SECTION V

SURFACE CONTROLS

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SECTION V

SURFACE CONTROLS

5-1. INTRODUCTION. This section provides the removal, installation, and rigging and adjustment procedures for the control assemblies of the various structural surfaces. For the removal and installation of the structural surfaces of the airplane, refer to Section IV. The assemblies need not be removed in order of paragraphs since each paragraph describes the individual removal and installation of a component.

5-2. DESCRIPTION. The primary flight controls of PA-23 series airplanes are of the conventional type, operated by dual control wheels and rudder pedals. A system of cables, pulleys, push-pull rods and bellcranks transfer the movement of the control wheel, control column and rudder pedals to the ailerons, stabilator and rudder.

The aileron controls consist of two-control wheels connected by torque tubes to sprockets on each end of the control column cross member. A chain is wrapped around the sprockets and around a double adjustable sprocket on the vertical post of the control column. The chain is connected to the two piece primary aileron control cable which is routed along the sides of the fuselage to the main spar, where the two pieces are permanently fastened together, and out through the wings to a bellcrank in each wing. A one-piece balance cable is also connected between the bellcranks. As the control wheels are moved, the control cables move the bellcranks and actuate push-pull rods to move the ailerons.

The stabilator controls are also connected to the control column on the top left side. From the connecting point, cables are routed around a series of pulleys down under the floor and aft to the tail section of the airplane. The aft end of each cable connects to the stabilator balance arm which in turn is attached to the stabilator torque tube. As the control wheels are moved forward or aft, the cables move the balance arm up and down, thus turning the torque tube and stabilator.

The rudder is controlled by the pilot's and copilot's rudder pedals. The rudder pedals also control the nose wheel steering on the ground which is explained in Section VII. Cables are connected to both sides of the rudder pedal assembly and are routed aft through the bottom of the fuselage to the rudder horn. As rudder pedals are pushed, the cables move in opposite directions turning the

TABLE V-I. CONTROL SURFACE TRAVEL AND CABLE TENSION

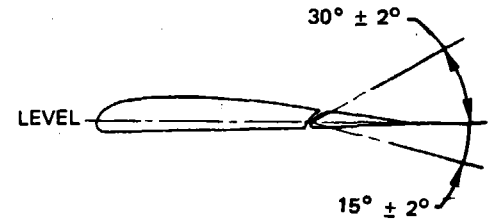
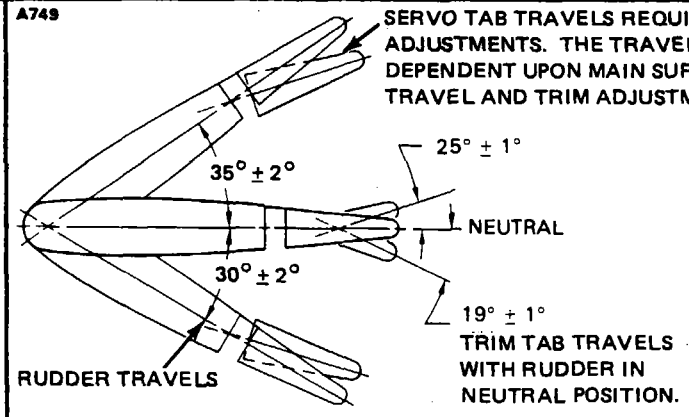
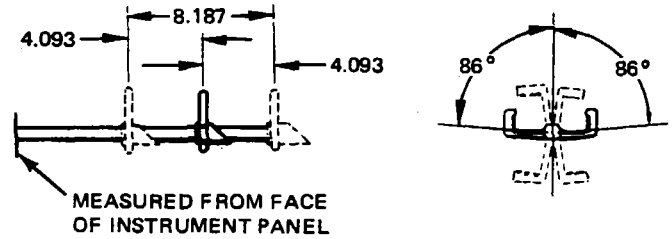
Aileron	A750 
Rudder Rudder Servo Tab Rudder Trim Tab	A749 
Flap	50° ± 2° Down
Control Wheel	A756 
Rudder Pedal	Neutral 12° aft of vertical Neutral to fwd 18.5°, 2.45 in. Neutral to aft 21.5°, 2.843 in. 40°, 5.293 Total

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TABLE V-I. CONTROL SURFACE TRAVEL AND CABLE TENSION (cont.)

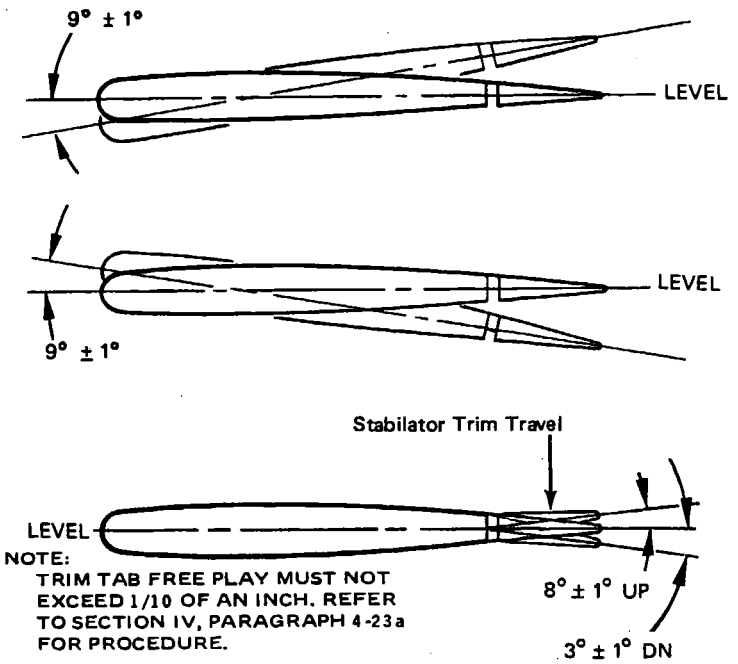
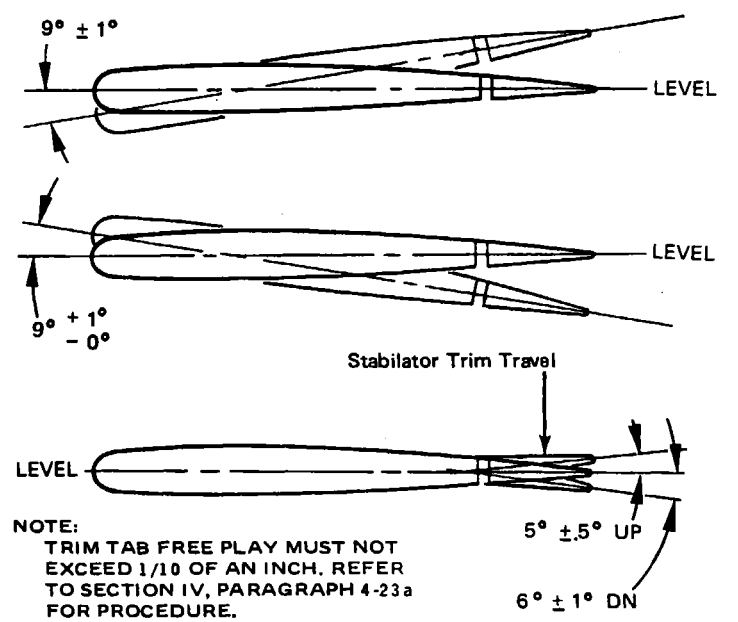
Stabilator Stabilator Anti-Servo Travel Serial Nos. 27-1 to 27-4573 inclusive except 27-4426	(PA-23-250)  NOTE: TRIM TAB FREE PLAY MUST NOT EXCEED 1/10 OF AN INCH. REFER TO SECTION IV, PARAGRAPH 4-23a FOR PROCEDURE.
Stabilator Stabilator Anti-Servo Travel Serial Nos. 27-4426, 27-4574 to 27-7554168 incl., and 27-8054001	(PA-23-250)  NOTE: TRIM TAB FREE PLAY MUST NOT EXCEED 1/10 OF AN INCH. REFER TO SECTION IV, PARAGRAPH 4-23a FOR PROCEDURE.

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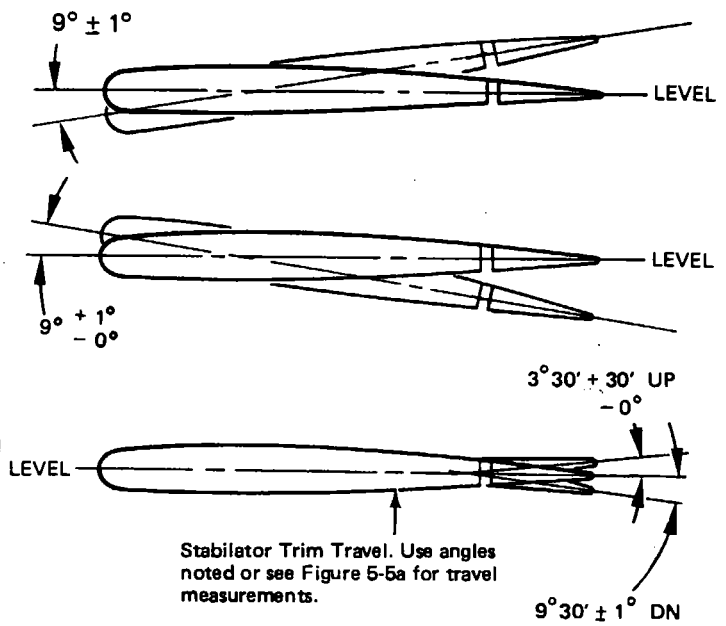
TABLE V-I. CONTROL SURFACE TRAVEL AND CABLE TENSION (cont.)

Stabilator Stabilator Anti-Servo Travel Serial Nos. 27-76540001 to 27-7954121 incl.	(PA-23-250)  NOTE: TRIM TAB FREE PLAY MUST NOT EXCEED 1/10 OF AN INCH. REFER TO SECTION IV, PARAGRAPH 4-23a FOR PROCEDURE.

CABLE TENSIONS:

AILERON	40 LBS + 25% -0%
STABILATOR	35 LBS +/- 10%
STABILATOR SERVO TAB*	15 LBS +/- 20%
RUDDER	30 LBS +/- 20%
RUDDER SERVO TAB	10 LBS +/- 20%
TRIM TAB INTERCONNECT**	30-60 LBS.

NOTE

CABLE TENSIONS GIVEN APPLY ONLY TO AIRPLANES WITHOUT AUTOPILOT BRIDLE CABLES ATTACHED. REFER TO APPROPRIATE AUTOPILOT SERVICE MANUAL FOR PROPER CABLE TENSIONS WHEN ATTACHING BRIDLE CABLES.

*WITH BUNGEE DISCONNECTED
**TENSION OF BOTH CABLES ADDED TOGETHER.

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rudder horn and rudder.

Stabilator and rudder trim are controlled by hand crank systems located within the cockpit ceiling. As each crank is turned the movement is transferred to the particular trim drum in the tail section. With the rotation of the drums, a screw is moved through the drum, moving a push-pull rod connected to the trim tab. An indicator wire is connected which transmits an indication of trim position to the indicator located in the cockpit ceiling. On PA-23-250 (six place) airplanes with Serial Nos. 27-7654001 and up, a trim tab interconnect system is installed which connects the flap actuation to the stabilator trim tab. On PA-23-250 (six place) airplanes with Serial Nos. 27-8054001 and up a control column bobweight is installed.

The wing flap system is operated by the hydraulic system of the airplane and is described in Section VI. Non-hydraulic components and rigging of the flaps are discussed in this section.

For a visual description of the various control systems, refer to the illustrated figures throughout this section.

5-3. TROUBLESHOOTING. Troubles peculiar to the control system are listed in Table V-II at the back of this section, along with their probable causes and suggested remedies.

5-4. STANDARD PROCEDURES. The following tips may be helpful in the removal and installation of the various assemblies.

a. It is recommended, though not always necessary, to level and place the airplane on jacks during rigging and adjustment of controls.

b. Remove turnbuckle barrels from cable ends before withdrawing cables through structures.

c. Tie a cord to cable end before drawing cable through structures to facilitate reinstallation of cable.

d. Turnbuckle stations are given at neutral position.

e. When referring to marking cable ends, etc., before disconnecting, a felt inker may be used.

f. When turnbuckles have been set to correct cable tension, no more than three threads should be exposed from either end of the turnbuckle barrel.

g. Cable tension should be taken with the appropriate surface control in its neutral position.

h. To remove or install any unit of an AutoPilot, refer to grid 5A9 for the appropraite Piper Service Manual.

i. When installing rod end jam nuts refer to Figure 5-2 for proper installation method..

5-5. CONTROL COLUMN ASSEMBLY.

5-6. REMOVAL OF CONTROL COLUMN ASSEMBLY COMPONENTS. (Refer to Figure 5-1.)

a. Remove either control tube and wheel by removing the two nuts, washers and bolts from the forward end of the tube. Pull the tube through the instrument panel.

b. The control column roller guide assembly may be removed by the following procedure:

1. Disconnect the recoil strap spring (11) from the fuselage frame guide tube (3) by removing the bolt and self-locking nut holding it in place. (S/N 27-1 to 27-7554168 only.)

2. Cut the safety wire and remove the bolt, spacer (14), bushing (12) and roller (13) from each side of the guide tube.

3. Remove the bushing (12), spring (11), and roller mounting blocks (10) by removing the bolt, bushing, and self-locking nut.

c. The control wheel tube roller assembly (4) may be removed by the following procedure:

1. Remove the instrument trim panel that surrounds the control tube by removing attaching screws and disconnecting instrument lights behind the trim panel, if installed.

2. Remove the four screws from around the control wheel tube that secure the roller assembly.

3. If the control wheel assembly is still installed, remove the rolled assembly by removing the self-locking nut, machine screw, roller, and spring washer from one side and at the bottom of the assembly thus separating the unit. The assembly may be further disassembled as necessary.

d. Either sprocket assembly on the top of the control column may be removed by the following procedure:

1. Remove the chain (9) from the sprocket (15) by disconnecting the turnbuckles on either end of the chain.

2. Remove the bolt and self-locking nut on the forward side of the sprocket to be removed.

3. Remove the bolts installed through the forward end of the control wheel tube, if not previously removed.

4. Remove the sprocket shaft and universal joint (20) from the aft side of the tube.

5. Remove the two bearings (17) and shims (18 and 19), if installed.

e. Remove the center sprocket (2) by removing the attaching bolt and self-locking nut.

f. Remove the bottom center aileron pulley by removing the attaching nut, washer and bolt.

g. Remove the bearings from the bottom of the tube assembly as follows:

1. Remove the nuts from either end of the retaining rod installed through the tube.

2. Remove the retaining rod from the tube.

3. Move the tube away from the mounting brackets.

4. Remove the bearings from both ends of the bottom control tube.

h. On airplane with serial numbers 27-8054001 and up, remove the bobweight assembly as follows:

1. Remove the access panels on the left and right side of the fuselage nose section at station 51.00

2. Disconnect the bobweight control tube from the arm assembly.

3. Remove the lock nuts from the attachment rod extending through the arm assembly piviot and fuselage frame.

4. Remove the attachment rod, bobweight and arm assembly with the inserted bearing on both ends of the piviot tube.

5. The bobweight control tube may be removed from the control column by loosening the clamp from the protective boot inside the cockpit and disconnecting the tube rod end at the control column.

5-7. INSTALLATION OF CONTROL COLUMN ASSEMBLY COMPONENTS. (Refer to Figure 5-1.)

a. Install the bearings to the bottom of the tube assembly as follows:

1. Insert the bearings in both ends of the bottom control tube.

2. Align the tube with the mounting brackets on the floor.

3. Install the retaining rod through the brackets and the bottom control tube.

4. Secure the rod in place with attaching nuts on either end.

b. Install the bottom center aileron pulley with attaching bolt and self-locking nut.

c. Install the center sprocket (2) with attaching bolt and self-locking nut.

d. Install either sprocket assembly to the top of the control column by the following procedure:

1. Install a bearing (17) to each side of the tube for the sprocket to be installed.

2. Install the sprocket shaft and universal (20) through the aft side of the tube.

NOTE

It may be necessary to shim (.012, P/N 85012-58 and .018, P/N 85012-59) the shaft on the aft side to insure a proper fit between the bearings and the end of the universal joint. A .010 maximum clearance is permissible.

3. Install the sprocket (15) on the forward end of the shaft and secure with bolt and self-locking nut.

4. Install the universal (20) to the control wheel tube, if installed.

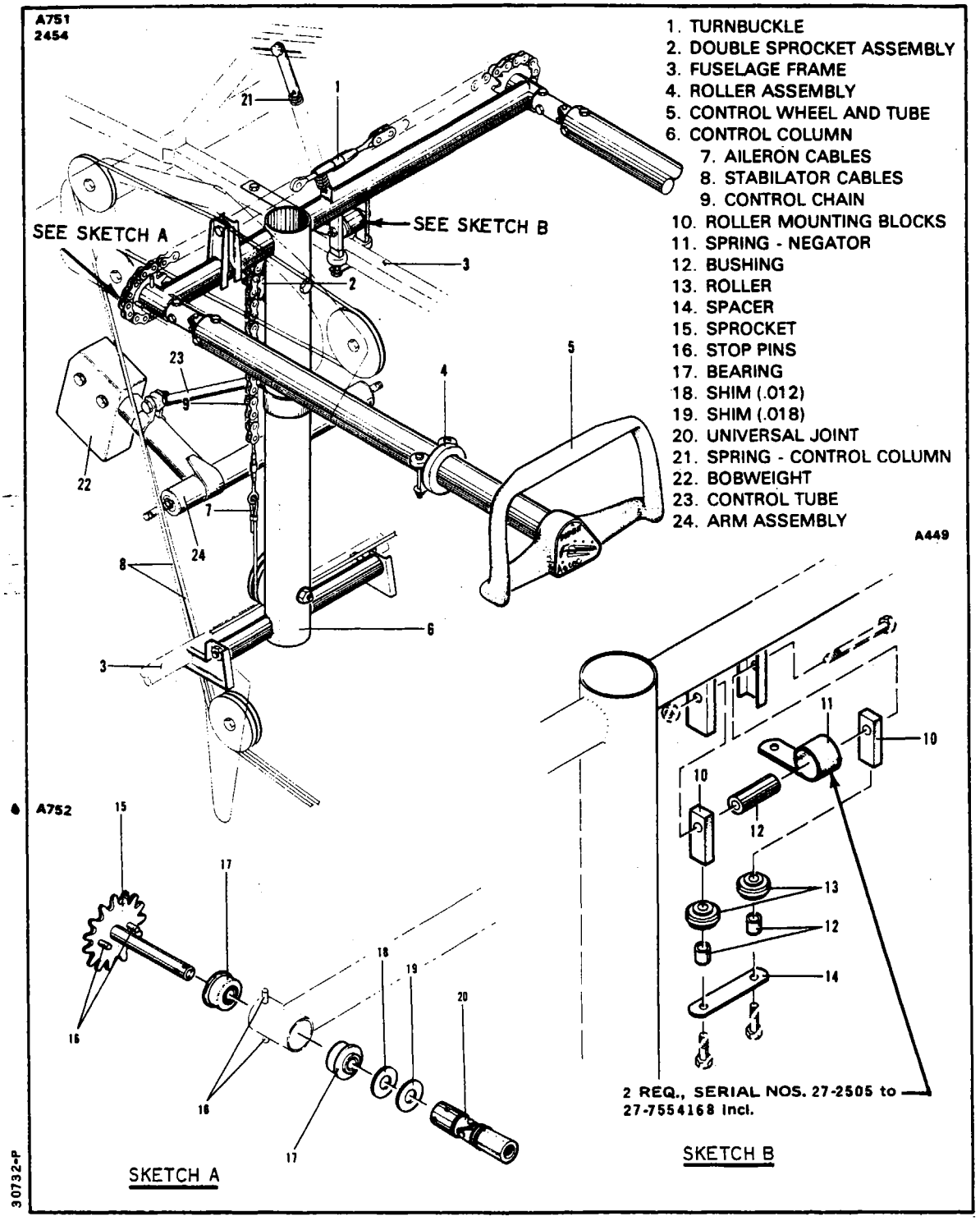

Figure 5-1. Control Column Installation

e. Install the control wheel tube roller assembly (4) by the following procedure:

1. If the control wheel tube is removed, install the assembled unit to the forward side of the instrument panel and secure with attaching screws.

2. If the control wheel tube is installed, assemble the unit around the tube, slide into position and secure to the forward side of the instrument panel with self-locking screws.

3. Position the control wheel in neutral (fore and aft) and adjust the roller attaching bolts until all three rollers contact the tube and the spring washers start to compress.

4. Install the instrument trim panel, if applicable, and connect the instrument lights, if installed.

f. Install the control column roller guide assembly by the following procedure:

1. Assemble the spring (11) to the bushing (12). (On Serial Nos. 27-2505 to 27-7554168, use two springs.)

2. Position the bushing (12), spring(s) (11), and roller mounting blocks (10) to the control column and secure with a bolt and self-locking nut. (No spring for 27-7654001 and up.)

3. Position the spacer (14) below the roller guide tube and install a bolt bushing (12) and roller (13), through the spacer, to each side of the guide tube.

g. Install the control tube and wheel (5) by inserting it through the instrument panel. Slide the tube over the aft end of the sprocket universal (20) and secure with attaching bolts and self-locking nuts.

h. On airplanes with serial numbers 27-8054001 and up install the bobweight assembly as follows:

1. Position the arm assembly with the bearings inserted in the piviot tube ends and the bobweight towards the nose of the airplane, between the fuselage frames at station 42.00.

2. Install the attachment rod through the frame and arm assembly. Secure the rod with locknuts. Ascertain that the arm assembly rotates freely.

3. If removed, install the control tube through the protective boot and connect the rod end to the control column.

4. Connect the control tube to the bobweight arm assembly.

5. Ascertain that there is clearance of 1.20 of an inch between the top surface of the bobweight and the fuselage cross tube at station 36.25 when the control wheel is in its aft most position (stabilator against the up stop).

6. Secure the boot to the control tube inside the cockpit after insuring full travel requirements. Install the access panels to the forward nose section.

5-8. AILERON CONTROLS.

5-9. REMOVAL OF AILERON CONTROL CABLES. (Refer to Figure 5-3.)

a. Remove the access plates located under each wing along the leading edge at stations 121.75 and 141.25.

b. Remove the wing root fairings from each wing by removing attaching screws.

c. Remove the top center section or access panel from each nacelle.

d. Remove the aileron control primary cable (3) by the following procedure:

1. Remove the front seats and tracks.

2. Remove the main spar cover by the following procedure:

(a) Remove the attaching screws around the fuel control pedestal.

(b) Remove the spar cover attaching screws by pulling the floor and side carpet back gaining access to the screws.

(c) Lean the fuel control pedestal forward slightly and remove the spar cover.

3. Remove the scuff plates below the rudder pedals.

4. Pull the carpet back around the rudder pedals and remove the pulley cover in each corner.

5. Disconnect the aileron cables at the control column by separating turnbuckle assemblies (8).

6. Remove the aileron cable pulley (9) on the control column by removing attaching nut, washers and bolt.

7. Remove the side carpet trim panels by removing the trim screws and the molding just under the cabin entrance door.

8. Remove the access panel on the left side of the nose section.

9. Remove the plastic tape from the edge of the left front floor plate around the rudder pedals.

10. Remove the machine screw from the forward outboard side of the floor plate by holding the nut inside the access opening in the nose.

11. Remove the machine screw from the aft outboard side of the floor plate.

12. Remove the left front pulley (7). Lift the left side of floor plate and remove the nut, washers and bolt.

13. Remove the access plate on the bottom right side of the fuselage.

14. Remove the right front pulley (7) by removing the nut, washers and bolt.

15. Remove the aileron rub-blocks (5) that are secured to the fuselage frame on each side of the forward cabin area.

16. Remove the aft aileron pulleys (15) by removing nut, washers, rub-block (12), guard clip (11) and bolt.

17. Draw the forward ends of the control cable back to the main spar.

18. Remove the wiring tube (19) and "U" bolt (18) on each side, located on the inboard wing rib (16).

19. Remove the guide pulleys (17) from the bracket just inside the inboard end of each wing. Move the wiring tube (19) out of the way and remove the nut, washers and bolt.

20. Remove the retaining cap from each rub-block (4) located inside the nacelle.

21. Remove the guard pins from the pulleys (1) at station 121.75 in each wing.

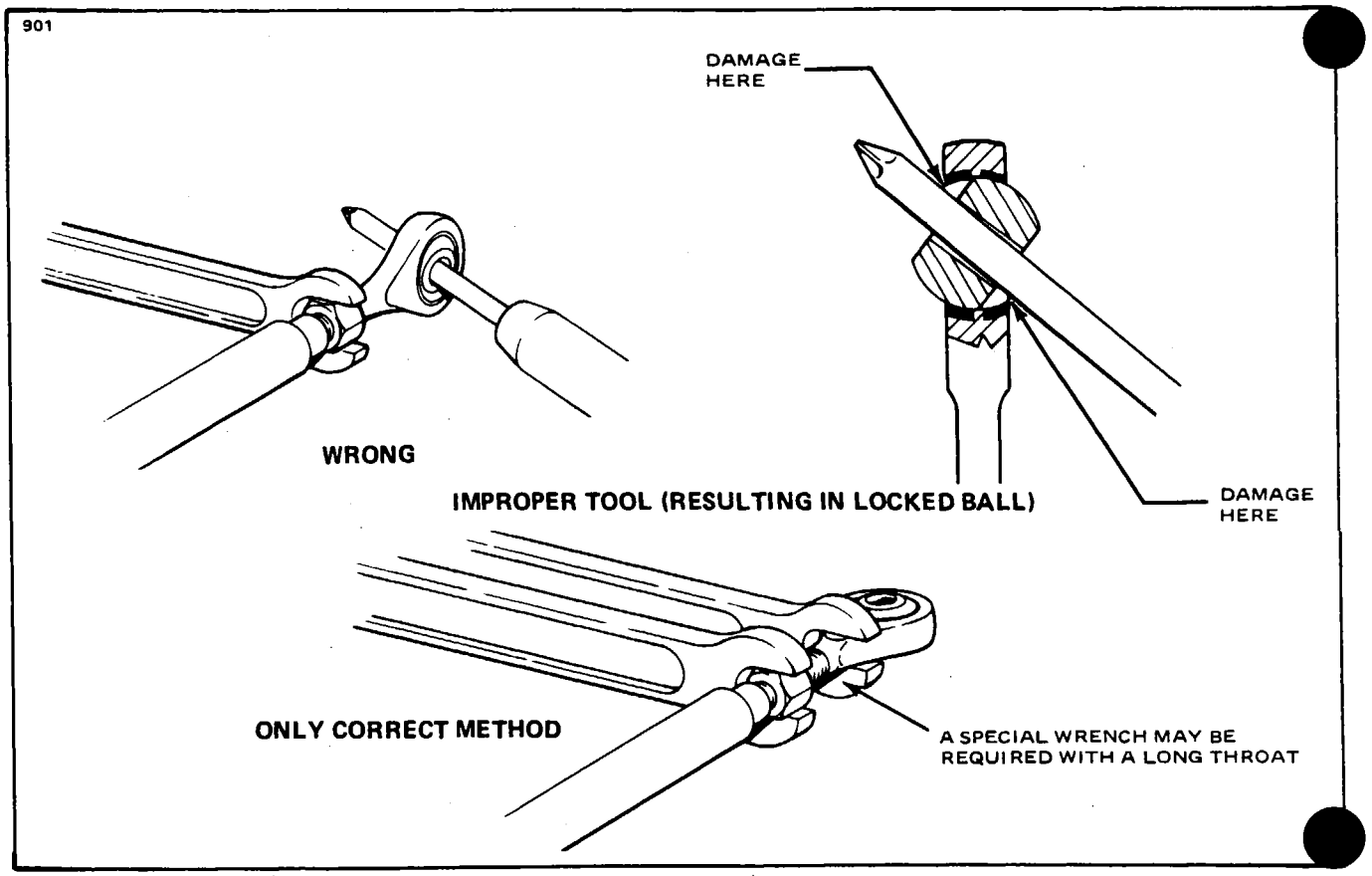

Figure 5-2. Correct Method of Installing Rod End Bearings

22. Separate the forward turnbuckle assembly at the aileron bellcrank (25) and remove the turnbuckle barrel.

23. Draw the cable through the wing into the fuselage.

e. Remove the aileron balance cable (2) by the following procedure:

1. Remove the wiring tube (19), "U" bolt (18) on each side located on the inboard wing rib (16), if not previously removed.

2. Remove the guide pulleys (17) from the bracket just inside the inboard end of each wing. Move the wiring tube out of the way and remove the nut, washers and bolt.

3. Remove the rub-block retaining cap (4) from each rub-block located inside the top center section of the nacelle.

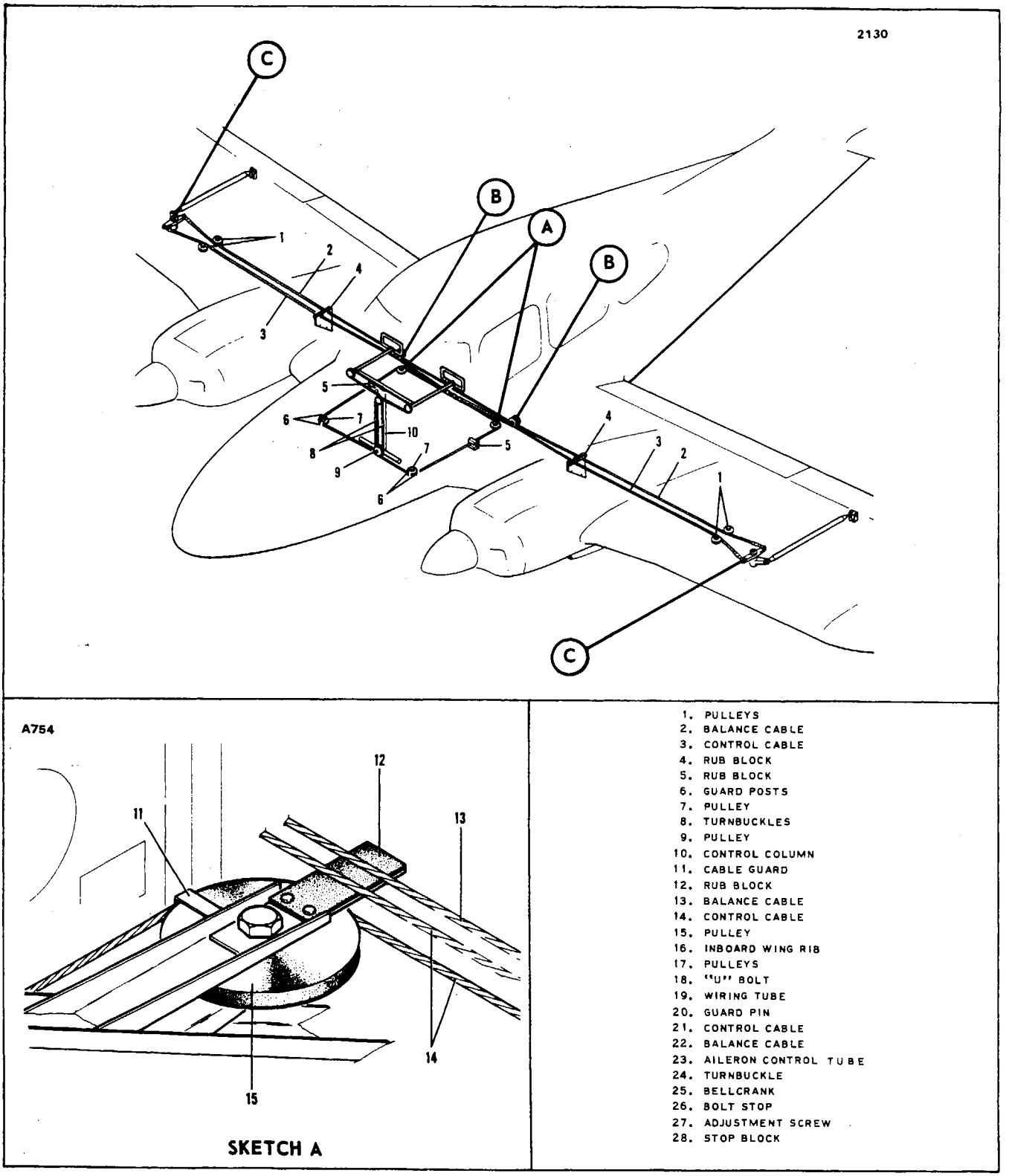

Figure 5-3. Aileron Controls

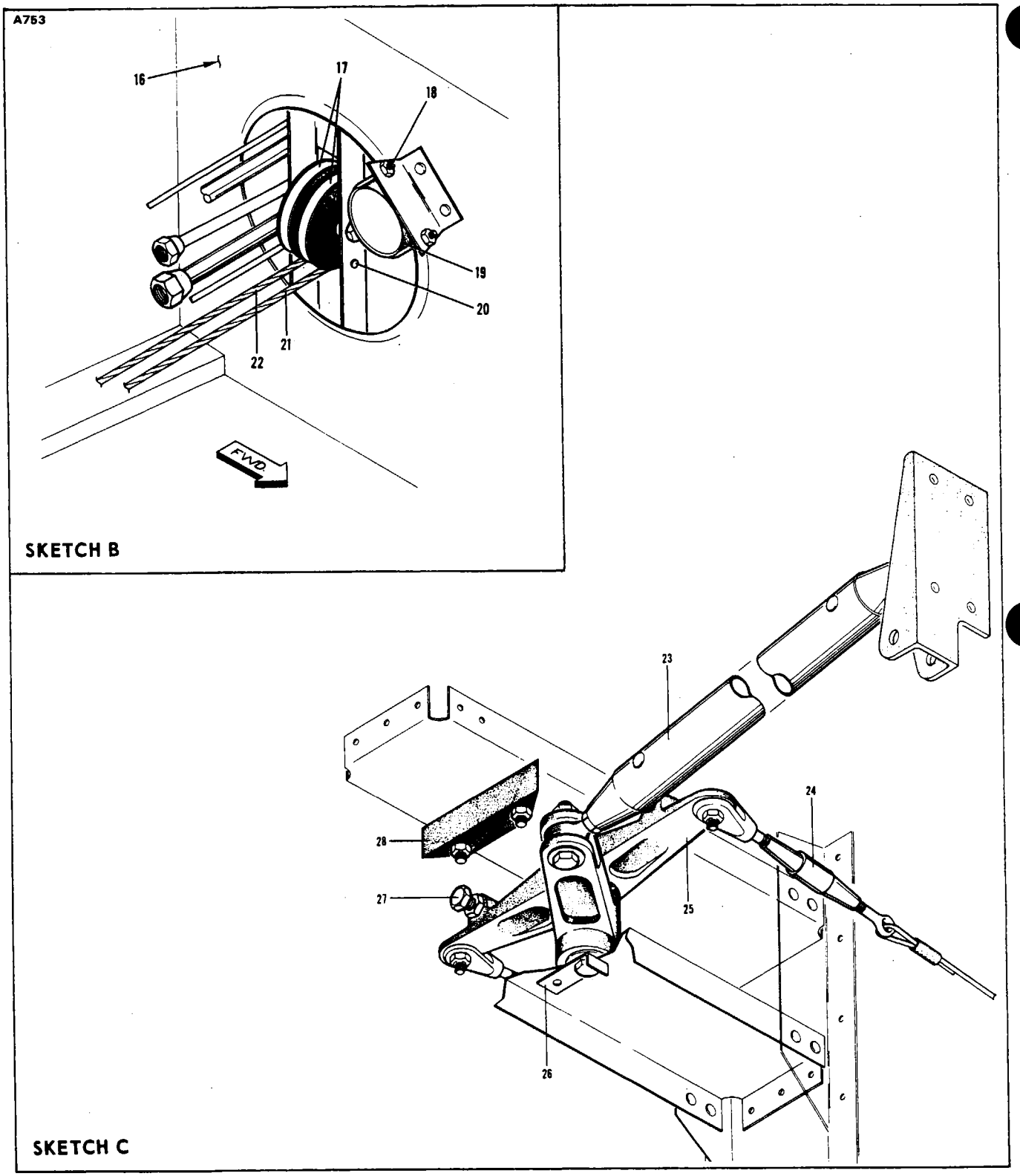

Figure 5-3. Aileron Controls (cont.)

NOTE

If an AltiMatic III or AutoControl III is installed, remove the bridle cable from the aileron balance cable inside the right engine nacelle. Remove the squeeze sleeve and the bridle cable clamp by removing three screws from each clamp.

4. Remove the guard pins from the pulleys (1) at station 121.75 in each wing.

5. Separate the aft turnbuckle assembly (24) at the aileron bellcrank.

6. Draw the cable through the fuselage, the wings, and the access hole at the aileron bellcrank.

5-10. INSTALLATION OF AILERON CONTROL CABLES. (Refer to Figure 5-3.)

a. Install the aileron balance cable (2) by the following procedure:

1. Insert the cable through the access hole at the aileron bellcrank and draw it through the wings and fuselage.

2. Connect the aft turnbuckle assembly (24) to the aileron bellcrank (25) with clevis bolt, washer, nut and cotter pin.

3. Hold the cable in the pulley slot and install a new guard pin through the pulley bracket at station 121.75.

4. Install the cables to the rub-block (4), located inside the top center section of each nacelle, and secure the retaining cap.

5. Install the pulleys (17) to the mounting bracket just inside the inboard end of each wing with bolt, washers and nut.

6. Move the wiring tube (19) on each wing into position and secure with a "U" bolt (18) to the inboard wing rib.

b. Install the aileron control cable (3) by the following procedure:

1. Insert the cable through the side of the fuselage and draw it through the wing.

2. Connect the forward turnbuckle assembly at the aileron bellcrank (25).

3. Hold the cable in the pulley slot and install a new guard pin through the pulley bracket at station 121.75.

4. Install the cables to the rub-block (4), located inside the top center section of each nacelle, and secure the retaining cap.

5. Install the pulleys (17) to the mounting bracket, just inside the inboard end of each wing, with bolt, washers and nuts.

6. Move the wiring tube (19) on each wing into position and secure with a "U" bolt (18) to the inboard wing rib.

7. Install the cable to the aft aileron pulleys (15) and secure in place with bolt, guard clip (11), rub-block (12), washers and nut.

8. Install the aileron rub-blocks (5) to the fuselage frame on each side of the forward cabin area.

9. Install the cable to the forward pulleys (7) and secure them in place with bolt, washers and nut.

10. Secure the left front floor plate using a machine screw in the aft left corner, and a bolt and nut in the forward left corner.

11. Apply plastic tape around the edge of the left front floor plate to cover rough edges and provide a seal between the floorboards and the plate.

12. Wrap the cables around the control column pulley (9) and install the pulley to the lower end of the control column with bolt, washers and nut.

13. Connect the turnbuckle assemblies (8) to the chain on the control column.

14. Install the pulley covers on the front floor plates on each side.

c. Set cable tension per Table V-I and check control cable rigging and adjustment per paragraph 5-13.

NOTE

If an autopilot is installed, consult the bottom of the Section XII (Electronics) Table of Contents page (Aerofiche Grid 5A9) for the part number of the appropriate Service Manual for information on installation of the bridle cable.

d. Install all access plates, panels and trim.

5-11. REMOVAL OF AILERON BELLCRANK ASSEMBLY. (Refer to Figure 5-3.)

a. Remove the access plate to the bellcrank assembly. (Refer to Access and Inspection Providions, Section II.)

b. Relieve cable tension from the control system by rotating one of the turnbuckles attached to the bellcrank.

c. Disconnect the turnbuckle ends from the forward and aft ends of the bellcrank (25) by removing cotter pin, nut, washer and clevis bolt.

d. Disconnect the aileron control tube (23) at the bellcrank.

e. Remove the pivot bolt securing the bellcrank by first bending the corners of the bolt stop (26) away from the nut and removing the nut and bolt.

f. Remove the bellcrank (25) from the wing.

g. The stop block (28) may be removed by unbolting it and removing it from the wing.

5-12. INSTALLATION OF AILERON BELLCRANK ASSEMBLY. (Refer to Figure 5-3.)

a. Install the stop block (28) and torque bolts, if previously removed.

b. Position the bellcrank (25) with the adjustable stops (27) toward the outboard end of the wing.

c. Install the pivot bolt and nut.

d. Torque the nut, then bend the corners of the bolt stop (26) around the bolt holding it secure.

e. Connect the turnbuckle ends to the bellcrank with clevis bolt, washer and nut. Secure and safety with cotter pins. Do not tighten turnbuckle fork ends on bellcrank so tight that the ends cannot rotate.

f. Connect the aileron control tube (23) to the bellcrank (25) with bolt, nut and cotter pin.

g. Set cable tension and check rigging and adjustment of aileron controls as described in paragraph 5-13.

h. Install access plate and secure.

5-13. RIGGING AND ADJUSTMENT OF AILERON CONTROLS. (Refer to Figure 5-4.)

NOTE

If an autopilot is installed, consult the bottom of the Section XII (Electronics) Table of Contents page (Aerofiche Grid 5A9) for the part number of the appropriate Service Manual for information on rigging and adjustment.

a. To rig the aileron controls, set the right and left aileron bellcranks in neutral position by attaching a fabricated aligning tool within both wings as shown in Figure 5-4. (This tool may be fabricated from dimensions given in Figure 5-16.) The fabricated tool may be installed by the following procedure:

1. Remove the access plate to the aileron bellcrank just aft from the leading edge of each wing at station 141.1.

2. Remove the bellcrank stop block by removing the self-locking nuts and bolts.

3. Remove the cotter pin and nut from the forward turnbuckle clevis attached to the bellcrank. The bolt should not be removed.

4. Position the tool to the bellcrank bracket with the tool pins inserted in the stop block attachment holes and the turnbuckle clevis attachment bolt inserted through the thin arm of the tool. Position the holding device in the lightening hole under the tool tightening the machine screw until the bellcrank tool is securely held in place. Do not over tighten the screw.

b. Check and adjust the aileron for neutral position by the following procedure:

1. Place a straight-edge against the underside of the wing, with the aft end even with the trailing edge of the aileron. Do not place the tool over rivets.

2. With the bellcrank neutral, the underside of the wing and aileron should fit flush with the straight edge. Apply a slight up pressure against the underside of the aileron at the trailing edge while making this check (or adjustment) to allow for free motion in the controls.

3. If the wing skin and the aileron skin do not contact the straight edge, disconnect the control tube from either the aileron or the bellcrank and rotate the tube and rod-end until the straight edge contacts both skin surfaces.

4. Connect the tube and tighten the rod end jam nuts.

NOTE

Be sure that there are no more than 9 rod end threads exposed on either end after adjustment has been made.

c. With the bellcranks in the neutral position, adjust the cable tension on the balance cable and the control cable between the bellcranks, using tensions given in Table V-I. Alternately adjust the balance and control cable turnbuckles.

d. Ascertain that the control wheels are in a parallel relationship with each other. If the control wheels are not parallel, adjust using the following procedure:

1. Loosen the vertical aileron turnbuckles at the control column.

2. Remove the chain from the center sprocket and one control wheel sprocket.

3. Holding the control wheels in a parallel relationship, reinstall the chain to the sprockets with the chain end turnbuckle hanging even.

4. Tighten the aileron cable turnbuckles.

5. If only a fine adjustment is needed, use the following procedure:

(a) Loosen the two outside bolts through the center sprocket.

(b) Adjust the chain turnbuckle to provide a parallel condition in the control wheels.

NOTE

Whenever the chain is moved or the chain turnbuckle adjusted, make sure there is no slack in the chain.

e. With the bellcranks in neutral position, adjust the cable tension on the control cable within the fuselage at the vertical turnbuckles or control column. Adjust to maintain a neutral-center alignment of control wheels.

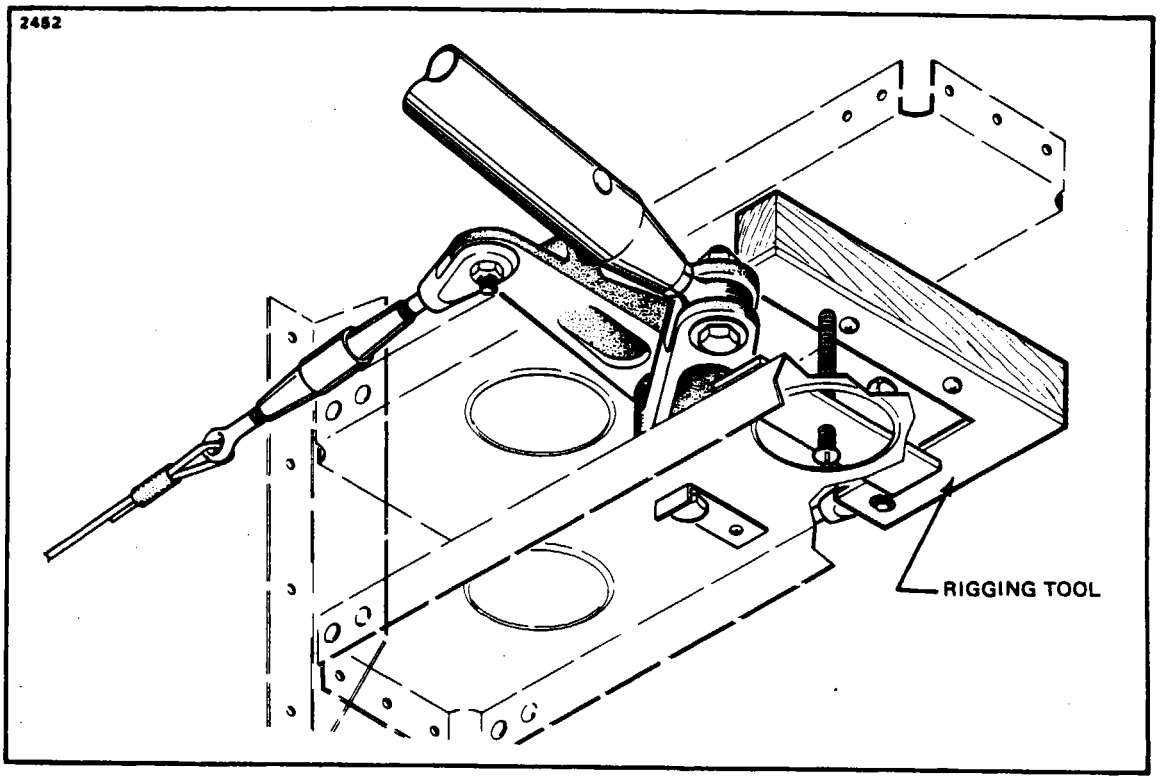

Figure 5-4. Installation of Aileron Bellcrank Rigging Tool

NOTE

It may be necessary to readjust the horizontal turnbuckle on the control column to maintain a parallel relationship between the control wheels. If this turnbuckle is adjusted, the vertical turnbuckles on the control column must be adjusted to maintain proper cable tension.

f. Tighten the nuts of the bolts installed through the center sprocket.

NOTE

When rigging has been completed, tension should be equal all through the system including the control chain.

g. With the aileron neutral, place a bubble protractor on the inboard section of the aileron and establish neutral or zero on the protractor. Remove the tools holding the aileron bellcranks in neutral, replace the aileron stop block and the nut and cotter pin on clevis attaching bolt, and safety. Adjust the bellcrank stop bolts to the specific aileron travel from neutral as given in Table V-I. Stops of both bellcranks should contact their stop blocks at the same time and before the control wheel contacts its stops.

NOTE

Later model PA-23-250(6) Aztecs have provided a means for safetying the aileron bellcrank stop screws. The appropriate parts must be lock-wired in such a manner that the lock-wire is put in tension should the stop screw or lock nut loosen. After starting the lock-wire thru the head of the screw, make one complete wrap around the shank of the screw next to the jam nut. Finish safety wiring thru holes provided in the bellcrank (the lock-wire should be installed and twisted so that the loop around the head stays down and does not tend to come up over the bolt head and leave a slack loop).

h. Check control operation, bolts and turnbuckles for safety and installation of cable guard pins.

i. Install access plates and panels.

5-14. AILERON TRIM. A fixed metal tab, which is adjustable on the ground for lateral trim of the airplane, is incorporated in the trailing edge of each aileron.

5-15. STABILATOR CONTROLS.

5-16. REMOVAL OF STABILATOR CONTROL CABLES. (Refer to Figure 5-5.)

a. Remove the bottom fuselage access panel by removing attaching screws.

b. Remove the access panel located on the left side of the fuselage just forward of the stabilator and the access plate on the underside of the fuselage, located just left of the wheel well.

c. Remove the seats from the airplane.

d. Remove the rear seat tracks.

e. Pull the floor carpet back from the aft cabin wall and remove the access plate from the left corner.

f. Remove the aft cabin trim panel or aft baggage compartment trim panel by removing attaching screws.

g. On PA-23-250 (six place) airplanes, remove the baggage compartment floor panel by removing the attaching screws.

NOTE

If the airplane is equipped with an oxygen system and removal of the oxygen cylinder is necessary, refer to Section XIV.

h. Relieve tension from the stabilator control cables by loosening one of the cable turnbuckles within the aft section of the fuselage.

i. Remove the guard pins (18) from the stabilator control pulley bracket (14) located on the top left side of the control column (16).

j. Remove the cable guard pins (18) from the stabilator pulley bracket (14) beneath the floor panel at station 44.25 by entering through the access opening to the left of the nose gear wheel well.

k. Disconnect the cables at the control column by removing cotter pin, nut, washer and bolt.

l. Draw the cable(s) (2) from the forward part of the fuselage aft to the main spar.

m. Remove the pulleys (1), just aft of the main spar at station 93.5, by removing the self-locking nut, washers and bolt.

n. Remove the cable guard pins from the stabilator pulleys (3) on both sides of the aft cabin area bulkhead at station 153.25.

o. On PA-23-250 and PA-23-250 (six place) airplanes, Serial Nos. 27-3050, 27-3154 and up, if removing the left stabilator cable, remove the cable guard pin from the stabilator pulley bracket just aft of the baggage compartment at station 193.0.

p. If removing the right stabilator cable, remove the fairlead from the fuselage bulkhead at station 192.4.

q. Disconnect the stabilator cable(s) from the aft cable(s) at the turnbuckle(s) in the aft section of the fuselage and draw the cable(s) forward to the main spar.

r. If required, the two aft cables attached to the balance tube may be removed by the following procedure:

1. Disconnect the cables from the balance tube by removing cotter pin, nut, washer and bolt.

2. For the removal of the upper cable, remove the fairlead from the bracket mounted to the bulkhead at station 257.5.

3. Remove the top and/or bottom stabilator pulley, as required, by removing nut, washer and bolt.

4. Remove the cable(s).

5-17. INSTALLATION OF STABILATOR CONTROL CABLES. (Refer to Figure 5-5.)

a. If either of the two cables attached to the balance tube were removed, reinstall by the following procedure:

1. Connect the two cables to the balance arm (40) with bolt, washers, nut and cotter pin.

2. Position the stabilator cables and pulleys (8) above and below the balance tube. Install a bolt, washers and a self-locking nut, securing each pulley in place.

3. For the upper cable, assemble the fairlead (12) to the cable and install it to the bracket mounted to the bulkhead at station 258.0.

b. Install the stabilator cables by drawing them aft from the main spar to the aft section of the fuselage and connect them to turnbuckles of the short cables connected to the balance tube.

c. Assemble the fairlead (11) to the lower cable and install it in the bulkhead at station 192.4.

d. On PA-23-250 (six place) airplanes, Serial Nos. 27-3050, 27-3154 and up, install a new cable guard pin to the bracket of the left cable pulley bracket, just aft of the baggage compartment, at station 193.0.

e. Install new cable guard pin(s) to the pulley bracket at the forward and/or aft side of the bulkhead, located to the lower rear of the tubular structure, at station 153.25.

f. Install the stabilator pulleys (1) just aft of the main spar at station 93.5 using a bolt, washer and self-locking nut.

g. Draw the forward end(s) of the cable(s) forward through the stabilator pulley bracket (14), located through the access opening, to the left of the nose gear wheel well at station 44.25.

h. Position the left cable over the top forward pulley (13) of the stabilator pulley control bracket (14) located at the top left of the control column (16). Temporarily connect the cable end to the control column.

i. Position the right cable over the bottom forward pulley (13) and around the aft pulley (13) of the stabilator pulley control bracket (14). Connect the cable ends to the control column with a bolt, washer, nut and cotter pin. Allow ends freedom to rotate.

CAUTION

Determine that no control cables are crossed, causing opposite control.

j. Install cable guard pins (18) to the control pulley bracket (14) and the bracket directly below at station 44.25.

k. On airplanes equipped with a stabilator bungee spring installation, install bungee spring (47) by attaching it to the adjuster link (50) and to link at station 192.3.

l. Adjust the cable tension and check rigging and adjustment of the stabilator per paragraph 5-18.

m. Safety turnbuckles; install access plates, panels, carpet, trim; and in PA-23-250 (six place) airplanes, the aft baggage compartment floor.

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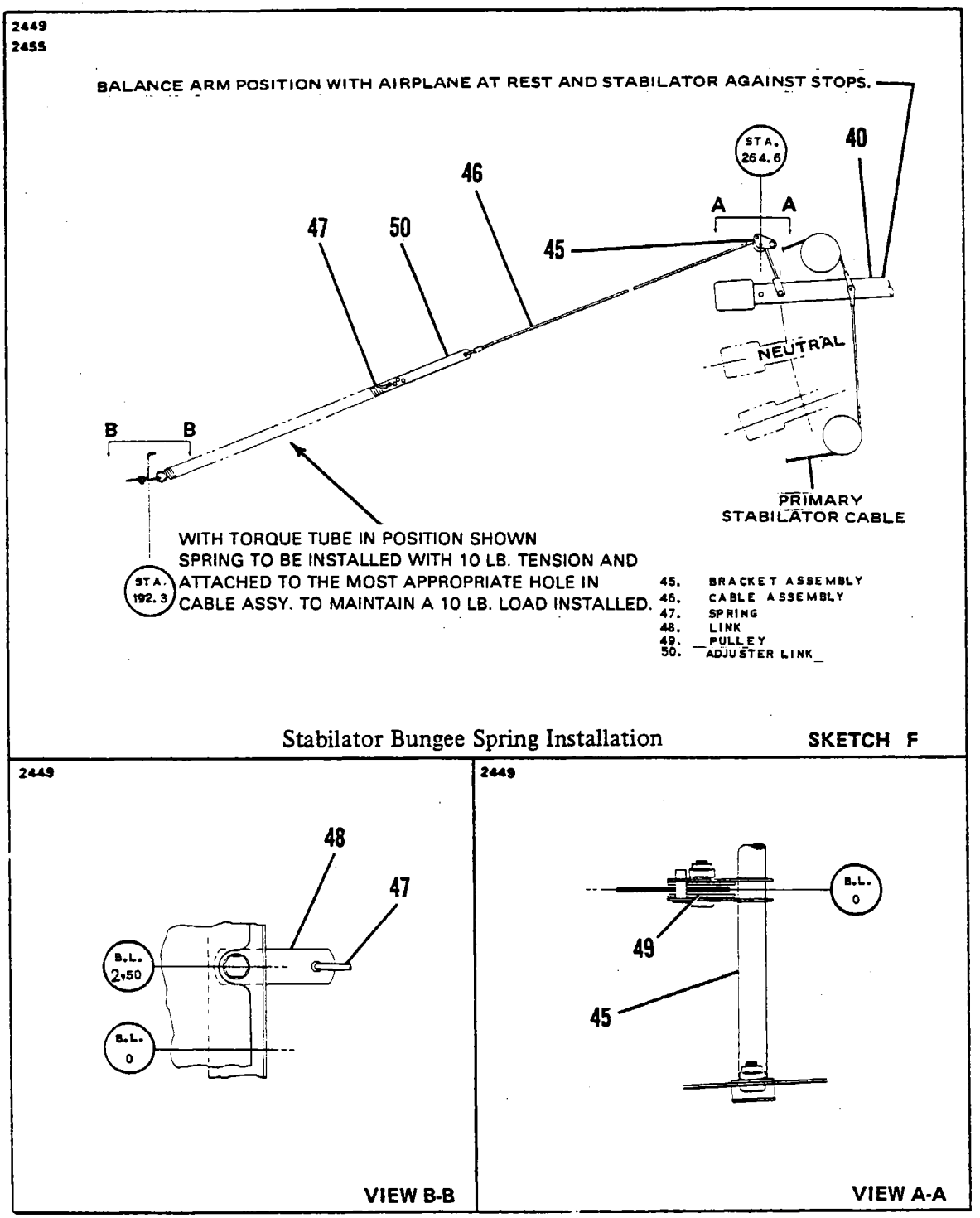

Figure 5-5. Stabilator and Stabilator Trim Controls

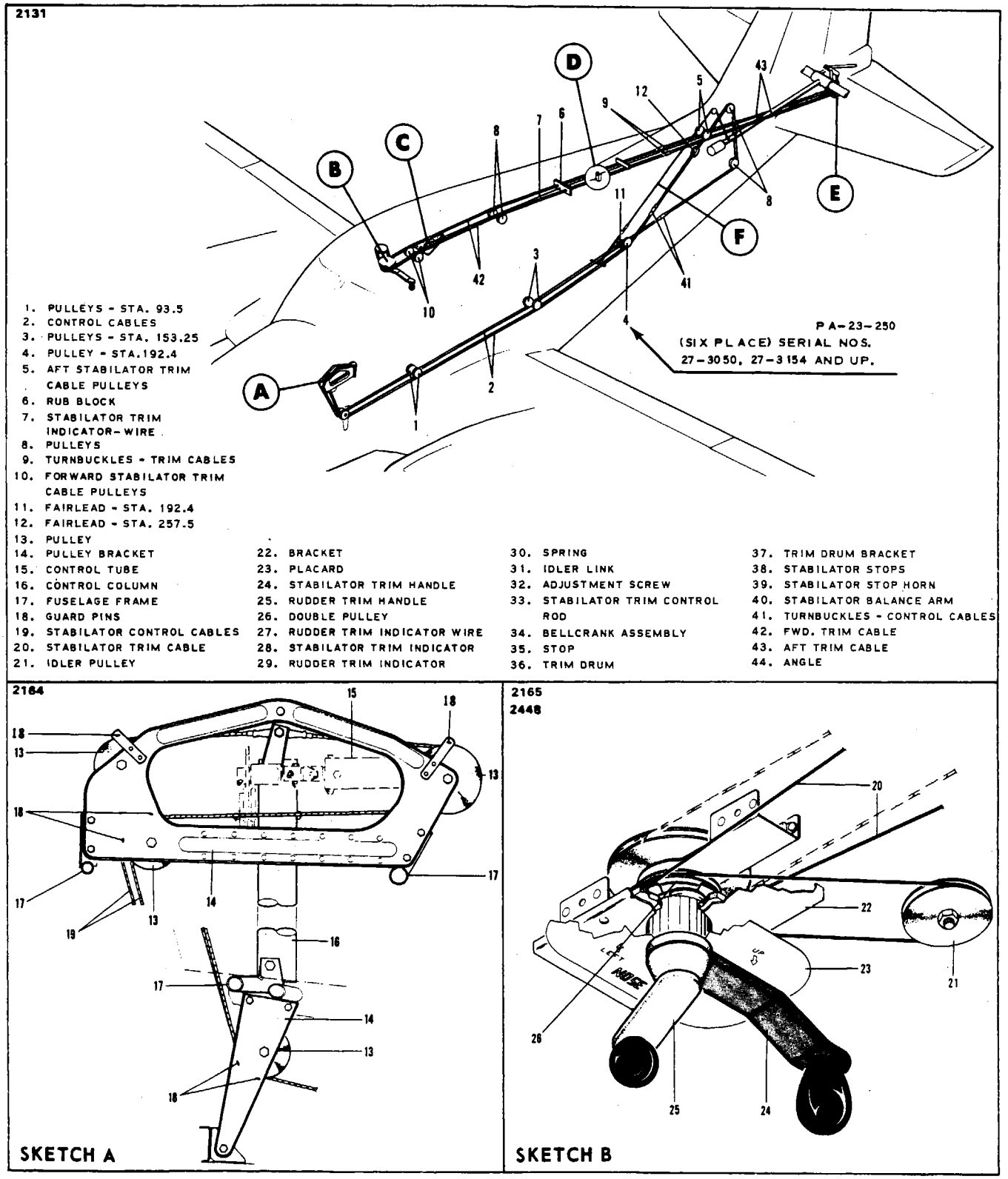

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Figure 5-5. Stabilator and Stabilator Trim Controls (cont.)

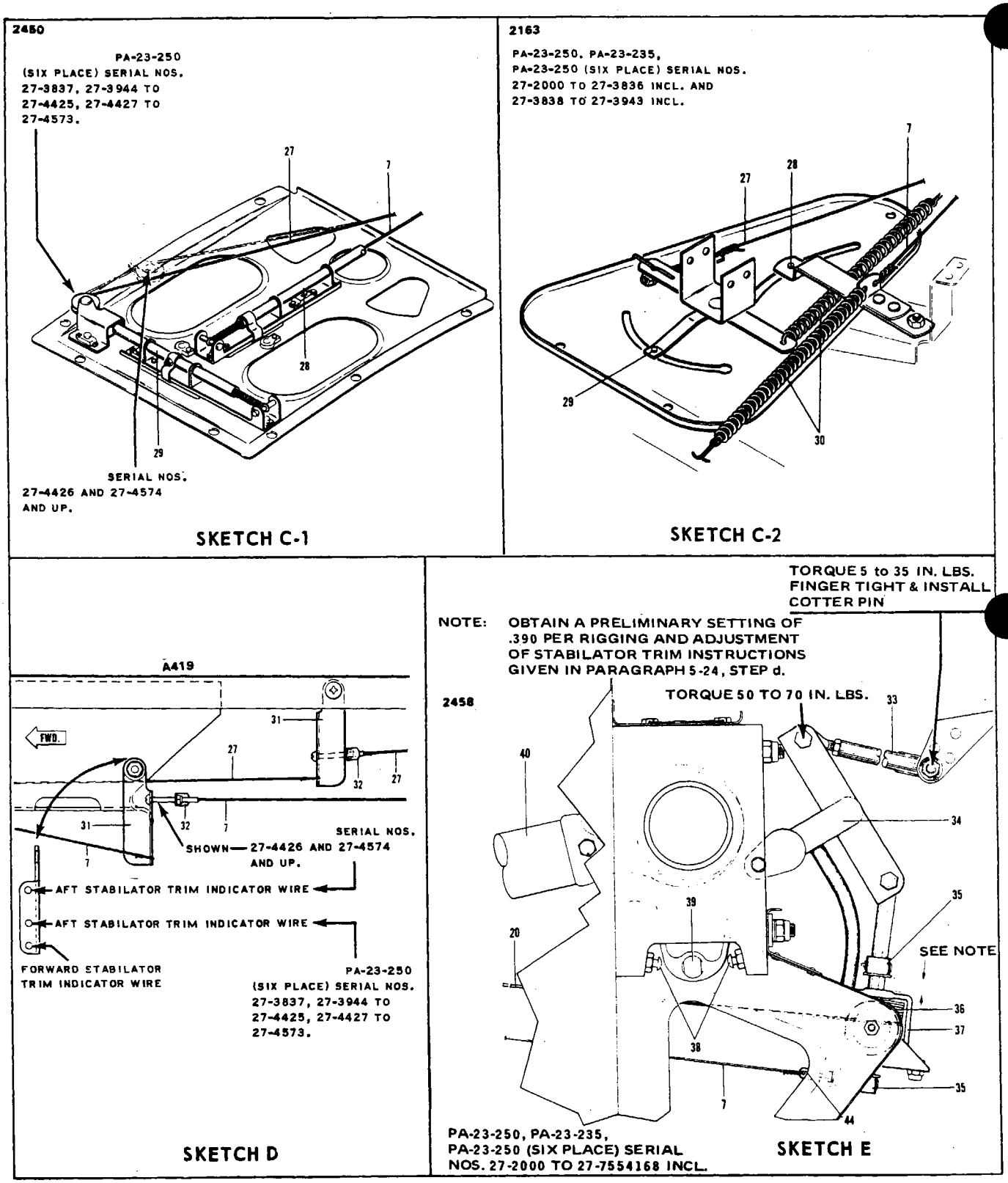


Figure 5-5. Stabilator and Stabilator Trim Controls (cont.)

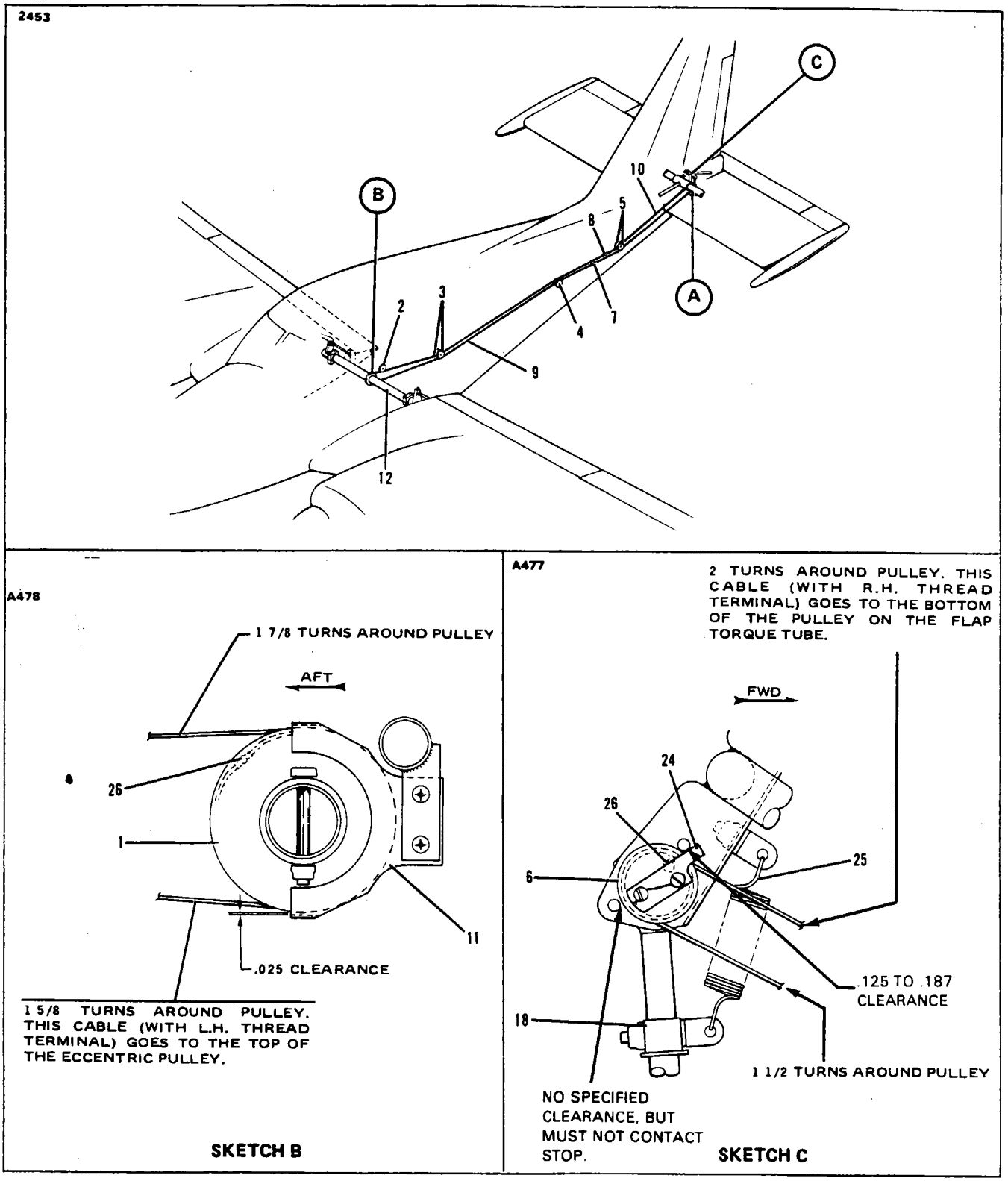
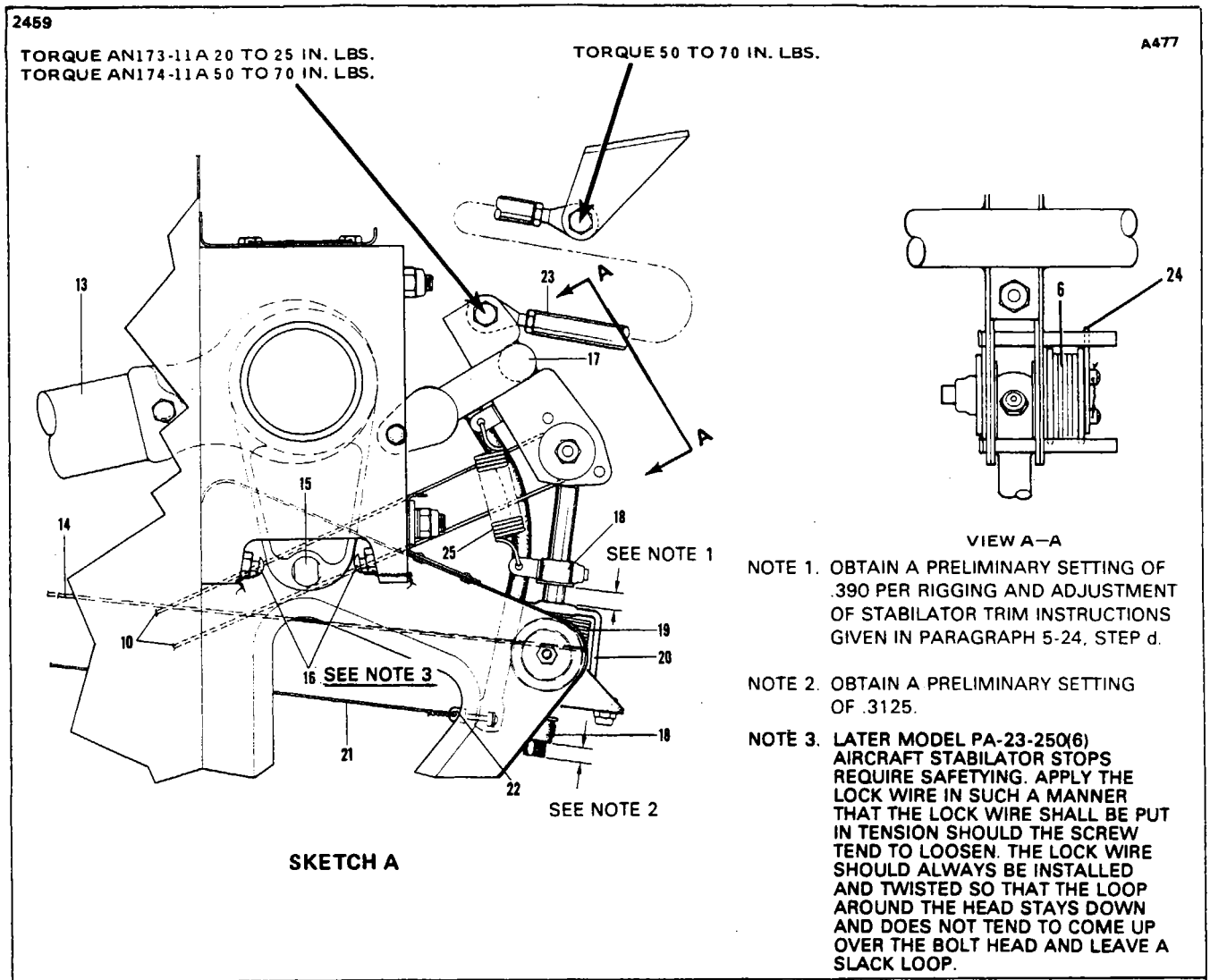


Figure 5-6. Stabilator Trim and Flap Interconnect (Serial Nos. 27-7654001 and up)



SKETCH A

NOTE 1. OBTAIN A PRELIMINARY SETTING OF .390 PER RIGGING AND ADJUSTMENT OF STABILATOR TRIM INSTRUCTIONS GIVEN IN PARAGRAPH 5-24, STEP d.

NOTE 2. OBTAIN A PRELIMINARY SETTING OF .3125.

NOTE 3. LATER MODEL PA-23-250(6) AIRCRAFT STABILATOR STOPS REQUIRE SAFETYING. APPLY THE LOCK WIRE IN SUCH A MANNER THAT THE LOCK WIRE SHALL BE PUT IN TENSION SHOULD THE SCREW TEND TO LOOSEN. THE LOCK WIRE SHOULD ALWAYS BE INSTALLED AND TWISTED SO THAT THE LOOP AROUND THE HEAD STAYS DOWN AND DOES NOT TEND TO COME UP OVER THE BOLT HEAD AND LEAVE A SLACK LOOP.

1. PULLEY - FLAP TORQUE TUBE
2. PULLEY - STA. 130.75
3. PULLEYS - STA. 153.88
4. PULLEYS - STA. 229.00
5. PULLEYS - STA. 273.38
6. PULLEY - ECCENTRIC
7. TURNBUCKLE - STA. 258.50
8. TURNBUCKLE - STA. 267.50
9. CABLE - FORWARD INTERCONNECT
10. CABLE - AFT INTERCONNECT
11. GUARD
12. FLAP TORQUE TUBE
13. STABILATOR BALANCE ARM
14. STABILATOR CONTROL CABLES
15. STABILATOR STOP HORN
16. STABILATOR STOPS
17. BELLCRANK ASSEMBLY
18. STOP
19. TRIM DRUM
20. TRIM DRUM BRACKET
21. STABILATOR TRIM INDICATOR WIRE
22. ANGLE
23. STABILATOR TRIM CONTROL ROD
24. STOP - ECCENTRIC PULLEY
25. SPRING
26. BALL - CABLE

Figure 5-6. Stabilator Trim and Flap Interconnect (Serial Nos. 27-7654001 and up) (cont.)

5-18. RIGGING AND ADJUSTMENT OF STABILATOR CONTROLS.

a. Level the airplane. (Refer to Leveling, Section II.)

b. Place the stabilator in a neutral position using a fabricated tool and bubble protractor as shown in Figure 5-7 or Figure 5-8. (The tool may be fabricated from dimensions given in Figure 5-17 or Figure 5-18.)

c. Support the stabilator in neutral position and adjust the control wheel for neutral fore and aft. Refer to Table V-I for neutral position of control wheel.

d. Should adjustment be required, remove the tail cone fairing and the access panel from the left side of the fuselage, just ahead of the stabilator, at station 261.0 by removing attaching screws.

e. To neutralize the control wheel with the stabilator, adjust the stabilator cable turnbuckles within the aft section of the fuselage at stations 249.25 and 296.25 to obtain proper cable tension and to allow the control wheel to neutralize fore and aft. (Refer to Table V-I.)

f. To obtain the proper stabilator travel, as given in Table V-I, adjust the stabilator stop bolts at the torque tube horn. Measure the angle of the stabilator travel up and down with a bubble protractor on the fabricated leveling tool.

NOTE

The stabilator should hit stabilator stop screws before control wheel shaft in cockpit hits stops. Later model PA-23-250(6) Aztecs require that a safety be applied to the stop screws after adjustments are made. Refer to Figure 5-6 for approved installation of safety wire.

g. Check control and direction of travel.

h. To rig airplanes with a stabilator bungee spring installation, position the balance arm (40) so that the stabilator is against its stops, then attach the bungee spring to one of the holes on the adjuster link so that it maintains a 10 lb. load installed.

i. Safety turnbuckles and install the access panel to the side of the fuselage and the tail cone fairing.

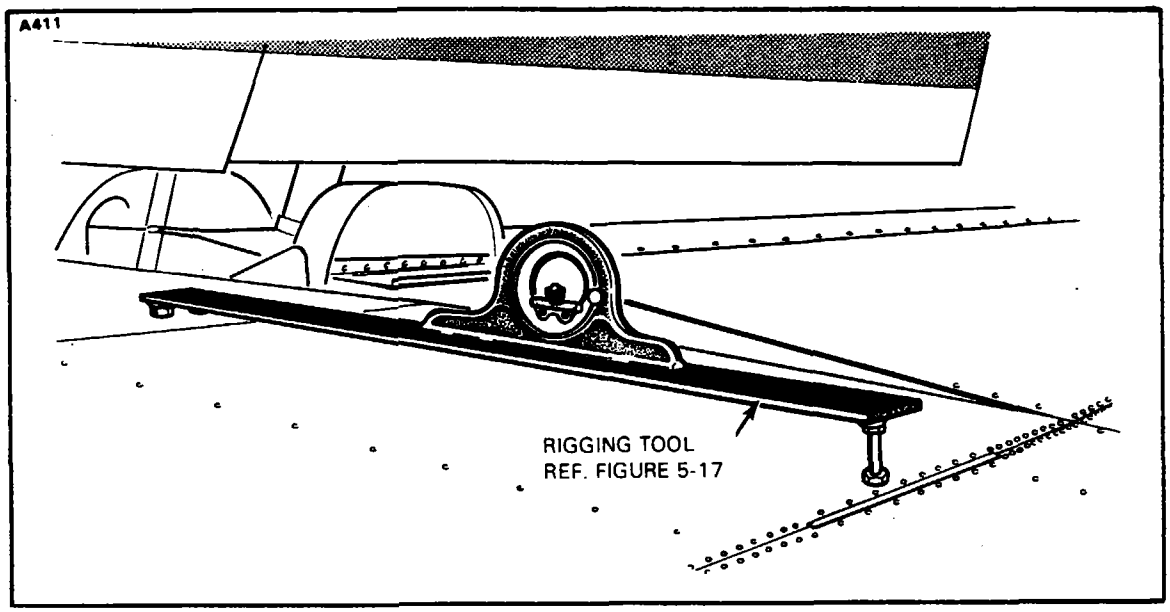


Figure 5-7. Leveling Stabilator
(Serial Nos. 27-1 to 27-7554168 incl. and 27-80540001 and up)

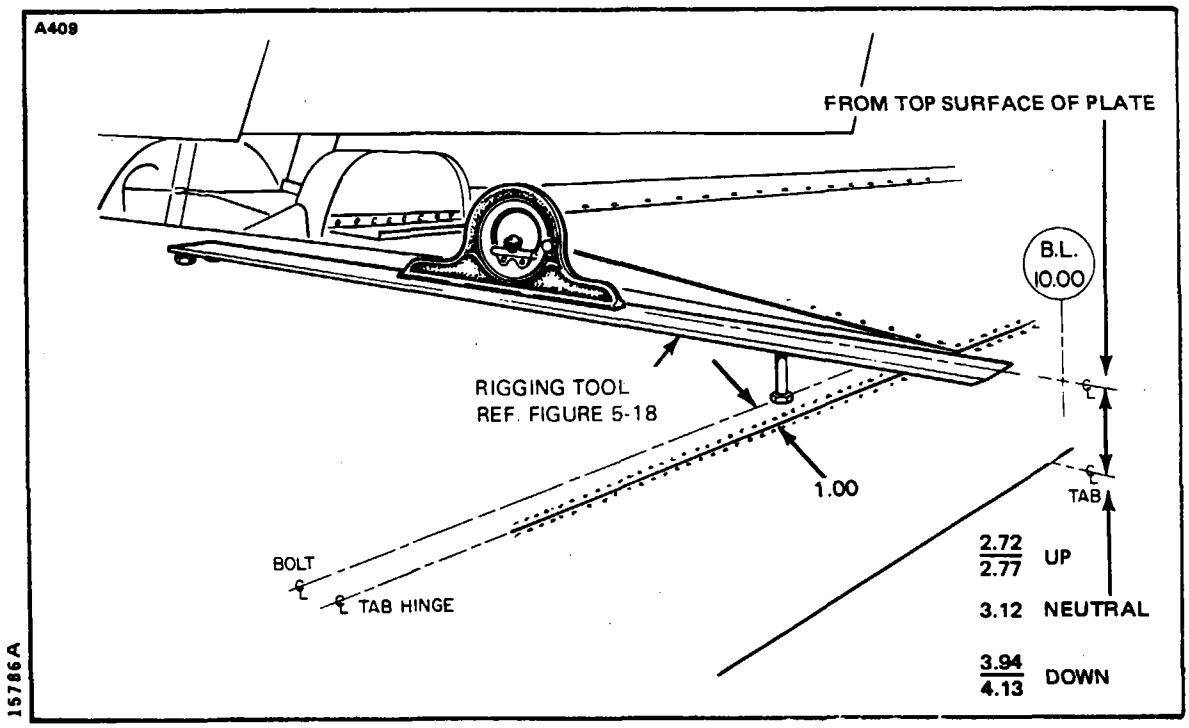


Figure 5-8. Leveling Stabilator
(Serial Nos. 27-7654001 to 27-7954121 incl.)

5-19. STABILATOR TRIM.

— NOTE —

Remove excess lubricant build-up from the stabilator trim cable as follows:

a. Dampen a clean white cloth with Methyl-Ethyl-Ketone solvent.

b. Place the dampened cable in hand and grasp stabilator trim cable near the stabilator trim crank.

c. Crank the cable through it's full travel fore and aft removing any excess buildup of lubricant.

5-20. REMOVAL OF FORWARD STABILATOR TRIM ASSEMBLY. (Refer to Figure 5-5.)

a. Remove the rudder trim control knob or handle (25) by removing the roll pin securing it in place.

b. Remove the stabilator trim control knob and handle (24) by removing the attaching screws from the hub of the handle.

c. Remove the headliner trim plate from around the trim crank assembly by the following procedure:

1. Remove the attaching screws securing the trim plate.
2. Lower the aft side of the trim plate and disconnect the vent lines.
3. Disconnect the wiring from the lights and their switches.

— NOTE —

It is recommended that the wires be marked for identification before removal to facilitate reinstallation.

4. Disconnect the control cable from the air control assembly on each side.
5. Remove the headline trim plate.

d. Remove the trim crank bearing bracket assembly (22) by removing attaching screws.

e. Remove the aft cabin or baggage area trim panel gaining access to the aft section of the fuselage.

f. Disconnect the forward stabilator trim cable (42) at the turnbuckles (9) located in the aft section of the fuselage.

g. On airplanes equipped with an electric pitch trim servo, use the following procedure:

1. On PA-23-250 (six place) airplanes only, remove the baggage compartment ceiling trim panel by removing attaching screws.

2. On all PA-23 airplanes, loosen the two machine screws on the left side of the servo unit in the baggage compartment that hold the cable guard bracket in place.

3. Unwrap the cable from the pulleys on top of the servo unit.

h. If the cable is not to be reused, cut the left end of the forward cable removing the turnbuckle. Solder the blank end of a new cable to the end of the old cable.

NOTE

If the trim cables are to be reused, the headliner insulation, rubblocks and pulleys must be removed from the cabin ceiling. Unless the headliner is to be replaced, it is not recommended that it be removed because of difficulties replacing an old headliner.

5-21. INSTALLATION OF FORWARD STABILATOR TRIM ASSEMBLY. (Refer to Figure 5-5.)

a. Ascertain that the splice where the old and new cables are joined, as described in paragraph 5-20, is smooth and minimum in size.

b. Draw the old stabilator trim cable, that is spliced to the new cable, through the ceiling to the cabin.

NOTE

To prevent breaking the splice, draw the cable in a straight line and do not use force.

c. Wrap the cable (20) around the trim crank and idler pulleys. Starting at the left side, the cable is routed around the top groove on the double pulley (26), then around the idler pulley (21) from right to left and back around the bottom groove on the double pulley (26) from left to right.

d. With the old and new cable ends still soldered together, draw the cable through the ceiling to the aft section of the fuselage.

e. Connect the forward cable end to the corresponding aft cable end by rotating the turnbuckle barrel until three threads on each end are showing.

f. On airplanes equipped with an electric pitch trim servo, use the following procedure:

1. Wrap the cable coming from the forward section of the airplane around top groove on the capstan, around the idler pulley and back around the bottom groove of the capstan to the aft section of the airplane.

2. Position the cable guard to allow a clearance of .031 of an inch between the capstan and the guard. Tighten the two machine screws that secure it in place.

3. On PA-23-250 (six place) airplanes only, install the baggage compartment ceiling trim panel with attaching screws.

g. Assembly the turnbuckle eyes and thimble on the remaining aft cable end (43). Turn the barrel until three threads on each end are showing.

h. Separate the old cable from the new cable where the two were spliced together.

i. Insert the free cable end and a thimble through the turnbuckle eye and draw the cable until it is tight.

j. Temporarily clamp the cable so as not to damage it or allow it to slip.

k. Operate the trim several times to seat the cable to the pulleys and to insure clearance of all moving parts.

l. Remove the temporary clamp and draw the free end of the cable to the approximate required cable tension. (Refer to Table V-I.)

m. Secure the free cable end using a nicopress sleeve.

n. Readjust the cable tension using the turnbuckles.

o. Check rigging and adjustment per paragraph 5-24.

p. Safety all turnbuckles.

q. Install all access plates, panels, and trim.

5-22. REMOVAL OF AFT STABILATOR TRIM ASSEMBLY. (Refer to Figures 5-5 and 5-6.)

a. Remove the tail cone fairing by removing attaching screws.

b. Remove the access panel from the aft left side of the fuselage.

c. On PA-23-250 and PA-23-235 airplanes, remove the rear seat and the aft cabin trim panel by removing attaching screws.

d. On PA-23-250 (six place) airplanes, remove the aft panel from the baggage compartment by removing attaching screws.

e. Block the trim cable at the trim drum to prevent it from unwrapping. (Refer to Figure 5-9.)

f. Disconnect the turnbuckle (item 9, Figure 5-5) at the ends of the aft stabilator trim cables (item 43, Figure 5-5).

g. Remove the guard pins from the stabilator trim pulleys (item 5, Figure 5-5) at station 260.2.

h. Remove the guard pins from the rub blocks at station 272.4.

i. Disconnect the trim screw from the bellcrank per Step 1 or 2 noted below:

1. On airplanes not including the stabilator trim and flap interconnect system, remove cotter pin, nut, washer and bolt connecting trim screw to bellcrank. (Refer to Sketch E, Figure 5-5.)

2. Airplanes including stabilator trim and flap interconnect system require relief of interconnect cable tension. Loosen turnbuckles at stations 258.50 and 267.50. Remove attaching hardware securing trim screw to eccentric pulley on bellcrank and disconnect tension spring. (Refer to Sketch A, Figure 5-6.)

j. Remove the trim drum bracket assembly by removing the four attachment bolts at the bottom of screw assembly.

5-23. INSTALLATION OF AFT STABILATOR TRIM ASSEMBLY. (Refer to Figures 5-5 and 5-6.)

a. Ascertain that the trim cable assembly (item 43, Figure 5-5) is evenly wrapped (centered) on drum (item 36, Figure 5-5 or item 19, Figure 5-6) as given in paragraph 5-48, and the cables are blocked to prevent them from unwrapping. (Refer to Figure 5-9.)

b. Position the trim drum bracket assembly (item 37, Figure 5-5 or item 20 in Figure 5-6) between its support brackets and secure with four bolts, washers and nuts.

c. Draw the cable ends into the fuselage and connect the aft trim cable (item 43, Figure 5-5) to the forward trim cable (item 42, Figure 5-5) at the turnbuckles (item 9, Figure 5-5).

d. Connect trim screw to bellcrank. On airplanes including stabilator trim and flap interconnect system, connect trim screw to eccentric pulley on bellcrank and attach tension spring.

e. Install the guard pins to the rub blocks at station 272.4.

f. Install the guard pins to the stabilator trim pulleys at station 260.2.

g. Set cable tension and check rigging and adjustment of aft stabilator trim assembly per paragraph 5-24. If stabilator trim and flap interconnect system is installed, set cable tension and rigging per paragraph 5-59.

h. Install access plates, panels and trim.

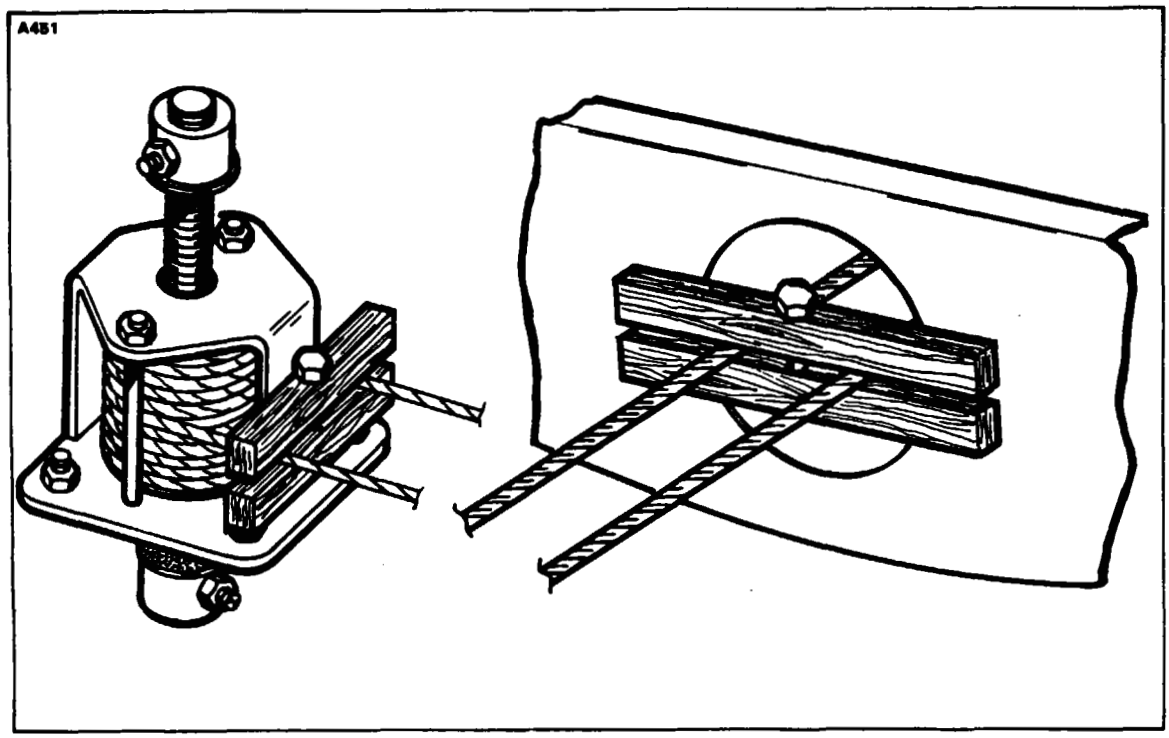


Figure 5-9. Methods of Blocking Trim Cables

5-24. RIGGING AND ADJUSTMENT OF STABILATOR TRIM. (Refer to Figures 5-5 and 5-6.)

a. Remove the tail cone fairing. On airplanes with Serial Nos. 27-4426, 27-4574 and up, remove the access panel on the aft left side of the fuselage.

b. Rotate the trim drum (item 36, Figure 5-5 or item 19, Figure 5-6) until the cable is evenly wrapped and the turnbuckle ends (item 9, Figure 5-5) inside the aft fuselage section are even. (There should be nine and one-quarter wraps on each end of the trim drum.)

c. Ascertain that the cable tension is set as given in Table V-I.

d. A preliminary setting of .390 of an inch between the upper screw stop (item 35, Figure 5-5 or item 18, Figure 5-6) and the drum housing (item 37, Figure 5-5 or item 20, Figure 5-6) as measured along the screw (refer to Sketch E, Figure 5-5 or Sketch A, Figure 5-6) must be confirmed. This measurement is obtained by disconnecting the upper end of the trim screw from the bellcrank (item 34, Figure 5-5) or eccentric pulley connected to the bellcrank (item 17, Figure 5-6) and turning the trim screw until .390 of an inch is obtained. Hold the trim drum stationary while adjusting the screw. If stabilator trim and flap interconnect system is installed, disconnect interconnect cables at turnbuckles before removing eccentric pulley. Reconnect the screw with attachment hardware.

e. Position the stabilator in neutral and proceed to set tab travels. Turn the trim in each direction to screw stops. If tab travels do not agree with angles given in Table V-I, disconnect the control rod (item 33, Figure 5-5 or item 23, Figure 5-6) from the tab, loosen the jam nut on the forward end of the rod and turn the rod until the proper travels are obtained. On aircraft with Serial Nos. 27-7654001 and up the rod end adjustments should be made from both ends of the rod.

NOTE

Upon completion of trim tab rigging of aircraft with Serial Nos. 27-7654001 and up, the tab trailing edge may be .125 to .250 of an inch up from the stabilator neutral position.

f. Check minimum number of wraps left on drum. (Minimum allowable is one and one-quarter wraps.)

g. Check adjustment of trim indicator wire. (Refer to paragraph 5-27 or 5-30.)

h. If stabilator trim and flap interconnect system is installed, reconnect interconnect cables at turnbuckles and adjust per paragraph 5-59.

i. Install the tail cone fairing and if removed, also install the access panel on the aft left side of the fuselage.

NOTE

The stabilator trim control rod end bearing located at the forward end of the control rod (item 33, Figure 5-5 or item 23, Figure 5-6) should be checked for freedom of movement during the regular 100 hour inspection by disconnecting the rod at the trim tab and holding the end between your fingers, try to turn the rod from side to side and rotate up and down. If the rod will not turn or is hard to turn, the bearing should be checked more thoroughly by removing the complete assembly from the airplane.

5-25. REMOVAL OF THE STABILATOR TRIM INDICATOR WIRE. (PA-23-250, PA-23-235 and PA-23-250 [six place], Serial Nos. 27-2000 to 27-2504 incl.; and PA-23-250 [six place], Serial Nos. 27-2505 to 27-3836 incl., 27-3838 to 27-3943 incl.) (Refer to Figure 5-5.)

a. Remove the placard plate from the ceiling of the cabin by removing attaching screws.
b. Remove the tail cone fairing by removing attaching screws.
c. Disconnect the indicator wire at the trim control bellcrank.
d. Disconnect the indicator wire at the indicator arm inside the cabin.
e. Solder a piece of .024 steel wire to the old indicator wire.

5-26. INSTALLATION OF STABILATOR TRIM INDICATOR WIRE. (PA-23-250, PA-23-235 and PA-23-250 (six place), Serial Nos. 27-000 to 27-2504 incl. and PA-23-250 (six place), Serial Nos. 27-2505 to 27-3836 incl. and 27-3838 to 27-3943 incl.) (Refer to Figure 5-5.)

a. Draw the old wire from the fuselage installing a new one at the same time.

NOTE

If the indicator wire has broken at a point other than at either end, it may be necessary to remove access and trim panels to the overhead area of the cabin to determine the breaking point and installation procedure.

b. Attach the end of the wire to the aft attachment point and center the nut on the adjustment screw.

c. Ascertain that the stabilator trim tab is rigged properly. (Refer to Paragraph 5-24.)

d. Position the stabilator in a neutral position as described in paragraph 5-18 and turn the trim until the trailing edges of the stabilator and stabilator trim tab align.

e. Insert the end of the wire through the attachment point inside the cabin ceiling. Pull the wire through the hole until the indicator would read approximately neutral. Bend the wire back twisting it around itself a minimum of seven times.

f. Install the placard plate to the ceiling with attaching screws.

g. Adjust the indicator as per paragraph 5-27.

h. Install the tail cone fairing with attaching screws.

5-27. RIGGING AND ADJUSTMENT OF STABILATOR INDICATOR WIRE. (PA-23-250, PA-23-235, and PA-23-250 (six place), Serial Nos. 27-2000 to 27-2504 incl. and PA-23-250 (six place), Serial Nos. 27-2505 to 27-3836 incl. and 27-3838 to 27-3943 incl.) (Refer to Figure 5-5.)

a. Ascertain the stabilator is rigged properly as per paragraph 5-18 and position the stabilator in neutral. Turn the trim tab until its trailing edge aligns with that of the stabilator.

b. With the tail cone fairing removed, hold the adjusting screw locknut located at the aft end of the indicator wire and adjust the screw to obtain a neutral indication in the cabin.

c. Install the tail cone fairing with attaching screws.

5-28. REMOVAL OF STABILATOR TRIM INDICATOR WIRES. (PA-23-250 (six place), Serial Nos. 27-3837, 27-3944 and up.)

a. Remove the trim panel from the ceiling of the aft baggage compartment by removing attaching screws.

b. Remove the placard panel from the cabin ceiling by loosening the set screws in the light knobs and removing knobs, and removing panel attaching screws.

c. The forward stabilator indicator wire may be removed by the following procedure:

1. Disconnect the indicator wire from the tab on the indicator in the cabin ceiling.
2. Solder a piece of .024 steel wire to the old indicator wire.

NOTE

If the indicator wire has broken at a point other than at either end, it may be necessary to remove access or trim panels to determine the breaking point and installation procedure.

d. The aft stabilator indicator wire may be removed by the following procedure:

1. Remove the bottom section of the tail cone fairing by removing attaching screws.
2. Disconnect the wire at the arm forward of the trim drum.
3. Solder a piece of .024 steel wire to the old indicator wire.
4. Disconnect the indicator wire or wires at the idler link inside the baggage compartment.

5-29. INSTALLATION OF STABILATOR TRIM INDICATOR WIRE. (PA-23-250 (six place), Serial Nos. 27-3837, 27-3944 and up.)(Refer to Figure 5-5, Sketch D.)

a. Draw the old wire out installing a new wire at the same time.

b. Ascertain that the adjustment nuts, located in the baggage compartment on the idler link and on the stabilator trim control bellcrank, are centered on their screws.

c. Position the stabilator in the neutral position. If stabilator trim and flap interconnect system is installed, also position flaps in full up position. Adjust the trim tab until the trailing edges of each align.

d. Connect the aft wire by the following procedure:

1. Separate the old wire from the new wire.
2. Insert the aft end of the wire through the angle at the attachment point on the trim control bellcrank. Bend the wire forward and wrap it around itself at least seven turns.

3. Hold the idler link perpendicular to its attachment point and attach the forward end of the wire to the angle on the adjustment screw in the same manner as the aft end.

NOTE

The position of the adjustment screw in the idler link is important for proper trim indicator operation. Refer to Figure 5-5, Sketch D for proper location.

e. Connect the forward wire by the following procedure:

1. Separate the old wire from the new wire.

2. Insert the aft end of the wire through the bottom hold in the idler link. Bend the wire forward and wrap it around itself at least seven times.

3. Insert the forward end of the wire through the indicator attachment.

NOTE

Refer to Figure 5-5, Sketch C-1 for the proper routing of the trim indicator wire at the indicator panel for the various installations.

4. Pull the wire through the indicator attachment until the indicator is centered. Bend the wire back and secure it in the same manner as the opposite end.

f. Adjust the wire per instructions in paragraph 5-30.

g. Install the placard plate, light control knobs, baggage compartment trim and the tail cone fairing.

5-30. ADJUSTMENT OF STABILATOR TRIM INDICATOR WIRE. (PA-23-250 (six place), Serial Nos. 27-3837, 27-3944 and up.)

a. Remove the trim panel from the baggage compartment ceiling.

b. Place the stabilator in a neutral position as described in paragraph 5-18. If stabilator trim and flap interconnect system is installed, also position flaps in full up position.

c. Turn the trim tab control until the trailing edge of the tab aligns with the stabilator.

d. Holding the nut, adjust the screw through the idler link in the baggage compartment until the indicator is centered.

e. Reinstall the trim panel to the baggage compartment ceiling.

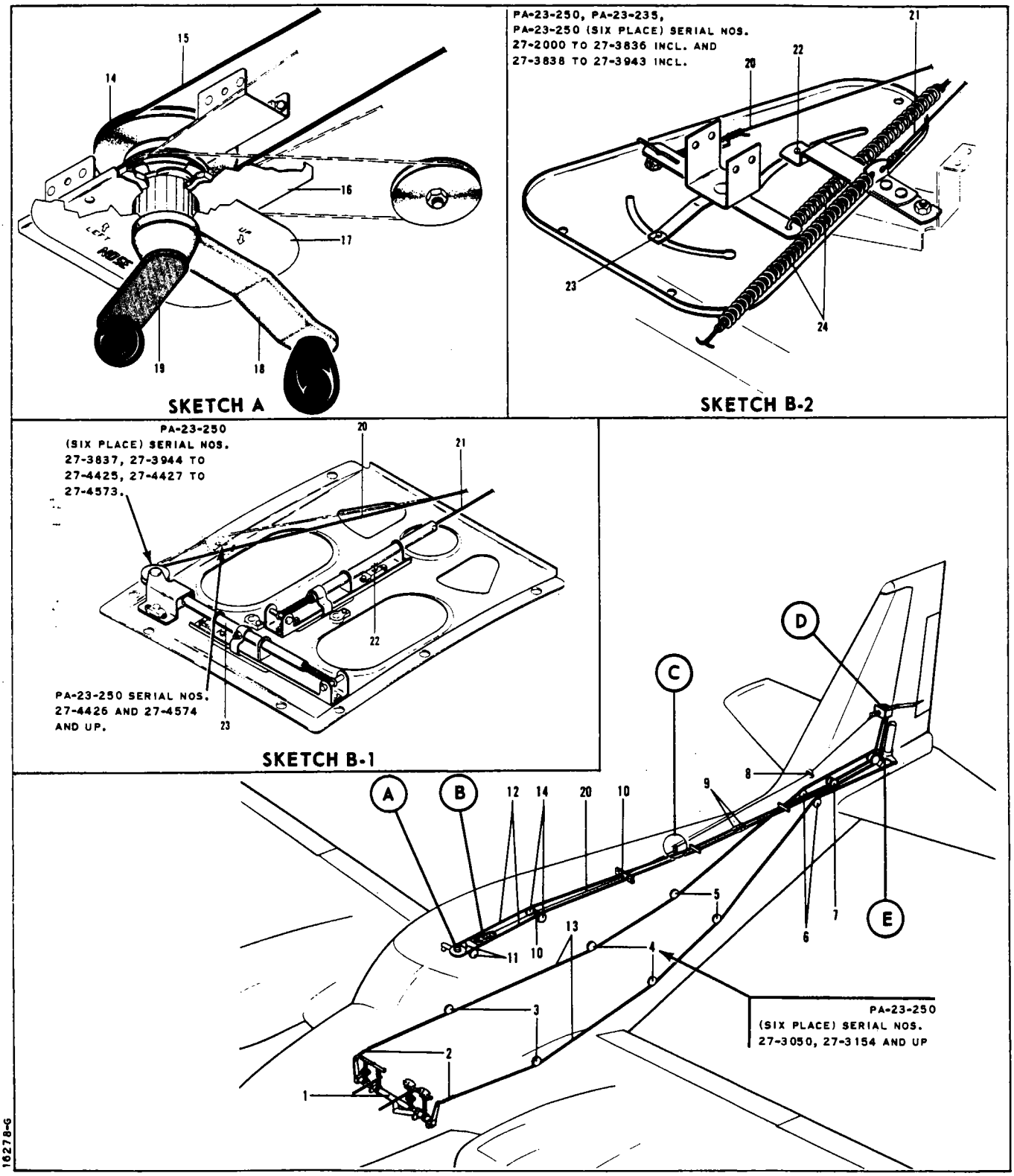
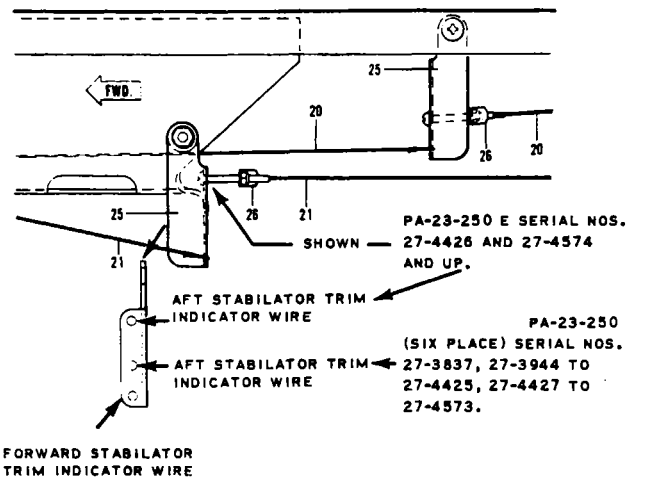
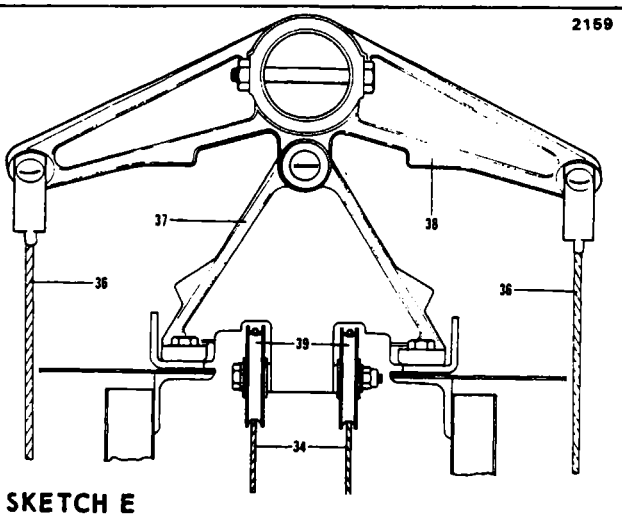


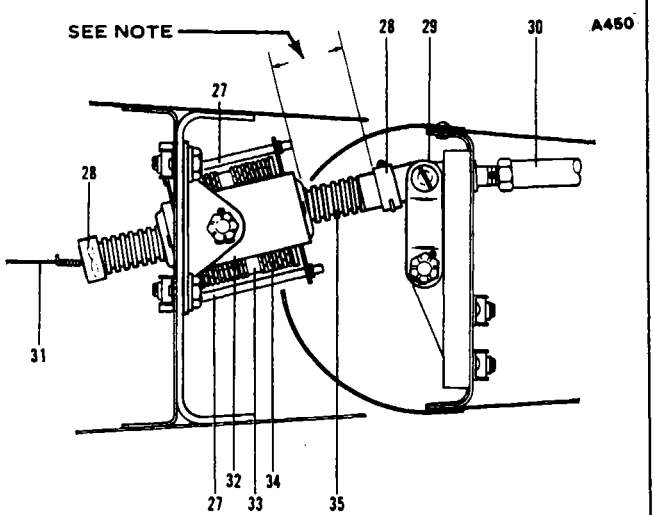
Figure 5-10. Rudder and Rudder Trim Controls



SKETCH C



SKETCH E



NOTE: OBTAIN A PRELIMINARY SETTING OF .875 PER RIGGING AND ADJUSTMENT OF RUDDER TRIM INSTRUCTIONS GIVEN IN PARAGRAPH 5-40, STEP d.

SKETCH D

1. RUDDER PEDAL ASSEMBLY
2. TURNBUCKLES
3. PULLEYS - STA. 94.0
4. PULLEYS - STA. 152.0
5. PULLEYS - STA. 192.4
6. PULLEYS - STA. 257.5
7. AFT RUDDER TRIM CABLE PULLEYS
8. RUB BLOCK
9. TURNBUCKLES
10. RUB BLOCK
11. FORWARD RUDDER TRIM CABLE PULLEYS
12. TRIM CONTROL CABLES
13. CONTROL CABLES
14. PULLEY
15. RUDDER TRIM CABLES
16. BRACKET
17. PLACARD
18. STABILATOR TRIM HANDLE
19. RUDDER TRIM HANDLE
20. RUDDER TRIM INDICATOR WIRE
21. STABILATOR TRIM INDICATOR WIRE
22. STABILATOR TRIM INDICATOR
23. RUDDER TRIM INDICATOR
24. SPRING
25. IDLER LINK
26. ADJUSTMENT SCREW
27. GUARD PIN
28. STOP
29. LINK
30. RUDDER TRIM CONTROL ROD
31. RUDDER TRIM INDICATOR WIRE
32. TRIM DRUM HOUSING
33. TRIM DRUM
34. TRIM CONTROL CABLES
35. TRIM SCREW
36. RUDDER CONTROL CABLES
37. HINGE BRACKET
38. RUDDER HORN
39. RUDDER TRIM PULLEYS

Figure 5-10. Rudder and Rudder Trim Controls (cont.)

5-31. RUDDER CONTROLS.

5-32. REMOVAL OF RUDDER CONTROL CABLES.

a. Remove the aft access panel from each side of the nose section by releasing the stud type panel fasteners.

b. Remove the access panel from the bottom of the fuselage by removing attaching screws.

c. Remove the access panel from the left side of the fuselage located below the leading edge of the vertical fin.

d. Remove the tail cone fairings by removing attaching screws.

e. Remove the center and rear seats.

f. Remove the rear outboard seat tracks from each side of the cabin floor.

g. Pull the carpet back and remove the access plates from each corner of the aft floor panel of the cabin by removing attaching screws.

h. Remove the trim panel from either the aft cabin or baggage area gaining access to the aft section of the fuselage.

i. Remove the cable guard pins from the rudder cable pulleys just aft of the main spar at station 94.0.

j. Remove the rudder pulleys under the aft cabin floor at station 152.0 by removing nut, washers, and cable guard bracket.

k. On PA-23-250 (six place) airplanes, remove the cable guard pins from the pulleys just forward of the fuselage bulkhead at station 192.4.

l. Remove the guard pins from the rudder cable pulleys at station 257.5.

m. Disconnect the cables from the torque tube arms by removing the turnbuckle barrel.

n. Disconnect the cables from the rudder horn by removing the cotter pin, nut, washers, and bolt from each side.

o. Remove the cables by drawing them aft through the fuselage.

5-33. INSTALLATION OF RUDDER CONTROL CABLES.

a. Connect the cable end straps to each side of the rudder horn with bolt, washers, nut and cotter pin.

b. Draw the cables forward through the fuselage and connect the cable ends to the torque tube arms with the use of turnbuckles.

c. Install new cable guard pins to the pulleys at station 257.5.

d. Within the aft section of the fuselage on PA-23-250 (six place) airplanes, install new cable guard pins to the pulleys just forward of the fuselage bulkhead at station 192.4.

fuselage bulkhead at station 192.4.

e. Install the rudder pulleys, with guard clips, under the aft cabin floor at station 152.0 using bolt, washers and self-locking nut.

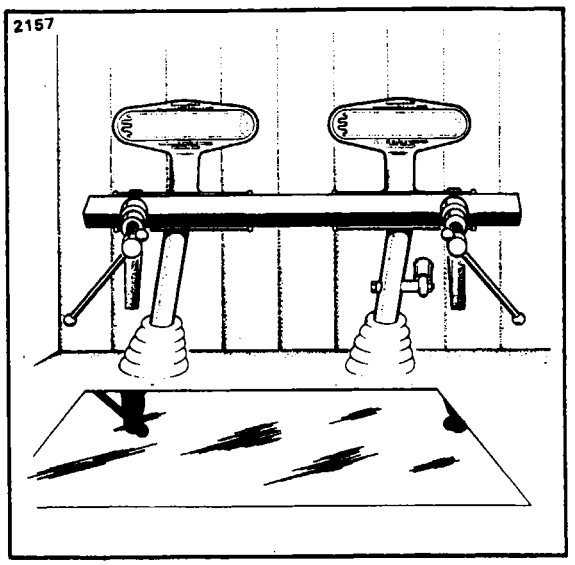


Figure 5-11. Clamping Rudder Pedals in Neutral

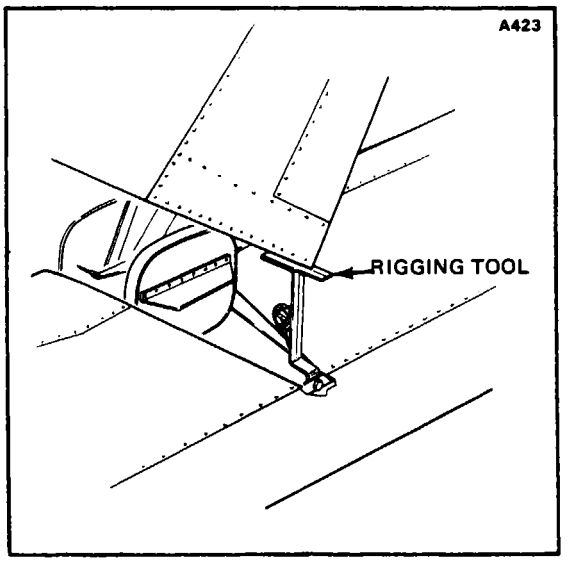


Figure 5-12. Installation of Rudder Aligning Tool (Typical)

f. Install new guard pins to the rudder pulleys just aft of the main spar at station 94.0.

g. Check rigging and adjustment of rudder controls. (Refer to Paragraph 5-34.)

h. Safety turnbuckles and install all access plates, panels, carpets, seat tracks, seats and tail cone fairings.

5-34. RIGGING AND ADJUSTMENT OF RUDDER CONTROLS. To adjust the rudder and rudder pedal for neutral, it first should be ascertained that the nose gear steering has been aligned with the rudder pedals according to Alignment of Nose Landing Gear, Section VII. Adjustment of the rudder and rudder cables may be accomplished as follows:

a. Place the airplane on jacks. (Refer to Jacking, Section II.)

b. Level the airplane laterally. (Refer to Leveling, Section II.)

c. Clamp the rudder pedals to align in a lateral position as shown in Figure 5-11.

d. Remove the aft cabin or baggage area trim panel to gain access to the aft section of the fuselage.

e. Remove the tail cone fairing by removing attaching screws.

f. Remove the nut and washer from the bolt that attaches the left and right stabilator halves together at the rear spar.

g. Attach a fabricated checking tool to the previously mentioned bolt and secure with washer and nut. (Refer to Figure 5-12.) (The tool may be fabricated from dimensions given in Figure 5-19.)

h. Place a level on the edge of the tool, leveling the tool vertically.

i. Position the rudder in neutral by adjusting the rudder cable turnbuckles, at the rudder pedal torque tube arms, until the trailing edge of the rudder is aligned with the scribe line on the fabricated tool. At the same time adjust the cable tension as given in Table V-I.

j. Remove the rudder cable clamps.

k. Move the rudder to the right and left and adjust the stops located at the base of the vertical fin to provide 12.25 $\pm$ .25 inches left and 14.5 $\pm$ .25 inches right as measured from a point on the tool where the rudder tip contacts the tool to the center of rudder tip with the rudder against its stop.

l. Check all moving components for freedom of movement.

m. Safety turnbuckles and install the access panel and tail cone fairing.

5-35. RUDDER TRIM CONTROLS.

5-36. REMOVAL OF FORWARD RUDDER TRIM ASSEMBLY.

a. Remove the rudder trim control knob or handle by removing the attaching roll pin.

b. Remove the stabilator trim control knob and handle by removing the attaching screws.

c. Remove the headliner trim plate around the trim crank assembly by the following procedure:

1. Remove the attaching screws securing the trim plate.
2. Lower the aft side of the trim plate and disconnect the vent lines.
3. Disconnect the wiring from the lights and their switches.

NOTE

It is recommended that the wires be marked for identification before removal.

4. Disconnect the control cable from the air control assembly on each side of the trim plate.
5. Remove the headliner trim plate by removing attaching screws.

d. Remove the trim crank bearing bracket assembly by removing attaching screws.

e. Remove the aft cabin or baggage area trim panel gaining access to the aft section of the fuselage.

f. Block the aft cables maintaining their position on the pulleys and the trim drum. (Refer to Figure 5-9.)

g. Disconnect the forward rudder trim cable at the rudder turnbuckle assemblies in the aft fuselage section.

h. If the cable is not to be reused, cut one end of the forward cable removing the turnbuckle thimble. Solder the blank end of a new cable to the end of the old cable.

NOTE

If the trim cables are to be reused, the headliner, insulation, rub blocks and pulleys must be removed from the cabin ceiling. Unless the headliner is to be replaced, it is not recommended that it be removed because of the difficulties replacing an old headliner.

5-37. INSTALLATION OF FORWARD RUDDER TRIM ASSEMBLY.

a. Ascertain that the splice where the two cables are joined together is secure, smooth and minimum in size.

b. Draw the old rudder cable that is spliced to the new cable forward through the ceiling to the cabin area.

NOTE

To prevent breaking the splice, draw the cable in a straight line and do not force.

c. Wrap the cable around the trim crank and draw it aft through the ceiling to the aft section of the fuselage.

d. For cables of undetermined length, connect the forward cable end to the corresponding aft cable and rotate the turnbuckle barrel until three on each end are showing.

e. Separate the old cable from the new cable where the two were spliced together.

f. Assemble the turnbuckle on the remaining aft rudder trim cable. Turn the barrel until three threads on each end are showing.

g. Insert the free cable end and a thimble through the turnbuckle eye and draw it until it is tight. Temporarily clamp the cable so as not to damage it or allow it to slip.

h. Operate the trim several times to seat the cable to the pulleys and to insure clearance of all moving parts.

i. Remove the temporary clamp and draw the free end of the cable to the approximate required tension. (Refer to Table V-I.)

j. Secure the free cable end using a nicopress sleeve.

k. Readjust the cable tension, adjusting the turnbuckles evenly.

l. Check rigging and adjustment of rudder trim. (Refer to Paragraph 5-40.)

m. Safety all turnbuckles.

n. Install all access plates and panels, bearing blocks, and trim cranks.

5-38. REMOVAL OF AFT RUDDER TRIM ASSEMBLY.

a. Remove the tail cone fairing by removing attaching screws.

b. Remove the two access plates from the right side of the vertical fin by removing attaching screws.

c. Remove the aft cabin or baggage area trim panel, gaining access to the aft section of the fuselage.

d. Block the trim cables at the trim drum to prevent them from unwrapping. (Refer to Figure 5-9.)

e. Block the forward rudder trim cables at any bulkhead inside the aft section of the fuselage and disconnect the rudder trim cable turnbuckles in the aft section of the fuselage. (Refer to Figure 5-9.)

f. Disconnect the rudder trim indicator wire from the forward end of the trim screw.

g. Disconnect the rudder trim control rod from the trim screw by removing cotter pin, nut, washer and bolt.

CAUTION

Do not push on the rudder.

h. Turn the nose wheel to the left moving the rudder to the left.

i. Remove the four bolts securing the trim drum and bracket in place. It may be necessary to remove the trim drum from the bracket before removal.

j. If the cable is not to be reused, cut the cable ends removing the turnbuckle eyes. Draw the cable and trim drum aft through the fuselage and vertical fin, removing it from the airplane.

k. If the cable is to be reused, remove the guard pins from the rudder trim cable pulleys at station 160.75 and remove the pulleys at station 290.0. Draw the cable and trim drum aft through the fuselage and vertical fin, removing it from the airplane.

5-39. INSTALLATION OF AFT RUDDER TRIM ASSEMBLY.

a. If a new cable is being installed, use the following procedure:

1. Ascertain that the trim drum is wrapped properly as described in paragraph 5-48.

2. Draw the cables forward through vertical fin and the aft section of the fuselage.

3. Insert the free cable ends and a thimble through the turnbuckle eye and draw them until it is tight. Temporarily clamp the cable so as not to damage it or allow it to slip.

4. Operate the trim several times to seat the cable to the pulleys and to insure clearance of all moving parts.

5. Remove the temporary clamp and draw the free ends of the cable to the approximate required tension (Refer to Table V-I.) and secure with nicopress sleeve.

6. Secure the trim drum and bracket inside the vertical fin with four attaching bolts.

7. Check rigging and adjustment per paragraph 5-40.

b. If the old cable is being installed, use the following procedure:

1. Ascertain that the trim drum is wrapped properly as described in paragraph 5-48.

2. Draw the cables forward through the vertical fin and the aft section of the fuselage.

3. Connect the trim cable turnbuckles.

4. Secure the trim drum and bracket inside the vertical fin with four attaching bolts.

5. Check rigging and adjustment per paragraph 5-40.

5-40. RIGGING AND ADJUSTMENT OF RUDDER TRIM. (Refer to Figure 5-10.)

a. Remove the access plate from the right side of the fin if not previously removed.

b. Rotate the trim drum (33) until the cable is evenly wrapped and the turnbuckle ends (9) inside the aft section fuselage are even. (There should be nine and one-quarter wraps on each end of the trim drum.)

c. Ascertain that the cable tension is set as given in Table V-I.

d. A preliminary setting of .875 of an inch between the aft screw stop (28) and the drum housing (32) as measured along the screw must be confirmed. This measurement is obtained by disconnecting the end of the trim screw from the trim control rod and link (29 & 30), if not previously disconnected, and turn the trim screw until .875 of an inch if obtained. Hold the trim drum stationary while adjusting the screw. Reconnect the screw with bolt, washers, nut and cotter pin.

e. Position the rudder in neutral and proceed to set tab travels. Turn the trim in each direction to screw stops. If tab travels do not agree with angles given in Table V-I, disconnect the control rod (30) from the tab, loosen the jam nut on the forward end of the rod and turn the rod until the proper travels are obtained.

f. Check minimum number of wraps left on drum. (Minimum allowable is one and one-quarter wraps.)

g. Check adjustment of trim indicator wire. (Refer to Paragraphs 5-43 or 5-46.)

h. Install the access plate with attaching screws.

5-41. REMOVAL OF RUDDER TRIM INDICATOR WIRE. (PA-23-250; PA-23-235 and PA-23-250 (six place), Serial Nos. 27-2000 to 27-2504 incl. and PA-23-250 (six place), Serial Nos. 27-2505 to 27-3836 incl. and 27-3838 to 27-3943 incl.)

a. Remove the placard plate from the ceiling of the cabin by removing attaching screws.

b. Remove the access plate from the right side of the vertical fin.

c. Disconnect the indicator wire at the indicator arm inside the cabin ceiling.

d. Disconnect the indicator wire at the trim screw.

e. Solder a piece of .024 steel wire to one end of the old indicator wire.

NOTE

If the wire has broken at a point other than either end, it may be necessary to remove certain access or trim panels to determine the breaking point and installation procedure.

5-42. INSTALLATION OF RUDDER TRIM INDICATOR WIRE. (PA-23-250; PA-23-235 and PA-23-250 (six place), Serial Nos. 27-2000 to 27-2504 incl. and PA-23-250 (six place), Serial Nos. 27-2505 to 27-3836 incl. and 27-3838 to 27-3943 incl.) (Refer to Figure 5-10.)

a. Draw the old wire from the fuselage installing a new one at the same time.

b. Attach the end of the indicator wire to the attachment point on the end of the trim screw.

c. Position the rudder in a neutral position and turn the rudder trim until the trailing edges of the rudder and rudder trim tab align.

d. Insert the remaining end of the wire through the attachment point inside the cabin ceiling. Ascertain the nut on the adjustment screw is centered and pull the wire through the hole until the indicator is centered. Bend the wire back and wrap it around itself at least seven times.

e. Adjust the wire per instructions in paragraph 5-43.

f. Install the placard plate to the ceiling and access plate to the right side of the fin.

5-43. RIGGING AND ADJUSTMENT OF RUDDER TRIM INDICATOR WIRE. (PA-23-250; PA-23-235 and PA-23-250 (six place), Serial Nos. 27-2000 to 27-2504 incl. and PA-23-250 (six place), Serial Nos. 27-2505 to 27-3836 incl. and 27-3838 to 27-3943 incl.) (Refer to Figure 5-10.)

a. Remove the placard cover from the cabin ceiling if not previously removed.

b. Position the rudder in a neutral position as described in paragraph 5-34.

c. Turn the rudder trim until the trailing edges of the rudder and rudder trim tab align.

d. Hold the screw where the forward end of the indicator wire is attached and adjust the nut until the indicator is centered.

e. Install the placard cover to the cabin ceiling.

5-44. REMOVAL OF RUDDER TRIM INDICATOR WIRES. (PA-23-250 (six place), Serial Nos. 27-3837, 27-3944 and up.)

a. Remove the trim panel from the ceiling of the aft baggage compartment by removing attaching screws.

b. Remove the placard panel from the cabin ceiling by loosening the set screws in the light knobs, removing the knobs and removing attaching screws.

c. The forward stabilator indicator wire may be removed by the following procedure:

1. Disconnect the indicator wire from the tab in the cabin ceiling.
2. Solder a piece of .024 steel wire to the old indicator wire.

NOTE

If the indicator wire has broken at a point other than either end, it may be necessary to remove certain access or trim panels to determine the breaking point and installation procedure.

d. The aft rudder indicator wire may be removed by the following procedure:

1. Remove the access plate on the right side of the vertical fin.

2. Disconnect the wire at the trim screw inside the vertical fin.
3. Solder a piece of .024 steel wire to the old indicator wire.

5-45. INSTALLATION OF RUDDER TRIM INDICATOR WIRE. (PA-23-250 (six place), Serial Nos. 27-3837, 27-3944 and up.) (Refer to Figure 5-10.)

a. Disconnect the indicator wire or wires at the idler arm inside the baggage compartment.

b. Draw the old wire out installing a new wire at the same time.

c. Ascertain that the adjustment nut located in the baggage compartment is centered on the screw.

d. Position the rudder in a near neutral position and adjust the trim tab until the trailing edges of each align.

e. Connect the aft wire by the following procedure:

1. Separate the old wire from the new wire.

2. Insert the aft end of the wire through attachment point just forward of the trim drum. Bend the wire forward and wrap it around itself at least seven turns.

3. Hold the idler link perpendicular to its attachment point and attach the forward end of the wire to the angle in the same manner as the aft end.

f. Connect the forward wire by the following procedure:

1. Separate the old wire from the new wire.

2. Insert the aft end of the wire through the idler link. Bend the wire forward and wrap it around itself at least seven times.

3. Insert the forward end of wire through the indicator attachment. Pull the wire through until the indicator is centered. Bend the wire back and secure it in the same manner as opposite end.

g. Adjust the wire per instructions in Paragraph 5-46.

h. Install the placard plate, light control knobs, baggage compartment trim and vertical fin access plate.

5-46. ADJUSTMENT OF RUDDER TRIM INDICATOR WIRE. (PA-23-250 (six place), Serial Nos. 27-3837, 27-3944 and up.) (Refer to Figure 5-10.)

a. Remove the trim panel from the baggage compartment ceiling.

b. Place the rudder in a neutral position as described in Paragraph 5-34.

c. Turn the trim tab control until the trailing edge of the tab aligns with the rudder.

d. Holding the nut, adjust the screw through the idler link in the baggage compartment until the indicator is centered.

e. Reinstall the trim panel to the baggage compartment ceiling.

5-47. TRIM DRUM.

5-48. WRAPPING TRIM DRUM. (Refer to Figure 5-13.) All trim drums are wrapped basically by the same procedure and must be removed from the airplane.

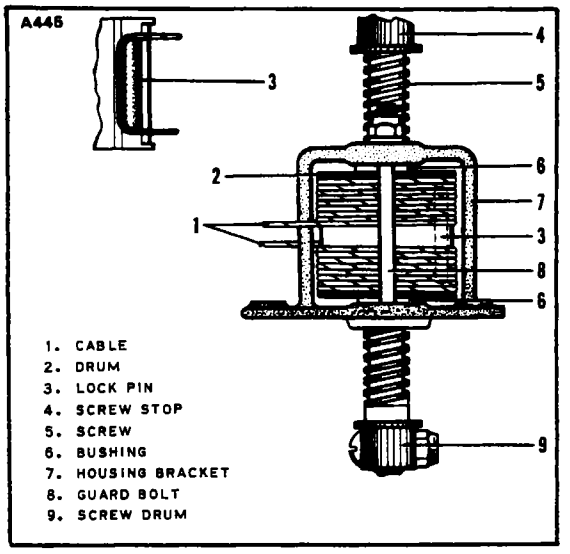


Figure 5-13. Trim Screw Assembly

a. Mark the end of the drum (2) toward the base of the housing bracket (7) for a reference when later installing and wrapping the cable on the drum.

b. With the drum housing bracket (7) firmly held, remove one of the cable guard bolts (8) from the housing bracket.

c. Remove the drum screw (5) from the trim screw assembly. The screw (5) is removed by removing the stop (4) located on the end of the screw, opposite the base of the housing bracket. Turn the screw from the drum (2).

d. Remove the drum from the housing.

e. Unwrap the trim cable (1) and remove the cable and lock pin (3) from the drum. (If one end of the cable has been marked to facilitate hook-up of the cable ends, note this location in relation to the drum when installing a new cable on the drum.)

f. Check the condition of the bushings (6) in the housing bracket for excess wear.

g. To install and wrap the trim cable, locate the center of the cable, measuring from end to end.

h. Insert the center of the cable into the cable slot in the drum and install the lock pin (3).

i. Hold the drum (2) with the previously marked or base end of the drum down.

j. Looking down on the drum, wrap up the cable that leads from the base end nine and one-quarter turns in a counterclockwise direction. The cable from the upper end, wrap down in a clockwise direction nine and one-quarter turns.

k. Insert the drum in the housing bracket, position the drum and route the cables from the assembly as shown in Figure 5-13.

l. Install the screw (5) and screw stop (4) and secure with the roll pin (3).

m. Block the trim cables in center position to keep them tight and from unwrapping, by the method shown in Figure 5-9.

n. Center the drum between the stops on the screw by rotating the screw.

5-49. WING FLAP CONTROLS.

5-50. REMOVAL OF FLAP ACTUATOR ASSEMBLY. (Refer to Figure 5-14.)

a. Disconnect the flap control rods allowing both flaps to hang free.

b. Remove the two access plates from the outboard undersides of the fuselage at station 128.75.

c. Remove the locknut from the sender unit rod installed through the torque tube and remove the rod.

d. Remove the bellcrank assembly from one end of the torque tube by removing the two bolts, washers, and cotter pins installed through the torque tube.

NOTE

If the bellcrank assembly is to be removed from the right side, disconnect the actuating rod from the bellcrank by removing the bolt, washer and self-locking nut.

e. Cut the safety wire from the bearing block bolts and remove the bolts, washers, bearing blocks, bearings and shims if installed from each side.

f. Remove the torque tube, withdrawing it from the aircraft on the opposite side of the airplane that the bellcrank was removed. If stabilator trim and flap interconnect system is installed, slide pulley from torque tube by removing attachment hardware and retaining pulley in fuselage while withdrawing torque tube.

5-51. INSTALLATION OF FLAP ACTUATOR ASSEMBLY. (Refer to Figure 5-14.)

a. Install the torque tube by installing it through the side of the fuselage at station 128.75.

b. Lubricate the torque tube bearings per Lubrication Chart, Section II.

c. Position the torque tube (if stabilator trim and flap interconnect system is installed, slide the pulley on torque tube while positioning tube) and install the bearing blocks with bearings, bolts, washers and shims as required. (Install shims .010 to .014, P/N 41371-02; .015 to .020, P/N 41371-03 or .032, P/N 41371-04 between the bearing blocks to insure a proper fit.)

d. Position the bellcrank on the torque tube end and secure by installing two bolts, washers, nuts and cotter pins through the bellcrank and torque tube.

e. Check rigging and adjustment of flaps. (Refer to Paragraph 5-55.)

f. Check adjustment of flap position sender. (Refer to Paragraph 5-52.)

g. Safety the bearing block bolts with MS20995-C32 safety wire and install the access plates.

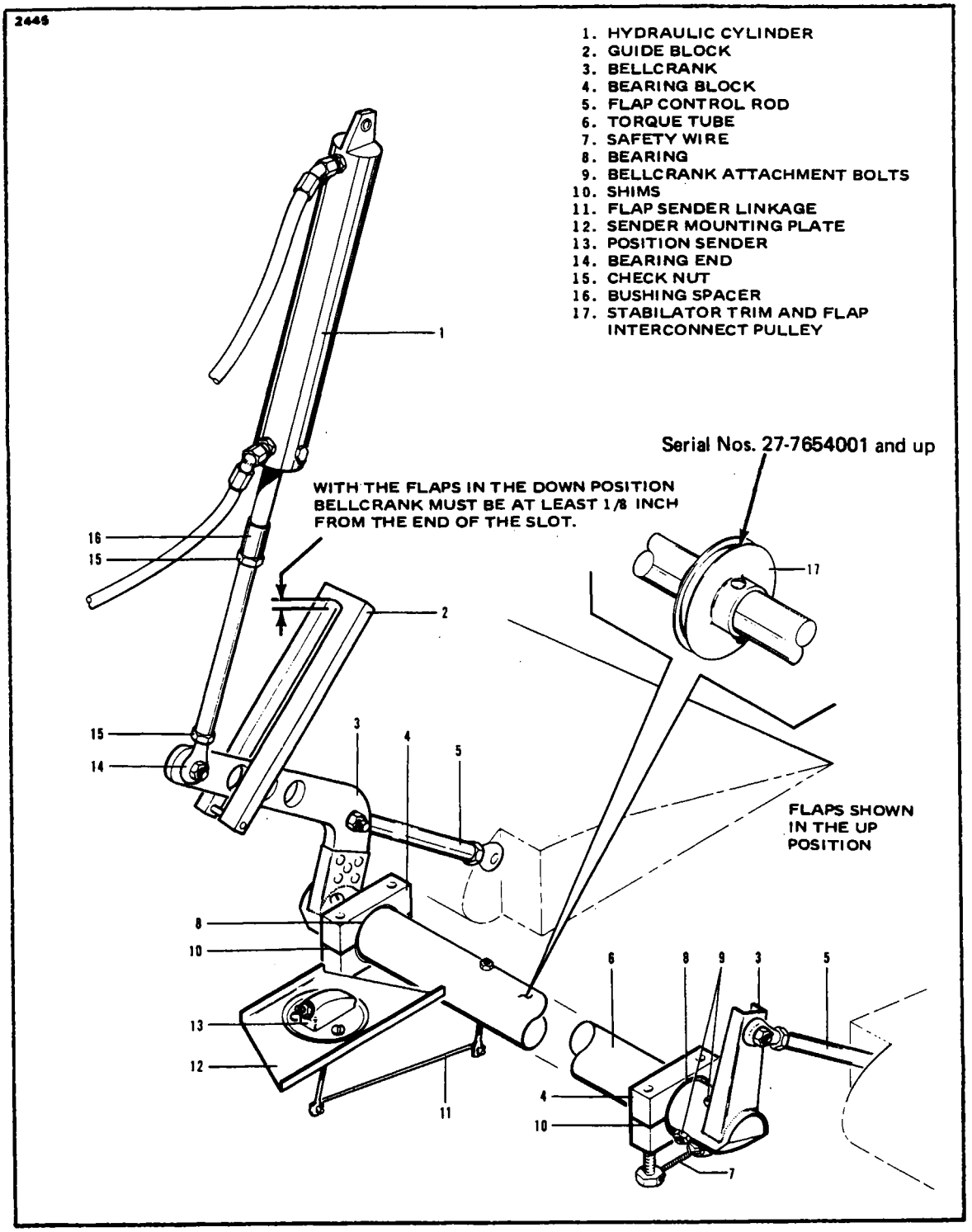


Figure 5-14. Flap Controls Installation

5-52. RIGGING AND ADJUSTMENT OF FLAPS.

a. Connect all the flap system linkages together, temporarily.

b. Place the cockpit FLAP control lever in the DOWN position. Using the pedestal hand pump, lower the flaps till there is no movement. At this time the piston will be withdrawn into the flap actuating hydraulic cylinder as far as the bushing, located on it, permits it to go. The locknut for the tube threaded into the piston rod and the bottom of the cylinder are the members between which the bushing is compressed.

c. Observe the position of the flap bellcrank assembly with respect to the slot in the flap actuating arm guide block. The bellcrank must be at least 1/8-inch from the end of the slot. If it strikes the block, remove the bolt, washer, and self-locking nut securing the tube end bearing to the bellcrank and rotate the tube counterclockwise to extend it. Tighten the tube locknut to maintain the new position of the tube relative to the piston rod. Check to see if end bearing locknut is tight.

d. Connect the tube end bearing to the bellcrank with a bolt, plain washer and a self-locking nut.

e. Raise the flaps as far up as they will go.

f. Place a straight edge beneath the wing surface and check if the flap is parallel with the bottom of the wing.

NOTE

On certain airplanes, the bottom of the flaps will not be flush with the wing. When the flaps and wings are not flush, set two rubber blocks between a straightedge and the bottom of the wing to check parallelism. (Refer to Figure 5-15.) Those serial numbers affected will be shown in the following chart:

Serial Numbers	Distance Between Straightedge and Wing
27-1 to 27-2504 inclusive	1/4 inch
27-2505 to 27-3049 inclusive 27-3051 to 27-3153 inclusive	Flush
27-3050, 27-3154 and up	1/8 inch

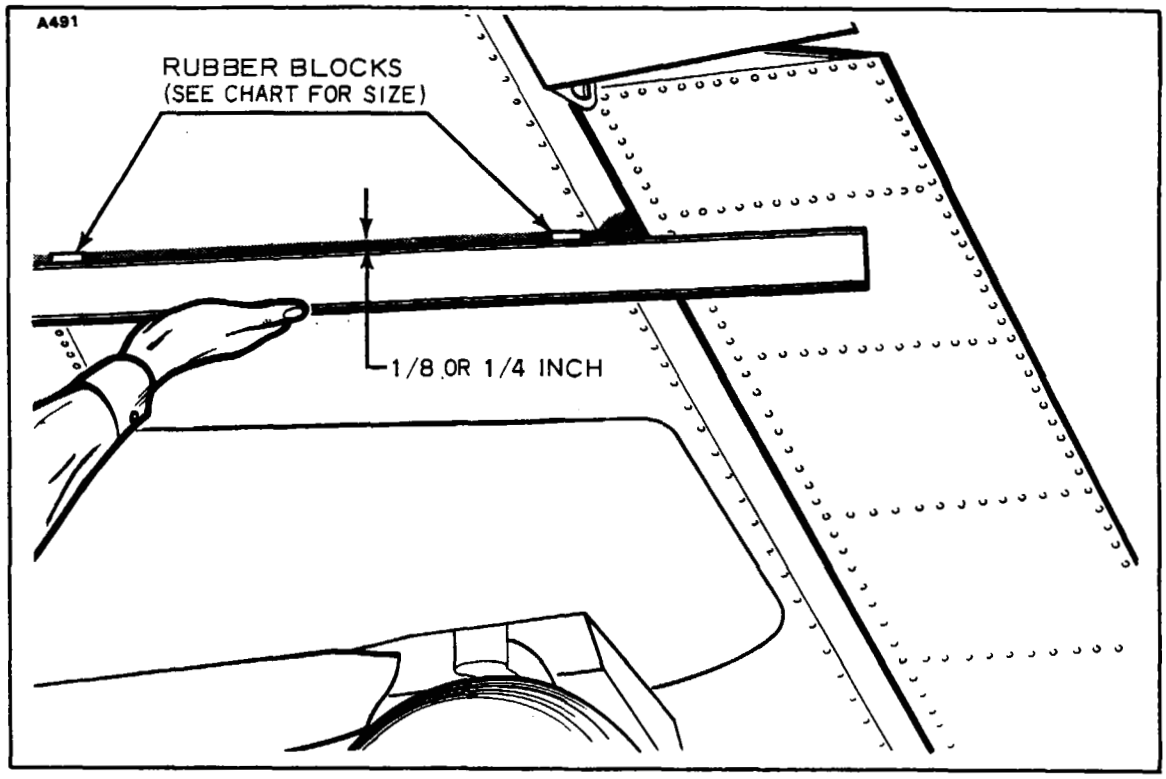


Figure 5-15. Flap Rigging

g. Rectify a non-parallel condition by lowering the flaps completely by the hand pump. Then disconnect the flap control rod assembly from the bolt in the flap bellcrank. Rotate the control rod end bearing to correct the misalignment. Reconnect the control rod to the bellcrank. Raise the flaps until the cockpit control lever returns to neutral and check for parallelism again.

h. If still unsatisfactory, lower the flap and repeat the adjustment. If necessary, also adjust the control rod end bearing at the flap. To do this, do not separate the end bearing from the flap but rotate the flap control rod itself. When satisfactory, install a washer between the end bearing and the bellcrank and secure with a castellated nut and a cotter pin.

i. Repeat all of the above procedures on the remaining flap.

NOTE

Place a plain washer under the castellated nut in addition to the washer located between the control rod end bearing and the bellcrank at the left flap.

j. Move the flap within its limits and note if there is 50 degrees of movement, plus or minus two degrees. Check all locknuts for tightness.

5-53. REMOVAL OF FLAP POSITION SENDER.

a. Remove the access plate from the outboard right underside of the fuselage just inboard of the flap.

b. Disconnect the flap position indicator rod by removing the self-locking adjustment nut and withdraw the rod from the torque tube.

c. Remove the center and rear seats from the right side of the airplane.

d. Remove the outboard seat track from the right side of the airplane by removing attaching screws.

e. Pull the carpet back and remove the access plate located below the center window at station 117.75.

f. Disconnect the electrical leads from the position sender.

g. Remove the position sender by removing the attaching screws.

5-54. INSTALLATION OF FLAP POSITION SENDER.

a. Position the sender and secure with attaching screws.

b. Connect the electrical leads to the sender.

c. Insert the flap position indicator rod through the torque tube and install the self-locking adjustment nut.

d. Adjust the sending unit as described in paragraph 5-55.

e. Install the access plates, carpet, seat track and seats.

5-55. RIGGING AND ADJUSTMENT OF FLAP POSITION SENDER.

a. Remove the access plate from the right underside of the fuselage, just inboard of the flap, if not previously removed.

b. Lower the flaps to an angle of 25 degrees as checked with a bubble protractor.

NOTE

To adjust the flap position sender, the electrical system must supply either 14 or 28 volts to the sender unit, depending on electrical system design for the particular aircraft.

c. Tighten or loosen the adjustment nut until the indicator on the instrument panel points to the half-way mark.

d. Check the three flap positions (retracted, half-way or 25^{o} and extended) with respect to the angular settings and the position indicated on the flap gauge.

e. Install the access plate to the underside of the fuselage with attaching screws.

5-56. STABILATOR TRIM AND FLAP INTERCONNECT SYSTEM. (Serial Nos. 27-7654001 and up.) On PA-23-250 (six place) airplanes with serial nos. noted above, a stabilator trim and flap interconnect system is installed which connects the flap torque tube to the stabilator trim tab. The system includes cables connecting a pulley on the flap torque tube to an eccentric pulley on the stabilator trim bellcrank, so that when the flaps are extended, pressure is exerted against the bellcrank to increase down trim. Thus reducing the pitch change during flap extension. The amount of trim tab displacement is directly proportional to the amount of flap extension.

5-57. REMOVAL OF STABILATOR TRIM AND FLAP INTERCONNECT SYSTEM. (Refer to Figure 5-6.)

a. Remove center seats and rails. Pull the carpet back to gain access to the stabilator trim and flap interconnect access cover at station 126.75. Remove aft baggage compartment trim and floor panels by removing attaching screws. Remove the tail cone fairing.

b. Disconnect the turnbuckles (7 & 8) at stations 258.50 and 267.50.

c. Remove guard pins from pulleys at stations 130.75, 153.88 and 229.00; pull cable (9) forward through fuselage to flap torque tube (12).

d. Remove guard from around flap torque tube pulley; unwind cable from pulley. Remove cotter pins securing cable to torque tube pulley and remove cable from airplane.

e. Remove flap torque tube pulley (1) per paragraph 5-50.

f. Pull guard pin from pulley at station 273.38 and pull remaining cable (10) aft to the stabilator trim bellcrank assembly (17).

g. Disconnect eccentric pulley (6) and remove cable and eccentric pulley from aircraft.

5-58. INSTALLATION OF STABILATOR TRIM AND FLAP INTERCONNECT SYSTEM.

a. Install pulley on torque tube per paragraph 5-51.

b. Hold cable ball in place on flap torque tube pulley with cotter pins.

c. Wrap cable around pulley as shown in Figure 5-6, Sketch B and install pulley guard.

d. Feed cable aft through pulleys at stations 130.75, 153.88 and 229.00 and install guard pins.

e. Slide cable ball on eccentric pulley and wrap cable as shown in Figure 5-6, Sketch C. Install eccentric pulley on bellcrank and screw assembly.

f. Connect tension spring (25) as shown in Figure 5-6.

g. Feed cable forward to the turnbuckles. Install pulley guard pin at station 273.38. Connect the cable end from the bottom of the flap torque tube pulley to the cable from the top of the eccentric pulley. (Refer to Figure 5-6, Sketches B and C.) Connect the other cables and adjust tension per paragraph 5-59.

h. Replace items removed in Step a of paragraph 5-57.

5-59. ADJUSTMENT OF STABILATOR TRIM AND FLAP INTERCONNECT SYSTEM. (Refer to Figure 5-6.)

a. Ascertain that the stabilator trim is rigged and adjusted per paragraph 5-24.

b. Place the flaps in the up position with the stabilator and stabilator trim in neutral then adjust the turnbuckles to obtain the combined cable tension as given in Table V-I.

c. When rigging the interconnect system, the eccentric pulley stop arms should have .125 to .187 of an inch gap between the upper stop pin and the stop arm. Therer is no specified clearance at the lower stop, but the eccentric pulley arm should not conduct the stop pin.

NOTE

With the flaps lowered, one cable will be slack on the eccentric cam, if the lower stop makes contact, tighten up on the slack cable to provide the cushion gap, always maintaining the combined tension as given in Table V-I.

d. With the flaps in the full down position, trim tab deflection should be 3.5° (minimum) up. If deflection of 3.5° is unobtainable recheck the stabilator trim adjustment per paragraph 5-24 and installation of stabilator trim and flap interconnect system per paragraph 5-58.

5-60. CONTROL SYSTEM FRICTION LIMITS.

5-61. FRICTION IN THE STABILATOR CONTROL SYSTEM.

a. Attach a spring scale to the brackets which join the rear spar just forward of the tab.

b. Record the scale reading as the stabilator passes through neutral by raising it from 2.0 inches below neutral to 2.0 inches above neutral.

c. Record the scale reading as the stabilator passes through neutral by lowering it to the original position.

d. Repeat the previous raising and lowering until average readings are obtained, making sure the movement is slow and steady.

e. The total friction is obtained by subtracting the two readings. This shall not exceed 16 lbs. on serial nos. 27-1 to 27-7554172 incl. or 13 lbs. on serial nos. 27-7654001 and up, when stabilator control system is rigged with proper travels and cable tension.

5-62. FRICTION IN THE RUDDER CONTROL SYSTEM.

a. The aircraft shall be on jacks with the nose wheel fully extended and clear of the floor.

b. The rudder shall be pushed to the stop and allowed to slowly return to its stable point.

c. A spring scale is place against the lower rearward corner of the rudder.

d. Move the rudder from the above position through neutral, recording the maximum scale reading.

e. Repeat the procedure for both left and right, gear up and gear down until an average reading is obtained. The movement should be slow and steady with the scale always perpendicular to the chord line of the rudder.

f. The friction is the direct reading obtained in each direction and shall not be in excess of 10 lbs. with the gear down, and 2 lbs. with the gear up, both to the right and left.

5-63. FRICTION IN THE AILERON CONTROL SYSTEM.

a. A spring scale is placed against the trailing edge of either the left or right aileron.

b. Record the scale reading as the aileron passes through neutral by raising it from 1.5 inches below neutral to 1.5 inches above neutral.

c. Record the scale reading as the aileron passes through neutral by lowering it to the original position.

d. Repeat above until average readings are obtained making sure movement is slow and steady with the scale always perpendicular to the chord line of the aileron.

e. The friction is the direct reading obtained in each direction and shall not be in excess of 7 lbs. for each.

5-64. ADJUSTMENT OF STABILATOR TAB POSITION INDICATOR. (Refer to Figure 5-5.)

a. Set tab travels as per Table V-I.

b. Verify that the indicator multiplying link is properly rigged as per Sketch D, Figure 5-5.

c. Crank stabilator trim handle (24) to full nose down position and turn back six (6) full turns.

d. Make adjustment to indicator system placing stabilator trim indicator (28) in center of "TAKE OFF" area.

TABLE V-II. TROUBLESHOOTING CHART (SURFACE CONTROLS)

Trouble	Cause	Remedy
	AILERON CONTROL SYSTEM	
Lost motion between control wheel and aileron.	Cable tension too low.	Adjust cable tension. (Refer to Paragraph 5-13.)
	Linkage loose or worn.	Check linkage and tighten or replace.
	Cables not in place on pulleys.	Install cables correctly. Check cable guards.
	Broken pulley.	Replace pulley.
Resistance to control wheel rotation.	System not lubricated properly.	Lubricate system.
	Cable tension too high.	Adjust cable tension. (Refer to Paragraph 5-13.)
	Control column chain improperly adjusted.	Adjust chain tension. (Refer to Paragraph 5-13d.)
	Pulleys binding or rubbing.	Replace binding pulleys and/or provide clearance between pulleys and brackets.
	Cables crossed or routed incorrectly.	Check routing of control cables.
	Cables not in place on pulleys.	Install cables correctly. Check cable guards.
	Bent aileron and/or hinge.	Repair or replace aileron and/or hinge.

TABLE V-II. TROUBLESHOOTING CHART (SURFACE CONTROLS) (cont.)

Trouble	Cause	Remedy
AILERON CONTROL SYSTEM (cont.)		
Control wheels not synchronized.	Incorrect control column rigging.	Rig in accordance with Paragraph 5-13d.
Control wheels not horizontal when ailerons are neutral.	Incorrect rigging of aileron system.	Rig in accordance with Paragraph 5-13.
Incorrect aileron travel.	Aileron control tubes not adjusted properly. Aileron bellcrank stops not adjusted properly.	Adjust in accordance with Paragraph 5-13b. Adjust in accordance with Paragraph 5-13a.
Correct aileron travel cannot be obtained by adjusting bellcrank stops.	Incorrect rigging of aileron cables, control wheel and control tube rod ends.	Rig in accordance with Paragraph 5-13.
Control wheel stops before control surfaces reach full travel.	Incorrect rigging between control wheel and control cables.	Rig in accordance with Paragraph 5-13.
STABILATOR CONTROL SYSTEM		
Lost motion between control wheel and stabilator.	Cable tension too low.	Adjust cable tension per Paragraph 5-18.

TABLE V-II. TROUBLESHOOTING CHART (SURFACE CONTROLS) (cont.)

Trouble	Cause	Remedy
STABILATOR CONTROL SYSTEM (cont.)		
Lost motion between control wheel and stabilator. (cont.)	Linkage loose or worn.	Check linkage and tighten or replace.
	Cables not in place on pulleys.	Install cables correctly.
	Broken pulley.	Replace pulley.
Resistance to stabilator control movement.	System not lubricated properly.	Lubricate system.
	Cable tension too high.	Adjust cable tension per Paragraph 5-18.
	Binding control column.	Adjust and lubricate per Paragraph 5-7.
	Pulleys binding or rubbing.	Replace binding pulleys and/or provide clearance between pulleys and brackets.
	Cables crossed or routed incorrectly.	Check routing of control cables.
	Cables not in place on pulleys.	Install cables correctly.
	Bent stabilator hinge.	Repair or replace stabilator or hinge.
Incorrect stabilator travel.	Stabilator stops incorrectly adjusted.	Adjust stop screws per Paragraph 5-18.

TABLE V-II. TROUBLESHOOTING CHART (SURFACE CONTROLS) (cont.)

Trouble	Cause	Remedy
STABILATOR CONTROL SYSTEM (cont.)		
Incorrect stabilator travel. (cont.)	Stabilator control cables incorrectly adjusted.	Adjust control cables per Paragraph 5-18.
Correct stabilator travel cannot be obtained by adjusting stabilator stops.	Stabilator cables incorrectly rigged.	Rig cables in accordance with Paragraph 5-18.
STABILATOR TRIM CONTROL SYSTEM		
Lost motion between trim control handle and trim tab.	Cable tension too low.	Adjust in accordance with Paragraph 5-24.
	Cables not in place on pulleys.	Install cables according to Paragraphs 5-21 and 5-23.
	Broken pulley.	Replace pulley.
	Linkage loose or worn.	Check linkage and tighten or replace.
Trim control handle moves with excessive resistance.	System not lubricated properly.	Lubricate system.
	Cable tension too high.	Adjust in accordance with Paragraph 5-24.
	Pulleys binding or rubbing.	Replace binding pulleys. Provide clearance between pulleys and brackets.

TABLE V-II. TROUBLESHOOTING CHART (SURFACE CONTROLS) (cont.)

Trouble	Cause	Remedy
STABILATOR TRIM CONTROL SYSTEM (cont.)		
Trim control handle moves with excessive resistance. (cont.)	Cables crossed or routed incorrectly.	Check routing of control cables.
	Cables not in place on pulleys.	Refer to Paragraphs 5-21 and 5-23.
	Trim tab hinge binding.	Lubricate hinge. If necessary, replace.
Trim tab fails to reach full travel.	System incorrectly rigged.	Check and/or adjust rigging per Paragraph 5-24.
	Trim drum incorrectly wrapped.	Check and/or adjust rigging per Paragraph 5-24.
Trim indicator fails to indicate correct trim position.	Trim indicator unit not adjusted properly.	Adjust in accordance with Paragraph 5-27.
Trim indicator fails to indicate any movement.	Trim indicator defective.	Replace indicator unit.
	Wire broken.	Locate break and splice or replace.
Trim control cable slippage.	Refer to Service Letter No. 628.	Refer to Service Letter No. 628.

TABLE V-II. TROUBLESHOOTING CHART (SURFACE CONTROLS) (cont.)

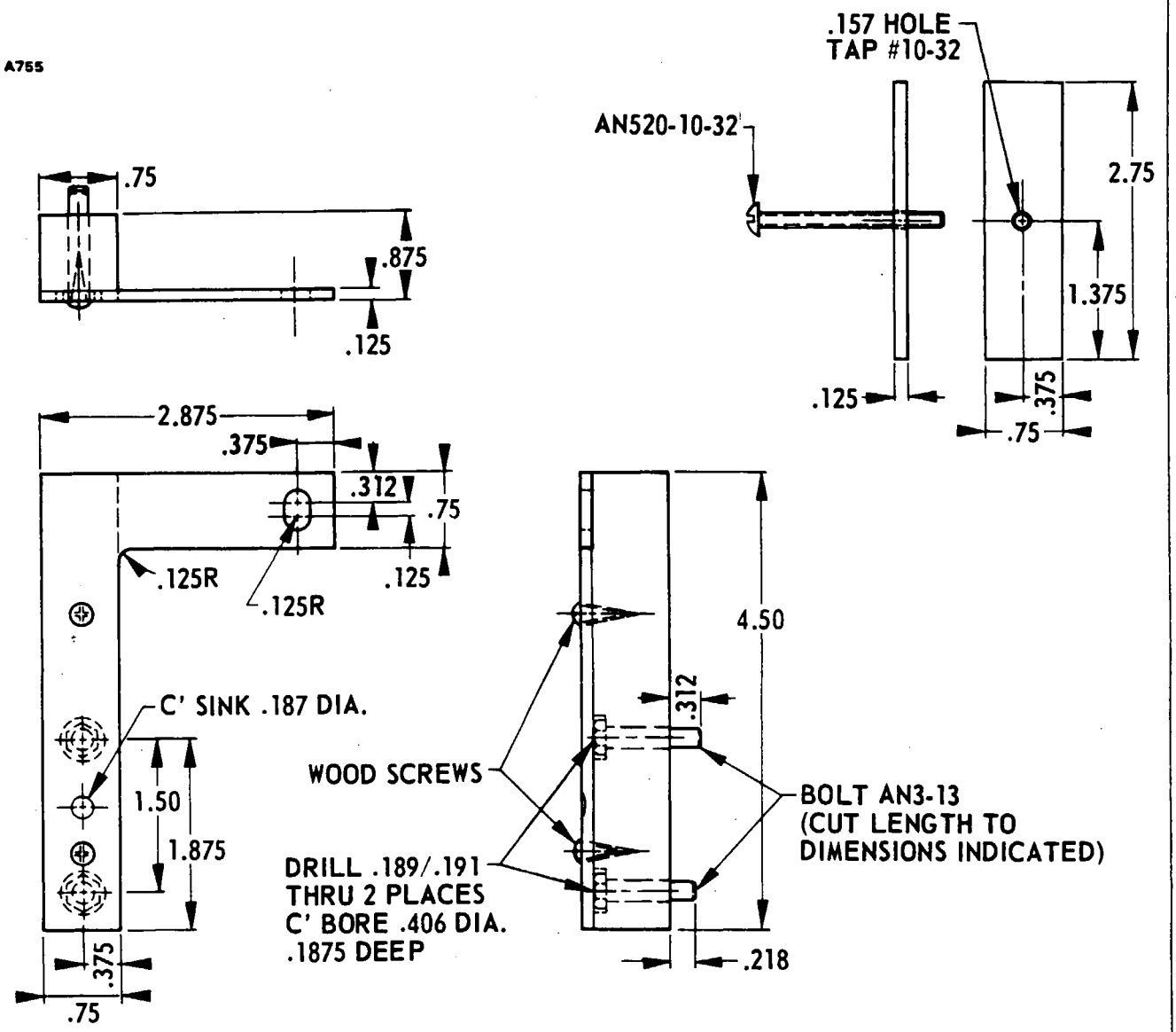
Trouble	Cause	Remedy
RUDDER CONTROL SYSTEM		
Lost motion between rudder pedals and rudder.	Cable tension too low.	Adjust cable tension per Paragraph 5-34.
	Linkage loose or worn.	Check linkage and tighten or replace.
	Broken pulley.	Replace pulley.
	Bolts attaching rudder to bellcrank are loose.	Tighten bellcrank bolts.
Excessive resistance to rudder pedal movement.	System not lubricated properly.	Lubricate system.
	Rudder pedal torque tube bearing in need of lubrication.	Lubricate torque tube bearings.
	Cable tension too high.	Adjust cable tension per Paragraph 5-34.
	Cables crossed or routed incorrectly.	Check routing of control cables.
	Cables not in place on pulleys.	Install cables correctly. Check cable guards.
	Pulleys binding or rubbing.	Replace binding pulleys and/or provide clearance between pulleys and brackets.

TABLE V-II. TROUBLESHOOTING CHART (SURFACE CONTROLS) (cont.)

Trouble	Cause	Remedy
RUDDER CONTROL SYSTEM (cont.)		
Rudder pedals not neutral when rudder is streamlined.	Rudder cables incorrectly rigged.	Rig in accordance with Paragraph 5-34.
Incorrect rudder travel.	Rudder bellcrank stop incorrectly adjusted.	Rig in accordance with Paragraph 5-34.
	Nose wheel contacts stops before rudder.	Rig in accordance with Paragraph 5-34.
RUDDER TRIM CONTROL SYSTEM		
Lost motion between trim control handle and trim tab.	Cable tension too low.	Adjust in accordance with Paragraph 5-40.
	Cables not in place on pulleys.	Install cables according to Paragraphs 5-37 and 5-39.
	Broken pulley.	Replace pulley.
	Linkage loose or worn.	Check linkage and tighten or replace.
Trim control handle moves with excessive resistance.	System not lubricated properly.	Lubricate system.
	Cables crossed or routed incorrectly.	Check routing of control cables.

TABLE V-II. TROUBLESHOOTING CHART (SURFACE CONTROLS) (cont.)

Trouble	Cause	Remedy
RUDDER TRIM CONTROL SYSTEM (cont.)		
Trim control handle moves with excessive resistance. (cont.)	Cables not in place on pulleys.	Install cables according to Paragraphs 5-37 and 5-40.
	Pulleys binding or rubbing.	Replace binding pulleys. Provide clearance between pulleys and brackets.
	Trim tab hinge binding.	Lubricate hinge. Replace if necessary.
Trim tab fails to reach full travel.	System incorrectly rigged.	Check and/or adjust rigging per Paragraph 5-40.
	Trim drum incorrectly wrapped.	Check and/or adjust rigging per Paragraph 5-48.
Trim indicator fails to indicate correct trim position.	Trim indicator unit not adjusted properly.	Adjust in accordance with Paragraph 5-43.
Trim indicator fails to indicate any movement.	Trim indicator defective.	Replace indicator unit.
	Wire broken.	Locate break and splice or replace.
FLAP CONTROL SYSTEM		
Refer to Hydraulic System Troubleshooting Section VI, Table VI-V, Pages 102, 103 and 104 for probable Causes and Remedy.		



MATERIAL LIST
1-.125 x .75 x 2.75 STEEL PLATE
1-.125 x 2.875 x 4.50 STEEL OR ALUM. PLATE
2-AN3-13 BOLT
1-AN520-10-32 SCREW
2-WOOD SCREWS

Figure 5-16. Fabricated Tool, Aileron Rigging

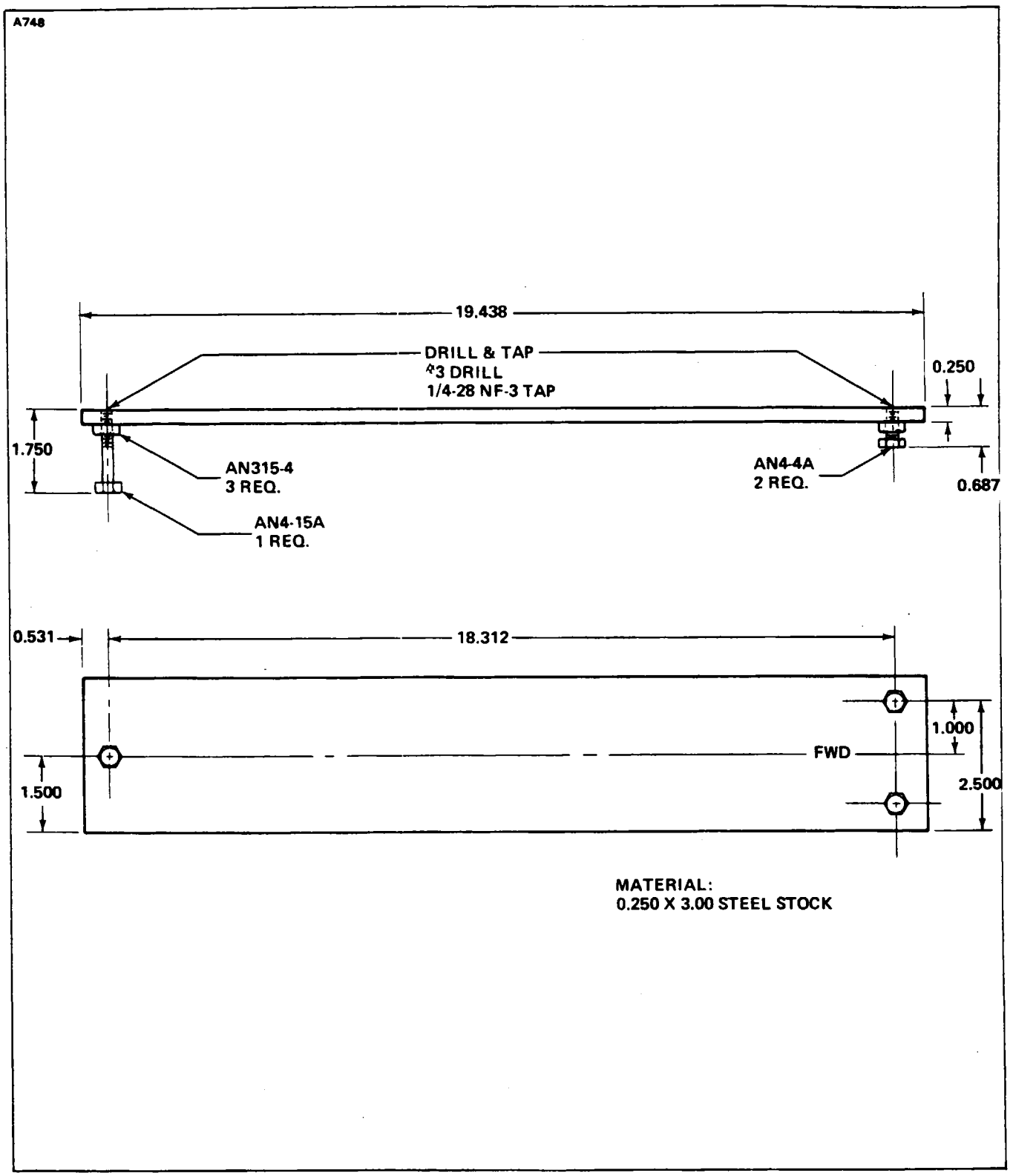


Figure 5-17. Fabricated Tool, Stabilator Leveling
(Serial Nos. 27-1 to 27-7554168 incl. and
27-8054001 and up)

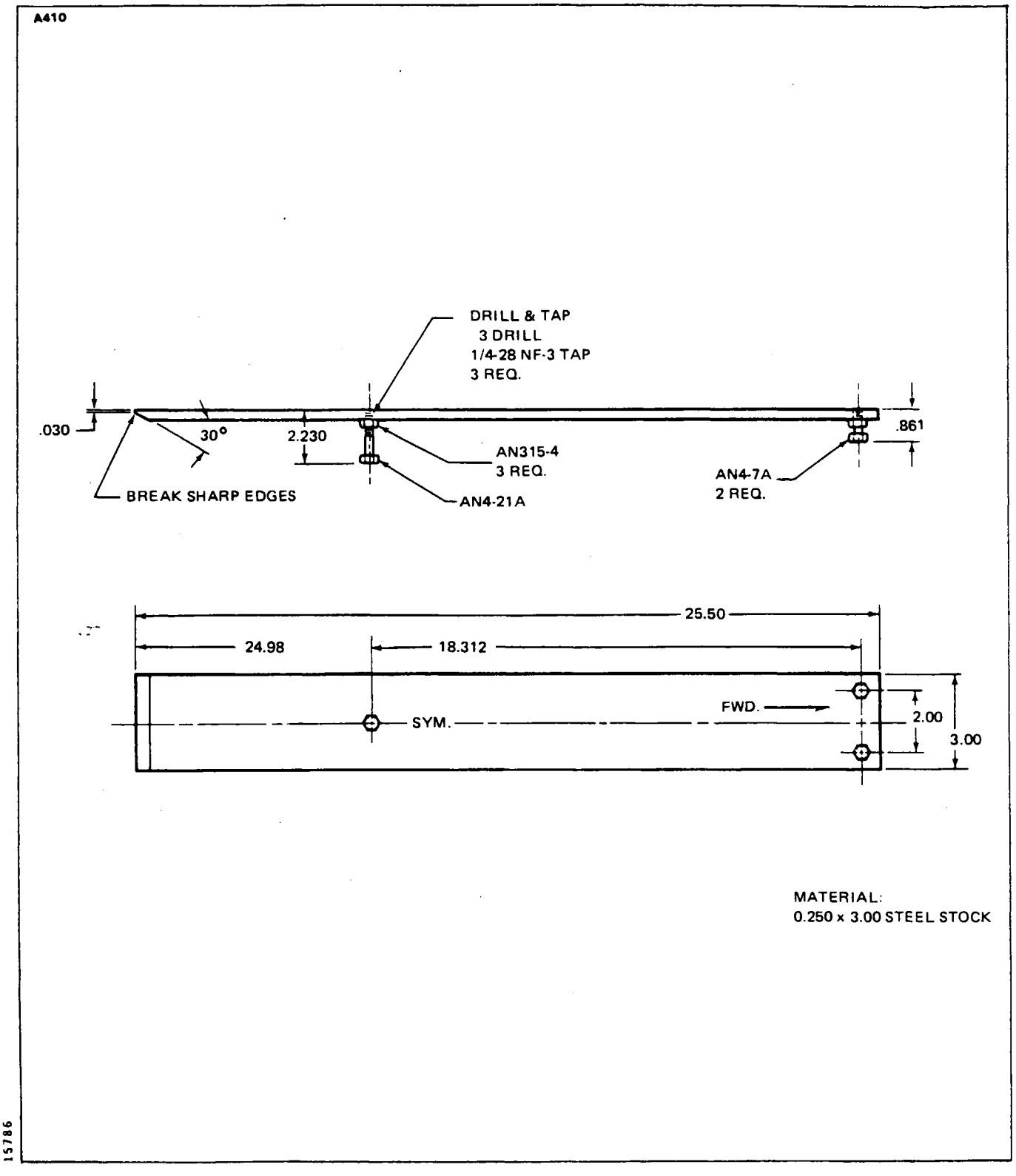


Figure 5-18. Fabricated Tool, Stabilator Leveling
(Serial Nos. 27-7654001 to 27-7954121 incl.)

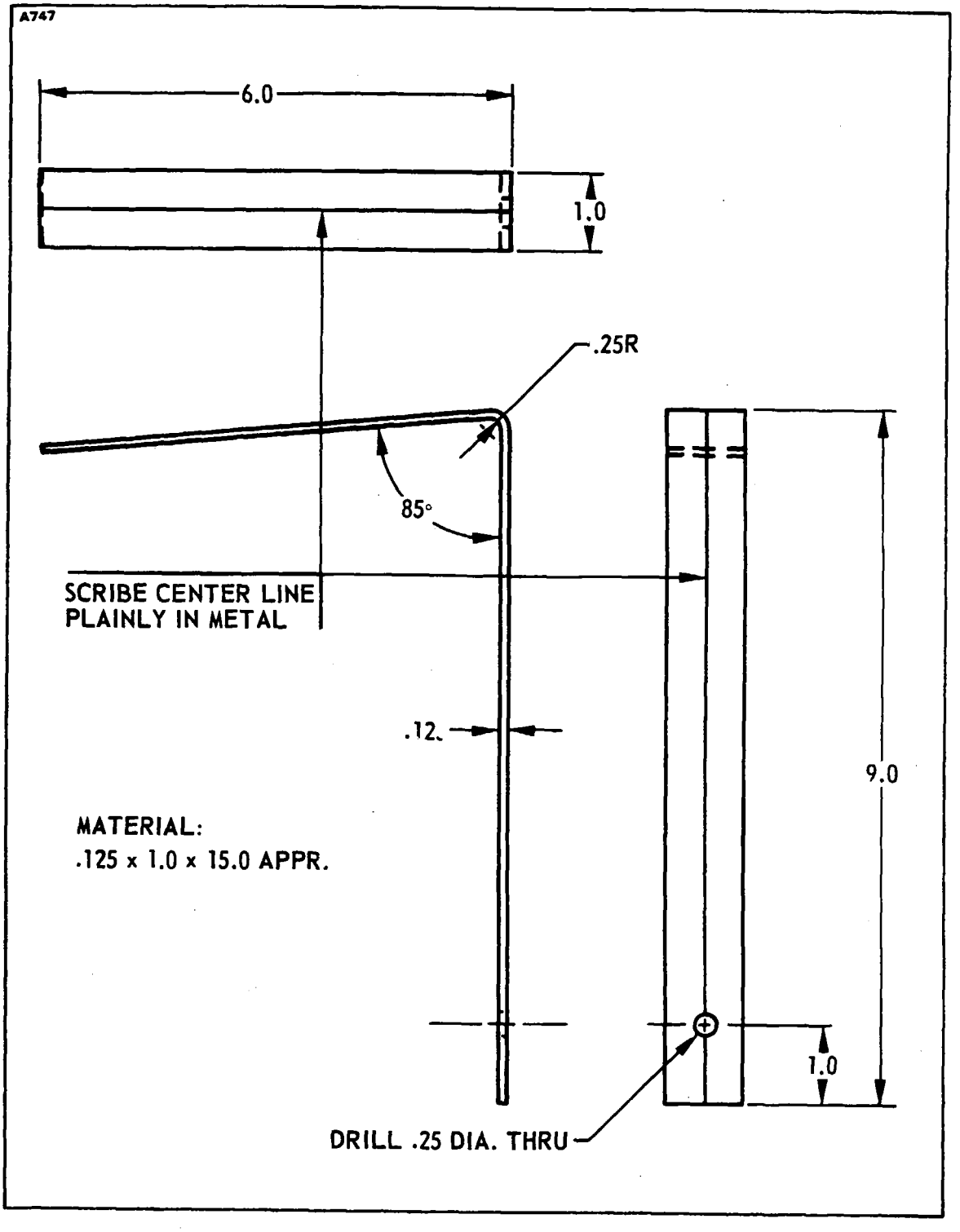


Figure 5-19. Fabricated Tool, Rudder Rigging
(All PA-23 series models except for the PA-23-250 [6] "F")

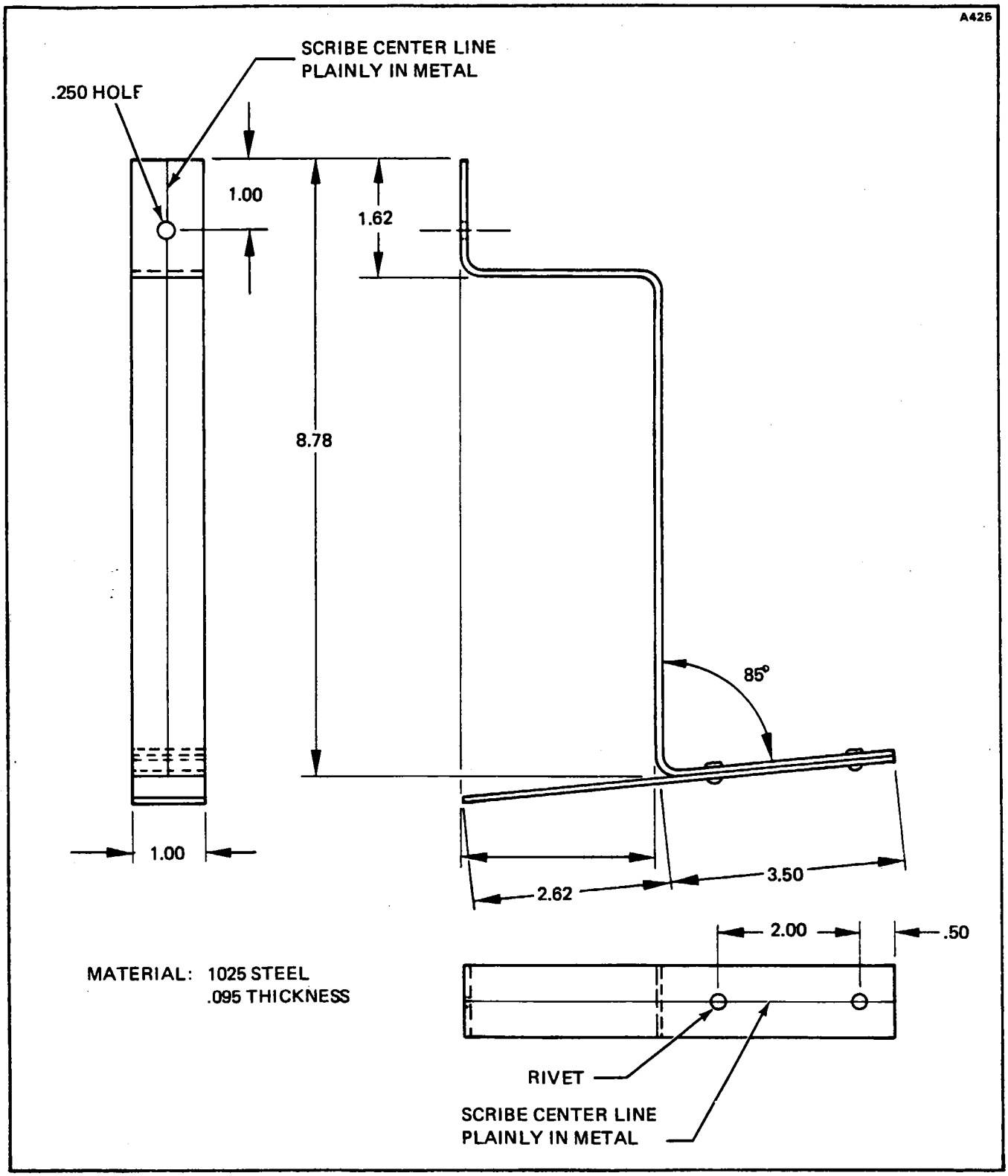


Figure 5-20. Fabricated Tool, Rudder Rigging
(PA-23-250 [six place] "F" Only)