CHAPTER 21
REVISION LIST
(Pressurized Version)

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
21-1	PC17	R&R	Added Note to page
21-2 thru 21-5	PC4	R&R	Revised chapter
21-6	PC10	R&R	Revised 21:A:2:b.
21-7 thru 21-11	PC4	R&R	Revised chapter.
21-12	PC17	R&R	Changed bolt direction in wing bellcrank
21-13	PC17	R&R	Added note and spacer to Fig. 21:C:1
21-14	PC17	R&R	Flipped AN5-21 bolt, redrew figure
21-15	PC17	R&R	In Fig. BB removed spacer, flipped bolt
21-16	PC17	R&R	Flipped bolt in figure

CHAPTER 21
FLAP CONTROLS
(PRESSURIZED VERSION)

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 When such revisions are made, you should immediately replace all outdated pages with the revised pages.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 itselfwill 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

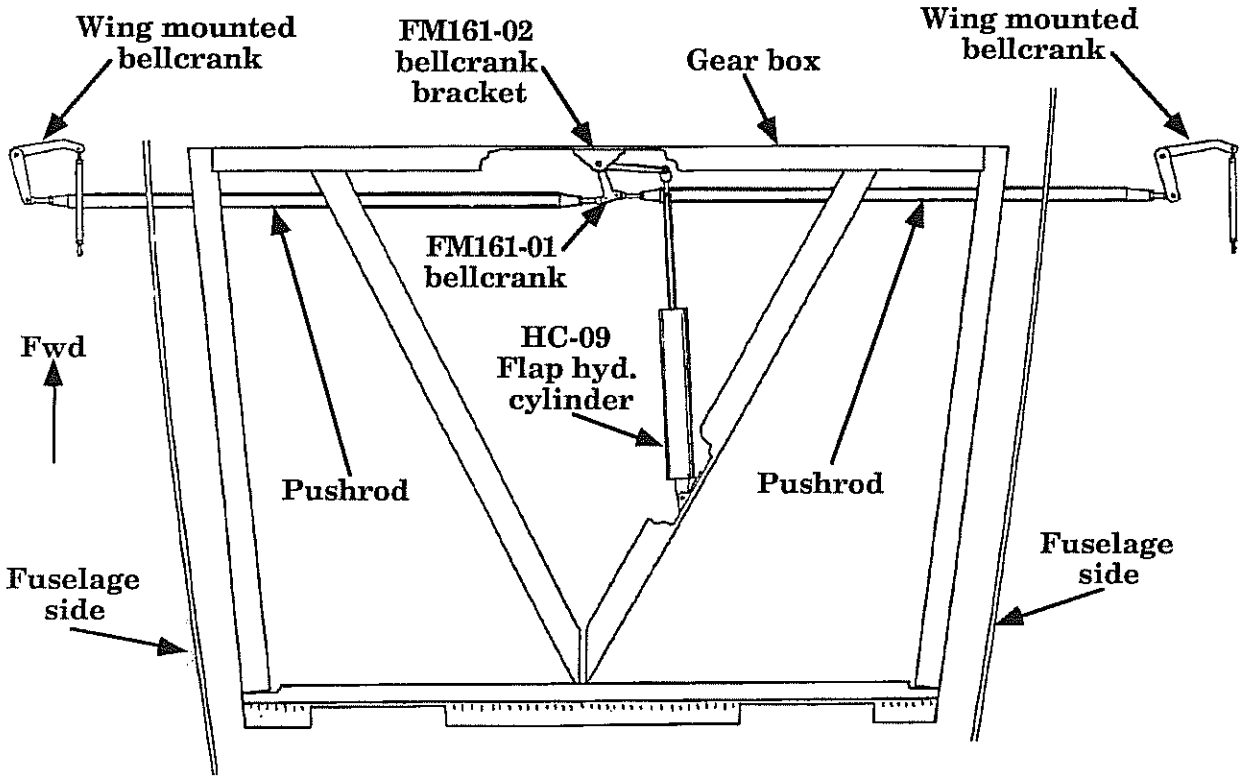
NOTE: WHEN THE AIRCRAFT IS SITTING IN ITS UPRIGHT POSITION, ALL BOLTS IN FLAP LINKAGE SHOULD BE POINTING DOWNWARD AND OR INBOARD. THIS IS STANDARD AIRCRAFT PROCEDURE. IT IS DONE THIS WAY SO THAT IN CASE A NUT FALLS OFF A BOLT, THE BOLT WILL NOT FALL OUT.

1. INTRODUCTION

The flaps of the Lancair IV are hydraulicly actuated. Pressure is bled off the main hydraulic system into a flap actuating cylinder, pushing the flaps down through a series of bellcranks and pushrods. The center flap bellcrank is mounted to the fwd face of the gear box.

Lancair IV flap actuation system

Figure 21:i:1



2. SPECIAL PARTS, TOOLS, AND SUPPLIES LIST

A. PARTS

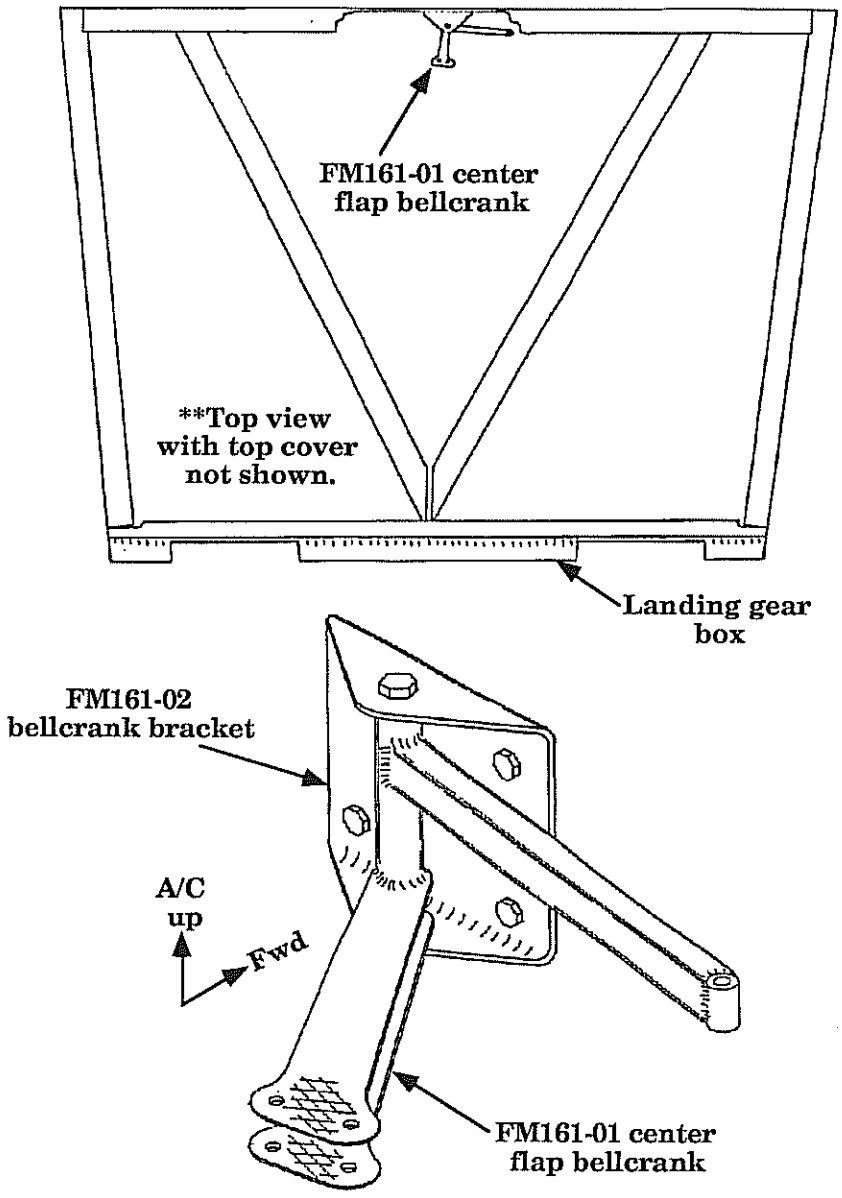
1 FM161-01 center flap bellcrank
1 FM161-02 bellcrank bracket
1 HC-09 hydraulic cylinder
1 FM162-01 aft cylinder attach bracket
1 FM162-02 spacer
1/4" thick phenolic

3. CONSTRUCTION PROCEDURE

A. CENTER FLAP BELLCRANK

The center flap bellcrank FM161-01 is mounted in the landing gear box on the fwd bulkhead. This bellcrank connects the hydraulic actuating cylinder to the two flaps.

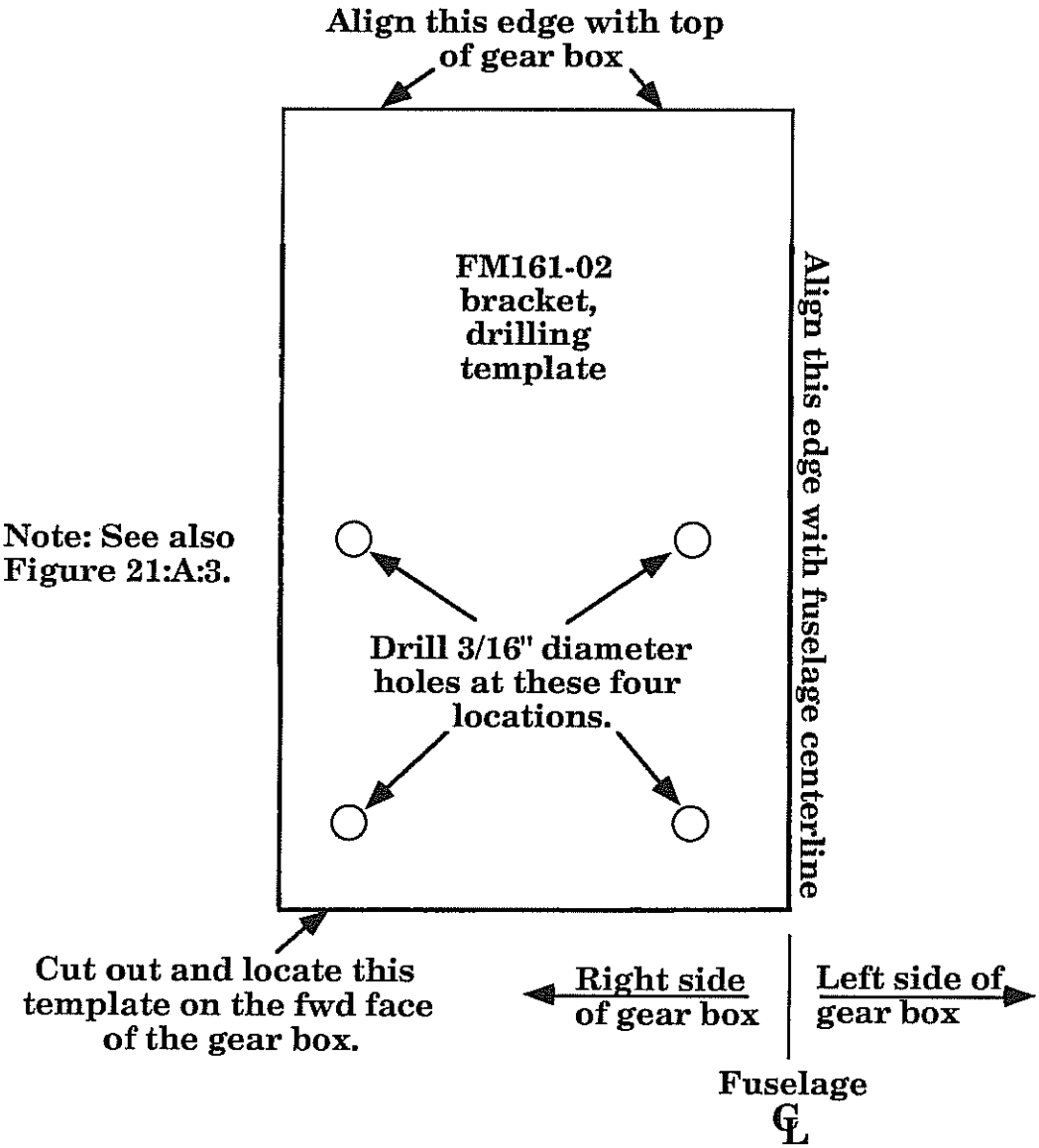
Center flap bellcrank
Figure 21:A:1



A1. Since it is difficult to locate and secure the FM161-02 bellcrank bracket from the *inside* of the gear box fwd bulkhead, a template is supplied in Figure 21:A:2 so you can locate the bracket position from *outside* the gear box. Cut out the template (there is a copy on the next page so you don't have to chop up this one) and use the dimensions shown to locate it on the gear box fwd bulkhead.

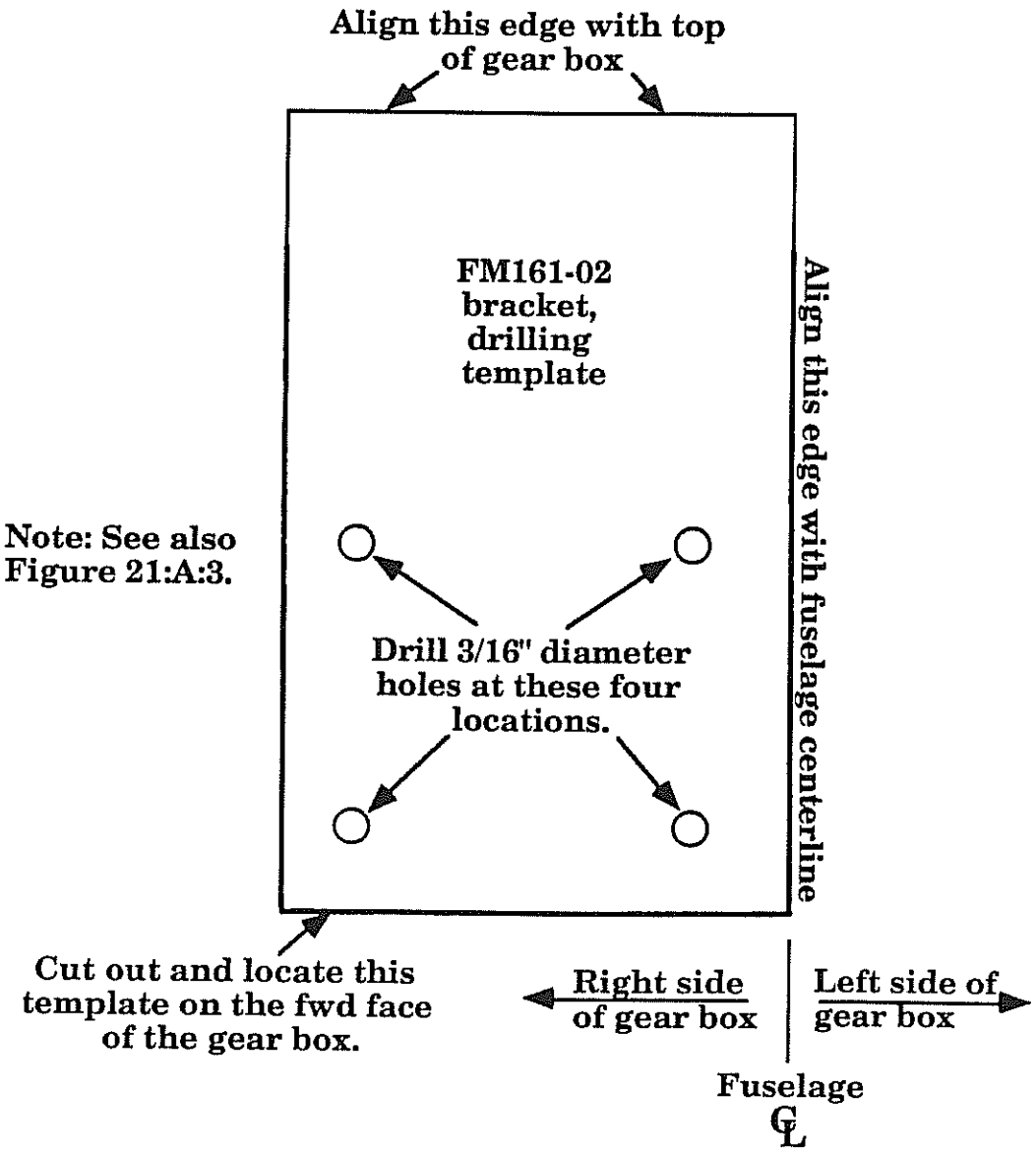
A2. Use the template to mark the mounting bolt locations for the FM161-02 bellcrank bracket onto the fwd face of the gear box. Place the bracket against the fwd face of the gear box, aligned the bolt holes on these marks. Use the holes in the bracket as guides to drill 3/16" diameter holes through the fwd bulkhead of the gear box. Be sure to have the holes oriented correctly. They are biased to the bottom side of the bracket.

Drilling template for FM161-02 bracket
Figure 21:A:2



Duplicate drilling template for FM161-02 bracket

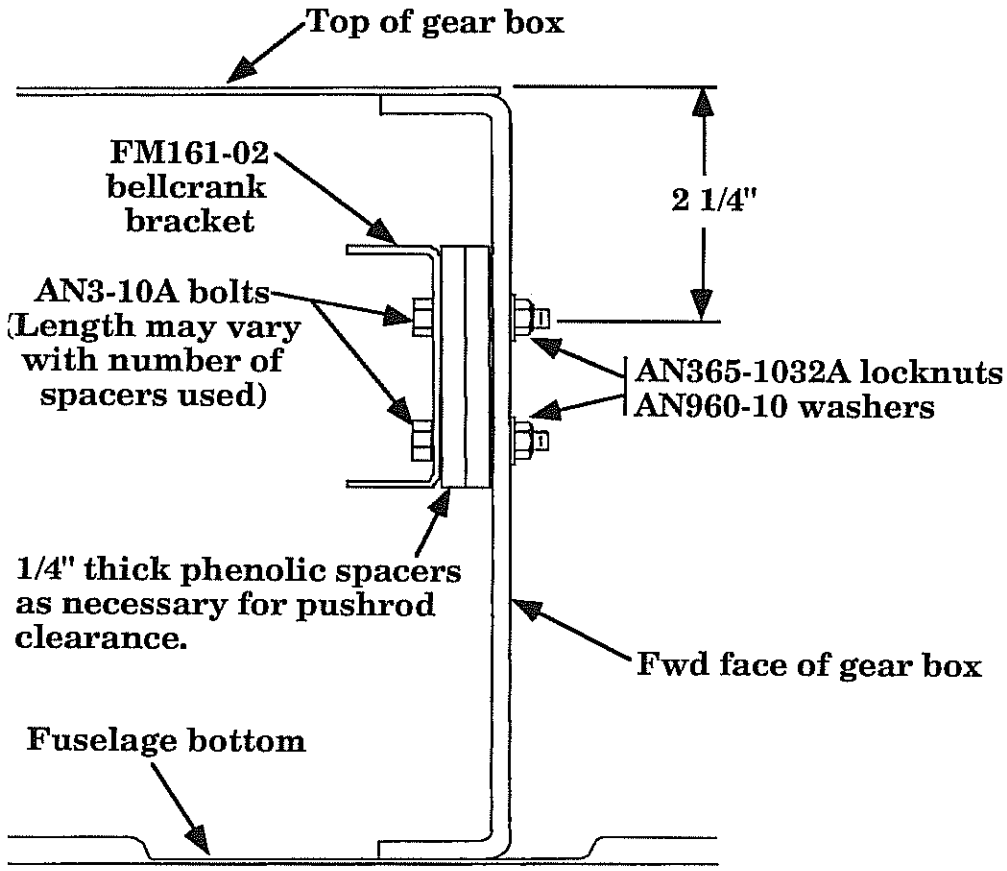
Figure 21:A:2:b



A3. Depending on your final rear wing spar location, you may have to add as much as a 1/2" spacer between the FM161-02 bracket and the gear box bulkhead. If your rear wing spars were farther forward than normal, the pushrods that will connect to the FM161-01 bellcrank will tend to rub against the transit holes in the gear box and the GM461 corner brackets. This situation is fixed by adding a phenolic spacer to push the FM161-02 bracket aft. Try a 1/4" thick spacer first, then add another spacer of equal thickness if the pushrods still rub. (You will not install these pushrods until Section B of this chapter). The phenolic spacers should the same size as the FM161-02 bracket.

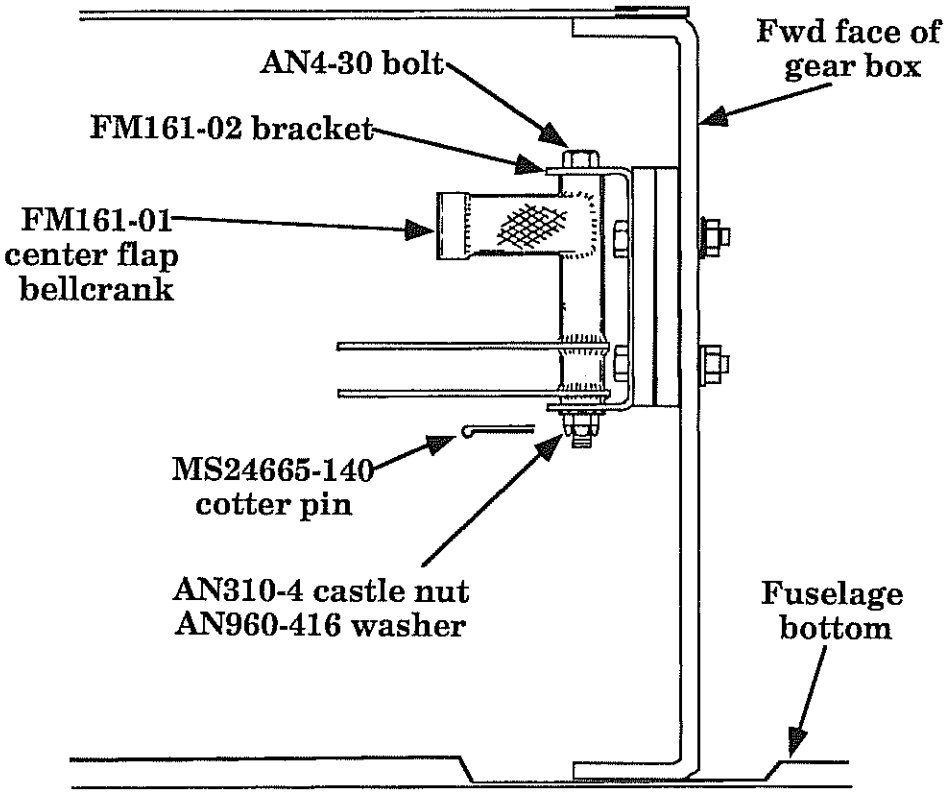
A4. Secure the FM161-02 bracket to the aft side of the fwd gear box bulkhead as shown in Figure 21:A:3. The length of the AN3 bolts will vary depending on the number of phenolic spacers between the bracket and the gear box bulkhead.

Securing FM161-02 bracket to gear box
Figure 21:A:3



A5. Secure the FM161-01 center flap bellcrank to the FM161-02 bracket using an AN4-30 bolt, AN960-416 washer, and AN310-4 castle nut. Do not over-tighten the castle nut or the bellcrank may not move freely. If you want to do the standard method of bolt positioning and have the bolt pointed down, you will have to remove the bracket from the gear box, install the bellcrank, then reinstall the bracket.

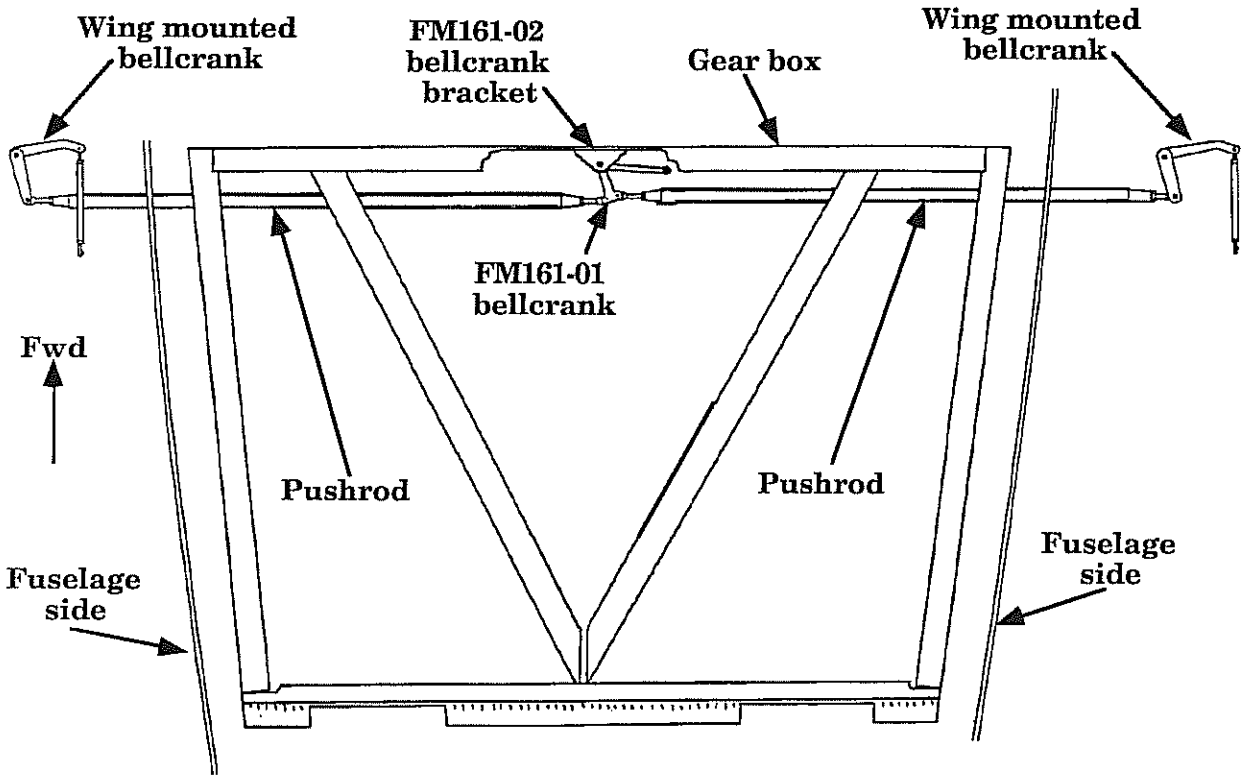
Installing FM161-01 center flap bellcrank
Figure 21:A:4



B. FLAP PUSHRODS

Two more pushrods are required to complete the flap actuation system. These pushrods connect the wing mounted bellcranks to the center bellcrank in the gear box.

Flap pushrods into fuselage
Figure 21:B:1



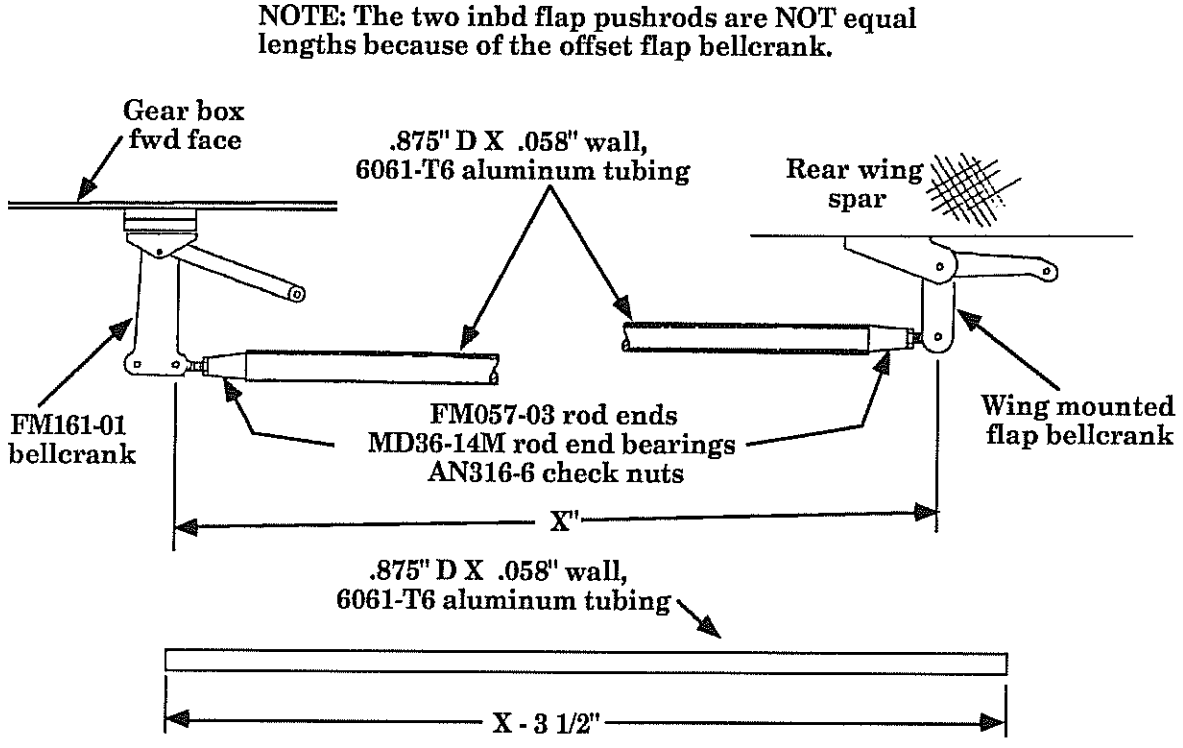
B1. Disconnect all pushrods in the flap system.

B2. Position the FM161-01 center flap bellcrank and the two inbd wing bellcranks so their aft pointing bellcrank arms are all in the trail position (direction of flight) as shown in Figure 21:B:2. This is just an eyeball alignment here, so +- 5° is fine.

B3. Measure the distance from the FM161-01 center flap bellcrank to the mounting points of the inbd , wing mounted bellcranks as shown in Figure 21:B:2. Subtract 3 1/2" from these dimensions to find the lengths to cut the aluminum pushrod tubes. Cut two pushrod tubes (one left, one right, their lengths will be different) from .875" diameter, .058" wall, 6061-T6 aluminum tubing.

NOTE: Because of the small adjustment range of the MD36-14M rod end bearings, it is a good idea to leave the .875" x .058" pushrods long by 1/2" for now. Use instant glue to temporarily bond the FM057-03 rod ends into the pushrods for initial alignment and adjustment. This way the rod ends can be slid in and out of the tube as necessary for adjustment, instead of using the precious few threads of the rod end bearings for adjustment. When satisfied with adjustment, cut the tube to the proper length and rivet the rod ends into place as described in Steps B4 and B5.

Finding pushrod length
Figure 21:B:2



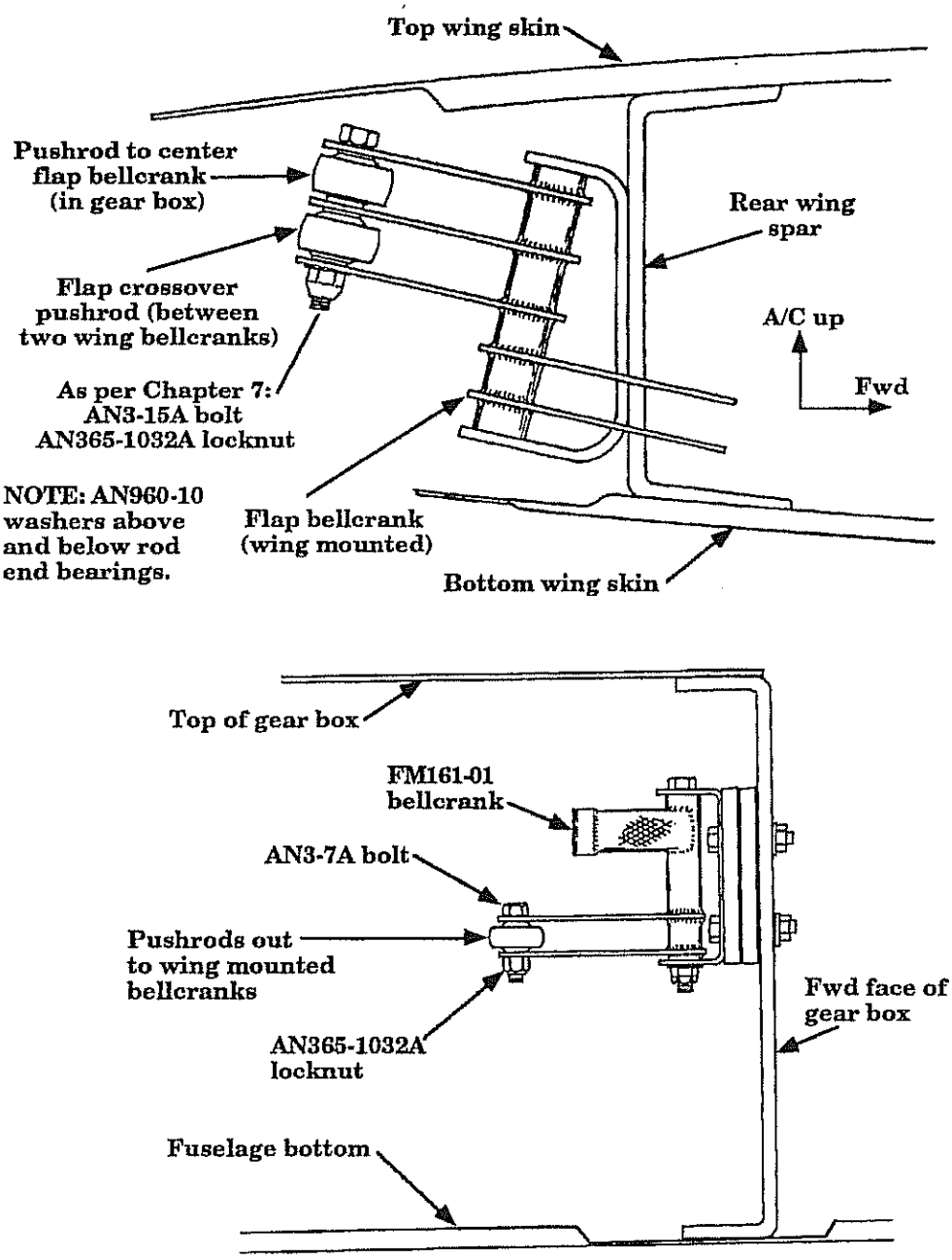
*** NOTE: Right pushrod is shown, Make left pushrod the same way. Also notice that the FM161-01 bellcrank and the inbd wing bellcrank are both in the "trail" position, parallel with the line of flight.**

B4. Use AN470AD4-20 rivets to secure FM057-03 rod ends into the ends of the two pushrods you have just cut.

B5. Onto each FM057-03 rod end, thread an AN316-6 check nut and an MD36-14M rod end bearing. These rod end bearings do not have much excess thread for adjustment. With the center of the bearing hole 1 3/4" from the edge of the pushrod tube, you will probably only see a couple threads exposed behind the check nut.

B6. Install the two pushrods that connect the flaps to the FL161-01 center flap bellcrank. Use the hardware shown in Figure 212:B:3. Reinstall the other flap pushrods in the wing. You may have to readjust these pushrods so the FL161-01 bellcrank moves an equal amount left and right of center when the flaps are full up and full down.

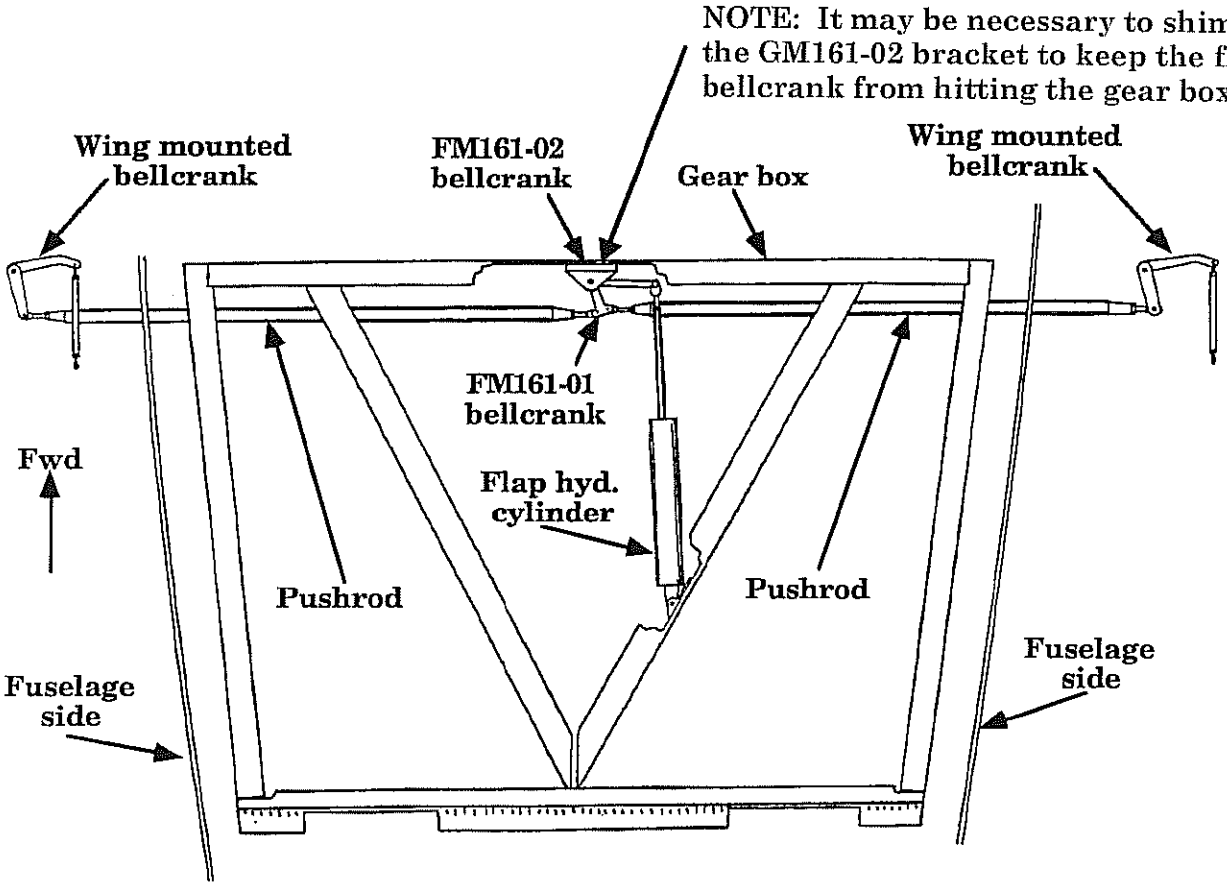
Installing flap pushrods
Figure 21:B:3



C. INSTALLING FLAP HYDRAULIC CYLINDER

The flap hydraulic cylinder is located when the flaps are in the full up position. The flaps are stopped in both full up and full down positions by bottoming the hydraulic piston in both directions.

Flap hydraulic cylinder
Figure 21:C:1

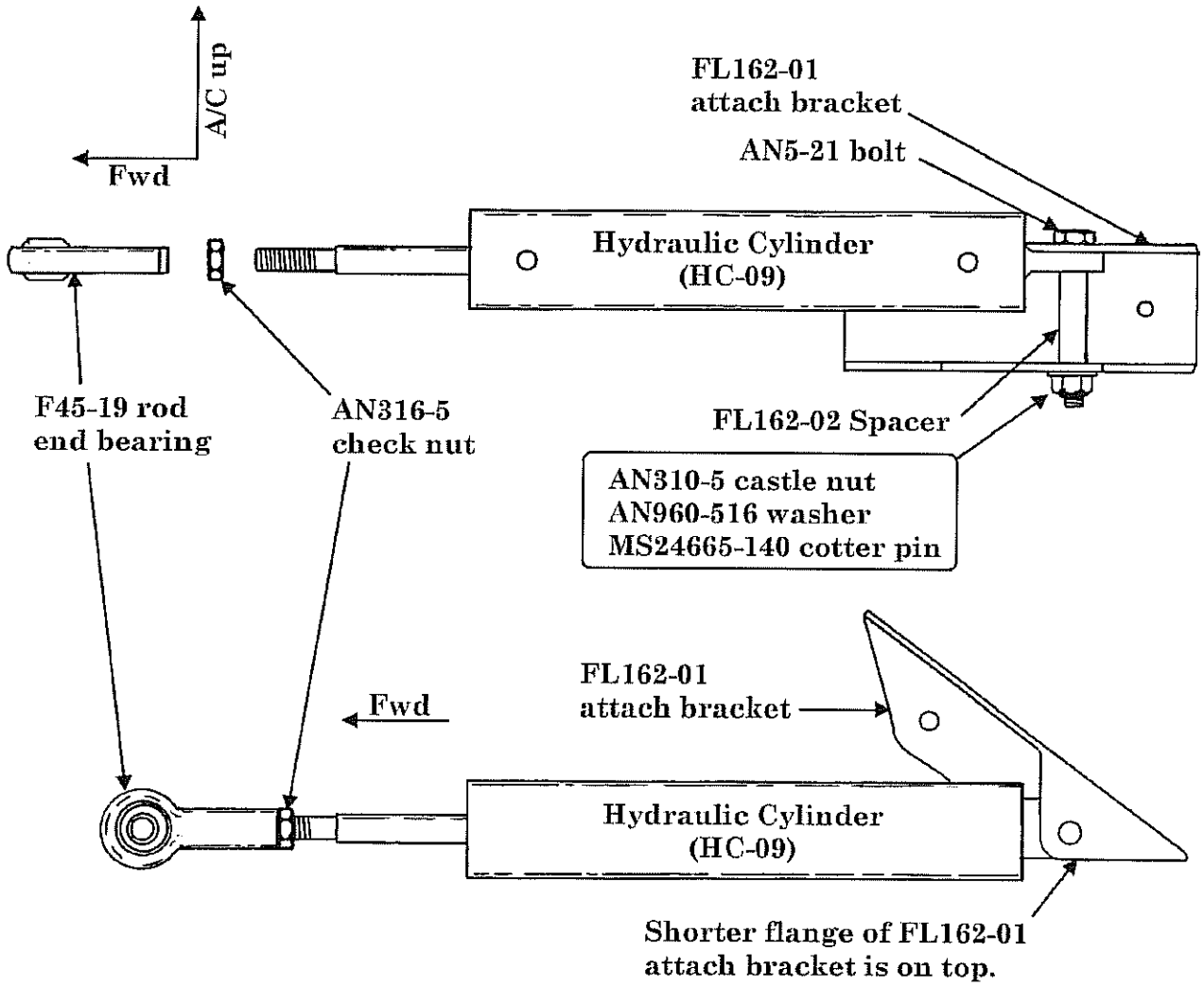


NOTE: Be sure you have the proper hydraulic cylinder (HC-09). The stroke of this cylinder was shortened from the earlier version (HC-08) so a secondary stop would not be necessary.

C1. Thread a F45-19 rod end bearing onto the shaft of the hydraulic cylinder (HC-09). Also thread an AN316-5 check nut onto the shaft. Six threads of the shaft should be visible behind the check nut for best adjustment range.

C2. Secure the FL162-01 aft cylinder bracket to the aft end of the hydraulic cylinder as shown in Figure 21:c:2. THE SPACER (FM162-02) is installed below the cylinder to hold it toward the top of the bracket. the ports of the hydraulic cylinder should be oriented inboard. Tighten the AN310-5 castle nut so the cylinder can still be oriented inboard. Tighten the AN310-5 castle nut so the cylinder can still rotate in the bracket. Secure the AN5-21 bolt with an MS24665-140 cotter pin.

Assembling hydraulic cylinder
Figure 21:C:2



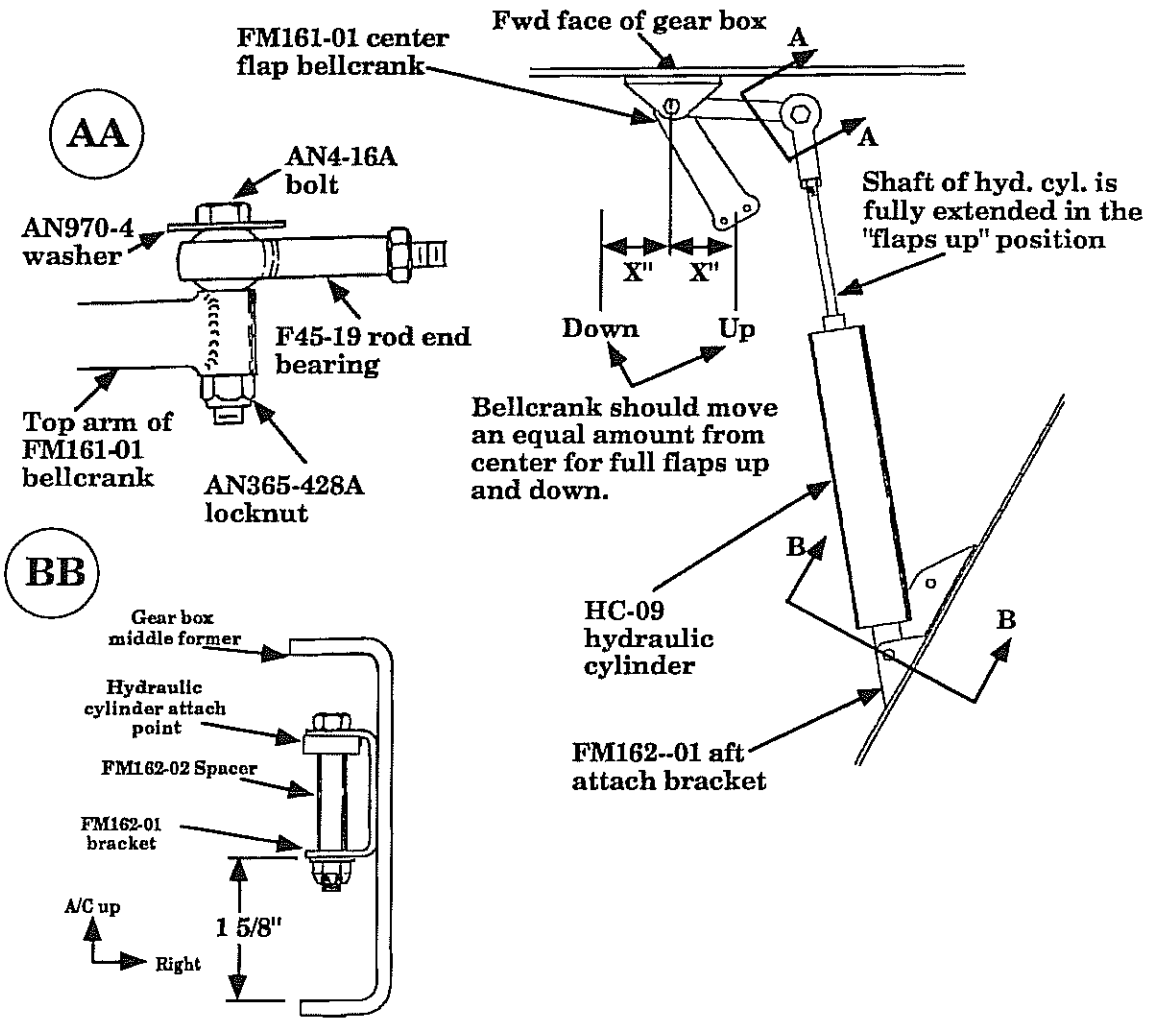
C3. Secure the hydraulic cylinder's F45-19 rod end bearing to the single (thicker) arm of the center bellcrank. The rod end bearing will mount to the top of this arm. Use an AN4-16A bolt, AN970-4 area washer and AN365-428A locknut as shown in figure 21:C:3.

C4. Pull the shaft of the hydraulic cylinder out to its full extension. This is the cylinder's full up position.

C5. Lay the cylinder attach bracket flat against the right middle gear box former, as shown in Figure 21:C:3. the bottom of the bracket should be 1-5/8" above the bottom flange of the gear box former, or at a height which makes the cylinder roughly parallel with the bellcrank. The hydraulic cylinder shaft should be fully extended to properly set the fore/aft location of this bracket.

Locating FM162-01 aft cylinder attach bracket

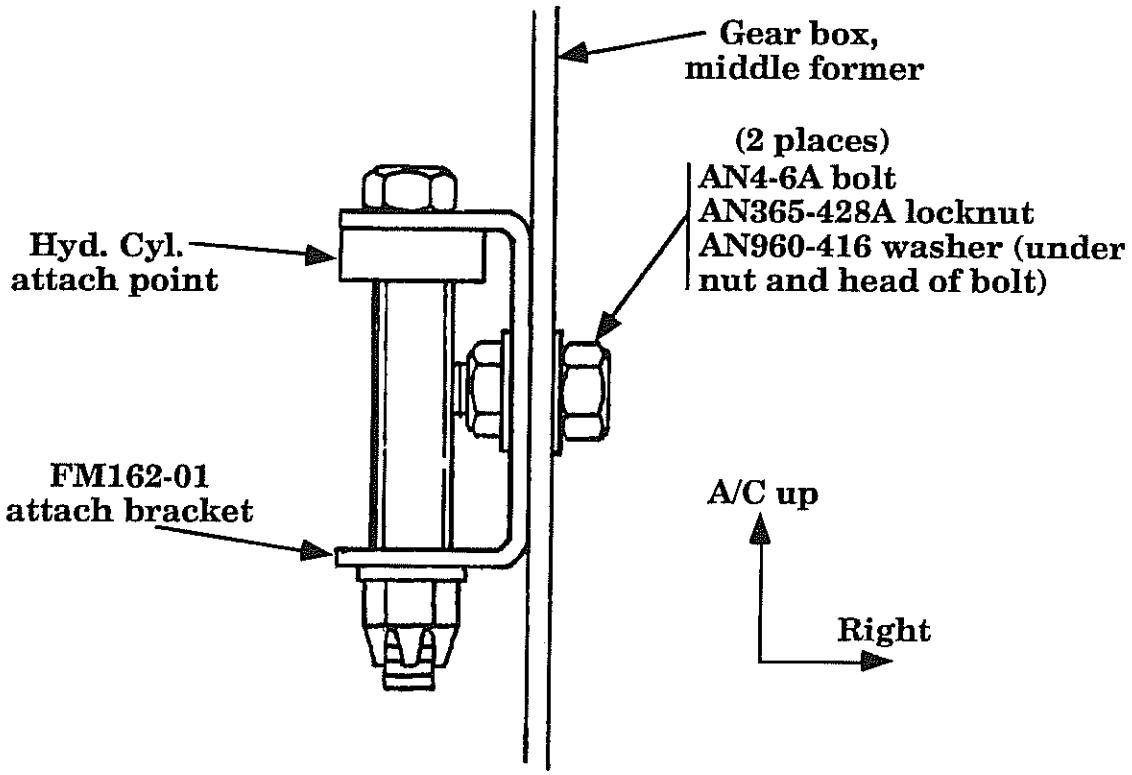
Figure 21:C:3



C6. Use the two mounting holes in the at cylinder attach bracket as guides to drill 1/ 4" diameter holes through the gear box former.

C7. Secure the at cylinder attach bracket to the gear box former with AN4-6A bolts, AN960-416 washers, and AN365-428A locknuts, as shown in Figure 21:C:4. the bolts will point inboard to avoid interfering with the gear retraction system.

Securing FM161-01 bracket
Figure 21:C:4



NOTE: It may be necessary to remove FM162-01 bracket in order to install the bolt point down.