

SECTION 8

ELEVATOR, ELEVATOR TRIM AND FLAP
ELEVATOR TRIM INTERCONNECT SYSTEMS

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8-1. ELEVATOR CONTROL SYSTEM. (Refer to figure 8-1.)

8-2. DESCRIPTION. The elevator is controlled by a system of cables routed from the control column.

8-3. TROUBLE SHOOTING.

through pulleys and fairleads to a bellcrank in the left vertical fin. This bellcrank operates a push-pull tube connected to the left balance weight arm of the elevator.

NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to re-rig system, refer to paragraph 8-12.

TROUBLE	PROBABLE CAUSE	REMEDY
NC RESPONSE TO CONTROL WHEEL FORE-AND-AFT MOVEMENT.	Push-pull tube disconnected.	Check visually. Attach push-pull tube correctly.
	Cables disconnected.	Check visually. Attach cables and rig system in accordance with paragraph 8-12.
	Cables not clamped to control column.	Check visually. Secure cables to control column.

8-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
BINDING OR JUMPY MOTION FELT IN MOVEMENT OF ELEVATOR SYSTEM.	Defective bearing in elevator bellcrank or balance weight arm.	Check visually. Replace defective bearings.
	Cables slack.	Rig system in accordance with paragraph 8-12.
	Cables not riding correctly on pulleys.	Check visually. Route cables correctly over pulleys.
	Defective elevator hinge bearings.	Check visually. Replace defective bearings.
	Defective control column roller bearings.	Check that roller bearings will rotate freely. Replace defective bearings.
	Push-pull tube clevis bolts too tight.	Check visually. Readjust to eliminate binding.
	Adjustable glide plug on aft end of control square tube adjusted too tightly.	Remove control wheel and check glide for binding. Loosen screw in end of glide enough to eliminate binding.
	Control column needs lubrication.	Check visually. Lubricate in accordance with Section 2.
	Defective pulleys or cable guards.	Check visually. Replace defective parts and install guards properly.
	Incorrect rigging.	Rig system in accordance with paragraph 8-12.
	Teflon tape too thick in collar on control wheel tube. (Thru aircraft serials 33701462 and F33700055.)	Check thickness of tape. Replace .07" thick tape with .06" thick tape.
	Eccentric bearings at control column adjusted too tightly or defective. (Beginning with aircraft serials 33701463 and F33700056.)	Readjust or replace defective bearings.
Defective bearings in elevator bob weight mechanism. (Thru aircraft serial 337-0755.)	Check bearings. Replace defective bearings.	

8-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ELEVATORS FAIL TO ATTAIN PRESCRIBED TRAVEL.	Stops incorrectly set.	Rig system in accordance with paragraph 8-12.
	Cables tightened unevenly.	Rig system in accordance with paragraph 8-12.
	Interference at instrument panel.	Rig system in accordance with paragraph 8-12.
SLIGHT UNDULATION OF TAIL DURING FLIGHT.	Excessive lateral movement of elevator bellcrank.	Check clearance with feeler gage (.005" max). Add brass shims as required. (Refer to figure 8-1, sheet 2.)
	Cable tension low.	Rig system in accordance with paragraph 8-12.

8-4. CONTROL COLUMN. (Refer to figure 6-2.) Section 6 outlines removal, installation and repair of the control column.

8-5. ELEVATOR. (Refer to figure 8-1.)

8-6. REMOVAL AND INSTALLATION.

- a. Remove rudders as outlined in Section 9.
- b. Remove access plates as necessary from left vertical fin.
- c. Disconnect elevator push-pull tube (15) from left balance weight arm (12).

NOTE

Do not disturb push-pull tube length to maintain elevator system rigging.

d. (Refer to figure 8-7.) Disconnect trim tab links (2) from actuator screw end (1). Wire screw end and clamp trim control wheel so they cannot be turned to maintain trim control system rigging.

e. (Refer to figure 8-4.) Remove hinge bolts (6) and pull elevator aft. Guide balance weight arms (1) out of fins as elevator is removed.

f. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 8-12 and reinstall all items removed for access.

8-7. REPAIR. Repair may be accomplished as outlined in Section 16. If repair has affected static balance, check and rebalance as required.

8-8. BELLCRANK. (Refer to figure 8-1.)

8-9. REMOVAL AND INSTALLATION.

- a. Remove access plates and leading edge section from left vertical fin.
- b. Disconnect elevator downspring (23) from bellcrank linkage. (Thru aircraft serial 337-0755.)
- c. Disconnect elevator push-pull tube (15) at bellcrank (17) and lower elevator gently.

d. Remove safety wire and relieve cable tension at either turnbuckle (8).

e. Disconnect cables (18 and 22) at bellcrank.

f. Remove bellcrank pivot bolt and shims (19), noting number and position of shims on each side of bellcrank.

g. Remove bellcrank through leading edge access hole.

h. Reverse the preceding steps for reinstallation. Rig elevator system in accordance with paragraph 8-12, safety turnbuckle and reinstall all items removed for access.

NOTE

The elevator down spring, linkage and push-pull tube can be removed from aircraft without removing bellcrank.

8-10. CABLES AND PULLEYS.

8-11. REMOVAL AND INSTALLATION.

a. FORWARD CABLES.

1. (Refer to figure 8-1.) Remove pilot's seat, carpeting and access plates in floorboard area as necessary to expose Details A, B, and C.

2. Remove left wing strut fairings as necessary to expose turnbuckles (8).

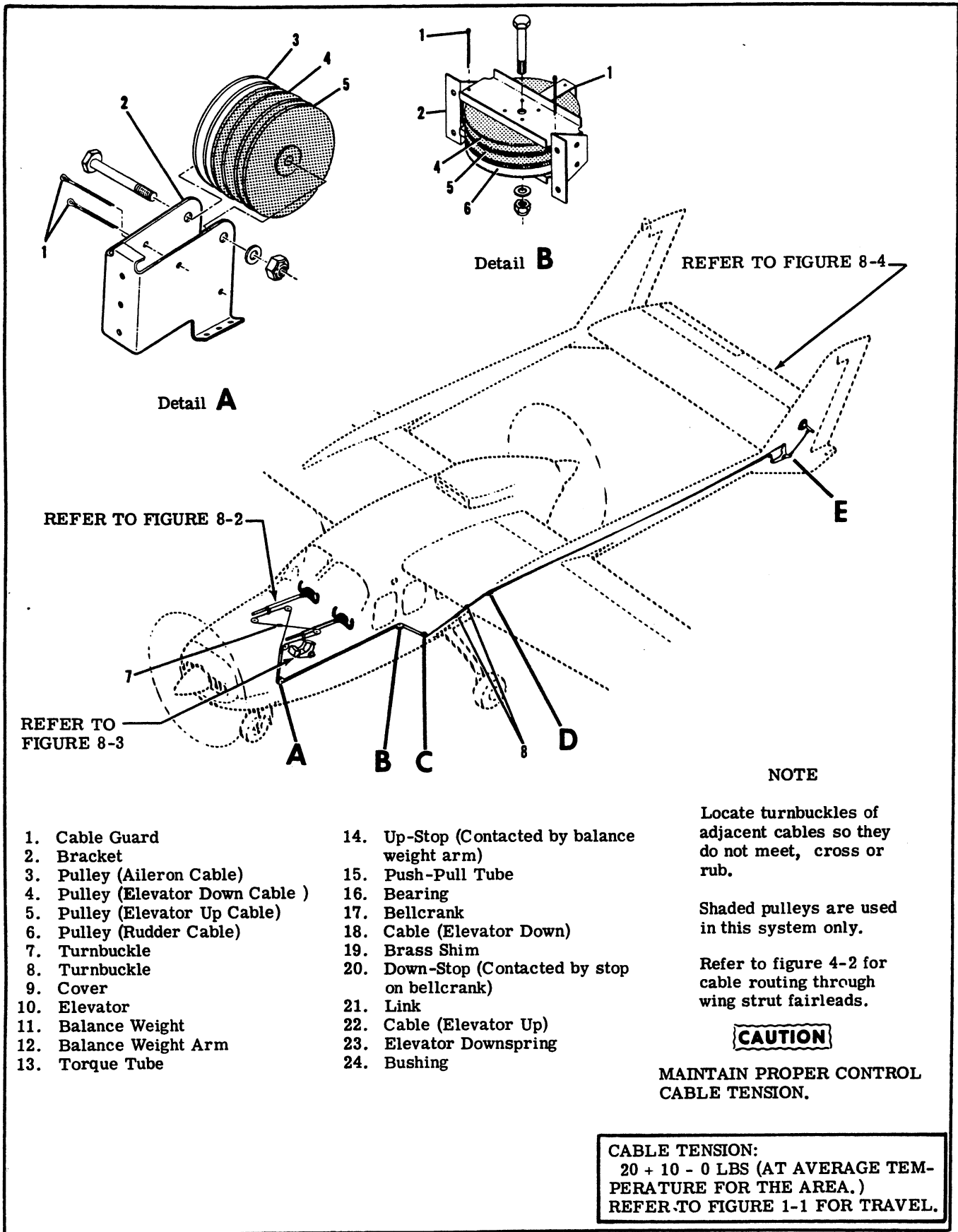
3. Remove safety wire, relieve cable tension and disconnect turnbuckles (7 and 8).

4. (Refer to figure 8-2.) Remove bolts (9) securing clamp blocks (7) to sleeve weld assembly (8) and remove cable swaged balls from blocks.

5. (Refer to figure 9-1.) Remove safety wire and relieve rudder control system cable tension at turnbuckle (9).

6. (Refer to figure 8-1.) Mark or tag cables and pulleys in Details B and C and remove bolts securing pulleys (4, 5 and 6) to brackets (2).

7. Remove cable guards from Detail A and control column as necessary to work cables free of aircraft.



- 1. Cable Guard
- 2. Bracket
- 3. Pulley (Aileron Cable)
- 4. Pulley (Elevator Down Cable)
- 5. Pulley (Elevator Up Cable)
- 6. Pulley (Rudder Cable)
- 7. Turnbuckle
- 8. Turnbuckle
- 9. Cover
- 10. Elevator
- 11. Balance Weight
- 12. Balance Weight Arm
- 13. Torque Tube

- 14. Up-Stop (Contacted by balance weight arm)
- 15. Push-Pull Tube
- 16. Bearing
- 17. Bellcrank
- 18. Cable (Elevator Down)
- 19. Brass Shim
- 20. Down-Stop (Contacted by stop on bellcrank)
- 21. Link
- 22. Cable (Elevator Up)
- 23. Elevator Downspring
- 24. Bushing

NOTE
 Locate turnbuckles of adjacent cables so they do not meet, cross or rub.

Shaded pulleys are used in this system only.

Refer to figure 4-2 for cable routing through wing strut fairleads.

CAUTION

MAINTAIN PROPER CONTROL CABLE TENSION.

CABLE TENSION:
 20 + 10 - 0 LBS (AT AVERAGE TEMPERATURE FOR THE AREA.)
 REFER TO FIGURE 1-1 FOR TRAVEL.

Figure 8-1. Elevator Control System (Sheet 1 of 2)

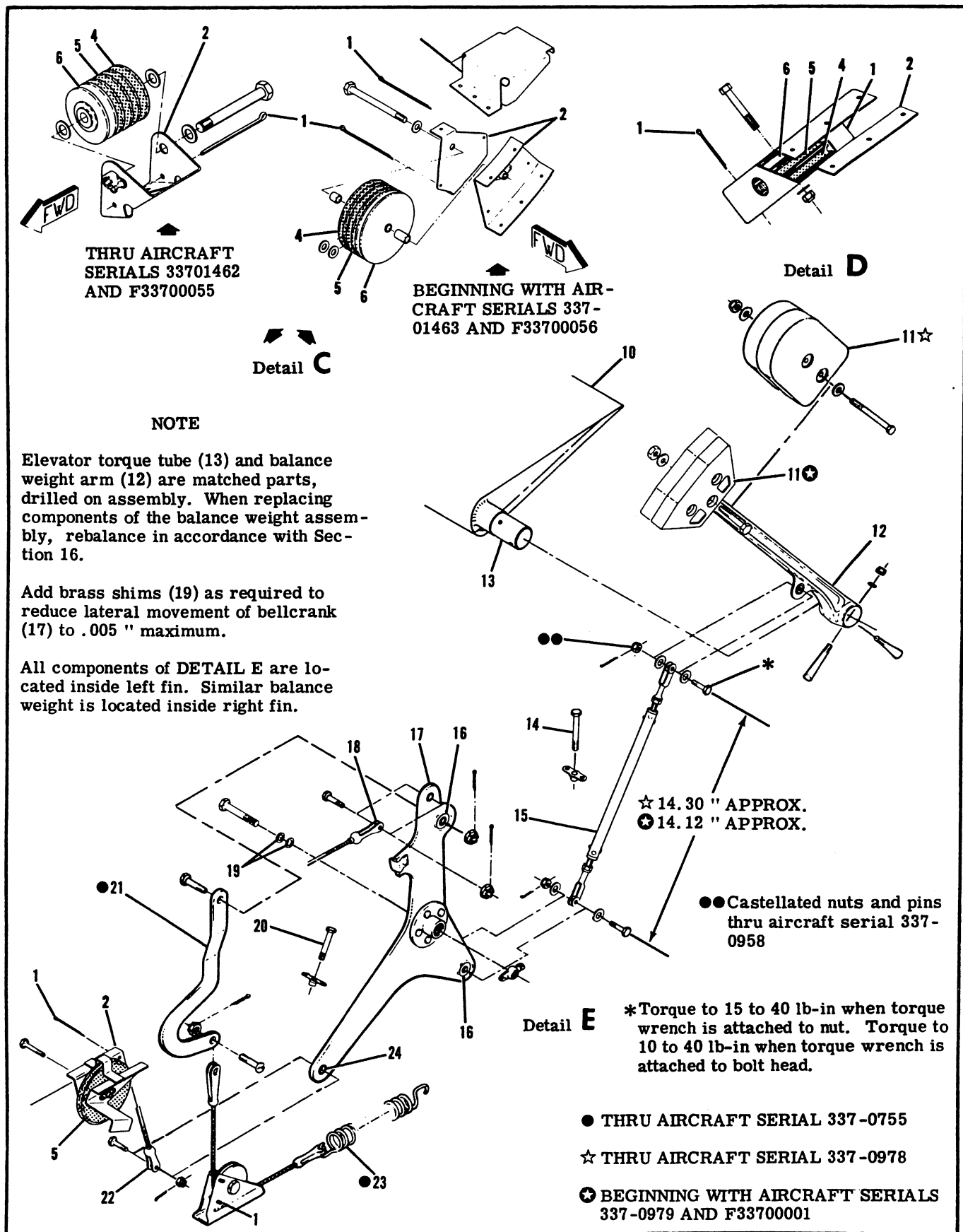


Figure 8-1. Elevator Control System (Sheet 2 of 2)

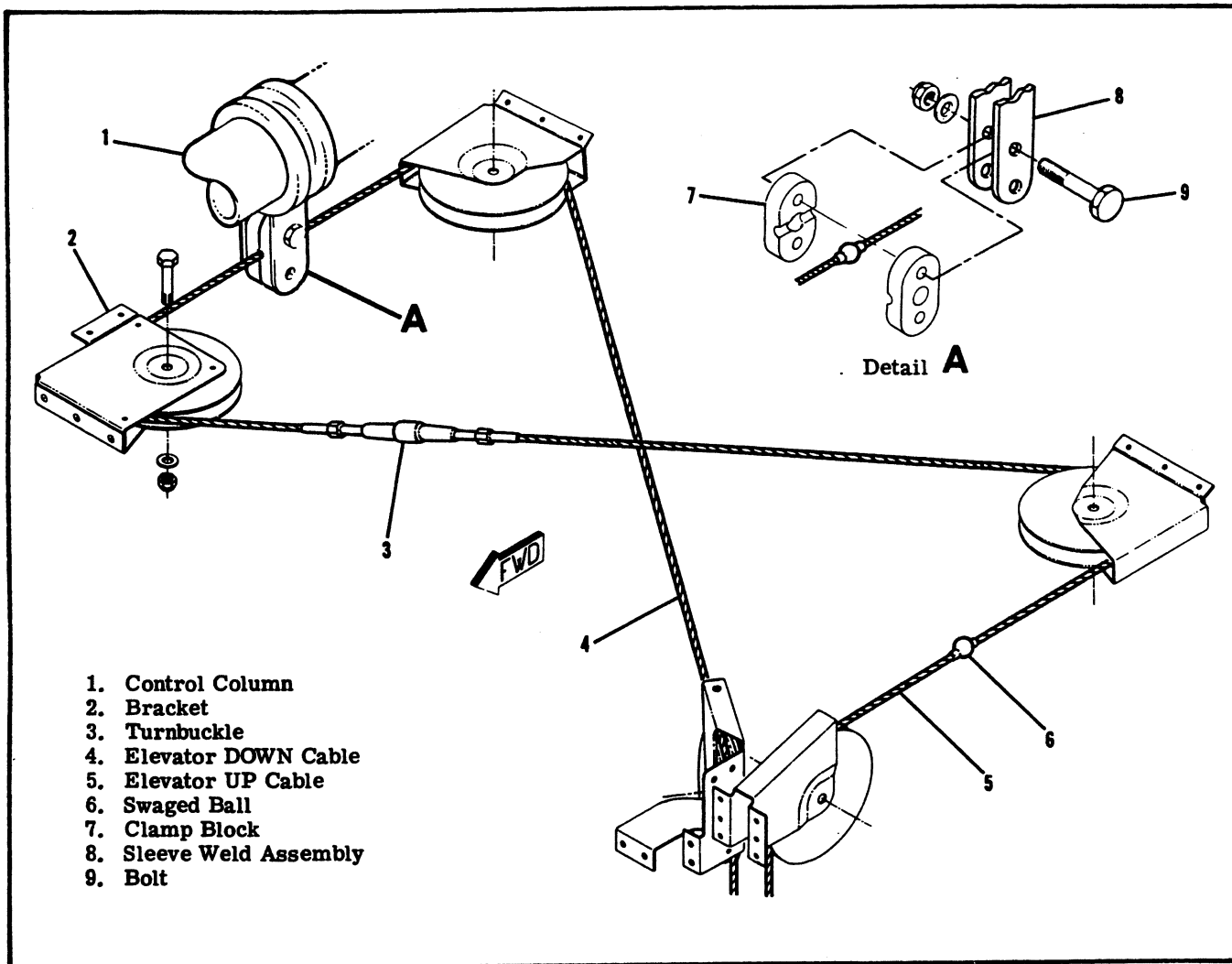


Figure 8-2. Elevator Cable Routing of Control Column

NOTE

To ease routing of cables, a length of wire may be attached to the end of cable being withdrawn from aircraft. Leave wire in place, routed through structure; then attach the cable being installed and use wire to pull the cable into position.

8. Reverse the preceding steps for reinstallation and install pulleys and cable guards. Ensure cables are positioned in pulley grooves before installing guards.

9. Re-rig elevator and rudder control systems in accordance with paragraphs 8-12 and 9-16 respectively, safety turnbuckles and reinstall all items removed for access.

b. AFT CABLES.

1. (Refer to figure 8-1.) Remove access plates from lower left vertical fin as necessary to expose Detail E.

2. Remove left wing strut fairings as necessary to expose Detail D and turnbuckles (8).

3. Remove safety wire, relieve cable tension and disconnect turnbuckles (8).

4. (Refer to figure 9-1.) Remove safety wire and relieve rudder control system cable tension at turnbuckle (9).

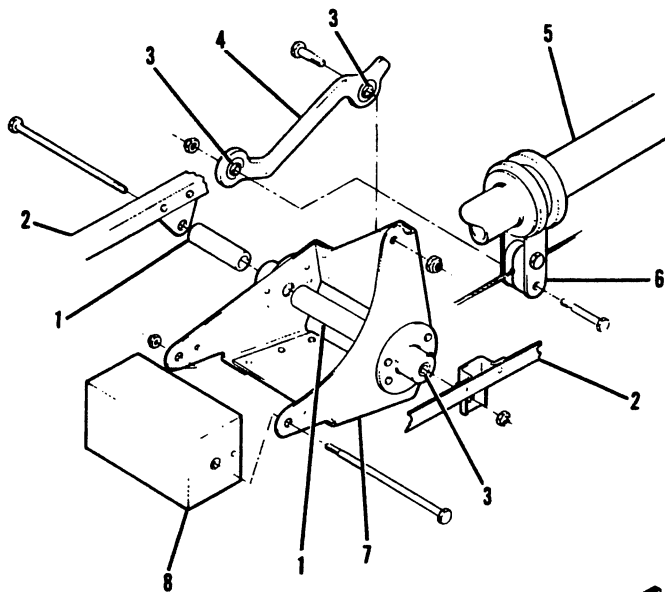
5. (Refer to figure 8-1.) Mark or tag cables and pulleys in Detail D and remove bolt securing pulleys (4, 5 and 6) to bracket (2).

6. Disconnect cables (18 and 22) at bellcrank (17).

NOTE

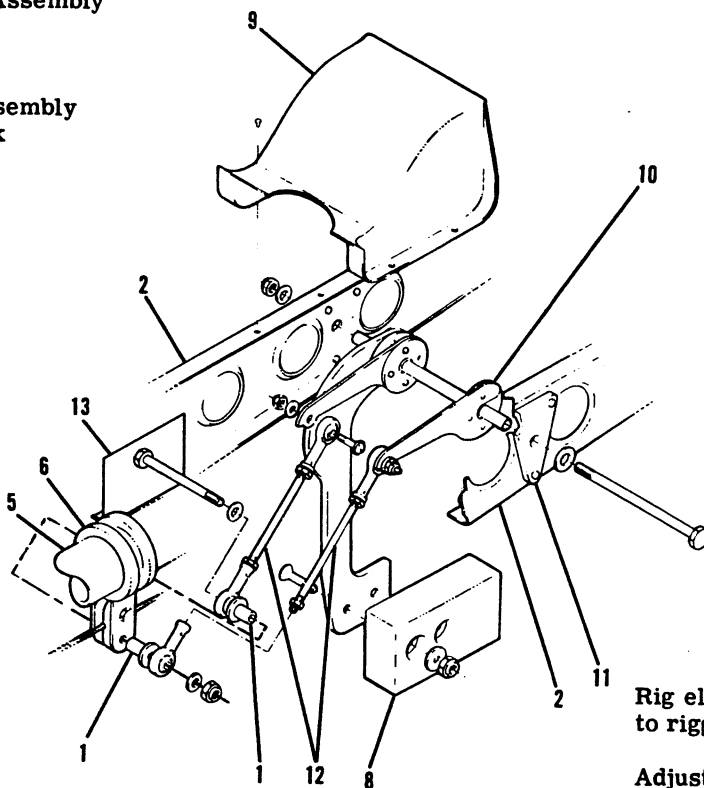
To ease routing of cables, a length of wire may be attached to the end of cable being withdrawn from aircraft. Leave wire in place, routed through structure; then attach the cable being installed and use wire to pull the cable into position.

THRU AIRCRAFT SERIAL 337-0239



1. Spacer
2. Support
3. Bearing
4. Link
5. Control Column
6. Sleeve Weld Assembly
7. Arm
8. Bob-Weight
9. Shield
10. Bellcrank Assembly
11. Bearing Block
12. Link
13. Guard

FWD



AIRCRAFT SERIALS 337-0240 THRU 337-0755

NOTE

Rig elevator control system prior to rigging bob-weight.

Adjust links (4) equally so forward top corner of bob-weight (8) is approximately even with top edge of support (2) when elevator is in the full up position.

Figure 8-3. Elevator Bob-Weight Installation

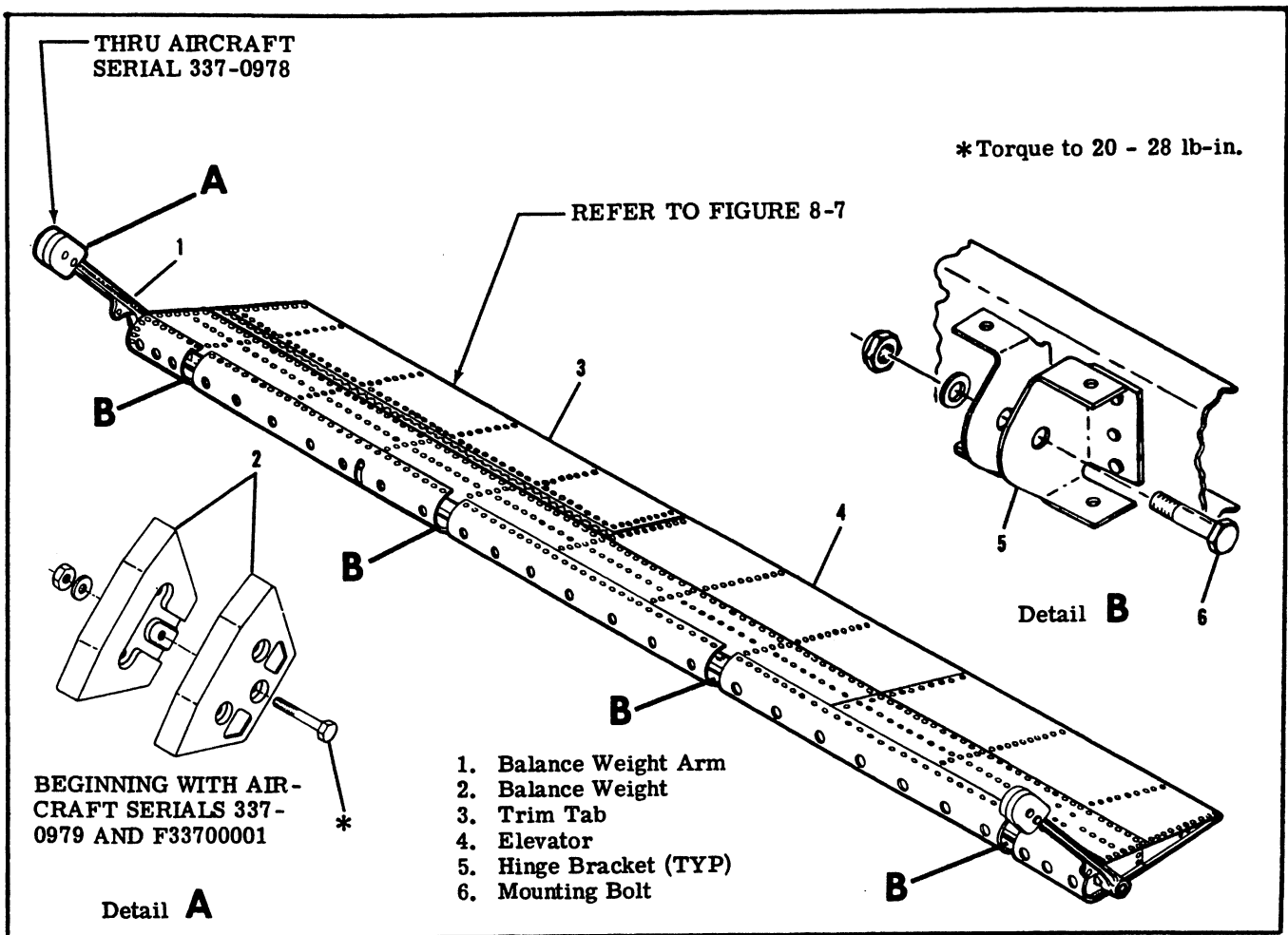


Figure 8-4. Elevator Installation

7. Reverse the preceding steps for reinstallation and install pulleys.

8. Re-rig elevator and rudder control systems in accordance with paragraphs 8-12 and 9-16 respectively, safety turnbuckles and reinstall all items removed for access.

8-12. RIGGING. (Refer to figure 8-1.)

- a. Remove access plates from left vertical fin as necessary to expose Detail E.
- b. Remove left wing strut fairings as necessary to expose turnbuckles (8).
- c. Lock pilot's control column in neutral position in accordance with instructions in figure 8-5.
- d. Adjust push-pull tube (15) to dimension specified in figure 8-1, tighten jam nuts and connect tube to balance weight arm (12).
- e. Streamline elevator and stabilizer to set elevator in neutral position.
- f. Adjust turnbuckle forward of the instrument panel and turnbuckles at the left wing strut to position the copilot's control wheel the same distance from the instrument panel as the pilot's control wheel and also to obtain the proper cable tension as follows:

1. Loosen turnbuckle (7) and tighten elevator DOWN cable turnbuckle to move copilot's wheel aft.
2. Tighten turnbuckle (7) and loosen elevator DOWN cable turnbuckle to move copilot's wheel forward.

NOTE

When dual controls are not installed, the ball ends swaged on the elevator cables should be used as reference points during rigging sequence.

- g. Readjust push-pull tube (15), if necessary, to streamline elevator in neutral position and tighten jam nuts.
- h. Mount an inclinometer on trailing edge of elevator and set at 0° with elevator in neutral position.
- i. Remove control lock or neutral rigging tool from pilot's control column and adjust travel stops (14 and 20) to obtain degree of travel specified in figure 1-1. With the left balance weight arm (12) resting on the up-stop (14), adjust the overtravel stop in the right vertical fin 1/16" from right balance weight arm.

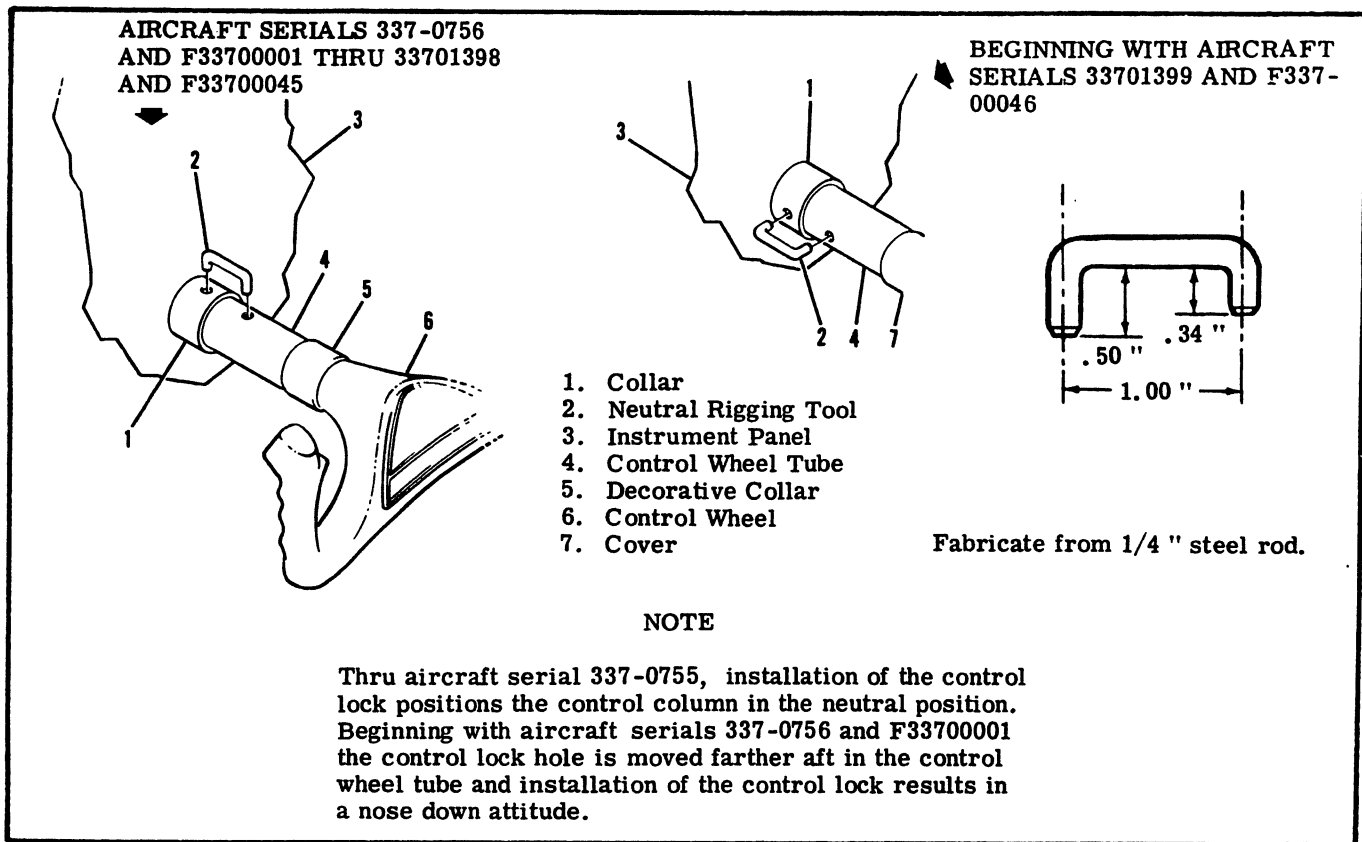


Figure 8-5. Control Column Neutral Rigging Tool

NOTE

An inclinometer for measuring control surface travel is available from the Cessna Service Parts Center. Refer to figure 6-4.

j. Safety turnbuckles and reinstall all items removed for access.

WARNING

Be sure elevator moves in the correct direction when operated with the control wheels.

8-13. ELEVATOR TRIM CONTROL SYSTEM. (Refer to figure 8-6.)

8-14. DESCRIPTION. The elevator trim tab, located on the right hand trailing edge of the elevator, is controlled by a trim wheel mounted in the lower

center section of the instrument panel. Power to operate the tab is transmitted from the trim control wheel by means of roller chains, cables, an actuator assembly, bellcrank and push-pull channel. A mechanical pointer adjacent to the control wheel indicates tab position. A "nose-up" setting results in a tab-down position. The small bellcrank, mounted inside the elevator, links the actuator to the push-pull channel which operates the tab. The bellcrank provides a differential rate of movement of the tab down (nose-up) position and slower movement to-and-from the tab up (nose-down) position. Beginning with aircraft serials 337-0526 and F33700001, an extra length of control cable is installed in the trim tab up cable, the cable stops are located farther aft in the right tail boom and the flap/elevator trim interconnect control is attached farther aft. The extra cable is installed in the tab up cable to facilitate installation of the optional electric elevator trim control system.

8-15. TROUBLE SHOOTING.

Due to remedy procedures in the following trouble shooting chart, it may be necessary to re-rig the system. Refer to paragraph 8-26.

TROUBLE	PROBABLE CAUSE	REMEDY
TRIM CONTROL WHEEL MOVES WITH EXCESSIVE RESISTANCE.	Cable tension too high.	Check and adjust cable tension.
	Pulleys binding or rubbing.	Check visually. Install cables correctly.
	Cables not in place on pulleys.	Check routing. Install cables correctly.
	Trim tab hinge or linkage binding.	Disconnect actuator and check resistance to tab movement. Check bearings in bellcrank and tab arm. Lubricate or replace hinge or linkage as necessary.
	Defective trim tab actuator.	Disconnect chain and linkage from actuator and operate actuator with fingers. Replace defective actuator.
	Rusty or excessively worn chain.	Check visually. Replace rusty chain.
	Damaged or worn sprocket.	Check visually. Replace sprocket.
	Bent sprocket shaft.	Check visually. Replace bent sprocket shafts.
	Chain guard rubbing chain.	Check visually. Free chain guard.
	Defective bearings at control wheel shaft.	Lubricate bearings; replace if defective.
LOST MOTION BETWEEN CONTROL WHEEL AND TRIM TAB.	Cable tension too low.	Check and adjust cable tension.
	Broken pulley.	Replace defective pulley.
	Cables not in place on pulleys.	Check visually. Install cables correctly.
	Worn trim tab actuator or linkage.	Check actuator for excessive play. Move trailing edge of trim tab and observe linkage. Replace actuator or worn linkage.
	Actuator attachment loose.	Check attachment. Secure actuator properly.
TRIM INDICATOR FAILS TO INDICATE CORRECT TRIM POSITION.	Indicator incorrectly engaged on wheel track.	Check visually. Reset indicator.
	Indicator bent.	Check visually. Straighten or replace indicator.

8-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
INCORRECT TRIM TAB TRAVEL.	Stop blocks loose or incorrectly adjusted.	Rig system in accordance with paragraph 8-26.
	Flap/elevator trim interconnect improperly rigged.	Rig system in accordance with paragraph 8-36.
	Incorrect rigging.	Rig system in accordance with paragraph 8-26.

8-16. TRIM TAB. (Refer to figure 8-7.)

8-17. REMOVAL AND INSTALLATION.

- a. Disconnect push-pull channel (8) from arm (7) on trim tab (6).
- b. Remove safety wire securing hinge pin (5) at the outboard end, deflect rudder to the right, pull pin out and remove tab.
- c. Reverse the preceding steps for reinstallation.

8-18. TRIM TAB ACTUATOR. (Refer to figure 8-7A.)

8-18A. REMOVAL AND INSTALLATION.

- a. Relieve tension on elevator trim control system by loosening an elevator trim cable turnbuckle in right tail boom.
- b. Loosen chain guard and disengage chain from actuator sprocket.
- c. Disconnect links from aft end of actuator screw.
- d. Remove bolts, clamps and spacers securing actuator and remove actuator through access hole.
- e. Reverse this procedure to install the actuator. Rig the elevator trim tab system in accordance with paragraph 8-12.

8-18B. DISASSEMBLY. (Refer to figure 8-7A.)

- a. Remove chain guard (1) if not previously removed in paragraph 8-18A.
- b. Using suitable punch and hammer, remove roll pin securing sprocket (2) to screw (6); remove sprocket from screw.
- c. Remove screw assembly (10) from actuator.
- d. Remove groove pins (12) securing bearings (3) at ends of housing (7).
- e. Lightly tap screw (6) in opposite direction from sprocket end; remove bearing (3), packing (9) and collar (4).

NOTE

It is not necessary to remove rings (8).

8-18C. CLEANING, INSPECTION AND REPAIR.

- a. Do not remove bearing (11) from screw assembly (10) unless replacement of bearing is necessary.
- b. Clean all components, except bearing (11) in Stoddard solvent or equivalent.
- c. Inspect all components for obvious indications of damage, such as stripped threads, cracks, deep

nicks and dents.

- d. Check bearings (3), screw (6) and screw assembly (10) for excessive wear and scoring.
- e. Examine screw assembly (10) and screw (6) for damaged threads or dirt particles that might impair smooth operation.
- f. Check sprockets (2) for broken, chipped and/or worn teeth.
- g. Check bearing (11) for smoothness of operation.

NOTE

Do not attempt to repair damaged or worn parts of the actuator assembly. Discard all defective items and install new parts during reassembly.

8-18D. REASSEMBLY. (Refer to figure 8-7A.)

- a. Always discard the following components and install new parts during reassembly: bearings (3), all groove pins, packing (9) and nuts (13).
- b. During reassembly, lubricate collars (4), screw (6) and screw assembly (10) as shown in Section 2 of this manual.
- c. Press sprocket (2) into end of screw (6), align pin holes in sprocket and screw, and install pins.
- d. Slip bearing (3) and collar (4) on screw (6) and slide them down against sprocket (2).
- e. Insert screw (6), with assembled parts, into housing (7), until bearing (3) is flush with end of housing.

NOTE

When inserting screw (6) into housing (7), locate sprocket (2) at end of housing which is farthest away from groove for retaining ring (8).

NOTE

Bearings (3) are not pre-drilled, and must be drilled on assembly. Pins are 1/16-inch in diameter, therefore, requiring a 1/16 (0.0625) inch drill.

- f. With bearing (3) flush with end of housing (7), carefully drill bearing so the drill will emerge from hole on opposite side of housing (7).

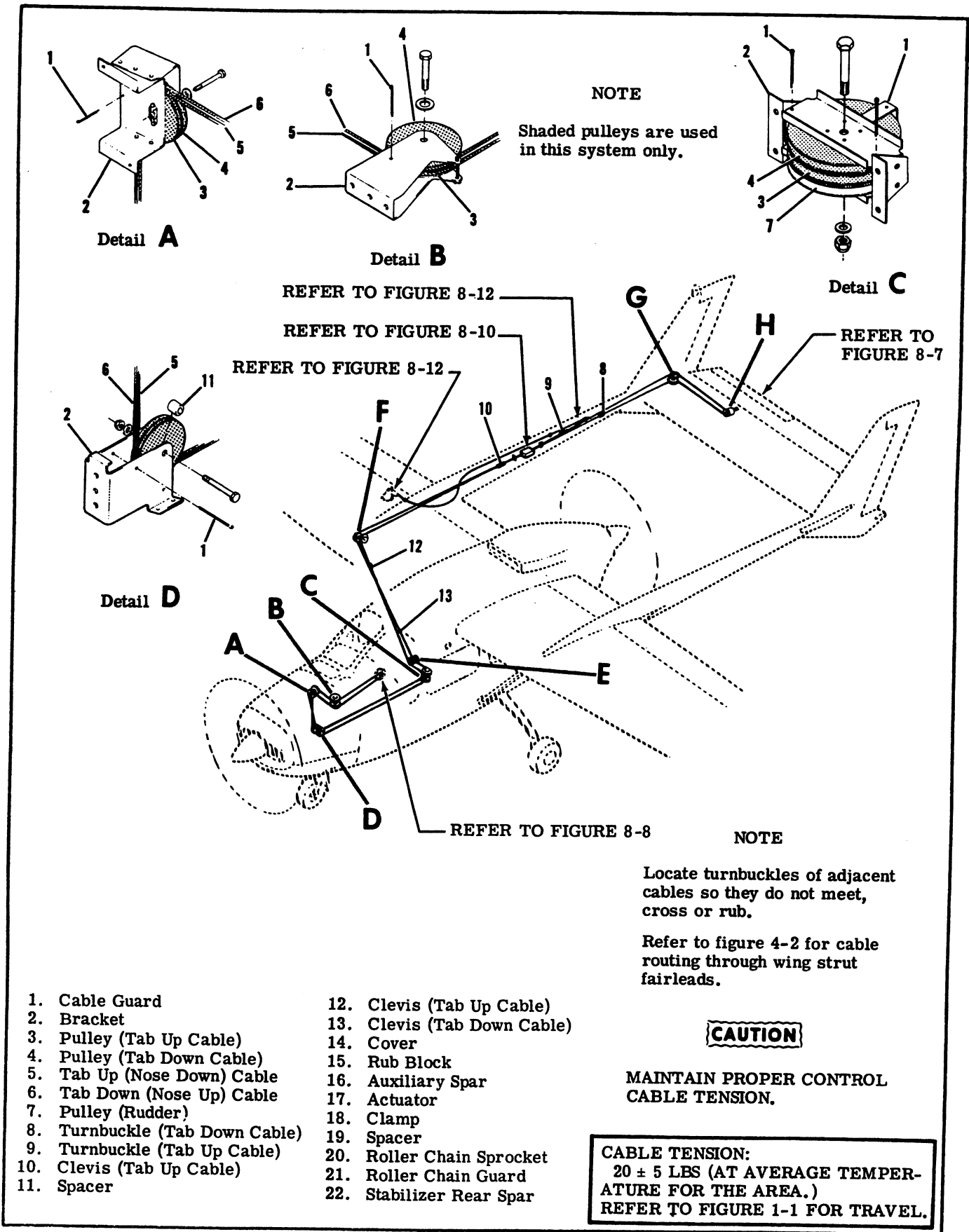


Figure 8-6. Elevator Trim Tab Control System (Sheet 1 of 2)

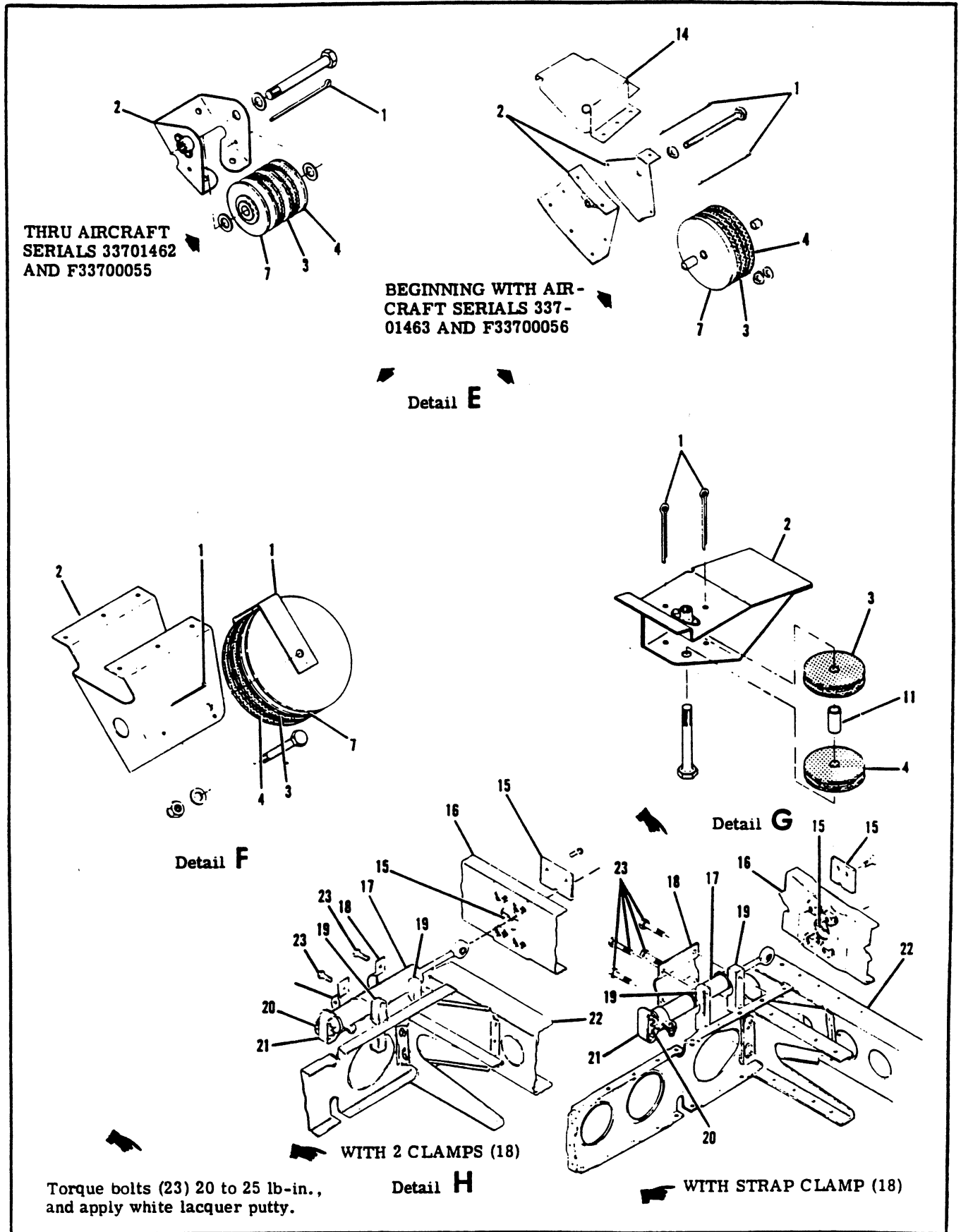


Figure 8-6. Elevator Trim Tab Control System (Sheet 2 of 2)

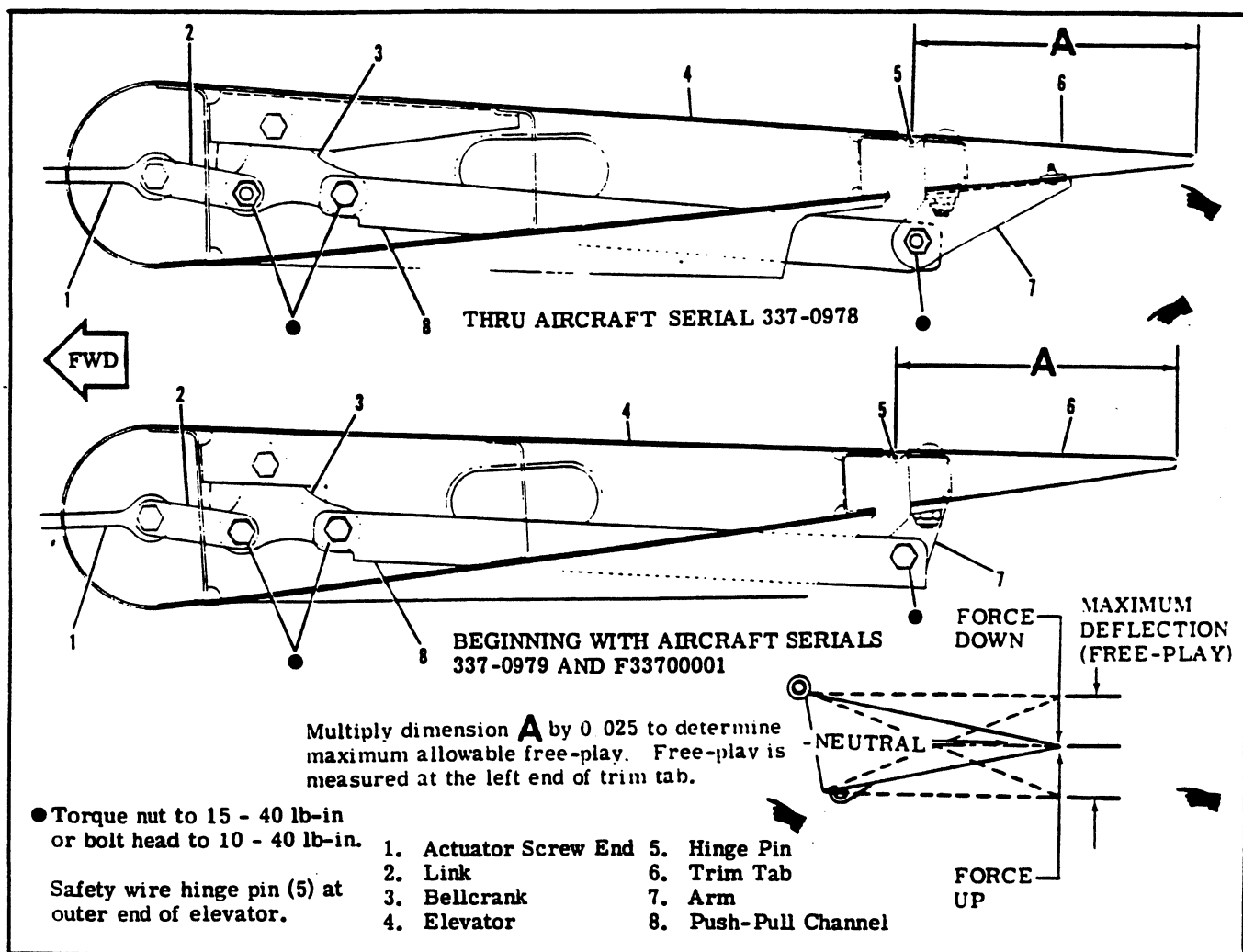


Figure 8-7. Elevator Trim Tab Linkage and Free-Play Inspection

NOTE

Do not enlarge holes in housing.

- g. Press new groove pins (12) into pin holes.
- h. Insert collar (4), new packing (9) and bearing (3) into opposite end of housing (7).
- i. Complete steps "f" and "g" for bearing (3) just installed.
- j. If new bearing (11) is required, a new bearing may be pressed into boss. Be sure force bears against outer race of bearing.
- k. Screw screw assembly (10) into screw (6).
- l. Install retaining rings (8), if removed.
- m. Test actuator assembly by rotating sprocket (2) with fingers while holding screw assembly (10). Screw assembly should travel in and out smoothly with no indication of binding.

8-19. TRIM TAB FREE-PLAY INSPECTION.

- a. Place elevators and trim tab in neutral position.
- b. Restrain elevator, and manually deflect tab at the trailing edge at the point where the actuator push-pull rod is located.
- c. Deflect tab in one direction to the point of positive stop, and measure the deflection from neutral.

using the elevator surface as a reference.

d. Measure the deflection from neutral in the opposite direction.

e. The sum of the two deflections must not exceed the result of the formula: Multiply dimension "A" (refer to figure 8-4) by 0.025.

f. If the sum of the two deflections exceed the figure attained from the formula, replace AN bolts with NAS464 bolts of equivalent diameter and grip length in the push rod and recheck.

g. If this does not obtain desired results, replace bearings in rod end and recheck.

h. If this does not obtain desired results, replace trim tab horn bearing and recheck.

i. If this does not obtain desired results, overhaul or replace trim tab actuator and insure that all areas are properly saftied.

8-20. TRIM TAB BELLCRANK. (Refer to figure 8-7.)

8-21. REMOVAL AND INSTALLATION.

- a. Remove access plate below bellcrank (3).
- b. Disconnect push-pull channel (8) from aft end of bellcrank.
- c. Disconnect links (2) from forward end of bell-

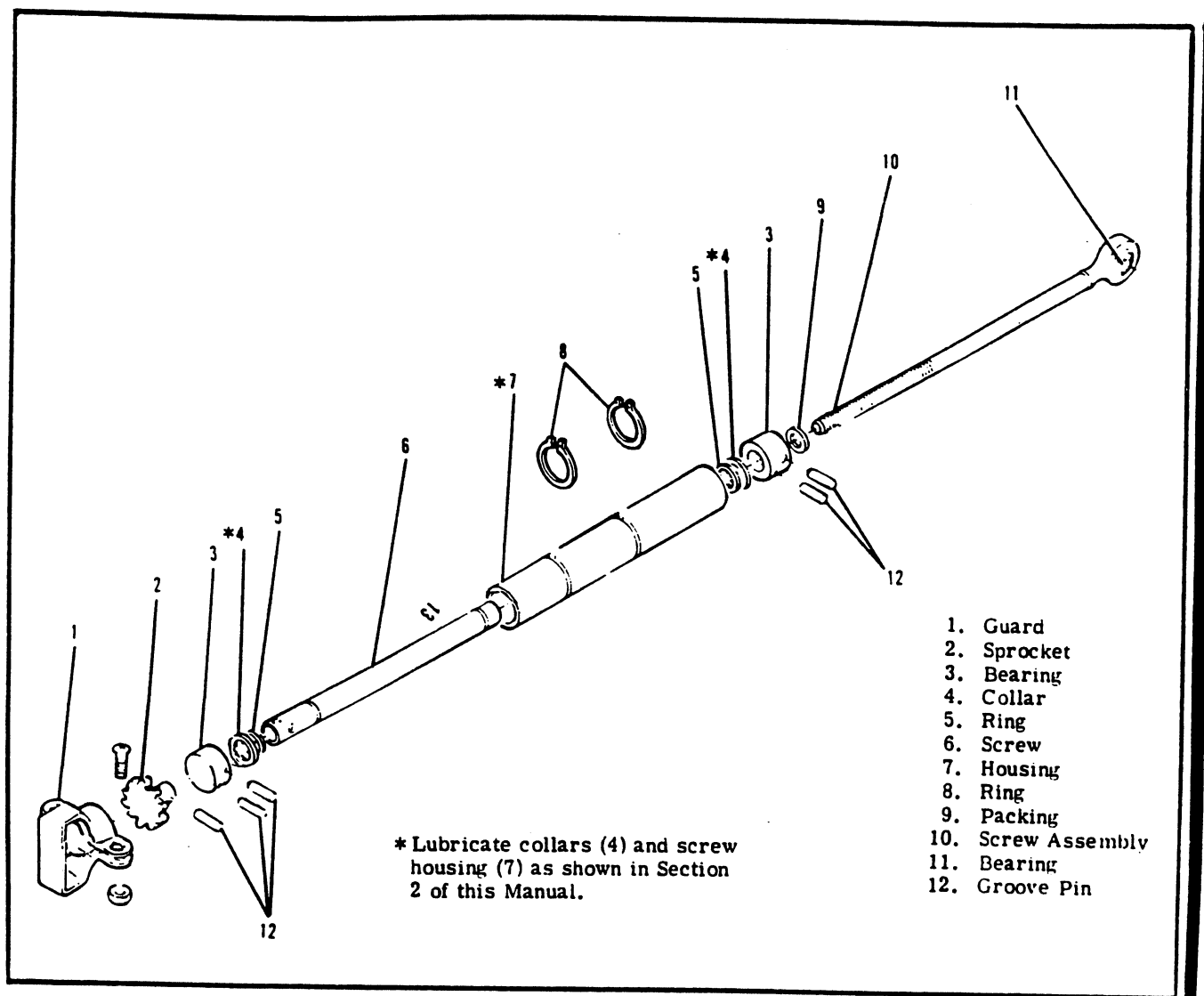


Figure 8-7A. Elevator Trim Tab Actuator Assembly

crank. Secure links (2) and trim control wheel so they cannot be turned to maintain control system rigging.

d. Remove bellcrank pivot bolt and remove bellcrank through access opening.

e. Reverse the preceding steps for reinstallation.

8-22. TRIM TAB CONTROL WHEEL. (Refer to figure 8-8.)

8-23. REMOVAL AND INSTALLATION.

a. Disconnect battery cables and insulate terminals as a safety precaution.

b. Remove access plates from right tail boom as necessary to expose turnbuckles (index 8 or 9, figure 8-6), remove safety wire and relieve cable tension.

c. Remove switch mounting nuts, switches, etc. as necessary to remove covers from left side of instrument panel.

d. Remove pin (14) and washer (12) securing trim wheel shaft to support bracket (13).

e. Remove screws securing support bracket (5) to instrument panel structure and move control wheel

(1) outboard. Remove spacer (9) from shaft and disengage chain (7) from sprocket (8).

f. Remove control wheel (1), bracket (5) and indicator (3) as an assembly. Position indicator (3) may be removed from assembly after removal from the aircraft.

g. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 8-26 and reinstall all items removed for access.

8-24. CABLES AND PULLEYS.

8-25. REMOVAL AND INSTALLATION.

a. **FORWARD CABLE.**

1. (Refer to figure 8-6.) Remove copilot's seat, carpeting and access plates in floorboard area as necessary to expose Details C, D and E.

2. Remove right wing strut fairings as necessary to expose Detail F and clevises (12 and 13).

3. Remove access plates from inboard side of right tail boom as necessary to expose turnbuckles (8 and 9).

4. Remove safety wire and relieve cable tension from either turnbuckle (8 or 9).

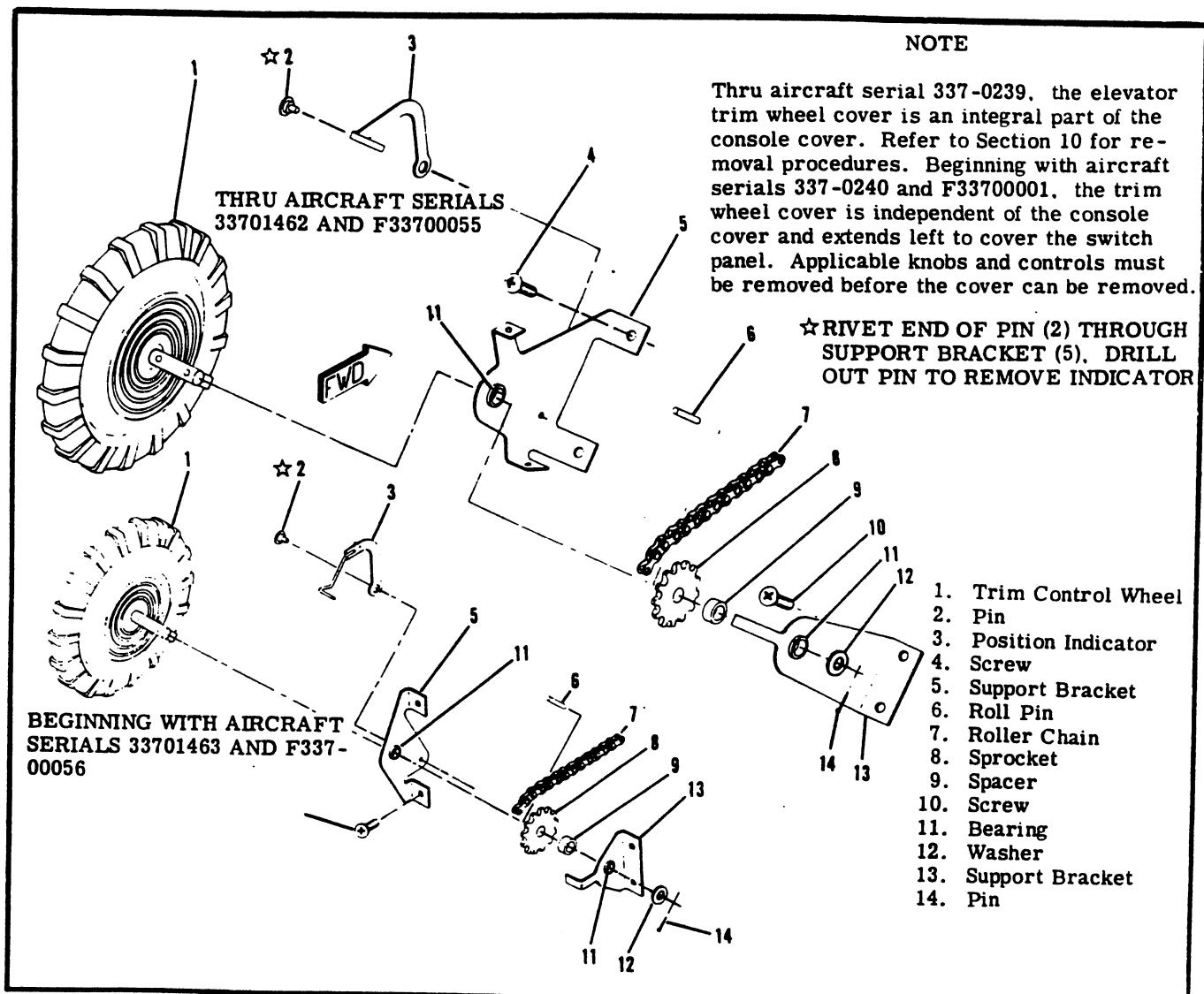


Figure 8-8. Elevator Trim Control Wheel Installation

5. (Refer to figure 9-1.) Remove safety wire and relieve rudder control system cable tension at turnbuckle (8).

6. (Refer to figure 8-6.) Disconnect cables at clevises (12 and 13).

7. Disengage roller chain from trim control wheel sprocket at instrument panel.

8. Mark or tab cables and pulleys in Details C and E and remove bolts securing pulleys (3, 4 and 7) to brackets (2).

9. Remove cable guards from Details A, B and D as necessary to work cables free of aircraft.

NOTE

To ease routing of cable, a length of wire may be attached to the end of the cable being withdrawn from the aircraft. Leave wire in place, routed through structure; then attach the cable being installed and pull the cable into position.

10. Reverse the preceding steps for reinstallation and install pulleys and cable guards. Ensure cables are positioned in pulley grooves before installing guards.

11. Re-rig elevator trim and rudder control systems in accordance with paragraphs 8-26 and 9-16 respectively, safety turnbuckles and reinstall all items removed for access.

b. AFT CABLE.

1. (Refer to figure 8-6.) Remove access plates from inboard side of right tail boom as necessary to expose turnbuckles (8 and 9).

2. Remove access plates from lower right vertical fin and stabilizer as necessary to expose Details G and H.

3. Remove safety wire, relieve cable tension and disconnect turnbuckles (8 and 9), leaving the turnbuckle barrels on the forward cables.

4. (Refer to figure 8-12.) Remove safety wire, remove screws and remove travel stop block (8) from cable (7).

5. Disconnect flap/elevator trim control assembly (5) at clamp (9) and remove clamp.

6. (Refer to figure 8-6.) Remove chain guard (21) and disengage roller chain from sprocket (20).

7. Remove cable guards from Detail G as necessary to work cable free of aircraft.

NOTE

To ease routing of cable, a length of wire may be attached to the end of the cable being withdrawn from the aircraft. Leave wire in place, routed through structure; then attach the cable being installed and pull the cable into position.

8. Reverse the preceding steps for reinstallation and install cable guards. Ensure cables are positioned in pulley grooves before installing guards.

9. Re-rig trim and interconnect systems in accordance with paragraphs 8-26 and 8-36 respectively, safety turnbuckles and travel stop screws and reinstall all items removed for access.

c. CENTER CABLE-TAB UP.

NOTE

Beginning with aircraft serials 337-0526 and F33700001, the center TAB-UP cable consists of two sections. The forward section begins at clevis (12) and ends at clevis (10). The aft section which is replaced with the electric trim servo cable when the electric trim installation is installed, begins at clevis (10) and ends at turnbuckle (9).

1. FORWARD SECTION.

a. (Refer to figure 8-6.) Remove access plates from inboard side of right tail boom as necessary to expose clevis (10) and turnbuckle (9).

b. Remove right wing strut fairings as necessary to expose Detail F and clevis (12).

c. Remove safety wire and relieve cable tension at turnbuckle (9).

d. (Refer to figure 9-1.) Remove safety wire and relieve rudder control system cable tension at turnbuckle (8).

e. (Refer to figure 8-6.) Disconnect clevises (10 and 12).

f. Mark or tag cables and pulleys in Detail F and remove bolt securing pulleys (3, 4 and 7) to bracket (2).

NOTE

To ease routing of cable, a length of wire may be attached to the end of the cable being withdrawn from the aircraft. Leave wire in place, routed through structure; then attach the cable being installed and pull the cable into position.

g. Reverse the preceding steps for reinstallation and install pulleys and cable guards. Ensure cables are installed in pulley grooves before installing guards.

h. Re-rig elevator trim and rudder control system in accordance with paragraphs 8-26 and 9-16 respectively, safety turnbuckles and reinstall all items removed for access.

2. AFT SECTION.

NOTE

If electric trim assist is installed, refer to paragraph 8-30 for removal of this cable.

a. (Refer to figure 8-10.) Remove access plates from inboard side of right tail boom as necessary to expose Detail A.

b. Remove safety wire, relieve cable tension and disconnect turnbuckle (7), leaving barrel attached to cable (8).

c. Disconnect cables (28 and 29) at clevis.

d. Remove safety wire, remove screws securing travel stop blocks (5 and 30) to cable (29) and remove stop blocks.

e. Remove cable (29) from aircraft.

NOTE

To ease routing of cable, a length of wire may be attached to the end of the cable being withdrawn from the aircraft. Leave wire in place, routed through structure; then attach the cable being installed and pull the cable into position.

f. After cable is routed in position, re-rig trim system in accordance with paragraph 8-26, safety turnbuckle (7) and reinstall all items removed for access.

d. CENTER CABLE - TAB DOWN.

1. (Refer to figure 8-6.) Remove access plates from inboard side of right tail boom as necessary to expose turnbuckle (8).

2. Remove right wing strut fairings as necessary to expose Detail F and clevis (13).

3. Remove safety wire, relieve cable tension and disconnect turnbuckle (8) leaving the turnbuckle barrel attached to the aft cable.

4. (Refer to figure 9-1.) Remove safety wire and relieve rudder control system cable tension at turnbuckle (8).

5. (Refer to figure 8-6.) Disconnect clevis (13).

6. Mark or tag cables and pulleys in Detail F and remove bolt securing pulleys (3, 4 and 7) to bracket (2).

NOTE

To ease routing of cable, a length of wire may be attached to the end of the cable being withdrawn from the aircraft. Leave wire in place, routed through structure; then attach the cable being installed and pull the cable into position.

7. Reverse the preceding steps for reinstallation and install pulleys and cable guards. Ensure cables are installed in pulley grooves before installing guards.

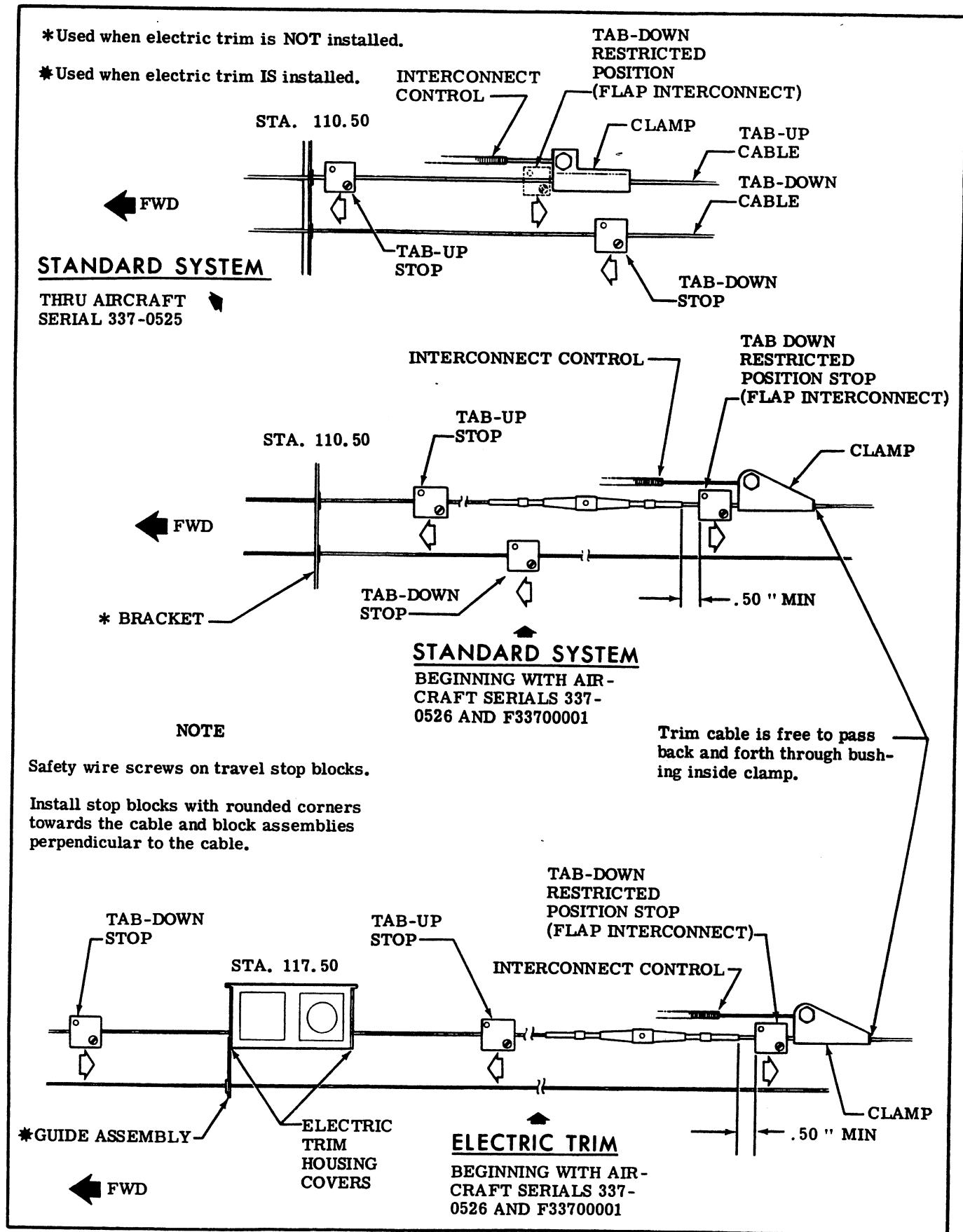


Figure 8-9. Elevator Trim Travel Stops

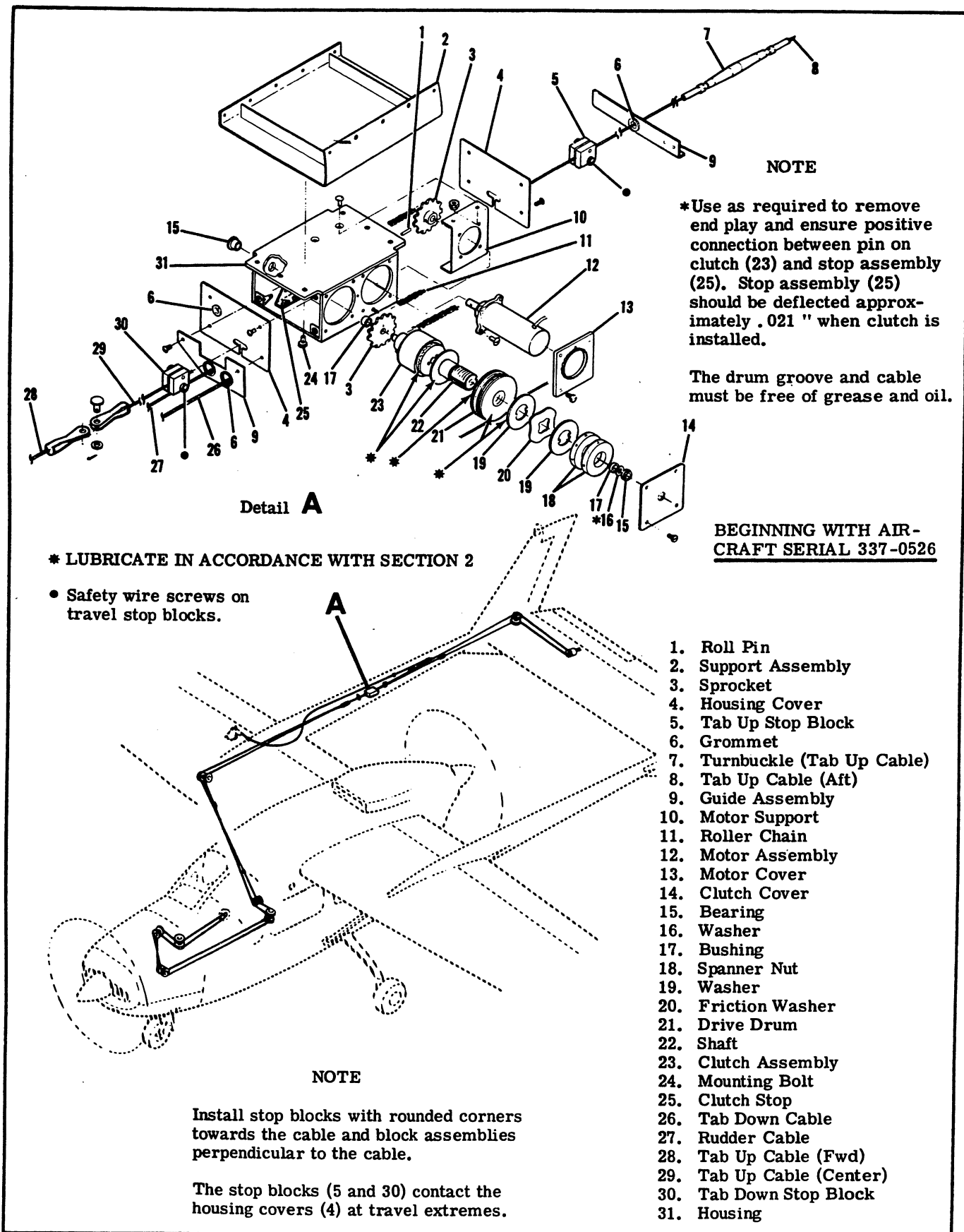


Figure 8-10. Electric Elevator Trim Control System

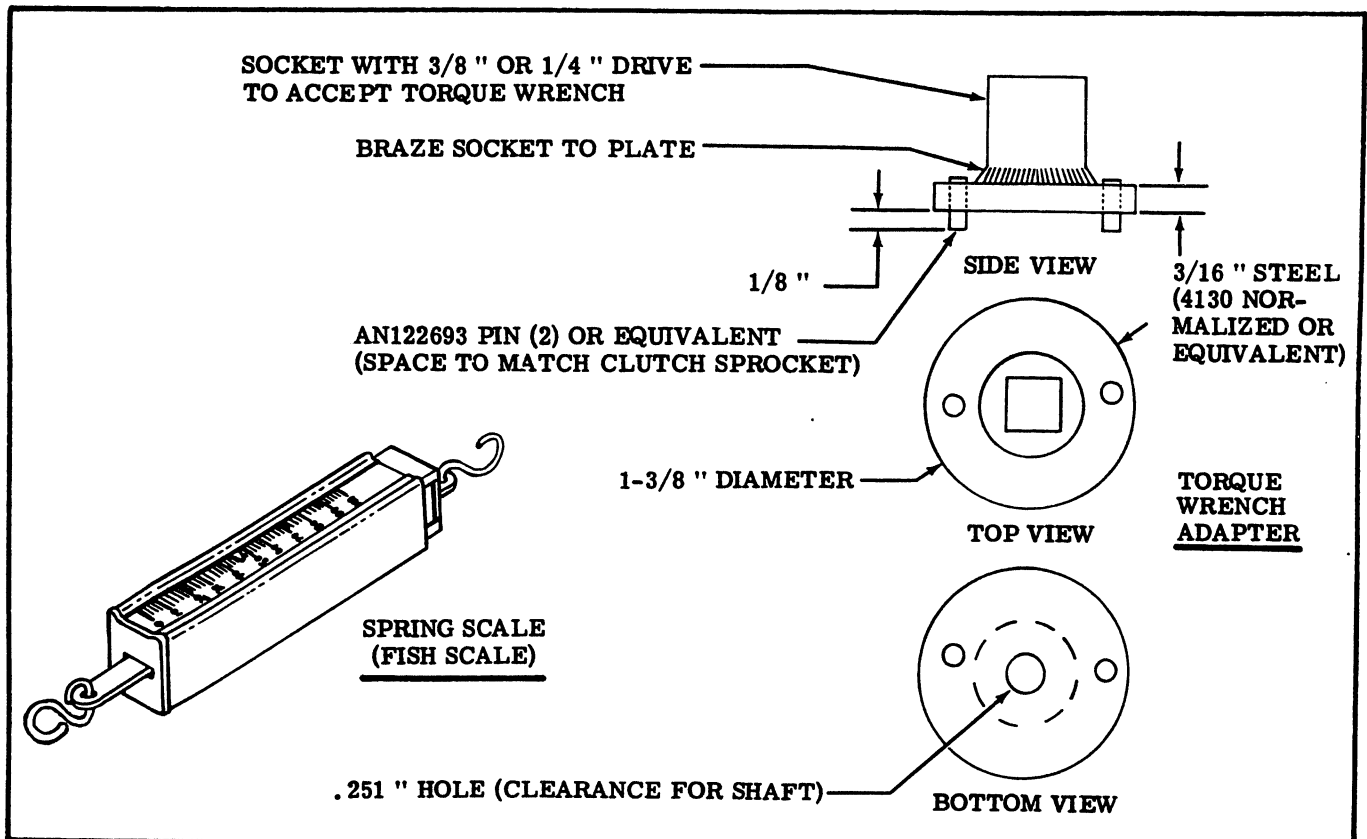


Figure 8-11. Electric Trim Servo Adjustment Tools

8. Re-rig elevator trim and rudder control systems in accordance with paragraphs 8-26 and 9-16 respectively, safety turnbuckles and reinstall all items removed for access.

8-26. RIGGING.

NOTE

The elevator trim and flap system are interconnected, therefore, the flaps must be in the DOWN position while rigging the trim control system.

- Remove access plates from inboard side of right tail boom.
- (Refer to figure 8-6.) Remove safety wire and relieve cable tension at turnbuckles (8 and 9).
- Remove safety wire and loosen screws securing travel stop blocks (index 5 and 30, figure 8-10).
- (Refer to figure 8-7.) Disconnect actuator screw end (1) at links (2).
- (Refer to figure 8-8.) Rotate trim wheel (1) to the mid-range position. Check that roller chain (7) ends extend the same distance from sprocket (8). If necessary, disengage roller chain and re-engage chain on sprocket.
- (Refer to figure 8-6.) Adjust turnbuckles (8 and 9) evenly to proper tension and safety.

g. Rotate trim wheel to full nose down (tab up) position, then back 1 1/4 turns (approximate neutral position).

h. (Refer to figure 8-7.) Place elevator and trim tab both in neutral (streamlined) position. (Refer to figure 8-5.) Adjust actuator screw end (1) OUT or IN as necessary to align with links (2) and install bolt.

i. Mount an inclinometer on trailing edge of trim tab and check tab for sufficient travel as specified in figure 1-1. If travel is insufficient in either direction, readjust actuator screw end (1).

NOTE

An inclinometer for measuring control surface travel is available from the Cessna Service Parts Center. Refer to figure 6-4.

j. (Refer to figure 8-9.) Rotate trim wheel to position tab at specified UP travel, slide tab up-stop block on cable against stop bracket, secure stop and safety wire screws.

NOTE

When electric trim assist is installed the stop blocks will strike the housing covers as a stop at travel extremes.

- k. Rotate trim wheel to position tab at specified DOWN travel, slide tab down stop block on cable against bracket, secure stop and safety wire screws.
- 1. Check and rig interconnect system in accordance with paragraph 8-36, if necessary.
- m. Reinstall all items removed for access.

WARNING

Be sure trim tab moves in the correct direction when operated with control wheel.

8-27. ELECTRIC TRIM ASSIST INSTALLATION.
(Refer to figure 8-10.)

8-28. DESCRIPTION. Beginning with aircraft serial 337-0526, an electric elevator trim assist may be installed. This system is operated by a switch on the left side of the pilot's control wheel. The servo unit, installed in the right tail boom, includes a motor and an adjustable chain-driven, solenoid-operated clutch. A section of the trim tab UP cable is removed and replaced with the servo cable which enters the housing and double wraps around a drive drum. This drum is secured to and driven by the clutch. When the clutch is not energized, the drive drum "free wheels" so that manual operation of the trim system is not affected. In case of malfunction, the manual system and interconnect system will override the servo clutch.

8-29. TROUBLE SHOOTING.

NOTE

When de-actuated, the electric trim system should not affect the manual system; therefore, the standard trouble shooting chart also applies to the electric trim system. The remedy procedures in the following trouble shooting chart may require re-rigging of trim system, refer to paragraph 8-26.

TROUBLE	PROBABLE CAUSE	REMEDY
SYSTEM INOPERATIVE.	Circuit breaker out.	Check visually. Reset breaker.
	Defective circuit breaker.	Check continuity. Replace breaker.
	Defective wiring.	Check continuity. Repair wiring.
	Defective trim switch.	Check continuity. Replace switch.
	Defective trim motor.	Remove and bench test. Replace motor.
TRIM MOTOR OPERATING - TRIM TAB FAILS TO MOVE.	Defective clutch solenoid.	Check continuity. Replace solenoid.
	Improperly adjusted clutch tension.	Adjust tension in accordance with paragraph 8-31.
	Disconnected or broken cable.	Check continuity. Connect or replace cable.
	Defective actuator.	Check actuator operation. Replace actuator.

8-30. REMOVAL AND INSTALLATION. (Refer to figure 8-10.)

- a. Remove access plates from inboard side of right tail boom as required.
- b. Remove safety wire, relieve cable tension and disconnect cable from turnbuckle (7), leaving barrel attached to cable (8). Slide cable (29) out through grommet (6) in aft guide (9).

- c. Disconnect cables (28 and 29) at clevis.
- d. Remove screws securing forward guide (9) to forward housing (4).
- e. Disconnect ALL electrical wiring from trim unit.
- f. Remove safety wire, remove screws securing stop block (30) to cable (29) and remove stop block. Slide cable (29) out through grommet (6) in forward guide (9).

- g. Remove mounting bolts (24) and remove unit from aircraft.
- h. Reverse the preceding steps for reinstallation. Rig trim system in accordance with paragraph 8-26, safety wire all items previously safetied and re-install all items removed for access.

8-31. CLUTCH ADJUSTMENT. (Refer to figure 8-10.)

a. SERVO UNIT REMOVED FROM THE AIRCRAFT BUT STILL INSTALLED IN THE HOUSING.

1. Remove servo unit from aircraft in accordance with paragraph 8-30.
2. Remove forward housing cover (4) to gain access to clutch assembly.
3. Loosen outside locking spanner nut (18) so that tension can be adjusted with inside spanner nut.
4. Connect spring scale (fish scale) to forward end of cable (29). (Refer to figure 8-11 for spring scale.)
5. Energize clutch assembly using a 24-volt power source.
6. Hold opposite end of cable (29) to prevent slippage of cable on drum (21).
7. Pull cable (29) with spring scale until clutch slips, noting pounds required to slip clutch.
8. Adjust inside spanner nut (18) until clutch slips at 28 to 32 lbs tension. Tighten outside locking

spanner nut against inside nut.

b. CLUTCH ASSEMBLY REMOVED FROM HOUSING.

1. Loosen outside locking spanner nut (18) so that tension can be adjusted with inside spanner nut.
2. Clamp clutch assembly in a vise at the drum (21) with sprocket (3) in the UP position.
3. Energize clutch assembly using a 24-volt power source.
4. Connect torque wrench (lb-in) and adapter over shaft on sprocket (3) so the pins of the adapter engage between teeth of sprocket. (Refer to figure 8-11 for adapter.)
5. Apply torque to clutch assembly noting tension required to slip clutch.
6. Adjust inside spanner nut (18) until clutch slips at 25±3 lb-in. Tighten outside locking spanner nut against inside nut.

8-32. FLAP/ELEVATOR TRIM INTERCONNECT SYSTEM. (Refer to figure 8-12.)

8-33. DESCRIPTION. The flap/elevator trim interconnect system restricts the amount of nose up trim available with the flaps up. As the flaps are raised from the full down position, the interconnect system automatically removes full nose up trim to a restricted position.

8-34. TROUBLE SHOOTING.

NOTE

The flap control system and elevator trim control system must be correctly rigged to ensure proper operation of the interconnect system.

TROUBLE	PROBABLE CAUSE	REMEDY
INTERCONNECT DOES NOT MOVE TRIM TAB FROM FULL DOWN POSITION AS FLAPS ARE RAISED.	Disconnected or broken interconnect control.	Check visually. Connect control; replace if broken.
	Control casing not secured to structure.	Check security of attaching clamps. Position control casing and tighten clamps.
	Trim tab up stop loose or improperly located.	Check stop for security and proper location. Locate stop for proper tab travel and tighten.
	Interconnect control attached around wrong trim cable.	Check visually. Attach around tab up cable in proper position.
	Control not rigged correctly.	Rig in accordance with paragraph 8-36.
INTERCONNECT DOES NOT MOVE TRIM TAB FAR ENOUGH.	Control casing slipping in clamps.	Check visually. Position control casing and tighten clamps.
	Control not rigged correctly.	Rig in accordance with paragraph 8-36.

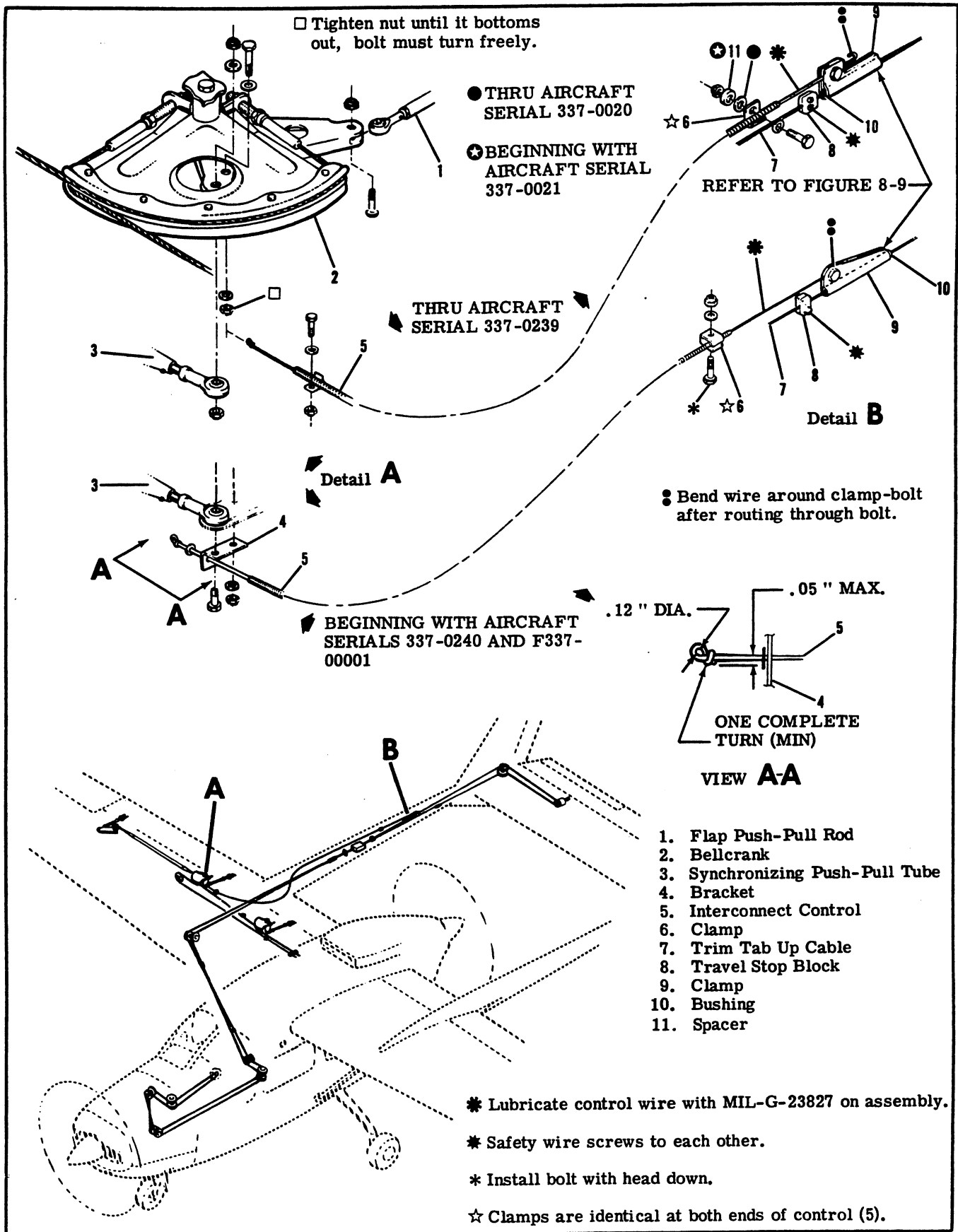


Figure 8-12. Flap/Elevator Trim Interconnect System

8-35. REMOVAL AND INSTALLATION. (Refer to figure 8-12.)

- a. Remove access plates from inboard side of right tail boom.
- b. Run flaps to DOWN position.
- c. Remove flap well gap seal panel and access plate at right outboard flap, inboard bellcrank (Detail A).
- d. Disconnect control wire at clamp (9).
- e. Remove bolts securing bracket (4) to bellcrank (2).
- f. Remove clamps (6) securing control assembly (5) to aircraft structure.
- g. Tie a guide wire to the aft end of control assembly (5) and pull control out through bellcrank access opening. Leave guide wire in place to aid in reinstallation of control assembly.

NOTE

If a new control wire is to be installed in casing, bend the forward end of wire as illustrated in figure 8-12, lubricate wire with MIL-G-23827, slide wire through washer and bracket (4) and insert wire into casing.

- h. Using guide wire pull control assembly through structure, in place and disconnect guide wire.
- i. Secure control casing in clamps (6) with approximately 1-inch extending beyond clamp at each end.
- j. Secure bracket (4) to bellcrank (2).
- k. Pull aft on control wire to remove slack, rig system in accordance with paragraph 8-36, bend wire 180° around clamp bolt before tightening bolt and reinstall all items removed for access.

WARNING

Do not reuse the wire inside control casing if it has been removed by straightening the ends or bent severely and then straightened. The wire becomes brittle and will break from work hardening.

8-36. RIGGING. (Refer to figure 8-12.)

NOTE

The following rigging procedure should be completed ONLY if the flap and elevator trim control systems are properly rigged

and if an interconnect control assembly has been installed in accordance with paragraph 8-35.

- a. Loosen bolt securing clamp (6) at aft end of control (5).
- b. Raise flaps to full UP position.
- c. Place elevator in neutral (streamlined) position. (Refer to figure 8-5.)
- d. Rotate trim control wheel to place trim tab in neutral position (streamlined with elevator), mount an inclinometer on tab and adjust to 0°.

NOTE

An inclinometer for measuring control surface travel is available from the Cessna Service Parts Center. Refer to figure 6-4.

WARNING

Do not use the wire inside control casing if the ends have been straightened and then rebent, or if the wire has been bent severely and restraightened. The wire becomes brittle and will break.

- e. Pull aft on control wire to remove slack, then slide control assembly (5) through clamp (6) either forward or aft to position clamp (9) firmly against the restricted position stop (8). Refer to figure 8-9 for minimum position of stop (8). Tighten bolt securing clamp (6).
- f. If binding occurs after initial installation or during service use, an effort should be made to relieve this condition by realignment or by repositioning the assembly through the aircraft structure rather than by removing the control wire from casing.
- g. Check that full elevator trim tab travel can still be obtained with flaps in the DOWN position. Check that the tab moves from the full DOWN position to the restricted position when the flaps are raised. Refer to figure 1-1 for specified travel.

NOTE

Trim tab travel is not restricted until the flaps are raised from full down to approximately the 2/3 down position. From 2/3 down to full up position, the trim tab is gradually restricted to degree specified in figure 1-1.