



SERVICE DIRECTIVE BULLETIN

SERVICE DIRECTIVE BULLETIN NO. 0066

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DATE: October 1, 1984

SUBJECT: Lateral Trim Actuator Location Change, Kit Number 28-01027

MODELS: F-28A, 280, F-28C, 280C, F-28F and 280F Model Helicopters

EFFECTIVITY: All F-28A, 280, F-28C, and 280C helicopters; all F-28F and 280F helicopters which have not been converted to 2600 lbs gross weight per Service Information Letter 0130 or Enstrom Specification Drawing 28-100015.

COMPLIANCE: At the owner's earliest convenience or prior to the next 50-hour inspection.

This Service Directive Bulletin provides for the relocation of the lateral trim capsule in an effort to improve the crashworthiness of the helicopter. Upon implementation, risk of serious back injury in hard landings resulting from collapse of the pilot's seat around the lateral trim capsule will be minimized.

This modification includes repositioning the lateral trim actuator and belicrank under the pilot's seat. In some F-28-series helicopters equipped with strobe anti-collision lights, this repositioning will also require relocation of the strobe power pack as described in Section II. In addition, some helicopters have machined trim actuator housings instead of castings. In this case, the actuator assembly must be partially disassembled and realigned as described in Section V.

NOTE: Any F-28F or 280F which has been modified for 2600 lb gross weight normal category operation in accordance with Enstrom Service Information Letter 0130 or Enstrom Specification Drawing 28-100015 is already in compliance with this bulletin.

I. FIXTURES

This modification requires constructing an alignment tool as shown in Figure 1. This tool can be constructed from any available material which is 7/16 inch thick and at least 12½ inches long.

The installation of the trim actuator bracket is greatly simplified by a drilling template as shown in Figure 2. This template should be made from light sheet metal.

II. REMOVAL OF LATERAL TRIM ACTUATOR ASSEMBLY

1. Remove seat cushions and fiberglass seat cover to gain access to trim actuator.
2. Disconnect one tail rotor control cable from the tail rotor pitch change yoke at the tail rotor transmission. This will provide easier access to the trim actuator.
3. Disconnect wires from trim actuator to aircraft. (Before disconnecting wires, check to make sure the wires are marked for reassembly.)
4. Remove the hardware from piston (upper) end of the trim actuator. Remove trim motor upper shaft.
5. Remove the hardware from the fixed (lower) end of the trim actuator.
6. Remove trim actuator.

NOTE: The old trim actuator bracket does not have to be removed.

7. Note that the motor is attached to a housing which is either a machined part or a casting. If this housing is a machined part, it must be modified as described in Section V. If the part is a casting, no modification is necessary.

III. RELOCATION OF STROBE POWER PACK

In F-28A, F-28C, and F-28F helicopters equipped with Whelen HDA strobe anti-collision lights, the strobe power supply must be relocated at this time. This is accomplished as described below. If the helicopter is not equipped with a strobe power supply under the pilot's seat, disregard this section and continue with Section IV - trim Actuator Installation.

1. Disconnect wires from strobe power supply.
2. Remove the four bolts which attach the strobe power supply to the seat frame and remove the power supply.
3. Using four AN526-832R8 screws and four AN960-8L washers, attach the strobe power supply to the 28-21059 brackets as shown in Figure 3. Do not connect the ground wires at this time.

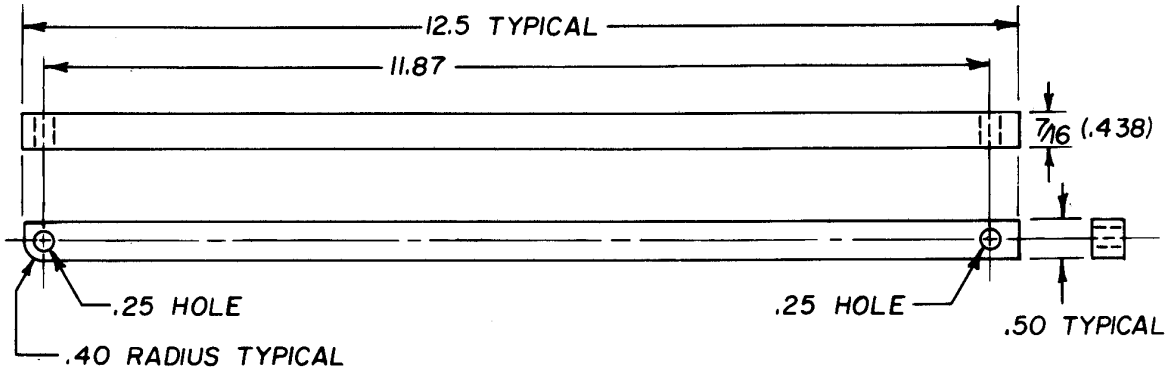


FIGURE 1- Bellcrank Locating Fixture

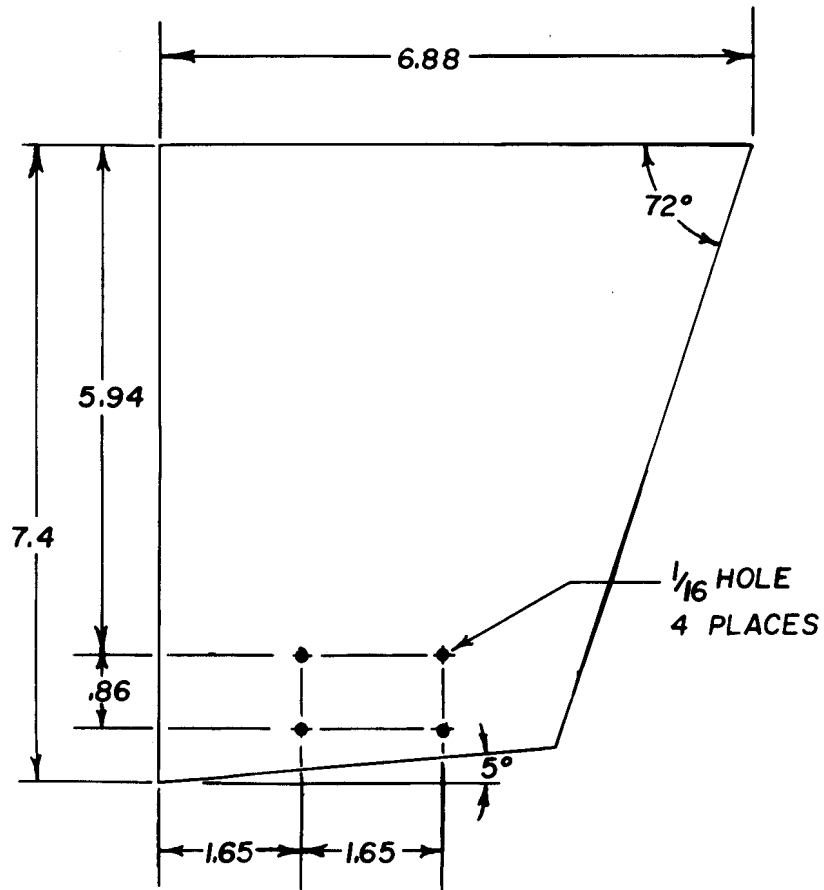


FIGURE 2- Trim Actuator Bracket Drilling Template
Make from light sheet metal.

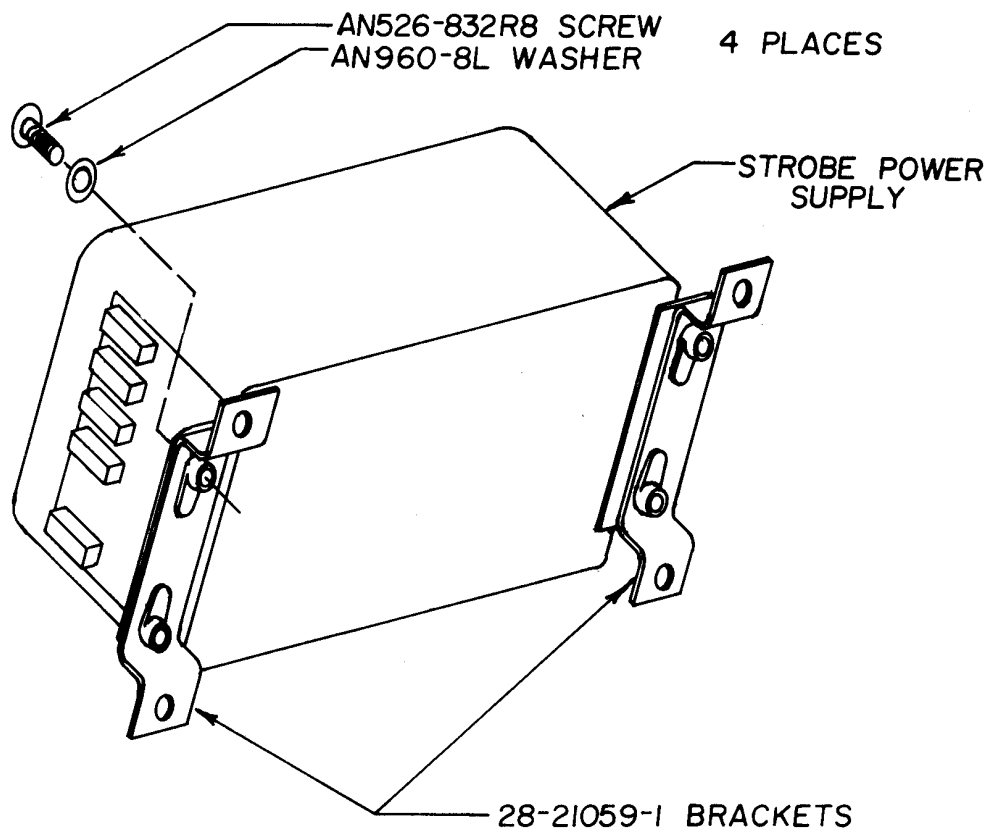


FIGURE 3 - Attaching the Strobe Power Supply to the Brackets

4. Mark and drill the four mounting holes in the left outboard seat frame as shown in Figure 4. The holes can be measured using the dimensions shown, or the strobe power supply, with the brackets attached, can be used as a template.
5. Using four AN526-832R8 screws, eight AN960-8L washers, and four AN364-832A locknuts, attach the brackets and strobe power supply to the inside of the left seat frame as shown in Figure 4. The electrical sockets should be on the aft side of the power supply.
6. Reroute the wires to the strobe power supply and connect the wires to the strobe power supply. In order to reroute the wires, remove wire ties as necessary. The new routing must be well clear of any and all control movement. Move all controls through their full travel to insure that clearance exists. On some aircraft, there is insufficient cable to reach from the light to the relocated power supply. When this occurs, two cable extensions must be fabricated as described below:
 - (a) Cut two pieces of A417-1 cable (gray cable with three conductors and shield) 24 inches long.
 - (b) Install an A441 terminal on one end of each cable and an A442 terminal on the opposite end of each terminal as listed below:
 - Pin 1 red
 - Pin 2 black and bare ground
 - Pin 3 white
 - (c) Install the connectors as described below:

NOTE: The pins go in the male connector and the sockets are installed in the female connector. The sockets are installed in the same manner as the pins

- (1) Remove the grey insulation approximately 3/4 inch from the end of the cable.
- (2) Separate the three conductors and remove the exposed foil shield.
- (3) Strip approximately 1/8 inch of insulation from the end of each conductor.
- (4) Crimp the small ears of the pin around the bare wire of each conductor. Note that the black wire and the bare ground wire must be in the same pin.
- (5) Solder the wires to the pins.
- (6) Crimp the long ears to the insulation of the wires.
- (7) Insert the pins in the connector as described in Step (b). Note that the pins will lock in place. Partially insert all three pins before locking any pin into place.

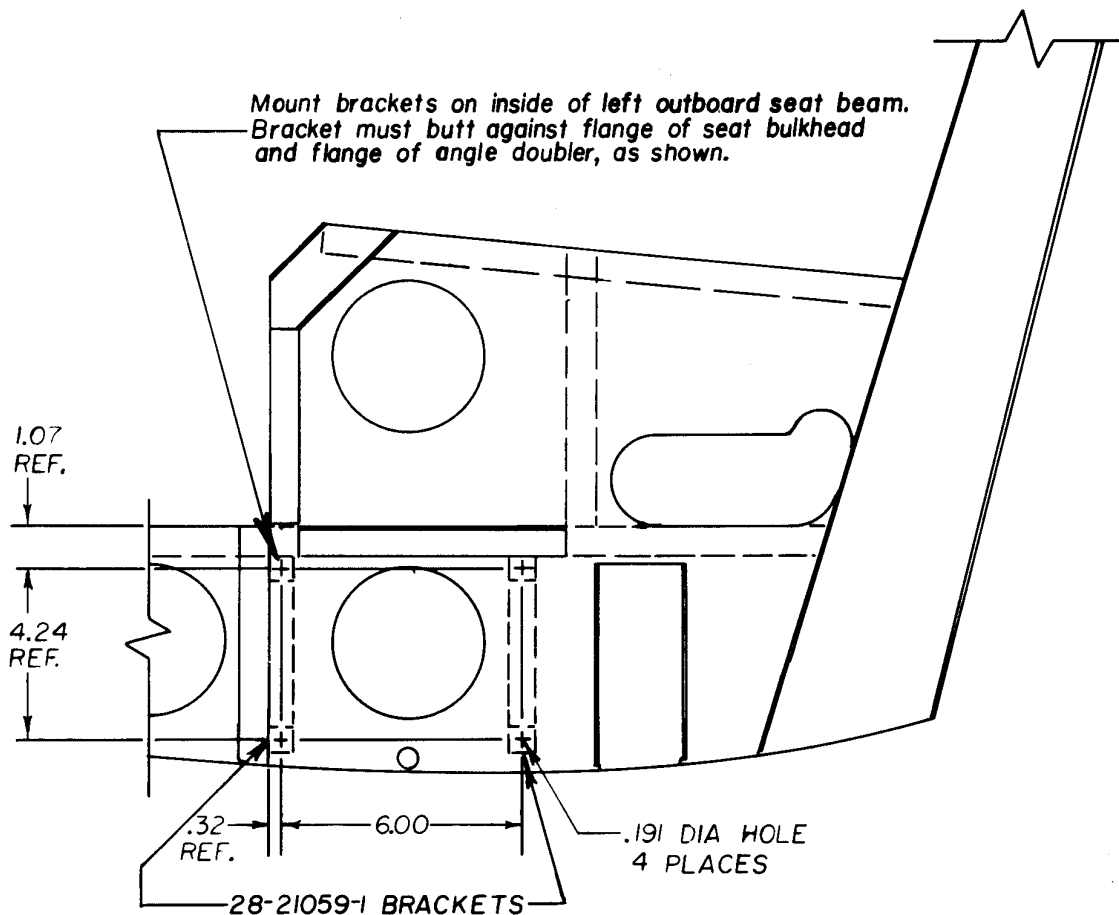
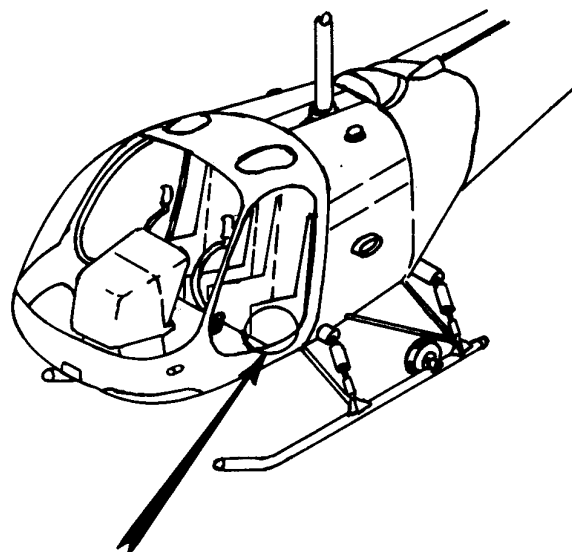
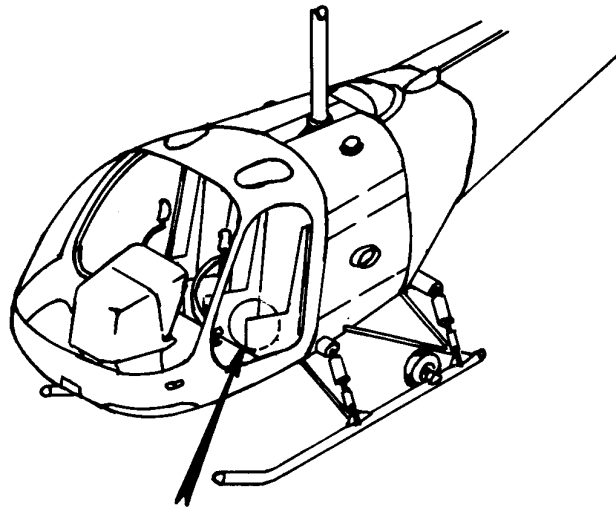


FIGURE 4-Location of Strobe Power Supply Brackets on Inside of Left, Outboard Seat Beam.

- (d) Mark one of these assemblies '36-9A' and the other assembly '36-8C'.
 - (e) Connect the 36-9A assembly from the 36-9 cable to socket #3 of the strobe power supply.
 - (f) Connect the 36-8C assembly from the 36-8A cable to socket #4 of the strobe power supply.
 - (g) Cut the red power wire and add 24 inches of red #18 AWG wire using two BS-N-331 wire splices.
 - (h) Connect this plug to the strobe power supply socket marked "PWR".
 - (i) Check to insure that wires are routed clear of controls and secure them with wire ties as necessary.
7. Remove the aft, upper screw which attaches the power supply to the bracket and reinstall the screw with the ground lug from the power socket. At this point, the power supply should be hooked up except for two ground lugs from the strobe cables.
8. Replace all cable ties and check security and location of cables.
9. Check tightness of all fastenings.

IV. TRIM ACTUATOR INSTALLATION

1. Position the drilling template from Section I as shown in Figure 5.
2. Drill top two holes with #41 drill, remove drilling template, cleco new support bracket, 28-113072-1, to bulkhead. Install alignment tool (Ref. Figure 1), check alignment. With alignment tool in place drill lower two holes with #41 drill. Remove alignment tool. Open holes to .143 inch with #27 drill.
- NOTE: If the housing is a machined part as described in Section II Step 7, install a .025 inch thick aluminum shim between the trim actuator support bracket and the seat beam.
3. Remove bracket, deburr, and attach with four Cherry-Max CR 3243-4-2 rivets.
4. Drill a 3/16 inch hole above and forward of the bracket, as shown in Figure 5. (This hole will be used to attach the ground wire.)
5. Remove the AN3 bolt which attaches the trim actuator bellcrank (PN 28-16622) to the cyclic torque tube.



Mount bracket on outboard side of left, inboard seat beam.
7.00 and 9.96 dimensions are measured to
the center of the trim actuator pivot bolt.

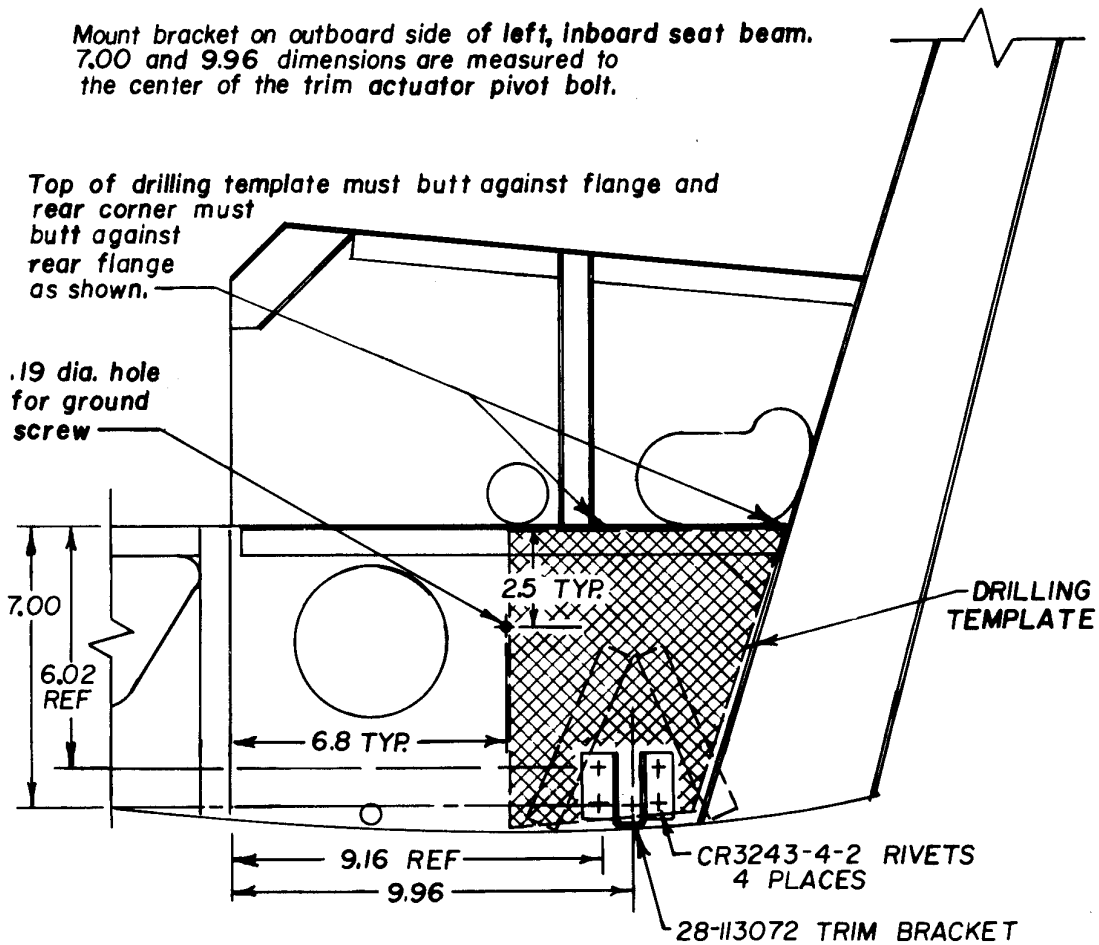


FIGURE 5 - Trim Actuator Bracket Location on Left Inboard Seat Beam

6. Hold the left hand (pilot's) cyclic to the right, against the stop in the floor. The lateral stop varies with fore and aft cyclic position. While holding the cyclic against the right stop, move the cyclic fore and aft until the extreme right hand position is determined. The cyclic may be held in this position by tying a rope to the left cyclic just below the grip and tying the rope to a weight suspended out of the right door or to an object (such as the landing gear) outside of the right door.
7. Bolt one end of the locating fixture (Figure 1) in the trim actuator support bracket with an AN4 bolt. Use an equal number of washers on each side of the fixture to center the fixture in the bracket. The other end of the fixture should be underneath the cyclic torque tube.
8. Rotate the trim bellcrank down and align it with the fixture. Bolt the fixture in the trim bellcrank using an AN4 bolt (Figure 6).
9. Check that the left hand (pilot's) cyclic is full right and against the stop and drill the cyclic torque tube to match the trim bellcrank.

NOTE: Using the existing hole in the bellcrank as a drill jig, drill through one side of the tube and repeat on the opposite side. CAUTION: Do not drill through both sides of the tube from one side of the bellcrank. After drilling through one side, a short AN3 bolt or a pin of the same diameter should be inserted to maintain the relative position between the bellcrank and the torque tube. This will assure proper alignment of bolt hole. In order to drill from the opposite side, a short drill motor and bit or a right-angle head may be required. If this equipment is not available, the torque tube will have to be disconnected from stick and control tube so it can be rotated for drilling clearance.

10. Attach the trim bellcrank to the cyclic torque tube with one AN3-16A bolt, two AN960-10L washers, and one AN364-1032 nut.
11. Remove the locating fixture.
12. Release the cyclic.
13. Position the trim actuator assembly with the housing in the trim actuator bracket and the piston in the trim bellcrank. The motor should be on the forward side of the trim actuator. Due to the routing of the wires on the trim motor, there may be interference between the seat bulkhead and the trim motor wires. This interference can be relieved by repositioning the wires and the cable tie as necessary.
14. Bolt the piston in the bellcrank with one AN4-10A bolt, two AN960-416L washers, and one AN 364-428 nut.
15. Bolt the trim actuator housing to the trim motor bracket with one AN4-12A bolt, one AN960-416L washer, and one AN364-428 nut.

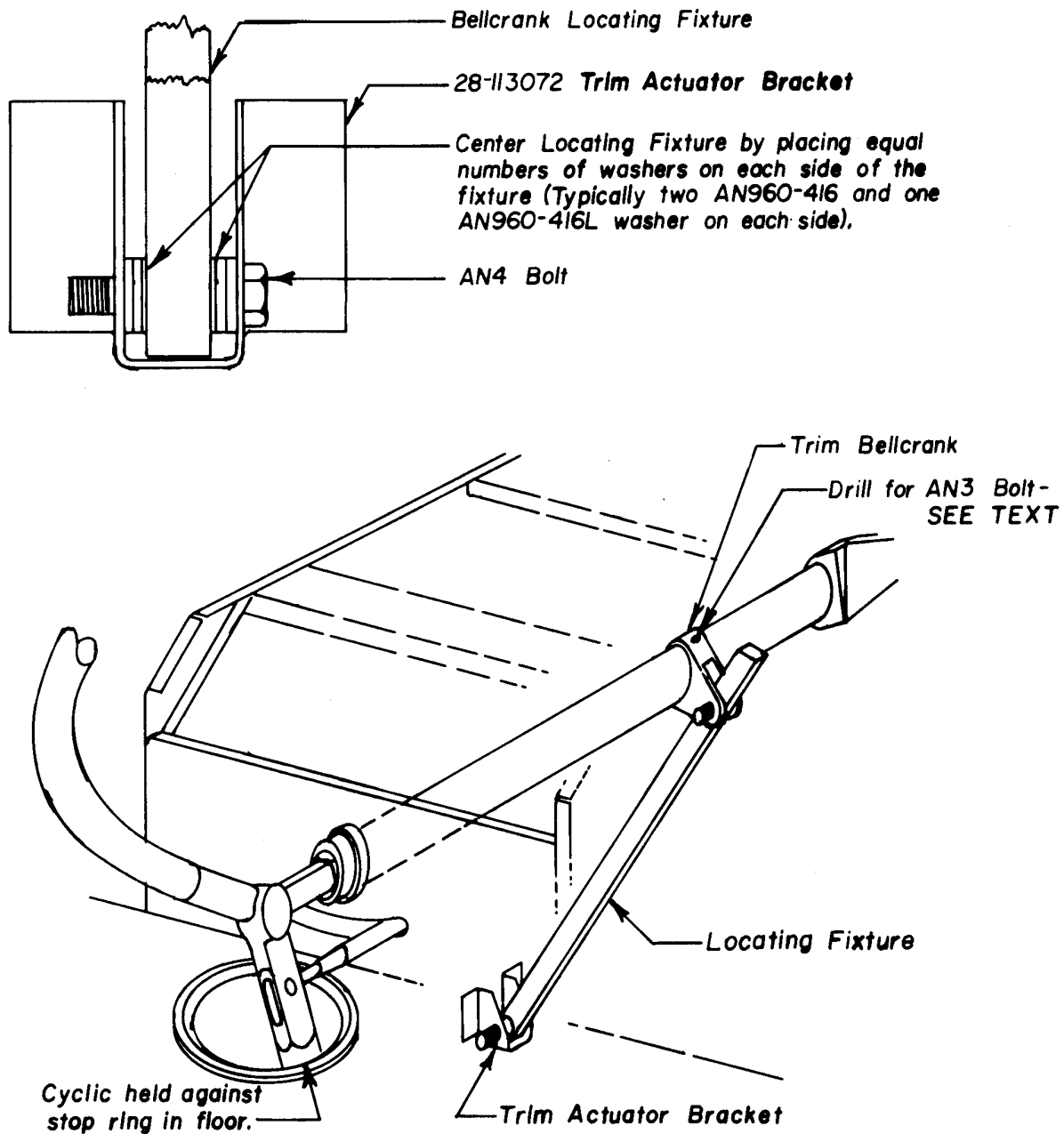


FIGURE 6 - Locating the Trim Bellcrank

6. Hold the left hand (pilot's) cyclic to the right, against the stop in the floor. The lateral stop varies with fore and aft cyclic position. While holding the cyclic against the right stop, move the cyclic fore and aft until the extreme right hand position is determined. The cyclic may be held in this position by tying a rope to the left cyclic just below the grip and tying the rope to a weight suspended out of the right door or to an object (such as the landing gear) outside of the right door.
7. Bolt one end of the locating fixture (Figure 1) in the trim actuator support bracket with an AN4 bolt. Use an equal number of washers on each side of the fixture to center the fixture in the bracket. The other end of the fixture should be underneath the cyclic torque tube.
8. Rotate the trim bellcrank down and align it with the fixture. Bolt the fixture in the trim bellcrank using an AN4 bolt (Figure 6).
9. Check that the left hand (pilot's) cyclic is full right and against the stop and drill the cyclic torque tube to match the trim bellcrank.

NOTE: Using the existing hole in the bellcrank as a drill jig, drill through one side of the tube and repeat on the opposite side. CAUTION: Do not drill through both sides of the tube from one side of the bellcrank. After drilling through one side, a short AN3 bolt or a pin of the same diameter should be inserted to maintain the relative position between the bellcrank and the torque tube. This will assure proper alignment of bolt hole. In order to drill from the opposite side, a short drill motor and bit or a right-angle head may be required. If this equipment is not available, the torque tube will have to be disconnected from stick and control tube so it can be rotated for drilling clearance.

10. Attach the trim bellcrank to the cyclic torque tube with one AN3-16A bolt, two AN960-10L washers, and one AN364-1032 nut.
11. Remove the locating fixture.
12. Release the cyclic.
13. Position the trim actuator assembly with the housing in the trim actuator bracket and the piston in the trim bellcrank. The motor should be on the forward side of the trim actuator. Due to the routing of the wires on the trim motor, there may be interference between the seat bulkhead and the trim motor wires. This interference can be relieved by repositioning the wires and the cable tie as necessary.
14. Bolt the piston in the bellcrank with one AN4-10A bolt, two AN960-416L washers, and one AN364-428 nut.
15. Bolt the trim actuator housing to the trim motor bracket with one AN4-12A bolt, one AN960-416L washer, and one AN364-428 nut.

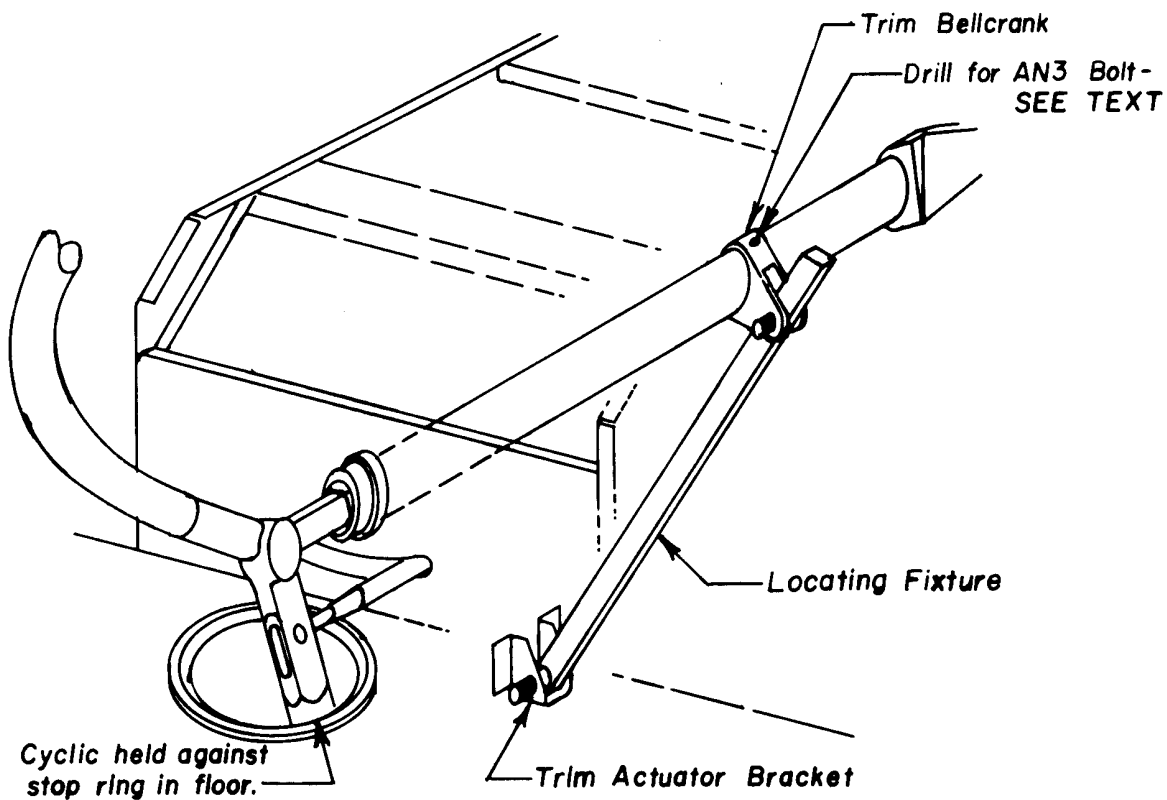
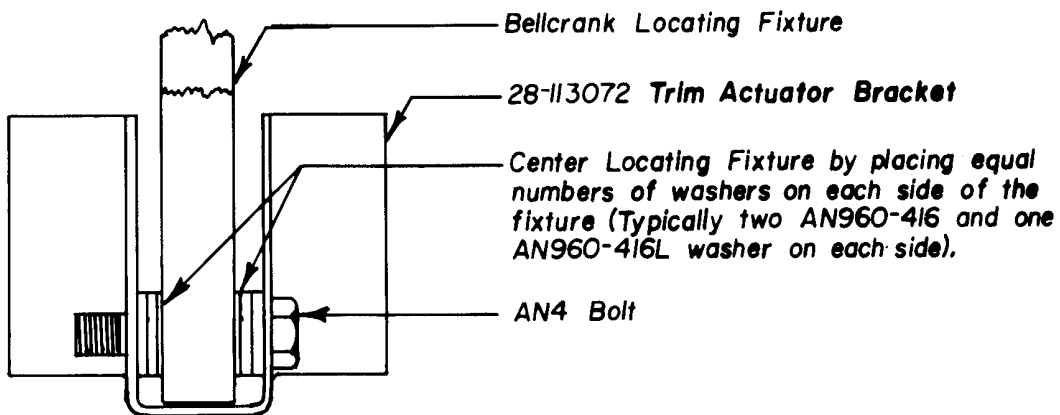


FIGURE 6 - Locating the Trim Bellcrank

16. Remove the hardware which attached the end of the green ground wire to the seat structure.
17. using the same hardware (with a new locknut), attach the green wire (and the two ground wires from the strobe light cables, if installed) to the seat frame at the 3/16 inch diameter hole drilled in Step 3.
18. Reconnect the tail rotor control cable.
19. Reconnect the wires from the trim motor to the aircraft. It may be necessary to reroute the wires slightly. The wires must remain well clear of all controls.
20. Cycle the trim actuator and the controls several times throughout their full travel to check for binding or interference.
21. Replace the fiberglass seat cover and seat cushions.

V. TRIM ACTUATOR HOUSING MODIFICATION

The trim motor is attached to one of three different types of actuator housing. If the actuator housing is a casting, the actuator assembly may be reinstalled without modification. If the housing is not a casting, it will be a machined part as shown in Figure 7A or 7B. If the adapter is present as shown in Figure 7A, it must be repositioned as described below. If there is no adapter, as shown in Figure 7B, the trim motor may be reinstalled as described in Section IV. Note that both types of machined gear housings require the shim described in Section IV Step 2. To reposition the adapter, proceed as follows:

1. Remove the AN345 nuts from the flanges of the trim motor and remove the trim motor from the housing.
2. Remove the nuts and screws which attach the adapter to the housing.
3. Rotate the adapter until the sides of the adapter are parallel to the longitudinal axis of the trim capsule as shown in Figure 8.
4. Drill two .166 inch diameter holes (#19 drill) in the trim housing to match the new position of the adapter.
5. Using the original hardware, attach the adapter to the housing in the new position.
6. File the outer corner of the bracket to a radius to match the flange of the trim motor as shown in Figure 8.
7. Reinstall the trim motor, making certain that the rubber coupling properly engages both the trim motor and the gear shaft.
8. Check to insure that all hardware is tight. The actuator is now ready to reinstall as described in Section IV.

Trim Motor Adapter

Machined Trim
Actuator Housing

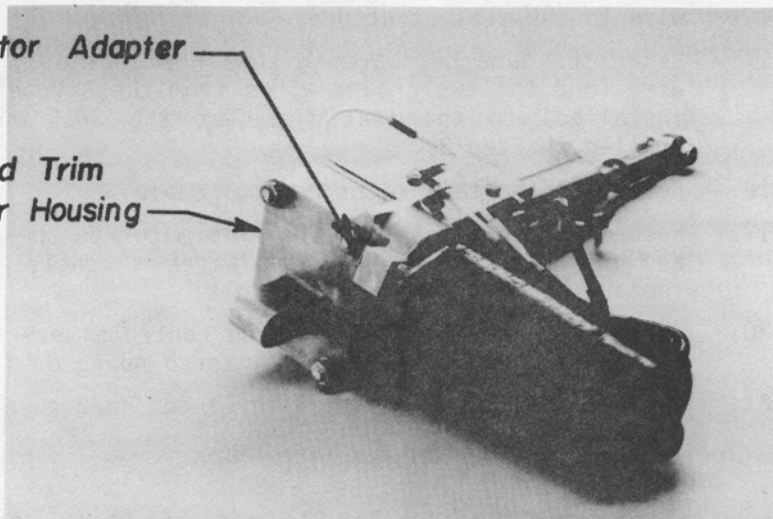


FIGURE 7A—Trim Actuator with Machined Housing and Trim Motor Adapter.
This assembly requires modification.

Note absence of trim motor adapter

Machined Trim
Actuator Housing

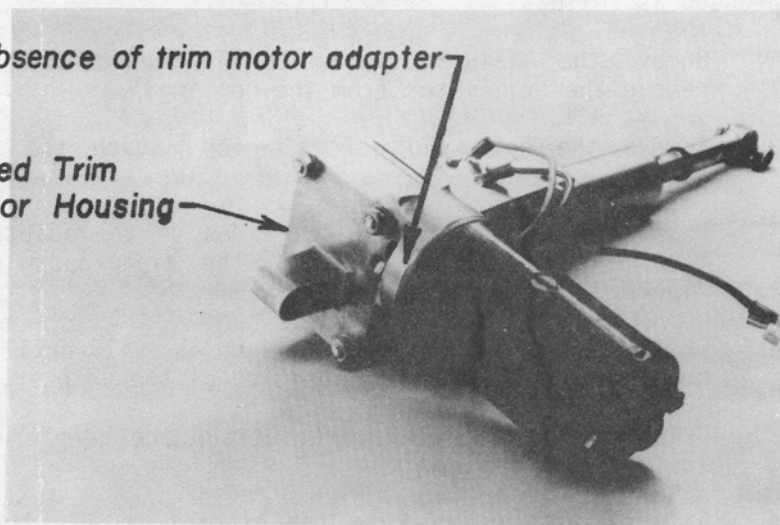
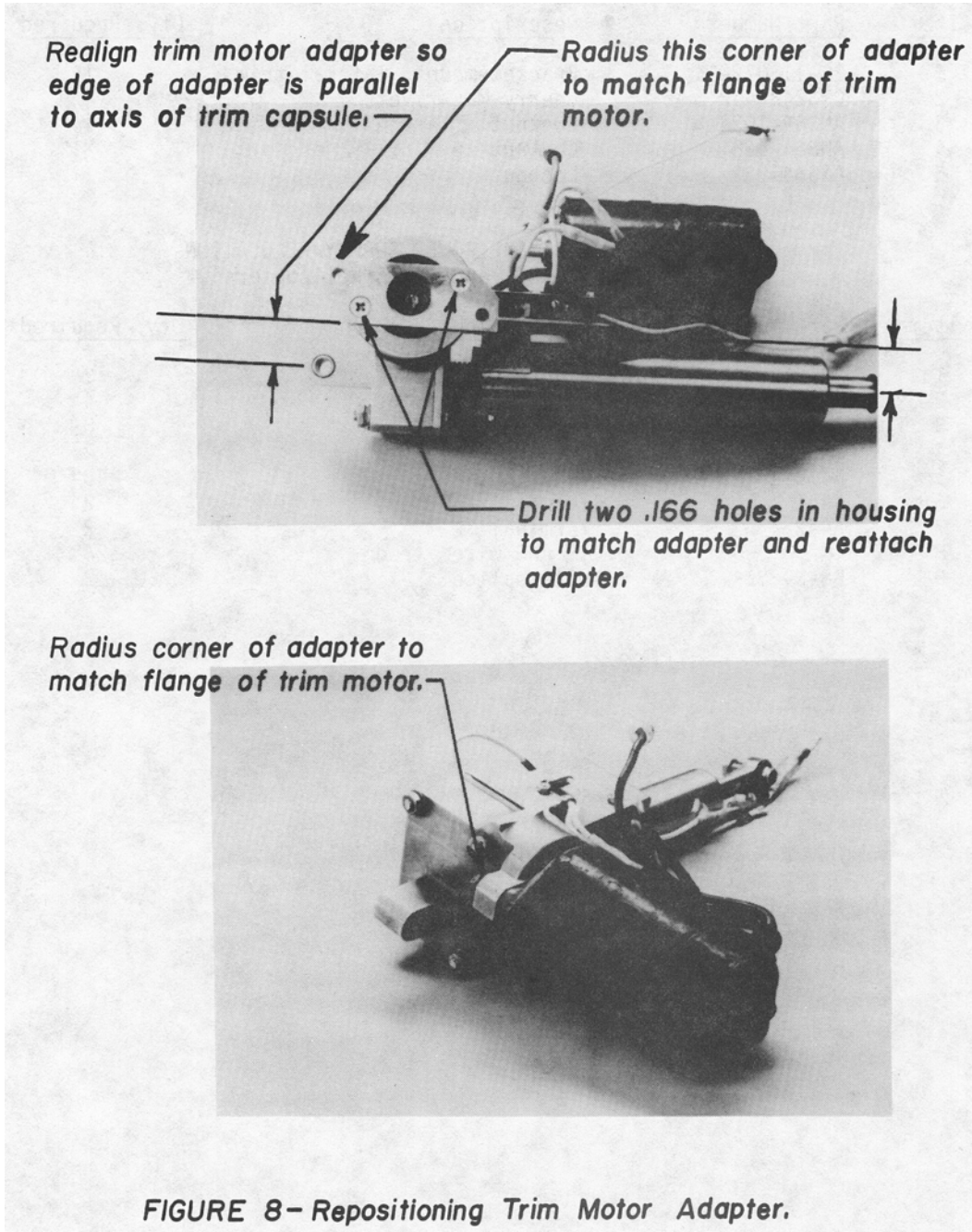


FIGURE 7B—Trim Actuator with Machined Housing without Trim Motor Adapter.
This assembly does not require modification.



PARTS LIST FOR KIT 28-01027

| <u>Item</u> | <u>Part Number</u> | <u>Description</u> | <u>Qty. Required</u> |
|-------------|--------------------|-----------------------------|----------------------|
| 1 | 28-113072-11 | Bracket-mount, lateral trim | 1 |
| 2 | CR3243-4-2 | Cherry-Max rivets | 4 |
| 3 | AN364-1032 | Locknut | 1 |
| 4 | AN364-428 | Locknut | 2 |
| 5 | AN364-832 | Locknut | 1 |

PARTS LIST FOR STROBE POWER SUPPLY RELOCATION
(For F-28A, F-28C, and F-28F Helicopters)

| <u>Item</u> | <u>Part Number</u> | <u>Description</u> | <u>Qty. Required</u> |
|-------------|--------------------|--------------------|----------------------|
| 1 | 28-21059-1 | Bracket assembly | 2 |
| 2 | AN526-832-R8 | Screw | 4 |
| 3 | AN960-8L | Washer | 8 |
| 4 | AN364-832A | Locknut | 4 |
| 5 | A417-1 | Cable | 48" |
| 6 | A441 | Terminal | 2 |
| 7 | A442 | Terminal | 2 |
| 8 | | 18 AWG wire - red | 24" |
| 9 | BS-N-331 | Wire splice | 2 |