

CHAPTER 76
ENGINE CONTROLS

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CHAPTER 76

ENGINE CONTROLS

76-00 Description

A twist grip throttle control is located on each collective stick. The controls are interconnected and actuate the Rolls-Royce engine model 250-C300/A1 fuel control input lever via a push-pull cable. The throttle is normally not used for control but is set either fully closed (idle position) or fully open.

The engine incorporates a hydromechanical governor which attempts to maintain 100% engine output shaft RPM when the throttle is in the open position. A linkage provides the power turbine governor with collective inputs to help anticipate changing power demands.

Large power changes or varying environmental conditions may cause the governor RPM setting to vary by a few percent. A momentary toggle switch (beep switch) on the collective stick is provided to trim, or "beep", the governor setting to the desired RPM. The switch controls an actuator which adjusts the linkage between the collective and power turbine governor.

The governor controls RPM under normal conditions. It may not prevent over- or under-speed conditions generated by aggressive flight maneuvers or rapid power changes.

Other engine controls include a push-pull fuel cutoff control on the console face, a start button on the pilot's collective, a key-type igniter switch, and an anti-ice switch.

76-10 Fuel Control Unit (FCU)

Refer to R66 Illustrated Parts Catalog (IPC) Figure 76-1.

A. Removal

1. Pull fuel valve OFF. Remove engine cowling assembly per Section 53-21.
2. Refer to Figure 76-1. Remove fasteners securing C522-10 throttle and A522-10 fuel cutoff control inner wires to FCU throttle and fuel cutoff levers.
3. Remove fasteners securing control housings and AN742-4 clamps to F577 bracket assemblies, as required.
4. Remove FCU per RR300 Series Operation and Maintenance Manual (OMM).
5. If sending FCU to repair facility, remove F147-1 (minimum throttle stop) screw and D930-2 spring.

B. Installation

1. If removed: Install F147-1 (minimum throttle stop) screw, special torque screw per Section 20-33, and torque stripe per Figure 5-1. Install D930-2 spring.
2. Install FCU per RR300 Series Operation and Maintenance Manual (OMM).
3. Perform throttle control rigging per Section 76-11.
4. Perform fuel cutoff control rigging per Section 76-12.
5. Push fuel valve ON.

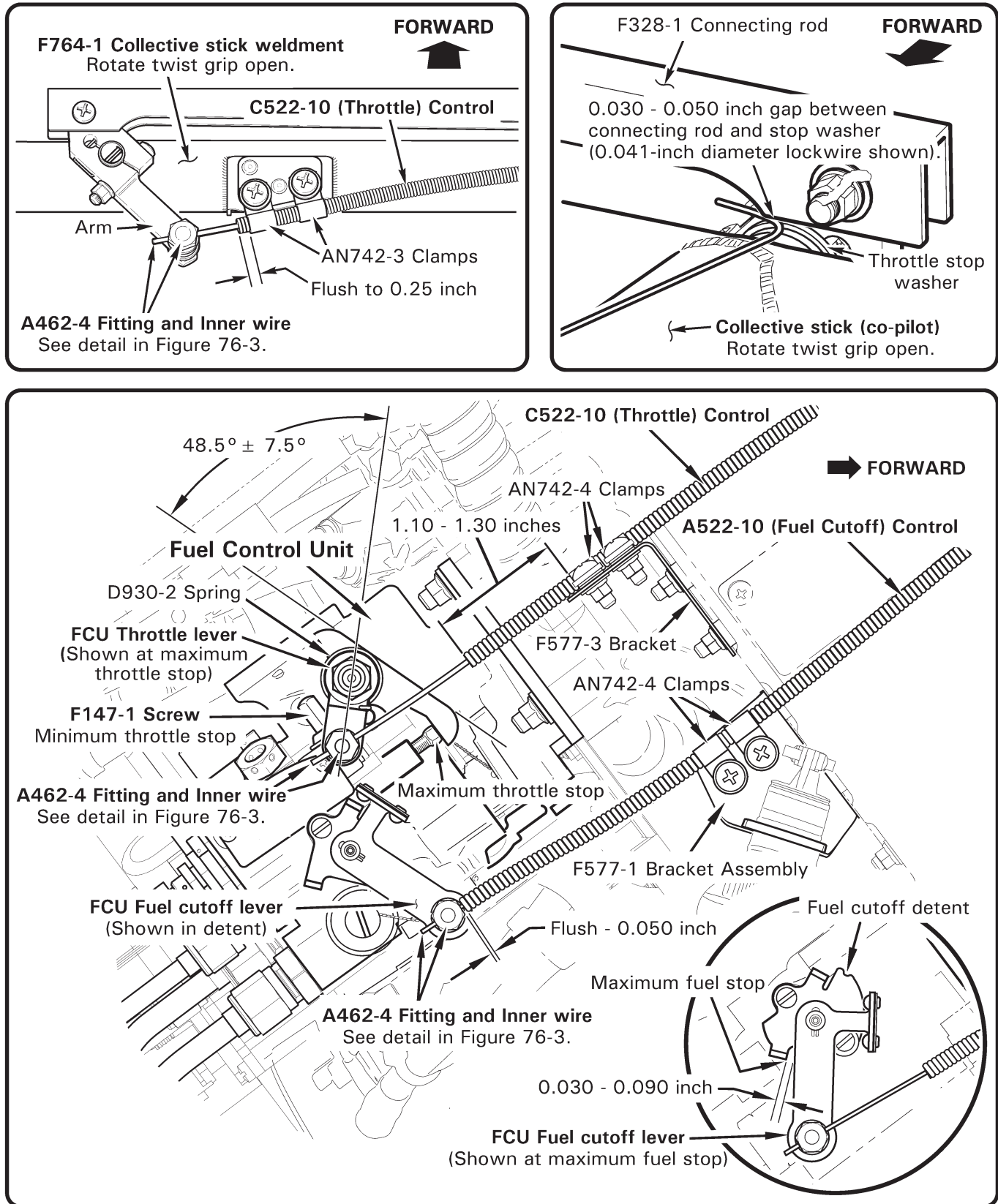


FIGURE 76-1 FUEL CONTROL UNIT

76-11 FCU Throttle Control Rigging

1. Remove engine cowling assembly per Section 53-21. Remove F461-1 collective cross tube cover and (copilot) F680-1 collective cover assembly (see Section 6-70).
2. Refer to Figure 76-1. Verify FCU throttle lever rigging angle is $48.5^\circ \pm 7.5^\circ$. As required, remove hardware securing serrated levers and reposition to proper angle. Install hardware, special torque nut per Section 20-33, & torque stripe per Figure 5-1.
3. Remove palnuts and loosen nuts securing A462-4 fittings and C522-10 (throttle) control inner wire to collective arm and to FCU throttle lever.
4. Position forward end of control housing flush-0.25 inch at or beyond edge of outboard AN742-3 clamp and install fasteners securing housing and clamps to F764-1 collective stick weldment.
5. Refer to detail in Figure 76-3. Rotate collective stick twist grip open. Position inner wire 0.10-0.30 inch beyond outboard edge of fitting in collective arm, and special torque fitting nut per Section 20-33. Install palnut, standard torque per Section 20-32, & torque stripe per Figure 5-1.
6. Position aft end of control housing 1.10-1.30 inches beyond edge of aft AN742-4 clamp and install fasteners securing housing and clamps to F577-3 bracket.
7. Refer to detail in Figure 76-3. Rotate twist grip closed; rotate and hold FCU throttle lever to contact idle stop. Verify sufficient inner wire beyond aft edge of fitting, and special torque fitting nut per Section 20-33.
8. Rotate twist grip open; verify FCU throttle lever contacts maximum throttle stop, and 0.030-0.050 inch gap between F328-1 connecting rod and throttle stop washer. Reposition fitting on wire as required until proper rod-to-washer gap, and FCU throttle lever contacts maximum throttle stop with twist grip open, and idle stop with twist grip closed.
9. Install fitting palnut, standard torque per Section 20-32, and torque stripe per Figure 5-1. Trim control wire 0.10-0.30 inch beyond aft edge of fitting.
10. Install collective cross tube cover and collective cover assembly. As required, perform FCU fuel cutoff control rigging per Section 76-12, or install engine cowling assembly per Section 53-21.

76-12 FCU Fuel Cutoff Control Rigging

1. Remove engine cowling assembly per Section 53-21.
2. Refer to Figure 76-1. Remove palnut and loosen nut securing A462-4 fitting and A522-10 (fuel cutoff) control inner wire to FCU fuel cutoff lever.
3. Rotate FCU fuel cutoff lever into OFF detent; pull fuel cutoff control knob OFF (at lower console). Position end of control housing flush-0.050 inch from forward edge of fitting and install fasteners securing housing and AN742-4 clamps to F577-1 bracket assembly.
4. Refer to detail in Figure 76-3. Verify sufficient inner wire beyond aft edge of fitting, and special torque fitting nut per Section 20-33.

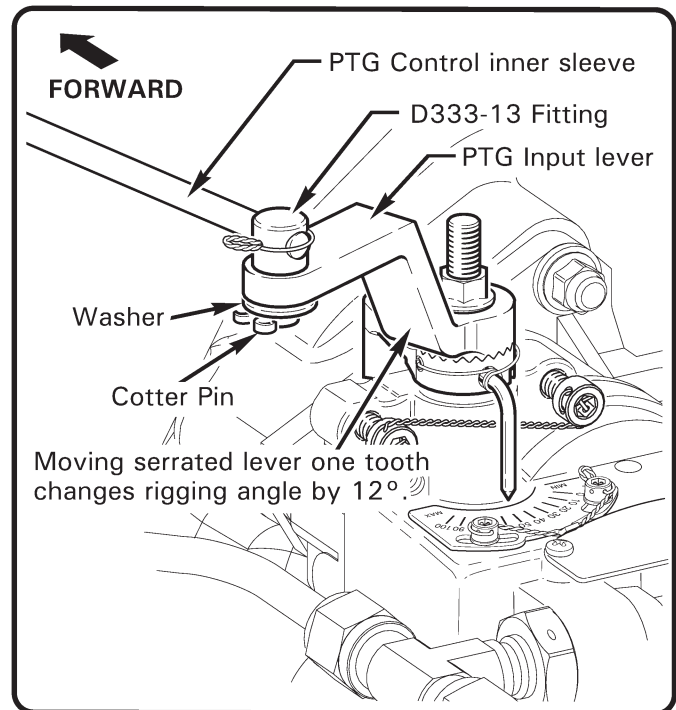
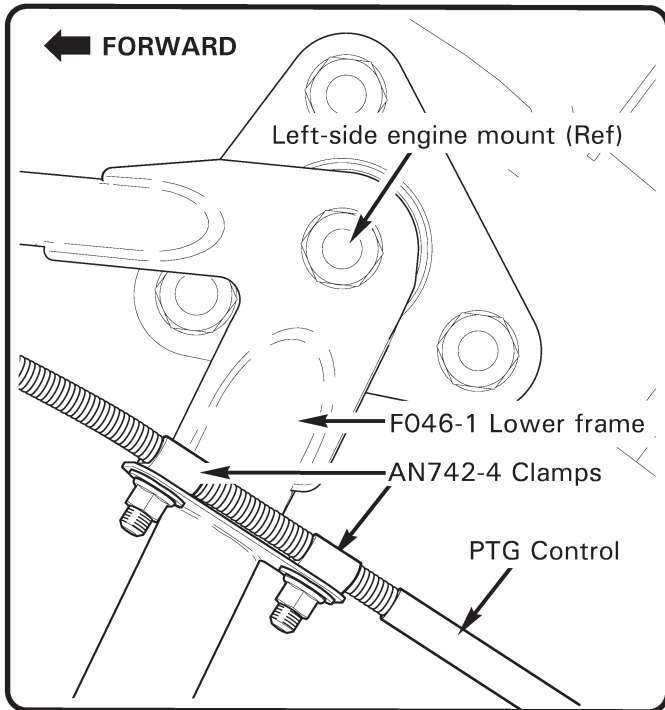
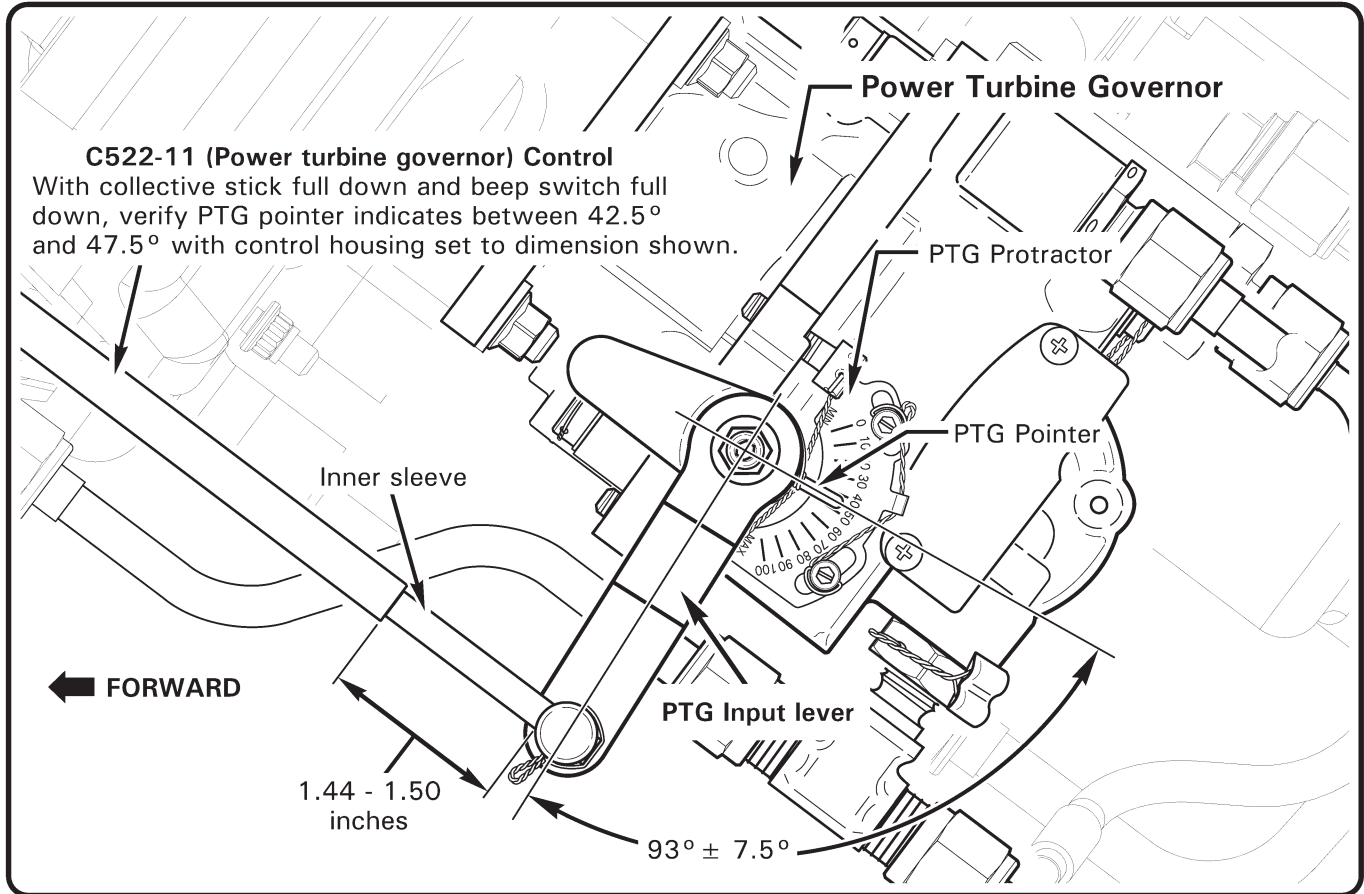


FIGURE 76-2 POWER TURBINE GOVERNOR

76-12 FCU Fuel Cutoff Control Rigging (continued)

5. Push fuel cutoff control knob ON and verify FCU fuel cutoff lever-to-maximum fuel stop clearance is 0.030-0.090 inch. Reposition fitting on wire as required until FCU fuel cutoff lever rests in detent when control is OFF and has required clearance from maximum fuel stop when control is ON.
6. Install fitting palnut, standard torque per Section 20-32, and torque stripe per Figure 5-1. Trim control wire 0.10-0.30 inch beyond aft edge of fitting.
7. Install engine cowling assembly per Section 53-21.

76-20 Power Turbine Governor (PTG)

Refer to R66 Illustrated Parts Catalog (IPC) Figures 76-5 and 76-7.

A. Removal

1. Remove engine cowling assembly per Section 53-21.
2. Refer to Figure 76-2. Remove cotter pin and washer securing C522-11 (power turbine governor) control inner sleeve and D333-13 fitting to PTG input lever.
3. Remove fasteners securing control housing and AN742-4 clamps to F046-1 lower frame, as required.
4. Remove PTG per RR300 Series Operation and Maintenance Manual (OMM).

B. Installation

1. Install PTG per RR300 Series Operation and Maintenance Manual (OMM).
2. Perform PTG control rigging per Section 76-21.

76-21 PTG Control Rigging

1. Remove engine cowling assembly per Section 53-21. Detach center back rest assembly hook and loop tape (Velcro) at bottom; slide back rest assembly up and out of keyhole slots. Remove F474-2 middle seat cover (see Section 6-70).
2. Refer to Figure 76-2. Verify PTG input lever rigging angle is $93.0^{\circ} \pm 7.5^{\circ}$. As required, remove hardware securing serrated levers and reposition to proper angle. Install hardware, special torque nut per Section 20-33, and torque stripe per Figure 5-1.
3. Refer to Figure 76-3. Remove palnut and loosen nut securing A462-4 fitting and C522-11 (power turbine governor) control inner wire to F822-1 bellcrank assembly.
4. Position PTG pointer to indicate 45° on PTG protractor. Position aft end of control housing 1.44-1.50 inches from forward edge of D333-13 fitting and install fasteners securing housing and AN742-4 clamps to F046-1 lower frame.
5. Position forward end of control housing flush-0.25 inch at or below edge of bottom AN742-3 clamp and install fasteners securing housing and clamps to F381-6 bracket.
6. Turn BATTERY switch ON. With collective stick full down, "beep" collective toggle switch to full down. Turn BATTERY switch OFF.

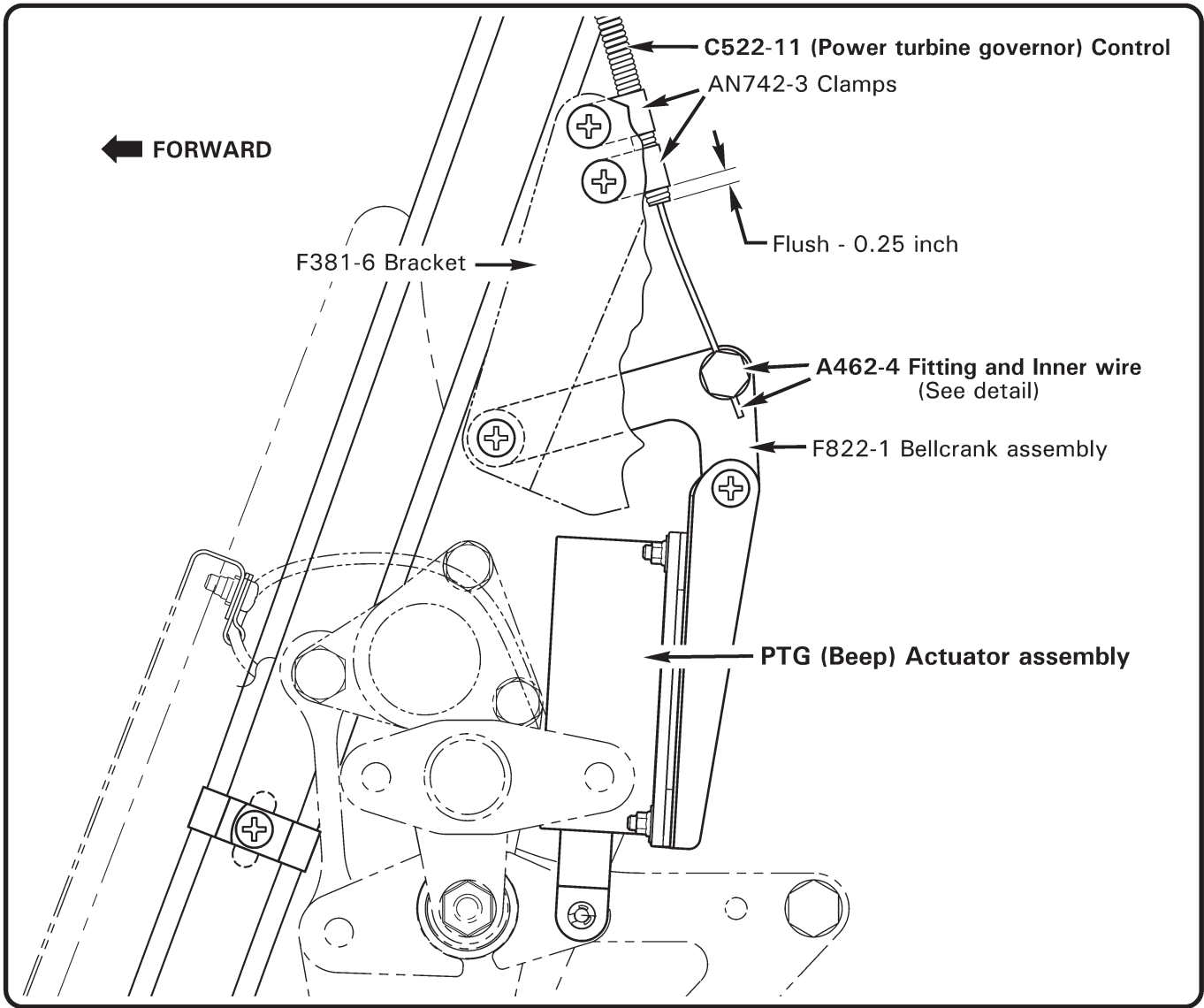
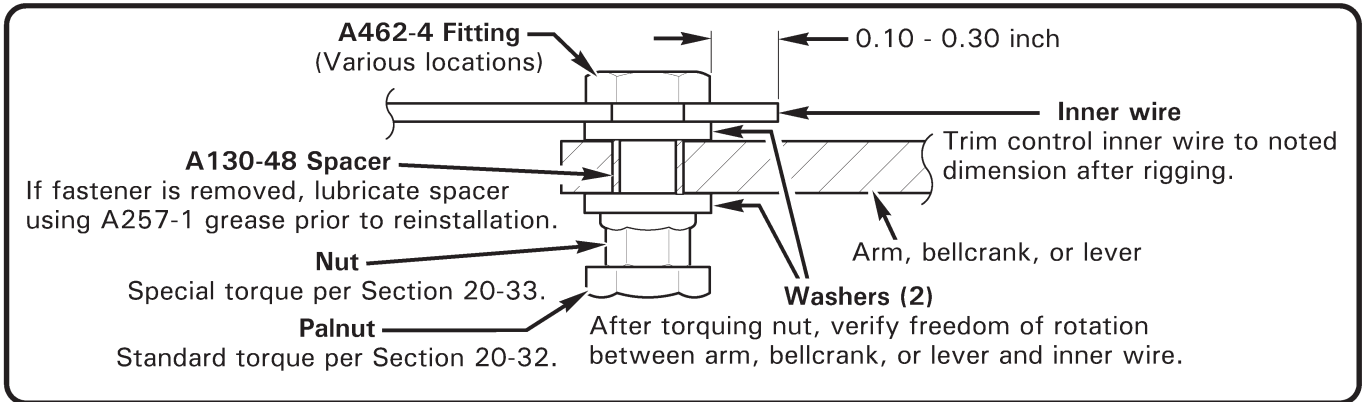


FIGURE 76-3 PTG (BEEP) ACTUATOR ASSEMBLY

76-21 PTG Control Rigging (continued)

7. Verify PTG pointer indicates 45° on PTG protractor, verify sufficient inner wire beyond bottom edge of bellcrank fitting, and special torque fitting nut per Section 20-33.
8. Install palnut, standard torque per Section 20-32, and torque stripe per Figure 5-1. Trim control wire 0.10-0.30 inch beyond bottom of fitting.
9. Perform PTG rigging check per Section 76-22.
10. Install engine cowling assembly per Section 53-21. Install middle seat cover. Install back rest assembly in keyhole slots and slide down; press firmly on back rest assembly hook and loop tape at bottom. Verify security.

76-22 PTG Rigging Check

1. Turn BATTERY switch ON.
2. Refer to Figure 76-2. With collective stick full down, "beep" collective toggle switch to full down. Verify PTG pointer indicates between 42.5° and 47.5° on PTG protractor. Turn BATTERY switch OFF.
3. Adjust PTG control rigging as required per Section 76-21; repeat previous steps until PTG is rigged for proper mechanical range.
4. Run-up helicopter per R66 Pilot's Operating Handbook, Section 4. Verify "beep" range is 97 to 103% rotor RPM with collective full down and twist grip open.
5. Adjust PTG control rigging as required per Section 76-21; repeat previous steps until PTG is rigged for proper operational range.

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