

# CHAPTER 14

## ✓ AILERON°ELEVATOR° PUSH-PULL ASSEMBLIES ✓ RUDDER CABLES

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# CHAPTER 14

## AILERON•ELEVATOR•PUSH-PULL ASSEMBLIES

### RUDDER CABLES

#### Section 1

#### Aileron Push-Pull Assembly

#### Figures PP-2, PP-3, PP-4

1. Figure PP-2 ATTACHING PUSH-PULL BRACKET TO BOOM

- a) Attach push-pull bracket (1) to the pre-drilled hole in the boom with one pop-rivet (2) as shown. NOTE: ATTACH ONLY ONE RIVET NOW. THE OTHER THREE POP-RIVETS (2) WILL BE INSTALLED AFTER ATTACHMENT OF THE PUSH PULL CABLE.

NOTE: THE AILERON PUSH PULL CABLE (3) WILL BE ROUTED THROUGH THIS BRACKET. NOTE THAT THE PUSH PULL CABLE MUST BE PARALLEL TO THE BOOM AND BRACKET.

2. Figure PP-3 FEEDING THE PUSH-PULL CABLE THROUGH THE BRACKET

- a) Ready the aileron push-pull cable (3) by removing and discarding ONLY the manufacturer installed plastic thread protection cap from the end of the cable on which the nuts and washers have already been manufacturer installed. TEMPORARILY slide or pull back the manufacturer installed 'rubber boot', slightly. This is the 'boot' located nearest to the 5/8" nut. This will enable easier removal of the 5/8" nut, and the push-pull lock washer, which are also manufacturer installed. Remove this nut and washer now, and set aside. (It is not necessary to remove the manufacturer installed 1/4" jam nut as the other 5/8" nut will easily slide over it.)
- b) Be certain that the manufacturer installed 5/8" jam nut is positioned about halfway down the threads as shown. The second push-pull lock washer should be next to this. Slide on a stainless steel washer (12). THIS WASHER KEEPS THE LOCK WASHER FROM DIGGING INTO THE ALUMINUM PUSH-PULL BRACKET.
- c) Feed the push pull cable (clamp end, NOT threaded end) down through the space between the upper fuel tank mount tube, (which was previously installed), and the bulkhead gusset plate on the center uprights. Continue feeding the push pull cable between the upper tube of left main landing gear and the rear cage rail. Finish by bringing the cable in a curve around and into the cabin area.
- d) Feed the capless end of the aileron push-pull cable through push-pull bracket (attached to the boom in step 1).
- e) Slide on a second stainless washer (12), then add the manufacturer installed push-pull lock washer and 5/8" nut that were removed and set aside in step 2. A), above. Hand tighten nut. FURTHER ADJUSTMENT WILL OCCUR AT FINAL ASSEMBLY.

# ✓ Chapter 14

## Section 1 AILERON PUSH-PULL ASSEMBLY

f) [NOT PICTURED]

Slide the rubber boot back into position, so that it just touches the edge of the 5/8" nut. Be careful not to cut the boot. Thread on female rod end (5).

3. **Figure PP-2 PREPARE BOTH PUSH ROD ASSEMBLIES**

Thread jam nuts (4) onto the ends of the two stainless push rods (6), and then thread on female rod ends (5). A drop of oil on the threads will facilitate this. If necessary, hold the push rod with a vise grip plier over a piece of cloth. Use a 3/8" wrench on the flat part of the rod end. **DO NOT** put a bolt in the ball of the rod end and thread. This will score the rod end race and create friction on the rod end. Adjust the female rod ends / jam nuts so that the distance between jam nuts measures approximately 3 7/8", as a starting point. **THIS DIMENSION WILL ADJUST THE AILERON DROOP. FURTHER ADJUSTMENT MAY OCCUR AT FINAL ASSEMBLY.** Note that the rod ends should be oriented at 90 Deg. to each other.

4. **Figure PP-2 ATTACHMENT OF PUSH RODS TO AILERON MIXER PLATE**

a) Locate the previously installed aileron mixer plate, located on the boom (Refer to Chapter 8 / Section 2 / Figures BA-2 &3).

b) Place a bolt through the female rod end (5) on the aileron push-pull cable (3). Add a washer (8). Insert bolt through indicated hole on the aileron mixer plate. Add a second washer (8). Select one of the two stainless push rods (6), assembled in step 3, above. Slide one of the two female rod ends onto the bolt. Add a third washer (8) and secure with locknut (9).

For lower roll pressure you can attach the push rods to the inside two holes on the mixer plate. Attach the push pull rod end to the outside hole on the mixer, this gives less throw on the surfaces and lightens control pressure greatly.

**FOR SMOOTH OPERATION, ONCE AGAIN VERIFY THAT THE PUSH-PULL CABLE IS PARALLEL TO THE AILERON MIXER PLATE AND TO THE BOOM. DO NOT ALLOW THE CABLE AND BRACKET TO COME IN AT AN ANGLE.**

c) After attaching the push pull cable to the mixer plate, drill and secure the push pull mount bracket (1) to the boom using pop rivets (2).

**NOTE: CASTLE NUTS ARE NOT USED AT THIS LOCATION. DUE TO THE USE OF ROD ENDS THE BOLTS ARE NOT SUBJECT TO ROTATION.**

Attach the second stainless push rod (6) assembly to the other hole on the aileron mixer plate. Insert bolt (7) through the indicated aileron mixer plate hole. Slide on washer (8) and a female rod end of the second stainless push rod (6) assembly. Add a second washer (8) and hand tightened locknut (9). **FURTHER ADJUSTMENT MAY OCCUR AT FINAL ASSEMBLY.**

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## Section 1 AILERON PUSH-PULL ASSEMBLY

### 5. Figure PP-2 ATTACHMENT OF STAINLESS PUSH RODS TO AILERON CONTROL HORNS

THIS PROCEDURE CAN BE DONE LATER, DURING FINAL ASSEMBLY. IF YOU ARE BUILDING THE PLANE WITHOUT WINGS ON.

Locate the aileron control horn, at the root of the aileron assembly. Select the stainless push rod (6) that was attached to the aileron mixer plate first. Turn the unattached female rod end so that it lies flat against, and aligns with, the hole on the inside of the aileron control horn. Place washer (8) on bolt (7) and insert through the female rod end. Add a second washer (8) and insert through the horn. Add final washer (8) and hand tightened locknut (9). FURTHER ADJUSTMENT MAY OCCUR AT FINAL ASSEMBLY. Repeat this entire procedure on the second stainless push rod and control horn.

### 6. Figure PP-4 INSTALLING THE PUSH-PULL BLOCK TO THE PUSH-PULL CABLE

a) Remove the second plastic cap that is protecting the threaded end on the other end of the aileron push-pull cable (3).

b) The Push-pull block (13) will be installed on this end. Open up the push-pull block by inserting a screwdriver in the slot to spread it open. Place the block on and slide it up the aileron push-pull cable (3). Continue sliding it up until the 3/16" through hole in the push-pull block (13) is over the "clamp groove" in the push-pull cable. Remove the screwdriver. MAKE CERTAIN THE THROUGH HOLE IS OVER THE CLAMP GROOVE OF THE PUSH PULL. LATER, THE PUSH PULL IS ATTACHED WITH A THROUGH BOLT TO SECURE THE BLOCK THERE.

### 8. Figure PP-4 ATTACHING THE PUSH-PULL CABLE TO THE ATTACH BRACKET

a) First thread on a jam nut (4) and then a female rod end (5) onto the aileron push-pull cable (3) assembly. Leave the jam nut loose for later adjustment.

b) Attach the push-pull block (13) to the previously installed push-pull attach bracket (Refer to Chapter 7 / Section 1 / Figure DS-2). Position the push-pull block into the push-pull attach bracket. Place washer (15) on bolt (14) and insert through push-pull attach bracket and block, as shown. Add a second washer (15) and secure with a locknut (16). MAKE CERTAIN THE BOLT (14) HAS GONE THROUGH THE CLAMP GROOVE OF THE PUSH PULL, NOT THE FLAIED END OF THE PUSH PULL FITTING (WHERE THE RUBBER BOOT SEATS).

### 9. Figure PP-4 ATTACHING THE PUSH-PULL CABLE TO CONTROL STICK

a) Remove the end of the previously attached connector rod (Refer to Chapter 7 / Section 1 / Figure DS-3) attached to the right dual control stick plug. Attach both the aileron push-pull (3) assembly and the connector rod to the right dual control stick plug. Place washer (8) on bolt just removed and insert through female rod end of aileron push-pull cable, add three washers (8). Align with the hole on the control stick plug and insert bolt through. the female rod end of the connector rod, a final washer and a finger tightened locknut (9).

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- a) Adjust the aileron push pull so that the mixer plate is perpendicular to the boom and the control sticks are straight up and down. The rod ends on the push pull cable are used for this adjustment. If further adjustment is necessary, adjust the large 5/8" nuts on the bulkhead end of the push pull. Retighten the locknuts, bolts, and jam nuts. Make sure that the rod ends are still 90 Deg. after tightening the jam nuts. **DO NOT FORGET TO TIGHTEN THE 5/8" NUTS!**

Section 1  
Aileron Push-Pull Parts List  
Figures PP-1, PP-2, PP-3 & PP-4

INDEX#	PART #	QTY	DESCRIPTION
1.	B-16	2	PUSH-PULL BRACKET
2.	SS-64	4	3/16" POP-RIVET
3.	BC-108	1	108" PUSH-PULL WITH NUTS
4.	AN316-4R	4	1/4" JAM NUT
5.	CW-4	4	FEMALE ROD END
6.	CS-111	2	STAINLESS PUSH ROD
7.	AN4-10A	2	1/4" BOLT
8.	AN960-416	6	1/4" WASHER
9.	AN365-428	3	1/4" LOCKNUT
10.	AN4-13A	1	1/4" BOLT
11.	CS-91	2	PUSH-PULL WASHER
12.			
13.	CS-71	1	PUSH-PULL BLOCK
14.	AN3-12A	1	3/16" BOLT
15.	AN960-10	2	3/16" WASHER
16.	AN365-1032	1	3/16" LOCKNUT

**FLIGHTSTAR II & IISL - Assembly Manual**

NOTE THAT THE AILERON PUSH-PULL CABLE GOES IN FRONT OF THE FUEL TANK AND BEHIND THE BULKHEAD GUSSET PLATE AND THE SEAT SUPPORT TUBE.

ELEVATOR  
ATTACH, SEE  
FIGURE PP

AILERON/MIXER  
SEE PP-

ATTACH THE ELEVATOR PUSH-PULL  
TO THE AFT UPRIGHT USING  
A TIE WRAP STANDOFF AS SHOWN  
BELOW.

THE AILERON PUSH-PULL GOES  
UNDER THE LOWER SEAT SUPPORT  
TUBE.

NOTE THAT THE ELEVATOR PUSH-PULL  
GOES UNDER THE REAR CAGE RAIL AND  
ABOVE THE UPPER TUBE OF THE  
MAIN GEAR AS SHOWN.

AILERON PUSH-PULL  
CABLE

ELEVATOR PUSH-PULL CABLE

PP-1

**FLIGHTSTAR**





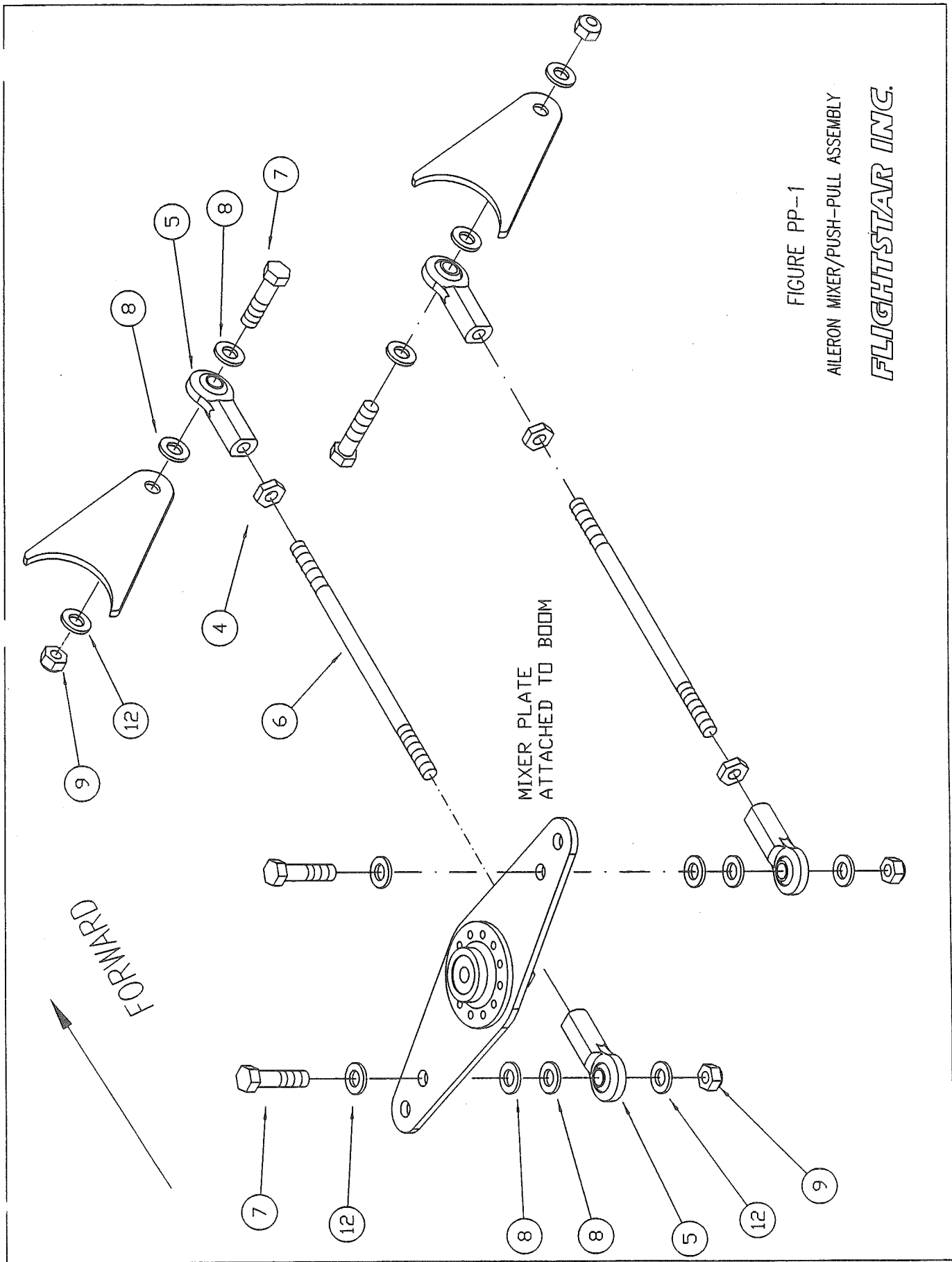


FIGURE PP-1

AILERON MIXER/PUSH-PULL ASSEMBLY

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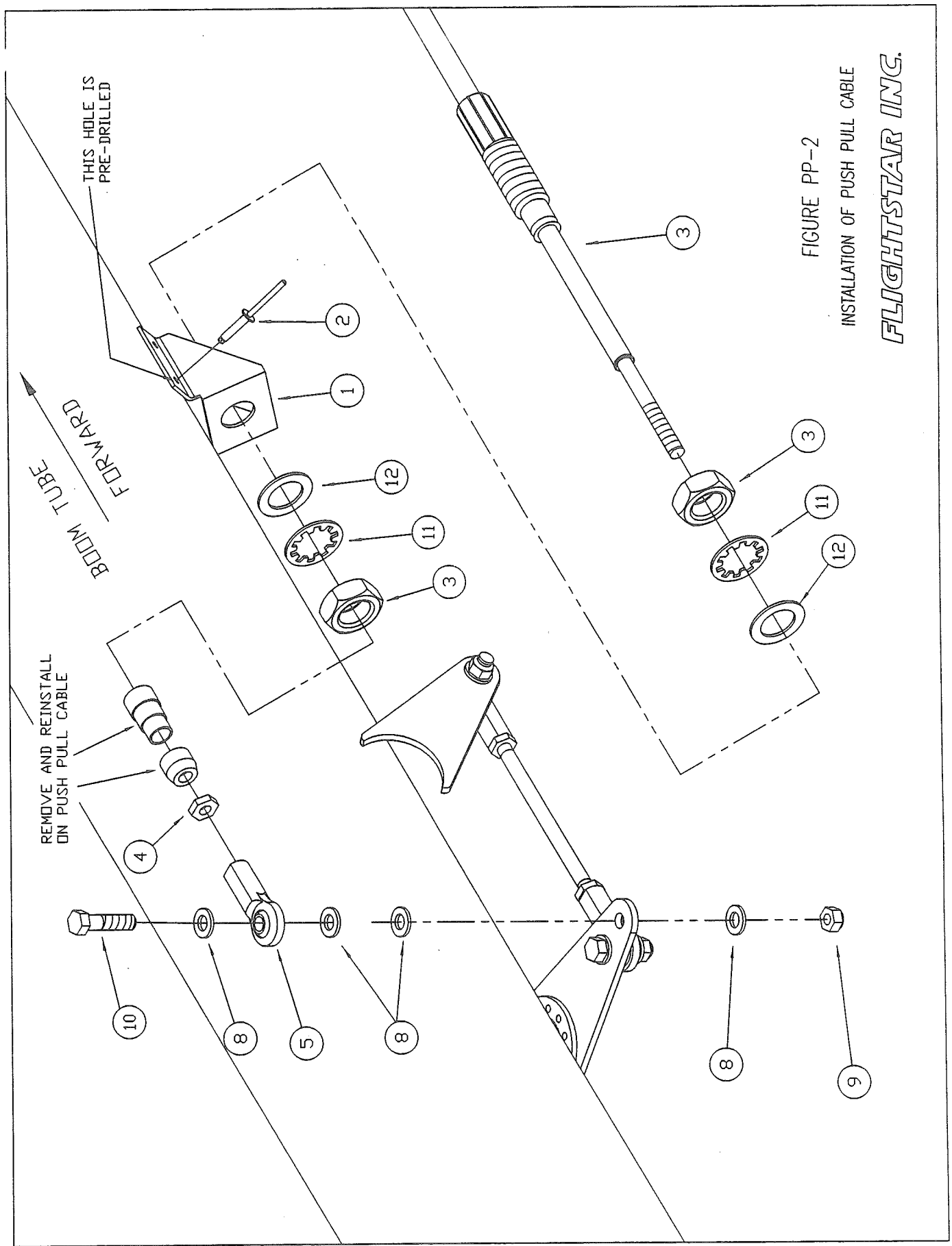
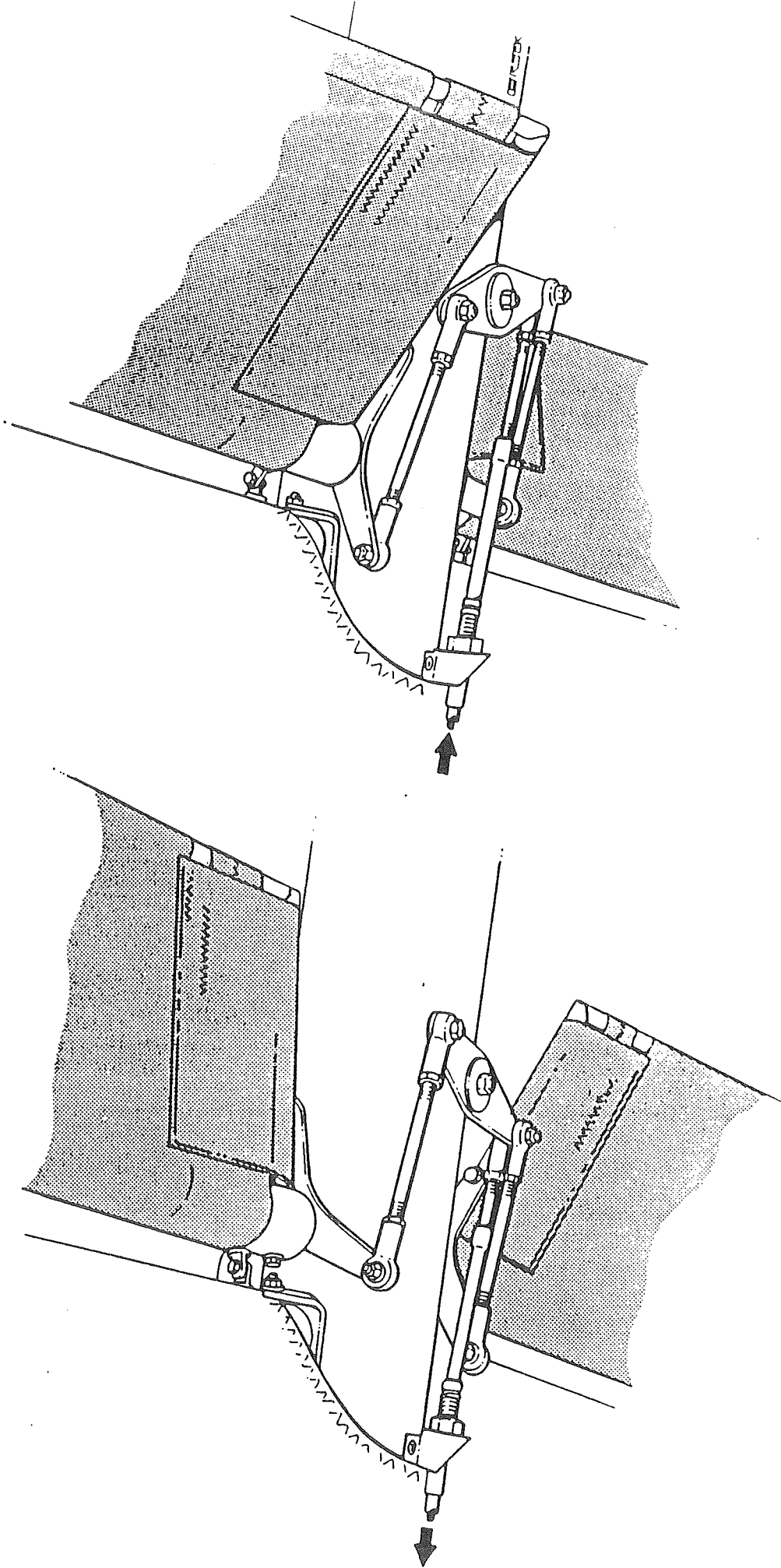


FIGURE PP-2  
 INSTALLATION OF PUSH PULL CABLE

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PP 4

CORRECT AILERON MOVEMENTS

**FLIGHTSTAR**



## Chapter 14

### Section 2

## Elevator Push-Pull Assembly

### Figure PP-7

1. **NOT PICTURED PREPARING THE TANGS TO RECEIVE BALANCE SPRING**
  - a) Prior to attaching the elevator balance spring (7) to the figure 8 tang (8) and the 4 hole (elevator adjust) tang (3). The holes that will receive the spring should be "de-burred". This will prevent the sharp edges from digging into the spring, which could cause it to fail prematurely. Only the two holes that the spring will connect to need to be "de-burred". This will be either hole on the figure 8 tang and the hole by itself on the 4 hole (elevator adjust) tang. De-bur these holes using a file or Weldon counter sink.
  - b) Use smooth billed pliers to hold and slightly twist out the end of the spring, opening it up slightly. Hook on the de-burred hole of the figure 8 tang (8). Repeat on the other end of the spring, this time hooking on the de-burred hole on the 4 hole (elevator adjust) tang. Note: There is no second spring on the left side push-pull.
2. **Figure PP-7 ATTACHING THE RIGHT SIDE PUSH-PULL BRACKET TO THE BOOM**
  - a) Insert bolt (2, through the center hole on the 4 hole elevator balance adjust tang). The proper adjustment of the balance spring is to have the elevator held up in neutral position parallel with the horizontal stabilizer. It may be adjusted later, after final assembly.
  - b) Position the top, left hand hole of the push-pull bracket (1) over the pre-installed 3/16" rivnut that is located toward the top center of the boom. Insert bolt (2) and the 4 hole tang assembly through the top left hand hole on the push-pull bracket and into the rivnut hole in the boom. Note: There is no elevator balance spring nor rivnut on the left side push-pull.

#### DRILLING THE LEFT SIDE PUSH-PULL BRACKET LOCATING HOLE.

- c) Measure and mark the boom on the pilot's left hand side for drilling and Attaching the push-pull bracket. The location for the first 3/16" locating hole is 8" from the rear of the boom and 1-1/2" down from the top of the boom tube. Check this before drilling by comparing to the other side (pilot's right side).

#### ATTACHING THE SECOND PUSH-PULL BRACKET TO THE BOOM

- c) Position the top right hand hole of the push-pull bracket (1) over the just-drilled 3/16" hole on the boom. Insert the pop rivet (15 ) into the top right hand hole on the push-pull bracket and into the hole in the boom. Pop the pop rivet, leaving the other three until after you attach the push-pull for proper alignment.

3. **Figures PP-7, PP-8, PP-1 FEEDING THE PUSH-PULL CABLES THROUGH THE BRACKETS**  
**NOTE:** This procedure is the same as the procedure used to prepare and feed the aileron push-pull cable through the bracket. Refer to Figure PP-8 for manufacturer installed hardware placement. **FURTHER NOTE** that the manufacturer installed hardware is not easily identifiable in Figure PP-7.

## Chapter 14 SECTION 2 ELEVATOR PUSH-PULL ASSEMBLY

- a) Prepare the 164" elevator push-pull cables (4) by removing and discarding the manufacturer installed plastic thread protection caps from the end of the cables on which the nuts and washers have already been manufacturer installed. TEMPORARILY slide or pull back the manufacturer installed 'rubber boots', slightly. This is the 'boot' located nearest to the 5/8" nut. This will enable easier removal of the 5/8" nuts, and the push-pull lock washers, which are also manufacturer installed. Remove these nuts and washers now, and set them aside. (It is not necessary to remove the manufacturer installed 1/4" jam nuts as the other hardware will slide easily over it.)

Be certain that the manufacturer installed 5/8" jam nuts are positioned about halfway down the threads as shown. The second push-pull lock washers should be on next to these nut. Slide on a stainless push-pull washer (5). THIS WASHER KEEPS THE LOCK WASHER FROM DIGGING INTO THE PUSH-PULL BRACKET.

- b) Feed the capless ends of the elevator push-pull cables through push-pull brackets (attached to the boom in step 2).
- c) Slide on a second stainless washer (5), then add the manufacturer installed push-pull lock washers and the 5/8" nuts that were removed and set aside in step 3.a), above. Hand tighten nut. FURTHER ADJUSTMENT WILL OCCUR AT FINAL ASSEMBLY.
- d) [NOT PICTURED]  
Slide the rubber boot back into position, so that it just touches the edge of the 5/8" nut.

### 4. Figure PP-7 THREADING ON THE FORK END FITTINGS TO THE CABLES AND CONNECTION TO CONTROL HORNS. Begin on the right side push-pull.

- a) Thread the fork end fitting (12) down to the manufacturer installed jam nut, which should be about half way down the threads. MAKE CERTAIN THAT THE THREADS ARE PAST THE DRILLED CHECK HOLE IN THE FORK END.
- b) Place washer (10) on bolt (9). Slide the bolt through the second hole in the figure 8 tang (end without the spring). Add three more washers (10).
- c) Turn the fork end fitting to align with the hole on the end of the right side elevator control horn. Insert the bolt through the fork end fitting and the elevator control horn. Add a final washer (10), castle nut (13), and, AFTER FINAL ADJUSTMENT, cotter pin (14).
- d) Repeat the above attachment for the pilots left side using bolt (6) and washers (10). castle nut (13), and, AFTER FINAL ADJUSTMENT, cotter pin (14). Final adjustment of the redundant cables occurs after attachment to the control sticks in the front.



## Chapter 14 SECTION 2 ELEVATOR PUSH-PULL ASSEMBLY

5. **Figure PP-7 FINISHING THE MOUNTING OF THE PUSH-PULL BRACKETS TO THE BOOM**

Determine the proper angle for the brackets to provide the least angle between the push-pull end sleeve and the push-pull outer cable, (as before on the aileron). Drill out the pop-rivet mounting holes using the brackets as a drill guide. Pop-rivet the brackets to the boom with pop-rivets (15).
6. **Figure PP-7 ROUTING THE PUSH-PULL CABLES**

Route the elevator push-pull cables from the brackets, along the left and right side of the rear uprights and under the rear cage rail, as shown. After finishing the complete assembly, use tie wraps to secure the elevator push-pull cables to the rear support tube, placed as indicated in the figure.
7. **Not Pictured INSTALLING THE PUSH-PULL BLOCKS TO THE PUSH-PULL CABLES**

Follow the same procedure that was used in Section 1 to install the push-pull block to the aileron push-pull cable.

  - a) Remove the second plastic cap protecting the threaded end on the other end of the block to the elevator push-pull cable. The push-pull block (20) will be installed on this end. Open up the push-pull block by inserting a screwdriver in the clamp slot to spread it open. Place it on the cable and slide it up the elevator push-pull cable (4) assembly. Continue sliding it up until the 3/16" hole in the push-pull block (20) is over the "clamp groove" in the push-pull cable. Slide the rubber boot back into position, so that it just touches the edge of the push-pull block. Be careful not to cut the boot
8. **Figure PP-7 - ATTACHING THE PUSH-PULL BRACKETS TO CAGE RAIL**

Locate the predrilled holes (just ahead of the drag strut of the main landing gear) on the left and right side cage rails and position the push-pull clamp brackets on the bottom of the rail as indicated in the figure, aligning the holes.

  - a) Place washers (18) on bolts (17) and insert through the two holes, slide on push-pull bracket (16), washers (18). Secure with locknut (19). Repeat this procedure on the second push-pull bracket.
9. **Figure PP-7 ATTACHING THE PUSH-PULL TO THE BRACKETS**

Attach the push-pull / block assembly to the brackets.

  - a) Insert bolt (21) through washer (18) push-pull bracket (16) and push-pull / block assembly as shown. Secure with washer (18) and locknut (19) Tighten locknut. Repeat this for the second push-pull.
10. **Figure PP-7 & DS-2 ATTACHING THE ROD ENDS TO THE DUAL STICK TORQUE TUBE**
  - a) Thread the female rod ends (22) onto the push-pull at the front end . Begin adjustments on one cable by threading the rod end in at least half way down the threads (use the jam nuts as a thread gauge for reference). Insert bolt (11)

✓ **Chapter 14** Section 2 ELEVATOR PUSH-PULL ASSEMBLY

into the control horn and adjust the rod end, the rear fork and the large nuts on the rear of the push-pull to adjust the elevator push-pull so that the control stick is straight up, or slightly forward of straight up with the elevator parallel with the angle of the horizontal stabilizer. This is the correct position of the elevator.

- b) After you have confirmed the adjustment on one push-pull, go back and secure bolt (11) with washers (10) and locknut (23) . Tighten all the locknuts and finally, cotter pin the drilled bolts and nuts. Adjust the second push-pull to match the first, so that there is no pre-load on the cables. After accumulating flight hours, the push-pulls will need to be adjusted again to maintain the correct position of the elevators and the control sticks.

✓ **Chapter 14** Section 2 ELEVATOR PUSH-PULL ASSEMBLY

Section 2  
Elevator Push-Pull Parts List  
Figures PP-1 - PP-7

(with additional references to Figures DS-2 & PP-4)

INDEX#	PART #	QTY	DESCRIPTION
1.	B-16	2	PUSH-PULL BRACKET
2.	AN3-4A	1	3/16" BOLT
3.	4HT	1	4 HOLE TANG (ELEVATOR ADJUST)
4.	BC-164	2	164" ELEVATOR PUSH-PULL
5.	CS-91	4	STAINLESS PUSH-PULL WASHER
6.	AN4-6	1	1/4" BOLT, DRILLED
7.	CS-2	1	ELEVATOR TRIM SPRING
8.	CS-1	1	FIGURE 8 TANG
9.	AN4-10	1	1/4" BOLT, DRILLED
10.	AN960-416	8	1/4" WASHER
11.	AN4-10A	2	1/4" BOLT
12.	AN486-2P	2	FORK END FITTING
13.	AN310-4	2	1/4" CASTLE NUT
14.	AN380-2-2	2	COTTER PIN
15.	SS64	7	3/16" POP-RIVET
16.	CS-102	2	PUSH-PULL CLAMP BRACKET
17.	AN3-21A	4	3/16" BOLT
18.	AN960-10	8	3/16" WASHER
19.	AN365-1032	6	3/16" LOCKNUT
20.	CS-71	2	PUSH-PULL BLOCK
21.	AN3-13A	2	3/16" BOLT
22.	CW-4	2	1/4"-28 FEMALE ROD END
23.	AN365-428	2	1/4" LOCKNUT

NOTE THAT THE AILERON PUSH-PULL CABLE GOES IN FRONT OF THE FUEL TANK AND BEHIND THE BULKHEAD GUSSET PLATE AND THE SEAT SUPPORT TUBE.

ELEVATOR ATTACH, SEE FIGURE PP

AILERON/MIXER SEE PP-

ATTACH THE ELEVATOR PUSH-PULL TO THE AFT UPRIGHT USING A TIE WRAP STANDOFF AS SHOWN BELOW.

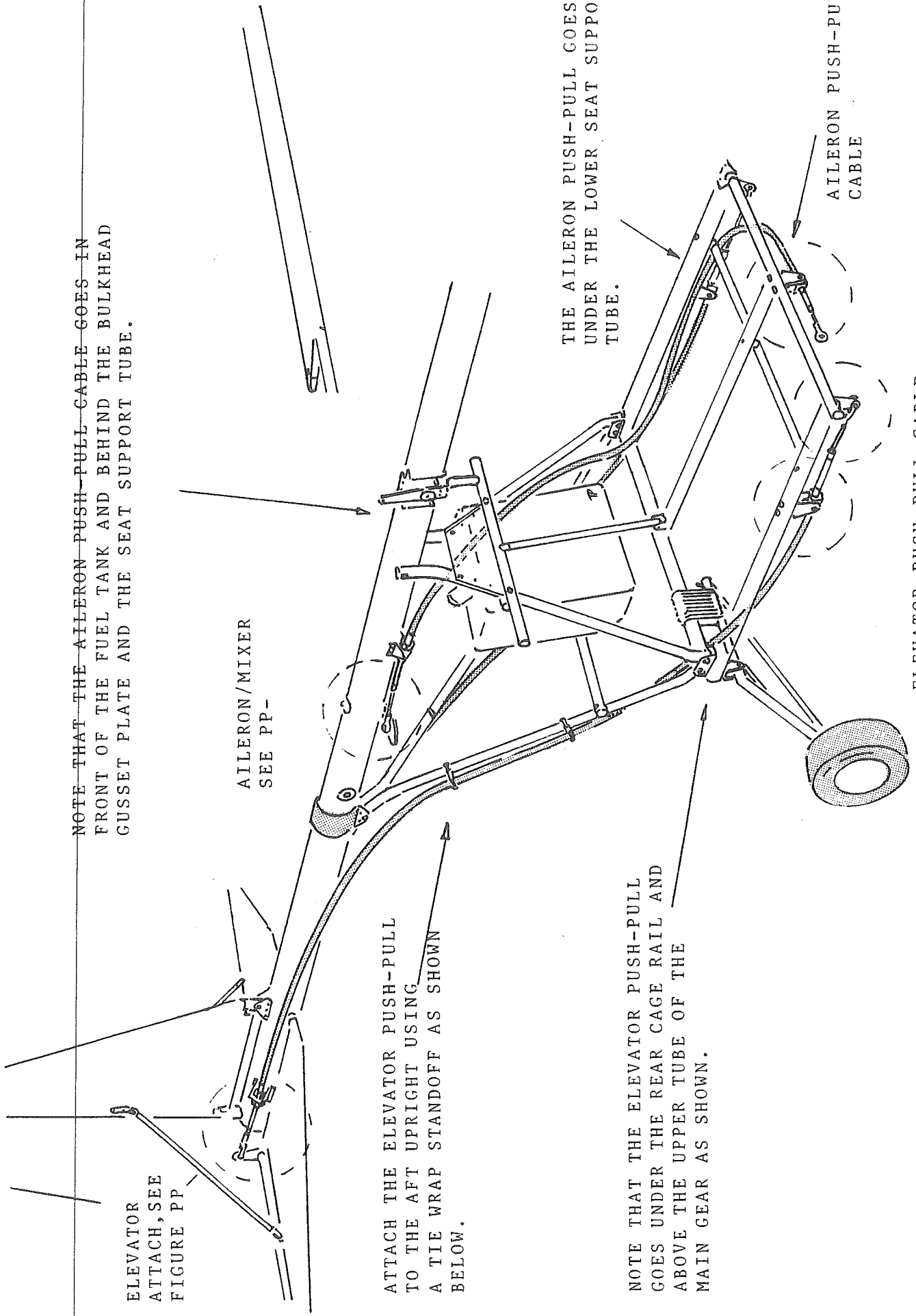
THE AILERON PUSH-PULL GOES UNDER THE LOWER SEAT SUPPORT TUBE.

NOTE THAT THE ELEVATOR PUSH-PULL GOES UNDER THE REAR CAGE RAIL AND ABOVE THE UPPER TUBE OF THE MAIN GEAR AS SHOWN.

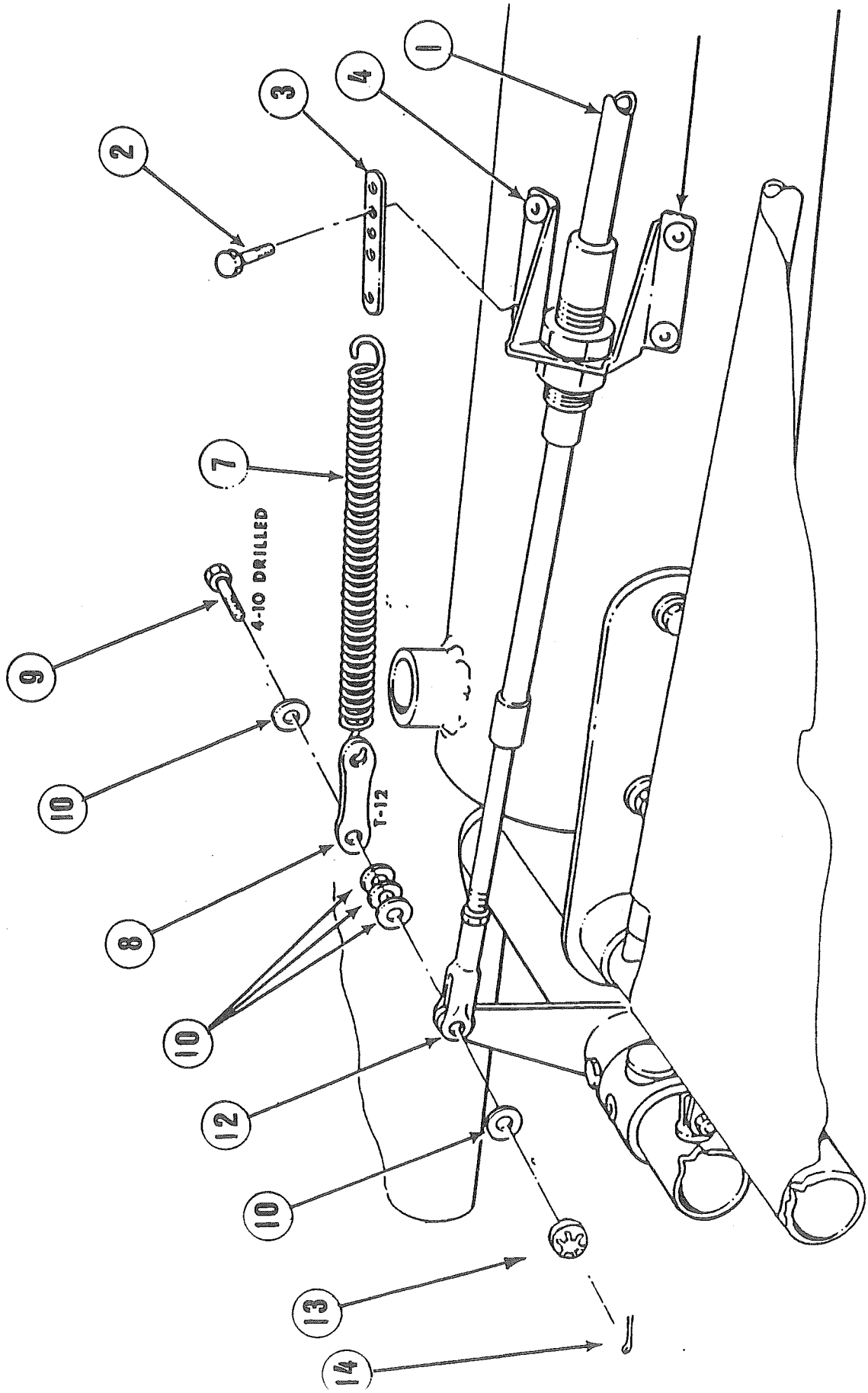
AILERON PUSH-PULL CABLE

ELEVATOR PUSH-PULL CABLE

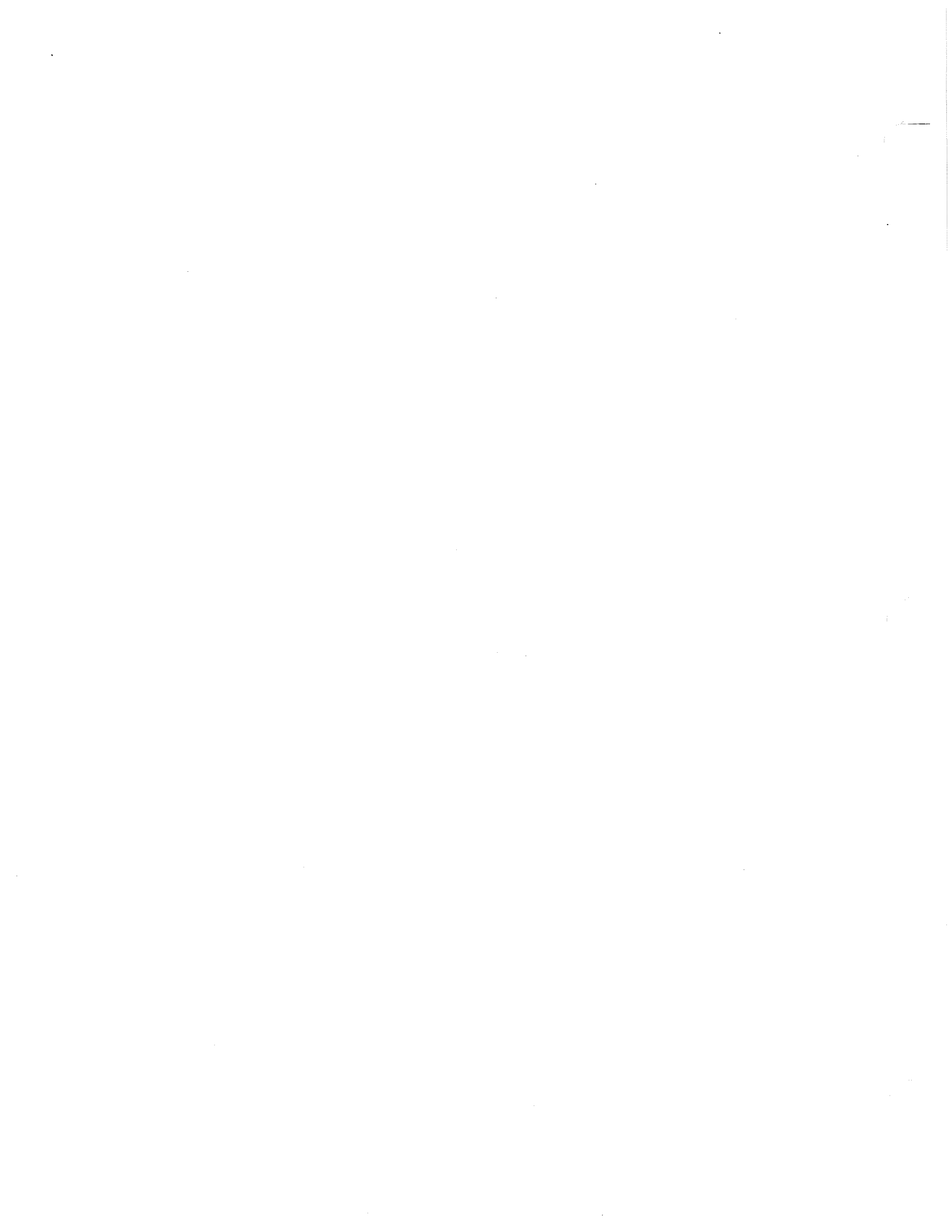
PP-1

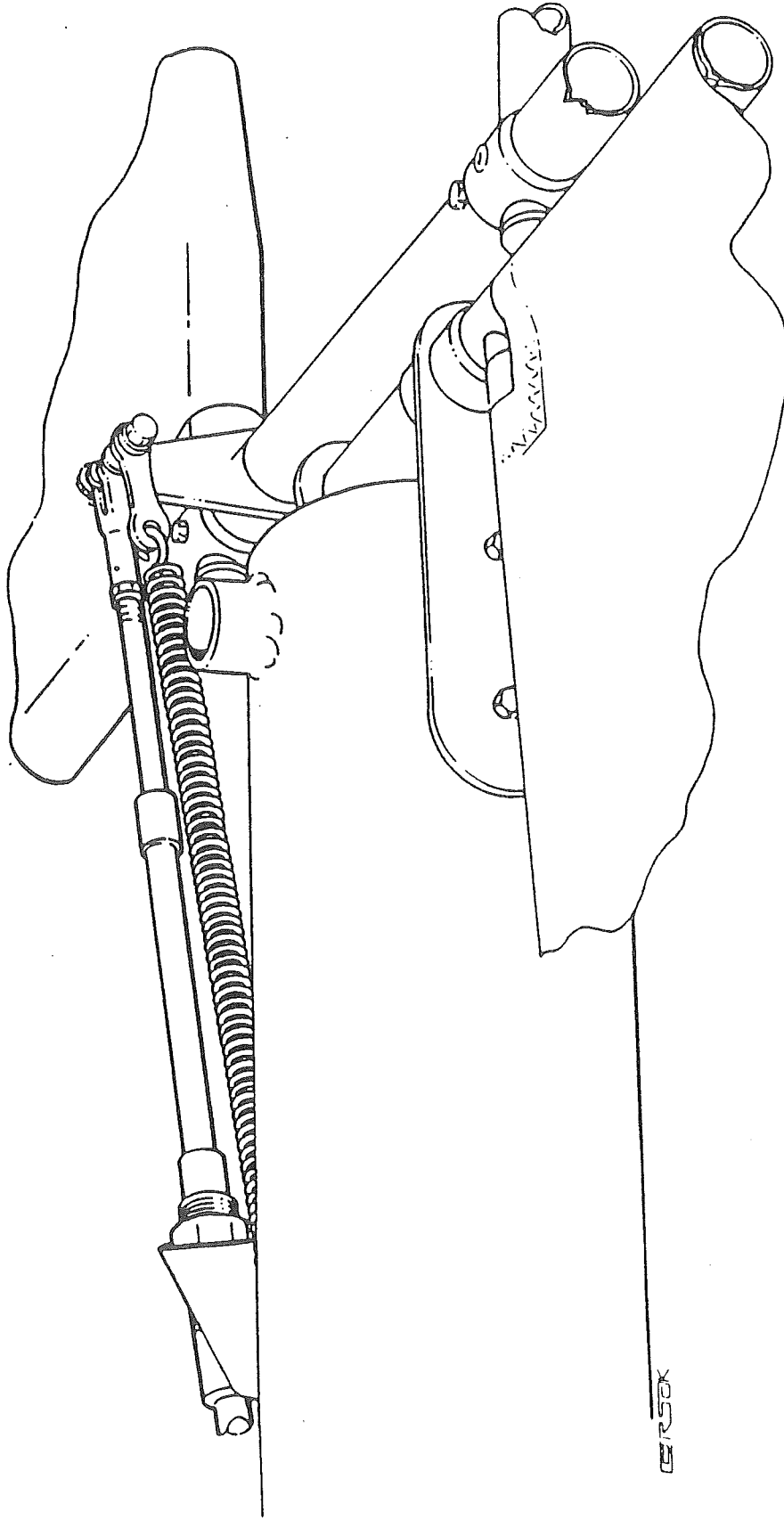






PP5





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PP6

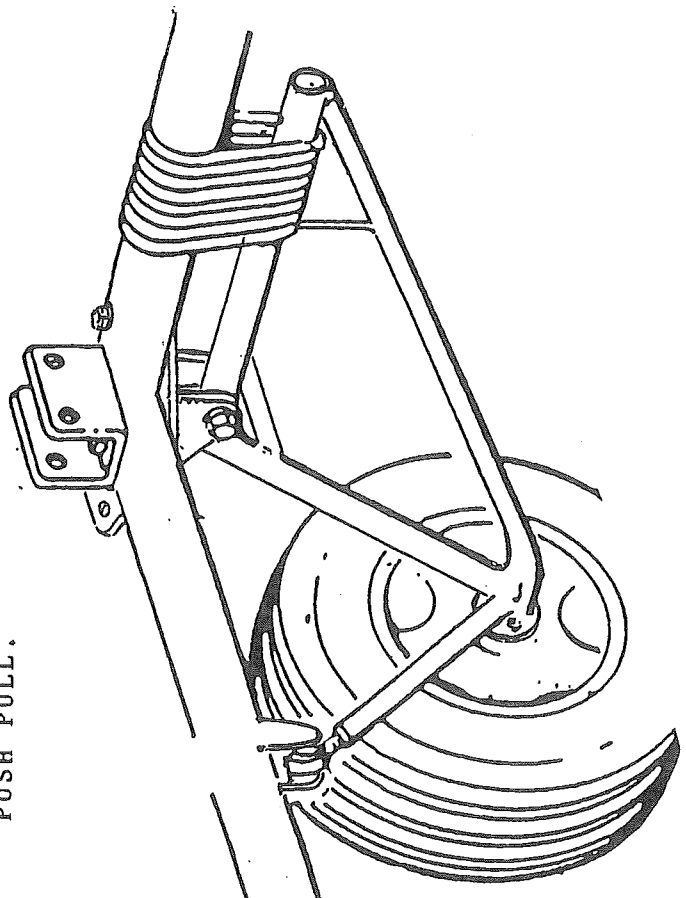
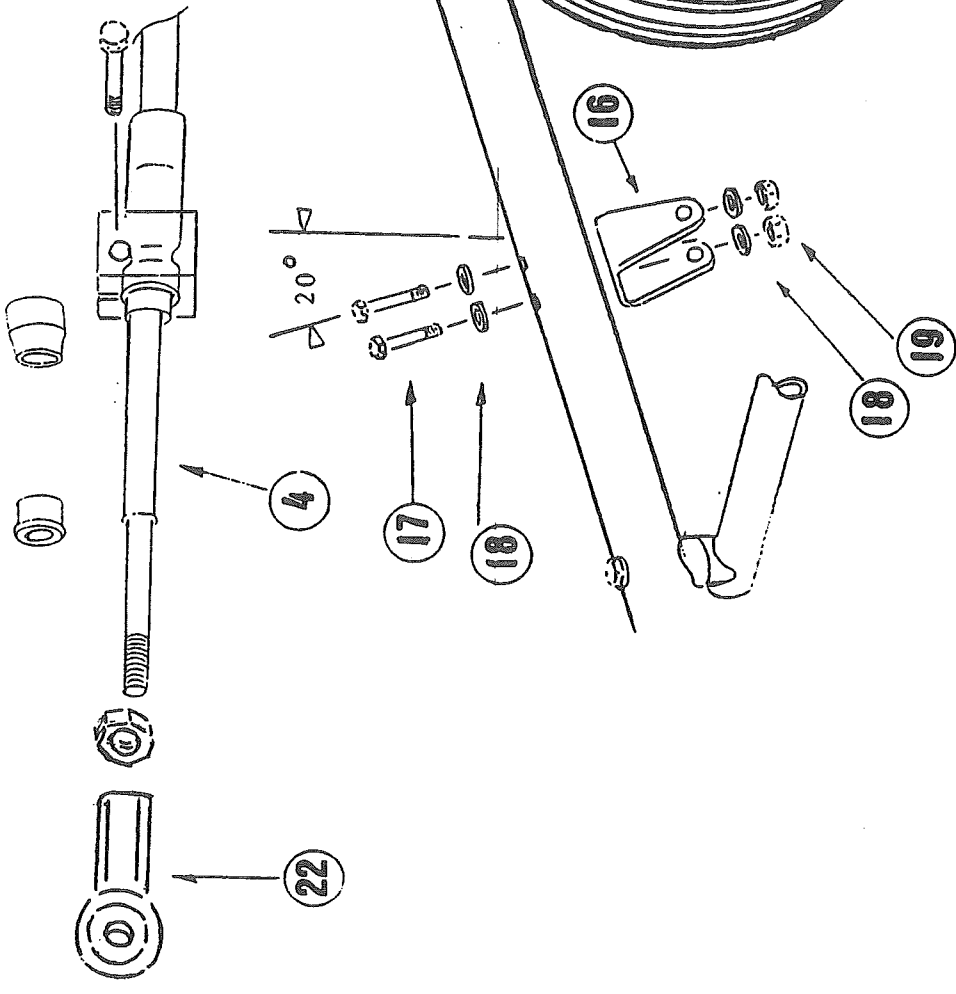
COMPLETED ELEVATOR HOOK-UP

**FLIGHTSTAR**

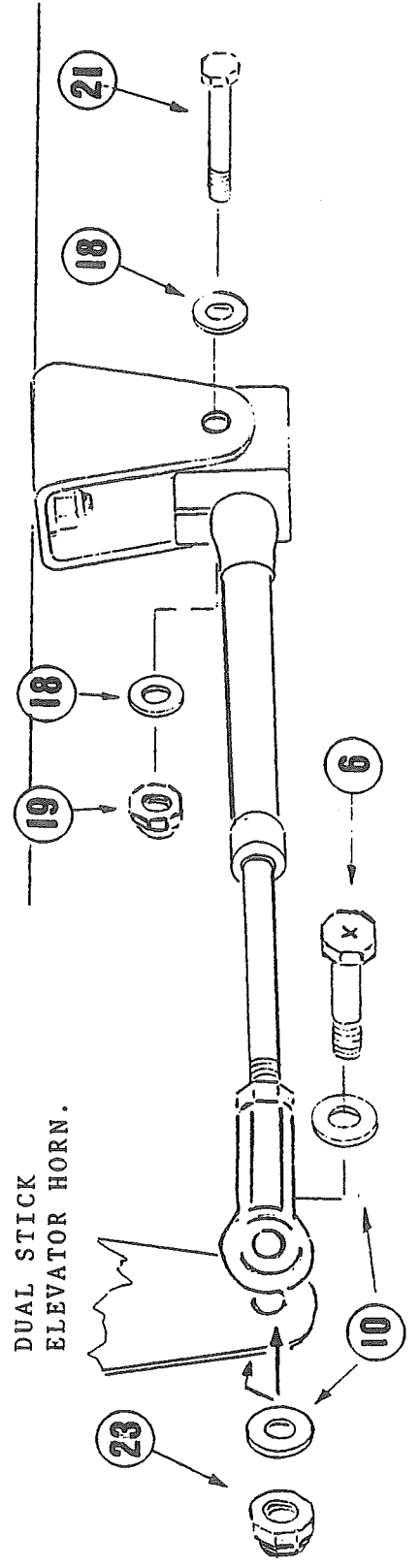




CAREFULLY REMOVE THE RUBBER (INNER) AND THE PLASTIC (OUTER) PROTECTIVE CAPS ON THE CLAMP END OF THE PUSH PULL CABLE USING A PAIR OF PLIERS. SLIDE ON THE CS-71 BLOCK (20) AS SHOWN. NOTE HOW THE THRU - BOLT "CAPTURES" THE PUSH PULL THROUGH THE BLOCK AND THE GROOVE IN THE PUSH PULL.



RIGHT SIDE RAIL





# ✓ Chapter 14

## Section 3 RUDDER CABLE ASSEMBLY Figure PP-9

### NOTE:

CHAPTER 5 SECTIONS 4 & 5  
CABLE ASSEMBLY AND TOWER ASSEMBLY  
BEGAN RUDDER CABLE ASSEMBLY PROCEDURES THAT WILL BE CONTINUED IN  
THIS SECTION. BE CERTAIN THAT ALL WORK IN THOSE PRECEDING SECTIONS  
HAS BEEN COMPLETED.  
REFER BACK TO CHAPTER 5 FIGURES RP-3 & RP-4 AS NECESSARY.

#### 1. Figure RC-1 ROUTING OF RUDDER CABLES

NOTE: ON *FLIGHTSTAR II*, THE RUDDER CABLES WILL BE ROUTED UP THROUGH A HOLE MADE IN THE REAR FAIRING (CHAPTER 11 - SECTION 6).

Continue routing the rudder cables from cable / tower assembly left off at Chapter 5 - Section 5, rear cage rail, up to boom, as shown. IT IS IMPORTANT TO BE CERTAIN THAT THE CABLES DO NOT INTERFERE WITH THE FUEL TANK (not pictured).

#### 2. Figure RC-1 ATTACHING RUDDER CABLE PULLEYS AND KEEPERS TO BOOM

a) Locate the predrilled hole through the boom that will receive the pulley keepers. Place on bolt (1), a washer (2), small MS pulley (3), and rudder cable pulley keeper (4). Insert through boom. On the other side of boom, add the second rudder pedal pulley keeper (4), small MS pulley (3), washer (2), and, after attachment of the rudder cables, secure with locknut (5).

b) Route the rudder cables through each one of the pulley keepers. Again be certain that the cables do not interfere with the fuel tank.

#### 3. Figure RC-1 ATTACHING THE RUDDER CABLES TO THE RUDDER CONTROL HORN

a) Locate the rudder control horn on the rudder (see inset in figure). Place washer (7) on bolt (6) and insert through tang. Add another washer (7). Align the hole of the end tang of the right side rudder cable ON TOP of the right side control horn hole. Insert through control horn. Add a final washer (7) and castle nut (8). Repeat this procedure on left hand side of control horn.

b) After adjusting the rudder cable tension, secure the castle nuts (8) with cotter pins (9). See directions on how to adjust the cable tension in the next section.

## ✓ Chapter 14 SECTION 3 RUDDER CABLE ASSEMBLY

### 4. Figure RC-1 TENSIONING CABLES & ATTACHING CABLE GUIDES TO THE BOOM

**BEFORE RIVETING THE CABLE GUIDE TO THE BOOM, IT IS VERY IMPORTANT THAT THE RUDDER CABLES ARE TENSIONED AND THAT THEY CLEAR THE ELEVATOR PUSH PULL BRACKET.**

**a) TO TENSION THE RUDDER CABLES:**

First be certain that the rudder surface is straight and that the rudder pedals are even and centered. Remove the AN bolt and locknut that were previously installed into the rudder cable adjuster plates in Chapter 5 / Section 5.

Move the bolt(s) in on the multiple holes of the adjuster until the cable is snug with no slack. The rudder cables should be very tight. A simple way to ease assembly of the tensioned cables is to use the rudder surface itself as a tensioning lever, leaving the rudder control horn / rudder cable attachment last, after adjusting the cable tension on the rudder cable adjuster plates.

**b) Be certain that the cable is kept in a straight line from the pulley keeper to the horn, that the tension is correct and that the cable clears the elevator push pull bracket.**

**c) The cable guides have been placed on the rudder cables by the manufacturer. With cables tensioned correctly, measure approximately 38" back from the right side pulley keeper attached in Step 2 above. Slide the cable guide to this measurement and position as shown in figure. Again, verify that the cable is kept in a straight line from the pulley keeper to the horn, that the tension is correct and that the cable clears the elevator push pull bracket. Holding the cable guide in position, drill out one 1/8" hole through the cable guide and pop rivet (10). Drill and pop rivet second hole.**

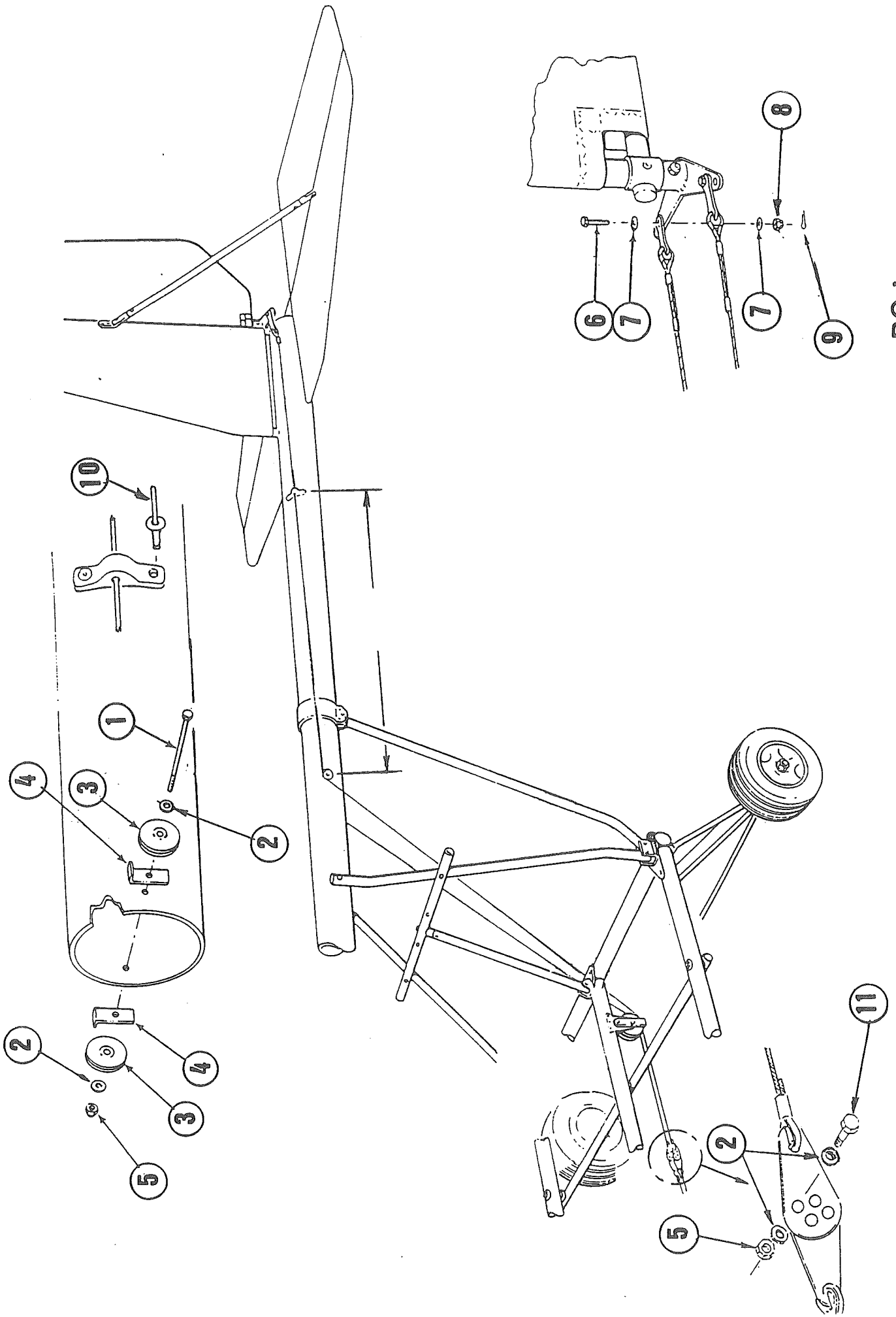
**d) Repeat this procedure for second cable guide on the other side of the boom**

## ✓ Chapter 14 SECTION 3 RUDDER CABLE ASSEMBLY

Rudder Cable AssemblySection 3  
Rudder Cable Parts List  
Figure RC-1

INDEX#	PART #	QTY	DESCRIPTION
1.	AN3-60A	1	3/16" BOLT
2.	AN960-10	4	3/16" WASHER
3.	MS-24566-1B	2	SMALL MS PULLEY
4.	CS-49	2	RUDDER CABLE PULLEY KEEPER
5.	AN365-1032	1	3/16" LOCKNUT
6.	AN4-5	2	1/4" BOLT
7.	AN960-416	4	1/4" WASHER
8.	AN310-4	2	1/4" CASTLE NUT
9.	AN380-2-2	4	COTTER PIN
10.	AA44	4	POP-RIVET ALUMINUM
11.	AN3-4A	2	3/16" BOLT





RC-1

