

**ALERT SERVICE BULLETIN**

**Bell Helicopter** **TEXTRON**

A Subsidiary of Textron Inc.

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REV

**MODELS AFFECTED:** 407

**SUBJECT:** FADEC – DIRECT REVERSION TO MANUAL (DRTM) SYSTEM, UPGRADE TO.

**HELICOPTERS AFFECTED:**

**PART I:** 407, S/N 53000 through 53355

[Helicopters Serial Number 53356 and subsequent will have the intent of Part I of this bulletin completed before delivery]

**PARTS II, III, IV, V :** 407, S/N 53000 through 53389

[Helicopters S/N 53390 and subsequent will have the intent of PARTs II, III, IV, and V of this bulletin completed before delivery.]

**NOTE :** Helicopters modified in accordance with Bell Helicopter customizing drawing 407-799-037 meet the intent of ASB 407-99-31 and Rolls-Royce Allison CEB A-73-6032.

**COMPLIANCE:** As specified in Rolls-Royce Allison Commercial Engine Bulletin CEB A-73-6032.

**DESCRIPTION:**

The FADEC system is being modified to let pilots keep their hand on the collective control during the transition to Manual Mode if accomplishment of a FADEC Failure procedure is required. The pilot will only have to remove his/her hand from the collective control, when fully established in Manual Mode, to push the FADEC Mode switch to stop the FADEC Fail horn.

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To do this, three changes are required. In the first system change, the FADEC Electronic Control Unit (ECU) is being modified to initiate a Direct Reversion to Manual Mode, if a FADEC failure occurs. This requires replacement of the existing ECU with an upgraded unit. **Fail Fixed failures will not occur with the Direct Reversion to Manual System.**

In the second system change, which must be completed at the same time as the ECU change, the throttle control is modified to give a detented “FLY” position. During operation in AUTO Mode, the detented “FLY” position will command the FADEC to maintain Power Turbine RPM (NP) and Main Rotor RPM (NR) at 100%. **The detented “FLY” position will be the Flight Manual approved throttle position for Flight Operations.** The detent is a ball plunger style which can be selected or deselected by direct throttle movement.

The new throttle “FLY” position is intended to help pilots match engine NG speed with throttle bezel position, if a Direct Reversion to Manual Mode occurs as a result of a FADEC Failure. In Manual Mode, the detented “FLY” position is equivalent to an engine NG speed of approximately 90%.

In addition to the ECU and throttle change, a new decal will be installed on the instrument panel to show that the Direct Reversion to Manual system is installed.

The third system change is applicable to 407 S/N 53355 and prior. In this change, the clear plastic flip-up guard is removed from the face of the FADEC Mode switch. The flip-up guard assembly is replaced with a new guard, which recesses the FADEC Mode switch. This modification will help to simplify pilot actions if the FADEC Mode switch activation is necessary.

Applicable Flight Manual Operational and Emergency Procedure changes are included with this bulletin. Refer to BHT-407-FM-1, TEMPORARY REVISION FOR FADEC DIRECT REVERSION TO MANUAL SYSTEM. Operators using quiet cruise mode can also refer to the Temporary Revision provided for BHT-407-FMS-25.

In addition to the Temporary Flight Manual revision, more information on the Direct Reversion to Manual system is given in the attached temporary revision to BHT-407-MD-1, ROTORCRAFT MANUFACTURERS DATA, SECTION 1 – SYSTEMS DESCRIPTION.

## **CAUTION**

AFTER THE COMPLETION OF THE REQUIRED CHANGES, AND BEFORE THE HELICOPTER IS RELEASED FOR FLIGHT, OPERATORS MUST MAKE SURE THAT PILOTS UNDERSTAND AND ARE FAMILIAR WITH THE DATA CONTAINED IN THE TEMPORARY REVISIONS TO THE FLIGHT MANUAL AND MANUFACTURER'S DATA.

**PART I** of this bulletin gives information to modify the FADEC Mode switch.

**PART II** of the bulletin gives information to replace the ECU. To complete the ECU PART of this upgrade, the existing ECU's will be replaced with modified ECU's. (Refer to this bulletin and Rolls-Royce Allison CEB A-73-6032). A rotatable pool of ECU's has been established by Rolls-Royce Allison.

For the accomplishment of PART II of this bulletin, Rolls-Royce Allison will coordinate the schedule and shipments of the required ECU (P/N 23071644 or subsequent) to customers. If it is necessary to phone or fax the Rolls-Royce Allison Engine Company Customer Support Department for information on the shipments of ECU's, use the numbers that follow:

Phone: 1-888-255-4766 (International customers use USA direct) or 1-317-230-6400.

Fax: 1-317-230-4243

**PART III** of the bulletin gives information to modify the throttle on the collective control.

**PART IV** of the bulletin provides information to replace the existing FADEC decal on the instrument panel.

**PART V** of the bulletin gives information to make applicable Flight Manual changes. Log Book entries, and complete a check run procedure.

### **APPROVAL:**

The engineering design aspects of this Alert Service Bulletin are Transport Canada approved.

### **MANPOWER:**

Approximately 8.0 man-hours are required to accomplish this bulletin. Man-hours are based on hands-on time and may vary with personnel and facilities available.

**WARRANTY:**

Owners/operators of 407 helicopters who comply with the instructions outlined in this bulletin are eligible for a special 100% warranty credit towards the purchase of the parts contained in the "Required Material" section of this bulletin.

To receive this credit:

- Customers must order the replacement parts from an approved BHTI supply source.
- Comply with the instructions outlined in this bulletin no later than compliance date specified in Rolls-Royce Allison CEB A-73-6032.
- Send a completed Malfunction Report (MR) to BHT Warranty Administration. A copy of the invoice referencing parts used to accomplish this bulletin must be attached to the Malfunction Report.

- NOTE -

Customers who fail to comply with the instructions in this bulletin after compliance date specified in Rolls-Royce Allison CEB A-73-6032 are **not** eligible for the special warranty credit provisions listed above.

**MATERIAL:**

**Required Material:**

The material that follows is necessary for the accomplishment of this Alert Service Bulletin and can be obtained through your Bell Helicopter Textron Supply Center.

**PART I: Required for S/N 53000 Through 53355**

<u>PART NUMBER</u>	<u>NOMENCLATURE</u>	<u>QUANTITY</u>
407-030-008-101	Guard	1

**PART II, III, AND IV: REQUIRED FOR S/N 53000 THROUGH 53389**

To simplify the ordering procedure for PARTs II, III, and IV, the necessary parts are to be ordered by kit **CA-407-99-31**.

- NOTE -

ECU's required per PART II of this bulletin and CEB A-73-6032, will be shipped separately. These shipments will be coordinated by Rolls-Royce Allison.

<u>PART NUMBER</u>	<u>NOMENCLATURE</u>	<u>QUANTITY</u>
CA-407-99-31 (including the following):		1
206-310-007-101	SCREW	1
407-001-133-101	DETENT	1
407-001-134-101	GRIP ASSEMBLY	1
407-075-011-109	DECAL	1
407-001-135-101	SWITCH BOX ASSEMBLY	1
CL-40-BP-3	BALL PLUNGER	1
MS171538	PINS	2
NAS1102E04-3	SCREWS	3
31-053-18CFHP	DECAL	1
100-050B500	PLUG	1
100-050B562	PLUG	1

**SPECIAL TOOLS:**

The Special Tool that follows is included with the **kit CA-407-99-31**.

<u>NOMENCLATURE</u>	<u>PART NUMBER</u>	<u>QUANTITY</u>
INSERTION/REMOVAL	M81969/14-11	2

Note 1: As an alternate tool, M81969/14-02 may be used.

Note 2: Operators also need to be aware that a #6 posi-drive torque set bit is required. This screwdriver bit is required to install screws P/N NAS1102E04-3 per Figure 3, Sheet 6. If you require the bit, it may be purchased through Bell Helicopter as P/N 170-6-ACR.

**Consumable Material:**

The material that follows, or equivalent, is necessary to accomplish this Alert Service Bulletin. This material is considered consumable (bench stock), and may be available considering the operators consumable material stock levels. Most material can be obtained through your Bell Helicopter Textron Supply Center.

<u>PART NUMBER</u>	<u>NOMENCLATURE</u>	<u>REF. NO. (NOTE1)</u>
3950 SCOTCHCAL	EDGE SEALER	C-349
TT-N-95TYII, 1GAL	ALIPHATIC NAPHTHA	C-305
MILS81733TYII-2PT	SEALANT	C-392
MIL-P-85582, TY1, CL2 (ALT.MILP23377TY1, CL3/2GA)	PRIMER	C-204
SN63	SOLDER	EC-041 (NOTE 2)
130-005-5-2	INSUL TUBING	(NOTE 3)
130-005-6K2	INSUL TUBING	(NOTE 4)
MS3367-4-9	CABLE STRAP	EC-087
MILT43435TY IV FIN C	LACING CORD	EC-052
299-947-096, WHT37925	EPOXY ENAMEL	C-207
MIL-V-6894A	CHORD	C-471
MIL-C-83286TY1-CLEAR PER FED-STD-595A	POLYURETHANE ENAMEL CLEAR	C-233

Note 1: The "C" REF. NO. above is a cross-reference found in the Standard Practices Manual. The "EC" designation is called out in the Electrical Standard Practices Manual.

Note 2: Used for Float Inflation and Quiet Mode Switches.

Note 3: Used for Float Inflation Switch.

Note 4: Used for Quiet Mode Switch.

**WEIGHT AND BALANCE:**

Not affected.

**ELECTRICAL LOAD DATA:**

Not affected.

**REFERENCES:**

BHT-407-MM, Maintenance Manual.  
Bell Helicopter Electrical Standard Practices Manual, BHT-ELEC-SPM.  
Bell Helicopter Installation Instruction, BHT-407-II-1.  
Bell Helicopter Installation Instruction, BHT-407-II-21.  
Allison Commercial Engine Bulletin CEB A-73-6032.  
Allison 250-C47B Operation and Maintenance Manual, CSP 21001.

**PUBLICATIONS AFFECTED:**

BHT-407-MM, Maintenance Manual.  
BHT-407-IPB, Illustrated Parts Breakdown Manual.  
BHT-407-FM-1, Flight Manual.  
BHT-407-FMS-25, Quiet Cruise Mode Supplement.  
BHT-407-MD-1, Flight Manual Manufacturer's Data.

**ACCOMPLISHMENT INSTRUCTIONS:**

**CAUTION**

THE ACCOMPLISHMENT INSTRUCTIONS THAT FOLLOW ARE TO BE DONE AT THE SAME TIME WITH THOSE ISSUED IN ROLLS-ROYCE ALLISON CEB A-73-6032. IF ASB 407-99-28 AND ROLLS-ROYCE ALLISON CEB 73-6026 (UPGRADE TO FADEC ECU SOFTWARE VERSION 5.202) HAVE NOT YET BEEN ACCOMPLISHED, OPERATORS MUST MAKE SURE THAT THE TEMPORARY REVISION FOR FADEC SOFTWARE VERSION 5.202, DATED 22 DECEMBER 1998, IS INCORPORATED INTO THE 407 FLIGHT MANUAL, BHT-407-FM-1, DURING ACCOMPLISHMENT OF THIS BULLETIN. WHEN THE TEMPORARY REVISION FOR FADEC SOFTWARE VERSION 5.202 HAS BEEN INCORPORATED INTO THE 407 FLIGHT MANUAL BHT-407-FM-1, THE COMPLETION OF THIS BULLETIN AND ROLLS-ROYCE ALLISON CEB A-73-6032 WILL REMOVE THE REQUIREMENT TO ACCOMPLISH ASB 407-99-28 AND CEB 73-6026.

## **PART I: Installation of the New FADEC Mode Switch Guard**

1. Disconnect the helicopter electrical power.

### **CAUTION**

MAKE SURE THE SWITCH PUSH-BUTTON IS IN THE EXTENDED (OUTER) POSITION PRIOR TO EXTRACTING THE PUSH-BUTTON.

2. Make sure that the FADEC Mode switch push-button is in the extended (outer) position.
3. Use your fingers to extract the push-button to its full length (Figure 1). When it is extracted, the push-button can hang freely on the attached retainer.
4. Turn the locking screws inside the switch housing counter clockwise with a small screwdriver (Figure 1, Detail A).

### **- NOTE -**

If it is difficult to gain access to the back of the FADEC Mode switch with instrument panel tilted aft, removal of Turn and Slip indicator or associated blanking cover will provide additional access.

5. Remove the hardware that attaches the instrument panel and tilt it aft to get access to the back of the panel. Slide the mounting sleeve and panel spacer off of the FADEC Mode switch housing.

### **- NOTE -**

Do not remove the electrical wiring from the FADEC Mode switch.

6. If applicable, remove electrical harness cable straps and cable wrap as necessary and pull the FADEC Mode switch from the face of instrument panel. Pull the FADEC Mode switch from instrument panel until the electrical wires extend through the mounting hole.
7. Move the existing push-button cover assembly off the switch housing and put the switch wires through the slot in the cover assembly to remove it.

8. To install the new switch guard (407-030-008-101), put the switch wires through slot in guard. With the switch housing positioned with the (TOP) in the “up” position, put the guard, with the slot in the “up” position on the switch housing.
9. With switch housing positioned with (TOP) in the “up” position and with the slot in the new guard in the “up” position, push the switch housing into the instrument panel.
10. Get access to the back of the instrument panel and put the panel spacer and the mounting sleeve on the switch housing. Install the mounting sleeve as shown in Figure 1.
11. Hold the switch and mounting sleeve in position and turn the locking screws, inside the switch housing, clockwise until the mounting cams contact the mounting sleeve and the switch is correctly attached. Do not over-tighten the locking screws.
12. Install the push-button assembly, with slot in the “up” position, and carefully put it into the switch until it snaps into place. Cycle the push-button and make sure it latches in the inner position and unlatches to the outer position.
13. Make sure the FADEC Mode switch wires have not been moved during the procedure. If applicable, install the cable wrap you removed, and the new cable straps, as necessary.
14. Use the hardware you removed to close the instrument panel.

## **PART II: ECU Removal and Replacement**

The procedure that follows gives the necessary steps to remove and replace the ECU as called out in Step A of the Accomplishment instructions of Rolls-Royce Allison CEB A-73-6032.

- NOTE -

Bell Helicopter recommends that you do a check of the ECU for faults and exceedances before you remove it. Use the Chandler Evans EMC-35A Maintenance Terminal to do this.

The Fault History option of the Maintenance Terminal is to be used to check for Current, Last Engine Run, and Accumulated Faults. The Engine History option is to be used to check the Engine History Data screen for exceedances. If there are faults or exceedances, find the correct maintenance action.

Also, if operators wish to transfer the Engine History Data from one ECU to another, the Transfer Engine History feature of the EMC-35A Maintenance Terminal – Engine History Menu can be used. (Refer to the EMC-35A FADEC Maintenance Terminal User's Guide for operational information).

1. Disconnect the helicopter electrical power.
2. Remove the forward transmission cowling (Chapter 53) to get access to the ECU.

- NOTE -

Make sure that you do not cause damage to the contacts during the removal of the ECU connectors. Put protective covers on the ECU and harness connectors immediately after removal.

3. Disconnect the FADEC harness electrical connectors (1 and 2, Figure 2) from the ECU.
4. Remove the screw (4), lock washer (5), the bonding strap (7), and the washer (6) from the ECU (3).
5. Remove the bolts (8, 9, 10, and 11) and the washers (13) from the top of the ECU mounting pads.
6. Remove the ECU P/N 23070264 or 23070254.
7. Leave the washers (13) found on top of the roof shell inserts for the ECU.
8. Use your fingers to remove the spacers (12) from ECU rubber isolation dampers.

9. Install the four spacers (12) into the mounting pads of replacement ECU P/N 23071644 or subsequent.
10. Confirm a stack-up of three washers (13) on top of each roof shell insert for the ECU.
11. Position the ECU mounting pads over the washers (13).
12. Install one washer (13) on top of each of the four ECU mounting pads.

- NOTE -

The ECU mounting bolts (8, 9, and 10) have -12 grip length. The ECU mounting bolt (11) has a -18 grip length.

13. Install the ECU mounting bolts (8, 9, 10, and 11) in correct position and torque per Figure 2.

- NOTE -

If not already accomplished, Bell Helicopter recommends compliance with Technical Bulletin 407-98-9 (S/N 53000 through 53199). T.B. 407-98-9 replaces round bonding strap P/N MS525083-2BB6 with improved flat bonding strap P/N 961114-1.

14. Install the washer (6), the bonding strap (7), the lock washer (5), and the screw (4) on the ECU. Tighten the screw (4).

- NOTE -

Remove the protective covers on the ECU and FADEC harness connectors only before the installation. Inspect connectors for condition and cleanliness (Rolls-Royce Allison CSL-6069). Make sure that you do not cause damage to the contacts during the installation of the ECU connectors. Make sure that the red band on each ECU electrical receptacle is not visible after the installation of the FADEC harness connectors.

15. Install the FADEC harness electrical connectors (1 and 2) on the ECU (3).

- NOTE -

Bell Helicopter recommends that you do a check of the ECU for faults and exceedances after the installation (before the first engine start). This will make sure the ECU is free of faults and exceedances before the helicopter is returned to service. Use the Chandler Evans EMC-35A Maintenance Terminal to do this.

Use the Fault History option of the Maintenance Terminal to do a check for Current, Last Engine Run, and Accumulated Faults. Use the Engine History option to do a check of the Engine History Data screen for exceedances. Prior to transfer of Engine History Data to new ECU, Last Engine Run Faults, Accumulated Faults and Exceedances should not exist with replacement ECU installed. If there are active Current faults, find the correct maintenance action.

If operators want to transfer the Engine History Data from one ECU to an other, use the Transfer Engine History feature of the EMC-35A Maintenance Terminal. (Refer to the EMC-35A FADEC Maintenance Terminal User's Guide for operational information). Ensure no faults or exceedances exist following transfer of Engine History Data.

16. Clean top of ECU with clean lint-free cloth made most with aliphatic naphtha (C-305). When surface is clean and dry, install "NO STEP" decal (31-053-18CFHP) on top of ECU. Refer to Figure 2, Sheet 1. Mask a 0.250 inch (15.0 mm) perimeter around decal. Apply clear polyurethane enamel (C-233) over the decal and perimeter, remove tape.

17. Install the cowlings (Chapter 53).

- NOTE -

Do not do the Check Run Procedure at this time.  
This procedure will be called out later in the bulletin.

18. Send the ECU to Chandler Evans as quickly as possible, as specified in Step B of Accomplishment Instructions of Rolls-Royce Allison CEB A-73-6032.

### **PART III: Collective Throttle Modification**

- NOTE -

The Collective throttle modification is to be done with collective assembly installed in helicopter. Make sure interior of the helicopter is sufficiently protected during the procedure that follows.

1. Disconnect the helicopter electrical power.
2. Remove the screws (1, Figure 3, Sheet 1) and the collective switch box lit panel assembly (2).
3. Remove screws (3) and the cover (4). Keep the hardware for installation.

- NOTE -

The wiring will have to be removed from all switches and lighting connector in the collective switch box assembly. Because of the exposed length of wiring in the switch box area, all wire numbers may not be visible. Therefore, those wires which can not be identified by wire number, must be temporarily identified during removal to make sure of the correct reinstallation.

4. If applicable, remove the lacing chord from the wiring in the switch box.

- NOTE -

Temporarily attach tape, with the correct wire number written, to the wires which can not be identified by wire number. Make sure each wire can be identified or is temporarily identified with tape when it is removed. (Refer to Figure 3, Sheet 2, for switch/wire number cross-reference).

5. Remove the wiring from all the switches and the lighting connector. Use removal tool P/N M81969/14-11 (Alt. P/N M81969/14-02) to remove the wires from the landing light switch.

- NOTE -

If the Lightweight Emergency Float kit is installed, remove the Float Arm Switch from the collective switch box to get access to the wiring attachment screws.

6. Remove the throttle friction assembly (5, 6, and 7, Figure 3, Sheet 1 and 3) from the collective switch box. Keep the hardware for the installation (i.e. 1-setscrew, 7-spring washers, 1-plug).
7. Remove wiring harness clamp and its hardware (8, 9, 10, 11, and 12, Figure 3) from the collective switch box. Keep the hardware for the installation.

- NOTE -

Push pins out from top and if required, use vise grip style pliers and hammer to remove pins from bottom of switch box.

8. Put a support below the collective and switch box assembly. Remove the two pins (13, Figure 3) with the correct-sized pin-punch and hammer.
9. With throttle in cut-off, press the idle detent button and carefully remove the collective switch box assembly (14, Figure 3) from the collective tube assembly. Roll throttle toward open and remove idle detent button and spring (15 and 16, Figure 3) from the collective tube assembly. Keep the idle detent button and spring for the installation.

- NOTE -

Sealant removed per step 10 may be very hard. Carefully remove all sealant from hole and slot of screw. Do not attempt to remove screw (17) until all sealant has been removed.

10. Get access to the screw (17, Figure 3) by removing the sealant installed in throttle bezel. Remove the screw (17). (Refer to Figure 3, Sheet 4 for location of sealant.)
11. Remove the throttle grip assembly (18, Figure 3) from the collective tube assembly (20).

- NOTE -

If installed friction of new grip is high, work in by hand until friction is reduced to acceptable level (i.e. equivalent to that of previously removed grip).

12. Put the new throttle grip assembly (19, Figure 3) on the collective tube assembly (20). (Refer to Figure 3, Sheet 5 for more information.)
13. Remove the four screws (22, Figure 3, Sheet 5) from the ferrule/bezel (23). Referring to Figure 3, Sheet 5, Detail A, remove the ferrule/bezel (23) until you can adjust and confirm alignment between all four setscrew positions and their associated recessed areas on the throttle grip assembly. Apply a piece of tape over one of the ferrule/bezel set screw positions and apply a piece of tape adjacent to it on the cork portion of the throttle grip. Using a pen line, match mark the center of the set screw to the center of its associated recessed area on the throttle grip. Slide the ferrule/bezel into position on the throttle grip.
14. Turn the ferrule until the access holes, for the screw (17), in the ferrule and the throttle grip are aligned. Keeping the alignment of the access holes, turn the ferrule and throttle grip until you have alignment with the threaded support hole in the throttle tube assembly (21). Install and tighten the screw (17). (Refer to Figure 3, Sheet 5 for more information.)

- NOTE -

There is only one position, between ferrule and throttle grip, where all 4 setscrews will fully engage. Do not overtighten setscrews during the following step.

15. Using the pen line match mark reference from Step 13, align the ferrule/bezel setscrew positions with the recessed areas in throttle grip (Figure 3, Sheet 5, Detail A). Lightly install the setscrews to prevent movement of the ferrule (23) on throttle grip (19). Remove tape from ferrule and throttle.
16. Roll throttle towards open and install the Idle Detent button and spring (15 and 16, Figure 3, Sheet 1) through the slot in the throttle grip assembly (19) and into the cavity in the collective tube assembly (20). (Refer to Figure 3, Sheet 5 for more information). Roll the throttle closed to keep detent and spring in place.
17. Use the three screws (26), wet with sealant (C-392), to install the detent (25, Figure 3, Sheet 6, Detail B) on the collective switch box detent holder.
18. Install the new switch box assembly (24) on the collective tube assembly (20). Prior to sliding the switch box fully onto the collective tube, apply a very light layer of unreduced primer (C-204) to the inside diameter of the collective switch box mounting bore (Figure 3, Sheet 1). Turn the switch box assembly (24) so the mounting holes for the pins (13) align with the collective tube assembly (20).

- NOTE -

Before you complete Step 19, make sure the throttle grip rotates smoothly and that the Idle Detent button operates correctly. To assist installation of pins (13) into lower half of switch box, position a guide pin through hole in bottom of switch box into center of pins (13). Use hand pressure on guide pin to help position pins (13) into lower holes during installation. Once pins have started into lower holes, remove guide pin.

**CAUTION**

**MAKE SURE THAT ELECTRICAL WIRING IS NOT DAMAGED DURING THE PROCEDURE.**

19. Put a support below the collective and switch box assembly and install the two new pins (13, Figure 3, Sheet 1) with pin punch and hammer.
20. Install the clamp and hardware for the wiring harness (8, 9, 10, 11, and 12, Figure 3, Sheet 1) in the collective switch box.

### CAUTION

MAKE SURE ALL SWITCH WIRING IS CORRECTLY INSTALLED. DO A CHECK TO MAKE SURE THE WIRING IS INSTALLED CORRECTLY AS SPECIFIED IN Figure 3, Sheet 2. REMOVE ALL THE TAPE THAT YOU INSTALLED TO IDENTIFY THE WIRE NUMBERS.

21. Install new plug buttons (25, 26, Figure 3, Sheet 1) into new collective switch box. If applicable, relocate the Lightweight Emergency Float switches to the new switch box assembly and attach wiring. For solder connections, install insul tubing P/N 130-005-5-2 as necessary and utilize solder (EC-041). Refer to Bell Helicopter Electrical Standard Practices BHT-ELEC-SPM for soldering procedures. Refer to Figure 3, Sheet 2, for correct wiring installation. For more specific information on the Lightweight Emergency Float switch and wiring installation procedures, operators can refer to Installation Instruction BHT-407-II-1.
22. Install the wiring to the Lighting connector and the Start and Landing Light switches. Wires for Landing Light switch can be inserted with finger pressure. Refer to Figure 3, Sheet 2, for the correct wiring installation.
23. If applicable, attach wiring to the Quiet Mode Switch. Refer to Figure 3, Sheet 2, for the correct wiring installation. For solder connections, install insul tubing P/N 130-005-6K2 as necessary, and utilize solder (EC-041). Refer to Bell Helicopter Electrical Standard Practices Manual BHT-ELEC-SPM for soldering procedures. For more specific information on the Quiet Mode switch and wiring procedures, refer to Installation Instruction BHT-407-II-21.
24. Install the lacing cord (EC-052) to the collective switch box wiring as required. (Refer to Bell Helicopter Electrical Standard Practices Manual BHT-ELEC-SPM for lacing procedures.)
25. Use the screws (3) to install switch cover (4, Figure 3, Sheet 1).
26. Use the screws (1) to install the collective switch box lit panel (2).

### - NOTE -

Make sure the spring washers are not flattened and are stacked as shown in Figure 3, Sheet 3.

27. Install the throttle friction assembly (5, 6, and 7, Figure 3, Sheets 1 and 3) into the collective switch box (24). Tighten the throttle grip friction setscrew until you have a slight friction when the throttle grip is turned.
28. To adjust the throttle friction grip setscrew (5, Figure 3, Sheets 1 and 3) to get a fish scale value of 10 +/-0.5 pounds (4.5 +/-0.23 Kg), after the initial breakaway force, do the procedure that follows:
  - a. Wrap a suitable length of cord (C-471 or equivalent) around the throttle grip and attach a fish scale to the cord.
  - b. Depress the Idle detent button and pull the fish scale to rotate the throttle from the Closed position to the Full Open position.
  - c. Adjust the setscrew (5, Figure 3, Sheet 3) to get the required friction value.

- NOTE -

Install the ball plunger to a depth that lets it lightly contact the surface of the detent (25).

29. Install the ball plunger (27, Figure 3, Sheet 6) into the ferrule (23).
30. To adjust the ball plunger to get a peak rotational value of between 4 to 5 pounds (1.8 to 2.3 Kg) in excess of throttle friction adjustment in Step 28 when the ball plunger rides through the detent groove, do the procedure that follows:
  - a. Turn the throttle to put the ball plunger near the groove of the detent (25, Figure 3, Sheet 6).
  - b. Wrap a suitable length of cord (C-471 or equivalent) around the throttle grip and attach a fish scale to the cord.
  - c. Pull the fish scale to turn the throttle in and out of the groove. Adjust ball plunger (27) to make sure the fish scale value is 14 to 15 +/-0.5 pounds (6.3 to 6.8 +/-0.23 Kg) when the plunger is pulled through the detent in either direction.
31. Following the throttle and "FLY" detent friction adjustments, make sure the operation of the throttle is smooth and that a positive indication is felt when the ball plunger is engaged in the detent. If applicable, also use the co-pilot's throttle to confirm.

- NOTE -

The EMC-35A Maintenance Terminal is necessary to complete the rigging procedure that follows. (Refer to the EMC-35A FADEC Maintenance Terminal User's Guide for operational information.)

32. Connect EMC-35A Maintenance Terminal and apply helicopter electrical power. Select Real Time Data – Analog Parameters.

**CAUTION**

THE POWER LEVER ANGLE (PLA) VALUES DISPLAYED ON THE ANALOG PARAMETERS SCREEN, OF THE EMC-35A MAINTENANCE TERMINAL, MUST BE IN THE SPECIFIED RANGES THAT FOLLOW. ADDITIONALLY, THE HMU LEVER MUST BE WITHIN THE SPECIFIED RANGES OF THE HMU MIN AND MAX STOPS WHEN THE THROTTLE IS POSITIONED TO THE CORRESPONDING CLOSED AND FULL OPEN POSITIONS. IF VALUES ARE NOT IN THE SPECIFIED RANGE FOR EACH THROTTLE POSITION, YOU MUST ADJUST THE THROTTLE RIGGING.

33. Ensure the following PLA values and HMU lever positions are obtained when the throttle is turned to the Closed, Idle, and Full Open positions.

<u>THROTTLE POSITION</u>	<u>PLA VALUE</u>	<u>MAX DISTANCE BETWEEN HMU LEVER AND HMU STOP (MIN/MAX)</u>
Closed	-2.5 to 5 degrees	.020 in (0.51 mm)(Min stop)
Idle	30 to 40 degrees	
Full Open	95 to 102.5 degrees	.020 in (0.51 mm)(Max stop)

34. Loosen the four setscrews (22, Figure 3, Sheets 1 and 7) on the ferrule (23).

35. To rig the detented "FLY" position, use the procedure that follows:

- a. Monitor the EMC-35A Maintenance Terminal and turn the throttle back from Full Open until a PLA value of 70 degrees is obtained.

- b. Keep the 70 degree PLA value with throttle position and turn ferrule (23, Figure 3, Sheets 1, 6, and 7) until the ball plunger (27, Figure 3, Sheet 6) engages the groove of detent (25).
  - c. Tighten the four screws (22) sufficiently to keep ferrule in position.
  - d. Turn the throttle from Full Open until the ball plunger (27) is engaged in the groove of "FLY" detent (25). **Make sure that the PLA value is 69.5 to 70.5 degrees, when the throttle is positioned from Full Open into the "FLY" detent. If necessary, readjust until the 69.5 to 70.5 PLA value is obtained.**
36. With the ball plunger (27) engaged in the groove of detent (25), paint (C-207) a permanent line 0.06 inch (1.59 mm) wide by 0.25 inch (6.35 mm) long, aligned with the "FLY" position of throttle ferrule (23). (Refer to Figure 3, Sheet 7.)

#### **PART IV: Instrument Panel Decal Application**

- NOTE -

For the best bond, install the decal at a temperature more than 60 degrees F (15.5 degrees C).

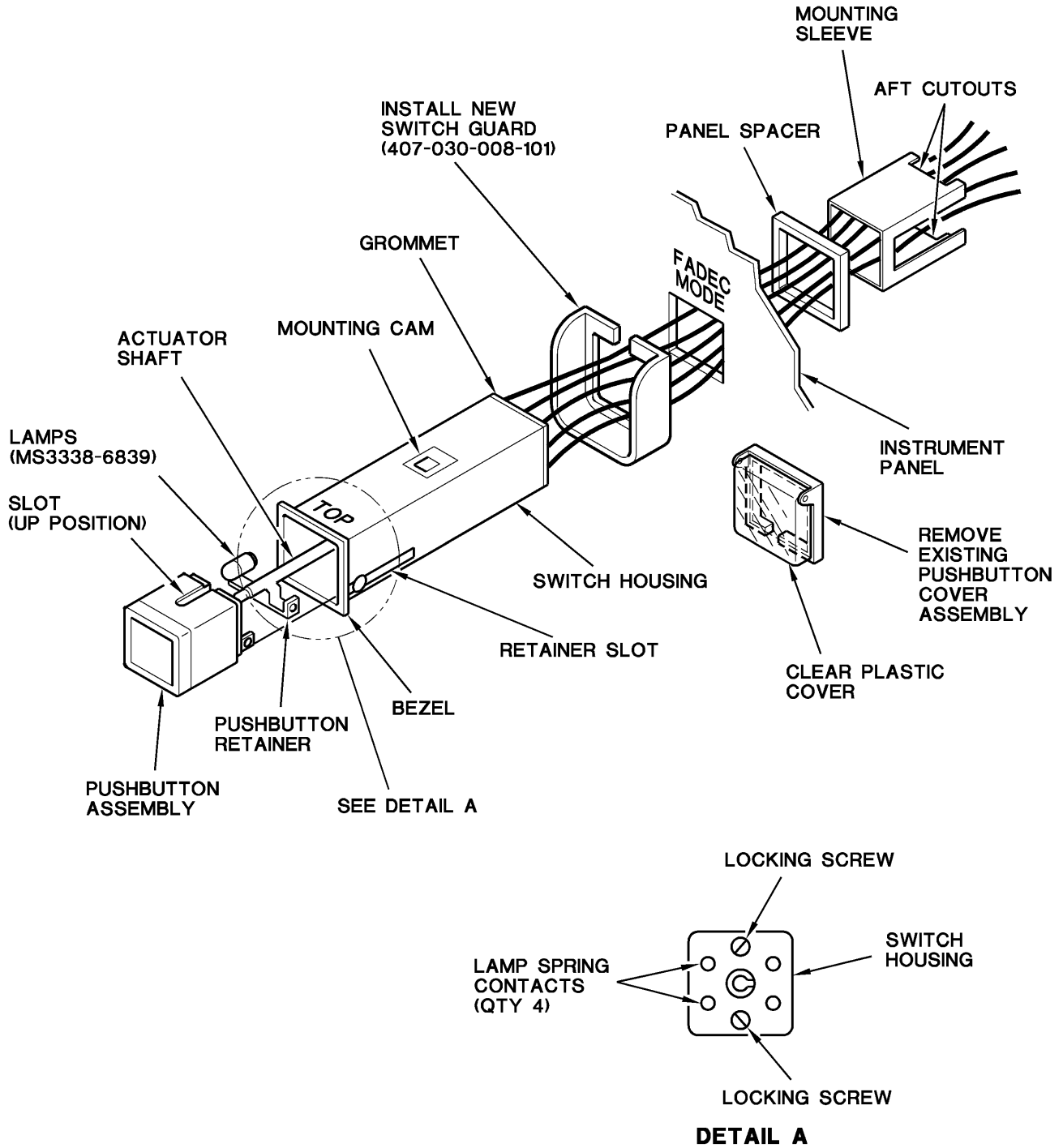
1. Use your fingers to carefully remove existing FADEC software version 5.1 or 5.202 decal from the lower left-hand corner of the instrument panel.
2. Clean the area with a clean lint-free cloth made moist with aliphatic naphtha (C-305).
3. When the surface is clean and dry, install the FADEC decal (407-075-011-109) in the same location.
4. Mask a 0.125 inch (3.18 mm) perimeter around the decal.
5. Apply edge sealer (C-349) over the decal, then remove the tape.

#### **PART V: Flight Manual Changes, Check Run Procedure, and Log Book Entries**

- NOTE -

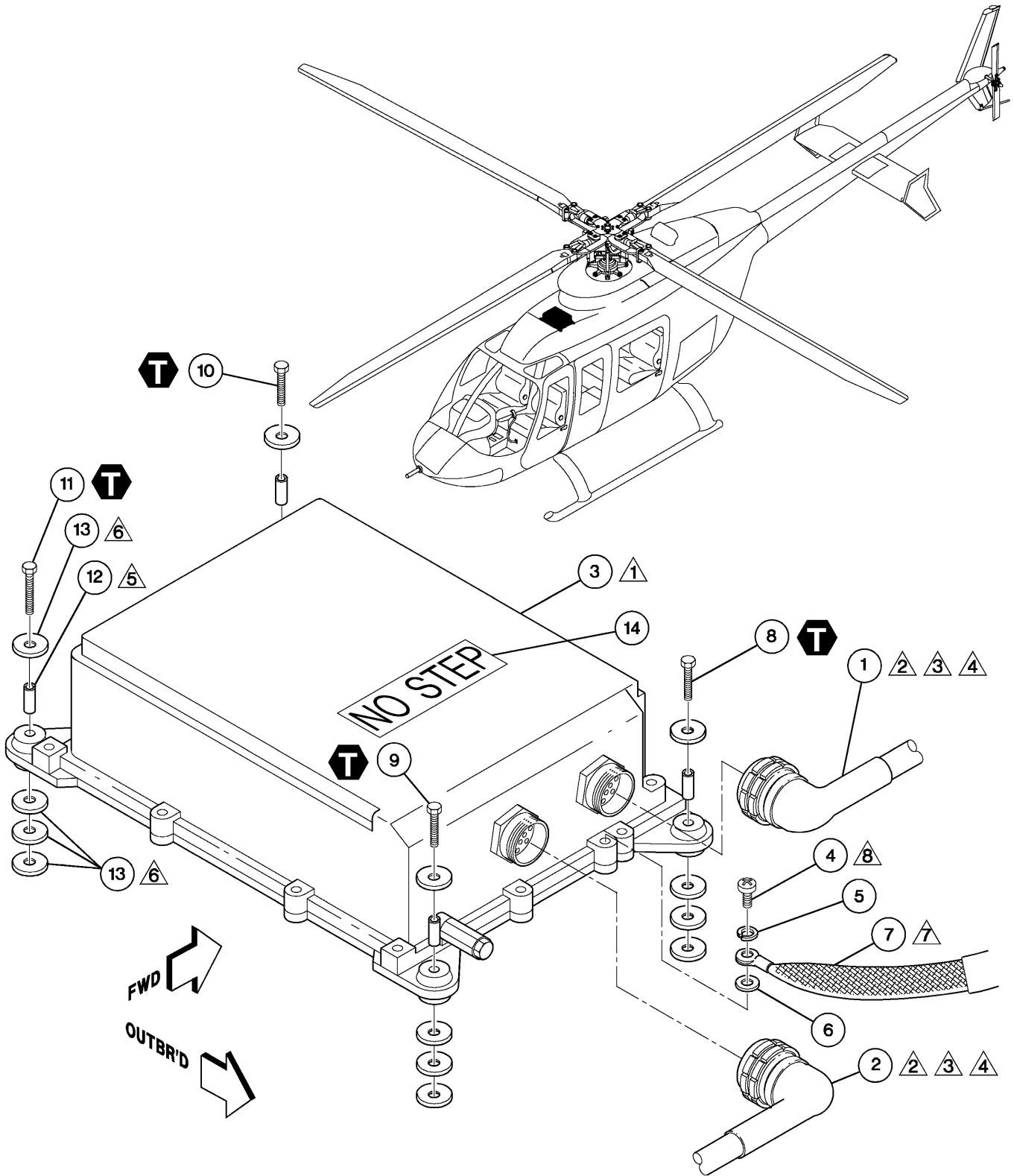
TEMPORARY REVISION FOR FADEC SOFTWARE VERSION 5.202, dated 22 December 1998, was supplied with ASB 407-99-28.

1. If ASB 407-99-28 and Rolls-Royce Allison CEB 73-6026 have not been accomplished, include TEMPORARY REVISION FOR FADEC SOFTWARE VERSION 5.202, dated 22 December 1998, to the 407 Flight Manual.
2. Include BHT-407-FM-1, TEMPORARY REVISION FOR FADEC DIRECT REVERSION TO MANUAL SYSTEM, dated June 4, 1999 to the 407 Flight Manual.
3. Include BHT-407-FMS-25, TEMPORARY REVISION FOR FADEC DIRECT REVERSION TO MANUAL SYSTEM, dated June 4, 1999 to the 407 Flight Manual.
4. Include BHT-407-MD-1, TEMPORARY REVISION FOR FADEC DIRECT REVERSION TO MANUAL SYSTEM, dated June 4, 1999 to the Rotorcraft Manufacturers Data – Systems Description section of the Flight Manual.
5. Do the operational check that follows:
  - a. Do the PREFLIGHT and PRESTART CHECK procedures (BHT-407-FM-1).
  - b. Do the ENGINE START procedure (BHT-407-FM-1).
  - c. Do the FADEC MANUAL CHECK procedure (BHT-407-FM-1).
  - d. Do the ENGINE RUNUP procedure (BHT-407-FM-1).
  - e. Do the ENGINE SHUTDOWN procedure (BHT-407-FM-1). Use the OVSPD TEST button for the shutdown.
6. Make an entry in the helicopter Historical Records (HR) to show that this Alert Service Bulletin is completed. If ASB 407-99-28 and Rolls-Royce Allison CEB 73-6026 have not previously been accomplished, make an other entry to tell that accomplishment of ASB 407-99-31 and Rolls-Royce Allison CEB A-73-6032 removes the requirement to accomplish ASB 407-99-28 and Rolls-Royce Allison CEB 73-6026.
7. Make an entry in the Record of Alert Service Bulletins in the Maintenance Manual.
8. Make an entry in the Engine Log Book, white pages and ECU Assembly (yellow pages). Part III per Rolls-Royce Allison CEB A-73-6032.
9. Complete steps as necessary to return aircraft to service.



RAB01301

Figure 1 FADEC Removal of Existing Cover Assembly/Installation of New Switch Guard



RAB01302

Figure 2. Electronic Control Unit (ECU) Removal/Installation (Sheet 1)

## LEGEND

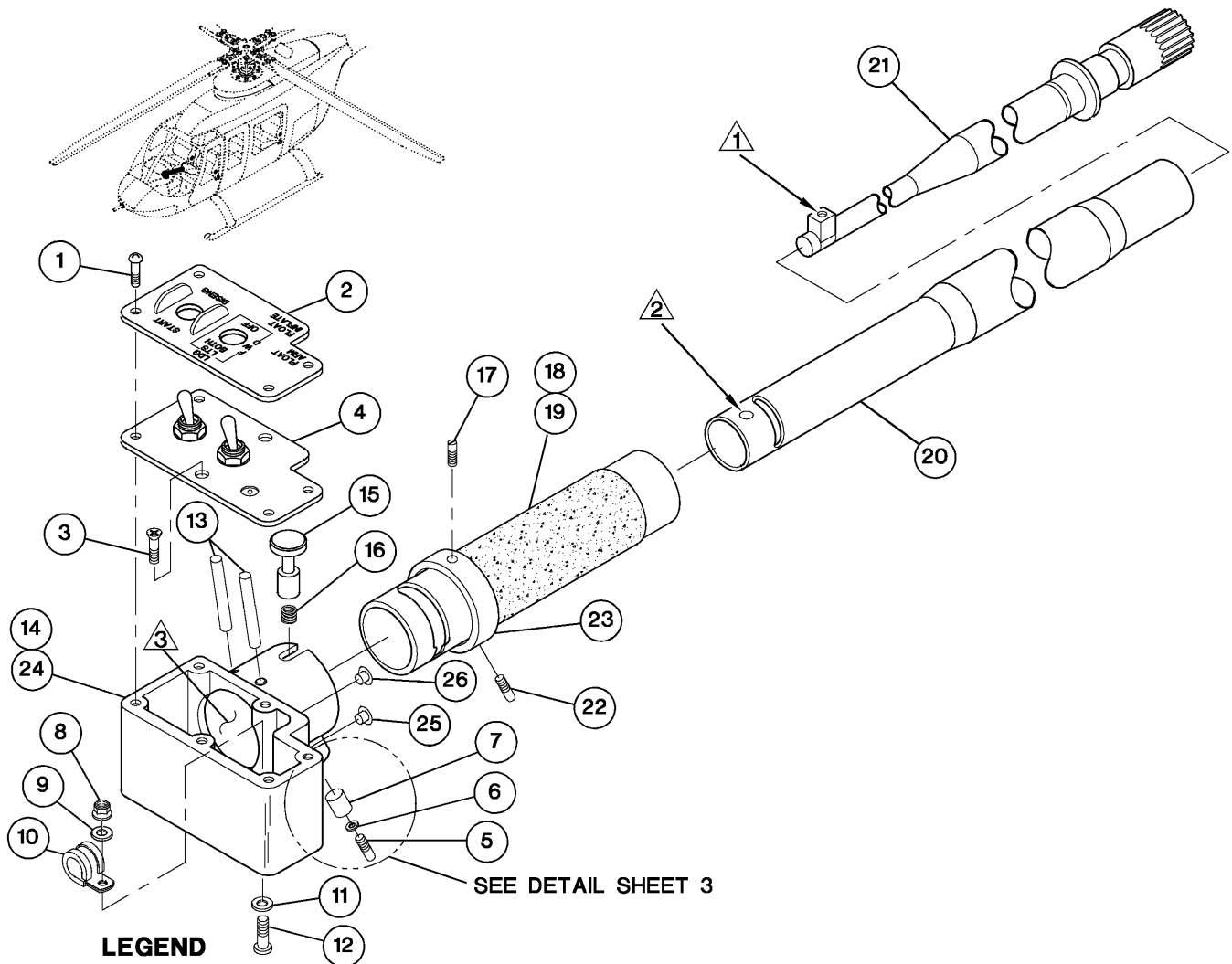
1. ECU-to-airframe electrical connector
2. ECU-to-engine electrical connector
3. ECU
4. Screw (MS35206-261)
5. Lockwasher (MS35338-43)
6. Plain washer (NAS1149D0332J)
7. Bonding strap
8. Bolt (NAS6203-12)
9. Bolt (NAS6203-12)
10. Bolt (NAS6203-12)
11. Bolt (NAS6203-18)
12. Spacer (NAS43DD3-34N)
13. Washer (AN970-3)
14. Decal (31-053-18CFHP)



30 TO 40 IN-LBS  
(3.4 TO 4.5 Nm)

## NOTES

1. Disconnect the electrical power from the helicopter when you remove or install the ECU.
2. Make sure that you do not cause damage to the connector contacts when you remove or install.
3. Put protective covers on the ECU and the harness connectors immediately after the removal.
4. Make sure that the red band on each ECU connector is not visible after you install the harness connectors.
5. Install one spacer in each of the ECU mounting pad isolation dampers.
6. Install one washer on the top of and three washers under each ECU mount.
7. Pre S/N 53200 or Pre T.B. 407-98-9, bonding strap MS25083-2BB6. S/N 53200 and subsequent or Post T.B. 407-98-9, bonding strap 961114-1.
8. Use only screw MS35206-261. Use of other type screw will damage the threads of the ECU casing.



**LEGEND**

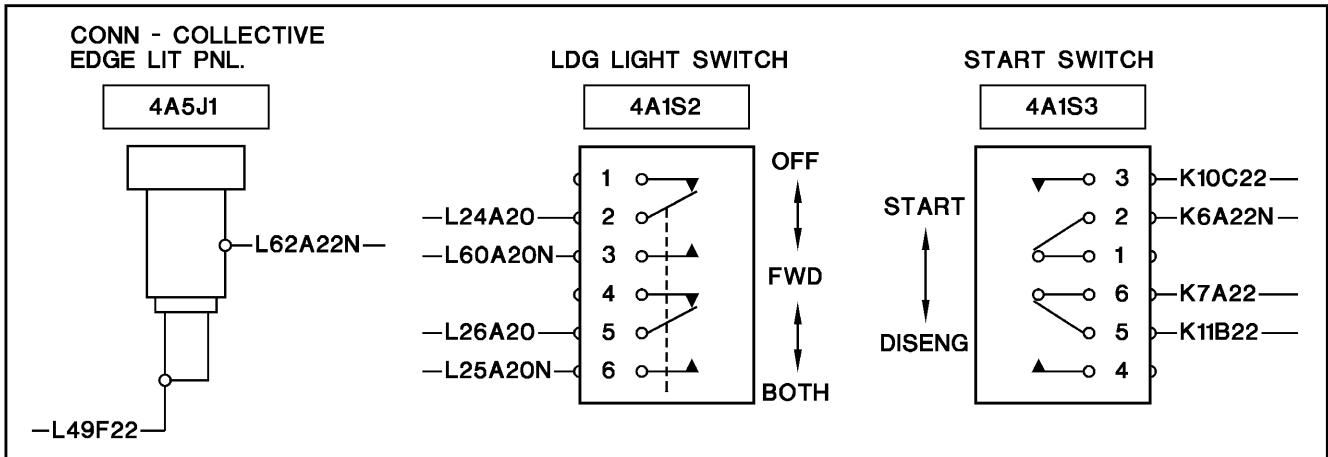
- |  |   |
|--|---|
| 1. Screw, MS35214-18 (4 REQ.)  | 13. Pins, MS171538 (Alt: NAS561C4-24)             |
| 2. Lit panel, 407-375-038-101<br>(Quiet Cruise kit: 407-375-038-105) | 14. Switch box, 407-001-130-101 (Remove)          |
| 3. Screw, MS24693-S6 (2 REQ.)  | 15. Detent button, 406-001-119-101                |
| 4. Cover, 206-001-815-105<br>(Quiet Cruise kit: 206-001-815-109)     | 16. Spring, MS24585-1106                          |
| 5. Set screw, NAS1081-6B8  | 17. Screw, 206-001-163-003 (Alt. 206-310-007-101) |
| 6. Spring washer, M12133/1-1P  | 18. Grip assembly, 406-001-111-109 (Remove)       |
| 7. Plug, 406-001-118-101   | 19. Grip assembly, 407-001-134-101 (Install)      |
| 8. Nut, 90-003-3   | 20. Tube assembly, 406-001-116-101                |
| 9. Washer, NAS1149D0363J   | 21. Tube assembly, 406-001-112-101                |
| 10. Clamp, MS21919WDG6   | 22. Set screw, NAS1081-08D3 (4 REQ.)              |
| 11. Washer, NAS1149D0363J  | 23. Ferrule, 407-001-131-101                      |
| 12. Screw, MS27039-1-08  | 24. Switch box, 407-001-135-101 (Install)         |
|  | 25. Plug button, 100-050-B500                     |
|  | 26. Plug button, 100-050-B562                     |

**NOTES**

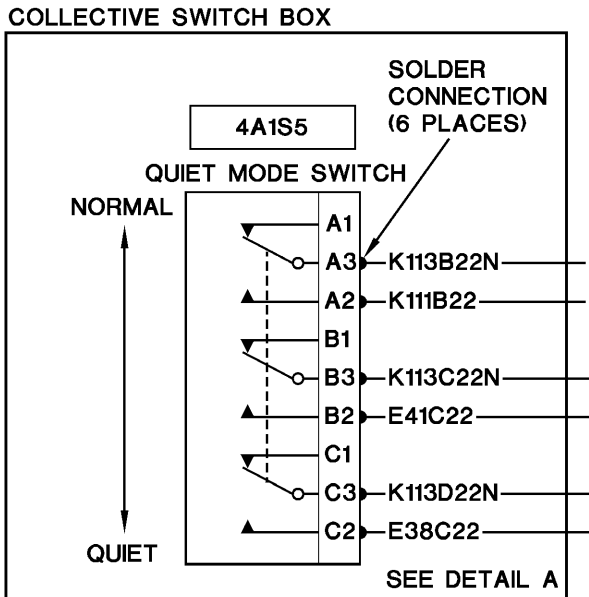
- △1 Treaded support hole for screw (17).
- △2 Cavity for idle detent button and spring (15, 16).
- △3 Apply a light coat of unreduced primer (C-204) during installation.

RAB01304

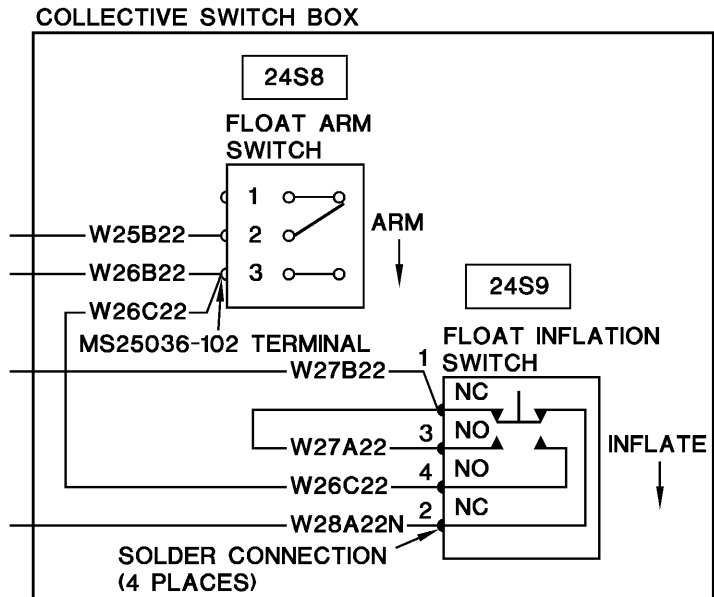
**Figure 3. Collective Throttle Modification (Sheet 1)**



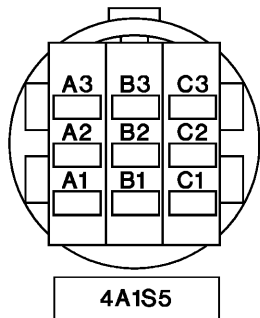
**BASIC SHIP COLLECTIVE SWITCH BOX WIRING**



**QUIET MODE KIT - IF INSTALLED**



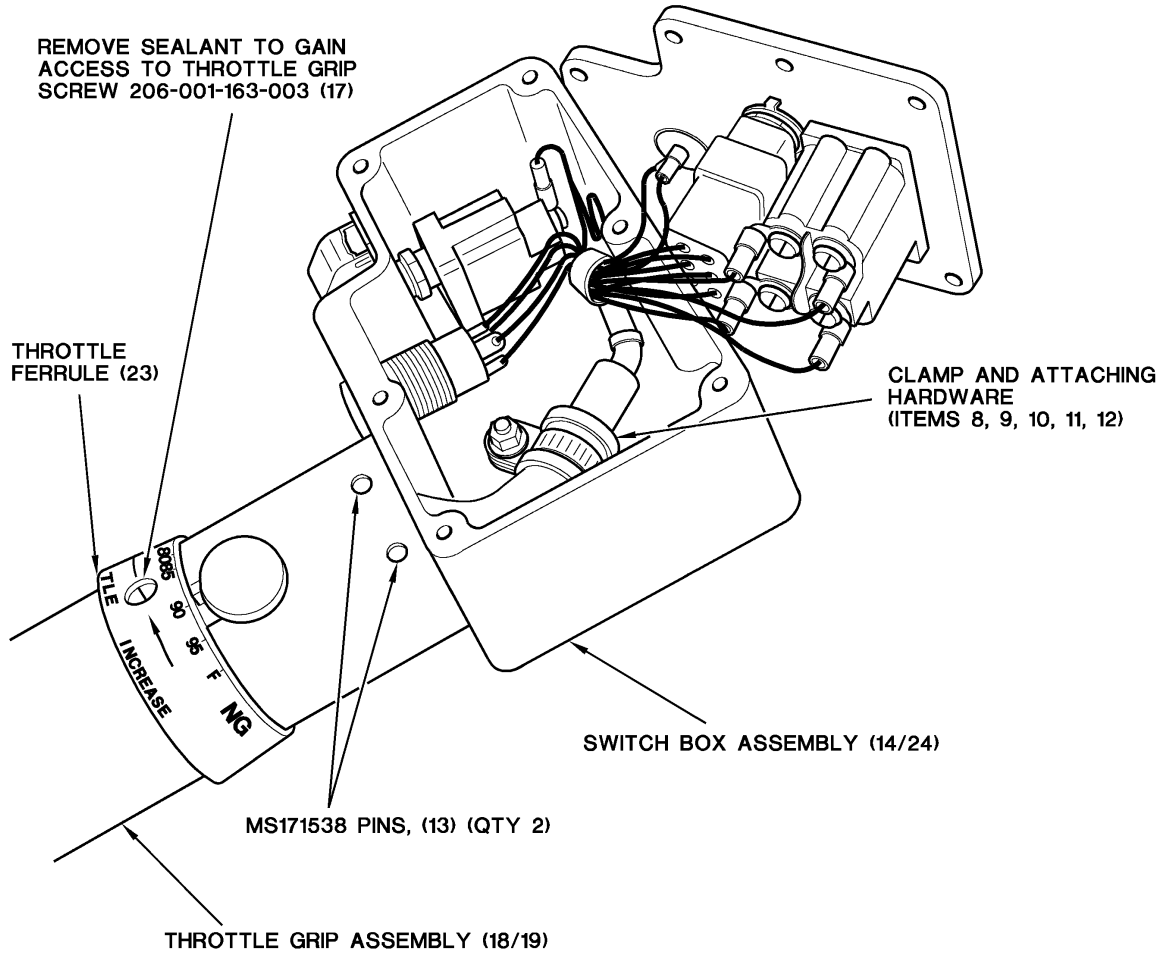
**LIGHTWEIGHT EMERGENCY FLOAT KIT - IF INSTALLED**



**QUIET MODE SWITCH  
PIN LOCATIONS (REF)  
DETAIL A**

**Figure 3. Collective Throttle Modification (Sheet 2)**



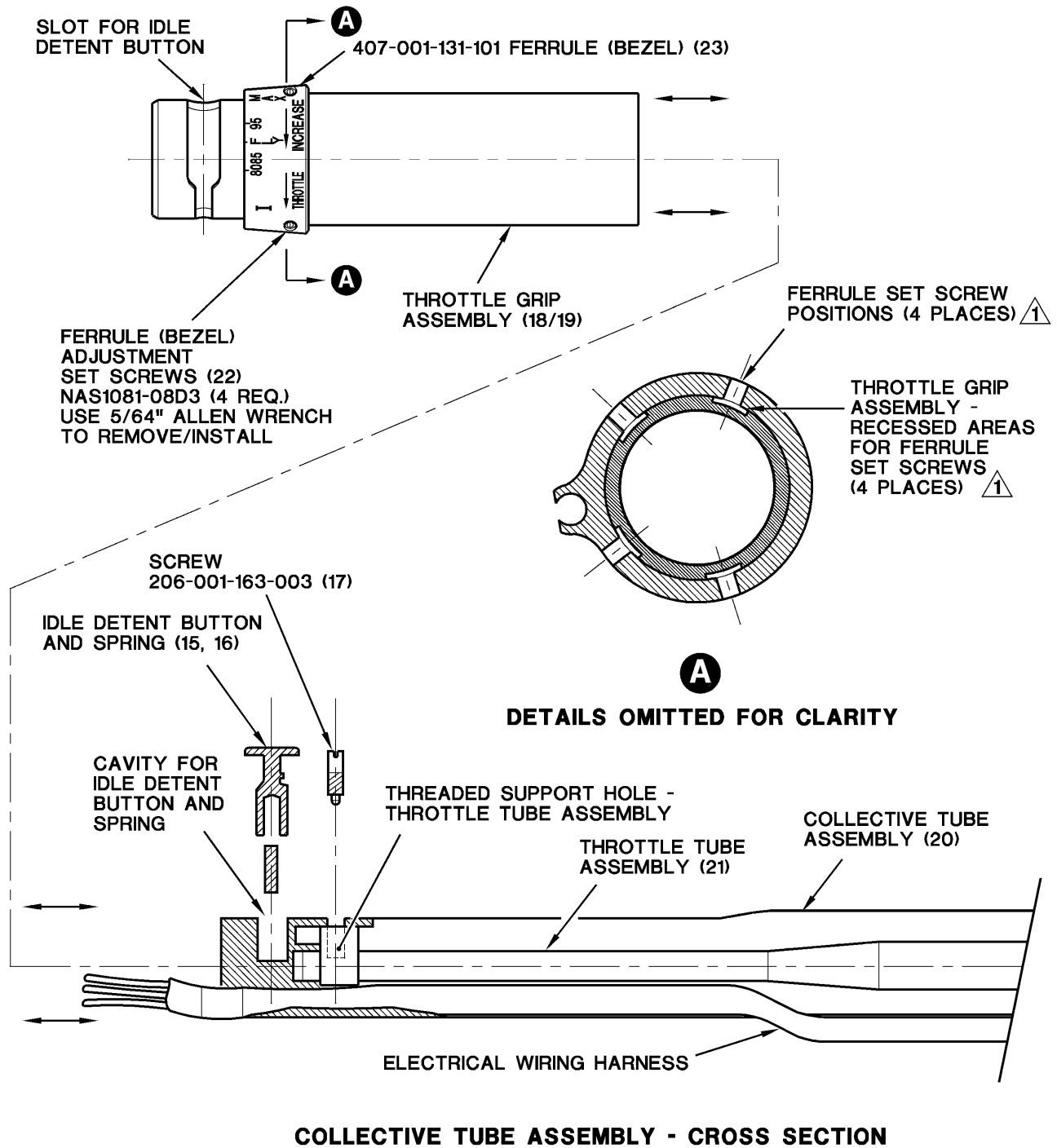


**NOTE**

View shown with lightweight emergency float switches installed.

RAB01307

**Figure 3 Collective Throttle Modification (Sheet 4)**

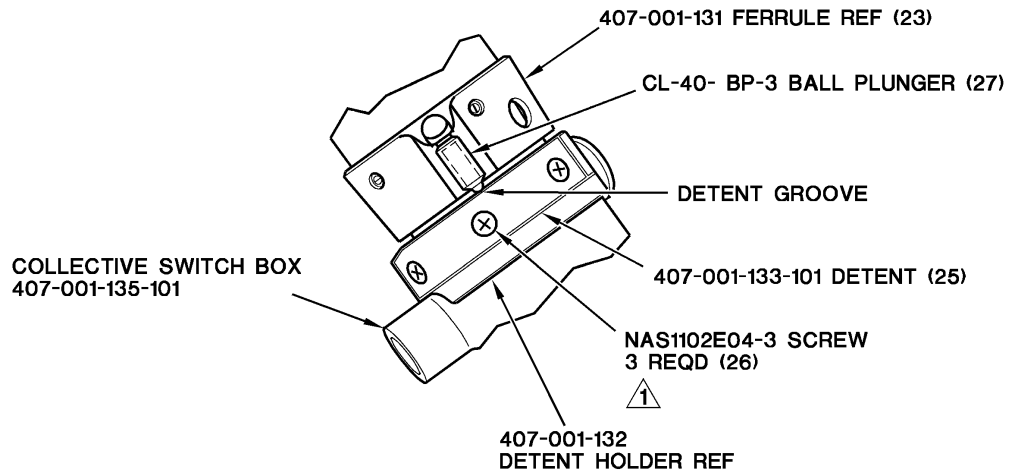
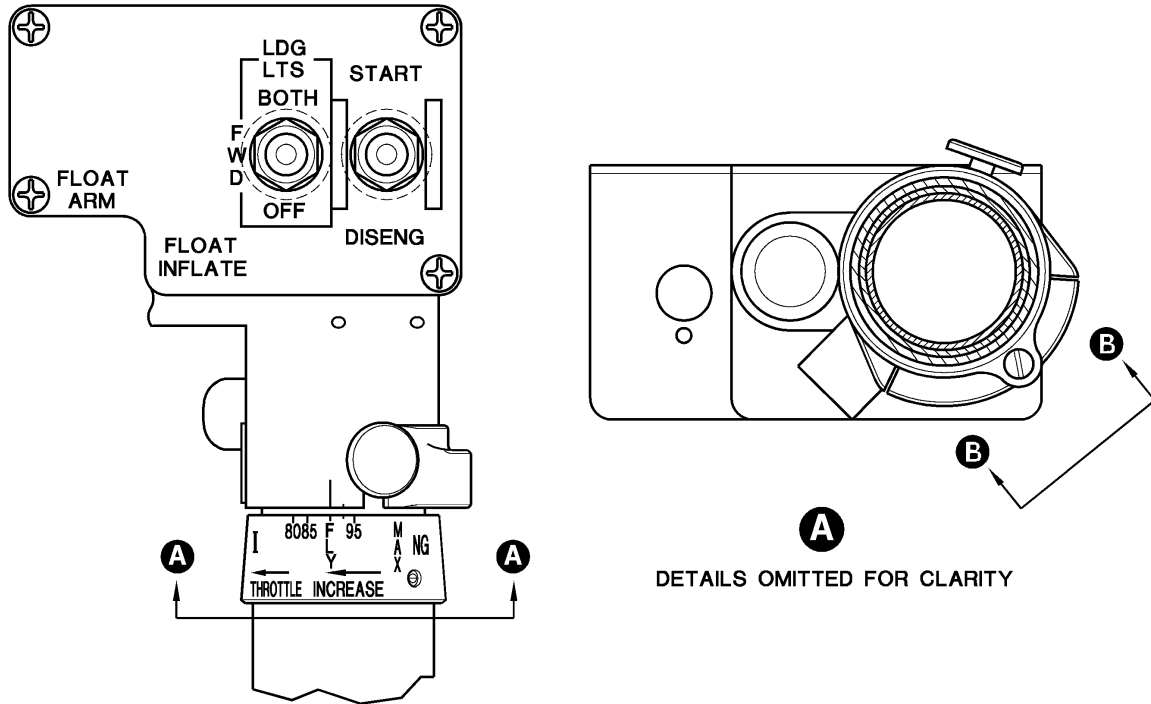


**NOTE**

There is only one position, between ferrule and throttle grip where all 4 set screws will fully engage.

RAB01308

**Figure 3. Collective Throttle Modification (Sheet 5)**



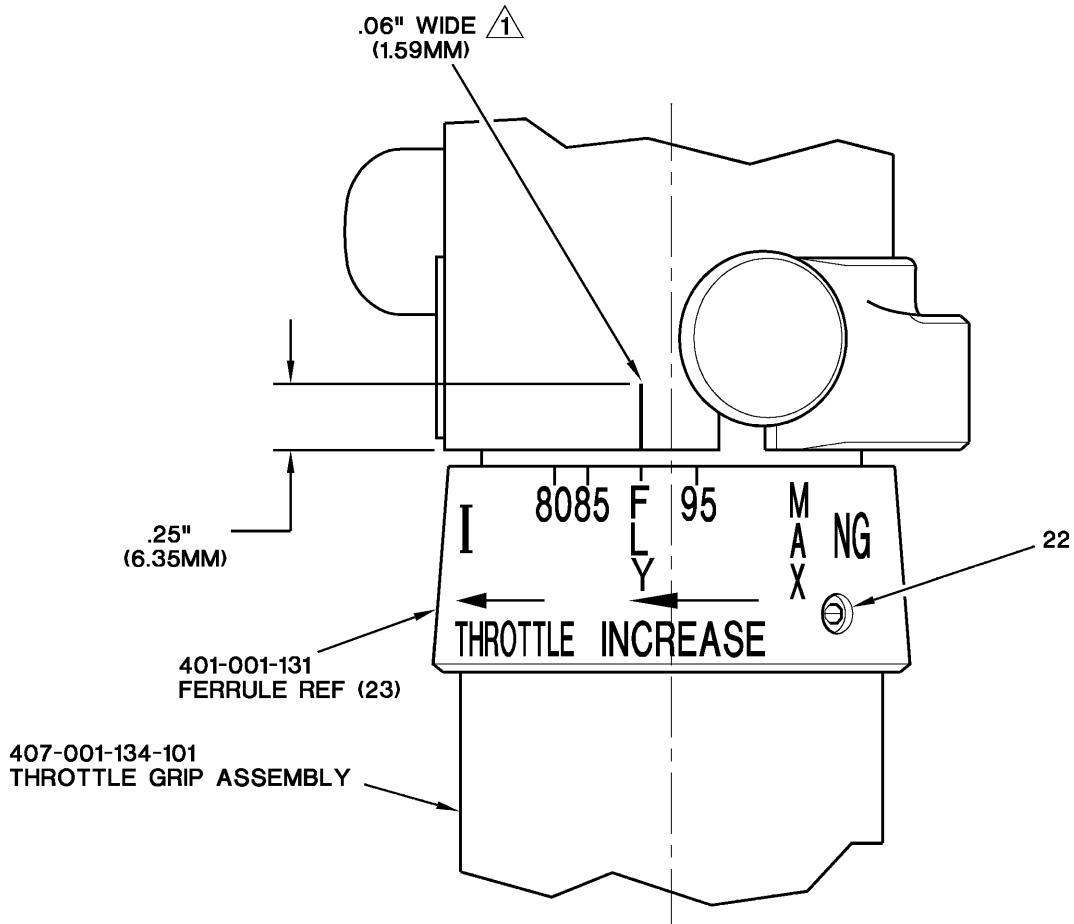
**NOTE**

⚠ Install screws with sealant (C-392). Use screwdriver bit 170-6-ACR.

**B**

RAB01309

**Figure 3. Collective Throttle Modification (Sheet 6)**



**NOTE**


 Mark with 299-947-096 epoxy paint, color to be white #37925 per FED-STD-595 (C-207).

Figure 3. Collective Throttle Modification (Sheet 7)