

## WINGS - REMOVAL/INSTALLATION

### 1. General

- A. The wing assembly consists of all metal left and right removable panels, each braced by a lift strut and attached to fuselage on each side with bolts through holes in attach fittings in both fuselage and inboard ends of wing spars. The structure of each wing panel is of conventional, semi-monocoque design employing a front and rear spar, ribs, stringers, and skins. Each wing panel also incorporates a sealed, integral fuel bay, a flap, a balanced aileron, and a slot-lip spoiler. Access holes in lower wing skins between ribs provide access to fuel bay, flight controls, electrical components, deice system plumbing, and ventilation system components. Wing tips of sheet metal construction attach to each wing panel with screws. The wing tips contain navigation lights and provisions for strobe lights. The airplane landing and taxi lights are located in leading edge of each wing panel, between Wing Stations 185.30 and 201.75. A stall warning detector and a pitot static probe are incorporated into leading edge of the left wing panel.
- B. The wing panel main frame structure consists of a front and rear spar assembly, center ribs, and upper and lower skins. The spars are of bonded and riveted construction and stringers between spars are bonded to interior wing skins. Spar caps are extruded angles riveted and bonded to sheet metal webs. The front spar incorporates a special forged fitting and formed channel assembly for lift strut attachment. Access openings with covers are provided between ribs to allow access to fuel bay and flight control system.
- C. The wings are attached to the fuselage with attach fittings on the forward and aft spar on each side of the fuselage. The forward spar also has fittings for the attachment of the lift strut. The wing trailing edge structure contains fittings for flap and aileron attachments. Wing spar fittings and fuselage fittings are shown in Figure 401.
- D. Sheet metal wing tips attach to the wing structure with screws, and contain navigation lights plus provisions for strobe lights.

### 2. Wing Removal/Installation

- A. Preparation for Removal of Wing (Refer to Figure 401).
  - (1) Turn off all electrical power, and ground the airplane structure.
  - (2) Defuel the airplane in accordance with Chapter 28, Fuel System - Maintenance Practices.
  - (3) Remove the attach screws from the lower wing root access covers (1) and (2) and remove the covers.
  - (4) On the 208, Remove the attach screws (18), and if installed (18B) from the strap fairing assembly (17) and the fairing assembly (16) and remove the fairings, refer to Figure 401 Sheet 1.
  - (5) On 208B, remove the attach screws (18) from the fairing assembly (17A) and strap fairing assembly (17B) and remove the fairings, refer to Figure 401 Sheet 1.
  - (6) Remove the attach screws from the air inlet cover (5) and the upper lift strut fairing (6) and remove the cover and the fairing.
  - (7) Remove the attach screws from the lower lift strut fairing (3) and remove the fairing.
  - (8) Disconnect the lift strut deice system plumbing (if installed) at connections inside the wing at the upper lift strut attachment location.
  - (9) Disconnect the wing deice system plumbing (if installed) in the wing root area.
  - (10) Loosen and remove the forward and aft hose connections of fuel bay supply lines in the wing root area. Drain the residual fuel.
  - (11) Remove the hose connection from fuel vent system crossover (right wing) or disconnect the three hoses of the fuel vent system (left wing) at the vent system cross inside the inboard wing bay.
  - (12) Loosen and separate the electrical wiring connector in the wing root leading edge.
  - (13) Disconnect the flap motor and crossover pushrods at the inboard flap bell cranks.
  - (14) Disconnect the pitot/static lines at the connections in the leading edge root area (left wing only). Cap the lines to prevent contamination.
  - (15) Remove the headliner and cut the safety wire and disconnect turnbuckles to relieve tension on the aileron control system carry-thru cables.
  - (16) If the right wing is to be removed, disconnect the aileron trim cables at the quick-disconnects located in the inboard leading edge wing bay. Refer to Chapter 27, Aileron Trim System - Maintenance Practices.
  - (17) Disconnect the wiring, the shutoff valve linkage, and the inlet duct from the cabin air blower system in wing root area.

Refer to Chapter 21, Fresh Air Distribution - Maintenance Practices.

- (18) Disconnect the fuel tank shutoff valve control at the clevis on the aft valve lever arm that is located in the wing root area. Remove the clevis attaches the interconnect link to the forward valve lever arm and remove the safety wire that attaches the control to mounting bracket.

## B. Remove the Wing

**CAUTION:** The wing must be separated from the fuselage at as near normal a dihedral angle as possible. Any motion up or down at the wing tip greater than +1.00 or -1.00 inch as the fittings are separated will damage attach fittings.

**CAUTION:** Support of the wing during the spar attach bolt and the strut support bolt removal is critical. If the bolts are loaded, it is impossible to remove them without damaging the fitting.

- (1) Remove the wing struts (4).

**NOTE:** Use a wing jack or a hoist to raise or lower the wing tip.

- (a) Make sure that all the load is removed from the strut-to-wing attach bolt.
- (b) Remove the nuts from the upper and lower strut fittings.
- (c) Apply a wrench to the head of the upper and lower strut attach bolts (30, 40) and attempt to rotate the bolts in the fittings.
- (d) Raise or lower the wing tip in very small increments until the force required to rotate the bolts is at a minimum.

**NOTE:** A torque wrench can be useful to determine the minimum rotational force.

- (e) If the bolts will not rotate, there may be corrosion between the bolts and the fittings.

1 Apply penetrating oil such as Kroil or Mouse Milk to the area and allow it to penetrate and dissolve the corrosion.

- (f) When the bolts rotate with minimum force, the wing is in the proper position for removal of the attach bolts.
- (g) Make sure the inboard and outboard areas of the wings are supported.
- (h) Remove the upper strut-to-wing attach bolt (40).

**NOTE:** If you cannot remove the bolts with your fingers, a "bullet" can be fabricated to help drive the bolt out. Refer to Bullet Fabrication and Use.

- (i) Support the wing struts and remove the lower fuselage-to-strut bolts and then remove the struts.

- (2) Remove the wings from the fuselage attach fittings.

- (a) Mark the location of the incidence setting of the index marker (arrow) on the head of the rear attach bolt (24) to the face of fitting (29) so the incidence setting is kept when wing is reinstalled.
- (b) Remove the forward and then the aft wing spar attach bolts (18) and (24).

**NOTE:** If you cannot remove the bolts with your fingers, a "bullet" can be fabricated to help drive the bolt out. Refer to Bullet Fabrication and Use.

**CAUTION:** The wing must be separated from the fuselage at as near normal a dihedral angle as possible. Any motion up or down at the wing tip greater than +1.00 or -1.00 inch as the fittings are separated will damage attach fittings.

- (c) Carefully move the wing outboard until the lugs on the wings and fuselage are separated.
- (d) Place the removed wing on padded support.
- (e) Remove the eccentrics (26, 27) from the lugs if necessary.

## C. Install the Wing (Refer to Figure 401).

- (1) Install the eccentrics in the aft spar wing/fuselage attachment fittings.

**NOTE:** The aft spar/fuselage attachment incorporates eccentrics to allow the wing incidence adjustments to trim out the wing heaviness.

**NOTE:** Correct positioning of eccentrics in the fittings is critical.

- (a) Assemble the aft attach fittings incidence eccentrics (26) into the fuselage attach fittings (29), with the keyway slot of the eccentrics approximately 90 degrees clockwise from the marked location of the bolt arrow and the thick side of the eccentric inboard. Refer to Figure 401.

- (b) Assemble the incidence eccentrics (27) into the aft wing attach fittings (28), with the keyway slot of the eccentrics aligned with those in the fuselage fittings and the thick side of the eccentrics outboard. Refer to Figure 401.
- (2) Install the wings to the fuselage .
  - (a) Apply MIL-G-21164 grease to each fitting lug face and bore.
 

**CAUTION:** Wing must be mated to fuselage at as near normal a dihedral angle as possible. Motion up or down at wing tip as or after fittings are mated must be limited to 1.00 inch up or down to avoid damage to attach fittings.

**CAUTION:** Support of the wing during the spar attach bolt and the strut support bolt installation is critical. If the bolts are loaded, it is impossible to install them without damage to the fitting.
  - (b) Carefully position the wings to mate the spar attach fittings (23) and (28) to the fuselage attach fittings (20) and (29).
- (3) Install the forward spar wing/fuselage attach fittings.
  - (a) Apply MIL-G-21164 grease to the bolt shank before you insert it.
    - 1 Place a washer (19) on the bolt.
    - 2 Install the forward spar attach bolt (18).
    - 3 Install three washers (19 and 19A) or two washers (19) and lifting hinge, whichever configuration applies.
    - 4 Install the nut (21A). Tighten the nut until it is snug, then loosen until the washer under the nut is free to turn and the cotter pin can be installed.

**NOTE:** It is permitted to ignore the washer (19) to get fit and alignment of cotter pin hole.
  - (b) Install forward attach fitting bolt (18).
 

**NOTE:** It is important that the wing fittings are not spread out or bent in by the process of bolt installation.
  - (c) Install the nut (21A). Tighten the nut until it is snug, then loosen until the washer under the nut is free to turn, and the cotter pin can be installed.
- (4) Install the aft spar wing/fuselage attach fittings.
  - (a) Apply MIL-G-21164 grease to the bolt shank before you insert it.
    - 1 Put a keyway washer (29B) on the bolt (24).
    - 2 Install the rear spar attach bolt (24) so that the index arrow is pointed as it was marked in the removal procedure. This will make sure wing incidence rigging is not disturbed. This bolt is installed with the head aft.

**NOTE:** The bullet used for disassembly should be inserted first to precisely align the fittings so the bolt threads do not damage the fittings.

  - 3 Install five washers (25) and nut (21B), or the lifting hinge (29C) with one washer (25), which ever configuration applies.

**WARNING:** This nut tightening procedure is for the aft wing attach fittings only.

  - 4 Tighten the nut until it is snug and the washer (25) is no longer free to rotate. Then tighten the nut not more than one more full turn and line up the cotter pin hole. Install the cotter pin (22).
- (5) Install the wing struts.
  - (a) Put the lift strut (4) lower fitting into the fuselage strut fitting.
 

**NOTE:** Apply MIL-G-21164 grease to the bolt (30) shank and faces of fittings before you insert it.
  - (b) Install the bolt (30), washers (31), and nut (33) into the lower end of the strut and fuselage fitting.
 

**NOTE:** The larger of the two washers is installed underneath the nut; the smaller washer is installed underneath the bolt.
  - (c) Tighten the nut until it is snug, then loosen until the washer under the nut is free to turn, and the cotter pin hole is lined up with the nut holes.
  - (d) Install the cotter pin.

- (e) With the outboard section of the wing supported at a normal dihedral angle, raise the lift strut (4) to align the upper attach fitting holes (38) with the strut wing fitting (39).
- (f) With the strut held against one face of the wing fitting, measure the gap between the strut fitting and the wing fitting.
  - 1 If the gap is 0.025 to 0.070 inch, it will be necessary to install a single 2622246-X shim. Refer to the Illustrated Parts Catalog for dash number and thickness of shim.
    - a Choose the shim that will provide a minimum gap of 0.005 inch.
    - b Apply a fay seal of Type 1 Class C sealant to one face only of the shim. Refer to Chapter 20, Fuel, Weather, and High Temperature Sealing.
    - c Adhere the sealant to the wing attach fitting.
  - 2 If the gap is less than 0.025 inch, proceed to the next step.
- (g) Install the spacer (37) and carefully tap lift strut-to-wing attach bolt (40) into place.
 

**NOTE:** Apply MIL-G-21164 grease to the bolt (30) shank and faces of fittings before you insert it.

**NOTE:** The bullet used for disassembly should be inserted first to precisely align the fittings so the bolt threads do not damage the fittings.
- (h) Install the bolt (40), spacer (37), washers (42), and nut (33). Tighten the nut until it is snug, then loosen until the washer under the nut is free to turn, and the cotter pin (34) can be installed.
 

**NOTE:** It is important that the wing fittings are not spread out or bent in by the process of bolt installation.
- (i) At the fuselage strut fitting tighten the nut until it is snug, then loosen until the washer under the nut is free to turn, and the cotter pin can be installed.
- (6) Reconnect wiring, shutoff valve linkage, and inlet duct from cabin air blower system. Refer to Chapter 21, Fresh Air Distribution System - Maintenance Practices.
- (7) Connect aileron control system cables at turnbuckles in overhead cabin area. If right wing is being installed, connect aileron trim tab cables at quick-disconnects in right inboard leading edge bay. Adjust cable tensions and rig aileron and aileron trim systems in accordance with Chapter 27, Aileron Trim System - Maintenance Practices.
- (8) Connect pitot/static system lines at connections in wing leading edge root area (left wing only).
- (9) Connect flap motor and crossover pushrods at inboard flap bell cranks. Rig flaps in accordance with Chapter 27.
- (10) Connect electrical wiring connector in wing root leading edge.
- (11) In left wing, connect fuel vent system crossover hose, or in right wing, connect three vent hoses to vent system cross inside inboard wing bay.
- (12) Connect fuel system forward and aft supply lines in wing root area. Wire fuel tank shutoff valve control to mounting bracket. Attach interconnect link to forward valve lever arm and connect control to aft valve lever arm. Insert cotter pin to clevis pins of both lever arm. Fuel airplane and check for leaks.
- (13) Connect wing deice system plumbing (if installed) in wing root area.
- (14) Connect lift strut deice boot plumbing at connections inside lift strut upper attachment location.
- (15) Install lift strut-to-fuselage fairing (3).
- (16) On 208, install strap fairing screws (18), and (18B) if installed, in the strap fairing assembly (17) and fairing assembly (16), refer to Figure 401 Sheet 1:
  - (a) If installed, make sure to fillet seal the upper leading edge strap fairing screw (18B) with Type I, Class B sealant. Refer to Chapter 20, Fuel, Weather and High-Temperature Sealing - Maintenance Practices, sealant cure times and fillet sealing procedure.
 

**NOTE:** Make note of cure time.
- (17) On 208B, install strap fairing screws (18) in the fairing assembly (17A) and strap fairing assembly (17B).
- (18) Install lower wing root access covers (1) and (2).
- (19) Install lift strut-to-wing fairing (6) and air inlet cover (5).
- (20) Remove the electrical ground and apply power to airplane electrical system.
  - (a) Examine the landing/taxi lights, stall warning system, pitot/static system heaters, navigation lights, fuel quantity

indicating system, air conditioning or vent blowers, and deice system (if installed) for correct operation.

- (21) Complete the Pitot System Inspection and Leak Test and the Pitot/Static System Functional Check. Refer to Chapter 34, Pitot/Static System - Inspection/Check.

### 3. Incidence Adjustment

#### A. General

- (1) The Incidence of the wing can be adjusted to reduce a "wing heavy" condition by adjustment of the aft fuselage-to-wing attach bolt
  - (a) This procedure is normally done after a flight test. It should not be required unless major wing damage to a wing has occurred.
  - (b) If adjustment is required, make the adjustment to both wings in opposite directions.

#### (2) Incidence Adjustment

- (a) Increase incidence is by rotating bolt head so that arrow points down. To decrease incidence, rotate bolt head so that arrow points up.

**NOTE:** Lettering on bolt head of the left wing will be upside down when arrow points outboard.

- (b) Do not rotate the arrow past vertical in either direction.

### 4. Wing Tip Removal/Installation

#### A. Remove Wing Tip (Refer to Figure 401).

- (1) Turn off all electrical power.
- (2) Remove attach screws and slide wing tip outboard slightly to gain access to electrical plug of tip navigation light.
- (3) Disconnect electrical plug(s) and remove wing tip.
- (4) Remove navigation light from wing tip.

#### B. Install Wing Tip (Refer to Figure 401).

- (1) Install navigation light in wing tip assembly.
- (2) Connect navigation light electrical plug and install wing tip assembly with attach screws.
- (3) Restore electrical power and check navigation light operation.

### 5. Bullet Fabrication and Use

#### A. Fabricate a Bullet (Refer to Figure 402).

- (1) Get a NAS464P14-76 and NAS464P12-37 bolt.
- (2) Grind to remove the threads and head of the bolts as shown.
- (3) Make sure there are no burrs or sharp edges at the transition to the full bolt diameter.

#### B. Use the Bullet.

- (1) When you drive an existing bolt out of the fittings, the blunt end must be against the threaded end of the bolt so the threaded part of the bolt does not cause gouges in the fittings.

**NOTE:** It is possible that shifting of the fittings can occur as the bolt is removed if the bullet is not used.

- (a) Always lubricate the shank of the bullet before you use it.
- (b) After its use it is necessary to drive the bullet out of the fitting with a drift punch.
- (2) When you use a bullet to align the fittings for the installation of a bolt, put the more tapered end into the lug holes from the direction the bolt is to be installed. The bolt will then drive the bullet out of the lugs as it is forced into place.

Figure 401 : Sheet 1 : Wing Installation

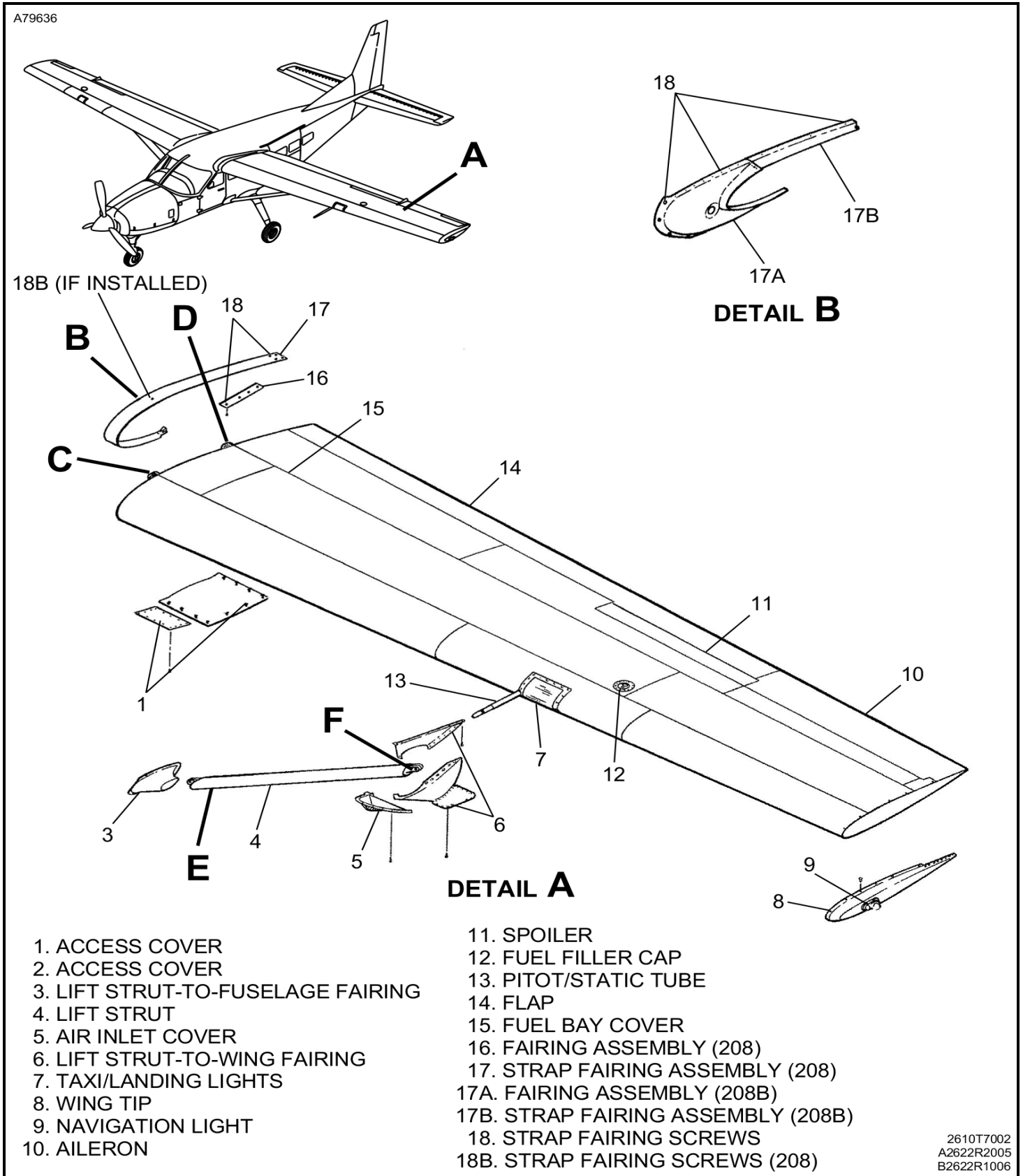
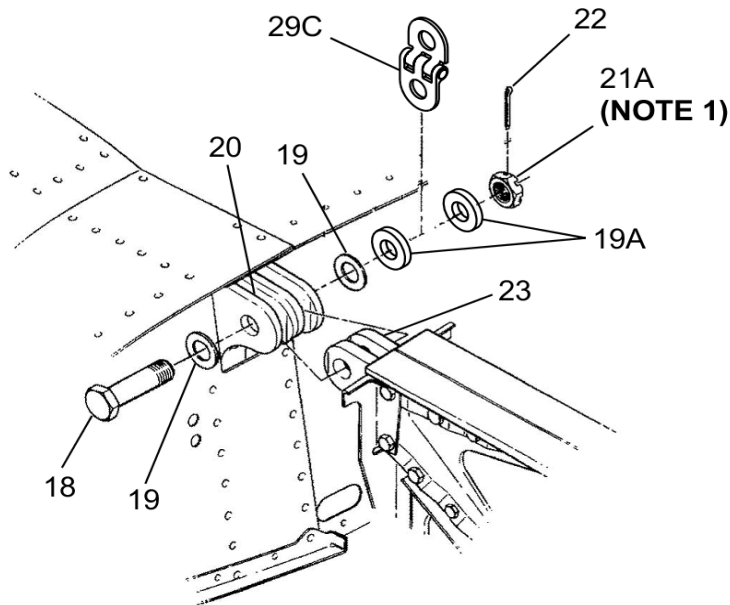
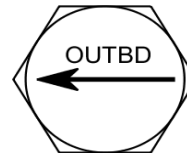


Figure 401 : Sheet 2 : Wing Installation

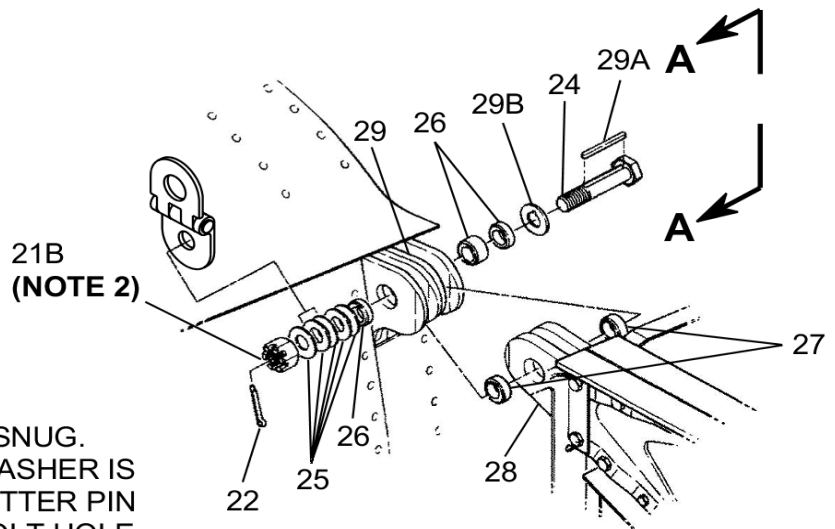
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**DETAIL C**



**VIEW A-A**



**DETAIL D**

**NOTE 1:** TIGHTEN THE NUT UNTIL IT IS SNUG. THEN LOOSEN IT UNTIL THE WASHER IS FREE TO ROTATE AND THE COTTER PIN HOLE IS ALIGNED WITH THE BOLT HOLE.

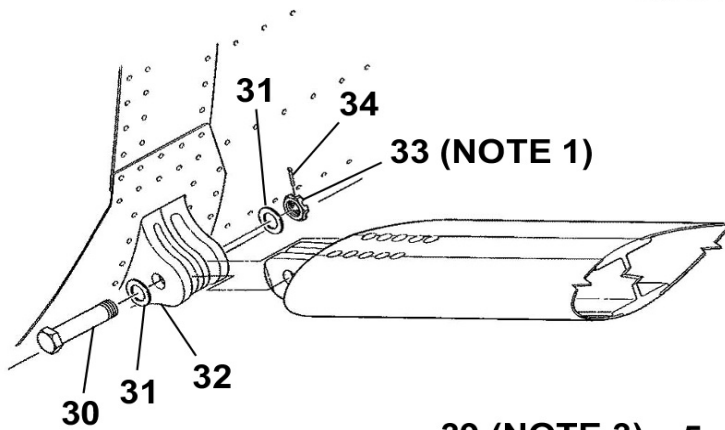
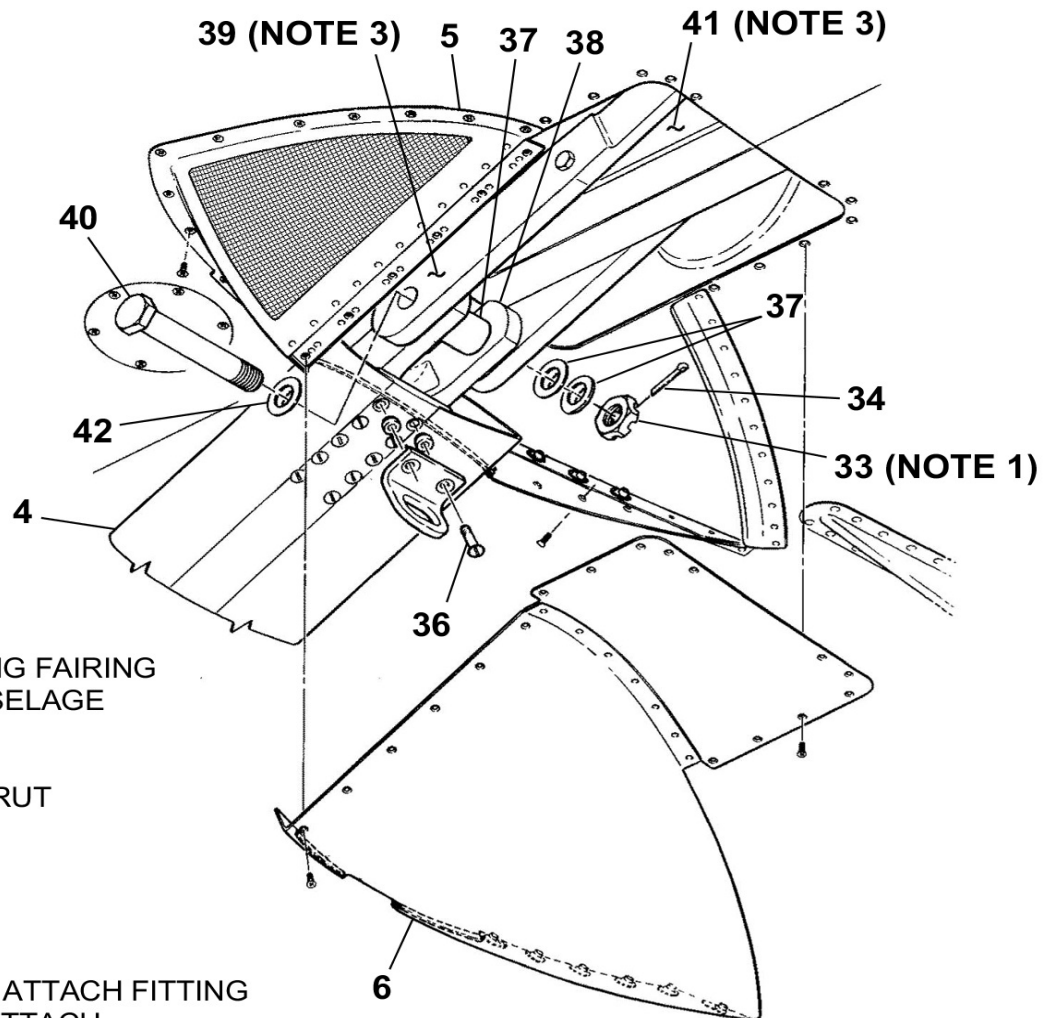
**NOTE 2:** TIGHTEN THE NUT UNTIL IT IS SNUG AND THE WASHER IS NO LONGER FREE TO ROTATE. THEN TIGHTEN THE NUT NOT MORE THAN ONE MORE FULL TURN AND ALIGN THE COTTER PIN HOLE WITH THE BOLT HOLE.

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|--|--|
| 18. FRONT SPAR ATTACH BOLT             | 26. INCIDENCE ADJUSTMENT ECCENTRICS (FUSELAGE FITTING) |
| 19. WASHER                             | 27. INCIDENCE ADJUSTMENT ECCENTRICS (SPAR FITTING)     |
| 19A. WASHER                            | 28. WING REAR SPAR ATTACH FITTING                      |
| 20. FUSELAGE FRONT SPAR ATTACH FITTING | 29. FUSELAGE REAR SPAR ATTACH FITTING                  |
| 21A. NUT ( <b>NOTE 1</b> )             | 29A. KEYWAY  |
| 21B. NUT ( <b>NOTE 2</b> )             | 29B. KEYED WASHER                                      |
| 22. COTTER PIN                         | 29C. LIFTING HINGE                                     |
| 23. WING FRONT SPAR ATTACH FITTING     |  |
| 24. REAR SPAR ATTACH BOLT              |  |
| 25. WASHER                             |  |

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Figure 401 : Sheet 3 : Wing Installation

**NOTE 3:** ON AIRPLANES 20800011 AND ON AND 208B0001 AND ON, THE WING LIFT STRUT ATTACH FITTING AND THE STRUT SUPPORT BECOME A ONE-PIECE ATTACH FITTING FORGING.

**DETAIL E****DETAIL F**

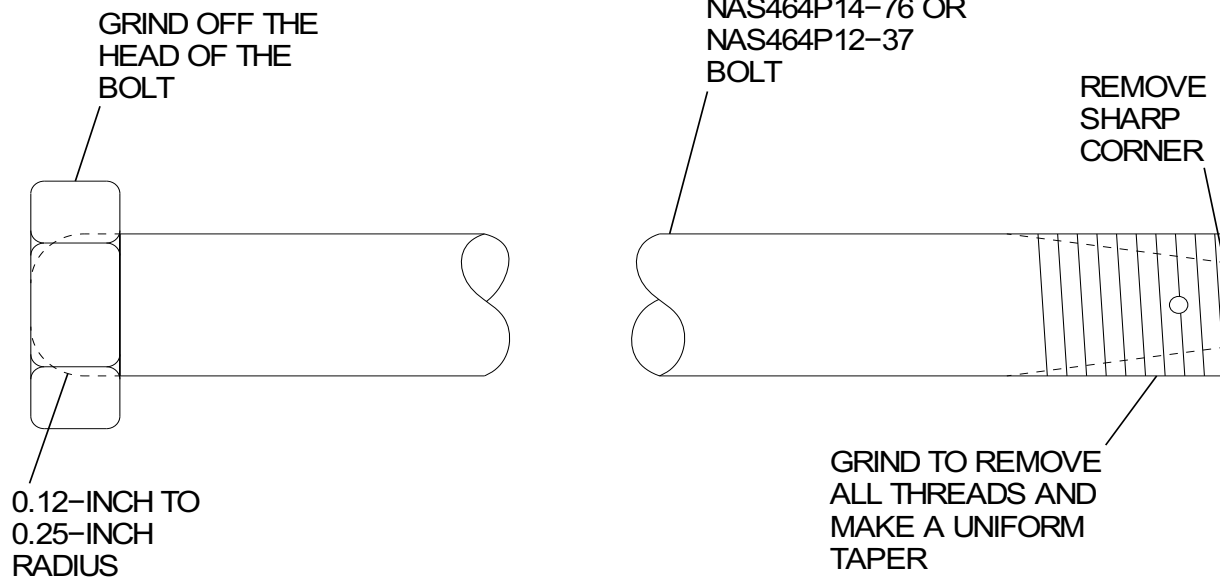
- 4. LIFT STRUT
- 5. AIR INLET COVER
- 6. LIFT STRUT-TO-WING FAIRING
- 30. LIFT STRUT-TO-FUSELAGE ATTACH BOLT
- 31. WASHER
- 32. FUSELAGE LIFT STRUT ATTACH FITTING
- 33. NUT (**NOTE 1**)
- 34. COTTER PIN
- 36. TIE-DOWN FITTING
- 37. SPACER
- 38. LIFT STRUT UPPER ATTACH FITTING
- 39. WING LIFT STRUT ATTACH FITTING (**NOTE 3**)
- 40. LIFT STRUT-TO-WING ATTACH BOLT
- 41. STRUT SUPPORT (**NOTE 3**)
- 42. WASHER

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Figure 402 : Sheet 1 : Bullet Fabrication

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**NOTE:** A LONGER OR SLIGHTLY SHORTER BOLT MAY BE USED TO MAKE THE BULLET. THE DIAMETER IS CRITICAL.

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