



# SERVICE LETTER

No. 764A

Piper Aircraft Corporation

Lock Haven, Pennsylvania, U.S.A.

July 17, 1979

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(Service Letter No. 764A supersedes and voids Service Letter No. 764 dated October 27, 1976).

Subject: Wing Flap System Maintenance Procedure

Reason for Revision: To revise Serial Numbers Affected.

Models Affected: Serial Numbers Affected:

PA-31/31-300/31-325 Navajos  
PA-31-350 Chieftain  
PA-31P Pressurized Navajo  
PA-31T Cheyenne/Cheyenne II  
PA-31T1 Cheyenne I

31-2 through 31-7812129  
31-5001 through 31-7852171  
31P-1 through 31P-7730012  
31T-7400002 through 31T-7820092  
31T-7804001 through 31T-7804011

Compliance Time: During normal aircraft inspection intervals or if flap system operational problems occur.

Purpose:

To provide current maintenance information relative to the flap system on the above referenced aircraft. This data summarizes inspection, maintenance and troubleshooting information contained in the latest versions of the subject aircraft respective service manuals, Piper Service Bulletin No. 494 dated April 21, 1976 and is submitted in the interest of maintaining the flap system in proper operating condition.

Instructions:

1. INSPECTION OF WING FLAP TRANSMISSION, (Refer to Figure 1.) The flap transmissions are inspected at every 100 hour inspection cycle of the aircraft. This is accomplished without removal of the transmissions, by the following procedures:
  - a. Position the flaps in the extended position (Down).
  - b. Remove the access covers on the lower wing surface to gain access to the flap transmissions.
  - c. With the use of vise grip pliers and exerting light pressure, grasp the exposed portion of the screw close to the transmission as shown. (Refer to Figure 1, views A and B).
  - d. With the pliers secured to the screw, a light pressure will move the pliers and screw as free play in the transmission gear set is taken up in either direction. Do not force the pliers.
  - e. Place a six inch ruler along the skin surface as shown in Figure 1, view B, and measure the overall distance the pliers move.

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Instructions (No. 1.) continued:

- f. Should this dimension exceed .32 (5/16) of an inch, replace the transmission assembly or obtain Gear Transmission Overhaul Kit 755 051 for 20:1 ratio transmissions, part numbers 4268-00 and 4268-00-1, or Kit 755 050 for 40:1 ratio transmissions, part numbers 1049-00-1 and 1049-00-3. (See parts catalog for serial numbers affected.) (Refer to appropriate service manual for transmission removal and installation.)
- g. Reinstall the access panels and make appropriate logbook entry.
- h. Repeat inspection at 100 hour intervals.

NOTE:

Refer to Appendix A (attached) for transmission run-in procedure - if transmission gears are replaced (per step f., above).

2. INSPECTION OF WING FLAP TRANSMISSION ACTUATOR SHAFT. (Refer to Figure 2.)

- a. Remove access plate from underside of left and right wing trailing edge, to gain access to flap transmissions.
- b. Check the distance between the flexible shaft assembly nut and the transmission to determine if shaft assembly is properly installed.
- c. When properly installed, the nut on flexible shaft will bottom or be within 3/16 of an inch of bottoming against transmission.
- d. If inspection reveals that either of the shaft assemblies are not properly installed, it will be necessary to correct as follows:
  - 1. Cut safety wire from nut and disconnect shaft assembly from transmission.
  - 2. Align and insert tang on shaft assembly into slot in transmission. Tighten nut per Steps b and c requirements. (A specific torque is not required; however, nut must be drawn up snug to insure that end of shaft housing is firmly seated against transmission). Safety nut with .040 wire.
- e. If flexible shaft assembly is disconnected from transmission or from flap motor, it will be necessary to check the flexible shaft rigging as follows:
  - 1. As the last step after the flap system has been rigged and the flex shaft nut has been tightened and safetied, the flex shaft is to be disconnected at the flap motor. Inspect swaged end of inner cable for wear or looseness.
  - 2. Observe the clearance between the outer sheath and inner cable.
  - 3. Twist outer sheath in proper direction (to lengthen or shorten), bringing clearance to  $3/64 \pm 1/32$  of an inch. It may be necessary to loosen clamp on fuselage bulkhead in order to twist outer sheath. (See Figure 2.)
  - 4. Holding outer sheath in this position, insert spline into flap motor, tighten nut and safety with .040 brass wire.
  - 5. Proceed with Steps 1 through 4 for other flex shaft if it has been disconnected.
  - 6. Tighten fuselage bulkhead clamp if loosened, reinstall access plates and make appropriate logbook entry.

Instructions continued:

3. REDUCTION OF FRICTION IN WING FLAP SYSTEM. (Refer to Figure 3.) To insure proper flap system operation and reduce friction on the flap motor, the following inspection and repairs are only required should operational problems exist in the flap system.
- a. Remove both right and left flap assemblies from the aircraft. (Refer to appropriate service manual.)
  - b. Clean all paint and dirt from the top and bottom of the flap tracks.
  - c. Inspect the flap tracks for any burrs along the track edges. If any are found, remove them with a fine file. Insure that no noticeable depressions are evident at the ends of the track areas.
  - d. Using fine sandpaper, polish the inside surfaces of the flap tracks and lubricate the tracks with light oil, MIL-L-7870 or Dupont Slip Spray No. 6611.
  - e. Clean all dirt and paint from the flap rollers.
  - f. On each flap roller remove 1/64 or .016 of an inch from one side of each roller. (Refer to Figure 3, View A-A.)
  - g. Polish all flap rollers and lubricate with light oil, MIL-L-7870.
  - h. Insure that the washers used on both sides of the rollers are flat. (Refer to Figure 3, View A-A.)
  - i. Install both flap assemblies on the aircraft. (Refer to applicable service manual.) Do not connect the flap transmission screws to the flaps at this time.
  - j. Ascertain that the flap rollers turn freely and that the flaps will move freely in the flap tracks under their own weight through the entire length of the flap tracks.
  - k. Insure that the flap transmission screw fits into the horn assembly on the flap without any binding throughout the flap travel.

NOTE:

It may be necessary to move the horn assembly to obtain this no binding fit. The mounting holes on the horn assembly may be slotted to gain some adjustment if needed. (Refer to Figure 3, View B-B for dimensions of slots.)

CAUTION: Do not attempt to force the screw barrel into the horn; if misalignment cannot be corrected by slotting, contact the factory Product Support Specialist.

- l. Ascertain that the transmission bolt at the flap end fits into the screw end horn assembly with finger pressure only. (Refer to Figure 3).
- m. Install the transmission bolt AN4-15, washer AN960-416, and nut AN310-4 only finger tight and install a cotter pin MS24665-134.
- n. If not previously accomplished at the regular 100 hour inspection, the flap transmission should be checked in accordance with Instructions no. 1, above.
- o. Ascertain that the flap transmission cables are installed properly. (Refer to Instructions no. 2, above.)
- p. Inspect the travel of the flaps in the flap tracks per instructions given in appropriate service manual.
- q. Ascertain that all wire connections on the flap relay in the radio compartment are tight.
- r. Ascertain that all wire connections on the flap selector switch are tight.

Instructions continued:

4. WING FLAP MOTOR NO LOAD RPM CHECK. (Refer to Figure 4.) This check for demagnetization of the flap actuating motor should be accomplished along with friction reduction per Instructions, No. 3, above if flap motor circuit breaker popping has been or remains a problem.
- With the wing flap motor (1) installed in the aircraft, disconnect both of the flexible drive shafts (4) and remove one of the flex drive adapters (2) from the motor.
  - On the exposed motor splines, paint a white strip on one of the spline teeth.
  - Energize the flap motor with the flap selector switch.
  - With the aid of a Simpson 410 Photo Tachometer or equivalent, hold the probe within one-half of an inch of the painted rotating spline shaft and observe the RPM reading on the meter. RPM in excess of 11,000 (see note 3 on page 4) will indicate demagnetized motor field magnets, and the motor should be replaced.
  - In the event that the above meter cannot be obtained, another method can be used to make the check. This would require the removal of the motor from the aircraft and using a hand held tachometer and 24 volt D.C. power source. (Refer to appropriate service manual for removal and installation of flap actuator motor.) If this cannot be accomplished, remove the motor and take it to a local electric motor overhaul facility for the RPM check.
  - Re-assemble and insure proper spline shaft engagement per Instructions No. 2, above.

NOTES

- Do not perform no load RPM check unless a problem of circuit breaker popping exists or has existed with the flap motor that is still in the system.
- Flap motor check must be made with a 24 volt D.C. power source only; check electrical power source with a voltmeter to insure source is exactly 24 volts. Lower and higher voltages will result in invalid RPM check.
- Reference step d., above, the 11,000 RPM limit supersedes the 9,000 RPM limit denoted in Piper Service Bulletin No. 494 dated April 21, 1976, Section III, "Wing Flap Motor No Load RPM Check".

5. WING FLAP MOTOR/FLEX SHAFT ENGAGEMENT CHECK, (Refer to Figure 4.)

- With both flexible drive cables disconnected at the motor, examine the splined coupling for wear and security. Examine the base of the swaged portion for wear under the washer (See Fig. 4-B). Wear in excess of .005 inch deep on the swaged terminal is cause for replacement of the cable assembly.
- If signs of wear are discovered (caused by the washer), recenter the adapter plate over the motor drive spline (See Fig. 4-A). Remove motor, loosen the adapter plate attachment nuts, recenter the plate over the spline and re-attach and secure the plate (in some cases, it may be necessary to rotate the plate 180° for better alignment).

Material Required:

Not applicable.

Availability of Parts:

Not required.

Effectivity:

This service release is effective upon receipt.

Summary:

The primary intent of this service release is to provide a summarized version of various current maintenance and troubleshooting data relative to the above referenced aircraft wing flap system, and is published for the mutual benefit of Piper Field Service Facilities and affected owners/operators.

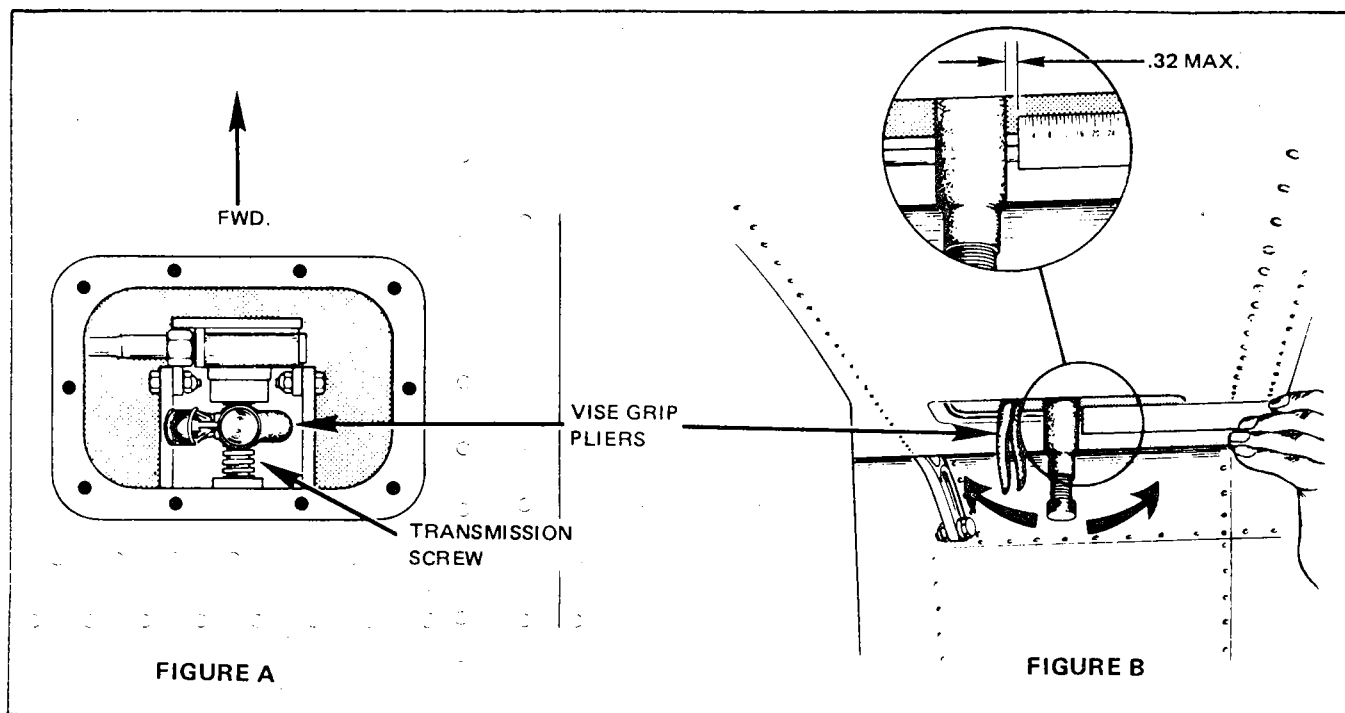


Figure 1. Wing Flap Transmission Inspection

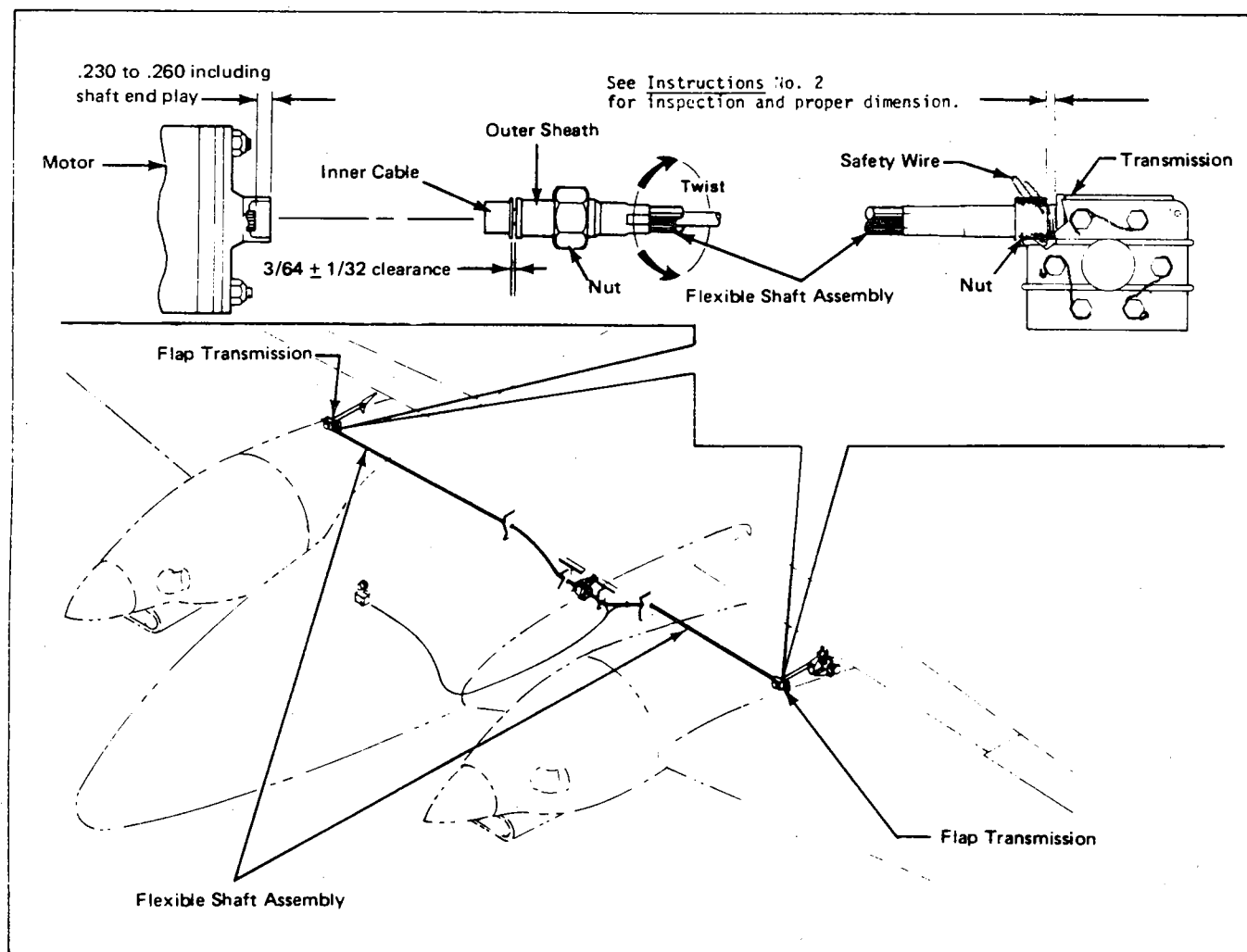


Figure 2. Wing Flap Actuator Cable

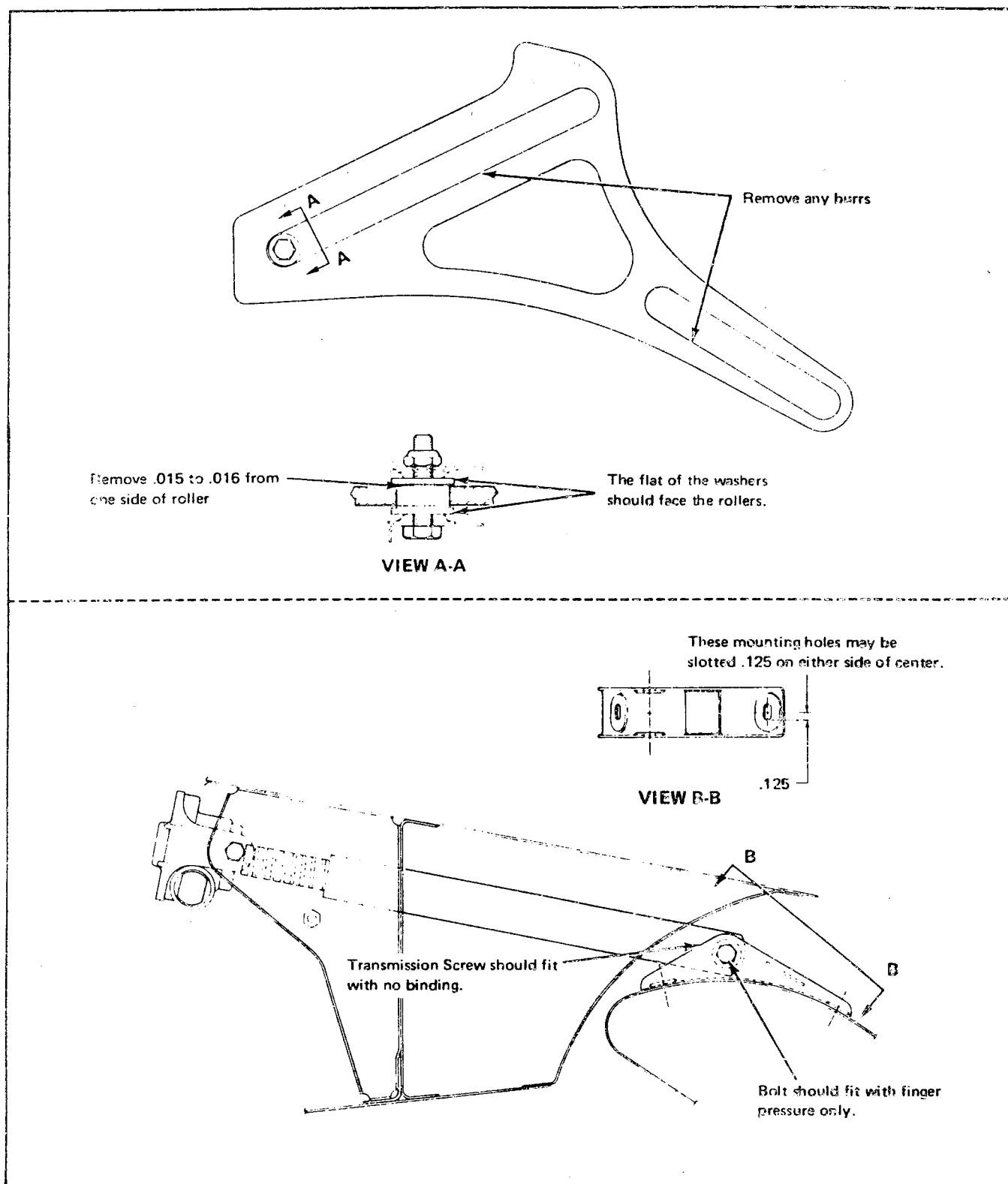


Figure 3. Friction Reduction in Wing Flap System

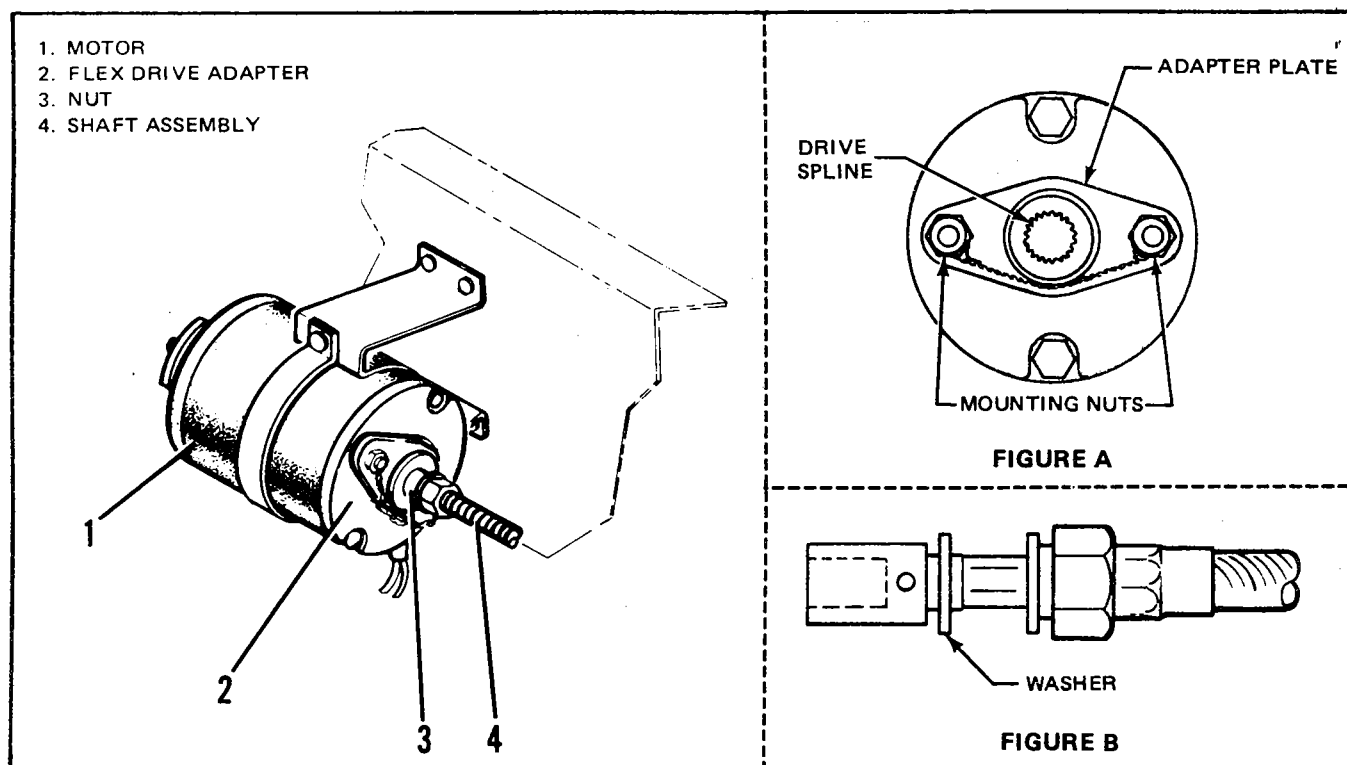


Figure 4. Wing Flap Motor



First it must be determined whether the transmission in question should be run-in. This applies to transmissions with Part Nos. 4268-00, 4268-00-1, 1049-00-1 and 1049-00-3 which have been rebuilt with new gear sets from Dukes or Piper Kit Nos. as follows:

Dukes Kit No.	Piper Kit No.	Transmission Part No.
1209-1000	755 051 20:1	4268-00
1209-1000	755 051 20:1	4268-00-1
1216-1000	755 050 40:1	1049-00-1
1216-1000	755 050 40:1	1049-00-3

This is accomplished with the transmission removed from the aircraft as follows:

1. Extend the transmission screw to the end of its travel.
2. Using a flat blade screwdriver inserted into the slot of the worm gear on the transmission (see Figure A), turn the gear 20 turns for the 4268 unit or 40 turns for the 1049 unit and note any tight or high spots as the worm gear is rotated.

#### NOTE

The transmission should have an end load applied while turning the worm gear. (See Figure A.)

3. Should a tight or high spot be felt, an additional check must be made. This requires the use of a short length of smooth (3/16) .1875 diameter rod with one end filed to form a blade shape that will fit the slot in the worm gear, or use a screwdriver with a smooth (3/16) .1875 diameter shank.

4. With the transmission positioned upright and applying the end load, again feel for the tight or high spot with the screwdriver inserted in the worm gear slot. If a high spot is found, remove the screwdriver and insert the fabricated rod or screwdriver into the slot and try to rotate the rod or screwdriver shank between your fingers.

5. If the rod or screwdriver can be rotated by finger pressure only, no further action is required and the transmission is ready for use in the aircraft. If the rod or screwdriver cannot be rotated by finger pressure only, the transmission will require a run-in prior to being used in the aircraft.

6. There are two methods for performing this run-in. The first is the preferred method which will require some equipment and the second is an alternate, should the equipment not be available.

#### METHOD I:

Equipment required:

- a. Flap motor
- b. Flap system actuator cable
- c. 28 Volt DC Power Source

1. Connect the actuator cable to the transmission and flap motor. Secure the flap motor to a solid base.

2. Extend the transmission screw to the end of its travel and hold the transmission with a shop cloth to prevent the heat buildup generated during the run-in from scorching your hand.

3. Connect the flap motor to the power source (operate the motor and transmission to extend the transmission screw) and proceed to run-in the unit for two, three (3) minute periods with a three minute rest period inbetween.

4. With the transmission positioned upright and applying the end load, again feel for the tight or high spot with the screwdriver inserted in the worm gear slot. If a high spot is found, remove the screwdriver and insert the fabricated rod or screwdriver into the slot and try to rotate the rod or screwdriver shank between your fingers.

5. If the rod or screwdriver can be rotated by finger pressure only, no further action is required and the transmission is ready for use in the aircraft. If the rod or screwdriver cannot be rotated by finger pressure only, the transmission will require an additional run-in prior to being used in the aircraft. Refer back to step 3.

## APPENDIX A (continued)

**METHOD II:** If the equipment listed in Method I is not available, the flap motor and actuator cable in the aircraft may be used. This will require disconnecting one of the actuator cables from the flap motor and the extension of the wing flaps and removal of the three lower rollers to allow the flap to drop completely out of the way, and subsequent re-rigging of the complete flap system.

1. Extend the flaps to the full down position and then run them back up 5 degrees to clear the limit switches.
2. Disconnect the transmission from the flap.
3. Remove the three lower flap rollers on the side to be used for the run-in and allow the flap to hang down from the wing.
4. Disconnect the flap actuating cable from the opposite side of the flap motor to prevent the other flap from moving during the run-in.
5. Support the flap transmission to prevent it from shaking during the run-in. (Refer to Figure A.)
6. Actuate the flap motor by selecting the flap "DOWN" position.

### NOTE

Do not select the flap "UP" position as this will run the screw up and bind the flap screw.

7. Run the transmission for two, three (3) minute periods with a three minute rest period inbetween.
8. With the transmission positioned upright and applying the end load, again feel for the tight or high spot with the screwdriver inserted in the worm gear slot. If a high spot is found, remove the screwdriver and insert the fabricated rod or screwdriver into the slot and try to rotate the rod or screwdriver shank between your fingers.
9. If the rod or screwdriver can be rotated by finger pressure only, no further action is required and the transmission is ready for use in the aircraft. If the rod or screwdriver cannot be rotated by finger pressure only, the transmission will require an additional run-in prior to being used in the aircraft. Refer back to step 7.

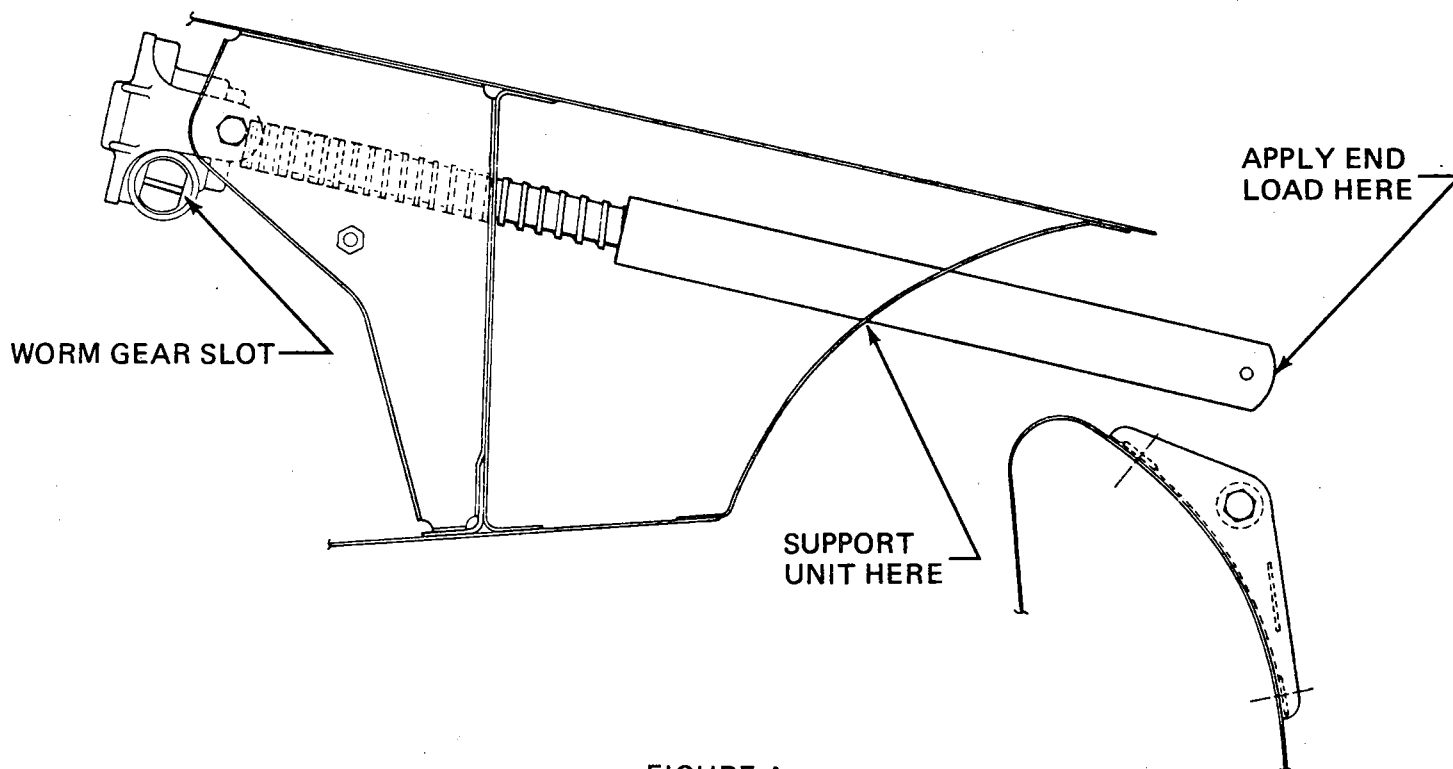


FIGURE A