

## SECTION 4

### WINGS AND EMPENNAGE

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#### 4-1. WINGS AND EMPENNAGE.

#### 4-2. WINGS. (See figure 4-1.)

**4-3. DESCRIPTION.** Each all-metal wing is a semi-cantilever, semimonocoque type, with two main spars and suitable ribs for the attachment of the skin. Skin panels are riveted to ribs, spars and stringers to complete the structure. An all-metal, piano-hinged aileron, flap and a detachable wing tip are mounted on each wing assembly. A single metal fuel tank is mounted between the wing spars at the inboard end of each wing. The leading edge of the left wing may be equipped with landing and taxi lights (thru 1970 Models). Colored navigation lights are mounted at each wing tip.

**4-4. REMOVAL.** Wing panel removal is most easily accomplished if four men are available to handle the wing. Otherwise, the wing should be supported with a sling or maintenance stand when the fastenings are loosened.

- a. Remove wing root fairings and fairing plates.
- b. Remove all wing inspection plates.
- c. Drain fuel from tank of wing being removed.
- d. Disconnect:
  1. Electrical wires at wing root disconnects.
  2. Fuel lines at wing root. (Refer to precautions outlined in Section 12.
  3. Pitot line (left wing only) at wing root.
  4. Cabin ventilator hose at wing root.
  5. Wing leveler vacuum tube, if installed, at wing root.

e. Slack off tension on aileron cables by loosening turnbuckles, then disconnect cables at aileron bell-cranks. Disconnect flap cables at turnbuckles above headliner, and pull cables into wing root area.

#### NOTE

To ease rerouting the cables, a guide wire may be attached to each cable before it is pulled free of the wing. Cable may then be disconnected from wire. Leave guide wire routed through the wing; it may be attached again to the cable during reinstallation and used to pull the cable into place.

- f. Support wing at outboard end and disconnect strut at wing fitting. Tie the strut up with wire to prevent it from swinging down and straining strut-to-fuselage fitting. Loosen lower strut fairing and slide it up the strut, the strut may then be lowered without damage.

#### NOTE

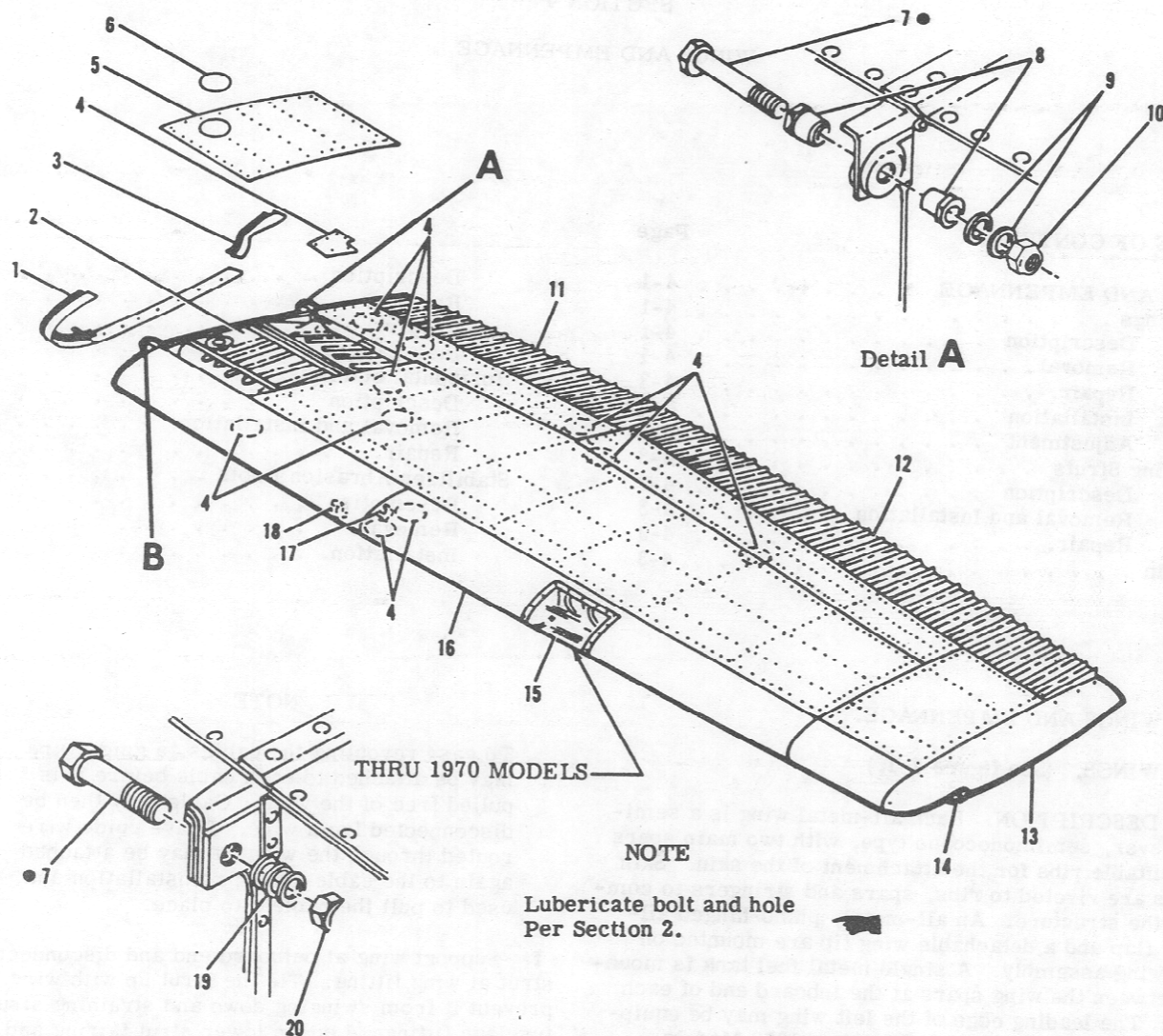
It is recommended that flap be secured in streamlined position with tape during wing removal to prevent damage, since flap will swing freely.

- g. Mark position of wing attachment eccentric bushings (refer to figure 4-1); these bushings are used to rig out "wing heaviness."
- h. Remove nuts, washers, bushings and bolts attaching wing spars to fuselage.

#### NOTE

It may be necessary to rock the wing slightly while pulling attaching bolts, or to use a long drift punch to drive out attaching bolts.

1. Remove wing and lay on padded stand.



THRU 1970 MODELS

#### NOTE

Lubricate bolt and hole  
Per Section 2.

#### NOTE

Three washers (19) are installed under the  
nut on the front spar-to-fuselage fitting.

Beginning with the 1971 Models, the  
landing and taxi lights are located in  
the nose cowl.

● MINIMUM TORQUE 300 LB-IN.

- |                           |                                  |
|---------------------------|----------------------------------|
| 1. Fairing                | 11. Wing Flap                    |
| 2. Fuel Tank              | 12. Aileron                      |
| 3. Lower Rear Fairing     | 13. Wing Tip                     |
| 4. Inspection Plate       | 14. Navigation and Strobe Lights |
| 5. Fuel Tank Cover        | 15. Landing and Taxi Lights      |
| 6. Fuel Gage Access Cover | 16. Wing Assembly                |
| 7. Bolt                   | 17. Cover Plate                  |
| 8. Eccentric Bushings     | 18. Stall Warning Unit           |
| 9. Washer                 | 19. Washers                      |
| 10. Nut                   | 20. Nut                          |

Figure 4-1. Wing Installation



**4-5. REPAIR.** A damaged wing may be repaired in accordance with instructions outlined in Section 18, which supplements Federal Aviation Regulation, Part 43. Extensive repairs of wing skin and structure are best accomplished by using the wing alignment repair jig, which may be obtained from Cessna. The wing jig serves not only as a holding fixture, making work on the wing easier, but also assures absolute alignment of the repaired wing.

**4-6. INSTALLATION.**

a. Hold wing in position and install bolts, bushings, washers and nuts attaching wing spars to fuselage fittings. Be sure eccentric bushings are positioned as marked.

b. Install bolts, spacers, and nuts to secure upper and lower ends of wing strut to wing and fuselage fittings.

c. Route flap and aileron cables, using guide wires. (See note in paragraph 4-4.)

d. Connect:

1. Electrical wires at wing root disconnects.

2. Fuel lines at wing root. (Refer to precautions outlined in Section 12.)

3. Pitot line (if left wing is being installed).

4. Wing leveler vacuum tube, if installed, at wing root.

e. Rig aileron system. (Section 6.)

f. Rig flap system (Section 7.)

g. Refuel wing tank and check for leaks. (Refer to precautions outlined in Section 12.)

h. Check operation of wing tip lights and landing and taxi lights thru 1970 Models.

i. Check operation of fuel gage.

j. Install wing root fairings.

**NOTE**

Be sure to insert soundproofing panel in wing gap, if such a panel was installed originally, before replacing wing root fairings.

k. Install all wing inspection plates, interior panels and upholstery.

**4-7. ADJUSTMENT (CORRECTING "WING-HEAVY" CONDITION.)** (Refer to figure 4-1.) If considerable control wheel pressure is required to keep the wings level in normal flight, a wing-heavy condition exists.

a. Remove wing fairing strip on the wing-heavy side of the aircraft.

b. Loosen nut (10) and rotate bushings (8) simultaneously until the bushings are positioned with the thick side of the eccentrics up. This will lower the trailing edge of the wing, and decrease wing-heaviness by increasing angle-of-incidence of the wing.

**CAUTION**

Be sure to rotate the eccentric bushings simultaneously. Rotating them separately will destroy the alignment between the off-center bolt holes in the bushings, thus exerting a shearing force on the bolt, with possible damage to the hole in the wing spar.

c. Tighten nut and reinstall fairing strip.

d. Test-fly the aircraft. If the wing-heavy condition still exists, remove fairing strip on the "lighter" wing, loosen nut, and rotate bushings simultaneously until the bushings are positioned with the thick side of the eccentrics down. This will raise the trailing edge of the wing, thus increasing wing-heaviness to balance heaviness in the opposite wing.

e. Tighten nut, install fairing strip, and repeat test flight.

**4-8. WING STRUTS.** (Refer to figure 4-2.)

**4-9. DESCRIPTION.** Each wing has a single lift strut which transmits a part of the wing load to the lower portion of the fuselage. The strut consists of a streamlined tube riveted to two end fittings for attachment at the fuselage and wing.

**4-10. REMOVAL AND INSTALLATION.**

a. Remove screws from strut fairings and slide fairings along strut.

b. Remove fuselage and wing inspection plates at strut junction points.

c. Support wing securely, then remove nut and bolt securing strut to fuselage.

d. Remove nut, bolt, and spacer used to attach strut to wing, then remove strut from aircraft.

e. Reverse preceding steps to install strut.

**4-11. REPAIR.** Wing strut repair is limited to replacement of tie-downs and attaching parts. A badly dented, cracked, or deformed wing strut should be replaced.

**4-12. FIN.** (Refer to figure 4-3.)

**4-13. DESCRIPTION.** The fin is primarily of metal construction, consisting of ribs and spars covered with skin. Fin tips are of ABS construction. Hinge brackets at the fin rear spar attach the rudder.

**4-14. REMOVAL.** The vertical fin on the Models 172 and F172 may be removed without first removing the rudder. However, for access and ease of handling, the rudder may be removed by following procedures outlined in Section 10.

a. Remove fairings on either side of fin.

b. Disconnect flashing beacon lead, tail navigation light lead, antennas and antenna leads, and rudder cables, if rudder has not been removed.

**NOTE**

The flashing beacon electric lead that routes into the fuselage may be cut, then spliced (or quick-disconnects used) at installation.

c. Remove screws attaching dorsal to fin.

d. Disconnect elevator cable from elevator bell-crank.

e. Remove bolts attaching fin rear spar to fuselage fitting. Remove upper elevator stop bolts.

f. Remove bolts attaching fin front spar to fuselage bulkhead, and remove fin.

g. Retain any shims installed between the rear spar of the fin and the fuselage fitting.

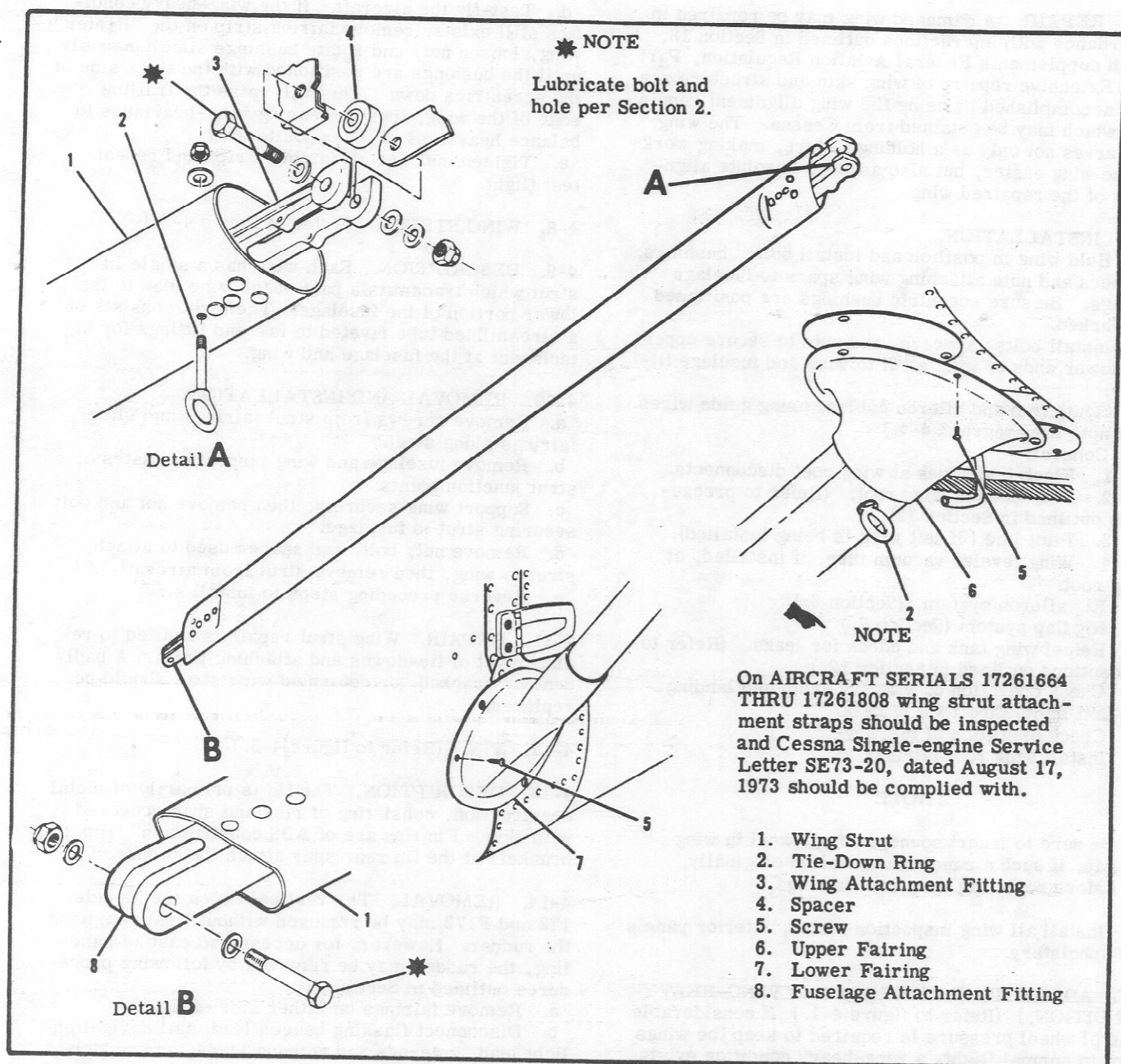


Figure 4-2. Wing Strut

4-15. **REPAIR.** Fin repair should be accomplished in accordance with applicable instructions outlined in Section 18.

4-16. **INSTALLATION.** Reverse the procedures outlined in paragraph 4-14 to install the vertical fin. Be sure to check and reset rudder and elevator travel.

a. Reinstall any shims removed from between the fin rear spar and the fuselage fitting. If a new fin is being installed, measure any gap existing between the fin rear spar and the fuselage fitting and use shims as follows:

|                              |                         |
|------------------------------|-------------------------|
| .000" to .030" gap . . . . . | No Shim                 |
| .030" to .050" gap . . . . . | .0531115-1 Shim (.020") |
| .050" to .070" gap . . . . . | .0531115-2 Shim (.040") |

A maximum of one shim per bolt is permissible.

4-17. **HORIZONTAL STABILIZER.** (See figure 4-4.)

4-18. **DESCRIPTION.** The horizontal stabilizer is primarily of all-metal construction, consisting of ribs and spars covered with skin. Stabilizer tips are of ABS construction. A formed metal leading edge is riveted to the assembly to complete the structure. The elevator trim tab actuator is contained within the horizontal stabilizer. The underside of the stabilizer contains a covered opening which provides access to the actuator. Hinges are located on the rear spar assembly to support the elevators.

4-19. **REMOVAL AND INSTALLATION.**



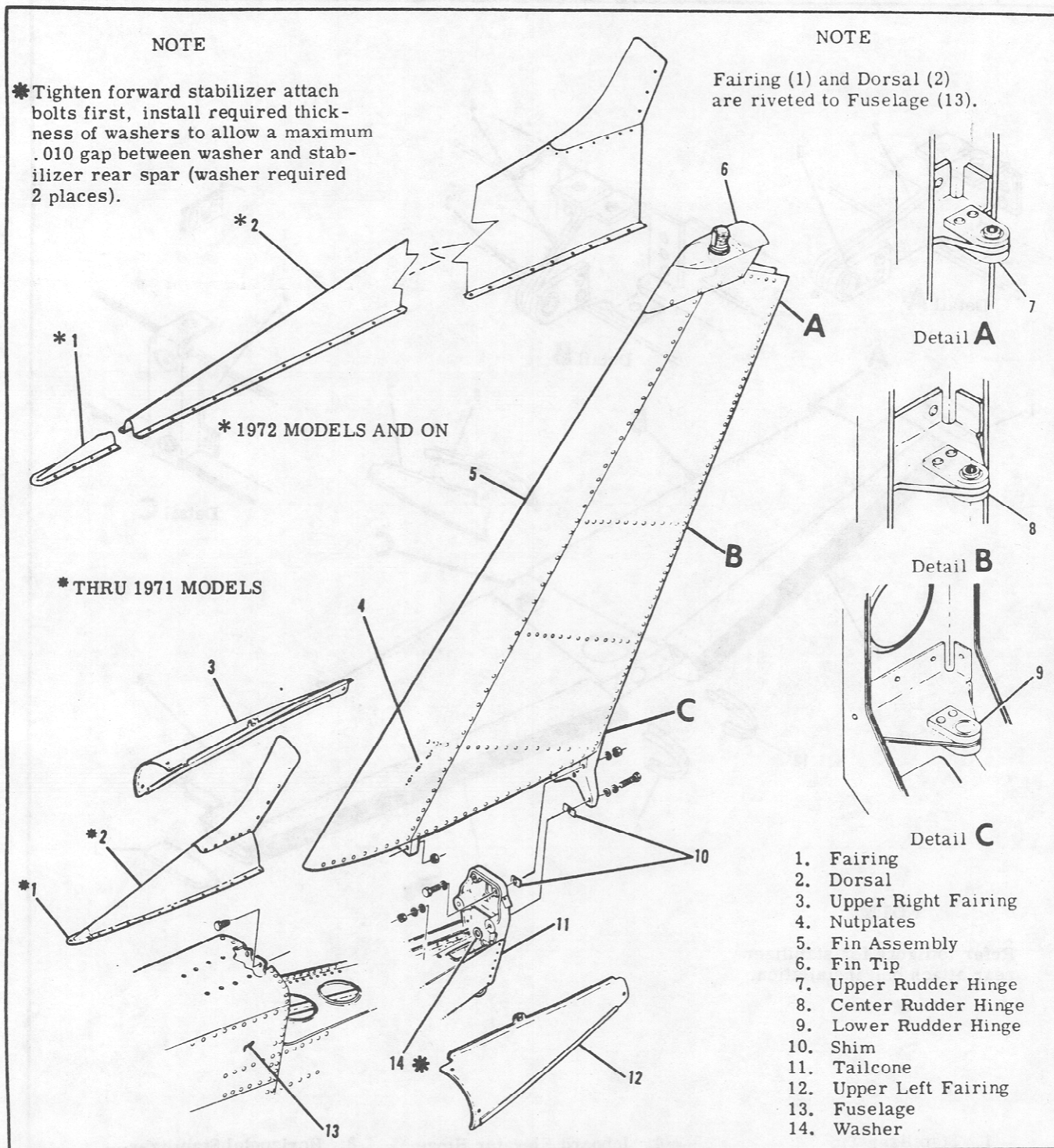


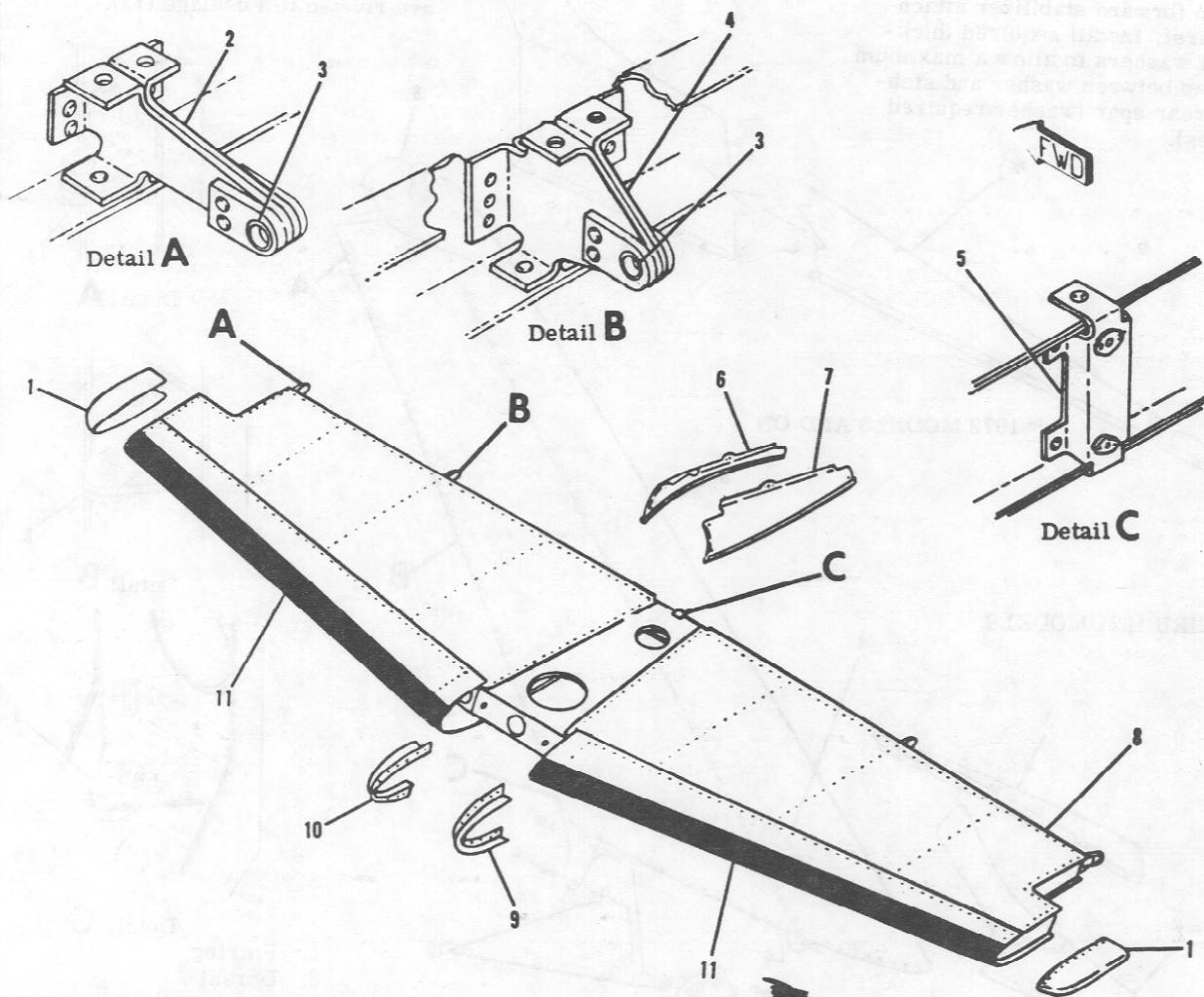
Figure 4-3. Vertical Fin

- a. Remove elevators and rudder in accordance with procedures outlined in Sections 8 and 10.
- b. Remove vertical fin in accordance with procedures outlined in paragraph 4-14.
- c. Disconnect elevator trim control cables at clevis and turnbuckle inside tailcone, remove pulleys which route the aft cables into horizontal stabilizer, and pull cables out of tailcone.
- d. Remove bolts securing horizontal stabilizer to

fuselage.

- e. Remove horizontal stabilizer.
- f. Reverse preceding steps to install horizontal stabilizer. Rig control systems as necessary, check operation of tail navigation light and flashing beacon.

4-20. REPAIR. Horizontal stabilizer repair should be accomplished in accordance with applicable instructions in Section 18.



**NOTE**

Refer to figure for stabilizer rear attach bolt installation.

- |                            |                           |                           |
|----------------------------|---------------------------|---------------------------|
| 1. Stabilizer Tip          | 4. Inboard Elevator Hinge | 8. Horizontal Stabilizer  |
| 2. Outboard Elevator Hinge | 5. Bracket                | 9. Forward Left Fairing   |
| 3. Bushing                 | 6. Upper Right Fairing    | 10. Forward Right Fairing |
|                            | 7. Upper Left Fairing     | 11. Abrasion Boot         |

Figure 4-4. Horizontal Stabilizer



#### 4-21. STABILIZER ABRASION BOOTS.

4-22. DESCRIPTION. The aircraft may be equipped with two extruded rubber abrasion boots, one on the leading edge of each horizontal stabilizer. These boots are installed to protect the stabilizer leading edge from damage caused by rocks thrown back by the propeller.

**4-23. REMOVAL.** The abrasion boots can be removed by loosening one end of the boot and pulling it off the stabilizer with an even pressure. Excess adhesive or rubber can be removed with Methyl-Ethyl-Ketone.

**4-24. INSTALLATION.** Install abrasion boots as outlined in the following procedures.

- a. Trim boots to desired length.
- b. Mask off boot area on leading edge of stabilizer with 1-inch masking tape, allowing 1/4-inch margin.
- c. Clean metal surfaces of stabilizer, where boot is to be installed with Methyl-Ethyl-Ketone.
- d. Clean inside surface of abrasion boot with Methyl-Ethyl-Ketone.

## NOTE

Boots may be applied over epoxy primer, but if the surface has been painted, the paint shall be removed from the bond area. This shall be done by wiping the surfaces with a clean,

lint-free rag, soaked with solvent, and then wiping the surfaces dry, before the solvent has time to evaporate, with a clean, dry lint-free rag.

e. Stir cement (EC-1300 Minnesota Mining and Manufacturing Co.) thoroughly.

f. Apply one even brush coat to the metal and the inner surface of the boot. Allow cement to air-dry for a minimum of 30 minutes, and then apply a second coat to each surface. Allow at least 30 minutes (preferably one-hour) for drying.

g. After the cement has thoroughly dried, reactivate the surface of the cement on the stabilizer and boot, using a clean, lint-free cloth, heavily moistened with toluol. Avoid excess rubbing which would remove the cement from the surfaces.

h. Position boot against leading edge, exercising care not to trap air between boot and stabilizer.

## NOTE

Should boot be attached "off-course", pull it up immediately with a quick motion, and reposition properly.

- i. Press or roll entire surface of boot to assure positive contact between the two surfaces.

j. Remove masking tape and clean stabilizer of excess material.

k. Mask to the edge of boot for painting stabilizer.

## SHOP NOTES:

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