FLAPS - DESCRIPTION AND OPERATION

The flaps are hinged in specially designed tracks. When extended, the flap moves rearward as it pivots downward. This gives a large, effective wing area, which produces additional lift and drag.

One flap is installed on each wing. The flaps are operated by an electric-motor-driven gearbox on the aft side of the front spar at the centerline of the airplane. The gearbox drives two flexible drive shafts, each connected to an acme-thread-type jackscrew at each flap. The flaps are controlled by a lever in the subpanel, and the flap position is indicated by an instrument to the left of the control column. The lever (switch) must be pulled out of a detent to change positions. On airplane serials E-1111, E-1241, thru E-1370; CJ-149; CE-748, CE-772 thru CE-815; D-10097, and D-10120 thru D-10178, the flaps may be stopped at any position by moving the flap switch to OFF when the flaps reach the desired position. The switch is placarded UP, OFF, and DOWN. The markings on the position indicator will be UP, 10°, 20°, and DN. On airplane serials CJ-150 and After; CE-816 and After; D-10179 and After; E-1371 thru E-2110 except E-1946 and E-2104; EA-1 thru EA-388 except EA-320, the indicator is marked UP, 15°, and DN. Serials E-1946, E-2104 and E-2111 and After; EA-320, EA-389 and After have lights to indicate flap position. These lights are marked to indicate the down, in-transit, and approach positions of the flaps. All lights are out when the flaps are up. The flaps can be stopped only on the up, approach, or down position as indicated by the flap switch.

The flap position transmitter (if installed) is located near the left flap actuator. Power to operate the indicator lights of later serials is controlled by the flap relay and limit switches.

NOTE

After an emergency extension at speeds above the normal extension speeds, inspect the flaps for damage or distortion before the next flight.

FLAPS - MAINTENANCE PRACTICES

FLAP REMOVAL

a. Remove the bolt from the flap actuating arm.

b. Remove the bonding cable from the flap tracks.

c. Remove the bolts from the flap track brackets and remove the flaps.

FLAP INSTALLATION

a. Hold the flap in position and install the rollers and the bolts in the flap track bracket.

NOTE

Install the flap track rollers (four rollers per flap and two rollers per track) in the flap track brackets with the flanges of the rollers in one track facing the flanges of the rollers in other track.

b. Connect the bonding cable and install the bolt in the flap actuating arm.

FLAP TRACK WEAR LIMITS

The allowable track wear on the bearing surface is 0.032 inch resulting in a maximum dimension of 0.785 inch in the track slot. The allowable wear into the track side surface is 0.050 inch. Track wear within the preceding limitations may be dressed smooth with light emery cloth to prevent roller binding. Lubricant mixed with solvent (49 and 26, Chart 1, 91-00-00) may be brushed on the flap tracks during servicing of the airplane.

FLAP LIMIT SWITCH ADJUSTMENT

NOTE

Battery voltage is not sufficient to properly cycle the flaps during rigging. An auxiliary power supply capable of maintaining 28.25 ± 0.25 volts should be used. If an external power receptacle is not available on the airplane, jumper cables may be used between the battery and the power supply. Be sure of the polarity before making the connection.

CAUTION

Excessive operation of the flap motor without proper cooling may cause damage to the motor. Allow a short cooling time after each extension and retraction cycle.

The flap limit switches are mounted on a bracket and installed on the outboard side of the inboard flap track in the left wing panel. The limit switches control the travel of the flaps by breaking the circuit to the flap motor at the extreme limits of travel. They are accessible by lowering the flaps.

TWO-POSITION FLAPS
(CE-748, CE-772 THRU CE-815; CJ-149; D-10097, D-10120 THRU D-10178; E-1111, E-1241 THRU E-1370)

There are two limit switches for this system, one for the uplimit position, and one for the downlimit position. To adjust the flaps to neutral position, loosen the screws of the switch assembly so that the assembly can pivot on the forward elongated hole. Adjust the switch as necessary to stop the flaps in neutral position. Actuate the flap switch to the down position and measure the degrees of travel (proper degree of travel is 30° + 0° - 2°). Adjustment of the down position of the flaps is made on the downlimit switch.

THREE-POSITION FLAPS
(CE-816 AND AFTER; CJ-150 AND AFTER; D-10179 AND AFTER; E-1371 AND AFTER; EA-1 AND AFTER)

The limit switches, one for up, two for the approach position and one for the down travel, control the travel of the flaps by breaking the circuit to the flap motor at the extreme limits of selected travel. The switches are accessible by lowering the flaps.

The flap travel is adjusted by moving the limit switches. The left flap is rigged first, then the right flap is synchronized with it. Rig as follows:

NOTE

Rig the flaps under a simulated flight load to reduce overtravel to a minimum after the limit switches have been actuated.

When the flaps are in the 0° position, a clearance of 1/16 inch + 1/16 inch - 1/32 inch must exist between the flap roller and the forward edge of the flap track slot.

a. Adjust the uplimit switch so the flaps will stop at the 0° position.

NOTE

At serials E-1946, E-2104, E-2111 and After, the flap switch approach position is 12°. Adjust the 11° limit (outboard) switch until the flaps are positioned at 11° to 11.5° after the flaps have been actuated from fully up position to the approach position. Adjust the 13° limit switch (inboard) switch until the flaps are at the 13° to 12.5° position after the flaps have been actuated from fully down to the approach position.

b. Adjust the 14° limit switch (inboard) in its mounting slot until the flap is positioned at 14° to 14.5° after the flap has been actuated from fully up to the takeoff position (15° range). Adjust the 16° limit switch (outboard) in its mounting slot until the flap is positioned at 16° to 15.5° after the flap has been actuated from fully down to the takeoff position (15° range).

c. Adjust the downlimit switch in its mounting slot until it actuates at 28° to 30° of flap travel.

d. Remove the bolt attaching the right actuator to the right flap.

e. Turn the jackscrew on the right actuator in or out to align the right flap with the left flap.

f. Install the bolt connecting the actuator to the flap.

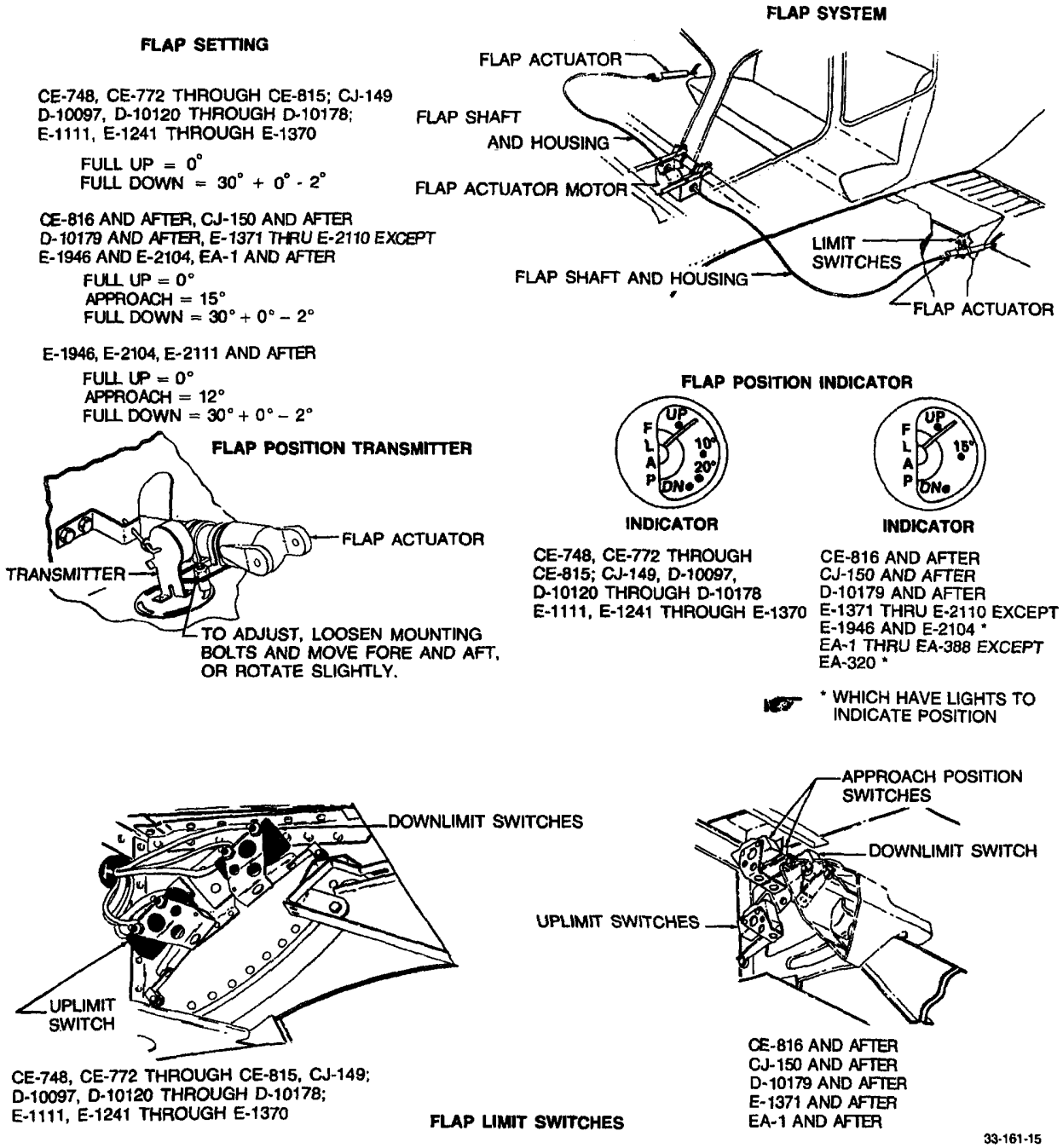
CAUTION

If the flaps are removed for any reason the main power switch should be in the OFF position.

NOTE

After the flap is completely rigged, adjust the rubber bumper (flap down) installed on the flap and aileron dividing rib. Turn the adjusting screw in or out, as required, to take out play or stop vibration when the flap is in the up position. A distinct change in the sound of the flap motor near the completion of the flap-up travel may indicate an excessive outward adjustment of the bumper.

g. Operate the flaps through full travel to ensure that the flaps contact the limit switches before they contact the rubber bumper.



Flap System
Figure 1

Island Enterprises

FLAP POSITION INDICATOR AND ADJUSTMENT

The flap position indicator gage is installed in the instrument panel. An adjustable flap position indicator transmitter is installed on the flap actuator in the left wing just forward of the rear spar to coordinate gage reading with flap travel.

a. Adjust the flap travel limit switches to provide the correct up and down travel of the flaps. Refer to FLAP LIMIT SWITCH ADJUSTMENT procedure.

b. Run the flaps down and check the pilot's compartment flap position indicator for 100% flaps. If down flaps are not indicated, loosen the transmitter attachment bolts and adjust transmitter fore and aft or rotate slightly until the reading is correct, then tighten the transmitter attaching bolts.

c. Run the flaps up and check the indicator for up flaps reading.

FLAP MOTOR REMOVAL

CAUTION

If the flap motor fails or if major overhaul is required for it to operate properly, the flap motor should be replaced. No attempt should be made to overhaul the motor in the field.

a. Remove the front seat assemblies.

b. Remove the spar cover.

c. Detach the clamp supporting the electrical wiring from the right-hand flap-shaft housing.

d. Disconnect the motor electrical wiring at the quick disconnect.

e. Loosen the two set screws on each cable retainer.

f. Rotate the cable retainers 90°.

g. Loosen the nuts on the inboard side of the mounting supports.

h. Pull the flexible drive shafts from the flap motor shafts and retainers.

i. Remove the flap motor attaching bolts and remove the flap motor.

CONNECTING FLEXIBLE FLAP DRIVE SHAFT TO FLAP MOTOR SHAFT

Connect the LH and RH flexible flap drive shafts to the flap drive motor shaft as follows, refer to Figure 2 for component locations:

a. Install the outboard nut and washer as far as they will go onto the threaded portion of the flap shaft housing.

b. Start set screws (2) into retainer. Insert the retainer through the flap shaft mounting support and onto the motor shaft as far as it will go.

c. Align retainer keyway with key slot in flap motor drive shaft and tighten one set screw temporarily.

d. While inserting the flap shaft through the mounting support, install the inboard washer and nut.