

AUTO FLIGHT (MINISTAB)

TABLE OF CONTENTS

Paragraph Number	Title	Effectivity	Page Number
22-1	MINISTAB flight control system.....	TH-57C	22-04
22-2	System operational description	TH-57C	22-04
22-3	MINISTAB flight control system checkout	TH-57C	22-04
22-4	Test setup	TH-57C	22-05
22-5	Functional test	TH-57C	22-06
22-6	Controller	TH-57C	22-06
22-7	Removal - controller	TH-57C	22-06
22-8	Installation - controller.....	TH-57C	22-06
22-9	Inspection - controller	TH-57C	22-06
22-10	Cleaning - controller	TH-57C	22-06
22-11	Repair - controller.....	TH-57C	22-08
22-12	Air data computer	TH-57C	22-08
22-13	Removal - air data computer	TH-57C	22-08
22-14	Installation - air data computer.....	TH-57C	22-08
22-15	Inspection - air data computer	TH-57C	22-08
22-16	Cleaning - air data computer	TH-57C	22-08
22-17	Repair - air data computer.....	TH-57C	22-10
22-18	Control tube actuator assemblies.....	TH-57C	22-10
22-19	Pitch computer.....	TH-57C	22-10
22-20	Removal - pitch computer.....	TH-57C	22-10
22-21	Installation - pitch computer	TH-57C	22-10
22-22	Inspection - pitch computer.....	TH-57C	22-12
22-23	Cleaning - pitch computer.....	TH-57C	22-12
22-24	Repair - pitch computer	TH-57C	22-12
22-25	Pitch trim damper unit	TH-57C	22-12
22-26	Removal - pitch trim damper unit	TH-57C	22-12
22-27	Installation - pitch trim damper unit	TH-57C	22-13
22-28	Inspection - pitch trim damper unit	TH-57C	22-13
22-29	Cleaning - pitch trim damper unit	TH-57C	22-15
22-30	Repair - pitch trim damper unit	TH-57C	22-15
22-31	Roll computer	TH-57C	22-15
22-32	Removal - roll computer	TH-57C	22-15
22-33	Installation - roll computer.....	TH-57C	22-15
22-34	Inspection - roll computer	TH-57C	22-16
22-35	Cleaning - roll computer	TH-57C	22-16
22-36	Repair - roll computer.....	TH-57C	22-16
22-37	Roll damper unit.....	TH-57C	22-16
22-38	Removal - roll trim damper unit	TH-57C	22-16
22-39	Installation - roll trim damper unit	TH-57C	22-17
22-40	Inspection - roll trim damper unit.....	TH-57C	22-17
22-41	Cleaning - roll trim damper unit	TH-57C	22-18
22-42	Repair - roll trim damper unit	TH-57C	22-18
22-43	Junction box	TH-57C	22-18
22-44	Removal - junction box.....	TH-57C	22-18
22-45	Installation - junction box	TH-57C	22-20
22-46	Inspection - junction box	TH-57C	22-20
22-47	Cleaning - junction box.....	TH-57C	22-20
22-48	Repair - junction box	TH-57C	22-20
22-49	Actuator position indicators	TH-57C	22-20
22-50	Removal - actuator position indicator	TH-57C	22-20

TABLE OF CONTENTS (CONT.)

Paragraph Number	Title	Effectivity	Page Number
22-51	Installation - actuator position indicator	TH-57C	22-21
22-52	Inspection - actuator position indicator	TH-57C	22-21
22-53	Cleaning - actuator position indicator	TH-57C	22-20
22-54	Repair - actuator position indicator	TH-57C	22-21
22-55	Test connectors	TH-57C	22-21
22-56	Removal - test connectors.....	TH-57C	22-21
22-57	Installation - test connectors	TH-57C	22-21
22-58	Inspection - test connectors.....	TH-57C	22-21
22-59	Cleaning - test connectors.....	TH-57C	22-21
22-60	Repair or replacement - test connectors	TH-57C	22-21
22-61	Cyclic grip	TH-57C	22-21
22-62	Removal - pilots stick grip.....	TH-57C	22-22
22-63	Removal - copilots stick grip	TH-57C	22-22
22-64	Installation - pilots stick grip	TH-57C	22-22
22-65	Installation - copilots stick grip.....	TH-57C	22-22
22-66	Inspection - cyclic grip	TH-57C	22-22
22-67	Cleaning - cyclic grip	TH-57C	22-22
22-68	Repair - cyclic grip.....	TH-57C	22-23
22-69	Yaw axis stabilization system.....	TH-57C	22-23
22-70	Yaw axis stabilization system - operational description	TH-57C	22-23
22-71	Yaw axis stabilization system checkout	TH-57C	22-23
22-72	Yaw control tube actuator assembly	TH-57C	22-23
22-73	Removal - yaw control tube actuator assembly	TH-57C	22-23
22-74	Installation - yaw control tube actuator assembly	TH-57C	22-25
22-75	Yaw computer	TH-57C	22-25
22-76	Removal - yaw computer.....	TH-57C	22-25
22-77	Installation - yaw computer	TH-57C	22-25
22-78	Inspection - yaw computer.....	TH-57C	22-27
22-79	Cleaning - yaw computer.....	TH-57C	22-27
22-80	Repair - yaw computer	TH-57C	22-27
22-81	Yaw trim damper unit.....	TH-57C	22-27
22-82	Removal - yaw trim damper unit	TH-57C	22-27
22-83	Installation - yaw trim damper unit	TH-57C	22-27
22-84	Inspection - yaw trim damper unit	TH-57C	22-29
22-85	Cleaning - yaw trim damper unit	TH-57C	22-29
22-86	Repair - yaw trim damper unit	TH-57C	22-29
22-87	Yaw power amplifier	TH-57C	22-29
22-88	Pedal switch.....	TH-57C	22-29
22-89	Inspection - pedal switch.....	TH-57C	22-29
22-90	Cleaning - pedal switch	TH-57C	22-30
22-91	Repair - pedal switch.....	TH-57C	22-30

LIST OF FIGURES

Figure Number	Title	Effectivity	Page Number
22-1	MINISTAB Flight Control System	TH-57C	22-05
22-2	Controller - Removal / Installation.....	TH-57C	22-07
22-3	Air Data Computer - Removal / Installation.....	TH-57C	22-09
22-4	Pitch Computer and Trim Damper Unit	TH-57C	22-11
22-5	Roll Computer and Trim Damper Unit		
22-6	Junction box - Removal / Installation.....	TH-57C	22-19
22-7	Yaw Control Tube Actuator Assembly - Removal / Installation.....	TH-57C	22-24
22-8	Yaw Computer - Removal / Installation	TH-57C	22-26
22-9	Yaw Trim Damper Unit - Removal / Installation	TH-57C	22-28

AUTO FLIGHT (MINISTAB)

22-1. MINISTAB FLIGHT CONTROL SYSTEM.

The MINISTAB flight control system (Figure 22-1) is a basic two-axis series system and a yaw axis stabilization system (refer to paragraph 22-69 for yaw axis stabilization system description), with force trim. The two-axis series system is a rate gyro based, transparent (fly through) flight control system that provides rate damping and altitude retention in the pitch and roll axis and attitude hold in cruise flight, in addition to force trim functions. The force trim functions include stick trim point retention, artificial feel gradient for stick movements away from trim, and viscous damping of stick inputs, as well as transparency logic to interface with the MINISTAB attitude retention channel. The flight control system is comprised of two computers (roll and pitch), two control tube actuator assemblies, two trim damper units, a controller, an air data computer, a junction box, two actuator position indicators, two cyclic grips, and a wire harness containing a test connector.

22-2. SYSTEM OPERATIONAL DESCRIPTION.

The MINISTAB helicopter flight control system uses self-contained rate gyros to provide cyclic stability by driving linear electromechanical actuators. It differs from previous types of rate gyro systems in that the rate gyro signal is electronically integrated to achieve an attitude hold function. The system requires 28V dc, 26V ac and 115V ac single phase power sources.

The +27V dc power, obtained from both essential 1 and essential 2 buses, is applied to the control and junction box. The 26V ac power, obtained from the FCS inverter, is applied to the junction box.

The 115V ac, 400 Hz, single phase power, obtained from the FCS inverter, is for the rate gyro motor and for the computer internal power supplies. The rate gyro output signal is demodulated and applied to a servo amplifier which drives the rate and integrated rate (damping and attitude hold) channels. Both paths are switched off when the system is off, resulting in a zero signal to the servo amplifier and centering of the actuator.

The actuators are mounted in control tubes and contain dc, permanent magnet motors driven by a pulse-width modulating type of servo amplifier. The $\pm 27V$ motor-drive voltages and the $\pm 15V$ feedback pot excitation voltages are derived in the computer power supply.

The MINISTAB actuators have low force output and are used in conjunction with hydraulic boosted controls. They are installed as close as possible to the input valves of the hydraulic boosters, thereby achieving a favorable condition for isolating the actuator motion from the pilot controls. The mass and friction on the booster side of the actuator is low compared to the pilot's side of the actuators. In addition, cyclic artificial feel breakout force aids in this isolation.

In cyclic, the actuators are installed downstream of the mechanical collective and cyclic mixing and therefore the two cyclic actuators must have a mixed motion, a lateral and longitudinal control. This mixing is accomplished electronically by applying the roll computer output differentially to the left and right actuators while the pitch computer output is applied additively to the two actuators. The series cyclic actuators "float" above the collective motion of the controls and no electronic collective mixing input is required. The computers are identical and interchangeable, with the proper gains for all axes contained in each, but selected by wiring connections in the aircraft harness.

An altitude hold function is standard with the two axis system. The altitude error signal is derived in the Air Data Computer (ADC) from an electromechanical absolute pressure transducer and an associated electronic synchronizing hold circuit. The error signal is applied to additional circuitry in the controller, resulting in longitudinal control inputs in response to altitude errors.

22-3. MINISTAB FLIGHT CONTROL SYSTEM CHECKOUT.

The MINISTAB flight control system must be functionally tested any time a component has been replaced or the electrical integrity disturbed.

22-4. TEST SETUP.

NOTE

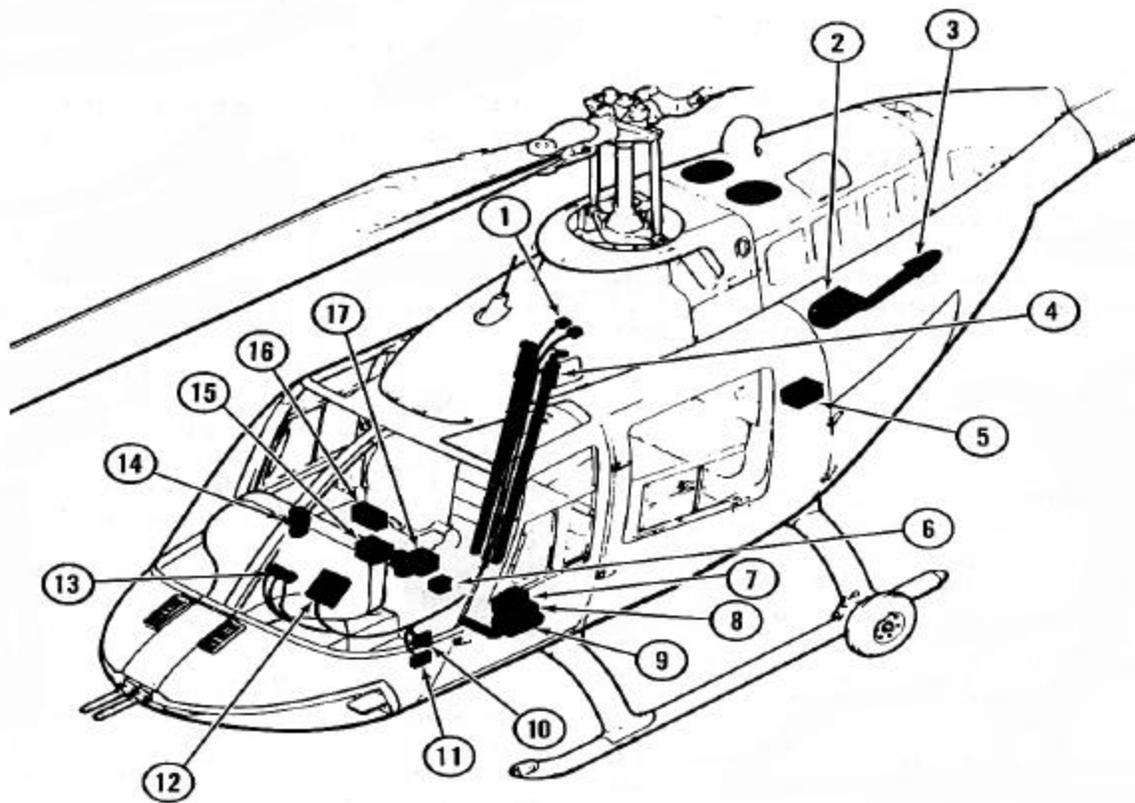
The following procedures require use of Test Set T-262-002.

1. On lower circuit breaker panel, Open FCS and FT circuit breakers.

2. On upper circuit breaker, open YAW FCS, FORCE TRIM, and AVIONICS INV circuit breakers. Set MASTER AVIONICS switch to OFF.

WARNING

DO NOT CONNECT OR DISCONNECT COMPONENTS WHILE SYSTEM IS POWERED. SHOCK HAZARD AND EQUIPMENT DAMAGE MAY RESULT.



- | | |
|---------------------------------------|-------------------------------------|
| 1. Wire Harness | 10. Test Connector J7 |
| 2. Yaw Trim Damper Unit | 11. Test Connector J23 |
| 3. Yaw Actuator Assembly | 12. Controller |
| 4. Control Tube Actuator Assembly (2) | 13. Actuator Position Indicator (3) |
| 5. FCS Inverter (refer to Chapter 96) | 14. Cyclic Grip (2) |
| 6. Air Data Computer | 15. Roll Computer |
| 7. Yaw Computer | 16. Junction Box |
| 8. Pitch Computer | 17. Pitch Trim Damper Unit |
| 9. Roll Trim Damper Unit | |

Figure 22-1. MINISTAB Flight Control System

3. Connect the test cable to connector J2 of test set T-262-002 and test connectors J7 and J23 located on copilots side of instrument console.
4. Set all switches on the test set in the OFF, NORMAL, or NEUTRAL position as applicable.
5. Set METER INPUT SELECT switch to EXTERNAL VOLTMETER position.

NOTE

Ensure proper circuit breakers have been opened before connecting external ground electrical power unit.

6. Perform the following steps:
 - a. Connect external power to the helicopter.
 - b. On upper circuit breaker panel, close ESS 1/ BUS SUPPLY circuit breaker.
 - c. On lower circuit breaker panel, close ESS 1 BUS FEEDER/BAT circuit breaker.

NOTE

Power is now applied to the Essential 1 bus.

- d. On upper circuit breaker panel, close ESS 2 BUS SUPPLY/BAT circuit breaker.

NOTE

Power is now applied to essential 2 bus.

22-5. FUNCTIONAL TEST.

Perform the functional test for the MINISTAB flight control system as specified in the Test Set T-262-002 Instruction Manual (TH-57 Advanced IFR) (See Appendix C).

22-6. CONTROLLER.

The controller (Figure 22-1) is a single control unit mounted in the center of the radio console and contains the following switch functions:

1. FT switch controls the engagement and disengagement of the force trim system.
2. STAB switch controls general engagement and disengagement of the flight control system.

3. ALT switch controls engagement and disengagement of the altitude hold mode.
4. TEST switch, when operated, initiates and auto-test of the flight control system.

22-7. REMOVAL - CONTROLLER.

1. Ensure electrical power is OFF or disconnected from aircraft.
2. Using a 3/32 inch Allen wrench, turn controller locking screw (1, Figure 22-2) counter clockwise until controller (2) disengages from connector (4) in rear of mounting rack (6).
3. Remove controller (2).

22-8. INSTALLATION - CONTROLLER.

1. Ensure electrical power is off or disconnected from aircraft.
2. Looking at the top of the controller (Figure 22-2), ensure the front lobe of the hold-down device is in a vertical position.
3. Slide controller (2, Figure 22-2) into mounting rack (6) until front lobe touches mounting rack.
4. Using 3/32 inch Allen wrench, turn locking screw (1) until set is secure. Do not overtighten.
5. Perform system checkout of flight control System. (Refer to paragraph 22-3.)

22-9. INSPECTION - CONTROLLER.

1. Inspect electrical connector and receptacle for contact corrosion, damaged contacts, broken wires, and faulty insulation.
2. Inspect controller for dents, surface damage, and corrosion.
3. Inspect indicators for evidence of corrosion and burned elements.

22-10. CLEANING - CONTROLLER.

1. Remove moisture and loose dirt with a clean, soft cloth.
2. Remove dust and dirt from the front panel controls and panel light housing with a soft clean cloth. To remove fingerprints or dirt difficult to remove, use a cloth dampened with water; if necessary, mild soap may be used to make the cleaning more effective.

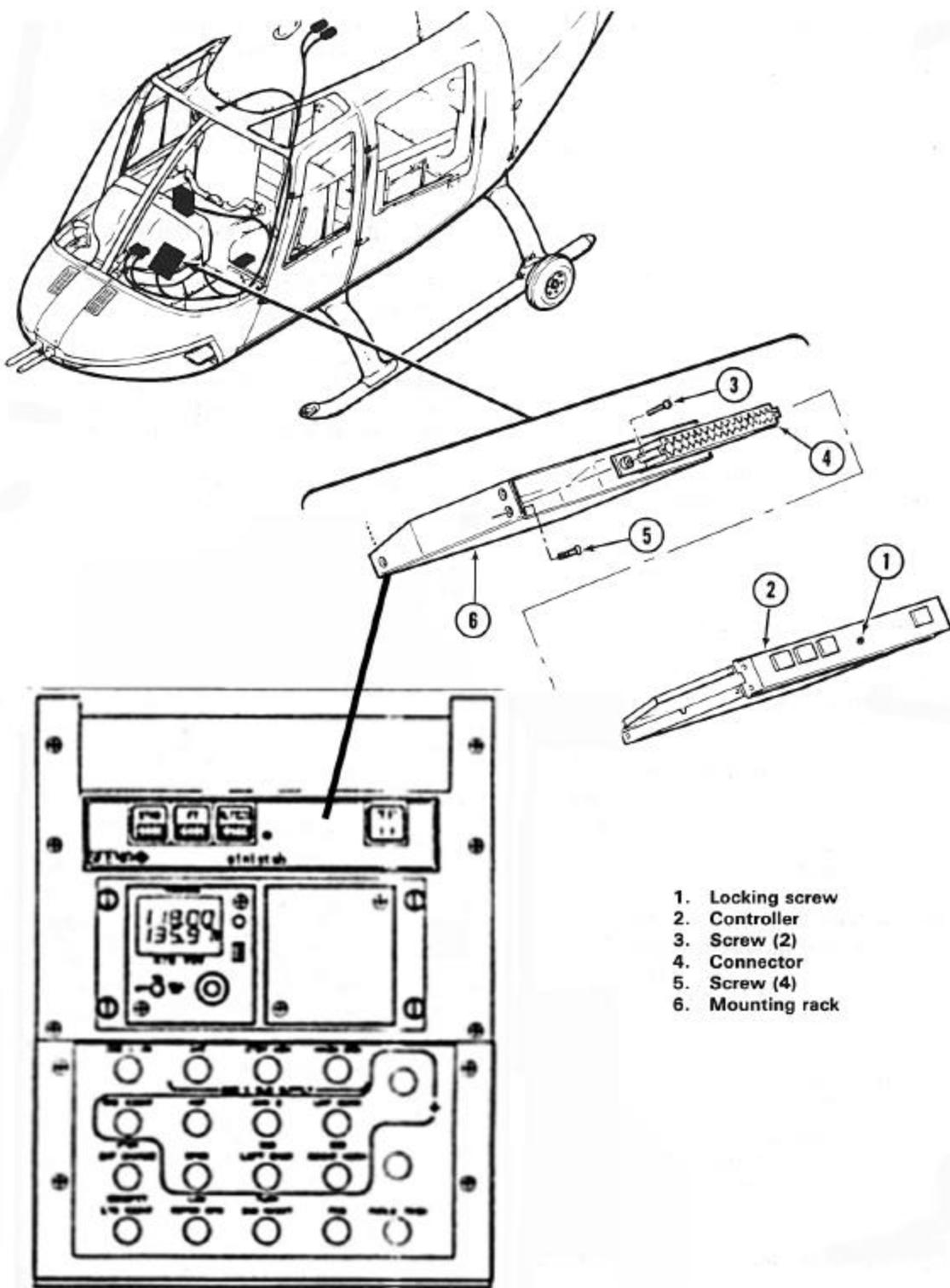


Figure 22-2. Controller - Removal / Installation (TH-57C)

WARNING**CLEANING SOLVENT IS FLAMMABLE AND ITS FUMES ARE TOXIC.**

3. Remove grease, fungus, and ground-in dirt with a soft cloth dampened (not wet) with solvent (C-304).
4. Remove dirt from the connector with a brush; remove moisture with a dry cloth.

22-11. REPAIR - CONTROLLER.

1. Replace defective indicator lamps.
2. Replace any dented controller and any parts having cracks.
3. Further repairs, other than removal and replacement, must be conducted by an authorized repair station.

22-12. AIR DATA COMPUTER.

The air data computer (ADC) (Figure 22-3), located below the copilots seat, monitors the copilot pitot and static system to provide airspeed and altitude information to the flight control system.

22-13. REMOVAL - AIR DATA COMPUTER.

1. Ensure that all electrical power is OFF or disconnected from aircraft.
2. Remove copilot seat panel and cushion.
3. Disconnect electrical connector (1, Figure 22-3) from air data computer (2).
4. Disconnect pitot line (3) and static line (4) from air data computer (2).
5. Cap the pitot and static lines.
6. Using a 3/32 Allen wrench, loosen clamp (5) on mounting assembly (6) and remove air data computer (2).
7. Remove union (7) from static port of air data computer (2).
8. Cap pitot and static ports.

22-14. INSTALLATION - AIR DATA COMPUTER.

1. Ensure that all electrical power is OFF or disconnected from aircraft.
2. Remove caps from pitot and static ports.
3. Install union (7, Figure 22-3) in static port of air data computer (2).
4. Position air data computer (2) in mounting assembly (6) and secure by tightening clamp (5) using a 3/32 Allen wrench.
5. Remove caps from pitot and static lines.
6. Connect static line (4) and pitot line (3) to air data computer (2).
7. Connect electrical connector (1) to air data computer (2).
8. Perform pitot-static system operational check. (Refer to Appendix E.)
9. Perform MINISTAB flight control system check-out. (Refer to paragraph 22-3.)

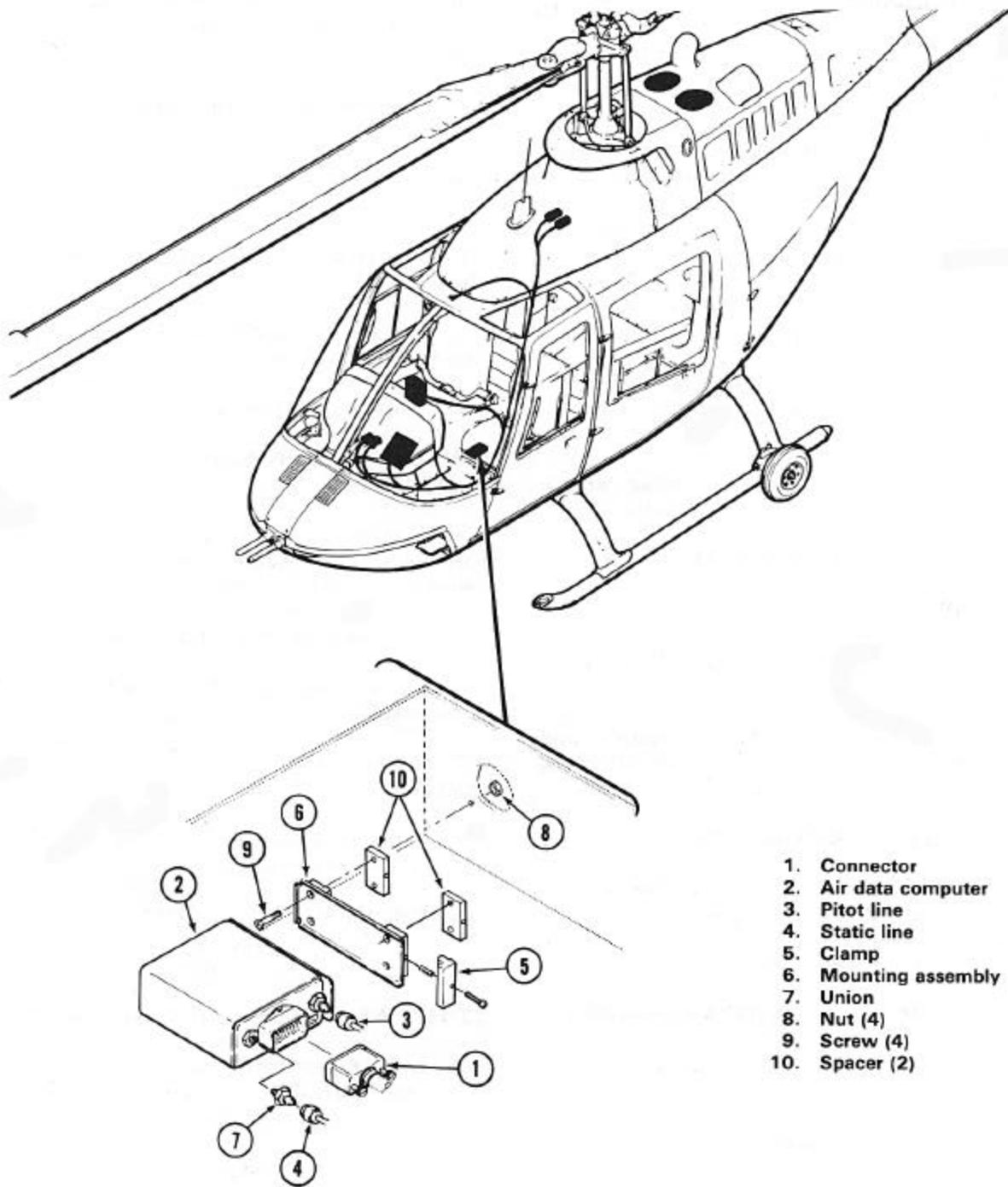
22-15. INSPECTION -AIR DATA COMPUTER.

1. Inspect electrical connector and receptacle for contact corrosion, damaged contacts, broken wires, and faulty insulation.
2. Inspect static and pitot ports for evidence of foreign matter and moisture.
3. Inspect air data computer for evidence of dents, surface damage, and corrosion.
4. Inspect attaching hardware for crossthreading and stripped threads.

22-16. CLEANING - AIR DATA COMPUTER.**NOTE**

Keep static and pitot ports plugged during cleaning.

1. Remove moisture and loose dirt with a clean, soft cloth.



- 1. Connector
- 2. Air data computer
- 3. Pitot line
- 4. Static line
- 5. Clamp
- 6. Mounting assembly
- 7. Union
- 8. Nut (4)
- 9. Screw (4)
- 10. Spacer (2)

Figure 22-3. Air Data Computer - Removal / Installation

WARNING

CLEANING SOLVENT IS FLAMMABLE AND ITS FUMES ARE TOXIC.

2. Remove grease, fungus and ground-in dirt with a soft cloth dampened (not wet) with solvent (C-304).

3. Remove dirt from the connector with a brush; remove moisture with a dry cloth.

22-17. REPAIR - AIR DATA COMPUTER.

1. Replace cross threaded and stripped hardware.

2. Repair minor surface damage by polishing out nicks, scratches, or corrosion pits within specified limits.

a. Remove no more material than necessary to blend repair smoothly into surrounding surface. Use fine to medium grades of sandpaper (C-423). Do not attempt repair by using a grinding wheel.

b. Mechanical damage (scratches or nicks) should be polished out only deep enough to remove traces of damage. Corrosion should be polished out no more than twice as deep as deepest pit.

c. Where - protective surface coating is removed, apply brush alodine (C-100) on bare metal of anodized surfaces, or touchup using standard practice.

3. Replace any dented air data computer and any parts having cracks.

4. Further repairs, other than removal and replacement, must be conducted by an authorized repair station.

22-18. CONTROL TUBE ACTUATOR ASSEMBLIES.

The control tube actuator assembly consists of an actuator installed on the upper end of a control tube. The actuators are electromechanical, linear actuators which receive command signals from servo amplifiers in the pitch, and roll computers. These signals cause the actuator output shaft to move about a neutral point, with a total movement of about 0.5 inch. Movements of the actuator output shaft are applied to the hydraulic servo input valves. Both actuators move simultaneously in

opposite directions for the roll axis and in the same direction for the pitch axis. (Refer to Chapter 67 for maintenance instructions and further description of control tube actuator assembly.)

22-19. PITCH COMPUTER.

The pitch computer (Figure 22-4) contains a rate gyro, capable of detecting changes of angular rate of the order of 0.01 deg/sec; a power supply module which provides the voltages that are used both within the computer and also by other components in the flight control system; servoamplifier circuitry which controls the direction and speed of the series actuators; and logic and gain networks for pitch and roll.

The pitch computer is mounted on top of the roll trim damper unit underneath the copilots seat.

22-20. REMOVAL - PITCH COMPUTER.

1. Ensure that all electrical power is OFF or disconnected from aircraft.
2. Remove copilot seat panel and cushion.
3. Disconnect connector assembly from pitch computer (1).



HANDLE WITH EXTREME CARE. THE PITCH COMPUTER IS A SENSITIVE INSTRUMENT AND CAN BE EASILY DAMAGED.

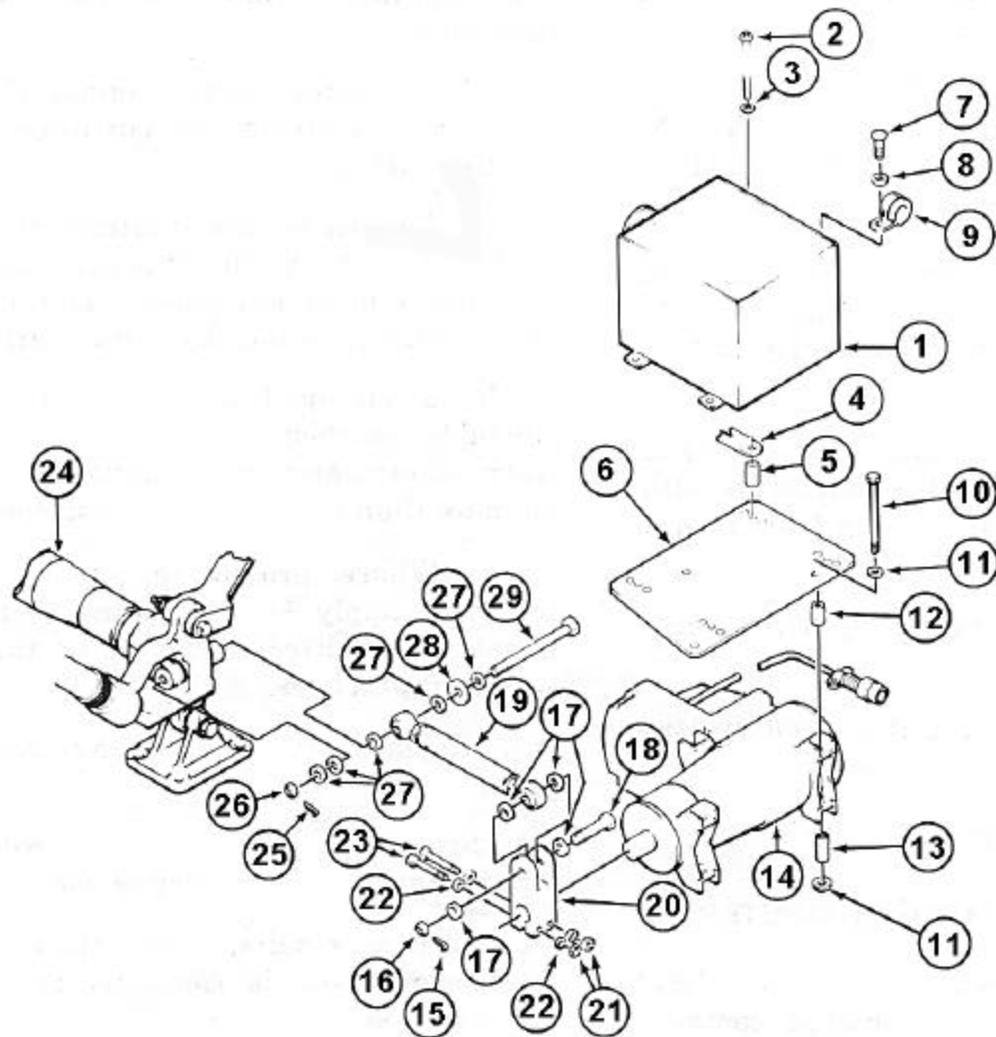
4. Remove screws (2), washers (3), and spacers (5), attaching pitch computer (1) to bracket (6).
Remove pitch computer (1).

22-21. INSTALLATION - PITCH COMPUTER.

1. Ensure that all electrical power is OFF or disconnected from aircraft.



HANDLE WITH EXTREME CARE THE PITCH COMPUTER IS A SENSITIVE INSTRUMENT AND CAN BE EASILY DAMAGED.



- | | |
|--------------------|------------------------|
| 1. Computer, pitch | 14. Trim Damper, roll |
| 2. Screw | 15. Cotter Pin |
| 3. Washer | 16. Nut |
| 4. Ground Strap | 17. Washer |
| 5. Spacer | 18. Bolt |
| 6. Bracket | 19. Control Rod |
| 7. Screw | 20. Clevis |
| 8. Washer | 21. Nut |
| 9. Clamp | 22. Washer |
| 10. Bolt | 23. Bolt |
| 11. Washer | 24. Torque Tube |
| 12. Spacer | 25. Cotter Pin |
| 13. Spacer | 26. Nut |
| | 27. Washer |
| | 28. Washer, large O.D. |
| | 29. Bolt |

Figure 22-4. Pitch Computer and Trim Damper Unit

2. Position spacers (5), and pitch computer (1) on bracket (6) and secure with screws (2) and washers (3). Torque screws (2) 12 to 15 inch-pounds.
3. Connect connector assembly to pitch computer (1).
4. Perform MINISTAB flight control system checkout. (Refer to paragraph 22-3.)
5. Install copilot seat panel and cushion.

22-22. INSPECTION - PITCH COMPUTER.

1. Inspect filter connector assembly and receptacle for contact corrosion, damaged contacts, broken wires, and faulty insulation.
2. Inspect pitch computer for evidence of dents, surface damage, and corrosion.
3. Inspect conductive tape along seams of computer for signs of cracks or damage.
4. Inspect attaching hardware for cross-threading and stripped threads.

22-23. CLEANING - PITCH COMPUTER.

1. Remove moisture and loose dirt with a clean, soft cloth.

WARNING

CLEANING SOLVENT IS FLAMMABLE AND ITS FUMES ARE TOXIC.

2. Remove grease, fungus, and ground-in dirt with a soft cloth dampened (not wet) with solvent (C-304).
3. Remove dirt from the connector with a brush; remove moisture with a dry cloth.

22-24. REPAIR - PITCH COMPUTER.

1. Replace cross-threaded and stripped hardware.
2. Repair minor surface damaged by polishing out nicks, scratches, or corrosion pits within specified limits.
 - a. Remove no more material than necessary to blend repair smoothly into surrounding surface. Use fine to medium grades of sandpaper (C-423). Do not attempt repair by using a grinding wheel.

- b. Mechanical damage (scratches or nicks) should be polished out only deep enough to remove traces of damage. Corrosion should be polished out no more than twice as deep as deepest pit.
- c. Where protective surface coating is removed, apply brush alodine (C-100) on bare metal of anodized surfaces, or touchup using standard practices.

3. Replace any dented pitch computer and any parts having cracks.
4. Replace any pitch computer with conductive tape broken or cracked along seams.
5. Further repairs, other than removal and replacement, must be conducted by an authorized repair station.

22-25. PITCH TRIM DAMPER UNIT.

The pitch trim damper unit (Figure 22-5) is an electromechanical device containing a magnetic brake, a force gradient spring, and a control motion detector (cyclic channels only). The pitch trim damper unit is mounted on the floor of the aircraft underneath the pilots seat.

22-26. REMOVAL - PITCH TRIM DAMPER UNIT.

1. Ensure that all electrical power is OFF or disconnected from aircraft.
2. Remove pilot seat panel and cushions.

NOTE

When replacing control tube (14, Figure 22-5) only, perform steps 4 and 7.

3. Disconnect pitch trim damper (22) electrical connector from wiring harness.
4. Remove nut (11), cotter pin (10), washers (12), and bolt (13), attaching control tube (14) to clevis (15).
5. Remove bolts (16), washers (17), clamps (18 and 19), spacers (20), and washer (21) attaching pitch trim damper (22) to floor. Remove trim damper unit (22).
6. Disconnect clevis (15) from pitch trim damper (22) by removing nuts (23), washers (24), and bolts (25).

NOTE

If replacement of control tube (14) is not required, omit step 7.

7. Remove cotter pin (26), nut (27), washers (28, 29, and 31), spacer (30), and bolt (32) attaching control tube (14) to yoke (33). Remove control tube (14).

22-27. INSTALLATION - PITCH TRIM DAMPER UNIT.

1. Ensure that all electrical power is OFF or disconnected from aircraft.

NOTE

When replacing control tube (14, Figure 22-5) only, omit steps 2, 3, and 8.

2. Install clevis (15) on shaft of pitch trim damper (22). Secure with bolts (25), washers (24), and nuts (23). Torque nuts 12 to 15 in. lbs.
3. Attach pitch trim damper (22) and large O.D. washers (21) to floor using bolts (16), washers (17), clamps (18 and 19), and spacers (20). Torque bolts 12 to 15 in. lbs.
4. Center cyclic stick. From underside of cabin, install AN5 rigging bolt through cover into pilots control lever.

NOTE

If control tube (14) is not to be replaced, omit step 5.

5. Connect control tube (14) to yoke (33) using bolt (32), spacer (30), washers (31, 29, and 28), and nut (27). Torque nut (27) using standard torque. Install cotter pin (26).

NOTE

If control tube (14) has been previously installed and its adjusted length left undisturbed, connecting control tube (14) to clevis (15) should bring the clevis to a near-vertical position (tilted slightly aft). If a new control tube is to be installed, adjust the rod ends so that the control tube will connect between clevis (15) and the yoke (33) while the clevis is in a near-vertical position (tilted slightly aft). Following adjustment, ensure rod ends have adequate thread engagement in the control tube and that jam nuts are tightened.

6. Connect control tube (14) to clevis (15) using bolt (13), washers (12), and nut (11). Torque nut (11) using standard torque. Install cotter pin (10).

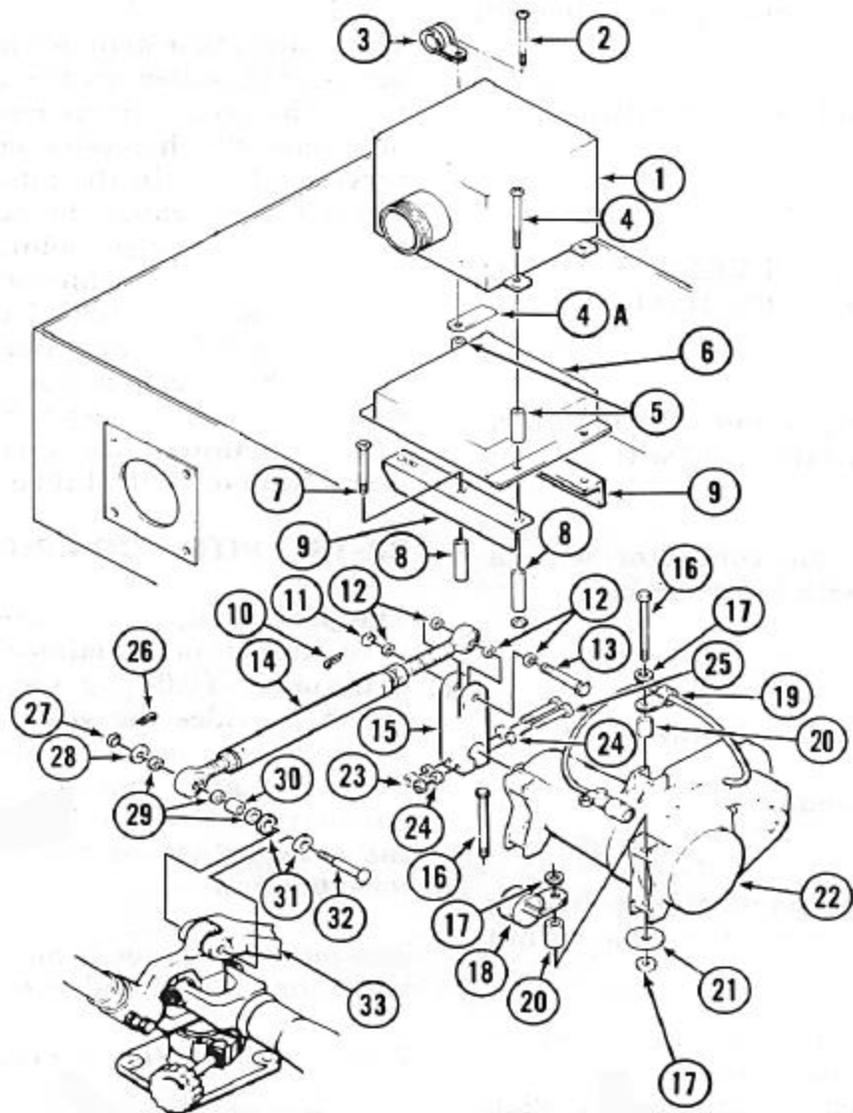


WHILE TESTING CONTROLS, ENSURE CONTROL TUBE ASSEMBLY AND CLEVIS CANNOT BE MOVED "OVER-CENTER". ENSURE THAT ROD END BEARINGS DO NOT BIND AT EXTREMES OF CONTROL TRAVEL AND THAT CONTROLS DO NOT INTERFERE WITH OTHER EQUIPMENT IN THE AIRCRAFT.

7. Remove rigging bolt from controls. Test control movement.
8. Connect pitch trim damper electrical connector.
9. Perform MINISTAB flight control system check-out. (Refer to paragraph 22-3.)
10. Install pilots seat panel and cushion.

22-28. INSPECTION - PITCH TRIM DAMPER UNIT.

1. Inspect electrical connector and receptacle for contact corrosion, damaged contacts, broken wires, and faulty insulation.



- | | | |
|--------------------|------------------------|------------------------|
| 1. Computer, roll | 13. Bolt | 26. Cotter Pin |
| 2. Screw | 14. Control Tube | 27. Nut |
| 3. Clamp | 15. Clevis | 28. Washer, large O.D. |
| 4. Screw | 16. Bolt | 29. Washer |
| 4A. Ground Strap | 17. Washer | 30. Spacer |
| 5. Spacer | 18. Clamp | 31. Washer |
| 6. Audio Generator | 19. Clamp | 32. Bolt |
| 7. Screw | 20. Spacer | 33. Yoke |
| 8. Spacer | 21. Washer, large O.D. | |
| 9. Bracket | 22. Trim Damper, pitch | |
| 10. Cotter Pin | 23. Nut | |
| 11. Nut | 24. Washer | |
| 12. Washer | 25. Bolt | |

Figure 22-5. Roll Computer and Trim Damper Unit

2. Inspect pitch trim damper unit for evidence of dents, surface damage, and corrosion.
3. Inspect attaching hardware for cross-threading and stripped threads.
4. Refer to Chapter 67 of the BHT 206 A/B-SERIES-MM-8 for control tube inspection requirements.

22-29. CLEANING - PITCH TRIM DAMPER UNIT.

1. Remove moisture and loose dirt with a clean, soft cloth.



CLEANING SOLVENT IS FLAMMABLE AND ITS FUMES ARE TOXIC.

2. Remove grease, fungus, and ground-in dirt with a soft cloth dampened (not wet) with solvent (C-304).
3. Remove dirt from the connector with a brush; remove moisture with a dry cloth.

22-30. REPAIR - PITCH TRIM DAMPER UNIT.

1. Replace crossthreaded and stripped hardware.
2. Repair minor surface damage by polishing out nicks, scratches, or corrosion pits within specified limits.
 - a. Remove no more material than necessary to blend repair smoothly into surrounding surface. Use fine to medium grades of sandpaper (C-423). Do not attempt repair by using a grinding wheel.
 - b. Mechanical damage (scratches or nicks) should be polished out only deep enough to remove traces of damage. Corrosion should be polished out no more than twice as deep as deepest pit.
 - c. Where protective surface coating is removed, apply brush alodine (C-100) on bare metal of anodized surfaces, or touchup using standard practices.
3. Replace dented pitch trim damper unit and any parts having cracks.
4. Refer to Chapter 67 for control tube repair limits.

5. Further repairs other than removal and replacement, must be conducted by an authorized repair station.

22-31. ROLL COMPUTER.

The roll computer (Figure 22-5) contains a rate gyro, capable of detecting changes of angular rate of the order of 0.01 deg/ sec; a power supply module which provides the voltages that are used both within the computer and also by other components in the flight control system; servo amplifier circuitry which controls the direction and speed of the series actuators; and logic and gain networks for pitch and roll.

The roll computer is mounted on top of the audio generator underneath the pilots seat.

22-32. REMOVAL - ROLL COMPUTER.

1. Ensure that all electrical power is OFF or disconnected from aircraft.
2. Remove pilot seat panel and cushion.
3. Disconnect connector assembly from roll computer (1).



HANDLE WITH EXTREME CARE. THE ROLL COMPUTER IS A SENSITIVE INSTRUMENT AND CAN BE EASILY DAMAGED.

4. Remove screws (2 and 4), ground strap (4A), and spacers (5 and 8) attaching roll computer (1) and audio generator (6) to bracket (9). Remove roll computer (1).

22-33. INSTALLATION - ROLL COMPUTER.

1. Ensure that all electrical power is OFF or disconnected from aircraft.



HANDLE WITH EXTREME CARE. THE ROLL COMPUTER IS A SENSITIVE INSTRUMENT AND CAN BE EASILY DAMAGED.

NOTE

Ground strap (4A, Figure 22-5) is installed under the mounting foot of roll computer (1).

2. Position spacers (5), ground strap (4A), and roll computer (1) over audio generator (6) and attach to bracket (9) using spacers (8) and screws (2 and 4). Torque screws 12 to 15 inch-pounds.
3. Connect connector assembly to roll computer (1).
4. Perform MINISTAB flight control system checkout. (Refer to paragraph 22-3.)
5. Install pilot seat panel and cushion.

22-34. INSPECTION - ROLL COMPUTER.

1. Inspect electrical connector and receptacle for contact corrosion, damaged contacts, broken wires, and faulty insulation.
2. Inspect roll computer for evidence of dents, surface damage, and corrosion.
3. Inspect conductive tape along seams of computer for signs of cracks or damage.
4. Inspect attaching hardware for cross-threading and stripped threads.

22-35. CLEANING - ROLL COMPUTER.

1. Remove moisture and loose dirt with a clean, soft cloth.

WARNING

CLEANING SOLVENT IS FLAMMABLE AND ITS FUMES ARE TOXIC.

2. Remove grease, fungus and ground-in dirt with a soft cloth dampened (not wet) with solvent (C-304).
3. Remove dirt from the connector with a brush; remove moisture with a dry cloth.

22-36. REPAIR - ROLL COMPUTER.

1. Replace cross-threaded and stripped hardware.
2. Repair minor surface damage by polishing out nicks, scratches, or corrosion pits within specified limits.

- a. Remove no more material than necessary to blend repair smoothly into surrounding surface. Use fine to medium grades of sandpaper (C-423). Do not attempt repair by using a grinding wheel.
- b. Mechanical damage (scratches or nicks) should be polished out only deep enough to remove traces of damage. Corrosion should be polished out no more than twice as deep as deepest pit.
- c. Where protective surface coating is removed, apply brush alodine (C-100) on bare metal of anodized surfaces, or touchup using standard practices.

3. Replace any dented roll computer and any parts having cracks.
4. Replace any roll computer with conductive tape broken or cracked along seams.
5. Further repairs, other than removal and replacement, must be conducted by an authorized repair station.

22-37. ROLL DAMPER UNIT.

The roll trim damper unit (Figure 22-4) is an electromechanical device containing a magnetic brake, a force gradient spring, and a control motion detector (cyclic channels only). The roll trim damper unit is mounted on the floor of the aircraft underneath the copilots seat.

22-38. REMOVAL - ROLL TRIM DAMPER UNIT.

1. Ensure that all electrical power is OFF or disconnected from aircraft.
2. Remove copilots seat panel and cushion.

NOTE

When replacing control rod (19) only, perform steps 4 and 5.

3. Remove pitch computer (1, Figure 22-4). (Refer to paragraph 22-20.)

NOTE

If replacement of control rod (19) is not required, omit step 4.

NOTE

4. Remove cotter pin (25), nut (26), washers (27 and 28), and bolt (29) attaching control rod (19) to torque tube (24).
5. Remove cotter pin (15), nut (16), washers (17), and bolt (18) attaching control rod (19) to clevis (20).
6. Disconnect roll trim damper (14) electrical connector.
7. Remove screw (7), washer (8), and clamp (9) securing wiring harness connector to bracket (6).
8. Remove bolts (10), washers (11), bracket (6), spacers (12 and 13) securing roll trim damper (14) to floor. Remove roll trim damper (14).
9. Remove nuts (21), washers (22), bolts (23), and clevis (20) from shaft of roll trim damper (14).

22-39. INSTALLATION - ROLL TRIM DAMPER UNIT.

1. Ensure that all electrical power is OFF or disconnected from the aircraft.

NOTE

When replacing control rod (19) only, omit steps 2, 3, 7, 8, and 9.

2. Install clevis (20, Figure 22-4) on shaft of roll trim damper (14). Secure with bolts (23), washers (22), and nuts (21). Torque nuts 12 to 15 inch pounds.
3. Attach roll trim damper (14) and bracket (6) to floor using bolts (10), washers (11), and spacers (12 and 13). Torque bolts 12-15 inch pounds.
4. Center cyclic stick. From underside of cabin, install AN5 rigging bolt through cover into pilots control lever.
5. Connect control rod (19) to clevis (20) using bolt (18), washers (17), and nut (16). Torque nut (16) using standard torque. Install cotter pin (15).

If control rod (19) has been previously installed and its adjusted length left undisturbed, connecting control rod (19) to clevis (20) should bring the clevis to a vertical position, i.e. perpendicular to floor. If new control rod assembly is being installed, adjust the rod-ends so that the rod will connect between clevis (20) and torque tube (24) while the clevis is in the vertical position. Following adjustment, ensure that rod-ends have adequate threaded engagement in control rod and that jam nuts are tightened.

NOTE

If control rod (19) is not being replaced, omit step 6.

6. Connect control rod (19) to torque tube (24) using bolt (29), washers (27 and 28), and nut (26). Torque nut (26) using standard torque. Install cotter pin (25).
7. Attach wiring harness connector to bracket (6) using screw (7), washer (8), and clamp (9).
8. Connect roll trim damper (14) electrical connector.
9. Install pitch computer (1). (Refer to paragraph 22-21.)
10. Perform MINISTAB flight control system check-out. (Refer to paragraph 22-3.)
11. Install copilots seat panel and cushion.

22-40. INSPECTION - ROLL TRIM DAMPER UNIT.

1. Inspect electrical connector and receptacle for contact corrosion, damaged contacts, broken wires, and faulty insulation.
2. Inspect roll trim damper unit for evidence of dents, surface damage, and corrosion.
3. Inspect attaching hardware for cross-threading and stripped threads.
4. Refer to Chapter 67 of the BHT 206 A/B-SERIES-MM-8 for control rod inspection requirements.

22-41. CLEANING - ROLL TRIM DAMPER UNIT.

1. Remove moisture and loose dirt with a clean, soft cloth.



CLEANING SOLVENT IS FLAMMABLE AND ITS FUMES ARE TOXIC.

2. Remove grease, fungus, and ground-in dirt with a soft cloth dampened (not wet) with solvent (C-304).
3. Remove dirt from the connector with a brush; remove moisture with a dry cloth.

22-42. REPAIR - ROLL TRIM DAMPER UNIT.

1. Repair crossthreaded and stripped hardware.
2. Repair minor surface damage by polishing out nicks, scratches, or corrosion pits within specified limits.
 - a. Remove no more material than necessary to blend repair smoothly into surrounding surface. Use fine to medium grades of sandpaper (C-423). Do not attempt repair by using a grinding wheel.
 - b. Mechanical damage (scratches or nicks) should be polished out only deep enough to remove traces of damage. Corrosion should be polished out no more than twice as deep as deepest pit.
 - c. Where protective surface coating is removed or touchup using standard practices.
3. Replace dented roll trim damper unit and any parts having cracks.
4. Refer to Chapter 67 of the BHT 206 A/B-SERIES-MM-8 for control rod repair limits.
5. Further repairs, other than removal and replacement, must be conducted by an authorized repair station.

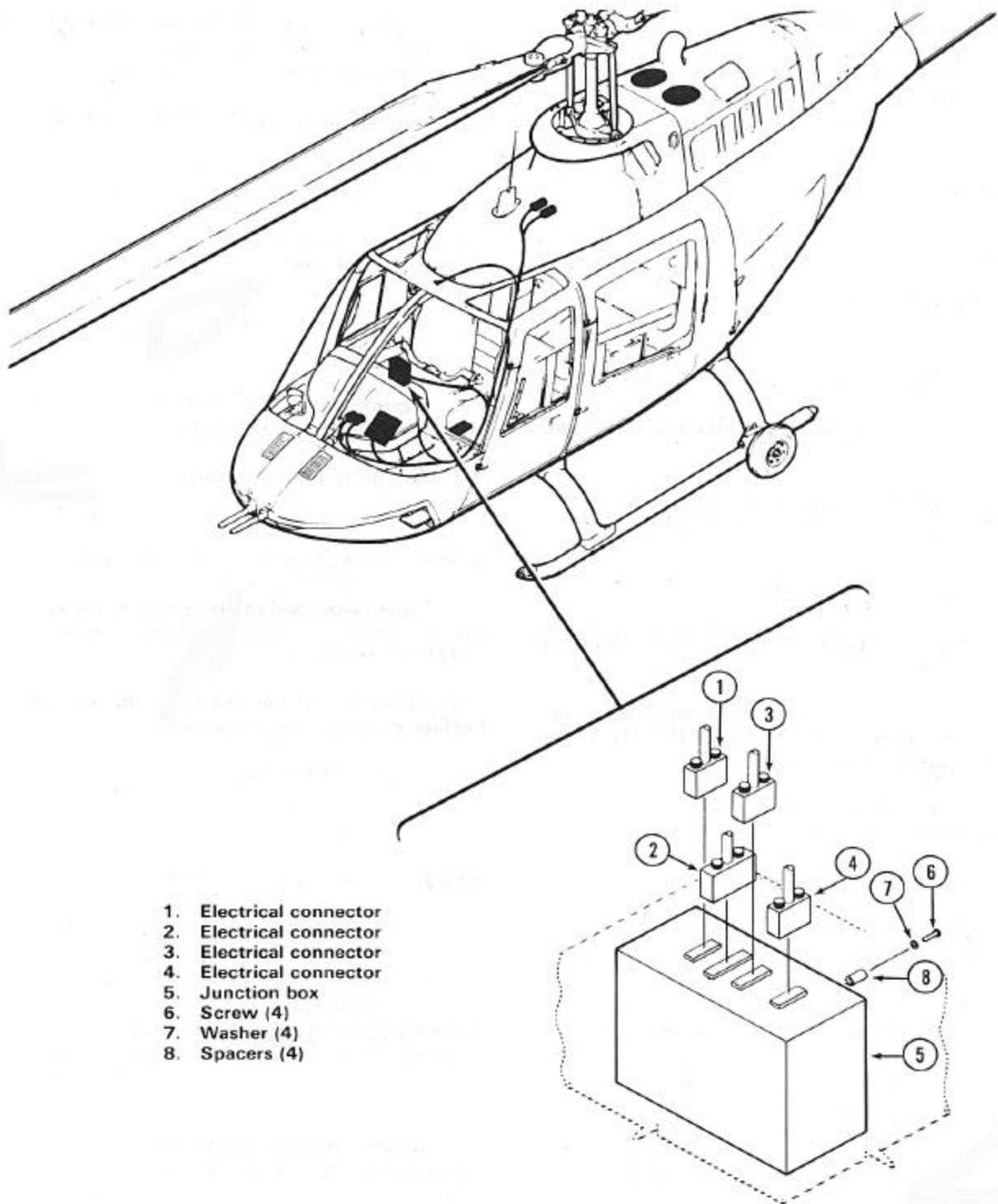
22-43. JUNCTION BOX.

The junction box (Figure 22-5) consists of a main interconnect module and a delay module housed in a metal box (the junction box) mounted against a bulkhead underneath the pilots seat.

1. Main interconnect module:
 - a. Distributes the various power supplies used in the MINISTAB flight control system.
 - b. Contains the force trim system power and ICO logic switching relays.
 - c. Provides interface between the computers.
 - d. Performs logic signal matching (ICO) for transparent flying.
 - e. Contains voltage monitoring circuit which provides threshold voltage in the pitch channel should the yaw computer fail.
2. Delay module includes:
 - a. Control circuits for the FCS warning light in the caution panel.
 - b. Circuits which automatically center the series actuators when the MINISTAB flight control system is disengaged.
 - c. A 0.6 second time delay circuit, used during actuator recentering.
3. Yaw power amplifier:
 - a. Provides necessary voltage to drive the yaw control tube actuator assembly.

22-44. REMOVAL - JUNCTION BOX.

1. Ensure that all electrical power is OFF or disconnected from aircraft.
2. Remove pilots seat panel and cushion.
3. Disconnect electrical connectors (1, 2, 3, and 4, Figure 22-6) from junction box (5).
4. Remove screws (6), washers (7) and spacers (8) from behind pilot seat, attaching junction box (5) to structure. Remove junction box (5).



- 1. Electrical connector
- 2. Electrical connector
- 3. Electrical connector
- 4. Electrical connector
- 5. Junction box
- 6. Screw (4)
- 7. Washer (4)
- 8. Spacers (4)

Figure 22-6. Junction Box - Removal / Installation

22-45. INSTALLATION - JUNCTION BOX.

1. Ensure that all electrical power is OFF or disconnected from aircraft.
2. Attach junction box (5, Figure 22-6) to structure using spacers (8), washers (7) and screws (6) from behind pilot seat.
3. Connect electrical connectors (1, 2, 3, and 4) to junction box (5).
4. Perform MINISTAB flight control system checkout. (Refer to paragraph 22-3.)
5. Install pilots seat panel and cushion.

22-46. INSPECTION - JUNCTION BOX.

1. Inspect electrical connectors and receptacles for contact corrosion, damaged contacts, broken wires, and faulty insulation.
2. Inspect junction box for evidence of dents, surface damage, and corrosion.
3. Inspect attaching hardware for cross-threading and stripped threads.

22-47. CLEANING - JUNCTION BOX.

1. Remove moisture and loose dirt with a clean, soft cloth.



**CLEANING SOLVENT IS FLAMMABLE
AND ITS FUMES ARE TOXIC.**

2. Remove grease, fungus, and ground-in dirt with a soft cloth dampened (not wet) with solvent (C-304).
3. Remove dirt from the connector with a brush; remove moisture with a dry cloth.

22-48. REPAIR - JUNCTION BOX.

1. Replace cross-threaded and stripped hardware.
2. Repair minor surface damage by polishing out nicks, scratches, or corrosion pits within specified limits.

- a. Remove no more material than necessary to blend repair smoothly into surrounding surface. Use fine to medium grades of sandpaper (C-423). do not attempt repair by using a grinding wheel..
- b. Mechanical damage (scratches or nicks) should be polished out only deep enough to remove traces of damage. Corrosion should be polished out no more than twice as deep as deepest pit.
- c. Where protective surface coating is removed, apply brush alodine (C-100) on bare metal of anodized surfaces, or touchup using standard practices.

3. Replace any dented junction box and any parts having cracks.

4. Further repairs, other than removal and replacements, must be conducted by an authorized repair station.

22-49. ACTUATOR POSITION INDICATORS.

Three actuator position indicators (Figure 22-1) are used in the flight control system to provide an indication of the position of the series actuators in yaw pitch and roll axes. The indicators are mounted on a bracket beneath the instrument panel, right side.

22-50. REMOVAL - ACTUATOR POSITION INDICATOR.

1. Ensure that all electrical power is OFF.
2. Disconnect battery.
3. Disconnect electrical connector from wiring harness.
4. Remove nut behind bracket from actuator position indicator and pull forward through bracket.

22-51. INSTALLATION - ACTUATOR POSITION INDICATOR.

1. Insert electrical connector through mounting hole in bracket, and place actuator position indicator in mounting hole.

NOTE

Position the actuator position indicator for roll, pitch or yaw, as required, prior to securing.

2. Slide nut over electrical connector and secure actuator position indicator.
3. Connect electrical connector to wiring harness.
4. Perform MINISTAB flight control system checkout. (Refer to paragraph 22-3).

22-52. INSPECTION - ACTUATOR POSITION INDICATOR.

1. Inspect electrical connector for contact corrosion, damaged contacts, and damaged wires.
2. Inspect face of indicator for cracked glass.
3. Inspect body of indicator for thread damage.

22-53. CLEANING - ACTUATOR POSITION INDICATOR.

1. Remove moisture and loose dirt with a clean, soft cloth.
2. Remove dust and dirt from the indicator face with a soft clean cloth. To remove fingerprints or dirt difficult to remove, use a cloth dampened with water; if necessary, mild soap may be used to make the cleaning more effective.

WARNING

CLEANING SOLVENT IS FLAMMABLE AND ITS FUMES ARE TOXIC.

3. Remove grease, fungus and ground-in dirt with a soft clean cloth dampened (not wet) with solvent (C-304).
4. Remove dirt from the connector with a brush; remove moisture with a dry cloth.

22-54. REPAIR - ACTUATOR POSITION INDICATOR.

Repairs, other than removal and replacement, must be conducted by an authorized repair station.

22-55. TEST CONNECTORS.

Two test connectors (J7) and (J23) are provided to enable testing of the flight control system after performing maintenance or during trouble-shooting. The connectors are located on the lower left panel below the radio console.

22-56. REMOVAL - TEST CONNECTORS

1. Ensure that all electrical power is OFF.
2. Disconnect battery.
3. Remove screws attaching left side panel of the radio console. Remove left side panel.
4. Remove UHF control head KFS-599A from radio console.
5. Using a contact extraction tool, remove contacts from connectors.
6. Remove nuts, washers, screws, and connectors.

22-57. INSTALLATION -TEST CONNECTORS

1. Using a contact insertion tool, install contacts in connectors.
2. Position connectors in mounting holes and secure with nuts, washers, and screws.
3. Perform MINISTAB flight control system checkout. (Refer to paragraph 22-3.)
4. Install UHF control head KFS-599A in radio console.
5. Position left side panel on radio console and secure with screws.

22-58. INSPECTION - TEST CONNECTORS

1. Inspect electrical connectors for contact corrosion, damaged contacts, broken wires, and faulty insulation.
2. Inspect attaching hardware for crossthreading and stripped threads.

22-59. CLEANING - TEST CONNECTORS

Remove dirt from connectors with a brush, remove moisture with a dry cloth.

22-60. REPAIR OR REPLACEMENT - TEST CONNECTORS

Replace bent or broken contacts.

22-61. CYCLIC GRIP.

The cyclic grip consists of a standard grip, a cyclic trigger switch, a FORCE TRIM (maneuver) button, a FCS OFF button, and associated wiring.

1. Cyclic Trigger Switch. Refer to Chapter 24 for description and maintenance procedures.

2. Force Trim (Maneuver) Button. When depressed, this button releases the magnetic brake. This enables the pilot to fly the helicopter manually as long as the button is depressed.

3. FCS OFF Button. When depressed, this button disengages the MINISTAB flight control system.

22-62. REMOVAL - PILOTS STICK GRIP.

1. Disconnect battery.
2. Ensure that all electrical power is OFF.
3. Remove pilots seat and seat panel.
4. Remove control run tunnel cover.

NOTE

Refer to Chapter 98 for wiring diagrams.

5. At wire bundle on right side of tunnel, locate seven wires leading to pilots stick.
6. Following identification, locate splices joining stick grip wires to wire bundle. Cut out splices.

NOTE

Attaching a four-foot length of safety wire to the loose ends of stick wires will facilitate installation of replacement grip assembly.

7. Remove two screws (fore and aft) attaching grip to stick elbow. Remove grip and grip wiring.

22-63. REMOVAL - COPILOTS STICK GRIP.

1. Disconnect battery.
2. Ensure that all electrical power is OFF.
3. Disconnect stick grip electrical connector at seat bulkhead.

NOTE

Refer to Chapter 98 for wiring diagrams.

4. Identify, then remove wires from connector.

NOTE

Attaching a three foot length of safety wire to the loose ends of the stick wires will facilitate installation of replacement grip assembly.

5. Remove two screws (fore and aft) attaching stick grip to elbow. Remove grip.

22-64. INSTALLATION - PILOTS STICK GRIP.

1. Ensure electrical power is OFF or disconnected from aircraft.
2. Thread stick grip wires through control stick.
3. Attach stick grip to elbow using two screws.

NOTE

Refer to Chapter 98 for wiring diagrams.

4. Connect stick grip wires to mating wires at wire bundle using butt splices.
5. Perform MINISTAB flight control system check-out. (Refer to paragraph 22-3.)
6. Install pilots seat panel and cushions.

22-65. INSTALLATION - COPILOTS STICK GRIP.

1. Ensure electrical power is OFF or disconnected from aircraft.
2. Thread stick grip electrical wires through stick.
3. Attach grip to stick elbow using two screws.

NOTE

Refer to Chapter 98 for wiring diagrams.

4. Identify, then connect stick grip wires to connector. Attach connector to bulkhead connector.
5. Perform MINISTAB flight control system check-out. (Refer to paragraph 22-3.)

22-66. INSPECTION - CYCLIC GRIP.

1. Inspect switches for weak detents, security, corrosion, and continuity in ON and OFF position.
2. Inspect grip for evidence of cracks or physical damage.

22-67. CLEANING - CYCLIC GRIP.

1. Remove moisture and loose dirt with a clean soft cloth.

WARNING**CLEANING SOLVENT IS FLAMMABLE AND ITS FUMES ARE TOXIC.**

2. Remove grease and ground-in dirt with a soft cloth dampened (not wet) with solvent (C-304).

22-68. REPAIR - CYCLIC GRIP.

1. Replace cyclic trigger switch. (Refer to Chapter 24.)
2. Further repairs, other than removal and replacement, must be conducted by an authorized repair station.

22-69. YAW AXIS STABILIZATION SYSTEM.

The yaw axis stabilization system is a single axis system with force trim. The system is a rate-gyro system that provides rate damping and attitude retention in the yaw axis in addition to force trim functions. The force trim functions include pedal trim point retention, artificial feel gradient for movements away from yaw trim.

The yaw axis stabilization system is comprised of a computer, a control tube actuator assembly, a trim damper unit, a yaw power amplifier assembly (installed in existing junction box), a stop assembly, two pedal switches, an attitude position indicator, and a wiring harness containing a test connector.

22-70. YAW AXIS STABILIZATION SYSTEM OPERATIONAL DESCRIPTION.

The yaw axis stabilization system is interfaced with the MINISTAB two axis system through connector J18 on the junction box and provides a yaw rate threshold signal (+15 volts when yaw rate is less than 1.5 deg/sec) for use in the MINISTAB cyclic logic circuitry. This system requires +28V dc and 115V ac single phase power sources.

The +28V dc power, obtained from the essential 2 bus, is applied to the yaw interface connector mounted on the junction box.

The 115V ac, 400 Hz, single phase power obtained from avionics inverter, is applied to the rate gyro motor and yaw computer internal power supplies. The rate gyro output signal is demodulated and applied to servo amplifier which drives the rate and integrated rate channels. Both channels

are switched off when the system is off, resulting in a zero signal to the servo amplifier and centering of the actuator.

The actuator is mounted in a control tube and contains a dc permanent magnet motor driven by a pulse-width modulating servo-amplifier. The $\pm 15V$ do feedback pot excitation voltages are supplied from the computer power supply. The $\pm 27V$ do motor drive voltages are supplied from the yaw power amplifier, mounted in the junction box.

The actuator is installed between the forward walking beam and aft walking beam, downstream of the pitch control mechanism. The computer is identical to and interchangeable with the computers used in the MINISTAB flight control system, with the proper gains for all three axes contained but selected by wiring connection in the system harnesses.

22-71. YAW AXIS STABILIZATION SYSTEM CHECKOUT.

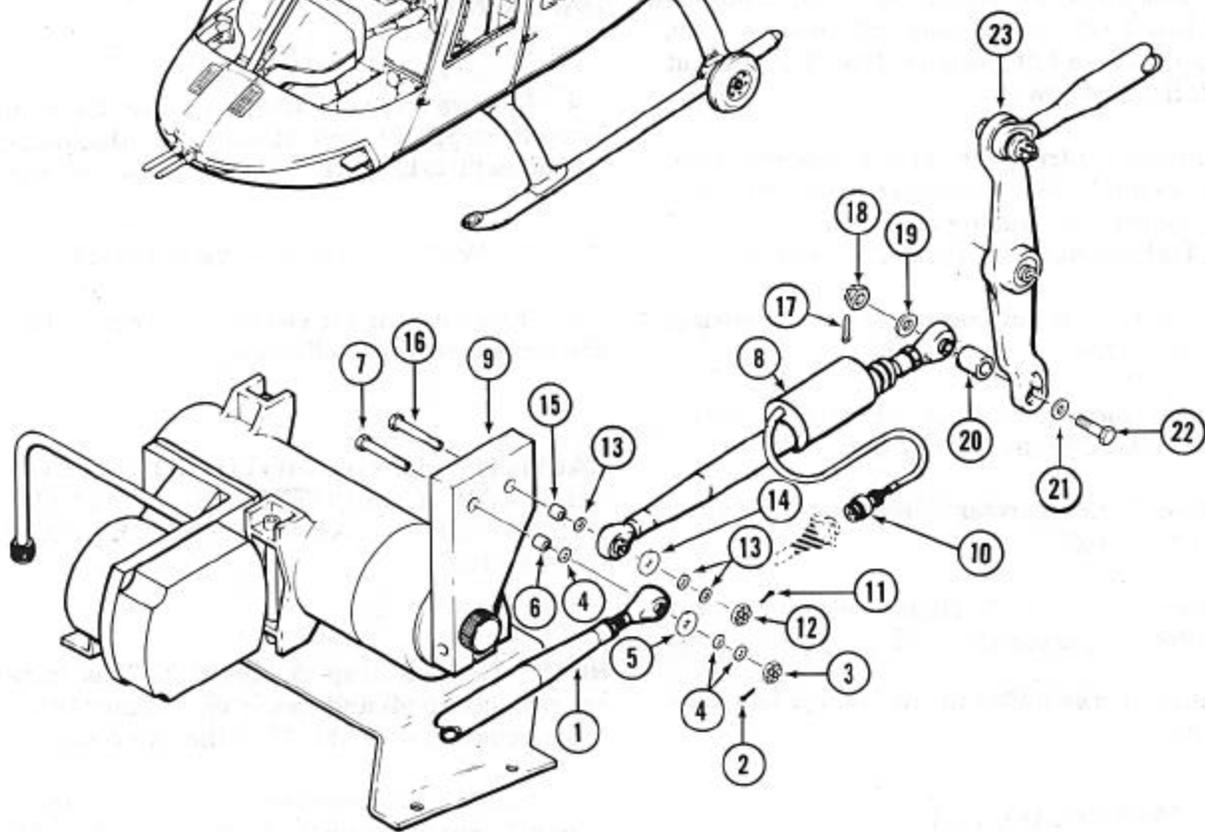
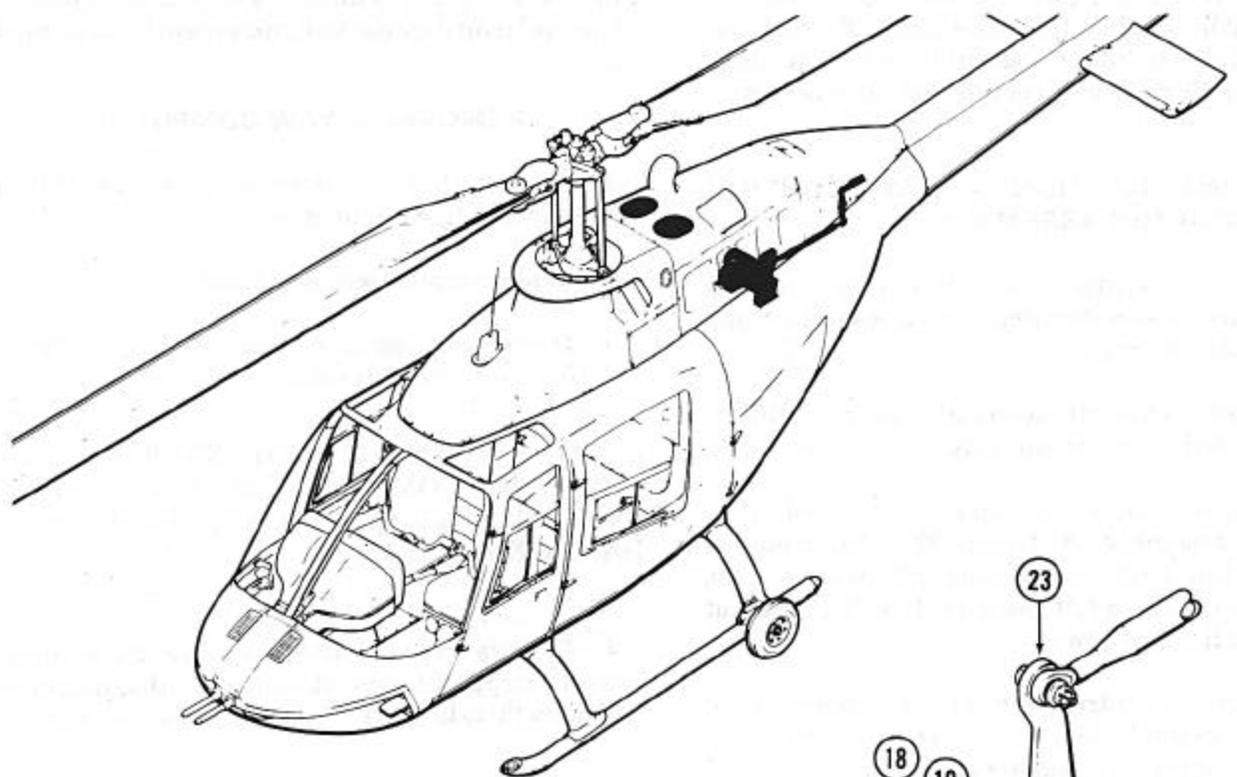
The yaw axis stabilization system checkout is contained in paragraph 22-3.

22-72. YAW CONTROL TUBE ACTUATOR ASSEMBLY.

The yaw control tube actuator assembly consists of an actuator installed on the aft end of a control tube. The actuator is an electro-mechanical linear actuator which receives command signals from the servo amplifier in the yaw computer. These signals cause the actuator output shaft to move about a neutral point, with a total movement of about 0.5 inch. Movement of the actuator output shaft is applied to the tail rotor pitch change mechanism. Refer to Chapter 67 for inspection of yaw actuator assembly.

22-73. REMOVAL - YAW CONTROL TUBE ACTUATOR ASSEMBLY.

1. Ensure that all electrical power is OFF or disconnected from helicopter.
2. Remove access panel from roof inside baggage compartment.
3. Remove forward end of adjustable control tube (1, Figure 22-7) from walking beam. Refer to Chapter 67.
4. Remove cotter pin (2), nut (3), washers (4), spacer (5), spacer (6), and bolt (7) securing adjustable control tube (1) to arm (9). Remove adjustable control tube (1) from helicopter to provide access for control tube actuator assembly removal.



- | | | | |
|----------------------------|-----------------------------------|----------------|------------------|
| 1. Adjustable control tube | 7. Bolt | 13. Washers | 19. Washer |
| 2. Cotter pin | 8. Control tube actuator assembly | 14. Spacer | 20. Spacer |
| 3. Nut | 9. Arm | 15. Spacer | 21. Washer |
| 4. Washers | 10. Electrical connector | 16. Bolt | 22. Bolt |
| 5. Spacer | 11. Cotter pin | 17. Cotter pin | 23. Walking beam |
| 6. Spacer | 12. Nut | 18. Nut | |

Figure 22-7. Yaw Control Tube Actuator Assembly - Removal / Installation

5. Remove electrical connector (10) from wiring harness connector.
6. Remove cotter pin (11), nut (12), washers (13), spacer (14), spacer (15), and bolt (16) securing control tube actuator assembly (8) to arm (9).
7. Remove cotter pin (17), nut (18), washer (19), spacer (20), washer (21), and bolt (22) securing control tube actuator assembly (8) to walking beam (23). Remove control tube actuator assembly (8).

22-74. INSTALLATION - YAW CONTROL TUBE ACTUATOR ASSEMBLY.

NOTE

Yaw control tube actuator assembly is preadjusted to specifications and does not require further adjustments.

1. Ensure that all electrical power is OFF or disconnected from the aircraft.
2. Connect actuator end of control tube actuator assembly (8, Figure 22-7) to inside of walking beam (23) using bolt (22), washer (21), spacer (20), washer (19), and nut (18). Tighten nut (18). Install cotter pin (17).
3. Connect control tube end of control tube actuator assembly (8) to outside of arm (9) using bolt (16), spacer (15), washers (13), spacer (14) and nut (12). Tighten nut (12). Install cotter pin (11).
4. Connect electrical connector (10) to wiring harness connector.
5. Connect forward end of adjustable control tube (1) to walking beam. Refer to Chapter 67.
6. Perform tail rotor controls rigging. Refer to Chapter 67.
7. Perform MINISTAB flight control system checkout. Refer to paragraph 22-3.
8. Install access panel in roof inside baggage compartment.

22-75. YAW COMPUTER.

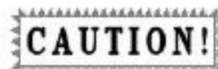
The yaw computer (Figure 22-8) contains a rate gyro, capable of detecting changes of angular rate of the order of 0.01 deg/sec; a power supply module which provides the voltages that are used both within the computer and also by other components in the flight control system; servo amplifier cir-

cuitry which control the direction and speed of the series actuators, and logic and gain networks for pitch and roll.

The yaw computer is mounted on a bracket just aft of the roll trim damper unit underneath the co-pilot seat.

22-76. REMOVAL - YAW COMPUTER.

1. Ensure that all electrical power is OFF or disconnected from helicopter.
2. Remove copilot seat panel and cushion.
3. Disconnect connector assembly (Figure 22-7) from yaw computer (8).



HANDLE WITH EXTREME CARE. THE YAW COMPUTER IS A SENSITIVE INSTRUMENT AND CAN BE EASILY DAMAGED.

4. Remove screws (1 and 3), washer (2), ground strap (5) and spacer (6) attaching yaw computer (8) to bracket (9). Remove yaw computer (8).

22-77. INSTALLATION - YAW COMPUTER.

1. Ensure that all electrical power is OFF or disconnected from helicopter.

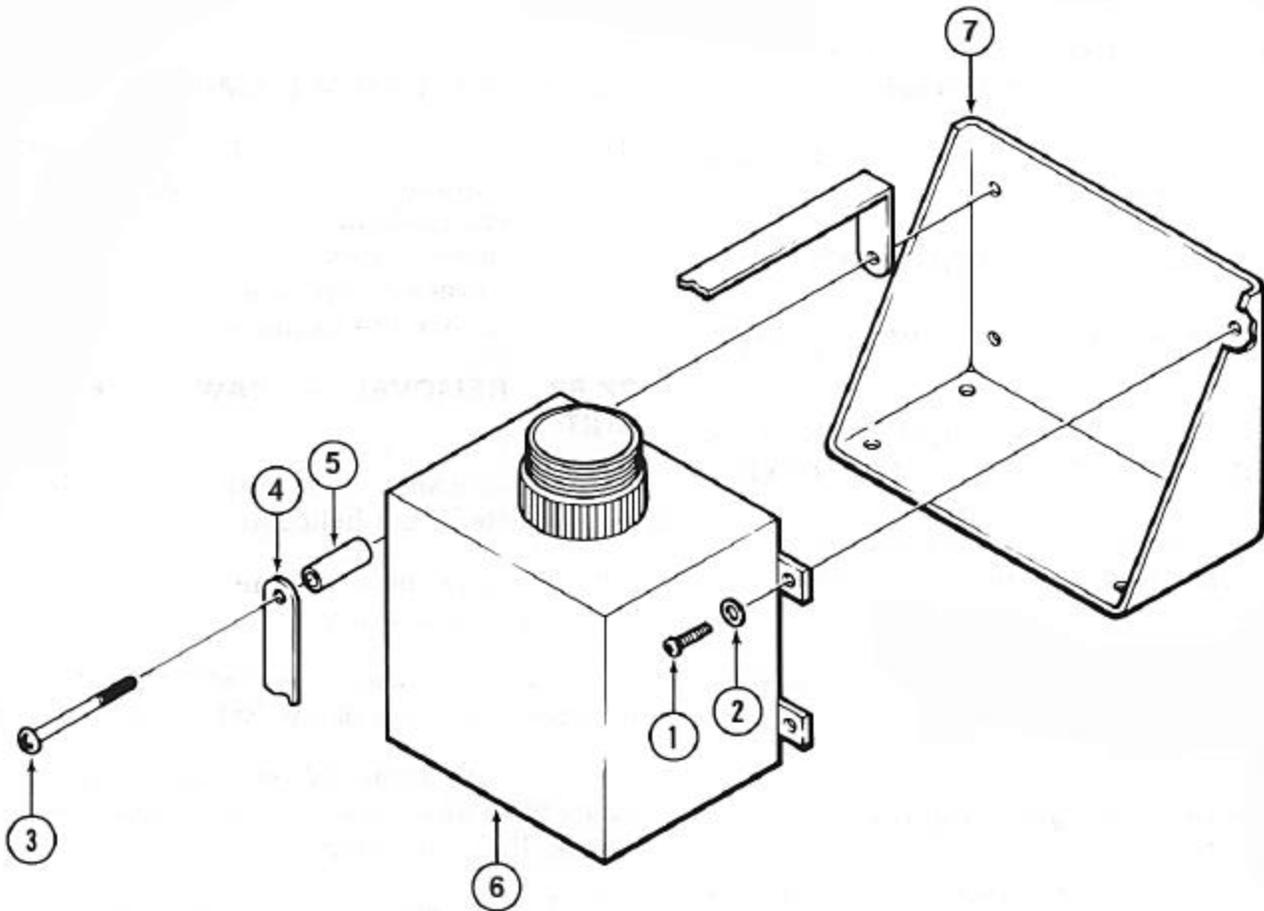


HANDLE WITH EXTREME CARE. THE YAW COMPUTER IS A SENSITIVE INSTRUMENT AND CAN BE EASILY DAMAGED.

NOTE

Ground strap (5, Figure 22-8) is installed on top of spacer (6).

2. Attach yaw computer (8) to bracket (9), using spacer (6), ground strap (5), clamp (4), washers (2) and screws (1 and 3). Torque screws 12 to 15 inch-pounds.
3. Connect connector assembly to yaw computer (8).
4. Perform flight control system checkout. Refer to paragraph 22-3.



- | | |
|-----------------|-----------------|
| 1. Screw | 5. Spacer |
| 2. Washer | 6. Yaw computer |
| 3. Screw | 7. Bracket |
| 4. Ground Strap | |

Figure 22-8. Yaw Computer - Removal / Installation

5. Install copilot seat panel and cushion.

22-78. INSPECTION - YAW COMPUTER.

1. Inspect connector assembly and receptacle for contact corrosion, damaged contacts, broken wires and faulty insulation.
2. Inspect yaw computer for evidence of dents, surface damage, and corrosion.
3. Inspect conductive tape along seams of computer for signs of cracks or damage.
4. Inspect attaching hardware for cross threading and stripped threads.

22-79. CLEANING - YAW COMPUTER.

1. Remove moisture and loose dirt with a clean, soft cloth.

WARNING

CLEANING COMPOUND IS FLAMMABLE AND ITS FUMES ARE TOXIC.

2. Remove grease, fungus and ground-in dirt with a soft cloth dampened (not wet) with cleaning solvent (C304).
3. Remove dirt from the connector with a brush, remove moisture with a dry cloth.

22-80. REPAIR - YAW COMPUTER.

1. Replace cross threaded and stripped hardware.
2. Repair minor surface damage by polishing out nicks, scratches or corrosion pits within specified limits.
 - a. Remove no more material than necessary to blend repair smoothly into surrounding surface. Use fine to medium grades of sandpaper (C-423). Do not attempt repair by using a grinding wheel.
 - b. Mechanical damage (scratches or nicks) should be polished out only deep enough to remove traces of damage. Corrosion should be polished out no more than twice as deep as deepest pit.
 - c. Where protective surface coating is removed, apply brush alodine (C-100) on bare metal of anodized surfaces, or touchup using standard practices.

3. Replace any dented yaw computer and any parts having cracks.

4. Replace any yaw computer with conductive tape broken or cracked along seams.

5. Further repairs, other than removal and replacement, must be conducted by an authorized repair station.

22-81. YAW TRIM DAMPER UNIT.

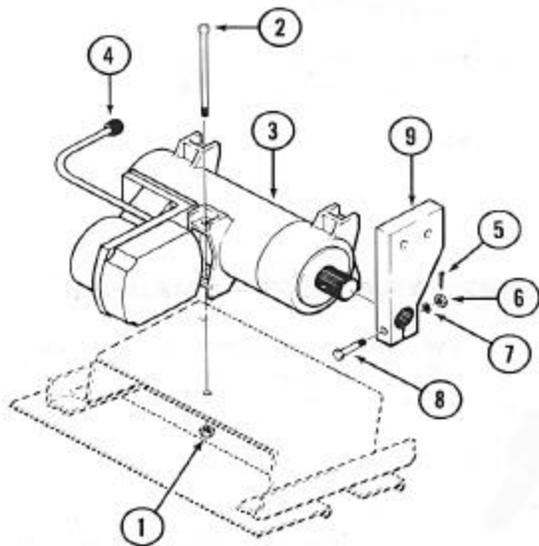
The yaw trim damper unit (TDU) (Figure 22-9) is an electro-mechanical device containing a magnetic brake, force gradient spring, and a control motion detector (used in cyclic channels only). The yaw TDU is bracket mounted on the helicopter structure above the baggage compartment.

22-82. REMOVAL - YAW TRIM DAMPER UNIT.

1. Ensure that all electrical power is OFF or disconnected from helicopter.
2. Remove access panel from roof inside baggage compartment.
3. Remove forward end of adjustable control tube from walking beam. Refer to Chapter 67.
4. Remove adjustable control tube from arm (9, Figure 22-8) and remove from helicopter to provide access. Refer to Chapter 67.
5. Disconnect electrical connector (4) from wiring harness connector.
6. Remove nuts (1) and cap head screws (2) securing trim damper unit (3) to floor mounted bracket. Remove trim damper unit (3) from helicopter.
7. Remove cotter pin (5), nut (6), washer (7), bolt (8), and arm (9) from splined shaft of trim damper unit (3).

22-83. INSTALLATION - YAW TRIM DAMPER UNIT.

1. Ensure that all electrical power is OFF or disconnected from the helicopter.
2. Install arm (9, Figure 22-9) on splined shaft of trim damper unit (3). Secure with bolt (8), washer (7) and nut (6). Torque nut 12-15 inch pounds and install cotter pin (5).



1. Nut
2. Cap head screw
3. Trim damper unit
4. Electrical connector
5. Cotter pin
6. Nut
7. Washer
8. Bolt
9. Arm

Figure 22-9. Yaw Trim Damper Unit - Removal / Installation

3. Position trim damper unit (3) on floor mounted bracket in helicopter and install cap head screw (2) and nuts (1). Torque nuts 12-15 inch pounds.
4. Connect electrical connector (4) to wiring harness connector.
5. Connect control tube end of control tube actuator assembly to outside of arm. Refer to Chapter 67.
6. Connect fixed end of adjustable control tube to walking beam. Refer to Chapter 67.

NOTE

If control tube adjusted length has been left undisturbed omit step 7.

7. Adjust rod end of adjustable control tube to align with arm (9) and secure. Refer to Chapter 67.
8. Perform tail rotor controls rigging. Refer to Chapter 67.
9. Perform flight control system checkout. Refer to paragraph 22-3.
10. Install access panel in roof inside baggage compartment.

22-84. INSPECTION - YAW TRIM DAMPER UNIT.

1. Inspect electrical connector and receptacle for contact corrosion, damaged contacts, broken wires and faulty insulation.
2. Inspect yaw trim damper unit for evidence of dents, surface damage, and corrosion.
3. Inspect attaching hardware for crossthreading and stripped threads.

22-85. CLEANING - YAW TRIM DAMPER UNIT.

1. Remove moisture and loose dirt with a clean, soft cloth.

WARNING

CLEANING COMPOUND IS FLAMMABLE AND ITS FUMES ARE TOXIC.

2. Remove grease, fungus and ground-in dirt with a soft cloth dampened (not wet) with cleaning solvent (C304).
3. Remove dirt from the connector with a brush, remove moisture with a dry cloth.

22-86. REPAIR - YAW TRIM DAMPER UNIT.

1. Repair crossthreading and stripped hardware.
2. Repair minor surface damage by polishing out nicks, scratches or corrosion pits within specified limits.
 - a. Remove no more material than necessary to blend repair smoothly into surrounding surface. Use fine to medium grades of sandpaper (C-423). Do not attempt repair by using a grinding wheel.
 - b. Mechanical damage (scratches or nicks) should be polished out only deep enough to remove traces of damage. Corrosion should be polished out no more than twice as deep as deepest pit.
 - c. Where protective surface coating is removed, apply brush alodine (C-100) on bare metal of anodized surfaces, or touchup using standard practices.
3. Replace any dented yaw trim damper unit and any parts having cracks.
4. Further repairs, other than removal and replacement, must be conducted by an authorized repair station.

22-87. YAW POWER AMPLIFIER.

The yaw power amplifier is installed in the junction box and is not removed separately. Refer to paragraph 22-43.

22-88. PEDAL SWITCH.

A pedal switch is installed between the pedal bell-crank and the pedal adjuster at both pilot and copilot positions. Pedal movement engages the pedal switch removing the force trim feature from the tail rotor controls. Refer to Chapter 67 for maintenance procedures.

22-89. INSPECTION - PEDAL SWITCH.

1. Inspect pedal switch for evidence of surface damage and corrosion.
2. Inspect pedal switch for evidence of lamination separation.

22-90. CLEANING - PEDAL SWITCH.

1. Remove moisture and loose dirt with a clean, soft cloth.

WARNING

**CLEANING COMPOUND IS
FLAMMABLE AND ITS FUMES ARE
TOXIC.**

2. Remove grease, fungus and ground in dirt with a soft cloth dampened (not wet) with cleaning solvent (C304).

22-91. REPAIR - PEDAL SWITCH.

1. Remove minor corrosion from pedal switch surface using a fine grade of sand paper (C-423).
2. Replace any pedal switch which does not meet the inspection requirements.
3. Further repairs, other than removal and replacement, are not authorized.