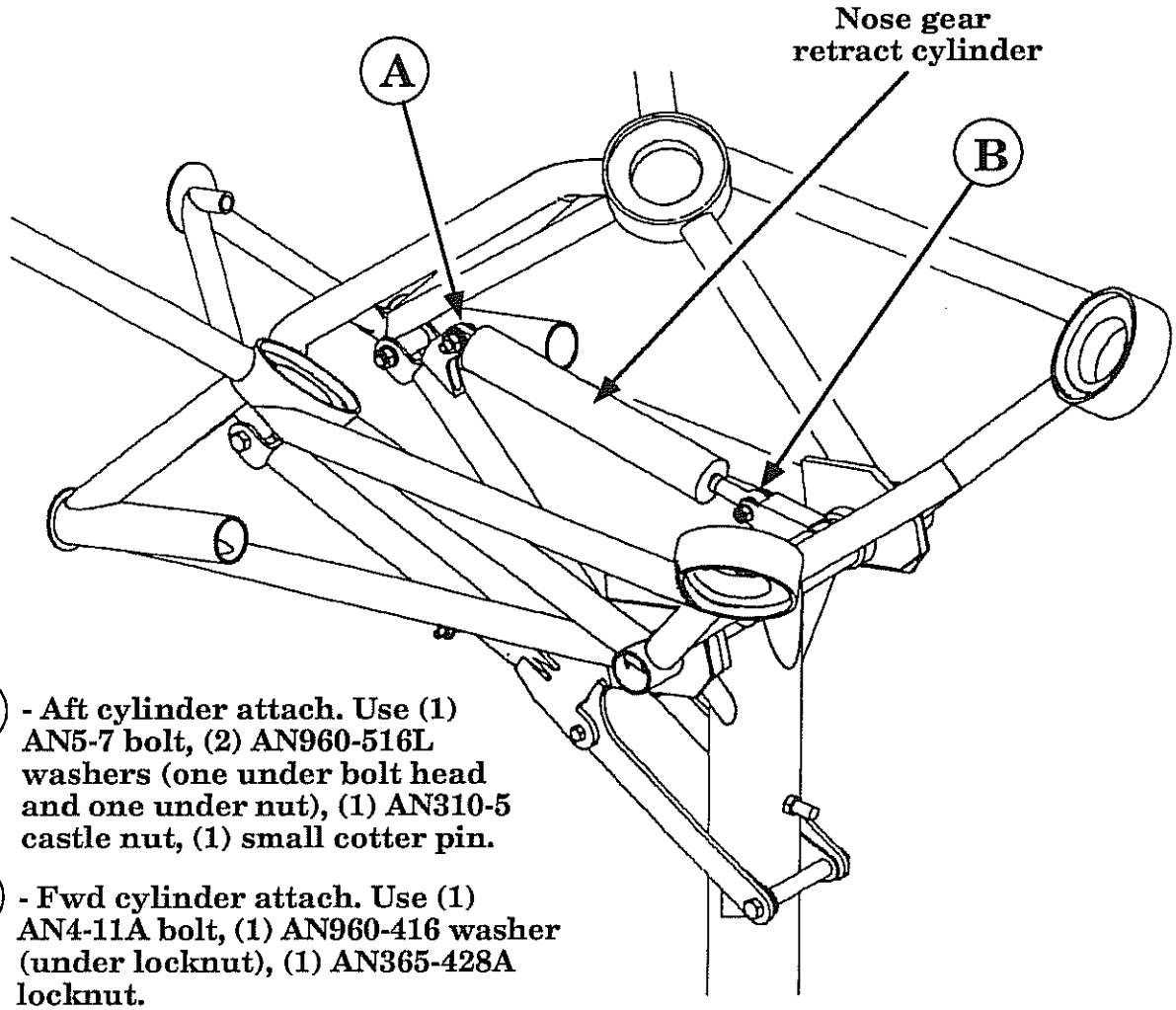
Nose gear hydraulic cylinder
Figure 20:F:1



F1. Connect the fixed end of the nose gear hydraulic cylinder to the upper over-center linkage (GM027-3) as shown in Figure 20:F:2. Use an AN5-7 bolt, AN960-516L washers, AN310-5 castle nut, and a small cotter pin. Do not tighten the castle nut so much that the cylinder can't move.

F2. Connect the piston end of the cylinder to the top of the nose gear strut as shown in Figure 20:F:2. Again, do not tighten the castle nut so much that the cylinder is bound up. An F45-19 rod end bearing and an AN316-5 stop nut should be threaded onto the shaft end of the hydraulic cylinder. 1/2" of the shaft thread should be inside the rod end.

Installing nose gear hydraulic cylinder
Figure 20:F:2



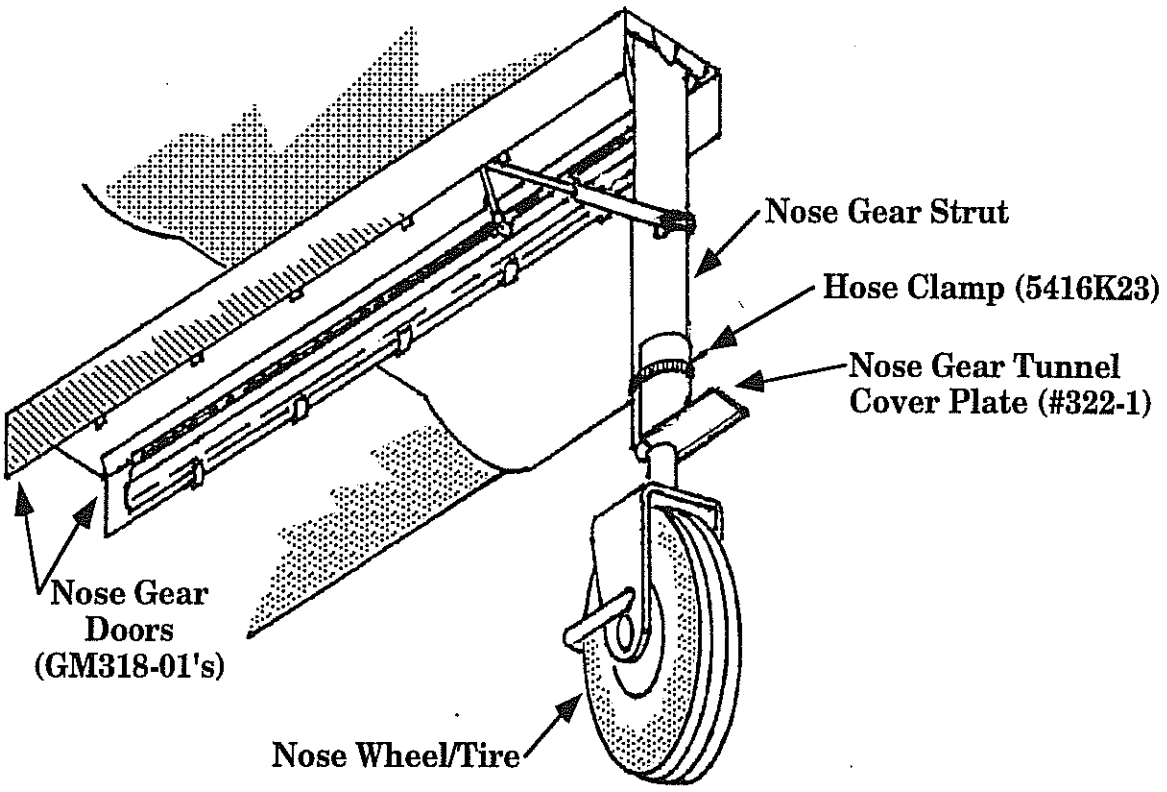
(A) - Aft cylinder attach. Use (1) AN5-7 bolt, (2) AN960-516L washers (one under bolt head and one under nut), (1) AN310-5 castle nut, (1) small cotter pin.

(B) - Fwd cylinder attach. Use (1) AN4-11A bolt, (1) AN960-416 washer (under locknut), (1) AN365-428A locknut.

G. NOSE GEAR DOORS

There are two aluminum doors that cover the nose gear in flight. The hinges and linkages for these doors are completely separate from the cowling installation, so the doors do not have to be removed when the cowling is removed. The nose gear tunnel cover plate and the nose gear shield installation instructions are provided in this section.

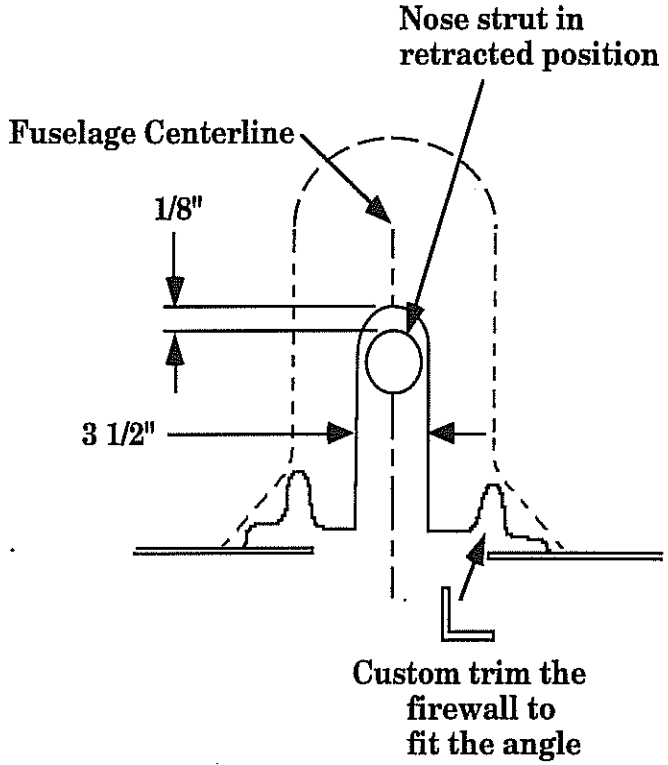
Nose Gear Doors
Figure 20:G:1



Note: A nose gear shield (not shown) is installed on the firewall.

G1. Trim the firewall and cowling flange as shown in Figure 20:G:2. This will provide a flat mounting surface for the nose gear door hinges. Use the aluminum angle to judge the trimming of the firewall. The opening slot in the firewall should be kept to a minimum. Note that the nose gear tunnel will be completely sealed off with the nose gear tunnel shield when the gear is retracted. Trim the firewall joggle in the area where the anlge passes through.

Trimming firewall and cowl flange
Figure 20:G:2

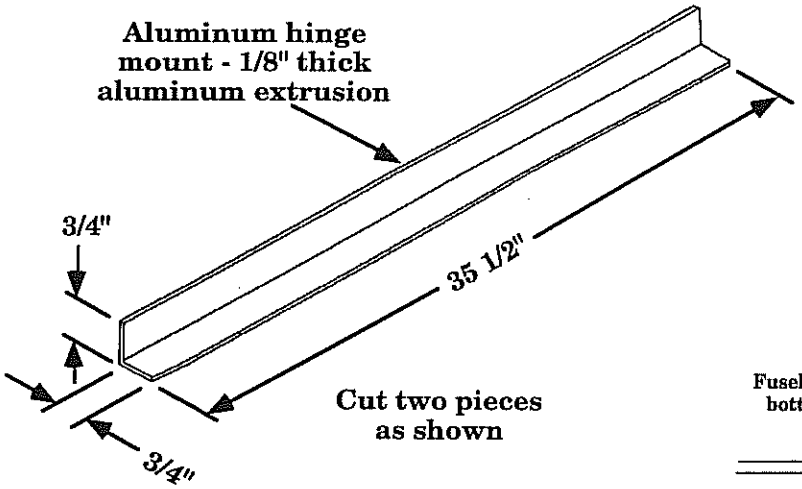


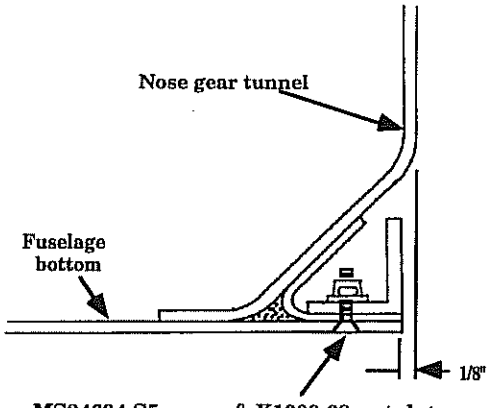
G2. The nose gear door hinges are mounted on 35 1/2" lengths of 6061-T6 aluminum "L" stock. The "L" stock is 3/4"x3/4"x1/8" thick, and is provided in two, 3' lengths. Cut the "L" stock into two, 35 1/2" lengths.

G3. Position the aluminum hinge mounts as shown in Figure 20:G:3. The "L" stock should rest flat on the nose gear tunnel flange, recessed 1/8" from the inner walls of the tunnel. The hinge mounts should be parallel with each other and the fuselage centerline. When satisfied with the hinge mount positions, secure them to the fuselage with MS24694-S5 flush head screws and K1000-08 nutplates. Use six screws per side, spaced about 3" (+/- 1/2") apart, to secure the hinge mounts. Secure the nutplates to the hinge mounts with AN426A3-8 rivets.

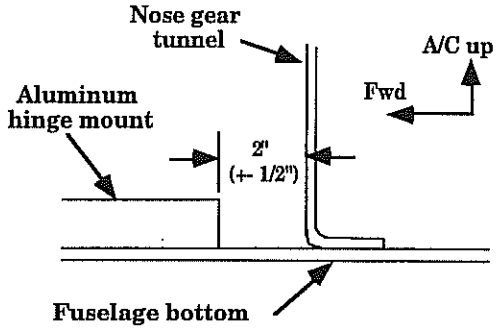
Aluminum Hinge Mounts

Figure 20:G:3





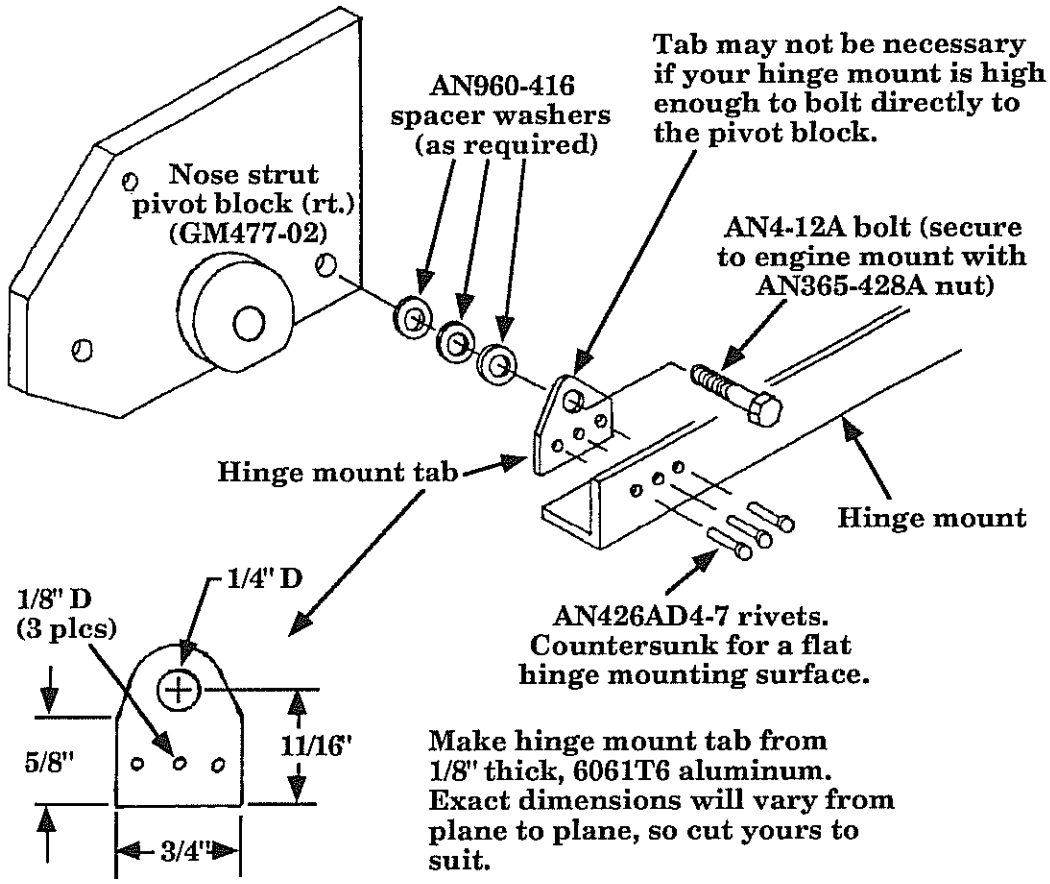
MS24694-S5 screw & K1000-08 nutplate.
Use AN426A3-8 rivets to secure nutplates to aluminum extrusion.



G4. The forward ends of the aluminum hinge mounts must be secured to the nose gear pivot blocks with tabs. Use the dimensions in Figure 20:G:4, cut two mounting tabs from the 6" x 6", 1/8" thick, 6061-T6 aluminum plate provided in the kit. The height of these tabs is determined by the distance from the hinge mounts to the lower, aft pivot bolt. Because of numerous areas where builder tolerance is involved, the tab height will vary from plane to plane, or the tab may not even be necessary. In this case, the hinge mount can be bolted directly to the pivot block. See Figure 20:G:4.

Securing hinge mounts to pivot block

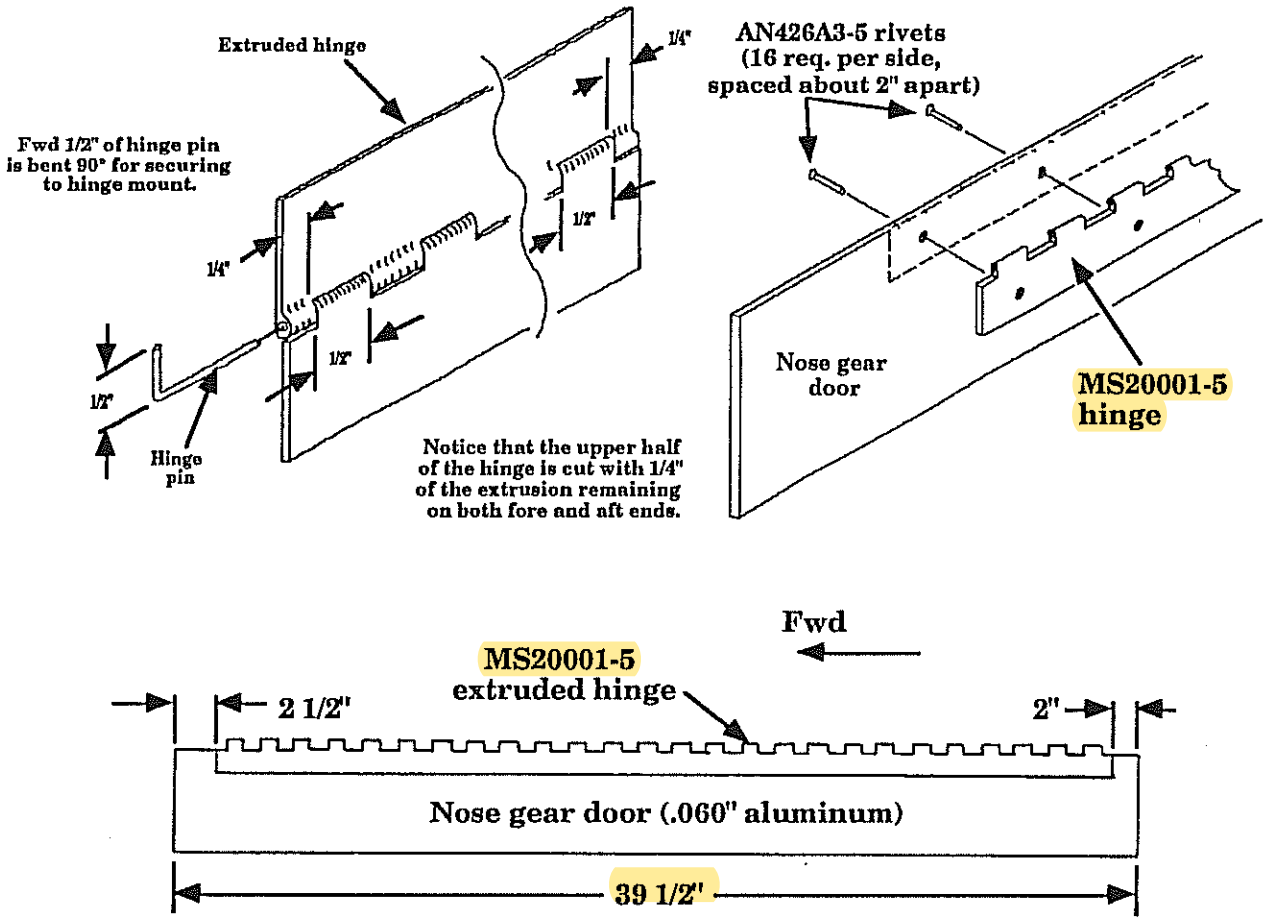
Figure 20:G:4



G5. Secure the tabs to the hinge mounts with AN426AD4-7 rivets (3 for each tab). Secure the tabs to the pivot blocks with AN4-12A bolts, AN960-416 washers, and AN365-428A locknuts. Remember that these bolts are also helping to secure the pivot blocks to the engine mount. If a pivot block does not fit flush against the engine mount, a thin (AN960-416L) spacer washer may be required to avoid bending the pivot block when the bolt is tightened.

G6. Use AN426A3-5 rivets to secure a 35" length of extruded hinge to each aluminum nose gear door, as shown in Figure 20:G:5.

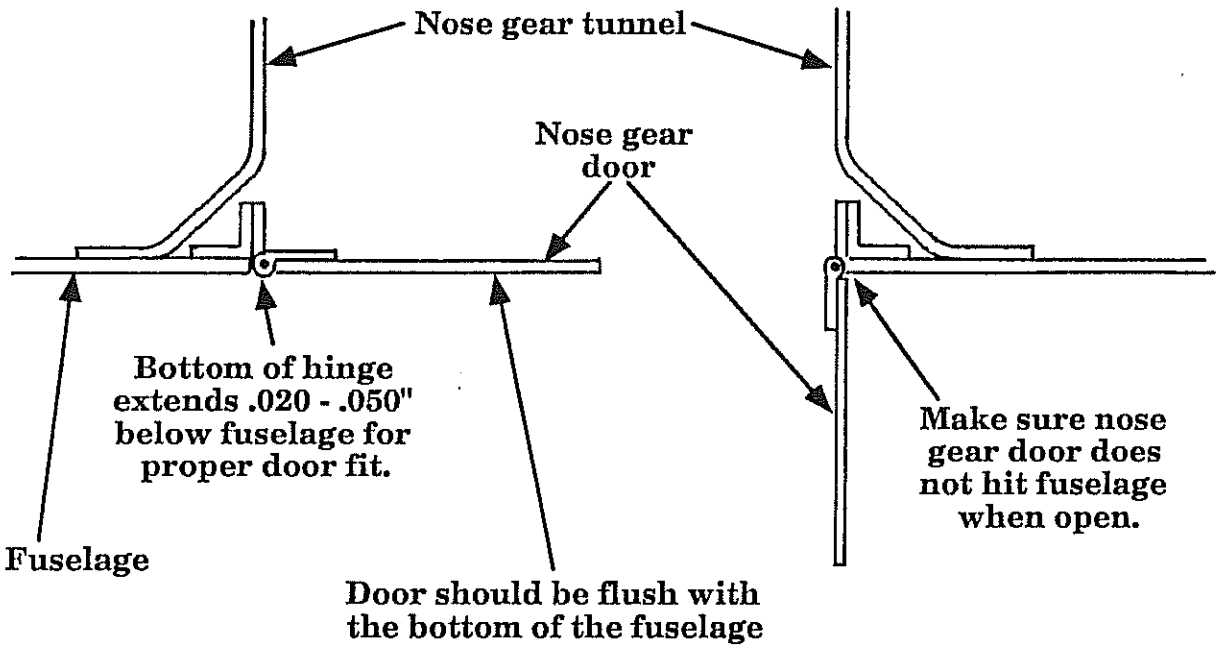
Securing hinge to nose gear door
Figure 20:G:5



G7. Cut two hinge pins for the nose gear doors. The pins should be approximately 1/2" longer than the hinges. Put a 90° bend in one end of each hinge pin. You'll have to heat the bend area to avoid breaking the hardened hinge pin. A propane torch works well for this job.

G8. Hold the upper halves of the gear door hinges against the aluminum hinge mount. The hinges should extend just below the fuselage by about .020 - .050". This will place the gear doors flush with the bottom of the fuselage. Clamp the hinges to the hinge mounts. (This is easily done forward of the firewall, but in the tunnel area, there isn't much room for the clamps. You can tack the hinges in place with a couple drops of instant glue for initial alignment.)

Aligning hinges
Figure 20:G:6



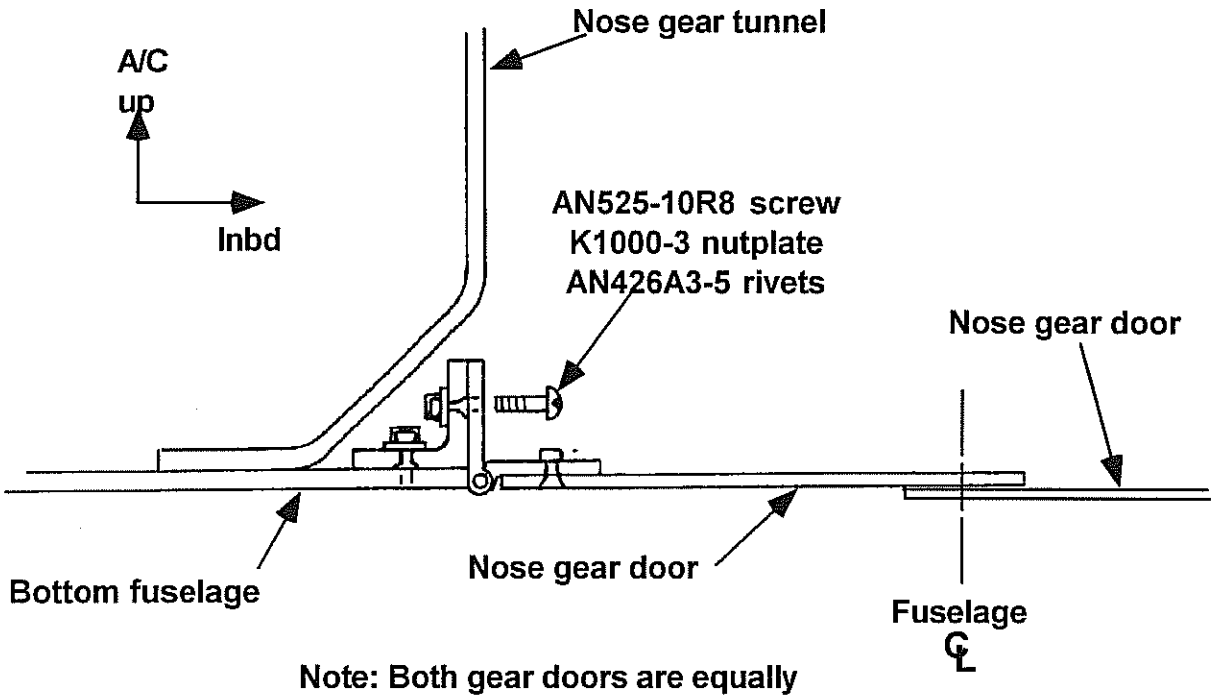
G9. Use the hinge pins to install the nose gear doors. Slide the pins into the hinges from the front. Let the doors hang. Both doors are purposefully cut wide, so they will overlap each other when closed until trimmed to the proper size. We did this to compensate for builder differences in nose gear tunnel width. Every tunnel can be slightly wider or narrower.

G10. Close one door at a time to check if they are flush with the bottom of the fuselage. Of course, there are no door stops yet, but you can still check that the hinges work smoothly and the doors will be able to close properly. Adjust the hinges on the hinge mounts if necessary.

G11. Remove the nose gear doors by pulling the hinge pins.

G12. Now that you have determined the positions of the hinges, secure them to the hinge mounts with AN525-10R8 screws and K1000-3 nutplates. Secure the nutplates to the outboard surfaces of the hinge mounts with AN426A3-5 rivets.

Securing hinges to hinge mounts
Figure 20:G:7



Note: Both gear doors are equally oversized. Cut both to get a .050" gap between them at the fuselage centerline.

G13. Reinstall the nose gear doors and determine their final size. The doors should have a .050" gap between them in the closed position. Both doors are equally oversized, so trim an equal amount off each one's width. We realize that cutting the entire door length with hand held shears will make an ugly edge. It would be best if you have access to a metal shear or bring the doors to a metal shop to have them quickly and cleanly cut to the proper width.

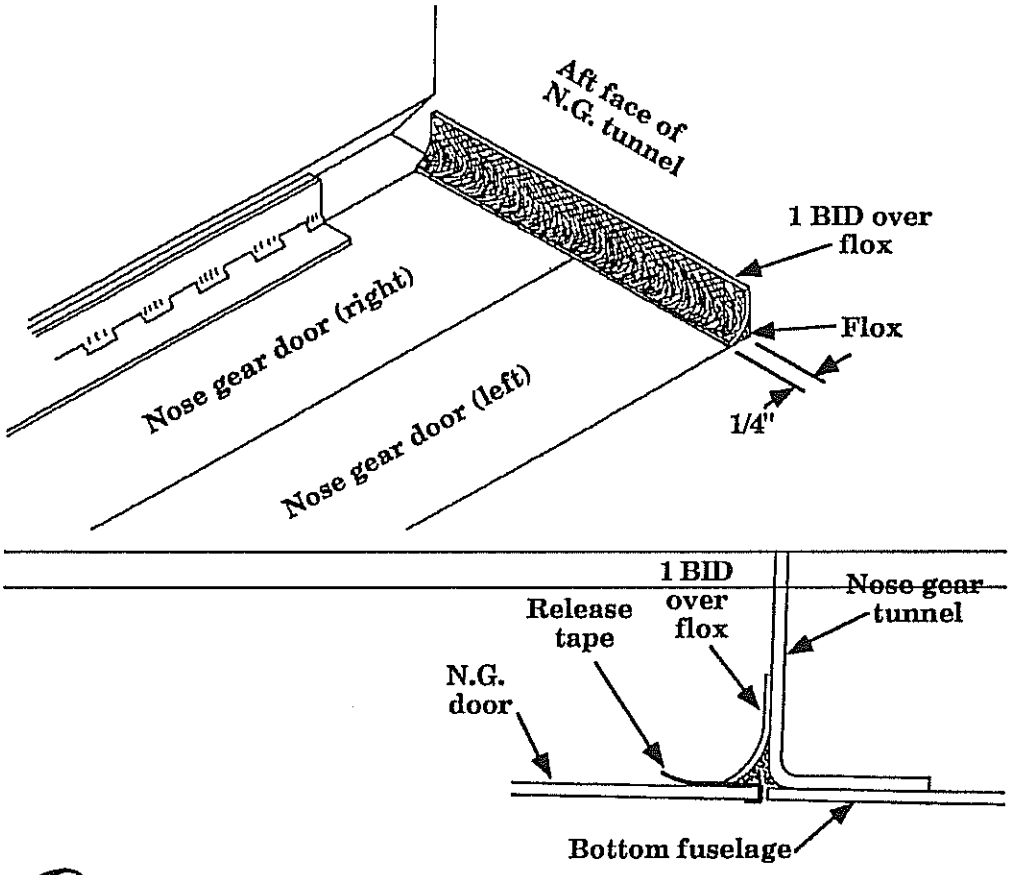
G14. To provide a positive stop for the doors to shut against, a flange is formed along the aft edges of the doors. Apply release tape to the aft 1" of the aluminum doors to prevent the flange from sticking to them.

G15. Mark on the aft face (inside surface) of the nose gear tunnel at the level where the gear doors close. This is the height where you want the flange. Sand and clean the area where the flange will be located.

G16. Mix a thick batch of flox and apply it to the area 1/2" above the flange reference mark. Let the flox extend 1/4" below the mark too. Now close the gear doors to their final positions. Secure the doors in position using a few tongue depressors and instant glue. The flox should hit the doors and conform against the release tape, forming the flange.

G17. When the flox has cured, reopen the nose gear doors. You now have a rough flange on the inside of the tunnel. Clean up the flange with a Dremel tool until it is only 1/4" wide. Apply 1 BID to the flange to better secure it to the nose gear tunnel. See Figure 20:G:8.

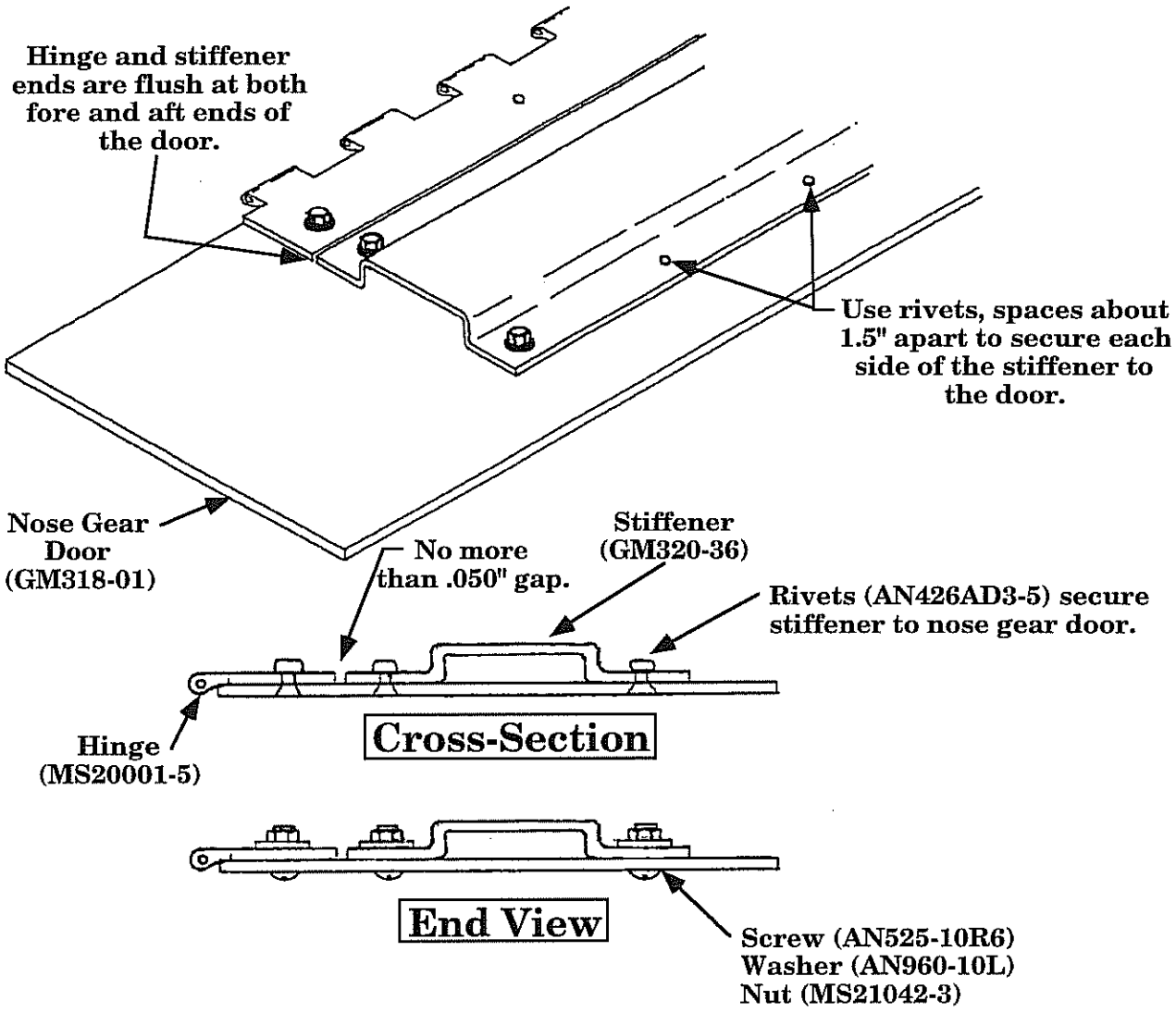
Forming the door stop flange
Figure 20:G:8



G18. A stiffener (GM320-36) is needed on each nose gear door. Provided in the kit is a thin aluminum hat section that will be used as a stiffener. Cut the stiffener material into two, 35" long segments.

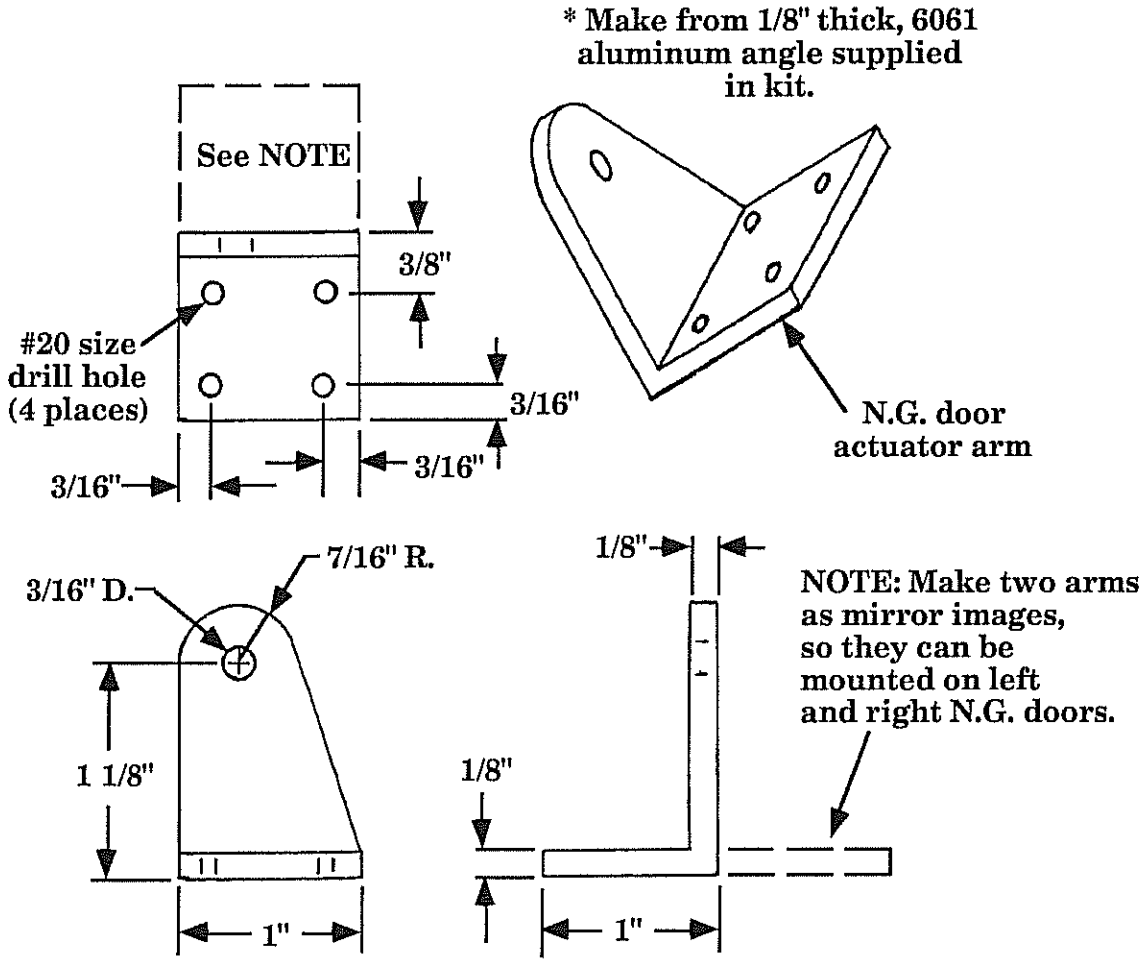
G19. Secure the stiffeners to the nose gear doors with AN426AD3-5 rivets as shown in Figure 20:G:9. Use 24 rivets per stiffener. Avoid using rivets in the areas where the actuator arms will be mounted. (See Figure 20:G:11 for actuator arm location).

N.G. door stiffeners
Figure 20:G:9



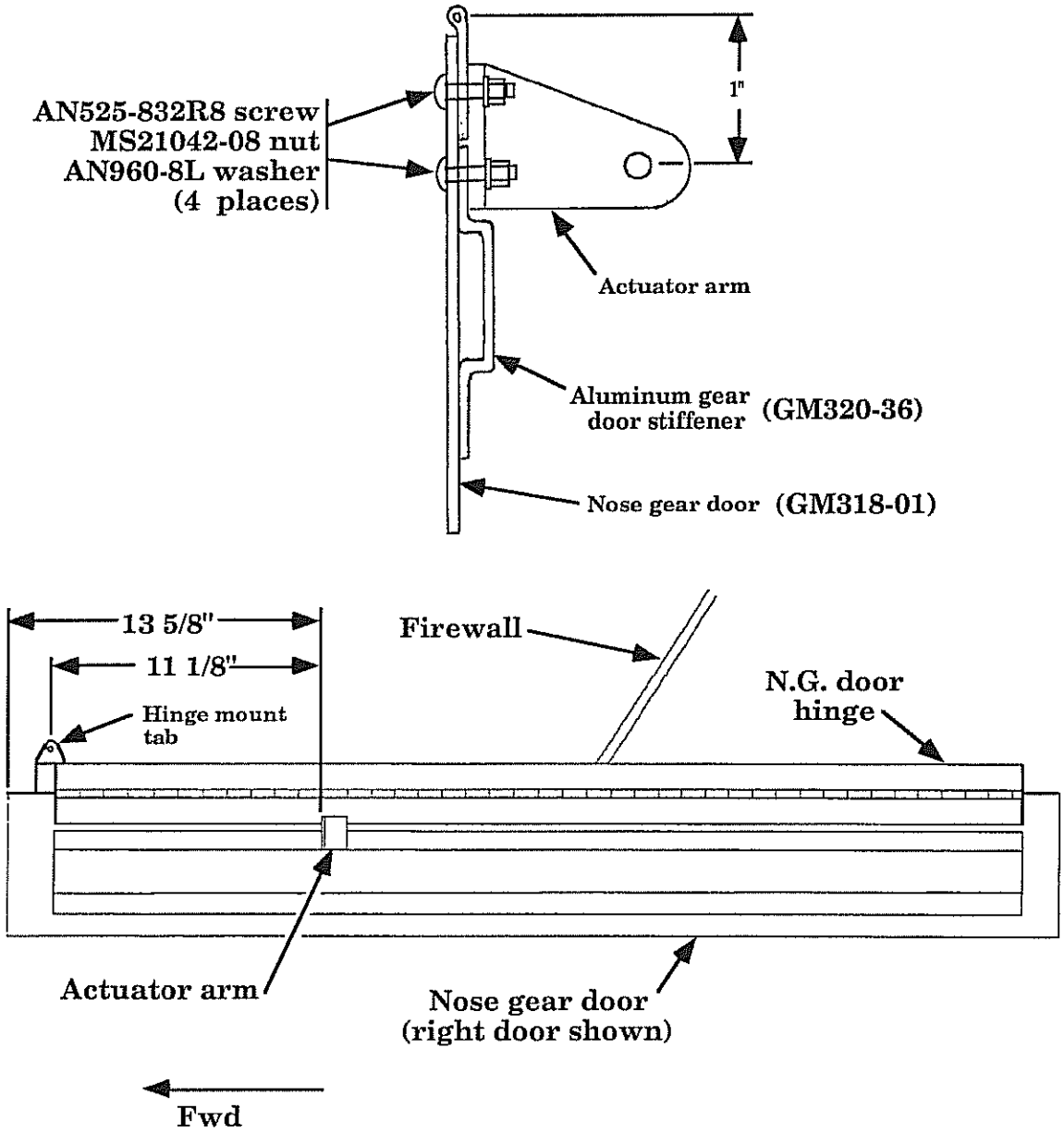
G20. Two actuator arms are needed to pull the nose gear doors shut. These arms are made from 1" x 2" x 1/8" thick aluminum extrusion (L shaped). A 6" piece of this extrusion is provided in the kit. From this piece, using the dimensions in Figure 20:G:10, cut two actuator arms. A band saw is a good tool to cut the extrusion with, and a medium file will smooth out the edges.

N.G. door actuator arms
Figure 20:G:10



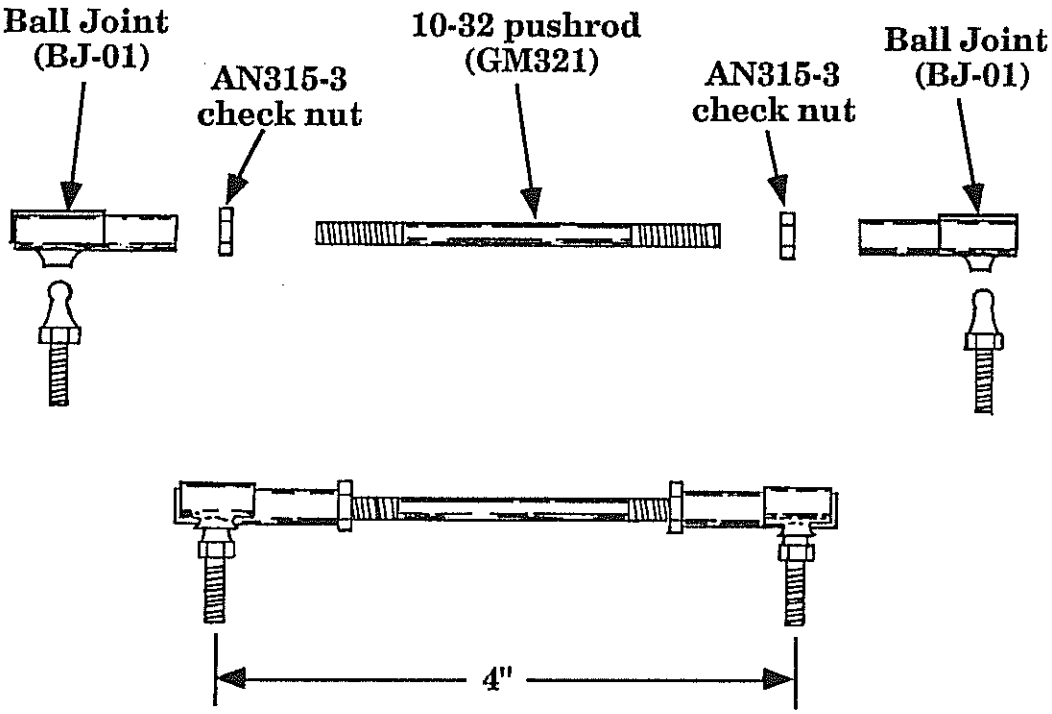
G21. Use four AN525-832R8 screws to secure each actuator arm to its gear door as shown in Figure 20:G:11.

Securing actuator arms to doors
Figure 20:G:11



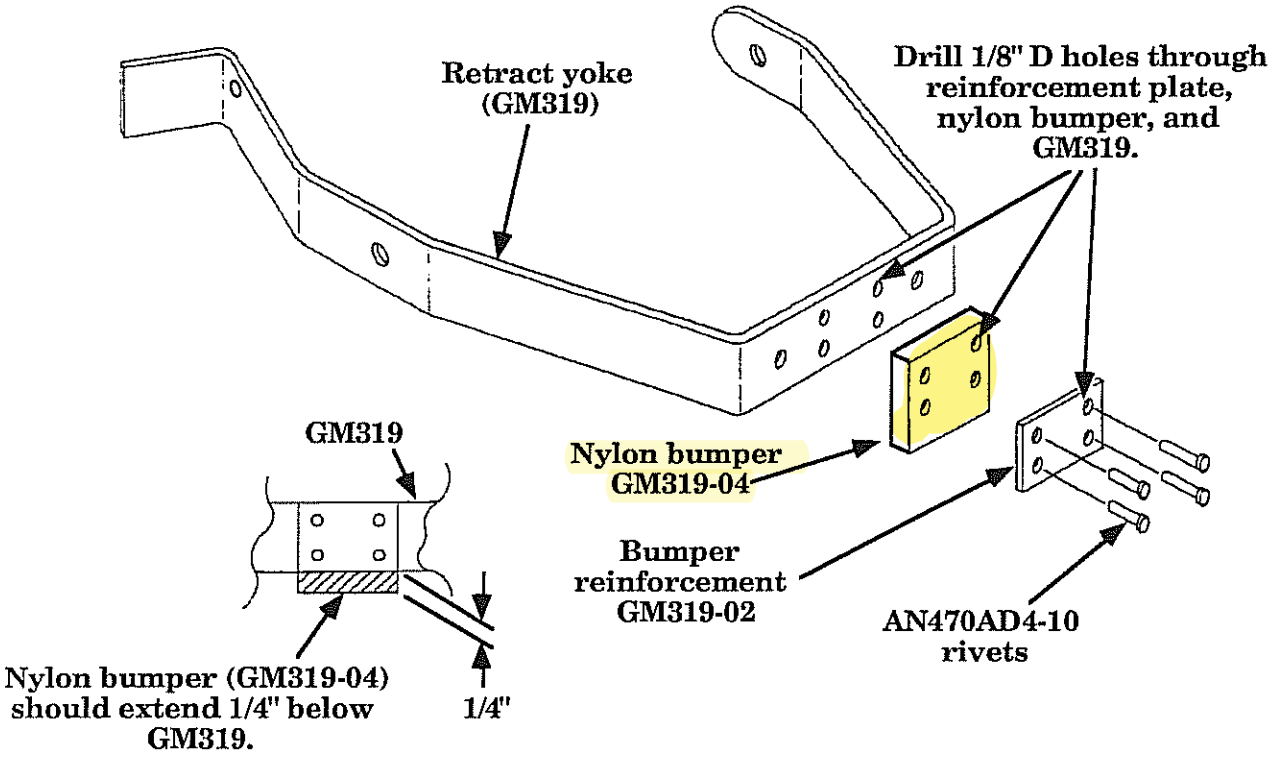
G22. Assemble the retraction pushrods as shown in Figure 20:G:12.

N.G. door retraction pushrods
Figure 20:G:12



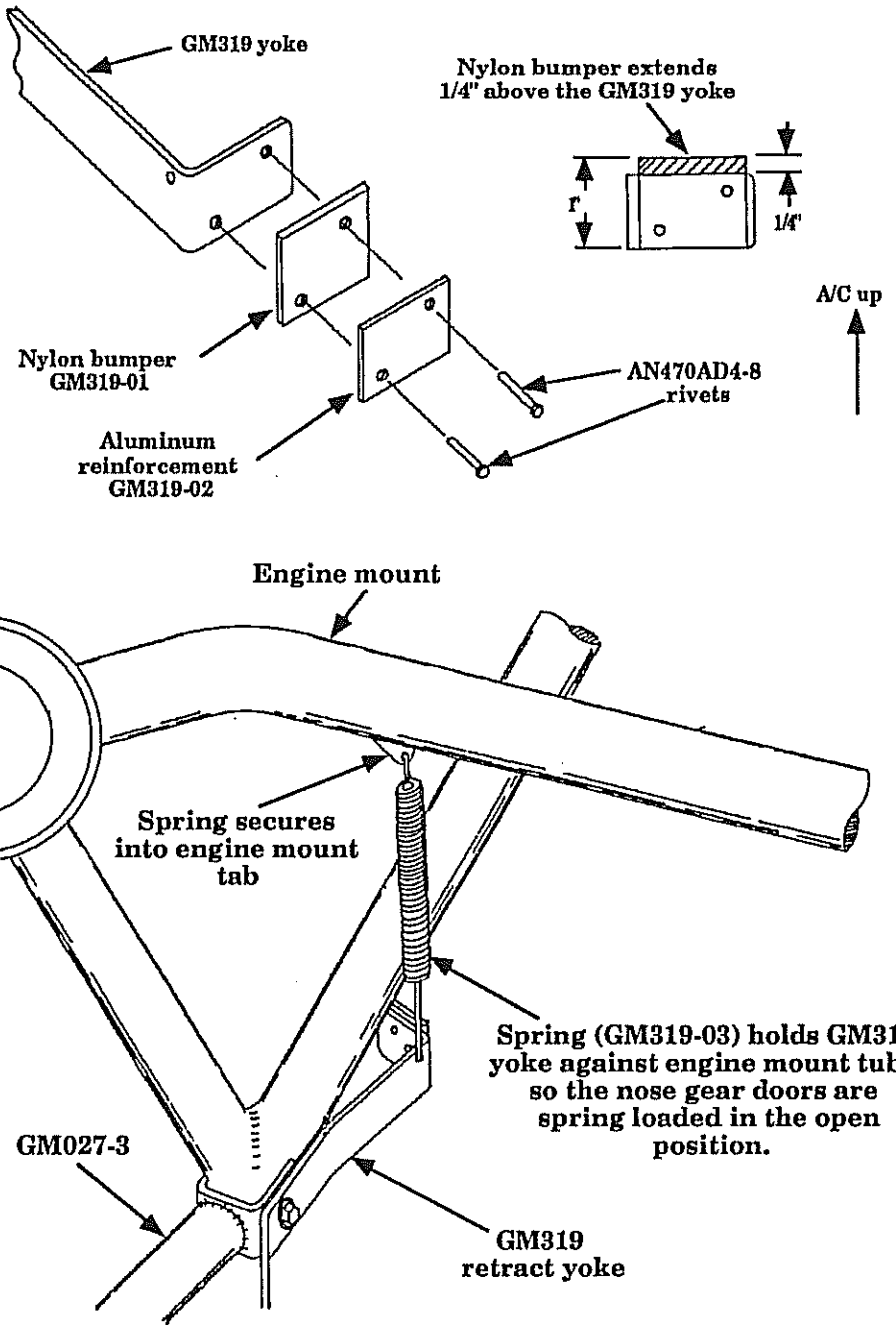
G23. Secure the 1" x 1" x 1/4" thick nylon piece(GM319-04) to the retract yoke (GM319) using AN470AD4-10 rivets, and the aluminum reinforcement (GM319-02). The nylon should extend 1/4" below the GM319 edge. The nose gear strut will hit this nylon piece and raise the yoke, thus closing the gear doors.

Secure nylon bumper to retract yoke
Figure 20:G:13



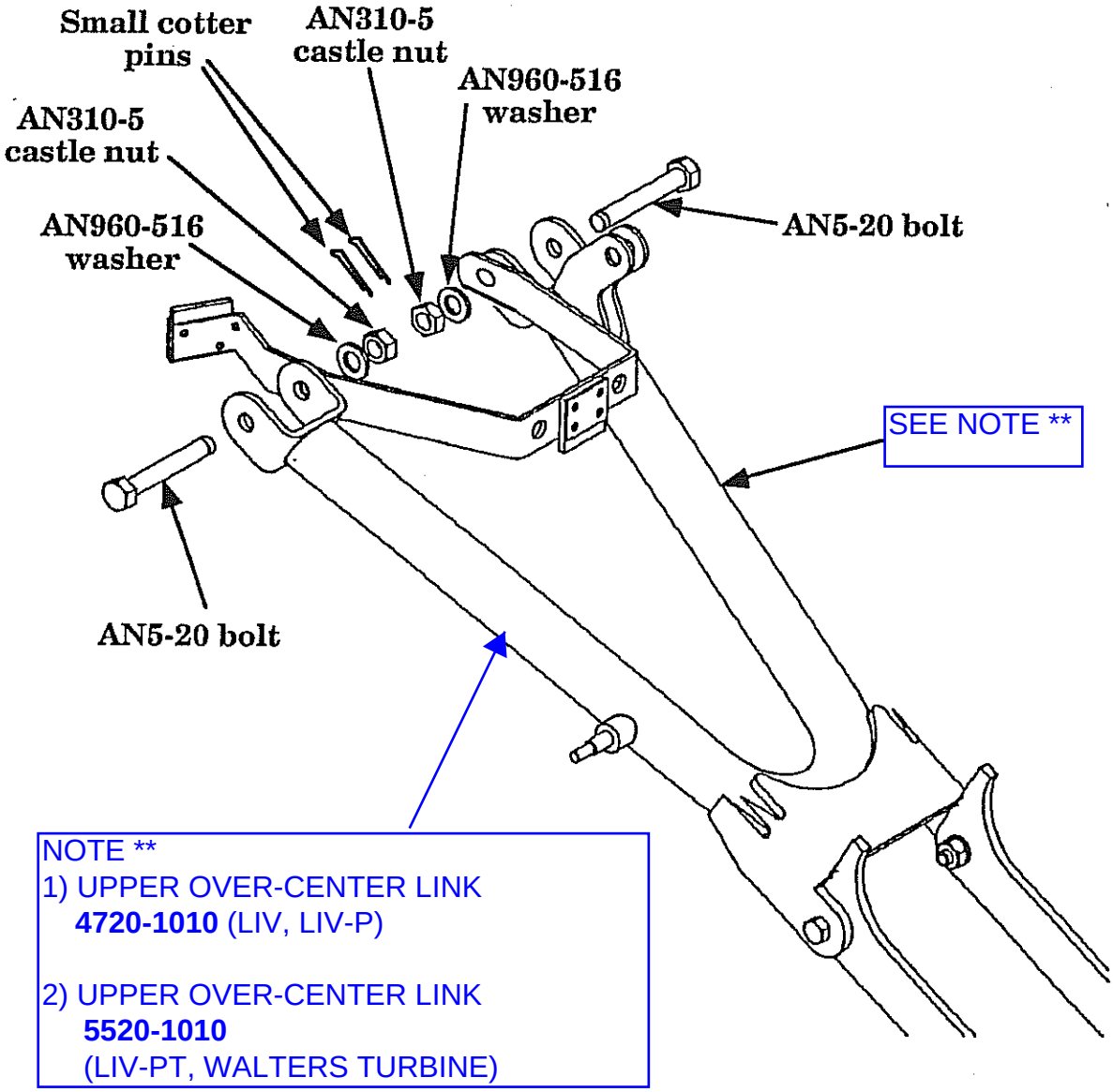
G24. Another nylon bumper is required to stop the retract yoke from hitting the engine mount when the doors are open. This bumper is the same size as the other, and is installed using the same hardware as shown in Figure 20:G:14.

Installing GM319 down stop
Figure 20:G:14



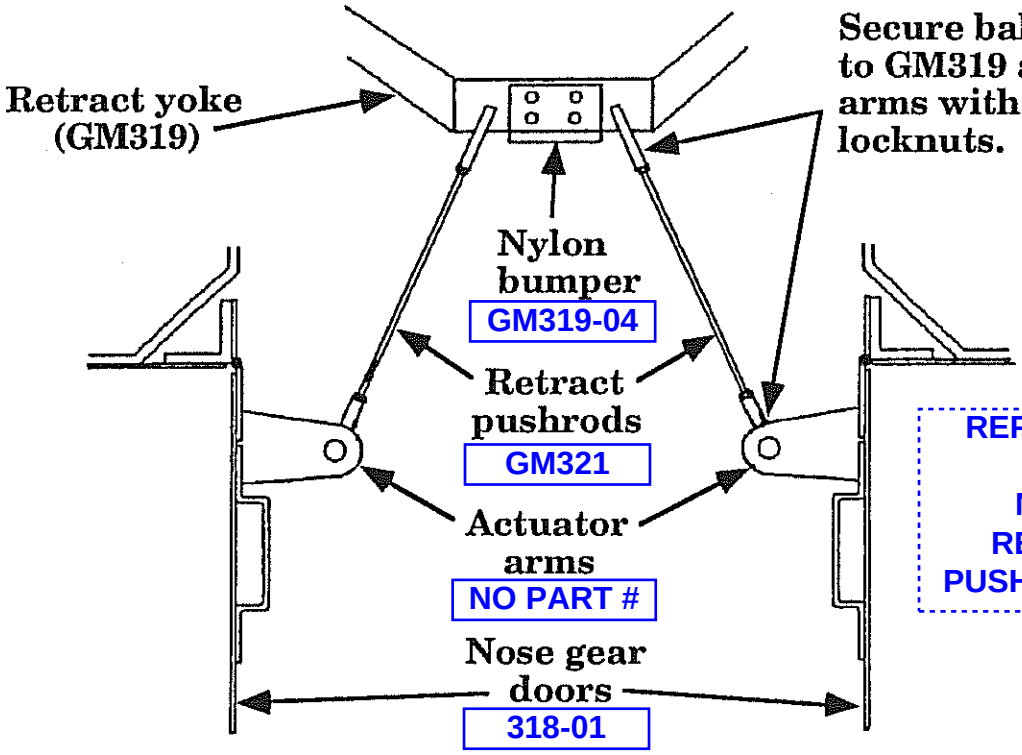
G25. The N.G. door retract yoke (GM319) installs using the same bolts as the GM027-3. Secure the yoke to the engine mount with AN310-5 nuts and small cotter pins.

Installing GM319
Figure 20:G:15



G26. Connect the retract yoke to the N.G. doors with the two pushrods you assembled in Step G22. Adjust the pushrods so that when the nose gear is retracted, the doors are properly closed (flat with each other and the bottom of the fuselage).

Connecting the nose gear doors
Figure 20:G:16



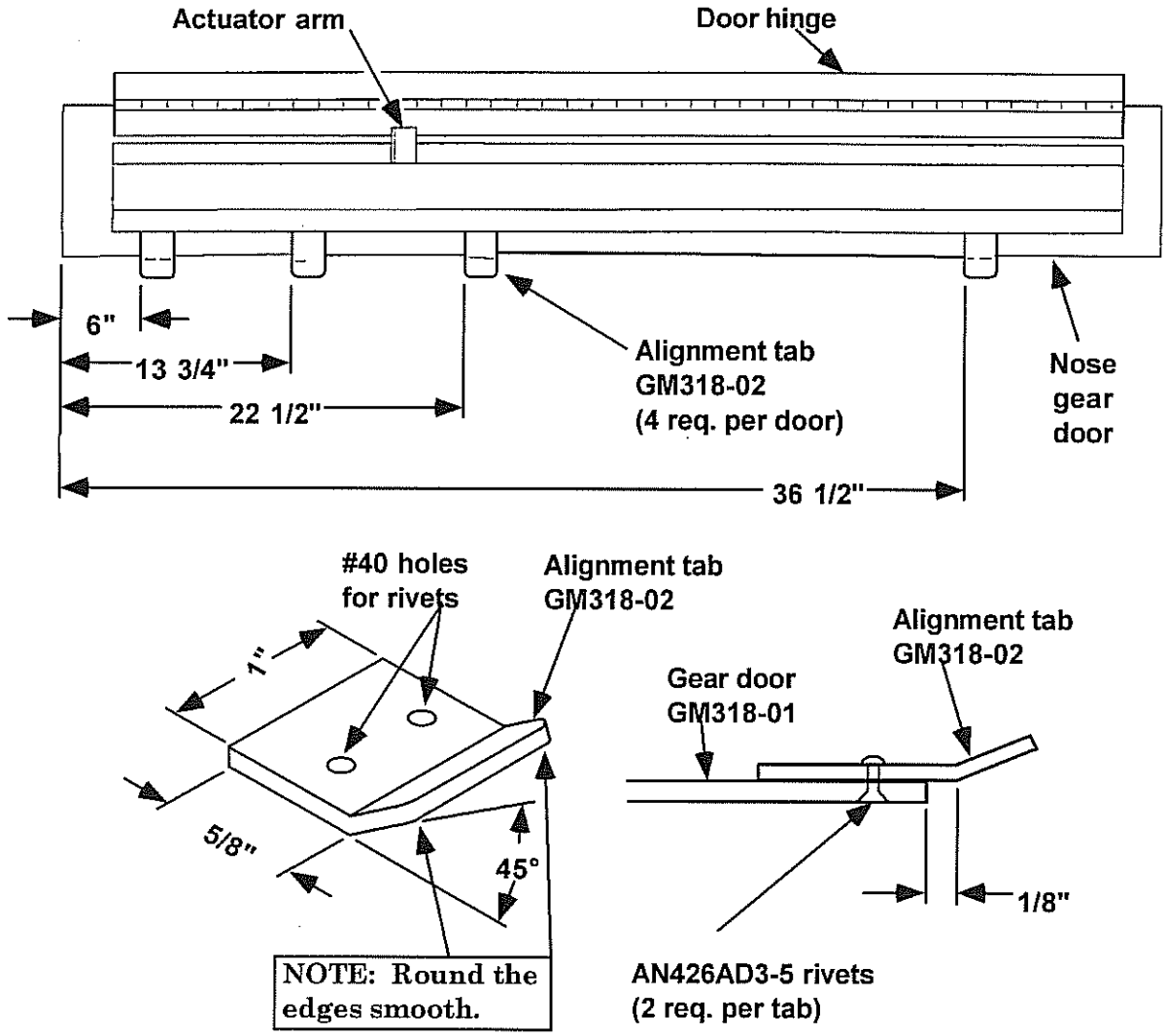
REFER TO PAGE (20-40) N.G. DOOR RETRACTION PUSHRODS DETAIL

Note: The angle of the gear doors in the "down" position is not critical as long as the nose gear clears them. The doors are adjusted with the pushrods so they are flush with the fuselage in the "up" position.

G27. To keep the doors in alignment in the "up" position, overlapping tabs (GM318-02) are installed on the edges of the doors. Bend the eight tabs as shown in Figure 20:G:17.

G28. Locate the tabs on the nose gear doors as shown in Figure 20:G:17 (4 tabs per door). It helps to use instant glue to hold the tabs in place while you check alignment. The tabs are arranged in staggered pairs, so be sure you don't position them at the same fore/aft location on both doors. Retract and extend the nose gear to make sure the tabs do not interfere with each other and the doors. It may be necessary to bend the tabs more than 45° to help engagement. When satisfied with the tab's locations, use two AN426AD3-5 rivets to secure each tab to the doors.

Alignment tabs
Figure 20:G:17



H. NOSE GEAR STOP

A bumper is mounted to the firewall to stop the retraction of the nose gear strut. The center engine mount is used as a mounting hardpoint for the bumper weldment. The GM482-03 bumper is made of a material called Orkot, which is a bit more plastic-like than phenolic.

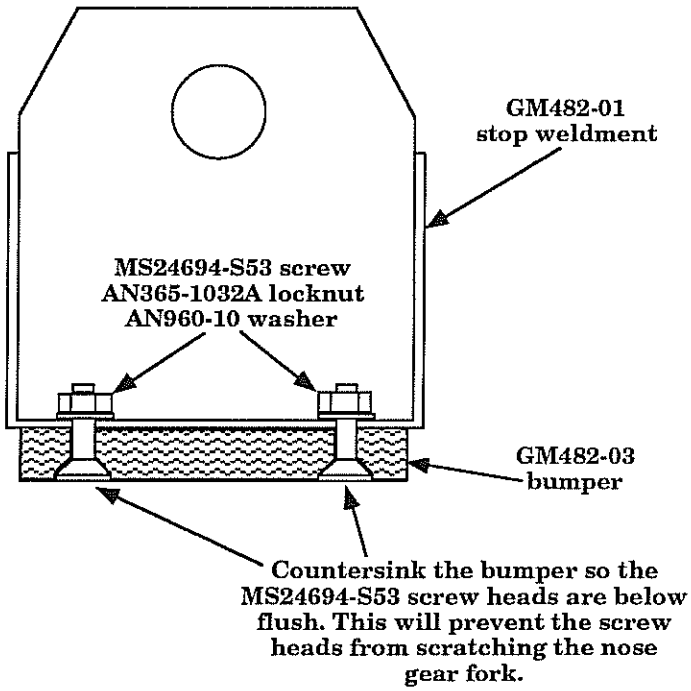
H1. Center the GM482-03 bumper on the two, predrilled, 3/16" D. holes in the GM482-01 weldment. Use these holes as guides to drill 3/16" D. holes through the bumper. See NOTE below before drilling.

NOTE: Early nose gear forks were taller than later versions. This has the effect of making the nose gear fork closer to the firewall in the retracted position. For these early nose gear forks, you will have to move the GM482-03 bumper fwd on the weldment to enable it to hit the nose gear fork properly.

H2. Countersink the screw holes in the GM482-03 bumper deep enough so the screw heads are below the surface. This will keep the heads from scratching the nose gear fork when it bumps into the surface.

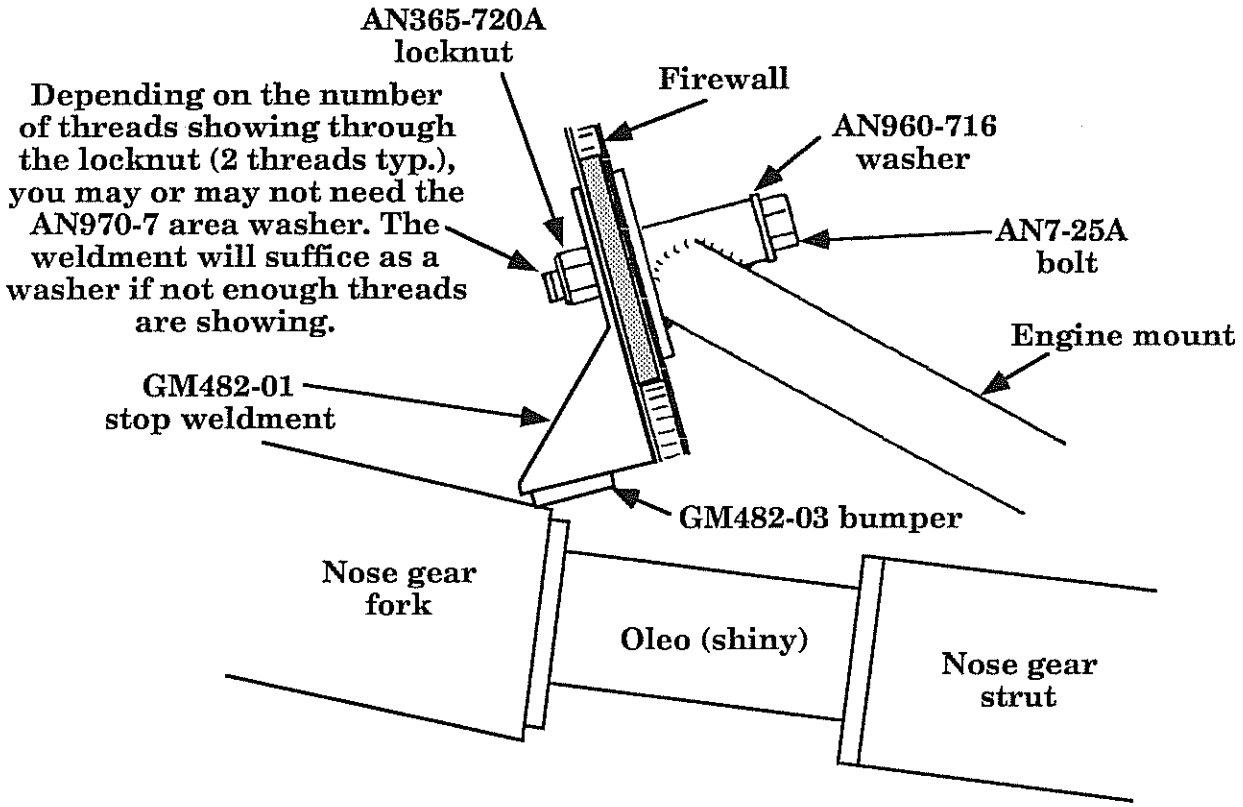
H3. Secure the GM482-03 bumper to the GM482-01 weldment with MS24694-S53 screws, AN960-10 washers, and AN365-1032A locknuts.

Securing bumper to weldment
Figure 20:H:1



H4. Secure the GM482-01 weldment to the aft face of the firewall as shown in Figure 20:H:2. The center engine mount bolt is used to secure the weldment. The AN970-7 area washer is really not needed because the weldment will do double duty, but if you can install the weldment *and* the AN970-7 washer while still maintaining the 2 thread minimum, keep the washer on.

Installing GM482-01 weldment
Figure 20:H:2



H5. Trim the firewall flush with the bottom of the GM482-01 weldment.

H6. When fully retracted, the nose gear fork should strike the GM482-03 bumper. In this condition, the nose gear tire should be fully enclosed in the tunnel and the nose gear doors should be able to fully shut. Adjust the nose gear door actuator rods if necessary.

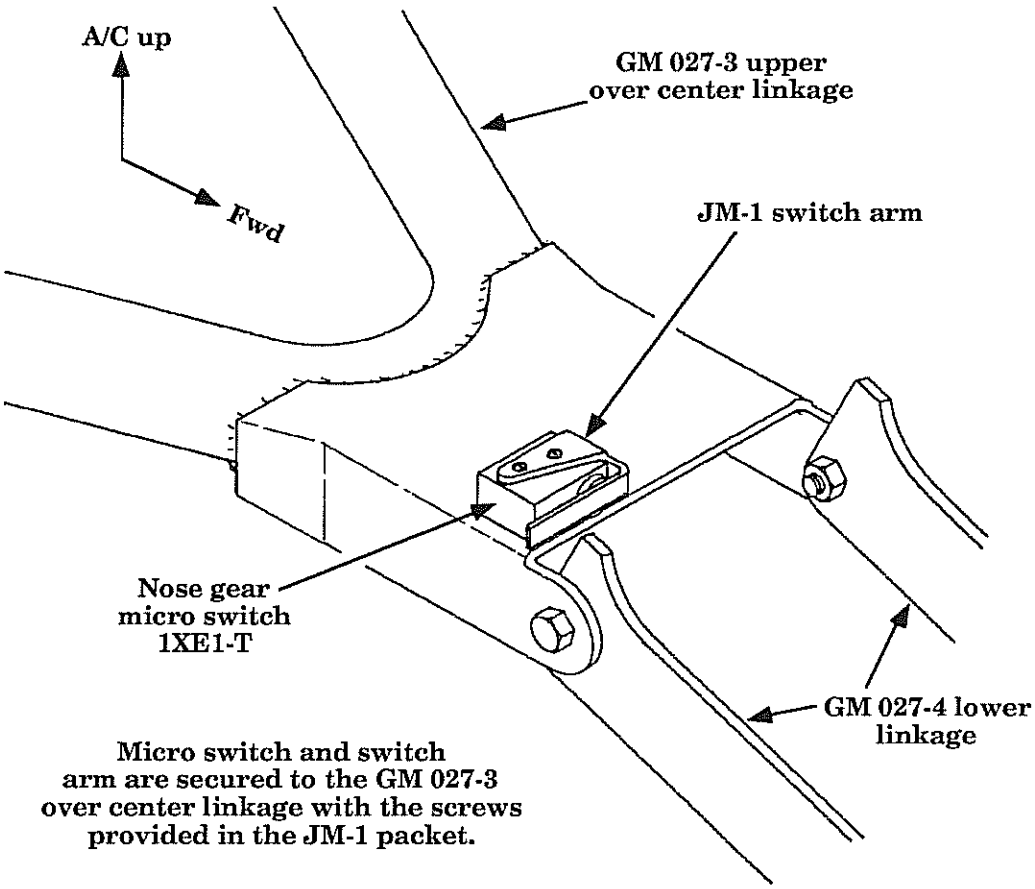
I. NOSE GEAR DOWN SWITCH

A micro switch is mounted to the GM 027-3 over center linkage to indicate if the nose gear is down and locked. The switch is activated by the GM 027-4 lower over center linkage.

I1. Use the hardware supplied in the JM-1 packet to secure the 1XE1-T micro switch to the GM 027-3 upper over center linkage. Two switch mounting holes are pre-drilled in the linkage for this purpose. The nuts and lock washers should be on the bottom of the GM 027-4 linkage. Use a drop of Loctite on these nuts just to be sure of a good hold.

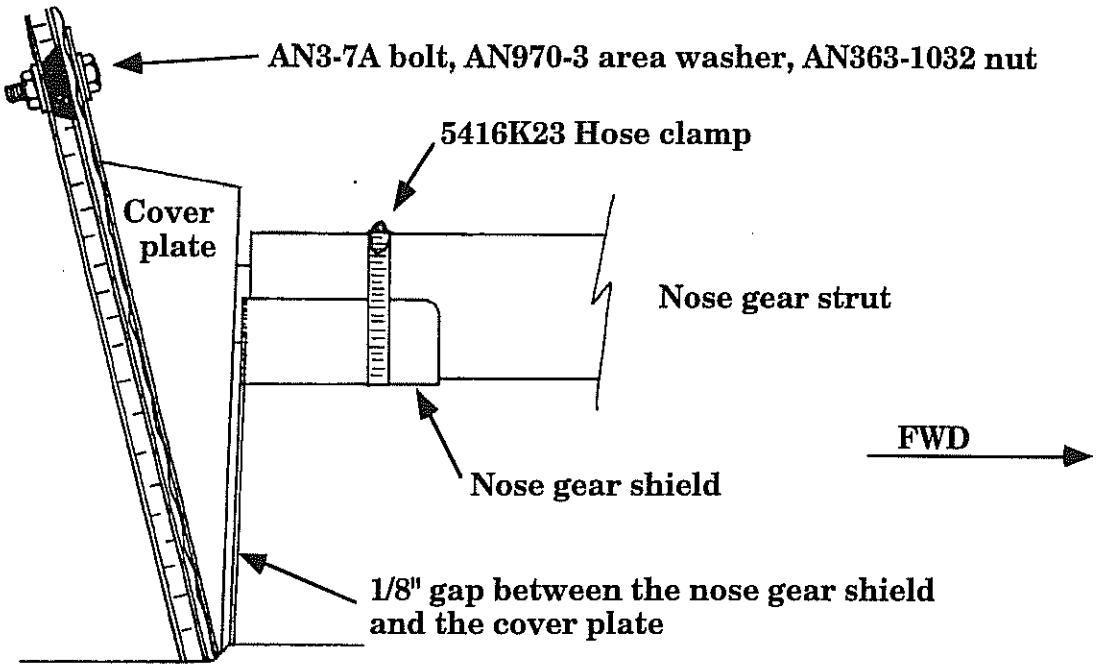
The right, GM 027-4 over center linkage should press the switch arm when the nose gear is losked in the down position. You should be able to hear the "click" of the switch as it contacts and releases.

Nose gear down switch
Figure 20:I:1



J. INSTALLING NOSE GEAR SHIELD

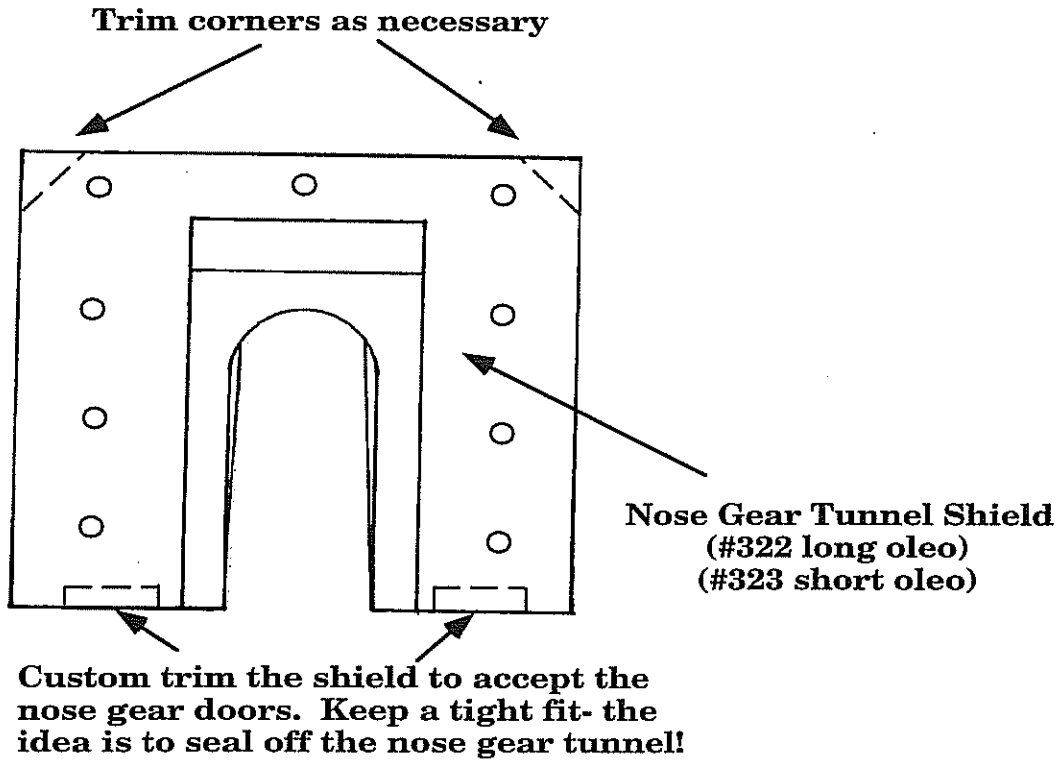
Closing off the Nose Gear Tunnel
Figure 20:J:1



J1. Position the nose gear tunnel shield, open end down, on top of the firewall blanket (You may end up installing the shield underneath the firewall blanket as discussed under point J3).

Installing the Nose Gear Tunnel Shield

Figure 20:J:2

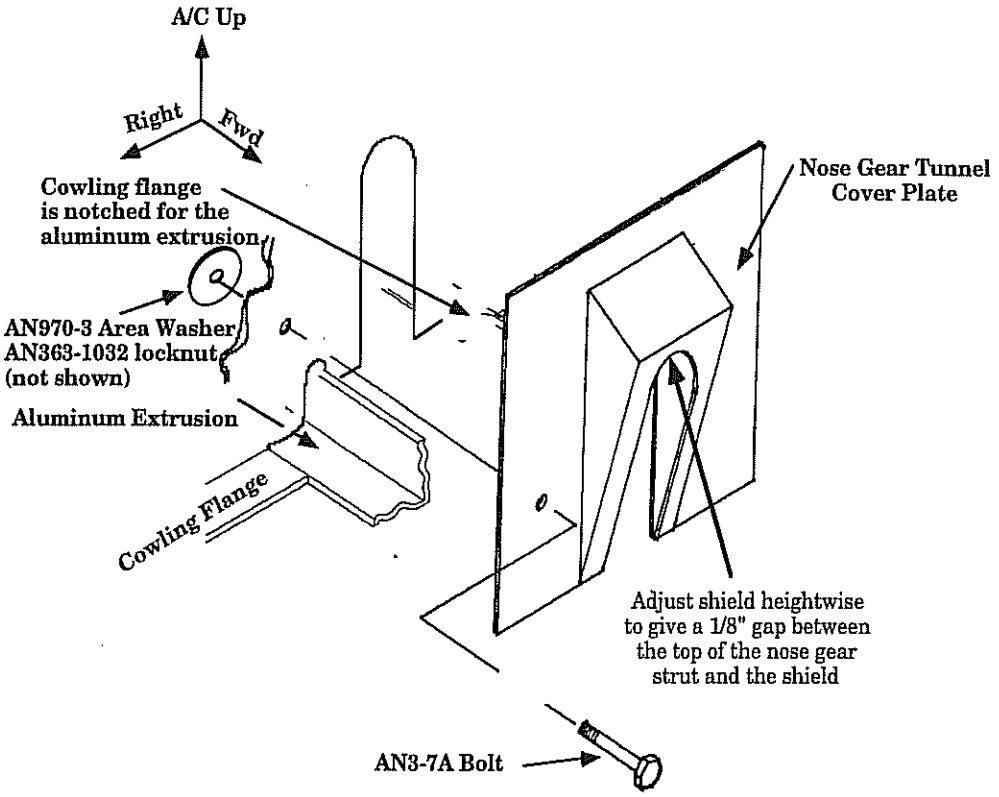


J2. Retract the nose gear fully and adjust the shield such that the opening is centered on the strut and such that there is a 1/8" clearance between the top of the strut and the shield. There must be clearance between the cover plate and the nose gear shield through the entire travel range of the gear leg.

J3. There must be about a 1/8" clearance between the bottom of the strut and the shield. Takeinto account the compression of the firewall blanket. If there is interference, the shield can be positioned under the blanket. If the clearance is greater than 1/4", the shield should be shimmed forward on top of the blanket as required. Such a shim must be airtight and fireproof.

Installing Nose Gear Tunnel Sheet

Figure 20:J:3



J4. The flange around the shield is large enough to be trimmed as necessary to fit in the space available. The shield is attached with bolts that go through and into the nose gear tunnel- not into the cabin. Install a bolt at each of the four corners and one at the top center and two more on each side as shown above.

J5. Install the nose gear tunnel cover plate with a Part #5416K23 hose clamp. Position the plate such that there is a slight interference fit against the nose gear tunnel shield when the gear is fully retracted. This cover plate must not be too low because the fork bolts may hit the plate.

J6. With the gear retracted, trim the lower edges of the shield and cover plate to provide as close fit as possible against the nose gear doors when closed.