# 52 Doors

# CHAPTER 52

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# CHAPTER 52 - DOORS

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## GENERAL - DESCRIPTION AND OPERATION

The Duke is equipped with a fail safe cabin door latching mechanism. When the door latch bolts are in position, a spring-loaded secondary locking device maintains a safety locked condition. In addition, a pressure slide lock prevents inadvertent movement of either the secondary system or the door handle itself when pressurized. When the door is closed, the outside cabin door handle is spring loaded to fit into a recess in the door to create a flat, aerodynamically clean surface. The door may be locked with a key.

To open the door from the outside, press inward on the forward end of the handle to raise the aft end enough to grasp it. On serials P-123, P-127 and after, push the safety release button and lift the handle from its recess and turn it counterclockwise until the door opens. The door will swing out and forward over the left wing section. The door may be closed from the outside by rotating the handle clockwise. The three door latching bolts activate three switches mounted on the bulkhead behind the fuselage door frame. A fourth switch mounted on the door (serials P-4 through P-126, except P-123) is activated by the door handle latch mechanism. A cabin door warning light on the annunciator panel illuminates when the cabin door is not secure. All door switches must be activated to turn off the annunciator light.

To close the door from the inside, pull the door shut firmly with the handle in the forward position. Rotate the door handle aft in a counterclockwise manner until the safety lock bolt handle moves aft or the safety lock button pops outward. When the door handle has been rotated completely aft, (serials P-4 through P-126, except P-123) the safety lock bolt handle will snap forward to its original position.

At this point, the door is securely locked and cannot be opened except by moving the safety lock bolt full aft; or on the serials P-123, P-127 and after, pressing the safety lock button in. If there is residual pressure remaining in the cabin, the red "T" handle, located forward of the cabin door handle, must be pulled to override the pressure locking mechanism before the safety lock bolt or safety lock button will move. Once the safety lock bolt has been pulled aft, or the safety lock button pressed in, the door handle may be rotated forward to open the door.

*CAUTION*

If the cabin door handle is rotated in an attempt to open the door and the safety lock bolt (P-4 through P-126, except P-123) is not in the full aft position, damage may result to the safety lock bolt mechanism.

The Duke 60 Series aircraft are equipped with a retractable assist step, attached to the fuselage under the cabin door, to aid in entering and leaving the aircraft. A cable, attached to the actuator arm on the right hand main landing gear strut, extends the assist step when the landing gear is extended. When the landing gear is retracted, the assist step is retracted and fits flush with the fuselage.

The CABIN DOOR light in the annunciator remains illuminated until the door is closed, latched and locked, since all three latch pin switches are wired in parallel with one another; and on serials P-4 through P-126, except P-123, with the door locked switch. When the cabin door is closed and latched, each latch pin compresses the actuator on its respective switch mounted on the bulkhead behind the aft frame of the doorway. When the cabin door handle is rotated to the locked position (serials P-4 through P-126, except P-123) a spacer at the bottom of the latch mechanism lock bolt compresses the arm on the door locked switch.

"END"

## PASSENGER/CREW - MAINTENANCE PRACTICES

### *CABIN DOOR REMOVAL*

a. Remove the upholstery panels adjacent to the hinges at the forward side of the door frame to gain access to the hinge attaching points.

b. Disconnect the electrical leads for the cigarette lighter and door locked indicator light at the forward side of the door frame.

c. Remove the nut securing the shaft of each hinge assembly to the door frame.

d. Remove the door by pulling the hinge shafts out of the mounting holes in the door frame.

### *CABIN DOOR INSTALLATION*

a. Align the door with the door frame and insert the upper and lower hinge shafts into the mounting holes in the door frame.

b. Reinstall the washers that go between the hinge bearing mount and the shoulder of each hinge shaft.

c. Secure the hinges to the door frame structure with the attaching washer and nut. Check for a clearance of .03 to .05 inch between the hinge half and the door frame throughout the arc of the hinge rotation as the door is latched and locked. Add AN960-616 or AN960-616L washers as necessary between the hinge bearing mount and the shoulder of each hinge shaft to obtain this clearance.

d. Make any adjustments necessary for proper operation of the latch mechanism.

### *DOOR LATCH ADJUSTMENT (Figures 201 and 202)*

The following adjustments are possible only if the latch mechanism is properly rigged:

a. Unsafety and adjust the length of the upper and lower latch pins until they extend one inch beyond the door frame with the hinges in the closed position.

b. Adjust the stop bolt (see Detail A) until the complete travel of the center latch bolt from the locked position is 1-1/4 inches.

*CAUTION*

To prevent damage to the ears of the spring in the exterior handle (P-4 thru P-126, except P-123) the stop bolt must be adjusted to provide .010 to .030 inch clearance (see Detail F, Figure 201) between the ears of the spring and the lug in the casting of the handle when the handle reaches the limit of its travel.

Check that the center latch pin extends 1-1/4 inches beyond the door frame when the hinges are in the closed position and 1/4 inch when in the open position. If necessary, adjust the length of the latch pin push rod to obtain the foregoing settings.

c. If the proper settings cannot be obtained by the preceding adjustments, the latching mechanism must be rerigged.

### *LATCH MECHANISM RIGGING (Figures 201 and 202)*

The door latch mechanism is prerigged at the factory and should not normally require further adjustment except when damaged parts, such as chains and sprockets, require replacement. After removing all upholstery panels from the door to gain access to the latching mechanism, rig the door as follows:

a. Check for a clearance of .030 to .050 inch between each hinge half and the door frame throughout the arc of hinge rotation as the door is latched and locked. If necessary, add AN960-616 or AN960-616L washers between the shoulder of the hinge shaft and the hinge bearing (see Detail C) until the proper clearance is obtained.

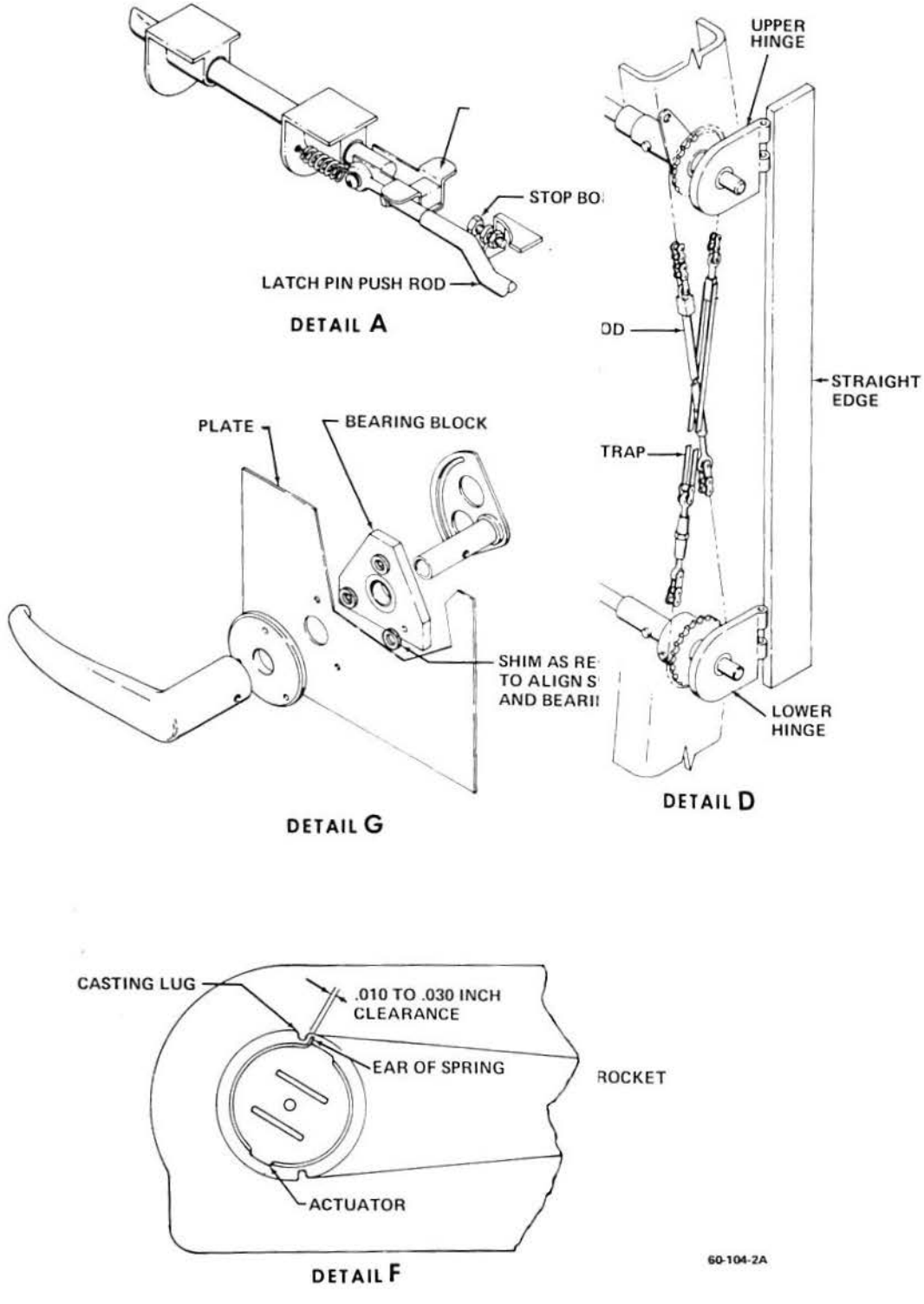
b. Use a straight edge to ascertain that the upper and lower hinge pins (see Detail D) are aligned with one another when the hinges are in the fully open position. Adjust the position of the chains on the upper and lower sprockets until the hinges can be rotated to the fully closed position without interference between the strap or rod terminals and the chain sprockets.

c. Check that the chains are positioned on sprockets (1, 2, 3, and 4, Details C and E) so that the hinges can be rotated to the fully open position without interference between the turnbuckle terminals and sprockets.

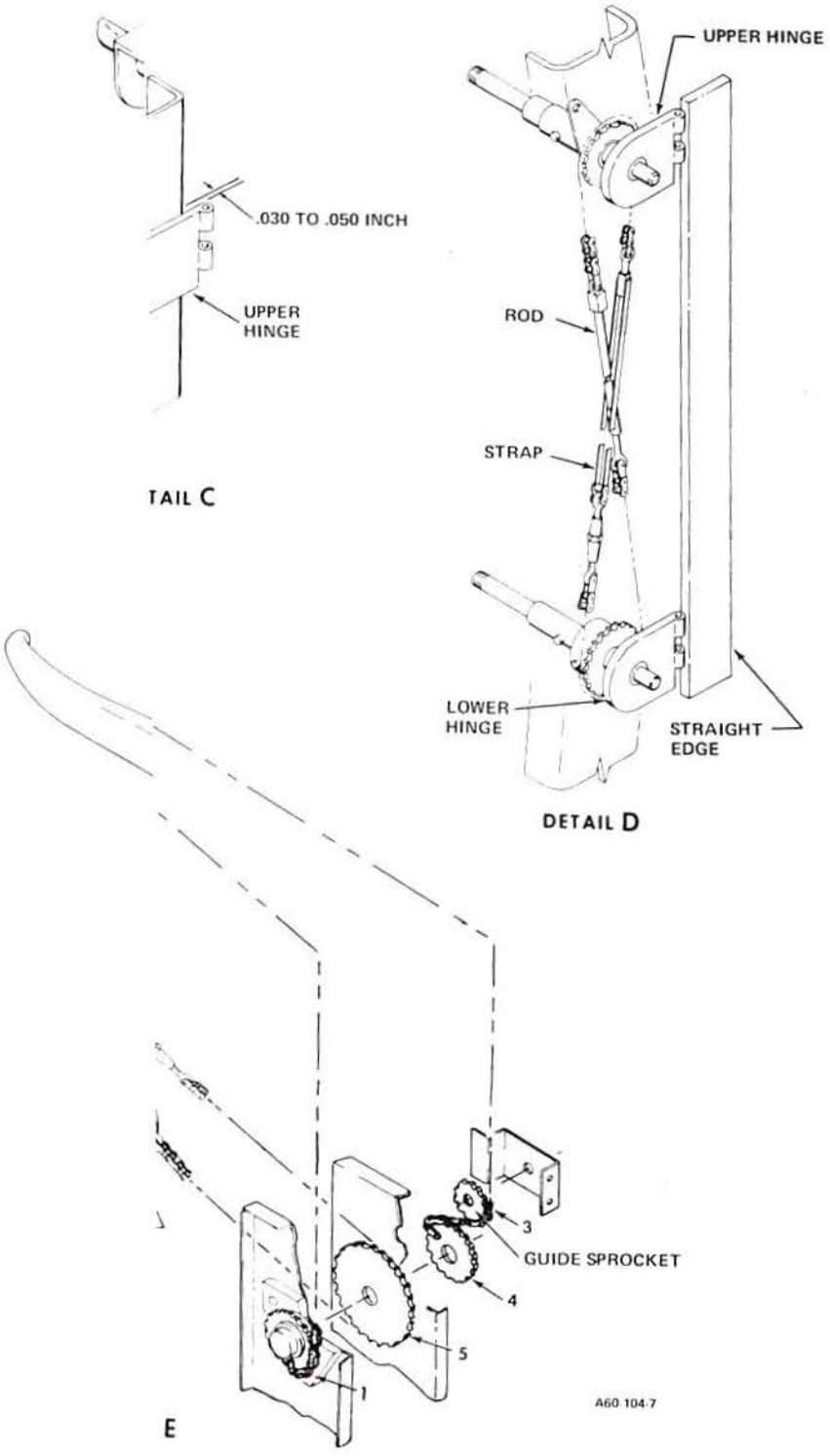
d. Align the hinges with the straightedge and place the interior handle in the fully open position.

NOTE

If the chain between sprockets (5 and 6, Detail E) has been removed, it must be reinstalled at this point. The chain must be installed with the exterior handle in the neutral position and the interior handle in the fully open position to avoid overloading the latching mechanism requiring excessive force to turn the door handles.




Cabin Door Mechanism (P-4 thru P-126, except P-123)
Figure 201




Cabin Door Mechanism (P-123, P-127 and after)
Figure 202

Check that the chains are positioned on sprockets (5 and 6, Detail E) so that the interior handle can be rotated for its full travel without interference between the chain turnbuckle and the sprockets.

NOTE

If the handle binds while being rotated, check the chain for proper deflection under firm thumb pressure as indicated in Detail E. Adjust the chain turnbuckle as necessary to obtain this deflection. If the chain is at the proper tension but the handle still binds, check for alignment of the plate and bearing (see Detail G) with the handle shaft. Shim between the bearing block and plate with AN960-10L washers as necessary to eliminate the misalignment.

e. Check that the lock bolt (P-4 thru P-126, except P-123) pulls aft to clear the lock (see Detail B, Figure 201) when the exterior handle is in the fully open position. If necessary, reposition the lock arm support at its slotted mounting holes to obtain this clearance.

f. Adjust the stop bolt (see Detail A) until the complete travel of the center latch bolt from the locked position is 1-1/4 inches.

*CAUTION*

To prevent damage to the ears of the spring in the exterior handle, (P-4 thru P-126, except P-123) the stop bolt must be adjusted to provide .010 to .030 inch clearance (see Detail F, Figure 201) between the ears of the spring and the lug in the casting of the handle when the handle reaches the limit of its travel.

Check that the center latch pin extends 1-1/4 inches beyond the door frame when the hinges are in the closed position and 1/4 inch when in the open position. If necessary, adjust the length of the latch pin push rod (see Detail A) to obtain these settings.

g. Unsafety and adjust the length of the upper and lower latch pins until they extend one inch beyond the door frame with the hinges in the closed position.

## *LUBRICATION OF CABIN DOOR LATCHING MECHANISM*

The latch mechanism is lubricated upon assembly and will not normally require further lubrication except when parts are replaced, then the chains and all points of friction except oilite bearings should be lubricated with MIL-G-81322 grease (9, Chart 207, 91-00-00).

**"END"**

## ENTRANCE STAIRS - MAINTENANCE PRACTICES

### *RETRACTABLE ASSIST STEP REMOVAL (Figure 201)*

a. Remove the bolt (1) from the outboard side of the step (2).

b. Slide the step off far enough to clear the stops (6). Allow the step to rotate until the tension on the spring (5) is relieved.

c. Remove the step.

### *RETRACTABLE ASSIST STEP INSTALLATION*

a. Place the spring in the step. Align the spring end in the corresponding hole in the step retainer (3).

b. Slide the step on the strut assembly shaft (4) and rotate counterclockwise until the remaining spring end is in place in the hole in the strut assembly shaft.

c. Continue rotating the step until the stops are aligned. Slide the step on until the stops engage.

d. Replace the bolt in the outboard side of the step.

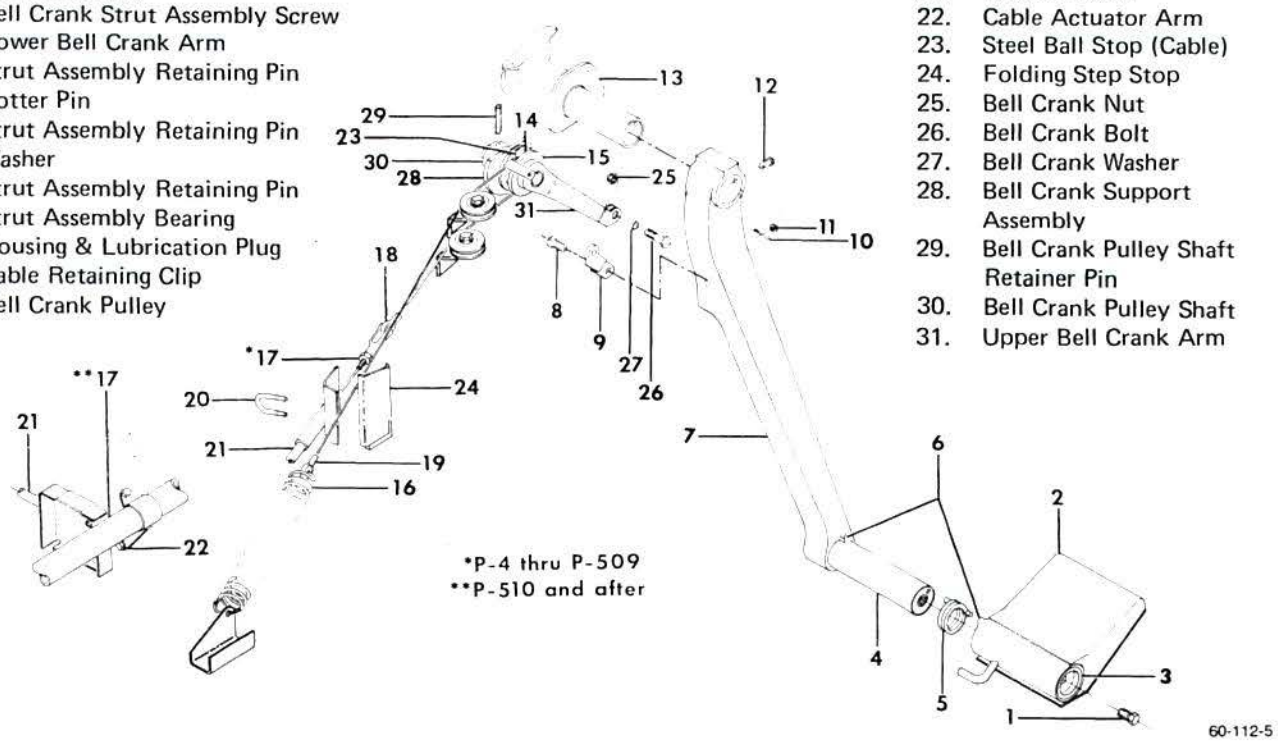
### *STEP ADJUSTMENT (FOLDED POSITION)*

If the step is not flush with the skin when in the folded position it may be adjusted. This is done by loosening the two bolts in the stop (24), and sliding it up or down as needed.

### *STRUT ASSEMBLY REMOVAL (Figure 201)*

a. Remove the small access plate below the cabin door in the area of the strut assembly (7).

1. Step Retaining Bolt
2. Cabin Step
3. Step Retainer
4. Step Assembly Shaft
5. Step Extension Spring
6. Step Extension Stops
7. Strut Assembly
8. Bell Crank Strut Assembly Screw
9. Lower Bell Crank Arm
10. Strut Assembly Retaining Pin Cotter Pin
11. Strut Assembly Retaining Pin Washer
12. Strut Assembly Retaining Pin
13. Strut Assembly Bearing Housing & Lubrication Plug
14. Cable Retaining Clip
15. Bell Crank Pulley
16. Strut Assembly Extension Spring
17. Clevis Adjusting Rod End
18. Cable Clevis
19. Bell Crank Actuator Cable
20. U-bolt Cable Clamps
21. Covered Cable
22. Cable Actuator Arm
23. Steel Ball Stop (Cable)
24. Folding Step Stop
25. Bell Crank Nut
26. Bell Crank Bolt
27. Bell Crank Washer
28. Bell Crank Support Assembly
29. Bell Crank Pulley Shaft Retainer Pin
30. Bell Crank Pulley Shaft
31. Upper Bell Crank Arm




**Retractable Assist Step**
**Figure 201**

b. Remove the access plate from the bottom of the airplane in the area of the strut assembly.

c. Remove the assembly screw (8) which connects the lower bell crank arm (9) to the strut assembly.

d. Remove the cotter pin (10), washer (11) and pin (12) which secures the strut assembly to the bearing housing (13).

e. Remove the six strut assembly attaching bolts revealed by removing the bottom panel, and remove the bearing housing.

*STRUT ASSEMBLY INSTALLATION*

a. Position the bearing housing (13) through the bottom panel and install the six strut assembly attaching bolts. Install the bottom panel.

b. Position the strut assembly (7) to the bearing housing and secure with the pin (12), washer (11), and cotter pin (10).

c. Position the bell crank arm (9) to the strut assembly and secure with the attaching screw (8).

d. Install the access plate to the bottom of the airplane in the area of the strut assembly.

e. Install the small access plate below the cabin door in the area of the strut assembly.

*CABLE REMOVAL (P-4 THRU P-509)*
*(Figure 201)*

a. Remove the large access plate below the cabin door.

b. Remove the L-shaped cable retaining clip (14) from the bell crank pulley (15).

c. Lower the flaps.

d. Release tension from the extension spring (16) by backing off the clevis adjusting rod end (17) from the clevis.

e. Separate the bell crank actuator cable at the cable clevis (18).

f. Disconnect the bell crank actuator cable (19) from the extension spring.

NOTE

The cable/return spring connection is accessible through holes which are exposed when the flaps are in the down position.

g. Remove the bell crank actuator cable.

h. Remove the long access plate inboard and slightly aft of the RH main landing gear door.

i. Remove the U-bolt clamps (20) from each end of the covered cable (21).

j. Detach the covered cable from the actuator arm (22) on the landing gear strut.

k. Note the routing of the covered cable and remove.

*CABLE INSTALLATION (P-4 THRU P-509)*

a. When installing either of the cables, peel laminations may be removed as required to allow the cable actuator arm (22) to rotate with 3 ± 2 inch-pounds torque.

NOTE

When installing the cables, be certain the steel ball stop (23) on the cable is in place on the bell crank pulley and tighten the rod end into the clevis to a depth of one inch. This is all that is necessary to rig the step travel.

b. Position the covered cable and route as noted during removal.

c. Attach the covered cable to the actuator arm (22) on the landing gear strut.

d. Install the U-bolt clamps (20) to each end of the covered cable.

e. Install the long access plate inboard and slightly aft of the RH main landing gear door.

f. Position the bell crank actuator cable and connect to the extension spring (16) and the clevis adjusting rod end (17).

g. Raise the flaps.

h. Install the L-shaped cable retaining clip (14) to the bell crank pulley (15).

i. Install the large access plate below the cabin door.

*CABLE REMOVAL (P-510 AND AFTER)*
*(Figure 201)*

a. Remove the large access plate below the cabin door.

b. Remove the L-shaped cable retaining clip (14) from the bell crank pulley (15).

c. Remove the long access plate inboard and slightly aft of the RH main landing gear door.

d. Release the tension from the extension spring (16) by backing off the clevis adjusting rod end (17) from the cable actuator arm (22), located on the landing gear strut.

e. Lower the flaps.

f. Separate the bell crank actuator cable at the cable clevis (18).

g. Disconnect the bell crank actuator cable (19) from the extension spring.

NOTE

The cable/return spring connection is accessible through holes which are exposed when the flaps are in the down position.

h. Remove the bell crank actuator cable.
i. Remove the U-bolt clamps (20) from each end of the covered cable (21).
j. Detach the covered cable from the actuator arm (22) on the landing gear strut.
k. Note the routing of the covered cable and remove.

## *CABLE INSTALLATION (P-510 AND AFTER)*

a. When installing either of the cables, peel laminations may be removed as required to allow the cable actuator arm (22) to rotate with 3 ± 2 inch-pounds torque.

NOTE

When installing the cables, be certain the steel ball stop (23) on the cable is in place on the bell crank pulley and tighten the rod end into the clevis to a depth of one inch. This is all that is necessary to rig the step travel.

b. Position the covered cable and route as noted during removal.
c. Position the bell crank actuator cable (19) and connect to the extension spring (16) and the non-adjustable clevis end of the covered cable.
d. Attach the clevis adjusting rod end (17) of the covered cable to the actuator arm (22) on the landing gear strut.
e. Install the U-bolt clamps (20) to each end of the covered cable.
f. Install the long access plate inboard and slightly aft of the RH main landing gear door.
g. Raise the flaps.
h. Install the L-shaped cable retaining clip (14) to the bell crank pulley (15).
i. Install the large access plate below the cabin door.

## *BELL CRANK ASSEMBLY REMOVAL (Figure 201)*

a. Remove the screw that attaches the bell crank to the strut assembly.
b. Remove the bell crank nut (25), bolt (26) and washer (27) from the upper bell crank arm (31). Remove the lower bellcrank arm (9).
c. Remove the access plate on the under side of the airplane, near the bell crank.
d. Remove the access plate below the cabin door in the area of the bell crank.
e. Remove the bell crank actuator cable as described in CABLE REMOVAL.
f. Locate the bell crank support assembly (28) in the lower access opening and remove the bell crank pulley shaft retainer pin (29) from the bell crank pulley shaft (30).
g. Remove the upper bell crank arm (31), the bell crank pulley (15) and bell crank pulley shaft (30).

## *BELL CRANK ASSEMBLY INSTALLATION*

a. Position the upper bell crank arm (31), pulley (15) and shaft (30) to the bell crank support assembly (28) and install the retainer pin (29) to the bell crank shaft (30).
b. Install the bell crank actuator cable as described in CABLE INSTALLATION.
c. Install the access plate below the cabin door in the area of the bell crank.
d. Install the access plate on the underneath side of the airplane, near the bell crank.
e. Install the lower bell crank arm (9) to the upper bell crank arm (31) and secure with the attaching bolt (26), washer (27) and nut (25).
f. Install the screw that attaches the bell crank to the strut assembly.

**"END"**

## DOOR WARNING - MAINTENANCE PRACTICES

The door locked and door latched switches will not normally require adjustment except when a new switch is installed.

a. Adjust the latch pin switches as follows:

NOTE

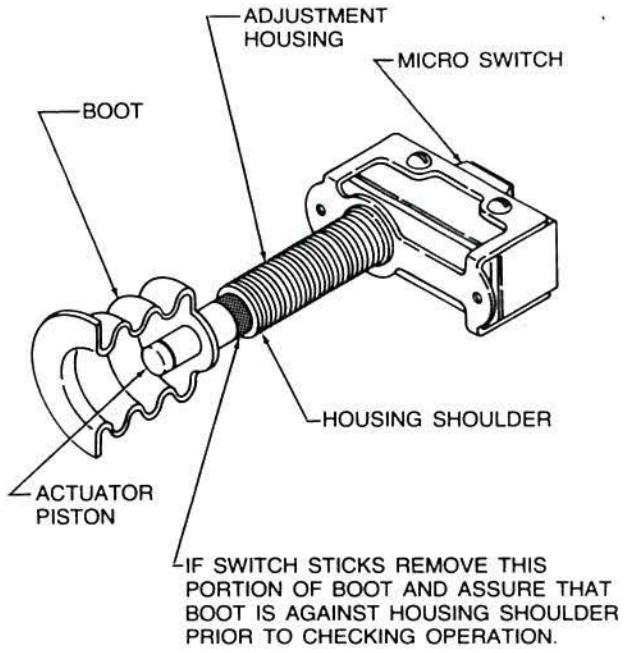
Before making adjustments to the latch pin switches be sure the latch pins are properly adjusted as outlined under DOOR LATCH ADJUSTMENT in this chapter.

1. Remove the cabin upholstery panels adjacent to the upper, lower and center latches to gain access to the switches.
2. Close and lock the cabin door.
3. Rotate the cabin door handle clockwise against the lock mechanism stop while in the locked position. This will eliminate the effect of play in the lock mechanism.
4. Back the switch adjustment off until the switch is not actuated.
5. Readjust the switch until it actuates.
6. Adjust upper and lower switch overtravel to .12 to .20 inch and middle switch overtravel to .07 to .11 inch.

NOTE

One complete revolution of the adjusting nut will provide .031 inch travel.

7. Reopen the cabin door and note if the switch remains in the actuated position due to the friction of the rubber boot on the actuating piston. If this occurs remove the safety wire on the boot, trim one-half of that portion of the boot which rides the actuating piston as indicated in Figure 201 and slide the boot along the piston until it rests against the shoulder of the adjustment housing.
8. Install new safety wire on the boot and close, lock and open the door to check for proper operation.
9. Install the cabin upholstery panels.




**Switch Boot Modification**
**Figure 201**

b. Adjust the door locked switch (P-4 thru P-126, except P-123) as follows:

1. Remove the upholstery panel under the window of the cabin door to gain access to the door locked switch.
2. Loosen the attaching screws and position the switch in its mounting slots so that the CABIN DOOR light goes out when the door is closed, latched, and locked.

**"END"**