

ENGINE CONTROLS - GENERAL**(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)****1. Description**

- A. Controlex cables connect the control levers in the pedestal to the linkage that operates the various components on each engine. Each cable conduit terminates in threaded rod ends to provide for rigging adjustments at the pedestal levers and at the linkage on the engine. The conduits for the cables are anchored to the brackets in the pedestal and at the engines. The cables are routed from the pedestal aft under the pilot's compartment floorboards in groups to each engine. At a point just aft of the partition between the cabin and pilot's compartment, a set of controls for each engine branches outboard along the leading edge of the center section to the nacelles, then forward through the firewall to the engine linkage. The cables are protected by spacers and grommets from adjacent structure and are supported at intervals by clamps attached to the structure. Each control cable is interconnected through bellcranks and pushrods to its respective control lever in the pedestal.
- (1) The propulsion system is operated by three sets of controls; the power levers, propeller levers and condition levers. The power levers and condition levers serve to control engine power. The propeller levers are operated conventionally and control constant speed propellers through the primary governor.
 - (2) The power levers provide control of engine power from idle through take-off power by operation of the gas generator (N_1) governor in the fuel control unit (FCU). Increasing N_1 rpm results in increased engine power. When the power levers are lifted over the IDLE detent, they control engine power through the beta and reverse ranges.
 - (3) Each propeller lever operates a speeder spring inside the primary governor to reposition the pilot valve, which results in an increase or decrease of propeller rpm. For propeller feathering, each propeller lever manually lifts the pilot valve to a position which causes complete dumping of high pressure oil. Detents at the rear of lever travel prevent inadvertent movement into the feathering range. Normal operating range is 1,600 thru 2,000 rpm.
 - (4) The condition lever has three positions; CUT-OFF, LOW IDLE and HIGH IDLE. This lever controls the idle cut-off function of the start control unit and controls N_1 speed. The condition levers may be set in the HIGH IDLE position to obtain a faster response when maximum reverse thrust has been selected.

NOTE: For detailed instructions on Low Idle and High Idle adjustments refer to the Pratt and Whitney Maintenance Manual.

ENGINE CONTROLS (POWER, PROPELLER AND CONDITION LEVERS) - REMOVAL/INSTALLATION (Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)

1. Engine Controls (Power, Propeller and Condition Levers)

A. Removal

- (1) Perform the BATTERY POWER DISCONNECT procedure (Ref. [24-30-01, 201](#)).
- (2) Perform the FLIGHT COMPARTMENT SEATS REMOVAL procedure (Ref. [25-10-00, 401](#) or [25-10-01, 401](#)) and remove the pilot's and copilot's seat.
- (3) Remove the screw and washer that secures the elevator trim tab control wheel and the left end of the engine control lever pivot shaft to the left side of the pedestal. Note the position of the elevator trim tab control wheel for installation.
- (4) Remove the power, propeller and condition lever knobs, friction brake knobs, and flap control knob.
- (5) Remove the edgelight panel and the printed circuit board from the pedestal. Retain all attaching parts. (Ref. [33-10-01, 601](#)).
- (6) Remove the upholstery panels from the left and right side of the pedestal.
- (7) Remove the small instrument panel forward of the pedestal control levers. Retain all attaching parts.
- (8) Remove the four screws that secure the right end of the control lever pivot shaft to the right side of the pedestal. Retain the screws (Ref. [Figure 401](#)).
- (9) Note the quantity of washers and spacers between the control lever assemblies for reassembly purposes.
NOTE: A drop cloth should be used to keep items dropped from the pedestal from falling below the floor.
- (10) Fabricate a dummy control lever pivot shaft that is 0.495 inch in diameter and at least nine inches long.
- (11) Insert the dummy shaft into the control shaft opening in the left side of the pedestal, pushing the control lever pivot shaft to the right until the dummy shaft is ready to enter the left or right control lever which is to be removed.
NOTE: If more than one control lever is to be replaced, remove and replace them individually, right side first, followed by the left side.
- (12) Disconnect the push rod from the lower end of the control lever to be removed. Retain the attaching parts.
- (13) Catching the spacers and washers that fall, pull the dummy shaft back to the left until the control lever assembly to be removed is released.
- (14) Remove the assembly from the pedestal.
- (15) Disassemble the engine control lever from the arm assembly by disconnecting the tension spring, removing the nuts and washers and one cotter pin and washer from the three pins in the slotted holes.

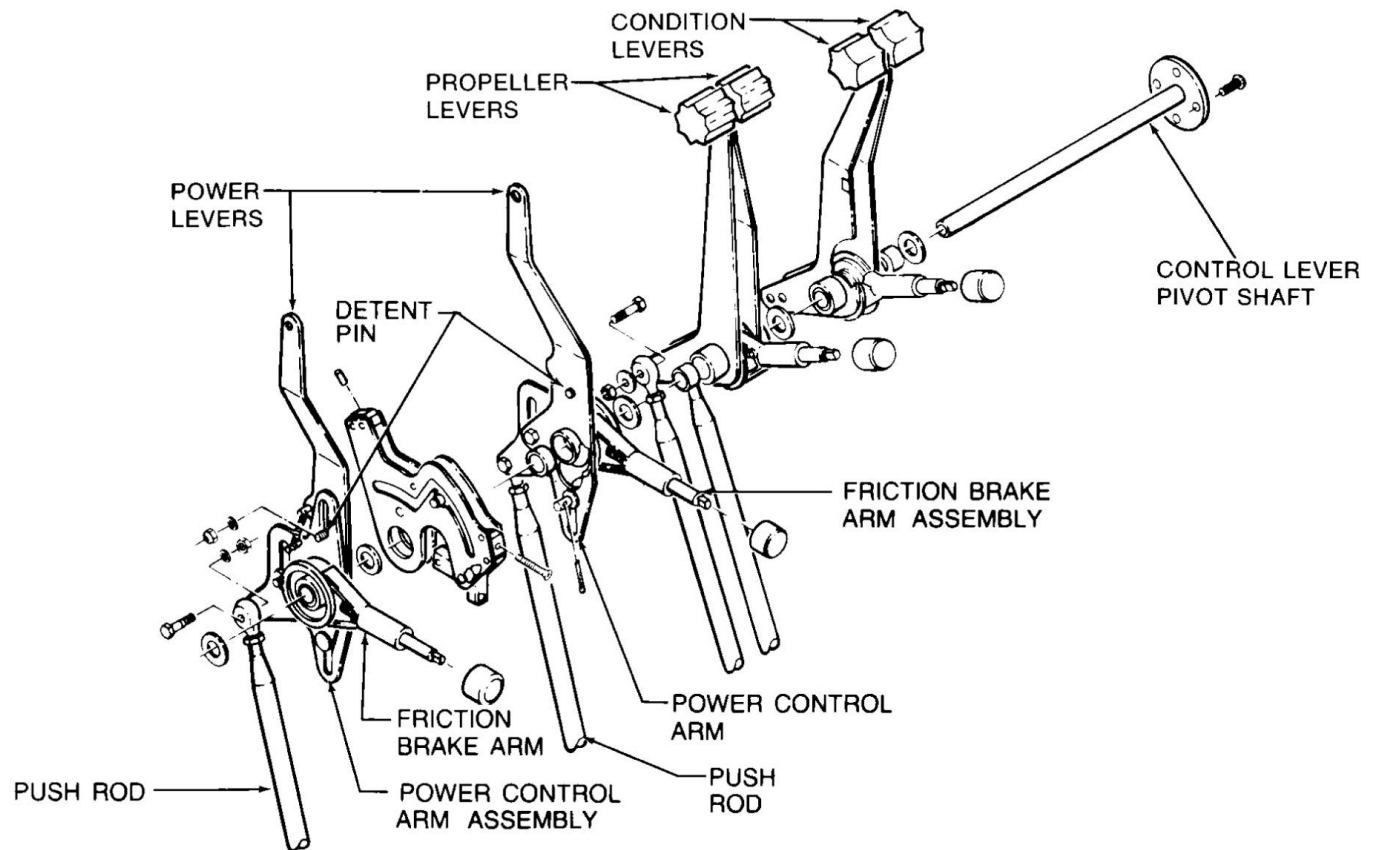
B. Installation

- (1) Assemble the new engine control lever to the arm assembly with the tension spring, nuts and washers removed in [Paragraph 2.A. \(15\)](#). Install a new cotter pin.
- (2) Position the complete control lever assembly and the arm and brake assembly in the pedestal and push the control lever pivot shaft through the control lever assembly.
- (3) Install the spacers and washers as noted in [Paragraph 2.A. \(9\)](#) until contact is made with the dummy shaft (Ref. [Figure 401](#)).
- (4) Connect the push rod to the lower end of the control lever with the existing attaching parts.
- (5) Install the control lever pivot shaft.
- (6) Install the spacers and washers as noted in [Paragraph 2.A. \(9\)](#) until the dummy shaft is pushed out of the pedestal.
- (7) Install the four screws which secure the right hand end of the control lever pivot shaft to the right hand side of the pedestal.
- (8) Install the left and right side pedestal upholstery panels.
- (9) Install the small instrument panel just forward of the pedestal control levers.
- (10) Install the printed circuit board and edgelight panel to the pedestal. Make sure that all lights are positioned correctly to avoid breakage (Ref. [33-10-01, 601](#)).
- (11) Install the manual elevator trim tab control wheel and secure it and the left end of the engine control lever pivot shaft with the attaching screw and washer. Position the elevator trim tab control wheel as noted in [Paragraph 2.A. \(3\)](#).
- (12) Install the power, propeller and condition lever knobs, friction brake knobs and flap control knob.

- (13) Perform the FLIGHT COMPARTMENT SEATS INSTALLATION procedure (Ref. [25-10-00, 401](#) or [25-10-01, 401](#)) and install the pilot's and copilot's seat.
- (14) Check for the correct operation of all switches and controls in the pedestal area.

Figure 401 : Sheet 1 : Engine Control Levers

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POWER LEVER - ADJUSTMENT/TEST
(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)

1. Information

- A. Refer to Standard Practices - Airframe [Chapter 20-14-00, 201](#), for information on tools and equipment referenced in Table 501. Refer to Standard Practices - Airframe [Chapter 20-15-00, 201](#), for information on recommended materials referenced in Table 501.

Table 501. Tools/Equipment and Recommended Materials

ITEM	TOOLS AND EQUIPMENT	ITEM	RECOMMENDED MATERIALS
		09-044	Lockwire

2. Power Lever

- A. Adjustment

NOTE: Do not lubricate engine control cables under any circumstances.

- (1) Disconnect the rear rod end clevis from the propeller control cam and disconnect the engine power lever from the control cable leading to the power control lever in the cockpit (Ref. [Figure 501](#)).
- (2) Disconnect the interconnect rod to the fuel topping governor.
- (3) Adjust the front end clevis until the bottom of the slot where the beta valve attaches to the propeller reversing lever is even with the cap nut on the beta valve.

NOTE: When removing the front rod end clevis from the propeller reversing lever, retain the small spacer installed on the reversing lever. It is not a standard hardware item and can easily be lost as it falls free when the clevis is removed.

- (4) Hold the fuel topping governor arm against the maximum stop and adjust the interconnect rod of the fuel topping governor until the arm is firmly against the stop and the forward rod end slips easily over the rod end bolt.
- (5) Shorten the length of the interconnect rod by half a turn to take up the slack.
- (6) Reattach the hardware on the rod end and secure.
- (7) Disconnect the forward end of the Fuel Control Unit (FCU) control rod.
- (8) Move the power control lever forward to hold the propeller control cam in the forward position.
- (9) Adjust the clevis of the rear end until it aligns with the 2nd hole from the top of the propeller control cam, then connect the clevis to the cam.
- (10) Move the cam pin aft in the cam slot until the cam itself begins to move aft (the cam will remain motionless while the cam pin moves in the forward portion of the slot). When the cam pin reaches the point in the slot where the cam begins to move aft, a line through the center of the cam pin, the center of the pivot point of the power control lever and the center of the grooved pin forward of the power control lever will form an angle of approximately 85° (Ref. [Figure 501](#)).
- (11) Check to make sure that the aft end of the fuel control rod is attached to the foremost hole in the FCU control arm.
- (12) Move the FCU control arm forward until resistance against spring tension is felt. The FCU arm should be positioned 22.5° below the pivot point of the shaft (Ref. [Figure 501](#)).

NOTE: A template with a 22.5° angle can be fabricated by folding in half, the 90° corner of a sheet of heavy paper, then again folding in half the resulting 45° angle to form a 22.5° angle that can be used to determine the position of the fuel control arm. Align the top edge of the template with the flat, horizontal, machined surfaces adjacent to the lever and check alignment of the center line of the FCU arm with the bottom edge of the template (Ref. [Figure 501](#)). If adjustment is necessary to align the arm with the template, remove the lockwire, loosen the retaining nut and reposition the arm by means of the coarse or fine serrated adjustments encircling the shaft. A minimum adjustment of 0.60° in either direction is possible by proper manipulation of the fine and coarse serrations of the serrated spacer at the base of the power control lever.

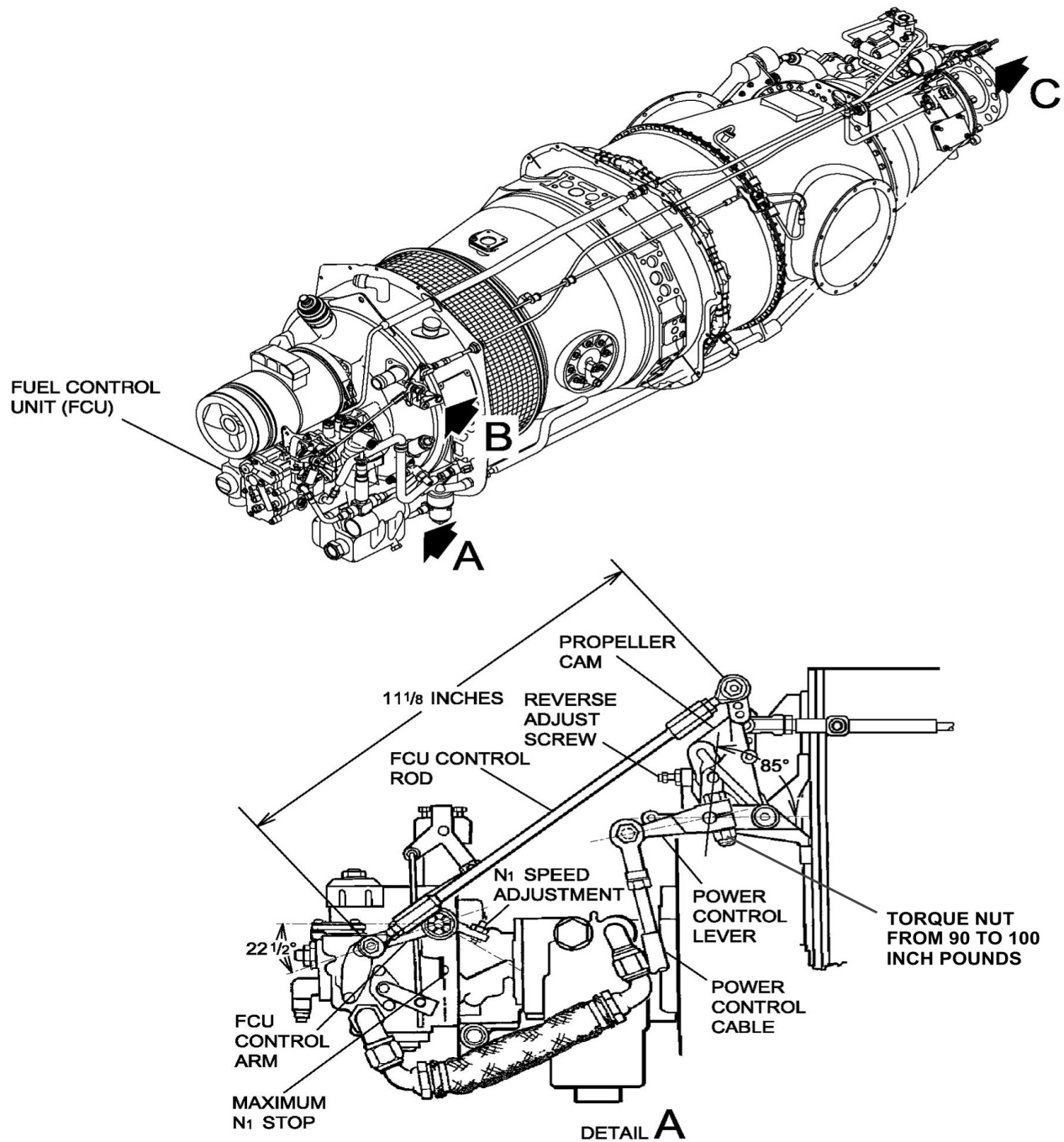
- (13) Move the FCU arm 1/8 inch away from the point of spring tension. This is the position for which the control rod will have to be set.
- (14) Adjust the FCU rod by turning the clevis ends until the length from center to center on the rod ends is 11 1/8 inches.

- (15) With the cockpit power levers in the idle position and with the propeller control cam located at the apex of the slot at the point where the cam begins to move aft, place the engine power lever arm on the reversing mechanism in the horizontal position and connect it to the power lever control cable from the cockpit, making certain that the rod end clevis aligns without moving the cam.

NOTE: The resistance of spring tension is an indication that fuel is being added for increased power. The 1/8-inch dead band is necessary to make sure that both engines will idle when the cockpit levers are retarded to the idle detent during the engine run-up checks after rigging.

Figure 501 : Sheet 1 : Rigging Engine Controls - Propeller Reversing System

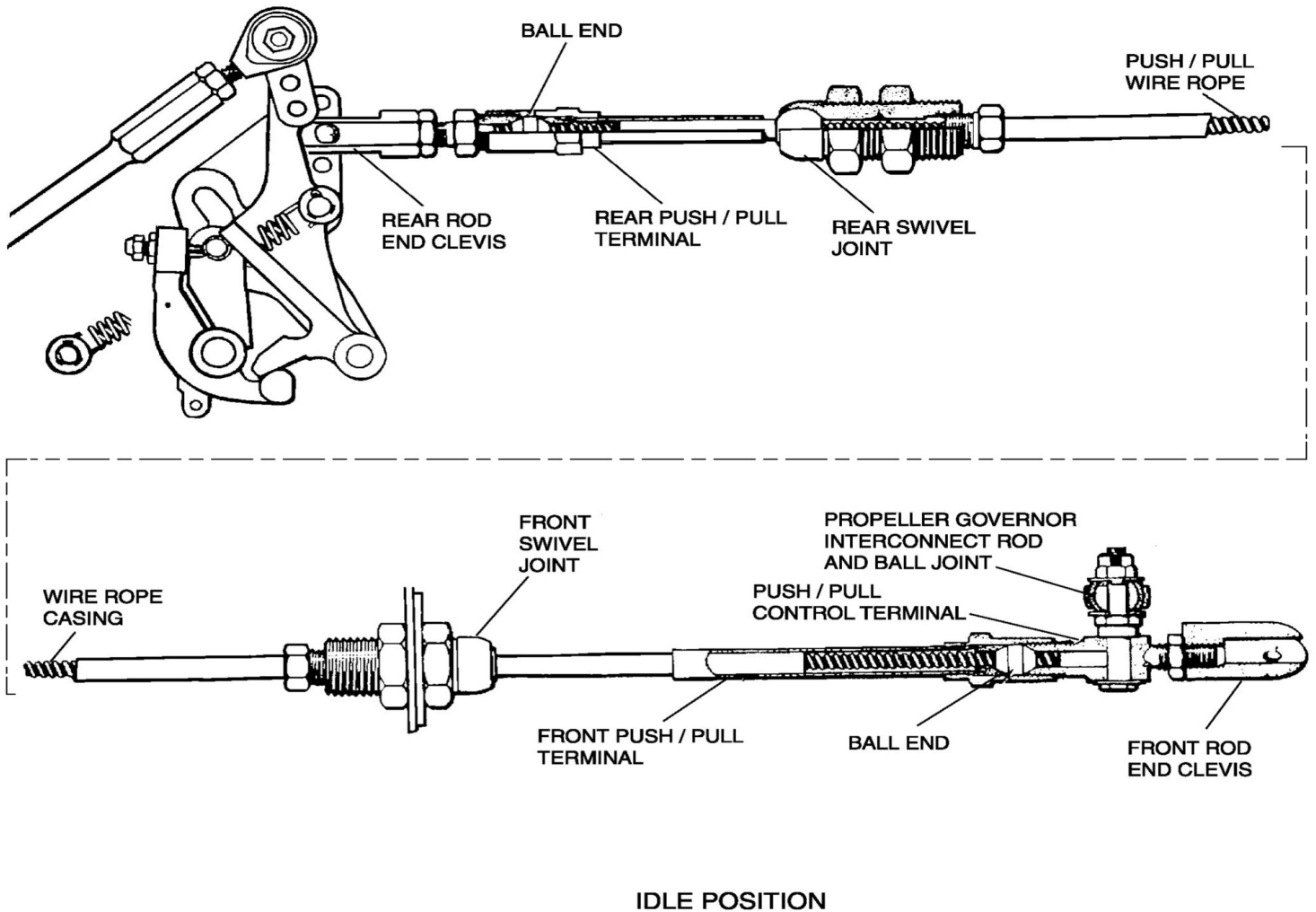
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Figure 501 : Sheet 2 : Rigging Engine Controls - Propeller Reversing System

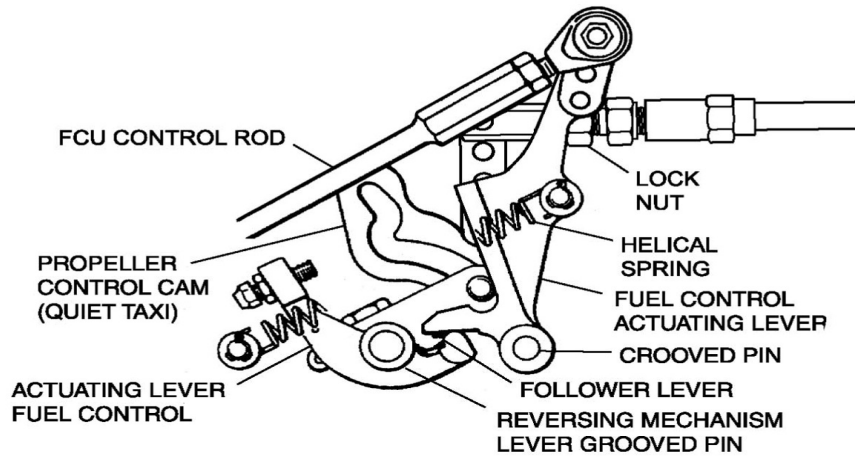
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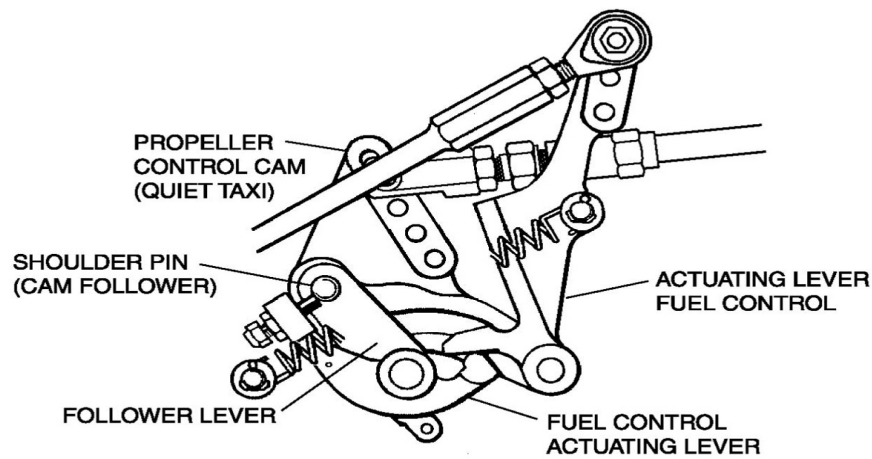
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Figure 501 : Sheet 3 : Rigging Engine Controls - Propeller Reversing System

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TAKE OFF POSITION

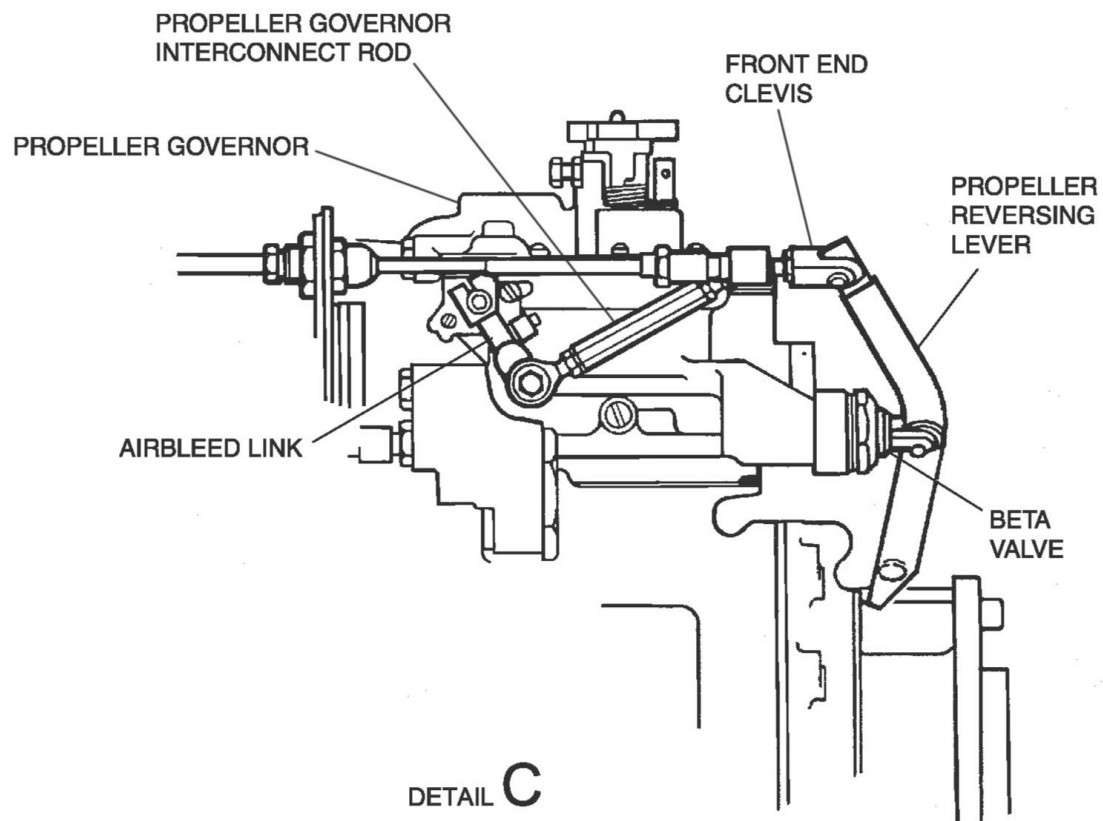


REVERSE POSITION

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Figure 501 : Sheet 4 : Rigging Engine Controls - Propeller Reversing System

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CONDITION LEVER - ADJUSTMENT/TEST**(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)****1. Condition Lever****NOTE: Do not lubricate engine control cables under any circumstances.****A. Adjustment**

- (1) Place the condition lever in the cockpit at CUTOFF position.
- (2) Disconnect the rod end for the condition cutoff control cable.
- (3) Move the FCU actuating lever forward approximately 25° until the top of the lever bottoms out against the front adjustment screw.
- (4) Screw the rod end in or out until it is aligned with the bolt on the FCU actuating lever.
- (5) Secure the rod end in place on the bolt and install the cotter pin locking it in place.
- (6) Move the cockpit condition to LOW IDLE and ascertain that the FCU actuating lever is in the vertical position.
- (7) Move the cockpit condition lever to HI IDLE. The top of the FCU actuating lever should swing aft and bottom out against the aft stop.

NOTE: The forward and aft stops are mechanical stops that are preset at the factory and require no further adjustment.

- (8) The aft lower arm of the FCU actuating lever is provided with a stop bolt and locknut. If lower gas generator rpm is required to achieve a high idle rpm of 70%, back off the nut until the proper gas generator speed is obtained.

NOTE: If the foregoing adjustment seems to be required, check the position of the aft (high idle) stop to ensure that the top arm of the FCU actuating lever is firmly against the stop when the cockpit lever is in the HI IDLE position. Adjust as necessary until it is so positioned.

PROPELLER LEVER - ADJUSTMENT/TEST**(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)****1. Information**

- A. Refer to Standard Practices - Airframe [Chapter 20-14-00, 201](#), for information on tools and equipment referenced in Table 501. Refer to Standard Practices - Airframe [Chapter 20-15-00, 201](#), for information on recommended materials referenced in Table 501.

Table 501. Tools/Equipment and Recommended Materials

ITEM	TOOLS AND EQUIPMENT	ITEM	RECOMMENDED MATERIALS
056	Feedback Ring Puller		

2. Propeller Lever

NOTE: Do not lubricate engine control cables under any circumstances.

A. Adjustment

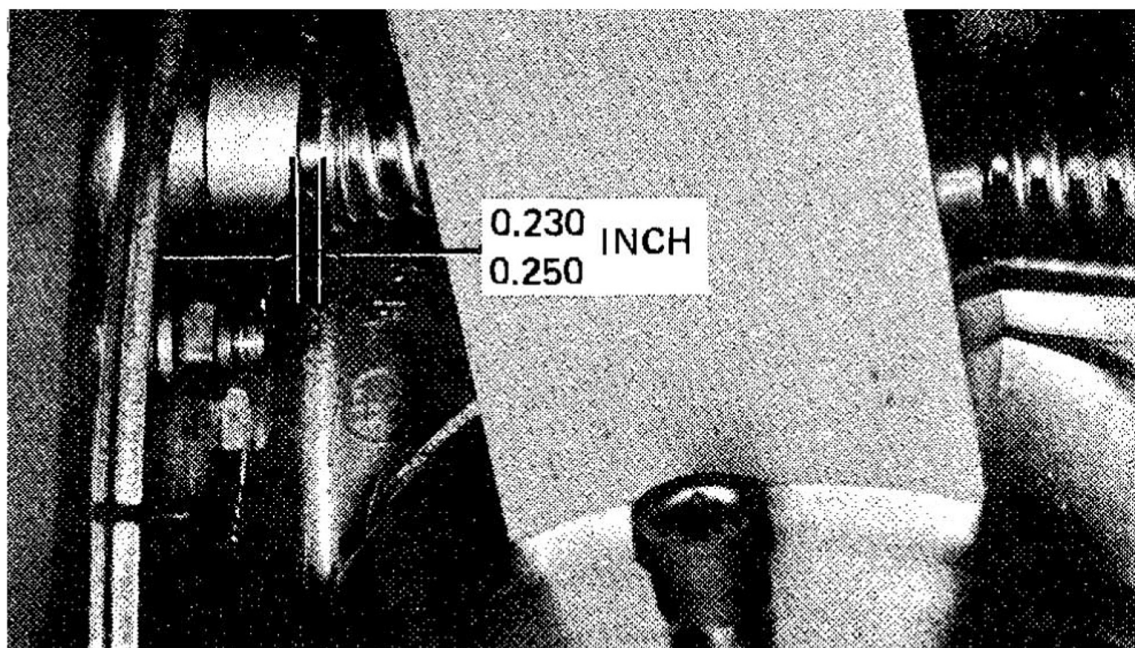
- (1) Move the propeller control lever in the cockpit to the FEATHER position.
- (2) Check the propeller speed select lever of the primary governor to make sure that it is against the forward stop.
- (3) If the speed select lever is not against the stop, adjust the rod end in or out until contact is achieved.
- (4) Move the propeller control lever in the cockpit fully forward and check that the propeller speed select lever is against the aft stop.
- (5) Pull the low pitch stop collar (brass ring) forward 0.230 to 0.250 inch from its rearmost position with the feedback ring puller (056, Table 501).

NOTE: Check the 0.230 to 0.250 dimension with a feeler gage at the base of the spring on the low pitch stop (Ref. Figure 501).

- (6) With the low pitch stop collar (brass ring) in this position, check that the proximity sensors are connected to the control module and hooked into the airplane electrical system.
 - (7) If necessary, adjust each proximity sensor (light emitting diode and amplifier on BB-52 thru BB-1509) on its mounting bracket (Ref. Figure 502) until the PITCH STOP (yellow) lights in the pedestal annunciator panel illuminate with the low pitch stop collar (brass ring) 0.380 inch forward of its rearmost position and the propeller test switch in the LOW PITCH TEST position.
- NOTE:** Check for a clearance of 0.060 to 0.070 inch between the proximity switch and the end of the arm assembly opposite that on which the brush block is installed.
- (8) Check that the clearance between the low pitch stop collar and the carbon block is 0.002 inch minimum at the narrowest portion of the stop collar.
 - (9) With the carbon brush block held against the low pitch stop collar, check the clearance between the low pitch stop collar and the metal retaining clip of the carbon block. If at any point this clearance is 0.005 inch or less, replace the carbon block to prevent damage to the low pitch stop collar by the brush block retaining clip.

Figure 501 : Sheet 1 : Checking Movement of Low Pitch Stop Collar (Brass Ring)

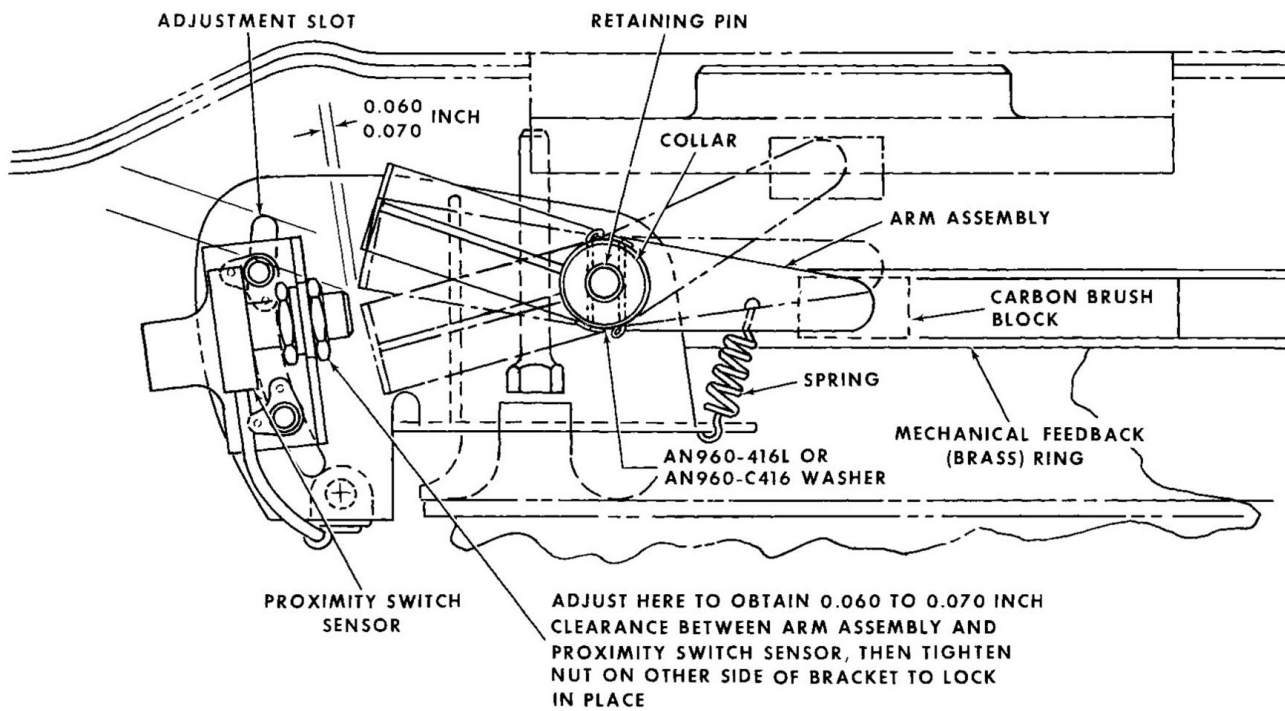
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Figure 502 : Sheet 1 : Target Clearance Check

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ENGINE RUN-UP - INSPECTION/CHECK**(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)****1. Engine Run-Up****NOTE: Do not lubricate engine control cables under any circumstances.****A. Check**

- (1) Run both engines at idle until the gas generator (N_1) speed of each stabilizes.
- (2) Slowly advance the cockpit power lever for the left engine until gas generator (N_1) speed just picks up, then advance the other cockpit power lever until the N_1 speed of the right engine just picks up.
- (3) The two cockpit power levers should be even. If they are not, advance each cockpit power lever in increments consecutively to ascertain if the stagger in the power levers at the point of pick up for each engine is constant or progressive (Ref. [Figure 601](#)).
 - (a) The stagger between the cockpit levers is constant if the distance between them (for example, 1/8 inch) remains constant throughout the full range of power for both engines. In this instance, the FCU rod requires adjustment (Ref. [76-10-03, 501](#)).
Lengthen the FCU rod on the engine that picks up power first until engine power is symmetrical when the cockpit power levers are advanced evenly together.
 - (b) The stagger between the cockpit power levers is progressive if the distance between them increases as the power settings are advanced; for example, one cockpit power lever leads the other by 1/8 inch at 53 to 55% N_1 , by 3/16 inch at 60% N_1 , and by 1/4 inch at 70% N_1 . In this instance, the FCU (fuel control unit) arm must be adjusted (Ref. [76-10-03, 501](#)).
Adjust the FCU arm counterclockwise on the engine that picks up power first (the one with the progressively lagging cockpit power lever) until it accelerates evenly with the other engine. This adjustment decreases the angle of the FCU arm, thereby lessening the acceleration of the engine that picked up power progressively faster.

NOTE: If inconsistent torque lag is present during flight (for example, when the power levers are retarded and one of the engines respond slower than the other) it is permissible to add a second spring to the power lever cable in the engine compartment to help remove possible backlash.

- (4) With the propeller levers fully forward, advance the cockpit power lever for the engine until the propeller reaches 1,800 rpm. The torquemeter reading for the engine should be within 40 foot-pounds of the value designated by the Pressure Altitude and Temperature Conversion Graph (Ref. [Figure 602](#)) for the ambient conditions under which the engine is operating.

NOTE: If this check is not being performed under zero wind conditions, take an average of the upwind and downwind readings to obtain valid results.

- (5) Repeat step (4) on the other engine. The difference between the torquemeter readings on the engines should not exceed 20 foot-pounds.
- (6) If the torquemeter readings do not fall within the limitations designated by the graph, or if the difference between the left and right engines exceeds 20 foot-pounds, the following adjustments are required:
 - (a) If the torque change required to bring an engine within the designed limits does not exceed 20 foot-pounds, disconnect the fuel topping governor interconnecting rod and disconnect the control cable rear clevis from the beta control cam.
Adjust the clevis in or out until engine torque is within the prescribed limits and the torque of each engine is the same, then reconnect the interconnecting rod and the rear clevis.
 - (b) For Airplanes BB-2 thru BB-1192, BB-1514 and After Special Edition Only; BL-1 thru BL-117; BN-1 thru BN-4; BT-1 thru BT-30:
If the torque change required to bring an engine within the prescribed limits exceeds 20 foot-pounds, adjustment of the stop (beta) nut on each of the low pitch stop rods for the propeller is required.
All three nuts must be adjusted to an identical setting. One flat of rotation on the beta nuts (clockwise to increase or counterclockwise to decrease) changes engine torque 30 foot-pounds.
Adjust the beta nuts as necessary to bring the engine within the prescribed limits.
 - (c) For Airplanes BB-1193 thru BB-1508; BL-118 thru BL-140; BT-31 thru BT-38:
If the torque change required to bring an engine within the prescribed limits exceeds 20 foot-pounds, adjustment of the beta rod on each of the low pitch stops for the propeller is required.

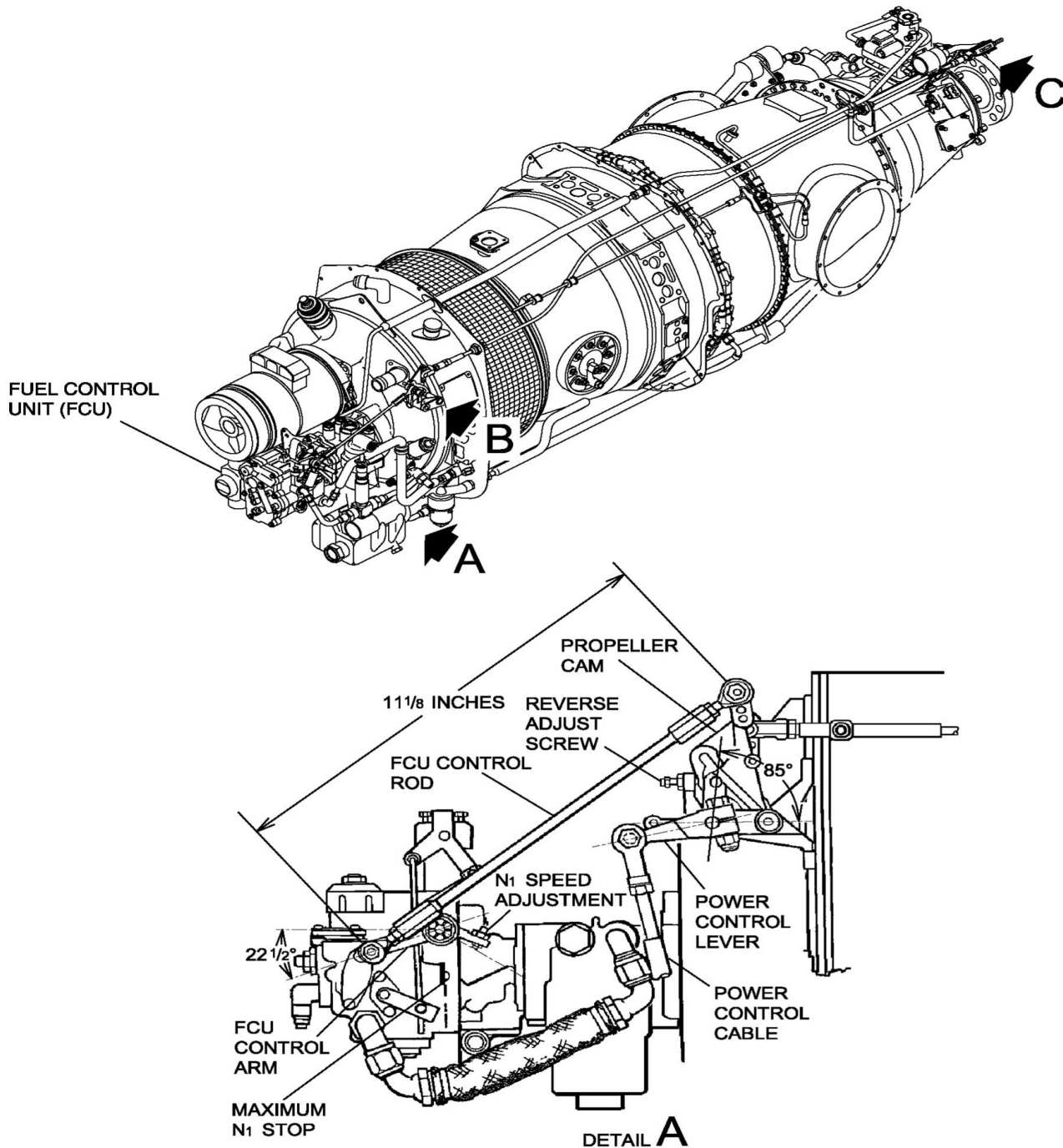
All of the beta rods must be adjusted by the same amount. Hold the flat of the beta rod stationary and loosen the beta rod lock nut. Hold the front adjusting nut stationary and turn the associated beta rod as necessary (turning the beta rod IN increases torque and turning the beta rod OUT decreases the torque) to bring the engine within the prescribed limits. One third turn of the beta rod changes engine torque approximately 35 foot-pounds.

After adjusting the beta rod, hold the flat of the beta rod stationary and torque tighten the beta rod lock nut to 38 to 42 inch-pounds.

- (7) With the condition levers at low idle and the propeller control levers full forward, pull both cockpit power levers over the detent into the beta range and check for an increase of 200 to 250 rpm in propeller speed before gas generator (N_1) speed picks up. The N_1 speed on both engines should pick up simultaneously. If they do not, adjust the reverse adjust screw OUT on the engine that picked up N_1 speed first until it matches the other engine.
- (8) Pull the cockpit power levers fully aft and check for a maximum N_1 speed of 85 to 88% in reverse for each engine. Adjust the reverse adjust screw IN to increase OUT to decrease N_1 speed until both engines fall within the prescribed limits of 85 to 88% and match maximum N_1 speed within 2%. The reverse adjust screw will normally change the N_1 speed by 3% for each full turn of the screw.

Figure 601 : Sheet 1 : Rigging Engine Controls Propeller Reversing System

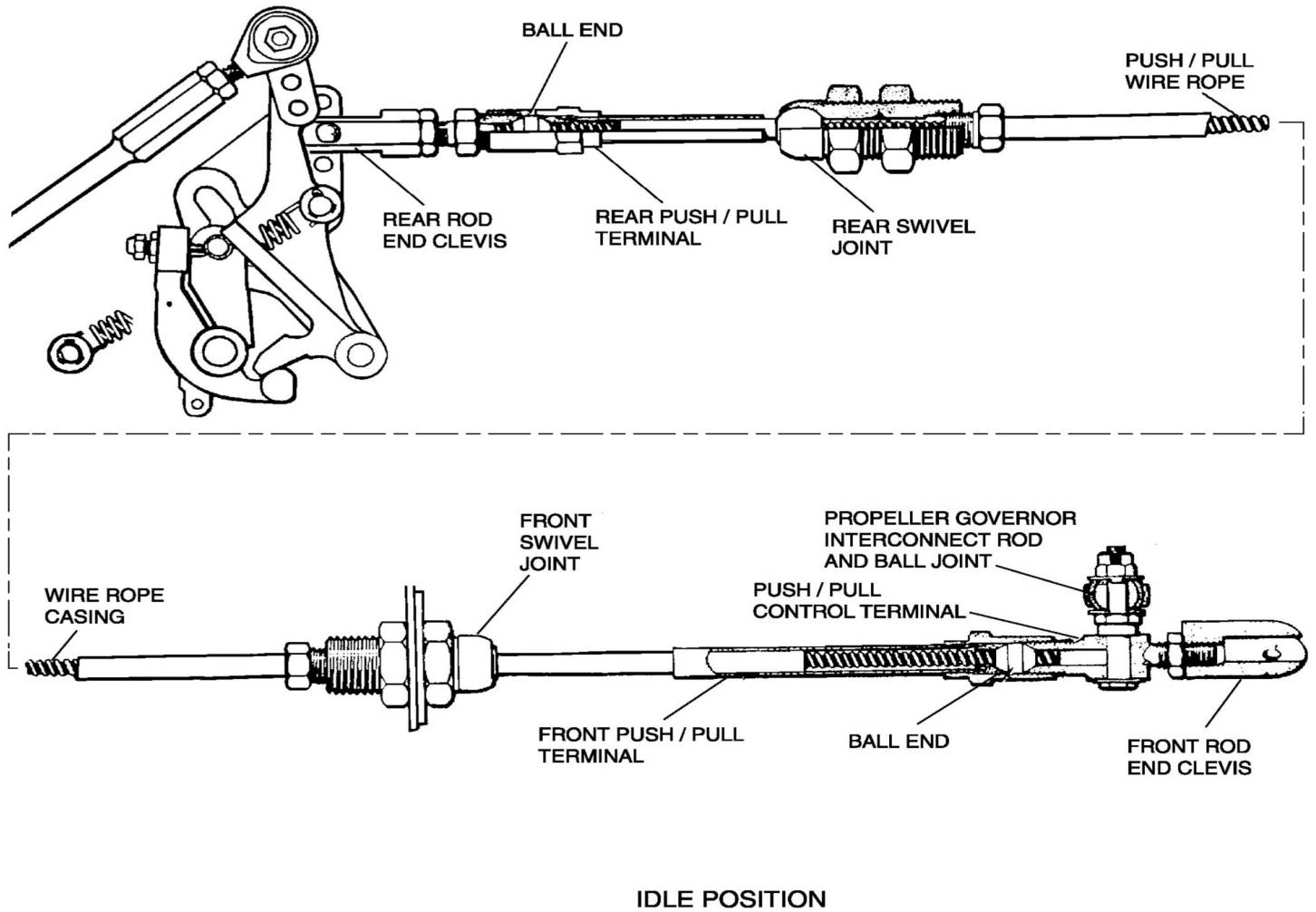
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Figure 601 : Sheet 2 : Rigging Engine Controls Propeller Reversing System

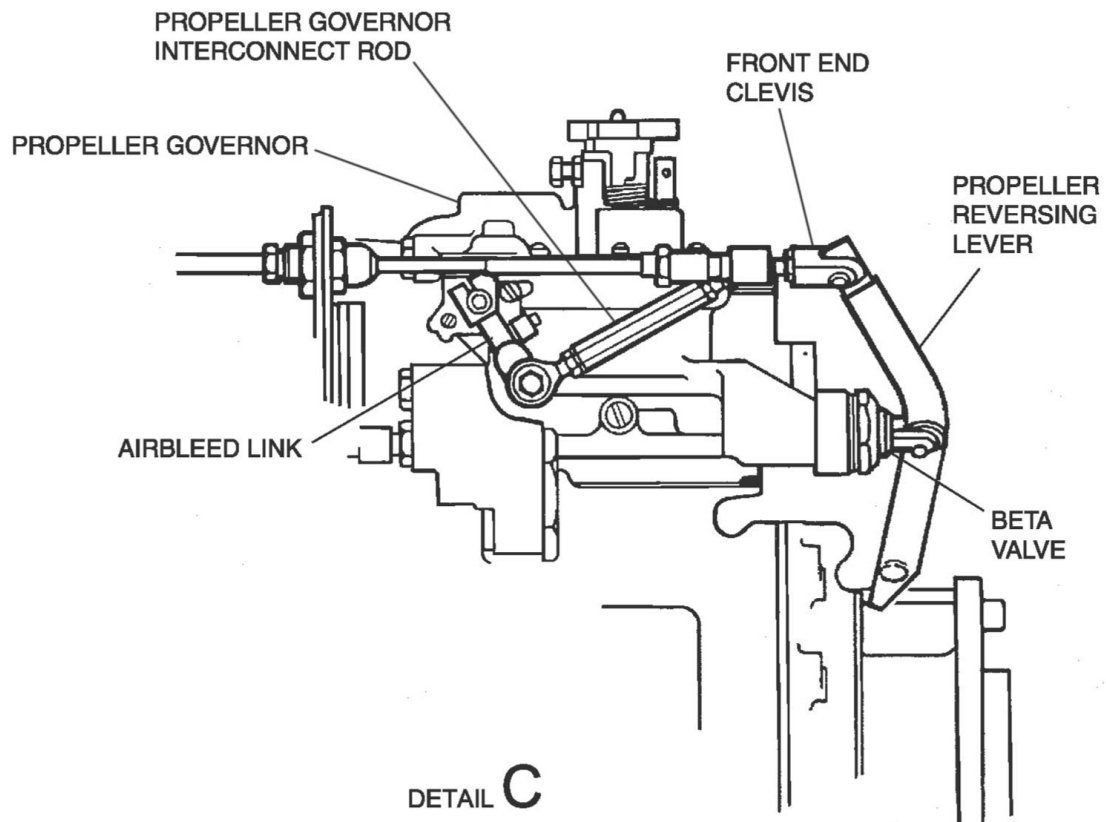
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Figure 601 : Sheet 3 : Rigging Engine Controls Propeller Reversing System

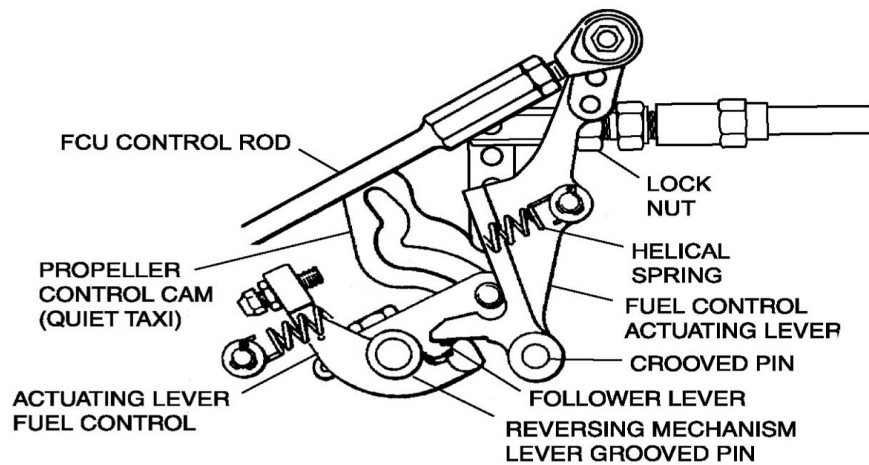
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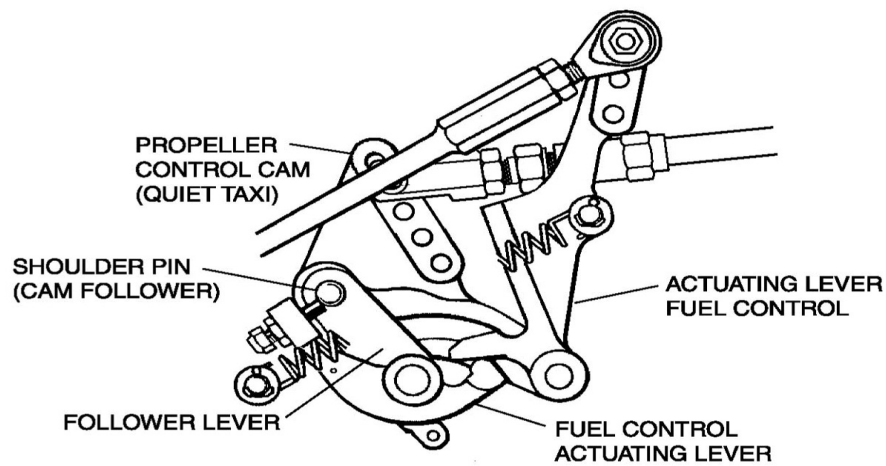
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Figure 601 : Sheet 4 : Rigging Engine Controls Propeller Reversing System

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TAKE OFF POSITION

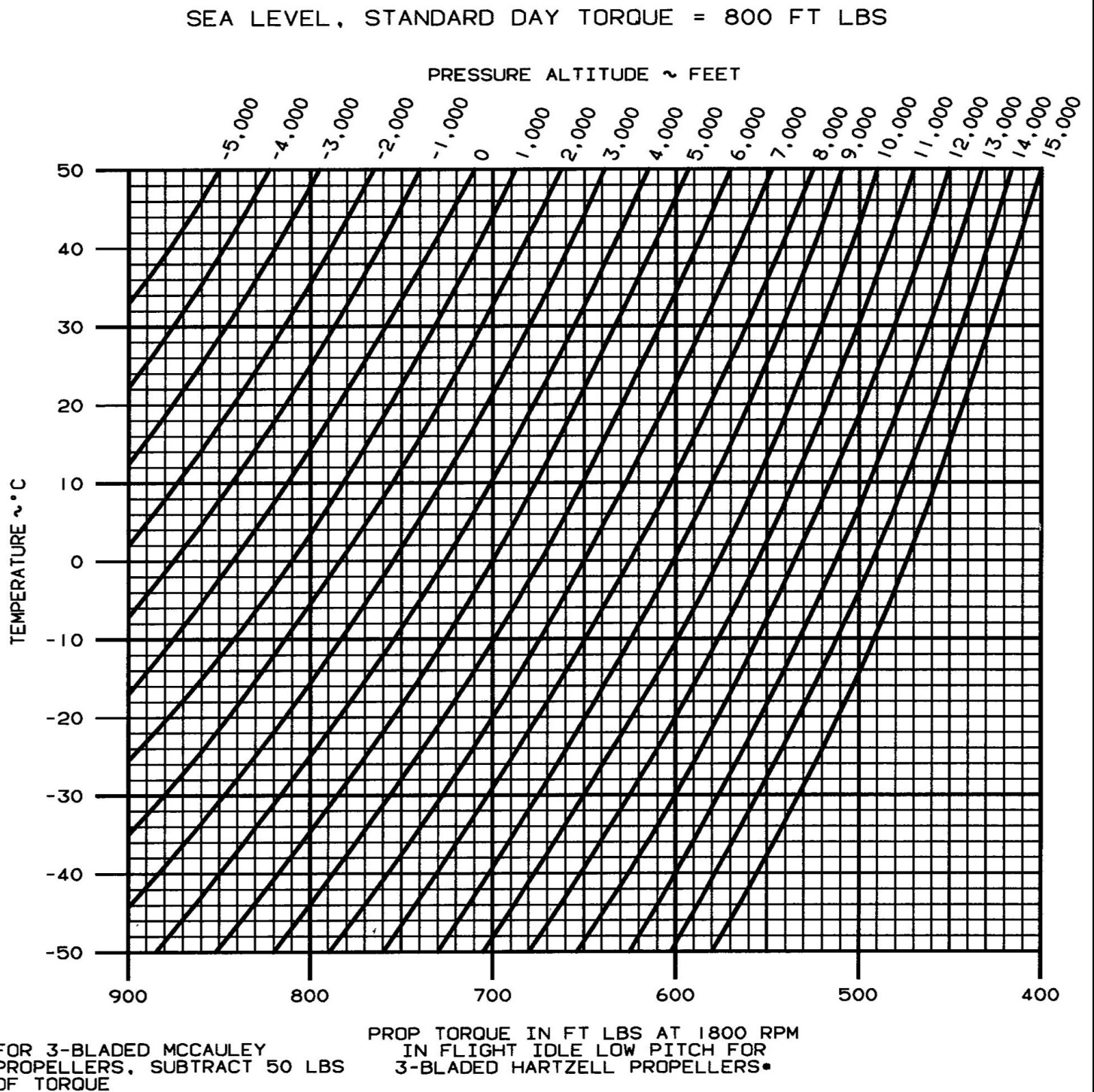


REVERSE POSITION

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Figure 602 : Sheet 1 : 3 Bladed Flight Idle Low Pitch Torque Chart

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CONDITION CONTROL CATCH GATE - REMOVAL/INSTALLATION
(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)

1. Information

- A. Refer to Standard Practices - Airframe [Chapter 20-14-00, 201](#), for information on tools and equipment referenced in Table 401. Refer to Standard Practices - Airframe [Chapter 20-15-00, 201](#), for information on recommended materials referenced in Table 401.

Table 401. Tools/Equipment and Recommended Materials

ITEM	TOOLS AND EQUIPMENT	ITEM	RECOMMENDED MATERIALS
		02-026	Lubricant
		05-010	Adhesive

2. Condition Control Catch Gate

A. Removal

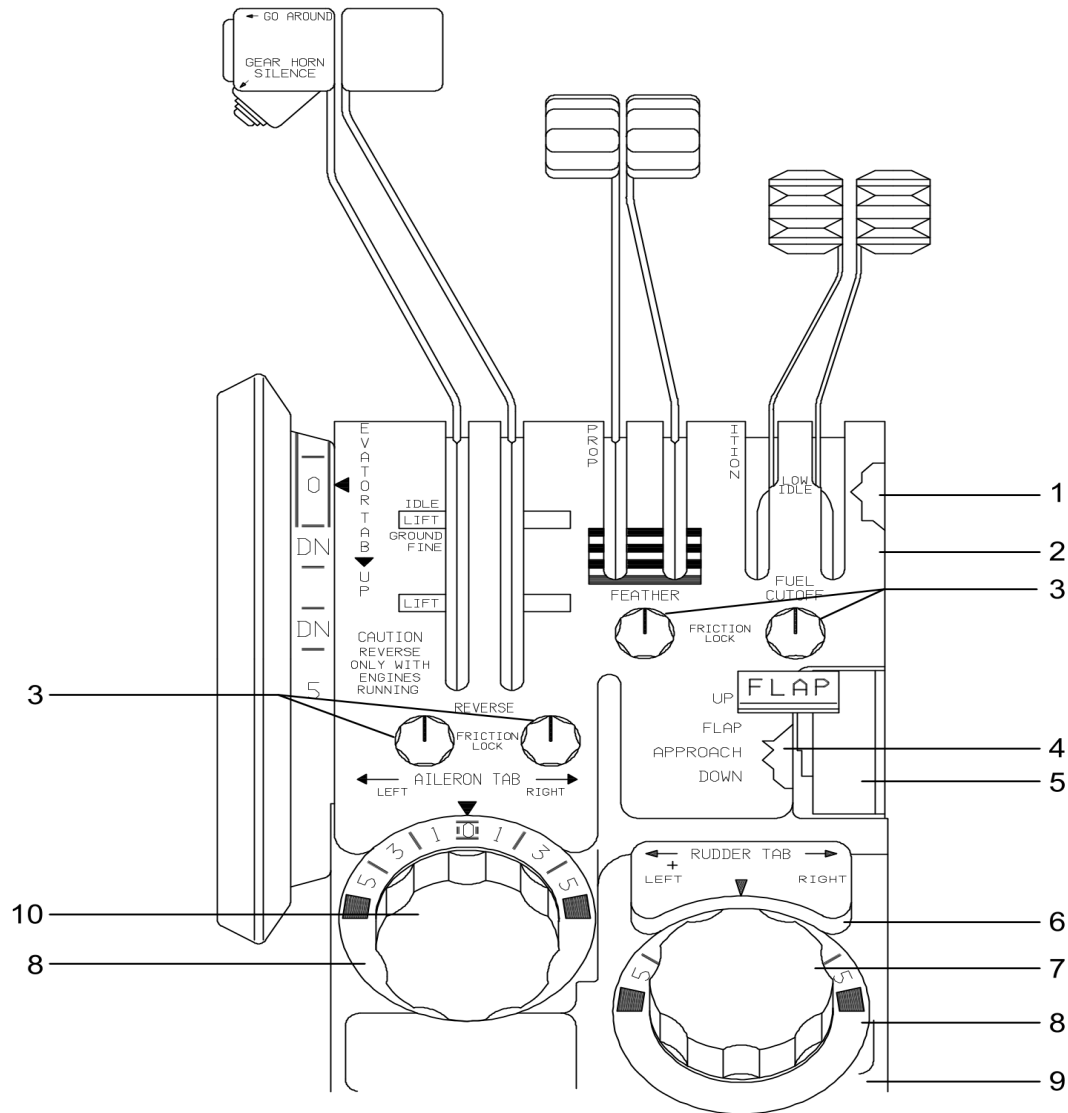
- (1) Set both the aileron and rudder trim tab adjusting knobs (7) and (10) so that the tab indicators (8) read 0. This will allow the adjusting knobs to be reinstalled in the correct position (Ref. [Figure 401](#) and [Figure 402](#)).
- (2) Loosen the set screw in the side of the trim adjusting knobs (7) and (10) and remove the knobs.
- (3) Remove the grip ring under each knob.
- (4) Remove the indicator dials (8).
- (5) Loosen the set screws and remove the friction lock knobs (3).
- (6) Remove the screws attaching the electroluminescent panel (2) that is installed over the POWER, PROP and CONDITION levers.
- (7) Position the electroluminescent panel (2) to gain access to the area where the condition control catch gate is located.
- (8) Peel back the rubber cover (1) in the area of the condition control catch gate. Two screw heads will become visible.
- (9) Remove screws attaching the escutcheon (9).
- (10) Lift the escutcheon and disconnect the wires to the electroluminescent panel (6).
- (11) Remove the escutcheon.
- (12) Remove screws attaching the flap switch gate (5). The gate may be allowed to hang from the flap switch lever.
- (13) Remove screws attaching the flap switch cover plate (4) and remove the plate.
- (14) Gain access to the condition control catch gate and remove the two screws, washers and nuts attaching the catch gate to the pedestal.
- (15) Discard the old catch gate.

B. Installation

- (1) Apply lubricant ([02-026](#), Table 401) to the areas of the new catch gate that will rub against the condition lever (Ref. [Figure 401](#) and [Figure 402](#)).
- (2) Install the new catch gate with the screws, washers and nuts. Locate the catch gate at the low idle end of the lever travel.
- (3) Install the flap switch cover plate (4) with screws.
- (4) Install the flap switch gate (5) with screws.
- (5) Connect the wires to the electroluminescent panel (6).
- (6) Install the escutcheon (9) with screws.
- (7) Secure the rubber cover (1) that was peeled back during removal with adhesive ([05-010](#), Table 401).
- (8) Install the electroluminescent panel (2) with screws.
- (9) Install the friction lock knobs (3) and tighten the set screws.
- (10) Install the indicator dials (8) so that they read 0.
- (11) Install the grip rings.
- (12) Install the trim tab adjusting knobs (7) and (10) and tighten the set screws.

Figure 401 : Sheet 1 : Condition Control Catch Gate Installation

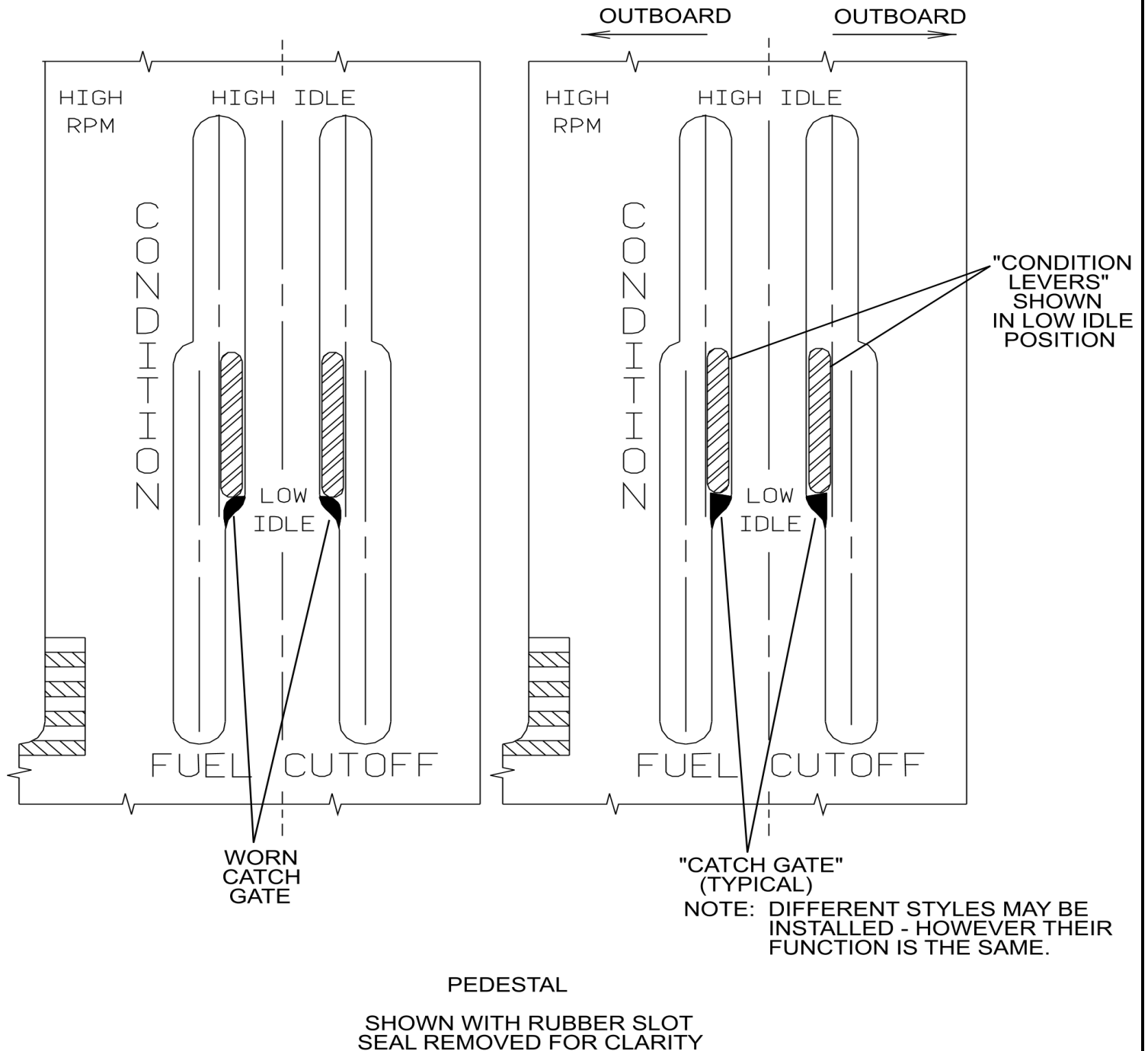
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1. RUBBER COVER
2. ELECTROLUMINESCENT PANEL
3. FRICTION LOCK KNOBS
4. FLAP SWITCH COVER PLATE
5. FLAP SWITCH GATE
6. ELECTROLUMINESCENT PANEL
7. RUDDER TRIM TAB ADJUSTING KNOB
8. TRIM TAB INDICATING DIALS
9. ESCUTCHEON
10. AILERON TRIM TAB ADJUSTING KNOB

Figure 402 : Sheet 1 : Condition Control Catch Gate

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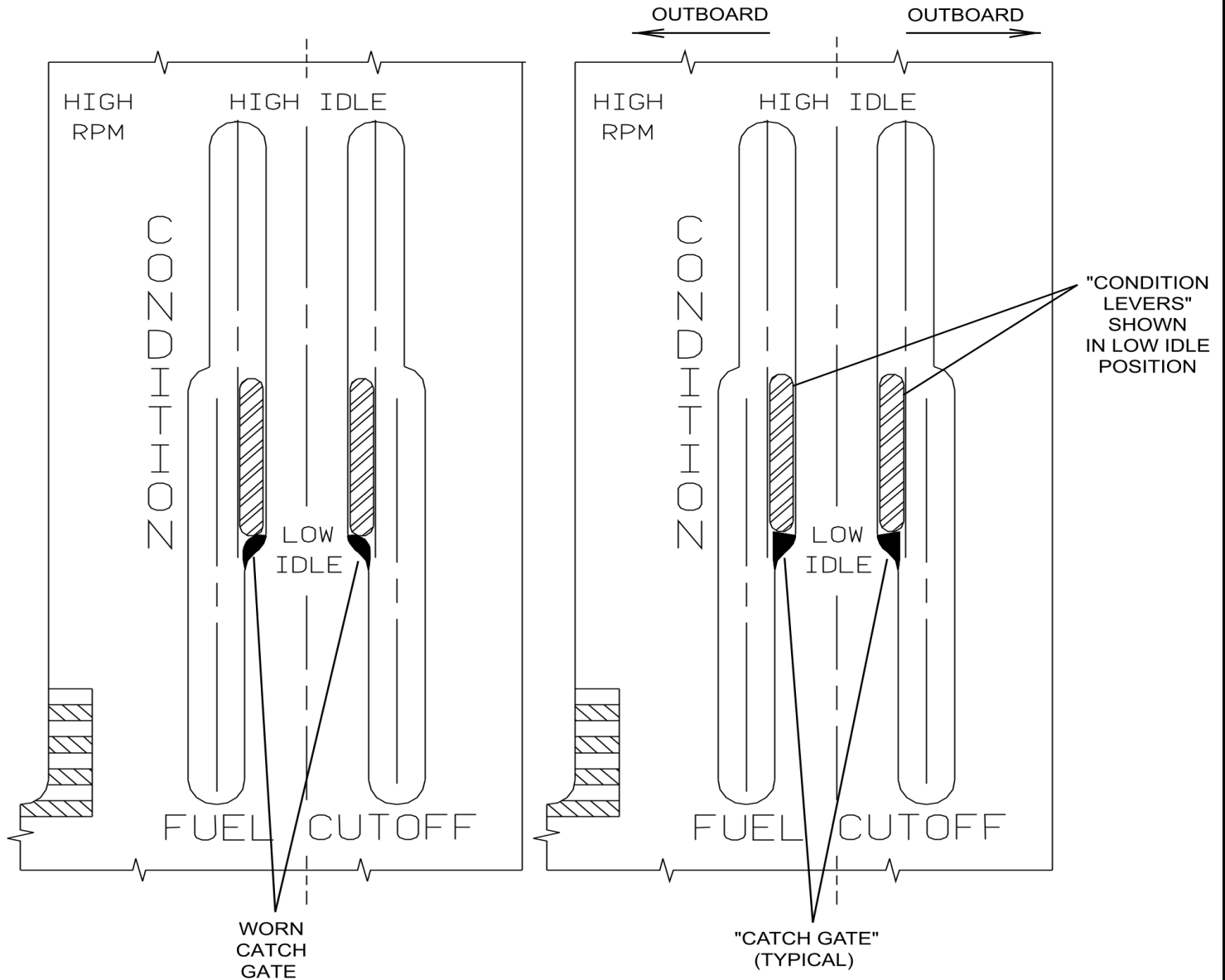
CONDITION CONTROL CATCH GATE - INSPECTION/CHECK**(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)****1. Condition Control Catch Gate****A. Inspection**

- (1) The condition control catch gates are designed to stop the aft travel of the condition levers at their low-idle position. If the catch gates are worn, the condition levers may not stop at their low idle position and be inadvertently moved to the fuel cut-off position. Inspect the catch gates for wear (Ref. [Figure 601](#)). Any worn or non-functioning low-idle catches should be replaced as soon as possible.

CAUTION: Use caution in the operation of the condition levers on any airplane with worn or non-functioning low-idle catch gates until the catch gates are replaced.

Figure 601 : Sheet 1 : Condition Control Catch Gate

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NOTE: DIFFERENT STYLES MAY BE
INSTALLED - HOWEVER THEIR
FUNCTION IS THE SAME.

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POWER LEVER DETENT PIN - INSPECTION/CHECK
(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)

1. Power Lever Detent Pin

A. Inspection

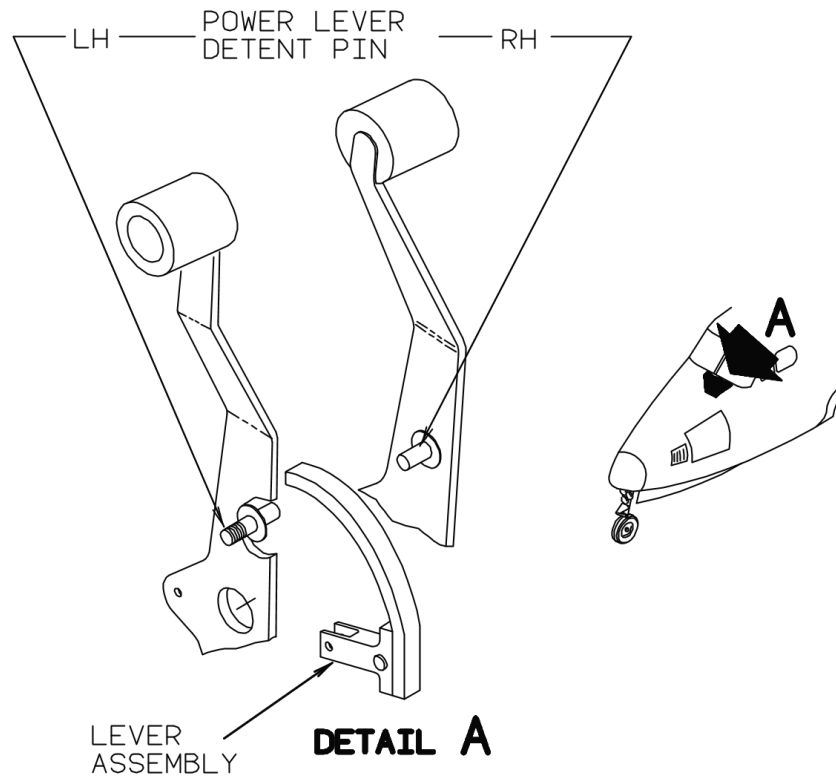
- (1) Perform the BATTERY POWER DISCONNECT procedure (Ref. [24-30-01, 201](#)).
- (2) Remove the pilot's seat from the airplane (Ref. [25-10-00, 401](#) or [25-10-01, 401](#)).
- (3) Remove the screw and washer that secure both the elevator trim tab control wheel and the left end of the engine control lever pivot shaft to the left side of the pedestal.
- (4) Index the position of the elevator trim tab control wheel for later installation.
- (5) Remove the upholstery panel from the left side of the pedestal.
- (6) Using a mirror and flashlight, inspect the upper power lever detent pin (Ref. [Figure 601](#)) on each power lever for excessive wear in the groove where the detent pin travels on the idle/reverse stop assembly between the levers.

NOTE: **Wear of the pin's diameter by a 1/3 or more is considered to be excessive.**

- (7) If excessive wear of the pin is indicated, the power lever assembly must be replaced (Ref. [76-10-01, 401](#)).
- (8) Install the upholstery panel from the left side of the pedestal.
- (9) Install the manual elevator trim control wheel and secure it and the left hand end of the control lever pivot shaft with the attaching screw and washer.
- (10) Position the control wheel as indexed in step (4).
- (11) Install the printed circuit board and edgelight panel on the pedestal. Make sure that all lights are positioned properly to avoid damage.
- (12) Install the pilot's seat assembly (Ref. [25-10-00, 401](#) or [25-10-01, 401](#)).
- (13) Perform the BATTERY POWER CONNECT procedure (Ref. [24-30-01, 201](#)).
- (14) Check operation of all switches and controls in the pedestal area.

Figure 601 : Sheet 1 : Power Lever Detent Pin

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FUEL CUTOFF LEVER - ADJUSTMENT/TEST**(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)****1. Fuel Cutoff Lever****A. Adjustment**

NOTE: If a new engine or fuel control unit has been installed, check for positive cutoff as follows before operating the engine.

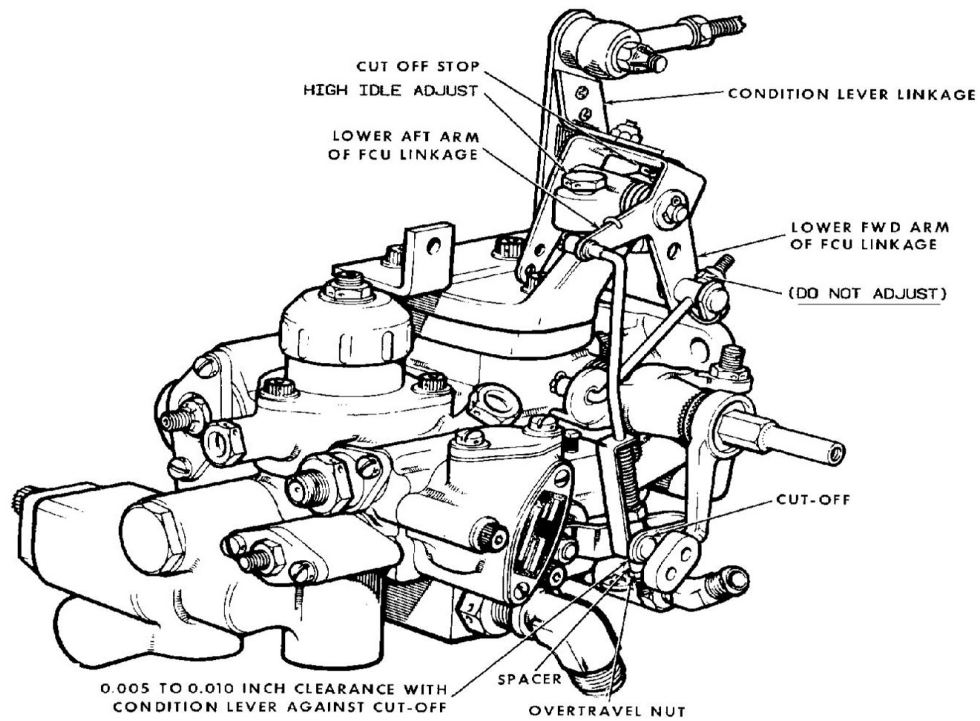
- (1) Disconnect the fuel line at the rear of the fuel control unit. A suitable length of hose or tubing may be routed overboard from the fuel control unit to prevent fuel from being pumped into the cowling (Ref. [Figure 501](#)).
- (2) Place one man in the cockpit to motor the engine and another at the hose to observe fuel flow.

CAUTION: Do not exceed the starter time limits of 40 seconds ON, 60 seconds OFF, 40 seconds ON, 60 seconds OFF, 40 seconds ON, then 30 minutes OFF.

- (3) With the electrical boost pumps operating and the ignition off, motor the engine while moving the cockpit condition lever from the CUTOFF position, then slowly back to CUTOFF. Fuel should flow from the hose, then stop flowing when the condition lever reaches CUTOFF.
- (4) If the fuel continues to flow after the condition lever is returned to CUTOFF, adjust the condition lever and/or the condition lever cable.
- (5) Repeat step (3) to make sure of proper cutoff, then reconnect the fuel line at the rear of the fuel control unit.

Figure 501 : Sheet 1 : Fuel Cutoff Adjustment

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ENGINE CONTROL CABLES - ADJUSTMENT/TEST
(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)

1. Information

- A. Refer to Standard Practices - Airframe [Chapter 20-14-00, 201](#), for information on tools and equipment referenced in Table 501. Refer to Standard Practices - Airframe [Chapter 20-15-00, 201](#), for information on recommended materials referenced in Table 501.

Table 501. Tools/Equipment and Recommended Materials

ITEM	TOOLS AND EQUIPMENT	ITEM	RECOMMENDED MATERIALS
111	Snap Ring Pliers		
112	Regulated Vacuum Source(capable of 20 in.Hg)		
124	Regulated Dry Nitrogen Source(capable of 18 in.Hg)		

2. Engine Control Cables

NOTE: The engine control cables used in this airplane are pre-lubricated by the cable manufacturer and the ends are sealed to reduce the possibility of ingress of moisture or contaminants into the cable housings. If problems are encountered with binding, stiff operation or freezing of the cables, the following tests should be followed:

A. Leak Test of Engine Control Cables

- Visually inspect the cable assemblies for evidence of damage, such as crimps, cuts, abrasions, unusually tight bends and installation damage.
- Disconnect the power, propeller and condition control cables from the engine in each nacelle.
- Using snap ring pliers ([111, Table 501](#)), remove the snap rings, washers and packings from each of the three control cables in each nacelle.
- Connect each of the three control cables in each nacelle to a regulated vacuum source ([112, Table 501](#)) and adjust the regulator to apply 20 in.-Hg. vacuum to each cable. Shut off the valves to trap the vacuum in the cable housings. There should be no loss of vacuum over a two minute period.

B. Nitrogen Purge of Cables

- With the regulated vacuum source ([112, Table 501](#)) still connected to the cables in one nacelle, remove the snap rings, washers and packings from each of the corresponding cables in the crew compartment pedestal. Connect a regulated dry nitrogen source ([124, Table 501](#)) to the cables in the pedestal and adjust the regulator output pressure to 18 psig.
- Purge the cables for a minimum of 15 minutes. Install new P/N 561-571-106 packings in the condition and propeller control cables and P/N 561-571-104 packings in the power cables (P/Ns of Cablecraft, Tacoma, Washington). Install the washers and snap rings in the crew compartment ends of the cables and repeat the LEAK TEST OF ENGINE CONTROL CABLES procedure (Ref. [Paragraph 2.A.](#)).
- Remove the test equipment, install new packings (per step (2)) and install the washers and snap rings on the nacelle ends of the cables.
- Repeat step (1) thru (3) on the opposite engine control cables.

ENGINE CONTROL CABLES - INSPECTION/CHECK**(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)****1. Engine Control Cables**

NOTE: The engine control cables used in this airplane are pre-lubricated by the cable manufacturer and the ends are sealed to reduce the possibility of ingress of moisture or contaminants into the cable housings. If problems are encountered with binding, stiff operation or freezing of the cables, the following Inspection should be followed:

A. Inspection

- (1) Visually inspect the cable assembly for evidence of damage, such as crimps, cuts, abrasions, unusually tight bends and installation damage. The assembly should be discarded if it has been crushed, has the binder or strand wires cut through, or has been contaminated (by petroleum products, dirt, etc.).

NOTE: If there is reason to believe that a substantial quantity of moisture (water vapor or condensation) has accumulated in the cable assembly, it should be baked dry at 125°C for four hours.

- (2) If inspection indicates that damage is confined to the teflon cover, perform the ENGINE CONTROL CABLE TEFLON COVER REPAIR procedure (Ref. 76-10-17, 801).

ENGINE CONTROL CABLES - APPROVED REPAIRS
(Special Edition; BB-2 thru BB-1508; BT-1 thru BT-38; BL-1 thru BL-140; BN-1 thru BN-4)

1. Information

- A. Refer to Standard Practices - Airframe [Chapter 20-14-00, 201](#), for information on tools and equipment referenced in Table 801. Refer to Standard Practices - Airframe [Chapter 20-15-00, 201](#), for information on recommended materials referenced in Table 801.

Table 801. Tools/Equipment and Recommended Materials

ITEM	TOOLS AND EQUIPMENT	ITEM	RECOMMENDED MATERIALS
049	Heat Gun	06-002	Solvent
		06-009	Solvent
		09-002	Lint Free Cloth
		09-075	Teflon Tape
		09-076	Heat Shrinkable Tubing

2. Engine Control Cables

A. Teflon Cover Repair

The purpose of this repair is to seal the damaged area to reduce the possibility of entry of moisture or other contaminants into the cable housing, and to protect the assembly from further damage or wear from abrasion.

- (1) Clean the damaged area, plus three inches on either side, using a clean, lint free cloth (09-002, Table 801) dampened with solvent (06-009, Table 801) or solvent (06-002, Table 801). Wipe dry with a dry, clean, lint free cloth (09-002, Table 801).
- (2) Starting at a point two inches from the damaged area, wrap teflon tape (09-075, Table 801) around the cable housing to a point two inches on the other side of the damaged area. Wrap the teflon tape so it overlaps itself by one-half width.

NOTE: Make sure to select teflon tape with a temperature range suitable for use in the area being repaired.

- (3) In areas subject to abrasive damage (e.g. clamp points), apply a second layer of teflon tape (09-075, Table 801) in the opposite direction from the first tape layer.

NOTE: If additional protection is required, heat-shrinkable tubing (09-076, Table 801) may be applied over the teflon tape. The largest size possible should be used to achieve maximum shrinkage, and tubing should be cut to at least 0.25 inch longer than the taped area to be covered. To properly shrink the tubing, heat to above the crystalline melt (327°F) with a heat gun (049, Table 801). As the heated tubing reaches 20 to 30% shrinkage, remove the heat source and allow the tubing to cool. The thickness of the covered area over the existing cable housing should be equal to, or greater than 0.010 inch.