

**CHAPTER 67 — FLIGHT CONTROLS**

**TABLE OF CONTENTS**

| Paragraph<br>Number                            | Title   | Chapter/Section<br>Number | Page<br>Number |
|--|---|---------------------------|----------------|
| <b>FLIGHT CONTROLS</b>                         |   |                           |                |
| 67-1   | Flight Controls.....                                  | 67-00-00                  | 5              |
| 67-2   | Control Tubes .....                                   | 67-00-00                  | 5              |
| 67-3   | Inspection and Repair.....                            | 67-00-00                  | 5              |
| 67-4   | Bellcranks, Levers, Supports, and Walking Beams ..... | 67-00-00                  | 5              |
| 67-5   | Inspection and Repair.....                            | 67-00-00                  | 5              |
| 67-6   | Flight Control Bolts Inspection.....                  | 67-00-00                  | 8              |
| <b>COLLECTIVE PITCH CONTROLS</b>               |   |                           |                |
| 67-7   | Collective Pitch Controls.....                        | 67-00-00                  | 9              |
| 67-8   | Collective Pitch Control Rigging .....                | 67-00-00                  | 9              |
| <b>PILOT COLLECTIVE STICK</b>                  |   |                           |                |
| 67-9   | Pilot Collective Stick.....                           | 67-00-00                  | 15             |
| 67-10  | Removal.....  | 67-00-00                  | 15             |
| 67-11  | Installation.....                                     | 67-00-00                  | 15             |
| 67-12  | Throttle Friction Adjustment.....                     | 67-00-00                  | 15             |
| <b>COPILOT COLLECTIVE STICK</b>                |   |                           |                |
| 67-13  | Copilot Collective Stick .....                        | 67-00-00                  | 19             |
| 67-14  | Removal.....  | 67-00-00                  | 19             |
| 67-15  | Disassembly .....                                     | 67-00-00                  | 19             |
| 67-16  | Inspection and Repair.....                            | 67-00-00                  | 19             |
| 67-17  | Assembly .....  | 67-00-00                  | 19             |
| 67-18  | Installation.....                                     | 67-00-00                  | 21             |
| 67-19  | Copilot Collective Stick Quick Disconnect .....       | 67-00-00                  | 21             |
| 67-20  | Removal.....  | 67-00-00                  | 21             |
| 67-21  | Installation.....                                     | 67-00-00                  | 23             |
| <b>OTHER COMPONENTS OF COLLECTIVE CONTROLS</b> |   |                           |                |
| 67-22  | Collective Jackshaft .....                            | 67-00-00                  | 25             |
| 67-23  | Removal.....  | 67-00-00                  | 25             |
| 67-24  | Installation.....                                     | 67-00-00                  | 25             |
| 67-25  | Collective Friction Adjustment .....                  | 67-00-00                  | 25             |
| 67-26  | Collective Pitch Control Linkage .....                | 67-00-00                  | 27             |
| 67-27  | Removal.....  | 67-00-00                  | 28             |
| 67-28  | Inspection and Repair.....                            | 67-00-00                  | 28             |
| 67-29  | Installation.....                                     | 67-00-00                  | 28             |
| 67-30  | Collective Trunnion and Lever .....                   | 67-00-00                  | 31             |
| 67-31  | Removal.....  | 67-00-00                  | 31             |
| 67-32  | Disassembly .....                                     | 67-00-00                  | 31             |

## TABLE OF CONTENTS (CONT)

| Paragraph<br>Number                       | Title   | Chapter/Section<br>Number | Page<br>Number |
|---|---|---------------------------|----------------|
| 67-33                                     | Inspection and Repair.....  | 67-00-00                  | 31             |
| 67-34                                     | Assembly .....  | 67-00-00                  | 32             |
| 67-35                                     | Installation.....   | 67-00-00                  | 32             |
| <b>CYCLIC CONTROLS</b>                    |   |                           |                |
| 67-36                                     | Cyclic Controls .....   | 67-00-00                  | 33             |
| 67-37                                     | Cyclic Control Rigging .....  | 67-00-00                  | 33             |
| 67-38                                     | Cyclic Stick Control Balance Spring Clip (or Eyebolt) and<br>Connecting Hardware Installation and Adjustment..... | 67-00-00                  | 37             |
| 67-39                                     | Cyclic Friction Adjustment .....  | 67-00-00                  | 37             |
| <b>CYCLIC STICK AND TORQUE TUBE</b>       |   |                           |                |
| 67-40                                     | Cyclic Stick and Torque Tube.....   | 67-00-00                  | 39             |
| 67-41                                     | Removal.....  | 67-00-00                  | 39             |
| 67-42                                     | Inspection and Repair .....   | 67-00-00                  | 39             |
| 67-43                                     | Installation.....   | 67-00-00                  | 42             |
| <b>COPILOT CYCLIC STICK</b>               |   |                           |                |
| 67-44                                     | Copilot Cyclic Stick Quick-Disconnect .....   | 67-00-00                  | 45             |
| 67-45                                     | Removal.....  | 67-00-00                  | 45             |
| 67-46                                     | Installation.....   | 67-00-00                  | 45             |
| 67-47                                     | Copilot Cyclic Stick and Lever Assembly.....  | 67-00-00                  | 45             |
| 67-48                                     | Removal.....  | 67-00-00                  | 45             |
| 67-49                                     | Disassembly .....   | 67-00-00                  | 45             |
| 67-50                                     | Inspection and Repair.....  | 67-00-00                  | 45             |
| 67-51                                     | Assembly .....  | 67-00-00                  | 50             |
| 67-52                                     | Installation.....   | 67-00-00                  | 50             |
| <b>OTHER COMPONENTS OF CYCLIC CONTROL</b> |   |                           |                |
| 67-53                                     | Cyclic Yoke and Mixing Lever.....   | 67-00-00                  | 51             |
| 67-54                                     | Removal.....  | 67-00-00                  | 51             |
| 67-55                                     | Inspection and Repair.....  | 67-00-00                  | 51             |
| 67-56                                     | Installation.....   | 67-00-00                  | 51             |
| 67-57                                     | Cyclic Control Linkage .....  | 67-00-00                  | 53             |
| 67-58                                     | Removal.....  | 67-00-00                  | 53             |
| 67-59                                     | Inspection and Repair.....  | 67-00-00                  | 58             |
| 67-60                                     | Installation.....   | 67-00-00                  | 58             |
| <b>TAIL ROTOR CONTROLS</b>                |   |                           |                |
| 67-61                                     | Tail Rotor Controls .....   | 67-00-00                  | 59             |
| 67-62                                     | Tail Rotor Control Rigging (Helicopters S/N 4 through 303, with<br>Tail Rotor Boost).....                         | 67-00-00                  | 59             |
| 67-63                                     | Tail Rotor Control Rigging (Helicopters S/N 304 through 497).....   | 67-00-00                  | 64             |

**TABLE OF CONTENTS (CONT)**

| Paragraph<br>Number                                      | Title   | Chapter/Section<br>Number | Page<br>Number |
|--|---|---------------------------|----------------|
| 67-64  | Tail Rotor Control Rigging (Helicopters S/N 498 and Subsequent) .....                       | 67-00-00                  | 67             |
| 67-65  | Dynamic Balancing — Tail Rotor Pedal Forces (with Tail Rotor Boost Kit) .....               | 67-00-00                  | 71             |
| 67-66  | Dynamic Balancing — Tail Rotor Pedal Forces (without Tail Rotor Boost Kit) .....            | 67-00-00                  | 73             |
| <b>PILOT AND COPILOT TAIL ROTOR PEDALS AND ADJUSTER</b>  |   |                           |                |
| 67-67  | Tail Rotor Pedals and Adjuster .....  | 67-00-00                  | 75             |
| 67-68  | Removal.....  | 67-00-00                  | 75             |
| 67-69  | Inspection and Repair.....  | 67-00-00                  | 75             |
| 67-70  | Installation.....   | 67-00-00                  | 75             |
| <b>TAIL ROTOR CONTROL LINKAGE</b>                        |   |                           |                |
| 67-71  | Tail Rotor Control Linkage .....  | 67-00-00                  | 79             |
| 67-72  | Removal.....  | 67-00-00                  | 79             |
| 67-73  | Inspection and Repair.....  | 67-00-00                  | 79             |
| 67-74  | Installation.....   | 67-00-00                  | 79             |
| 67-75  | Tail Rotor Pitch Change Mechanism .....   | 67-00-00                  | 87             |
| 67-76  | Removal — Tail Rotor Pitch Change Mechanism (Helicopters S/N 4 through 497) .....           | 67-00-00                  | 87             |
| 67-77  | Removal — Tail Rotor Pitch Change Mechanism (Helicopters S/N 498 and Subsequent) .....      | 67-00-00                  | 87             |
| 67-78  | Cleaning.....   | 67-00-00                  | 90             |
| 67-79  | Inspection.....   | 67-00-00                  | 90             |
| 67-80  | Installation — Tail Rotor Pitch Change Mechanism (Helicopters S/N 4 through 497). .....     | 67-00-00                  | 90             |
| 67-81  | Installation — Tail Rotor Pitch Change Mechanism (Helicopters S/N 498 and Subsequent) ..... | 67-00-00                  | 90             |
| <b>CYCLIC AND COLLECTIVE SERVO ACTUATORS AND SUPPORT</b> |   |                           |                |
| 67-82  | Cyclic and Collective Servo Actuators and Support.....                                      | 67-00-00                  | 93             |
| 67-83  | Cyclic and Collective Servo Actuators .....   | 67-00-00                  | 93             |
| 67-84  | Removal.....  | 67-00-00                  | 93             |
| 67-85  | Inspection .....  | 67-00-00                  | 102            |
| 67-86  | Installation.....   | 67-00-00                  | 102            |
| 67-87  | 206-001-520 Servo Actuator Support Assembly.....  | 67-00-00                  | 108            |
| 67-88  | Removal.....  | 67-00-00                  | 108            |
| 67-89  | Cleaning.....   | 67-00-00                  | 108            |
| 67-90  | Inspection and Repair.....  | 67-00-00                  | 108            |
| 67-91  | Installation.....   | 67-00-00                  | 111            |
| 67-92  | 206-001-566 Servo Actuator Support Assembly.....  | 67-00-00                  | 112            |
| 67-93  | Removal.....  | 67-00-00                  | 112            |
| 67-94  | Cleaning.....   | 67-00-00                  | 112            |
| 67-95  | Inspection and Repair.....  | 67-00-00                  | 112            |

## TABLE OF CONTENTS (CONT)

| Paragraph<br>Number | Title  | Chapter/Section<br>Number | Page<br>Number |
|---------------------|--|---------------------------|----------------|
| 67-96               | Installation.....                                  | 67-00-00                  | 112            |
| 67-97               | Antitorque Servo Actuator and Support .....        | 67-00-00                  | 115            |
| 67-98               | Removal.....                                       | 67-00-00                  | 117            |
| 67-99               | Inspection .....                                   | 67-00-00                  | 117            |
| 67-100              | Installation.....                                  | 67-00-00                  | 117            |
| 67-101              | Stabilization Augmentation Control System Kit..... | 67-00-00                  | 117            |

## FIGURES

| Figure<br>Number | Title   | Page<br>Number |
|------------------|---|----------------|
| 67-1             | Flight Control System.....  | 6              |
| 67-2             | Cyclic Control Rigging.....   | 10A            |
| 67-3             | Collective Control Rigging.....   | 11             |
| 67-4             | Collective Pitch Control System.....  | 16             |
| 67-5             | Copilot Collective Stick .....  | 20             |
| 67-6             | Copilot Collective Stick Quick-disconnect.....  | 22             |
| 67-7             | Collective Friction Adjustment.....   | 26             |
| 67-8             | Trunnion and Lever Installation.....  | 29             |
| 67-9             | Collective Trunnion and Lever .....   | 30             |
| 67-10            | Cyclic Control Rigging.....   | 34             |
| 67-11            | Cyclic Stick Control Balance Spring Clip (or Eyebolt) and Connecting<br>Hardware Installation ..... | 38             |
| 67-12            | Cyclic Stick and Torque Tube .....  | 40             |
| 67-13            | Copilot Cyclic Stick Quick-disconnect.....  | 46A            |
| 67-14            | Copilot Cyclic Stick .....  | 48             |
| 67-15            | Cyclic Yoke and Mixing Lever .....  | 52             |
| 67-16            | Mixing Lever.....   | 54             |
| 67-17            | Cyclic Control Linkage .....  | 55             |
| 67-18            | Tail Rotor Rigging Workaid .....  | 60             |
| 67-19            | Antitorque Control System Rigging.....  | 62             |
| 67-20            | Antitorque Control System Rigging.....  | 65             |
| 67-21            | Antitorque Control System Rigging.....  | 68             |
| 67-22            | Balance of Tail Rotor Pedal Forces .....  | 72             |
| 67-23            | Tail Rotor Control Pedals and Adjuster.....   | 77             |
| 67-24            | Tail Rotor Pitch Control System.....  | 80             |
| 67-25            | Tail Rotor Aft Pitch Controls System.....   | 84             |
| 67-26            | Tail Rotor Aft Pitch Control System .....   | 85             |
| 67-27            | Tail Rotor Pitch Change Mechanism (Helicopters S/N 4 through 497).....                              | 88             |
| 67-28            | Tail Rotor Pitch Change Mechanism (Helicopters S/N 498 through Sub) .....                           | 89             |
| 67-29            | Cyclic and Collective Servo Actuator Schematic .....  | 94             |
| 67-30            | 206-001-520 Support — Cyclic and Collective Servo Actuator .....                                    | 95             |
| 67-31            | 206-001-520 Support — Cyclic and Collective Servo Actuator .....                                    | 98             |
| 67-32            | 206-001-566 Support — Cyclic and Collective Servo Actuator .....                                    | 103            |
| 67-33            | 206-001-520 Servo Actuator Support Assembly.....  | 109            |
| 67-34            | 206-001-566 Servo Actuator Support Assembly.....  | 113            |

**FIGURES (CONT)**

| <b>Figure Number</b> | <b>Title</b>                                | <b>Page Number</b> |
|----------------------|---|--------------------|
| 67-35                | Antitorque Servo Actuator Schematic .....   | 116                |
| 67-36                | Antitorque Servo Actuator and Support ..... | 118                |



## FLIGHT CONTROLS

### 67-1. FLIGHT CONTROLS.

The flight control system consists of push-pull control tubes and bellcranks actuated by conventional helicopter cyclic, collective, and directional controls (figure 67-1). The controls are routed beneath the pilot seat aft to the center of the helicopter and up to the cabin roof through the control column which also serves as a primary cabin structure. Access doors located on the aft side of the control column and removable seats are provided for control inspection and maintenance accessibility. Cyclic and collective controls are routed to the main rotor blades through the swashplate. The directional controls are routed through the tailboom to the tail rotor. Fixed length control tubes and a minimum of adjustable tubes simplify rigging. All self-aligning bearings and rod ends are spherical bearings and require no lubrication.

Cyclic, collective, and directional control systems incorporate hydraulic servo actuators. The servo actuators on the cyclic and collective controls incorporate irreversible valves which prevent control force feedback.

A stabilization augmentation system kit may be installed for the cyclic and directional control system. Refer to Chapter 99 and Service Instruction for maintenance.

Copilot controls (figure 67-1) are provided as optional equipment for dual control capability and operations requirements. Dual control installation consists of copilot collective stick, cyclic stick, and tail rotor control pedal assembly which are connected to the pilot controls via jackshaft tube, torque tube, control tubes, and bellcranks. Copilot collective and cyclic control sticks feature quick-disconnects for rapid removal or installation of control sticks.

### 67-2. CONTROL TUBES.

Aluminum alloy control tubes are used throughout the collective, cyclic, and antitorque controls. Some control tubes are fixed length with fixed rod ends, while others have adjustable rod ends that are readily replaceable. Removal and installation procedures relating to the individual control tubes are contained in the applicable section for the controls.

### 67-3. INSPECTION AND REPAIR.

#### NOTE

For detailed inspection and repair procedures, refer to BHT-206A/B-SERIES-CR&O manual.

1. Clean control tubes with cloth moistened with solvent (C-304). Do not allow solvent to enter bearings.
2. Inspect control tubes for mechanical and/or corrosion damage.
3. Inspect bearings for security, smooth operation, and axial and radial wear. If wear in either direction exceeds the wear limits specified in BHT-ALL-SPM, the bearing or part shall be replaced.
4. Tag or otherwise identify parts which do not meet inspection standards to ensure that part is repaired or scrapped, as applicable.

### 67-4. BELLCRANKS, LEVERS, SUPPORTS, AND WALKING BEAMS.

Bellcranks, levers, supports, and walking beams are used throughout the collective, cyclic, and tail rotor control systems. These parts transmit or control change movements in the particular system in which they are installed. Removal and installation procedures relating to these parts are contained in the applicable section for the controls.

### 67-5. INSPECTION AND REPAIR.

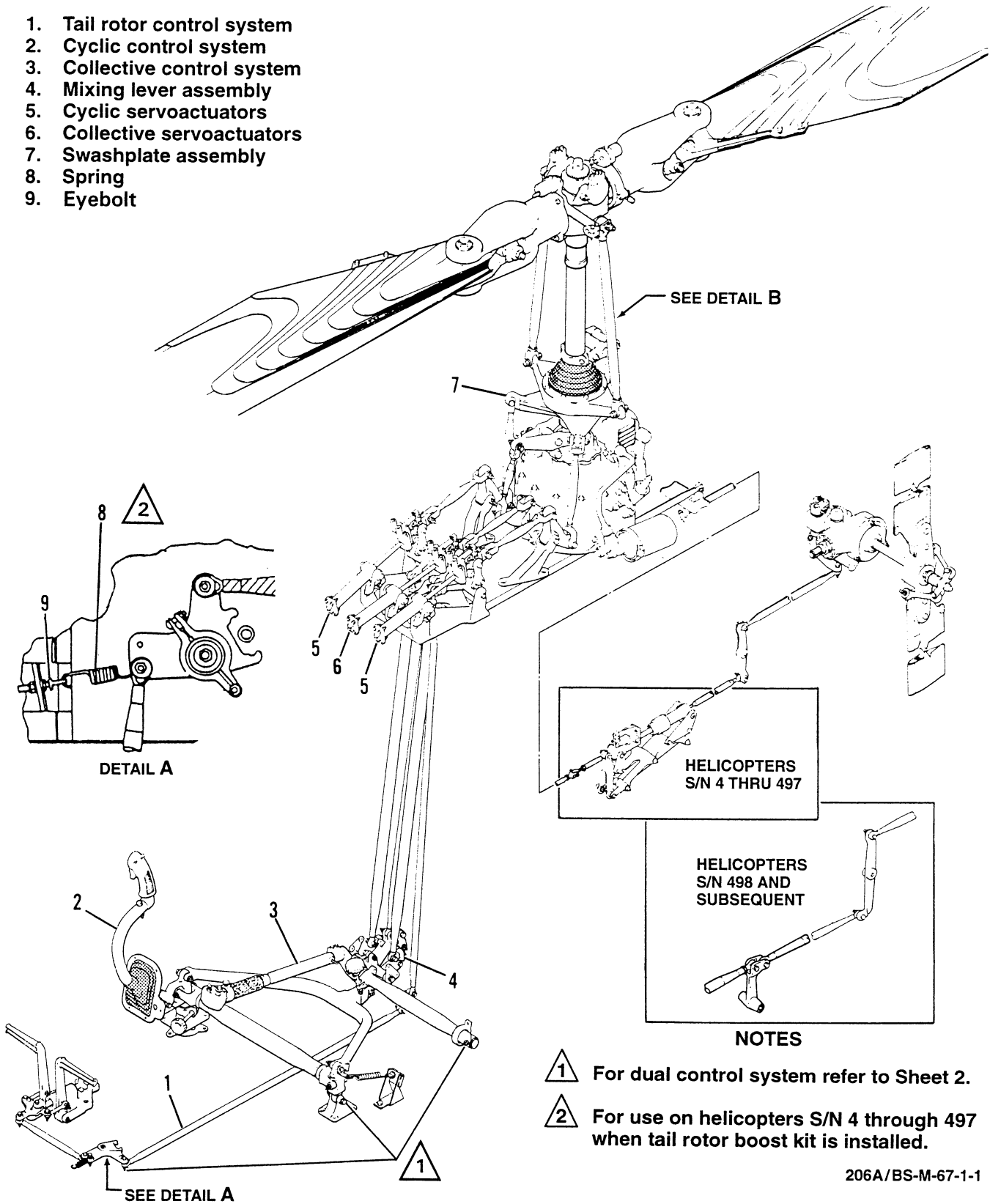
Inspection procedures and damage limits listed in the following steps apply to all parts of flight controls. These inspection procedures and damage limits are not listed in the inspection procedure relating to a specific part, but are referenced when they are employed. Some parts require additional or specific limits peculiar to them. These inspection limits are listed where a particular part is installed in the controls.

#### NOTE

For detailed inspection and repair procedures, refer to BHT-206A/B-SERIES-CR&O manual.

1. Clean parts with cloth moistened with solvent (C-304). Do not allow solvent to enter bearings.

1. Tail rotor control system
2. Cyclic control system
3. Collective control system
4. Mixing lever assembly
5. Cyclic servoactuators
6. Collective servoactuators
7. Swashplate assembly
8. Spring
9. Eyebolt



HELIPTERS  
S/N 4 THRU 497

HELIPTERS  
S/N 498 AND  
SUBSEQUENT

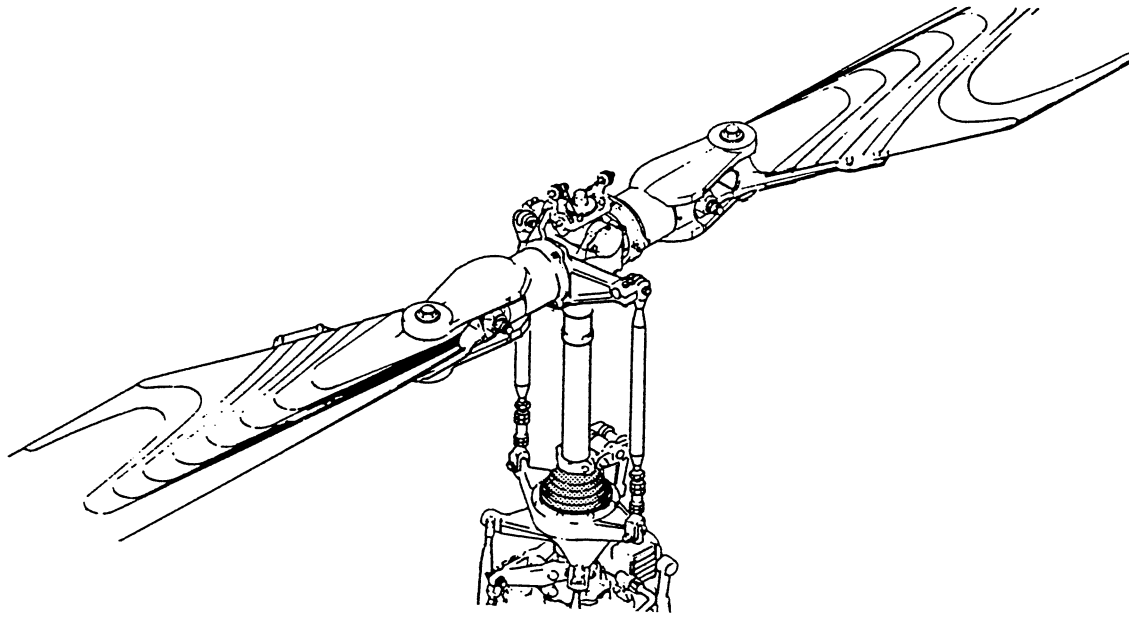
**NOTES**

- ① For dual control system refer to Sheet 2.
- ② For use on helicopters S/N 4 through 497 when tail rotor boost kit is installed.

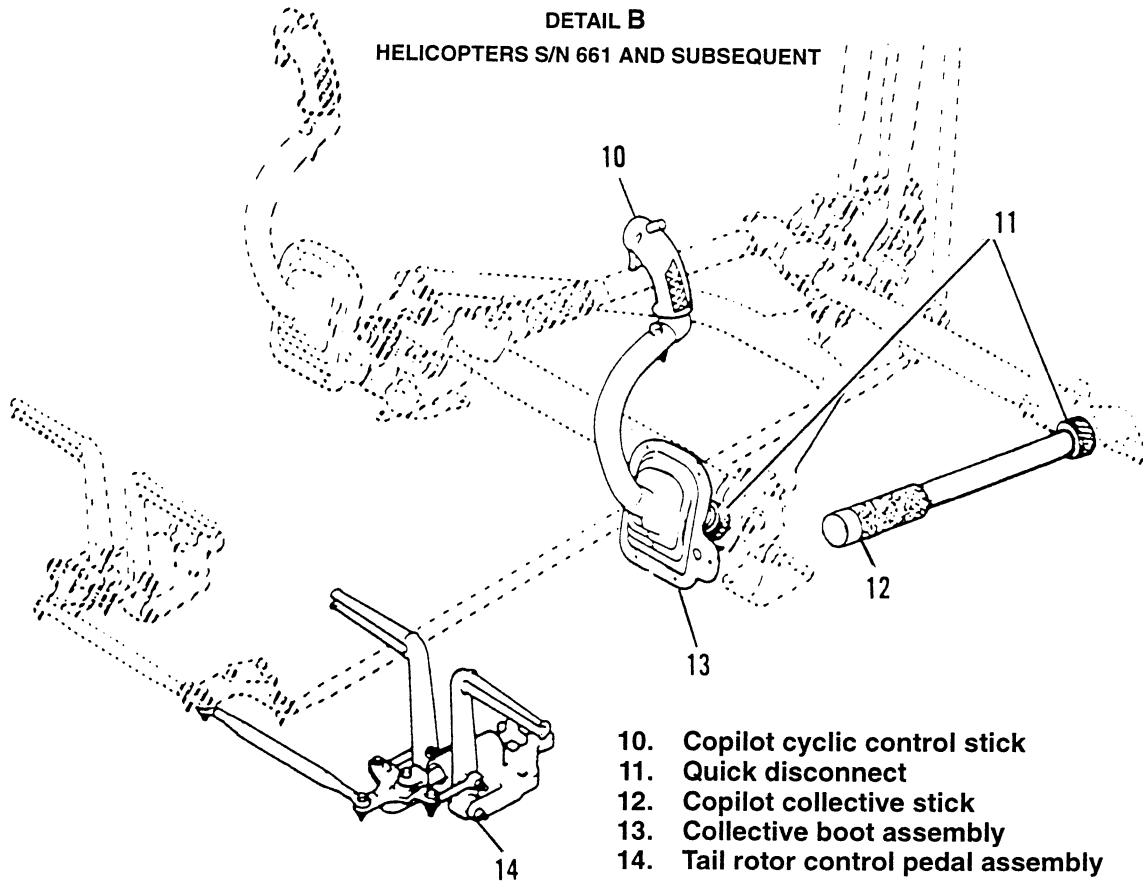
206A/BS-M-67-1-1

Figure 67-1. Flight control system (Sheet 1 of 2)





**DETAIL B**  
HELICOPTERS S/N 661 AND SUBSEQUENT



**DUAL CONTROL SYSTEM**

206A/BS-M-67-1-2

**Figure 67-1. Flight control system (Sheet 2)**

## BHT-206A/B-SERIES-MM-8

2. Inspect bearings for security, smooth operation, and axial and radial wear. If wear in either direction exceeds the wear limits specified in BHT-ALL-SPM, the bearing or part shall be replaced.

3. Inspect for elongated holes and wear in contact areas. Elongation of bolt or bushing holes must not exceed 0.005 inch (0.13 mm).

4. Bearing housing. Mechanical damage within a distance of one diameter from the edge of the hole must not exceed 0.020 inch (0.51 mm) in depth. Corrosion damage must not exceed 0.010 inch (0.25 mm) in depth after all corrosion is removed.

5. Remainder of part. Mechanical damage must not exceed 0.040 inch (1.02 mm) in depth. Corrosion damage must not exceed 0.020 inch (0.51 mm) in depth.

6. Polish out acceptable damage, removing no more than necessary to blend repair smoothly into surrounding surface. Damage shall be polished out only deep enough to remove traces of damage not exceeding maximum limits.

a. Use 400 to 600 grit abrasive cloth or paper to remove damage to a scratch-free surface. Do not attempt repairs with the use of a grinding wheel.

b. Apply chemical film treatment to repaired and bare areas (aluminum parts only) and a protective spray coating of epoxy polyamide primer (C-204) (BHT-ALL-SPM).

7. Refer to BHT-ALL-SPM for replacement of bearings or bushings.

8. Tag or otherwise identify parts which do not meet inspection standards to ensure that part is repaired or scrapped, as applicable.

### 67-6. FLIGHT CONTROL BOLTS INSPECTION.

When maintenance actions require disconnecting or removing any components of the flight control system, the removed bolts should be inspected per the following procedures:

1. Clean bolts using cloth dampened with methyl-ethyl-ketone (MEK) (C-309) or equivalent.

2. Inspect bolts for thread damage, shank wear, and corrosion. Replace any bolt that has damaged threads, detectable shank wear, or exhibits corrosion pitting.

3. When installing bolts, perform the following:

a. Prior to installation of bolt, apply soft film corrosion preventive compound (C-104) to the bolt shanks only.

b. After bolts have been installed and nuts tightened and lockwired, coat the boltheads and nuts with hard film corrosion preventive compound (C-101).

#### NOTE

Operations in extreme environmental conditions which erode the hard film corrosion preventive compound may warrant periodic touchup of bolt external surfaces. Prior to touchup, visually check exposed surfaces of hardware for evidence of corrosion and fretting. Remove, clean, and inspect bolts as conditions warrant.

## COLLECTIVE PITCH CONTROLS

### 67-7. COLLECTIVE PITCH CONTROLS

The collective pitch control system consists of a jackshaft assembly with a control stick, push-pull tubes, bellcranks, and a hydraulic servo actuator connected to a control lever on the swashplate support. Movement of the control stick is transmitted through linkage and servo actuator to the main rotor pitch control mechanism, causing the helicopter to ascend or descend, or to remain at constant altitude. The servo actuator has an irreversible valve to reduce feedback, and to provide for use of controls in event of hydraulic boost failure.

For helicopters with dual controls (Figure 67-1), the copilot collective stick is installed at left of copilot seat. A fully functioning twist-grip throttle control is included in the copilot collective stick. A quick-disconnect feature permits rapid removal of the copilot collective stick. A spring pin assembly is provided to ensure positive engagement of the stick. Switches are not installed on the stick.

### 67-8. COLLECTIVE PITCH CONTROL RIGGING

#### NOTE

Rig collective pitch controls with hydraulic boost OFF.

#### NOTE

Ensure hydraulic boost switch is OFF when rigging of cyclic pitch control is performed.

1. Ensure all fixed length control tubes and links in collective pitch control systems are installed.
2. Adjust collective friction (paragraph 67-25).

#### NOTE

AN5 rigging bolt (3, Figure 67-2) is inserted into position, not threaded.

3. Center cyclic stick by adjusting cyclic friction adjuster (1) to minimum and install AN5 rigging bolt (3) at base of pilot cyclic stick pivot support (2).

4. Tighten friction adjuster (1) to keep cyclic stick from moving. Remove AN5 rigging bolt (3).

#### NOTE

Link assemblies 206-001-159-005/-007 are adjustable. Link assembly 206-001-204-001 is not adjustable.

5. Remove cotter pin (2, Figure 67-3), nut (3), washers (4), and bolt (5) and disconnect control tube (1) from bellcrank (49). Ensure link assembly (38) is adjusted to 2.25 inches (57.15 mm).

6. Position pilot collective stick (39) 2.40 inches (60.96 mm) above forward edge of seat structure (50) (Detail D). Remove upholstery as required to access seat structure. Tighten friction to keep pilot collective stick in this position.

7. Position bellcrank (49) against stop on cylinder support assembly (51), as shown in Detail B and Detail E.

#### WARNING

MAXIMUM OF 1.0 INCH (25.40 MM)  
EXPOSED THREADS ON ALL  
ADJUSTABLE ROD ENDS.

8. Adjust control tube (1) to fit, to bellcrank (49) with bolt (5), two washers (4), and nut (3). Install cotter pin (2).

9. Hold pilot collective stick (39) against the low pitch stop and bottom the servo actuator valve shown in View C.

10. Remove cotter pin (24), nut (28), washers (29), and bolt (30) and disconnect control tube (2) from collective lever assembly (52).

11. Position collective lever assembly to position shown in View A.

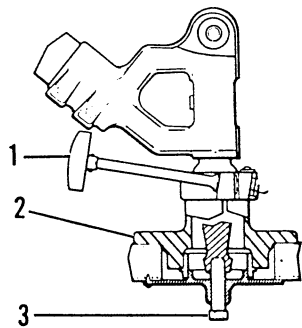
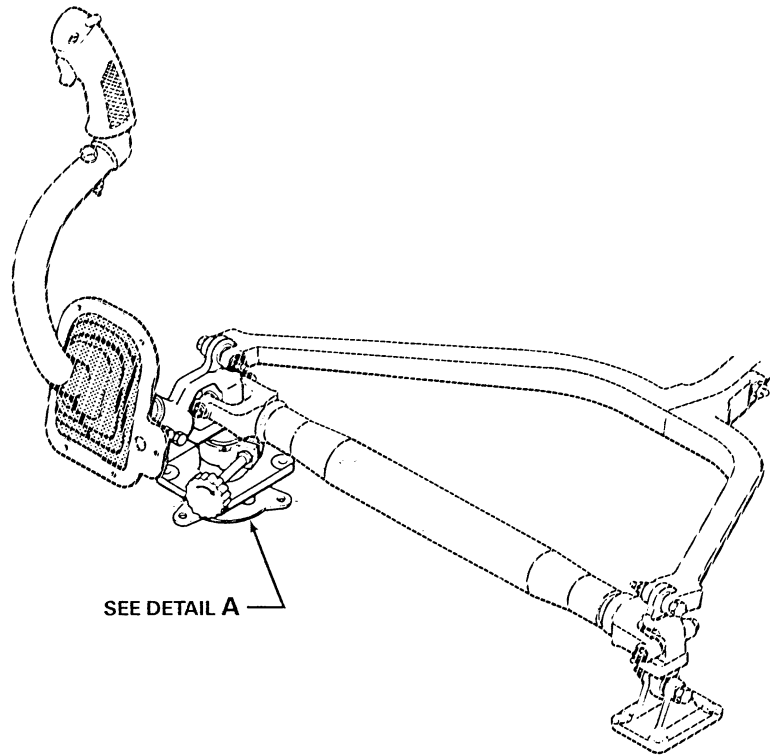
12. Adjust control tube (2) to fit. Connect control tube to collective lever assembly (52) with bolt (30), two washers (29), and nut (28). Install cotter pin (27).

13. Refer to [Chapter 62](#) for swashplate to main rotor blade pitch link rigging instructions. Refer to [paragraph 67-37](#), step 7, for clearance check between pivot sleeve and inner ring after collective and cyclic rigging is complete.



ENSURE AN5 RIGGING BOLT  
INSTALLED IN STEP 3 IS REMOVED.

14. Check rigging of droop compensator controls ([Chapter 76](#)).

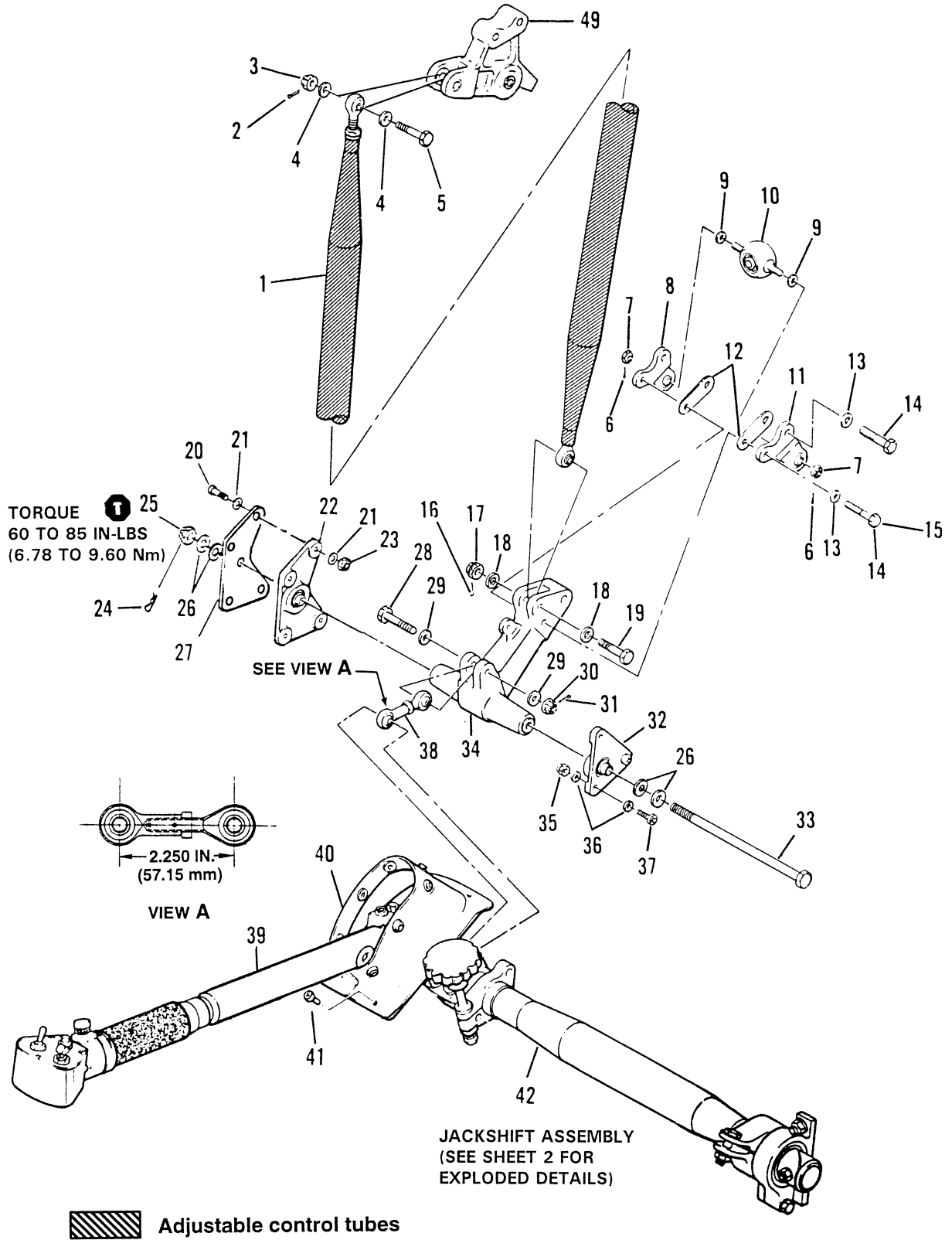


- 1. Cyclic friction adjuster
- 2. Pivot support
- 3. AN5 rigging bolt

DETAIL A

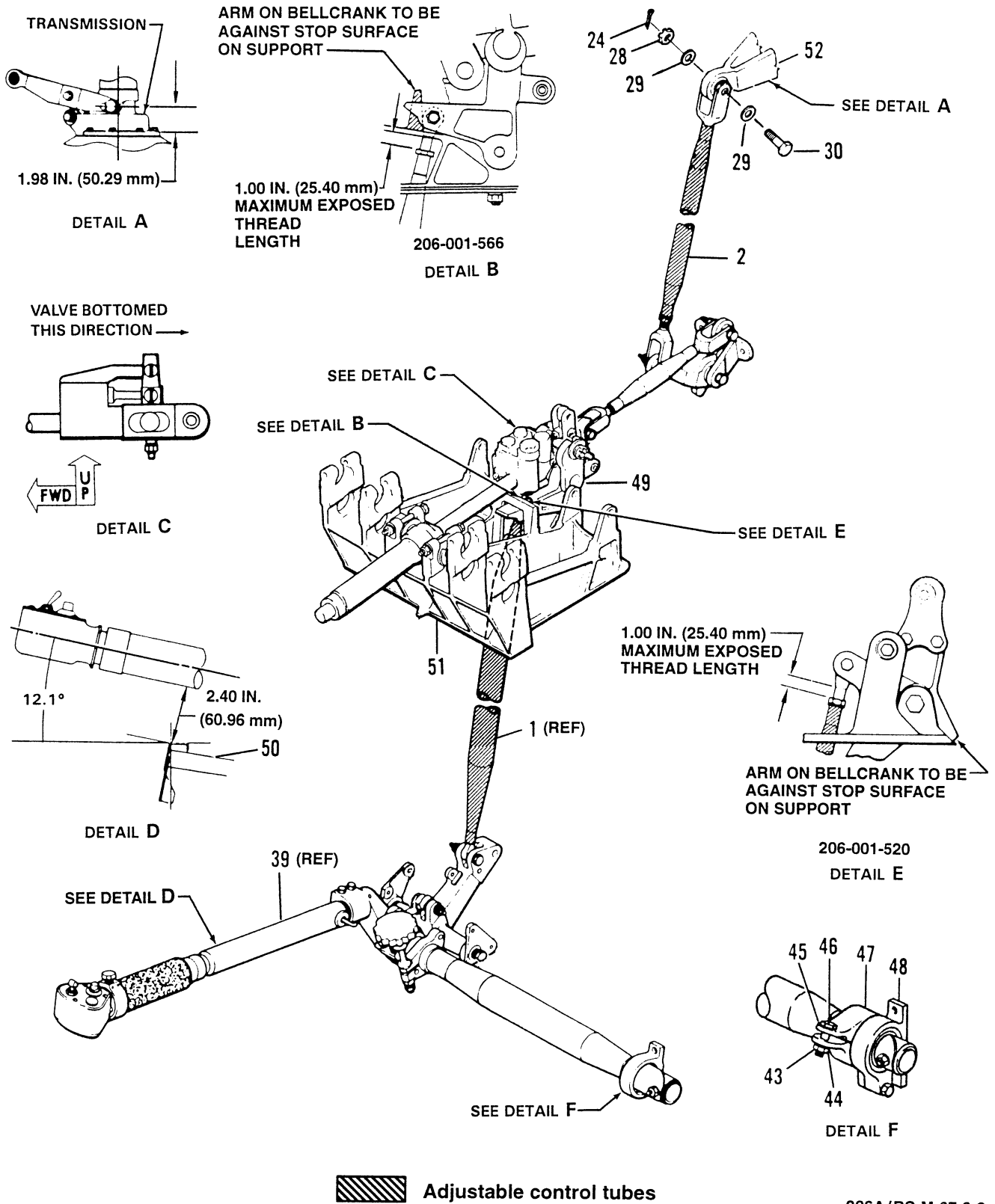
**Figure 67-2. Cyclic Control Rigging**





206A/BS-M-67-3-1

Figure 67-3. Collective control rigging (Sheet 1 of 3)



206A/BS-M-67-3-2

Figure 67-3. Collective control rigging (Sheet 2)



|                      |                      |                               |
|----------------------|----------------------|-------------------------------|
| 1. Control tube      | 19. Bolt             | 37. Screw                     |
| 2. Cotter pin        | 20. Bolt             | 38. Link assembly             |
| 3. Nut               | 21. Washer           | 39. Pilot collective stick    |
| 4. Washer            | 22. Support assembly | 40. Cover                     |
| 5. Bolt              | 23. Nut              | 41. Screw                     |
| 6. Cotter pin        | 24. Cotter pin       | 42. Jackshaft assembly        |
| 7. Nut               | 25. Nut              | 43. Nut                       |
| 8. Plate assembly    | 26. Washer           | 44. Washer                    |
| 9. Washer            | 27. Shim             | 45. Washer                    |
| 10. Trunnion bearing | 28. Bolt             | 46. Bolt                      |
| 11. Plate assembly   | 29. Washer           | 47. Clamp assembly            |
| 12. Shim             | 30. Nut              | 48. Support assembly          |
| 13. Washer           | 31. Cotter pin       | 49. Bellcrank                 |
| 14. Bolt             | 32. Support assembly | 50. Seat                      |
| 15. Lockwire         | 33. Bolt             | 51. Cylinder support assembly |
| 16. Cotter pin       | 34. Lever assembly   | 52. Collective lever assembly |
| 17. Nut              | 35. Nut              |                               |
| 18. Washer           | 36. Washer           |                               |

206A/BS-M-67-3-3

Figure 67-3. Collective control rigging (Sheet 3)



## PILOT COLLECTIVE STICK

### 67-9. PILOT COLLECTIVE STICK

The pilot collective stick is installed at left of pilot seat. Stick extends upward and forward through a flexible cover. Stick incorporates a twist grip for operation of gas producer controls. Switches are installed on top of stick for starter, governor, RPM, landing light, and idle stop released.

### 67-10. PILOT COLLECTIVE STICK — REMOVAL

1. Remove screws (1, [Figure 67-4](#)) and cover (2) from pilot collective stick (7).
2. Disconnect electrical cable from terminal block (TB4) ([Chapter 96](#)).
3. Remove nuts (3), clamp (4), bolts (5), and washers (6) that secure pilot collective stick (7) in elbow (8). Loosen screw (9) in friction clamp (10). Remove pin from elbow (8).
4. Remove pilot collective stick (7) from elbow (8) of jackshaft assembly (12).

### 67-11. PILOT COLLECTIVE STICK — INSTALLATION

1. Install pilot collective stick (7, [Figure 67-4](#)) in elbow (8). Engage throttle tube of pilot collective stick

with throttle arm (13) and friction clamp (10). Install pin (11) in elbow (8).

2. Install bolts (5) with washers (6) under bolt heads. Position clamp (4) around electrical cable and install on forward bolt. Install nut (3). Install washer and nut on aft bolt. Adjust throttle friction ([paragraph 67-12](#)).

3. Connect electrical cable to terminal block (TB4) ([Chapter 96](#)).

4. Install cover (2) with screws (1).

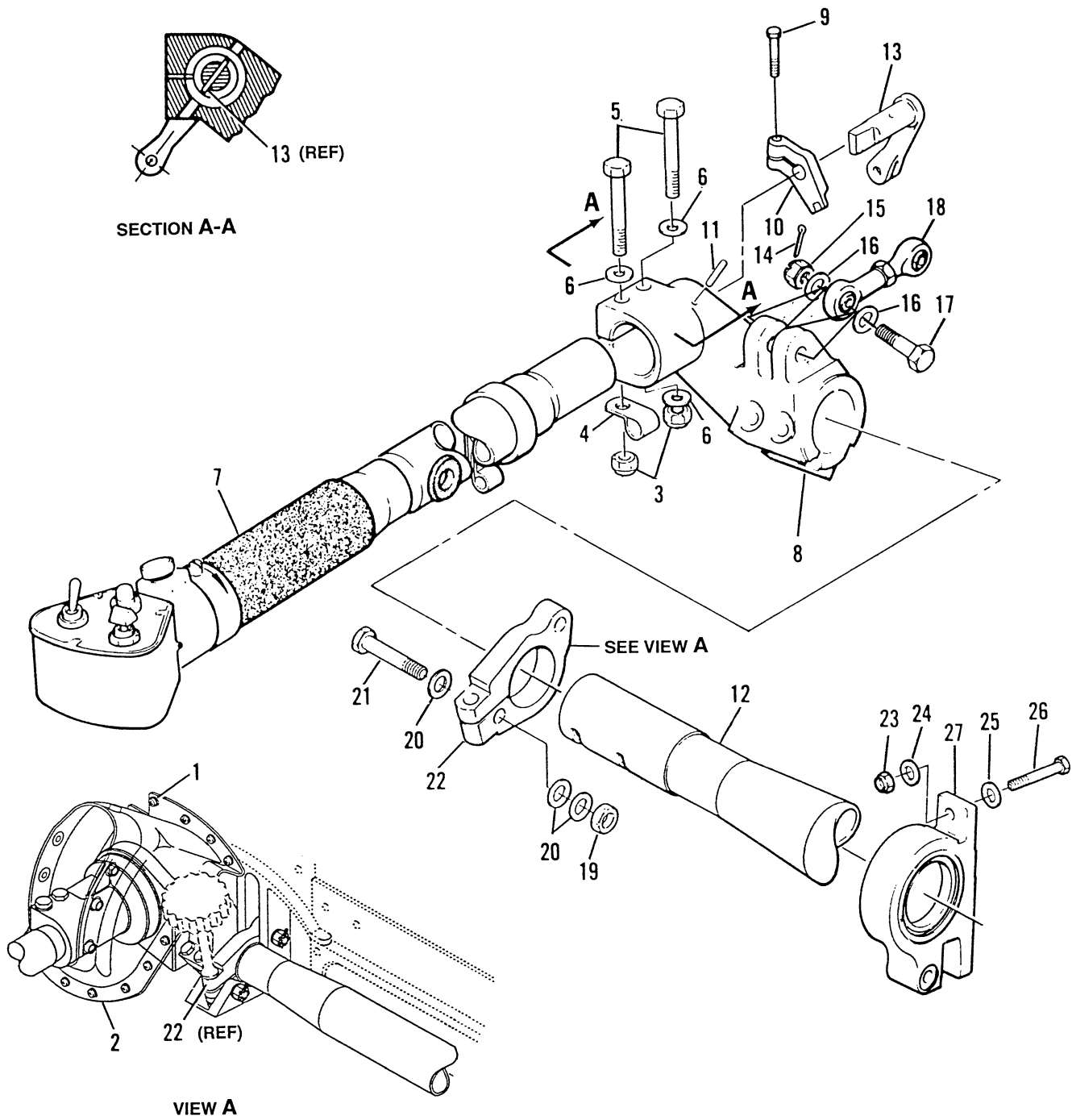
### 67-12. THROTTLE FRICTION ADJUSTMENT

1. Disconnect throttle control cable from throttle arm ([Chapter 76](#)).
2. Adjust screw (9, [Figure 67-4](#)) in friction clamp (10) to obtain 0.75 to 1.50 inch-pounds (0.085 to 0.169 Nm) of torque measured at the throttle twist grip.

#### NOTE

Lockwire is not required on screw (9) with self-locking threads.

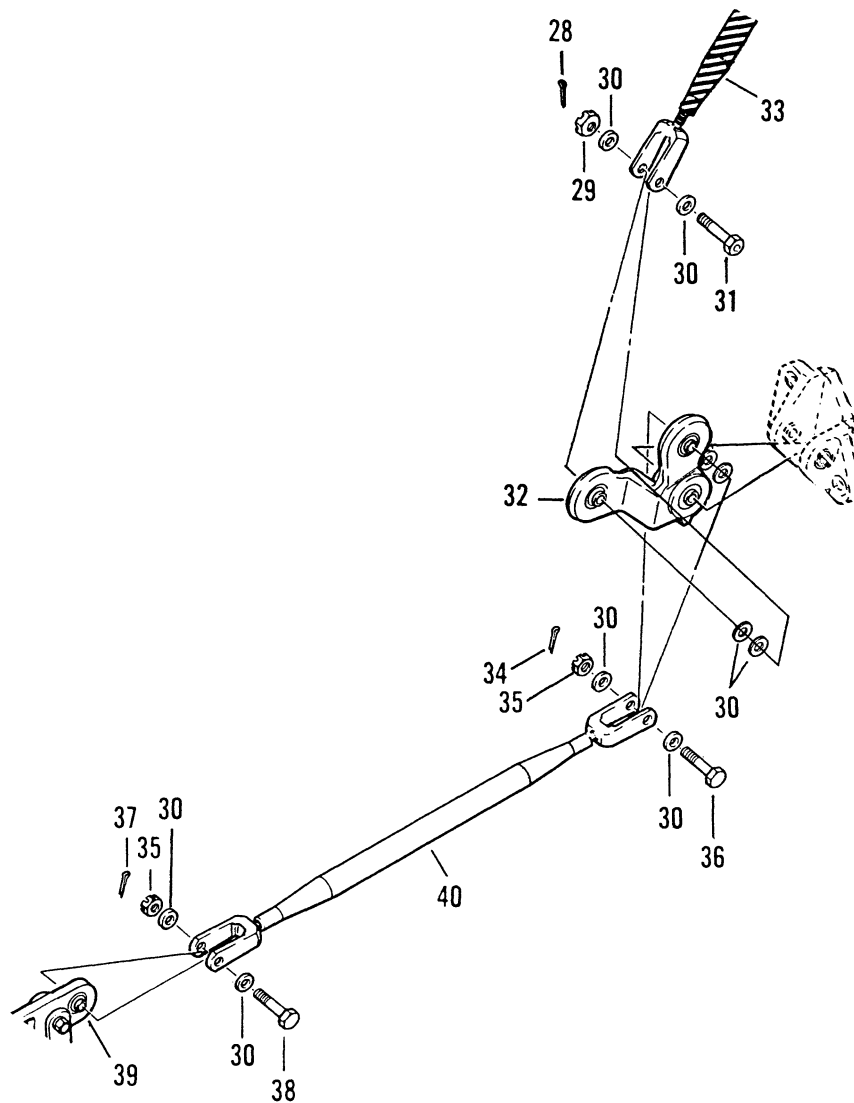
3. Secure screw (9) to friction clamp (10) with lockwire. Connect throttle control cable to throttle arm (13).



HELICOPTERS S/N 2798 AND SUBSEQUENT

206A/BS-M-67-4-1

Figure 67-4. Collective pitch control system (Sheet 1 of 2)



- |                     |                        |                |                            |
|---------------------|------------------------|----------------|----------------------------|
| 1. Screw            | 11. Pin                | 21. Bolt       | 31. Bolt                   |
| 2. Cover            | 12. Jackshaft assembly | 22. Bearing    | 32. Bellcrank              |
| 3. Nut              | 13. Throttle Arm       | 23. Nut        | 33. Control tube           |
| 4. Clamp            | 14. Cotter pin         | 24. Washer     | 34. Cotter pin             |
| 5. Bolt             | 15. Nut                | 25. Washer     | 35. Nuts                   |
| 6. Washer           | 16. Washer             | 26. Bolt       | 36. Bolt                   |
| 7. Collective stick | 17. Bolt               | 27. Support    | 37. Cotter pin             |
| 8. Elbow assembly   | 18. Link assembly      | 28. Cotter pin | 38. Bolt                   |
| 9. Screw            | 19. Nut                | 29. Nut        | 39. Servo actuator         |
| 10. Clamp           | 20. Washer             | 30. Washer     | 40. Extension control tube |

206A/BS-M-67-4-2

Figure 67-4. Collective pitch control system (Sheet 2)



## COPILOT COLLECTIVE STICK

### 67-13. COPILOT COLLECTIVE STICK.

The copilot collective stick is installed at left of copilot seat. Stick extends upward and forward through a flexible boot and incorporates a twist grip for operation of gas producer controls. No switches are installed on copilot collective stick.

### 67-14. REMOVAL.

1. Remove copilot collective stick (20, figure 67-5).
2. Unsnap and remove boot (19).
3. Using a plastic scraper, remove panel (18) or remove screw (21), washer (22), and cover (23).
4. Remove cotter pin (9), nut (8), washer (7), bolt (12), and disconnect throttle arm (6).
5. Using a drift, remove pin (5).
6. Remove tube assembly (11) at right side (Chapter 76).

#### NOTE

If helicopter is to be flown with tube assembly removed, ensure gas producer controls are installed and rigged (Chapter 76).

7. Remove nuts (14), bolts (13 and 17), and washers (15 and 16). Apply heat to soften zinc chromate primer (C-201). Remove elbow (4) from jackshaft (1).
8. Remove spacer (2) and shim (3).

### 67-15. DISASSEMBLY.

1. Remove screw (24, figure 67-5).
2. Remove grip (25).
3. Remove tube (26).
4. Remove bushing (31).

### 67-16. INSPECTION AND REPAIR.

#### NOTE

For detailed repair procedures, refer to BHT-206A/B-SERIES-CR&O manual.

1. Inspect grip (25, figure 67-5) for damage to cork surface, plug (30), and/or other damage.
2. Inspect screw (24) for stripped threads, damaged slot, broken point, and/or other damage.
3. Inspect tube (26) for bending, cracks, damage to slot, and/or other damage.
4. Inspect tube (29) for bent or damaged pin assembly (28), stripped or cracked nut (27), and/or other bending, cracks, and damage.

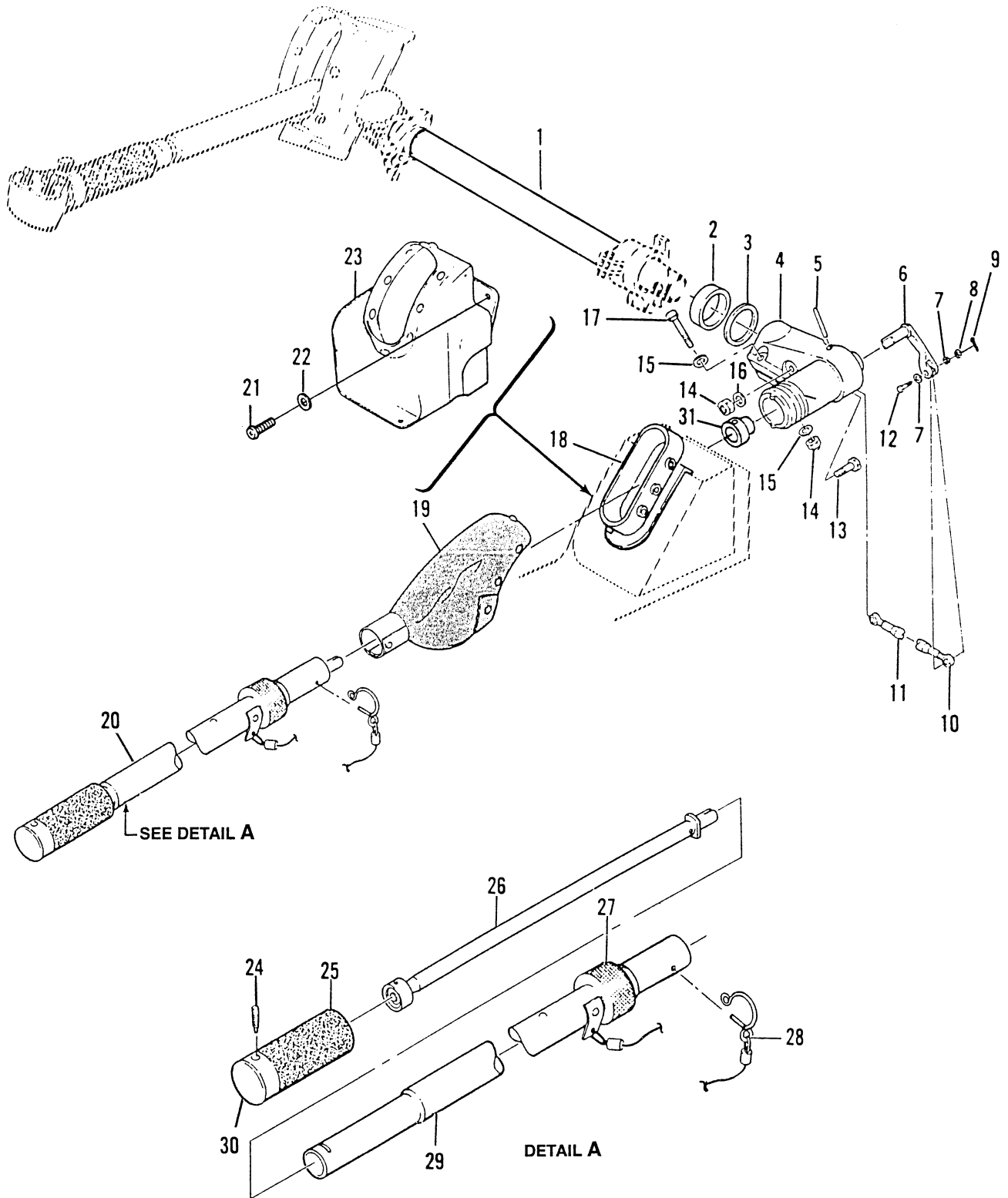
#### NOTE

If necessary, remove rivets, pin assembly (28) and nut (27).

5. Inspect tube assembly (11) for mechanical and corrosion damage and joint wear.
6. Inspect throttle arm (6) for cracks and/or other damage.
7. Inspect elbow (4) for cracks, stripped threads, and/or other damage.
8. Inspect panel (18) for missing or damaged snap fastener(s), cracks, debonding, and/or other damage.
9. Inspect boot (19) for missing or damaged snap fastener(s), tears, and/or other damage.
10. Inspect spacer (2) and shim (3) for cracks and/or other damage.

### 67-17. ASSEMBLY.

1. Place grip (25, detail A, figure 67-5) on tube (26).
2. Start screw (24) into grip (25) and tube (26).
3. Insert tube (26) with grip (25) into tube (29). Tighten screw (24) to engage slot in tube (29).
4. Cover head of screw (24) with adhesive (C-308).



HELICOPTERS S/N 414 AND SUBSEQUENT

206A/BS-M-67-5-1

Figure 67-5. Copilot collective stick (Sheet 1 of 2)



- |                   |                              |                  |
|-------------------|------------------------------|------------------|
| 1. Jackshaft      | 12. Bolt                     | 22. Washer       |
| 2. Spacer         | 13. Bolt                     | 23. Cover        |
| 3. Shim           | 14. Nut                      | 24. Screw        |
| 4. Elbow          | 15. Washer                   | 25. Grip         |
| 5. Pin            | 16. Washer                   | 26. Tube         |
| 6. Throttle arm   | 17. Bolt                     | 27. Nut          |
| 7. Washer         | 18. Panel                    | 28. Pin assembly |
| 8. Nut            | 19. Boot                     | 29. Tube         |
| 9. Cotter pin     | 20. Copilot collective stick | 30. Plug         |
| 10. Bearing       | 21. Screw                    | 31. Bushing      |
| 11. Tube assembly |                              |                  |

**NOTE**

Pin assembly (28) is attached to tube (29) with MS20600MP4 rivets.

206A/BS-M-67-5-2

**Figure 67-5. Copilot collective stick (Sheet 2)****67-18. INSTALLATION.**

1. Peel and install shim (3, figure 67-5) for a maximum total gap between spacer (2) and elbow (4) of 0.006 inch (0.15 mm). Install shim and spacer on jackshaft (1).
2. Apply a thin coating of zinc chromate primer (C-201) to faying surface of elbow (4) and jackshaft (1). Install elbow on jackshaft using bolts (13 and 17), washers (15 and 16), nuts (14), and bushing (31).
3. Install tube assembly (11) at right side (Chapter 76).
4. Install bushing (31), throttle arm (6) and secure with pin (5).
5. Connect throttle arm (6) using bolt (12), washers (7), nut (8), and cotter pin (9).
6. Install panel (18) or cover (23) as follows:

a. Clean faying surface of panel (18) by sanding lightly with 400 to 600 grit abrasive paper.

b. Remove sanding residue using a cloth and water. Dry surfaces using a clean cloth.

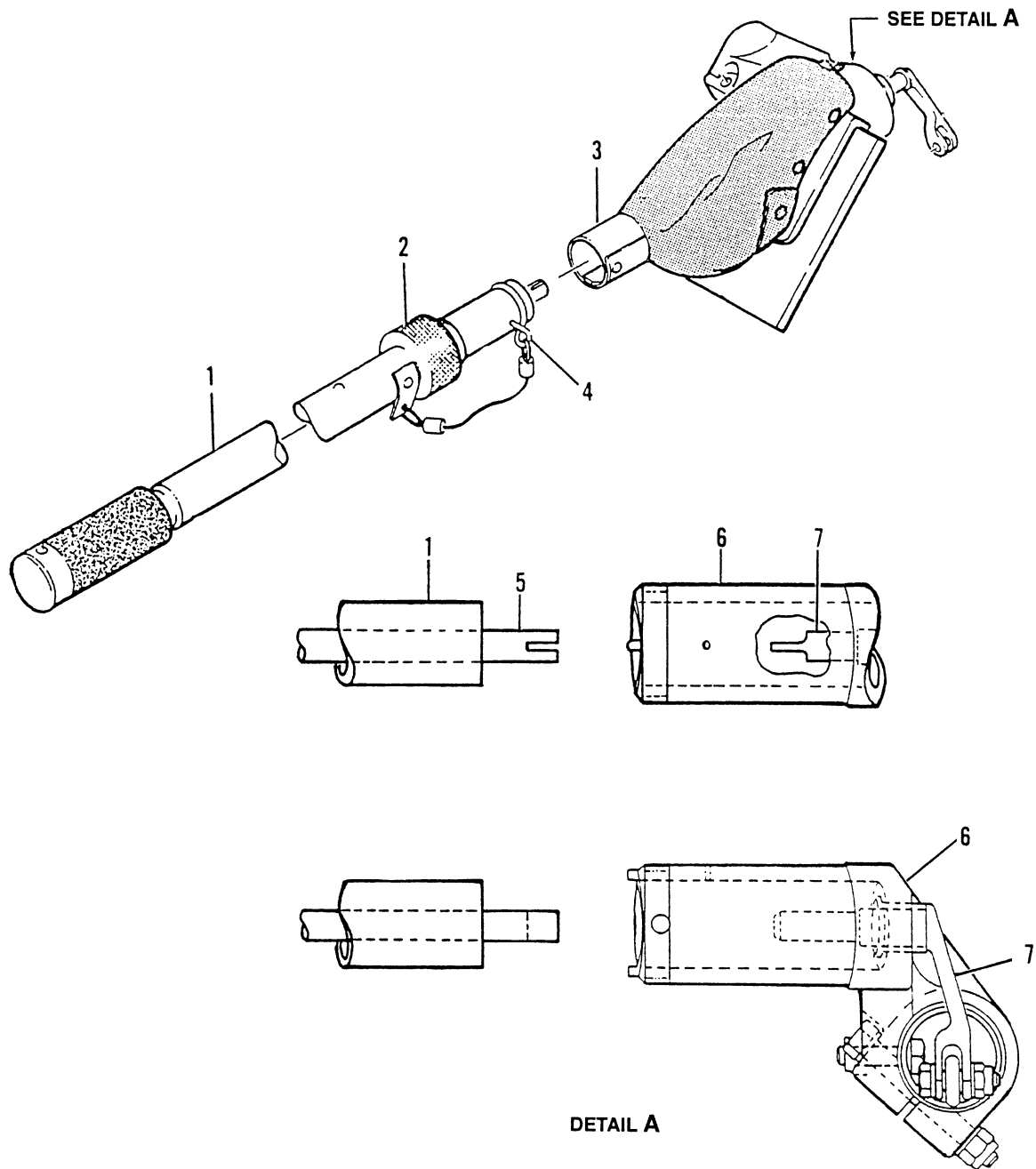
**NOTE**

Do not apply corrosion preventive compound to screws (21).

- c. Bond panel (18) in place using adhesive (C-301) or install cover (23) using screws (21) and washers (22).
7. Snap boot (19) in place.
8. Install copilot collective stick (20) (paragraph 67-16).
9. Check collective pitch control rigging (paragraph 67-8).

**67-19. COPILOT COLLECTIVE STICK QUICK DISCONNECT.****67-20. REMOVAL.**

1. Disengage pin assembly (4, figure 67-6).
2. Grasp and turn nut (2) to disengage threads.
3. Remove copilot collective stick (1) from boot assembly (3) and elbow (6).



- 1. Copilot collective stick
- 2. Nut
- 3. Boot assembly
- 4. Pin assembly
- 5. Tube assembly
- 6. Elbow
- 7. Throttle arm

206A/BS-M-67-6

Figure 67-6. Copilot collective stick quick-disconnect

**67-21. INSTALLATION.**

- 1.** Insert copilot collective stick (1, figure 67-6) through boot assembly (3) into elbow (6).
- 2.** Ensure blade of throttle arm (7) engages in slot of tube assembly (5).
- 3.** Grasp and turn nut (2) to engage threads on elbow (6). Tighten nut.
- 4.** Engage pin assembly (4).



## OTHER COMPONENTS OF COLLECTIVE CONTROLS

### 67-22. COLLECTIVE JACKSHAFT.

The collective jackshaft provides a mounting point for the collective stick. An adjustable friction bearing mounted on the jackshaft allows pilot to adjust friction for his own requirements. A minimum friction adjustment clamp, located at the left end of the jackshaft, ensures that the collective stick will always have a preset minimum friction.

### 67-23. REMOVAL.

1. Remove pilot collective stick (paragraph 67-10).
2. Remove copilot collective stick (paragraph 67-18).
3. Remove pilot and copilot seat and center panel (Chapter 25).
4. Disconnect fuel control linkage from throttle arm (13, figure 67-4).
5. Remove cotter pin (14), nut (15), washers (16), and bolt (17) and disconnect link assembly (18) from elbow (8).
6. Remove nut (19), washers (20), and bolt (21) from friction bearing (22).
7. Remove nut (23), washers (24 and 25), and bolt (26) from support assembly (27).
8. Remove jackshaft assembly (12).
9. Disassemble jackshaft as required for inspection.

#### NOTE

For detailed inspection and repair procedures, refer to BHT-206A/B-SERIES-CR&O manual.

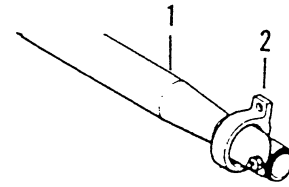
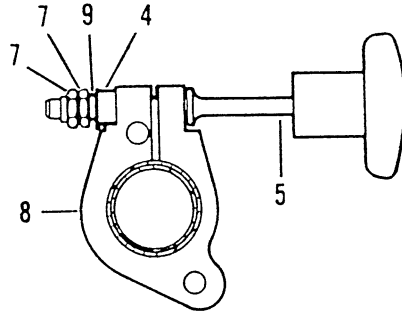
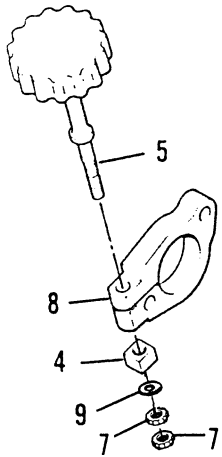
### 67-24. INSTALLATION.

1. Position jackshaft assembly (12, figure 67-4) in airframe.
2. Attach support assembly (27) to airframe using bolt (26), washers (24 and 25), and nut (23). Tighten nut.
3. Attach friction bearing (22) to airframe using bolt (21), washers (20), and nut (19).
4. Connect link assembly (18) to elbow (8) using bolt (17), washers (16), nut (15), and cotter pin (14).

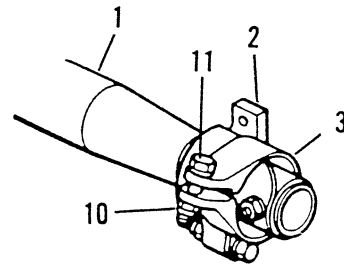
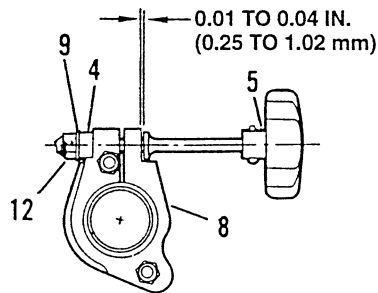
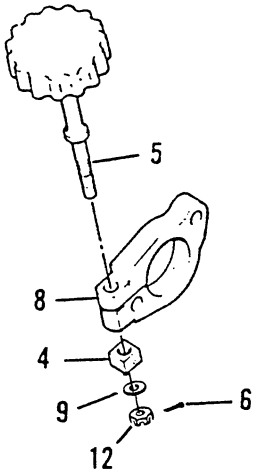
5. Connect fuel control linkage to throttle arm (13) (Chapter 76).
6. Install copilot collective stick (paragraph 67-21).
7. Install pilot collective stick (paragraph 67-11).
8. Check collective pitch control rigging (paragraph 67-8).
9. Check collective minimum friction adjustment (paragraph 67-25).
10. Check gas producer control rigging (Chapter 76).

### 67-25. COLLECTIVE FRICTION ADJUSTMENT.

1. Remove pilot and copilot seats to expose collective control friction mechanism located at pilot seat and clamp assembly located below copilot seat.
2. Inspect left outboard end of jackshaft assembly (1, figure 67-7) for the following:
  - a. Helicopters S/N 4 through 203 contain only jackshaft support (2). Collective friction adjustment for this configuration shall be accomplished in accordance with step 3.
  - b. Helicopters S/N 204 and subsequent contain jackshaft assembly (1) and support (2) and clamp assembly (3). Collective friction adjustment for this configuration shall be accomplished in accordance with step 4.
3. Accomplish friction adjustment on helicopters S/N 4 through 203 as follows:
  - a. Secure pilot cyclic stick in neutral position.
  - b. Completely relieve pilot collective friction adjuster (5).
  - c. Pull pilot collective stick up 1.0 to 2.0 inches (25.40 to 50.80 mm) from low collective rigged position.



HELICOPTER S/N 4 THROUGH 203



HELICOPTER S/N 204 AND SUBSEQUENT

- |                       |            |
|-----------------------|------------|
| 1. Jackshaft assembly | 7. Locknut |
| 2. Support            | 8. Bearing |
| 3. Clamp assembly     | 9. Washer  |
| 4. Square nut         | 10. Nut    |
| 5. Friction adjuster  | 11. Bolt   |
| 6. Cotter pin         | 12. Nut    |

206A/BS-M-67-7

Figure 67-7. Collective friction adjustment

**NOTE**

With hydraulic boost off, there is approximately 0.43 inch (10.92 mm) freeplay in the pilot collective stick that can be related to hydraulic servo actuator valve travel. Adjustment of the collective minimum friction will be accomplished within this freeplay band.

**d.** Adjust square nut (4) on friction adjuster (5) until a breakout force of 3 to 5 pounds (13.34 to 22.24 N) is measured at center of the throttle grip on the pilot collective stick.

**e.** Install seats and any additional covers that were removed.

**4.** Accomplish friction adjustment on helicopters S/N 204 and subsequent as follows:

**a.** Position pilot collective stick in the normal low pitch position.

**b.** Remove cotter pin (6, figure 67-7), nut (12), washer (9) and square nut (4) by turning friction adjuster (5) counterclockwise.



**DO NOT ALLOW GREASE TO CONTACT BEARING FRICTION SURFACE.**

**c.** Remove friction adjuster (5) from bearing (8). Clean adjuster shaft and threads with MEK (C-309) or equivalent solvent. Wipe dry and apply a coating of grease (C-001) to adjuster shaft and threads.

**d.** Position square nut (4) against bearing (8). Insert friction adjuster (5) into bearing and thread through square nut (4) by turning friction adjuster clockwise.

**e.** With square nut (4) positioned against bearing (8), turn friction adjuster (5) until a clearance of 0.01 to 0.04 inch (0.25 to 1.02 mm) is obtained between shoulder on the friction adjuster shaft and mating surface of bearing.

**f.** With square nut (4) against bearing (8), hold friction adjuster (5) to maintain 0.01 to 0.04 inch (0.25 to 1.02 mm) clearance. Install washer (9) and nut (12) against square nut. Secure with cotter pin (6).

**g.** With an auxiliary hydraulic unit connected and the hydraulic boost system operating, completely relieve adjustment friction. Check for 3 to 5 pounds (13.34 to 22.24 N) breakout force, measured at the center of the pilot throttle grip on pilot collective stick (9). Adjust nut (10) of clamp assembly (3) as required to obtain 3 to 5-pound (13.34 to 22.24 N) breakout force.

**5.** Accomplish friction adjustment with hydraulic boost off on helicopters S/N 204 and subsequent as follows:

**a.** Secure pilot cyclic stick in neutral position.

**b.** Completely relieve pilot collective friction adjuster (5) and minimum friction clamp assembly (3) under copilot seat.

**NOTE**

With hydraulic boost off, there is approximately 0.43 inch (10.92 mm) freeplay in the pilot collective stick that can be related to hydraulic servo actuator valve travel. Adjustment of the collective minimum friction will be accomplished within this freeplay band.

**c.** Pull pilot collective stick up 1.0 to 2.0 inches (25.40 to 50.80 mm) from low collective rigged position.

**d.** Adjust nut (10) on clamp assembly (3) until a breakout force of 3 to 5 pounds (13.34 to 22.24 N) is measured at center of the throttle grip on the pilot collective stick.

**6.** Install seats and any additional covers that were removed.

**67-26. COLLECTIVE PITCH CONTROL LINKAGE.**

Linkage between collective pitch control jackshaft and collective lever on swashplate support consists of push-pull tubes, bellcranks, and hydraulic servo actuator assembly. Linkage from jackshaft assembly to servo actuator is shown in figure 67-3. Linkage from servo actuator to collective sleeve lever on swashplate support is shown in figure 67-3.

## 67-27. COLLECTIVE PITCH CONTROL LINKAGE — REMOVAL

### NOTE




Remove components as required for inspection and replacement (paragraph 67-28).

1. Remove cotter pin (2, [Figure 67-3](#)), nut (3), washers (4), and bolt (5) from bellcrank (49).
2. Remove cotter pin (16), nut (17), washers (18), and bolt (19). Remove control tube (1).
3. Remove cotter pin (6), nut (7), lockwire (15), bolts (14), and washers (13) from plate assembly (11) and shims (12).
4. Remove cotter pin (31), nut (30), washers (29), and bolt (28) from lever assembly (34) and link assembly (38).
5. Remove cotter pin (24), nut (25), washers (26), bolt (33), and lever assembly (34).
6. Remove cotter pin (24), nut (28), washers (29), and bolt (30) from collective lever assembly (52).
7. Remove cotter pin (14, [Figure 67-4](#)), nut (15), washers (16), and bolt (17). Remove link assembly (18) from elbow (8).
8. Remove cotter pin (28), nut (29), washers (30), and bolt (31) from bellcrank (32). Remove control tube (33).
9. Remove cotter pin (34), nuts (35), washers (30), and bolt (36) from bellcrank (32).
10. Remove cotter pin (37), nut (35), washers (30), and bolt (38) from servo actuator (39). Remove extension control tube (40).
11. Remove servo actuator (39) ([paragraph 67-77](#)).
12. Remove collective bellcrank and cover assembly from servo actuator support assembly.

## 67-28. COLLECTIVE PITCH CONTROL LINKAGE — INSPECTION AND REPAIR

1. Inspect and repair control tube (1, [Figure 67-3](#)) ([paragraph 67-3](#)).
2. Inspect and repair extension control tube (40, [Figure 67-4](#)) and control tube (33) ([paragraph 67-3](#)).
3. Inspect and repair link assembly (38, [Figure 67-3](#)) (BHT-206A/B-SERIES-CR&O).
4. Inspect and repair bellcrank (32, [Figure 67-4](#)) and lever assembly (34, [Figure 67-3](#)) ([paragraph 67-5](#)).

## 67-29. COLLECTIVE PITCH CONTROL LINKAGE — INSTALLATION


1. Install trunnion bearing (5, [Figure 67-8](#)) on lever assembly (11) as follows:
  - a. Position thin steel washers (4) on either side of trunnion bearing (5).
  - b. Install plate assemblies (3 and 6) on either side of trunnion bearing (5) and flush with washers (4).
  - c. Install nuts (2) .
  - d. Position assembled plate assemblies (3 and 6) and trunnion bearing (5) to mating holes of lever assembly (11) and temporarily install bolts (8 and 9) . Measure the gap between plate assemblies and lever. Adjust shims (1) to fill gap within 0.002 inch (0.05 mm). Peel shims equally within 0.009 inch (0.23 mm) on each side of lever. Install washers (7 and 10) and bolts . Secure bolt heads together with lockwire. Install nuts (2) and cotter pins (12).
  - e. Check trunnion bearing (5) along trunnion axis for a breakout torque of 24 inch-ounces (0.169 Nm).


### NOTE

Earlier helicopters had a shim (27, [Figure 27-3](#)) installed between support assembly (5, [Figure 67-9](#)) and the mounting structure. The shim is no longer required for future installation of the trunnion and lever (25).

2. Install support assemblies (5 and 19, [Figure 67-9](#)) to helicopter structure at bottom of tunnel as follows:



a. Secure support assembly (5) with four screws (3), washers (4), and nuts (6) .

b. Secure support assembly (19) with three screws (22), washers (23), and nuts (24) .

3. Install trunnion and lever (25) as follows:

a. Make sure bearing (7) is pushed all the way in the support assembly (5), against shoulder. Bearing will move toward trunnion and lever (25) during the application of the following steps.


b. Install trunnion and lever (25) between support assemblies (5 and 19) and temporarily install bolt (21) and washer (20).

c. Push the trunnion and lever (25) against support (19). Use washers (30) and fill the gap between the trunnion and lever and the support assembly (5).

**NOTE**

A maximum of two washers (30) can be installed on each side of the trunnion and lever (25), if required.

d. After the correct quantity of washers (30) has been established, install the trunnion and lever (25) with the same quantity of washers on each side.

e. Install bolt (21), washer (20), washer (1), and nut (2) .

**NOTE**


The outer race of the bearing (7) may protrude from the inboard face of the support assembly (5) a maximum of 0.060 inch (1.524 mm).

f. Determine if the outer race of the bearing (7) on support assembly (5) is correct (Detail A).

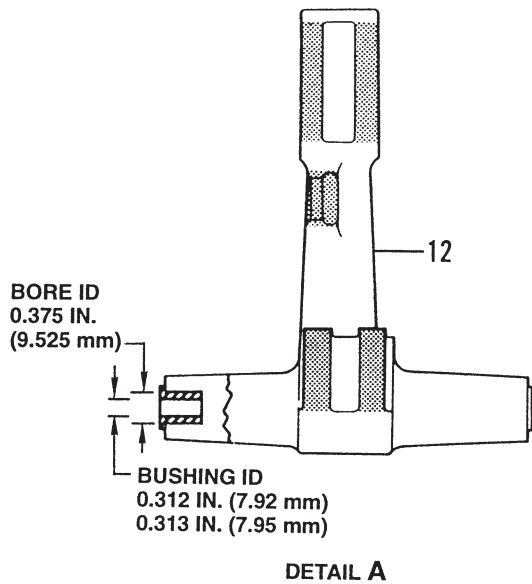
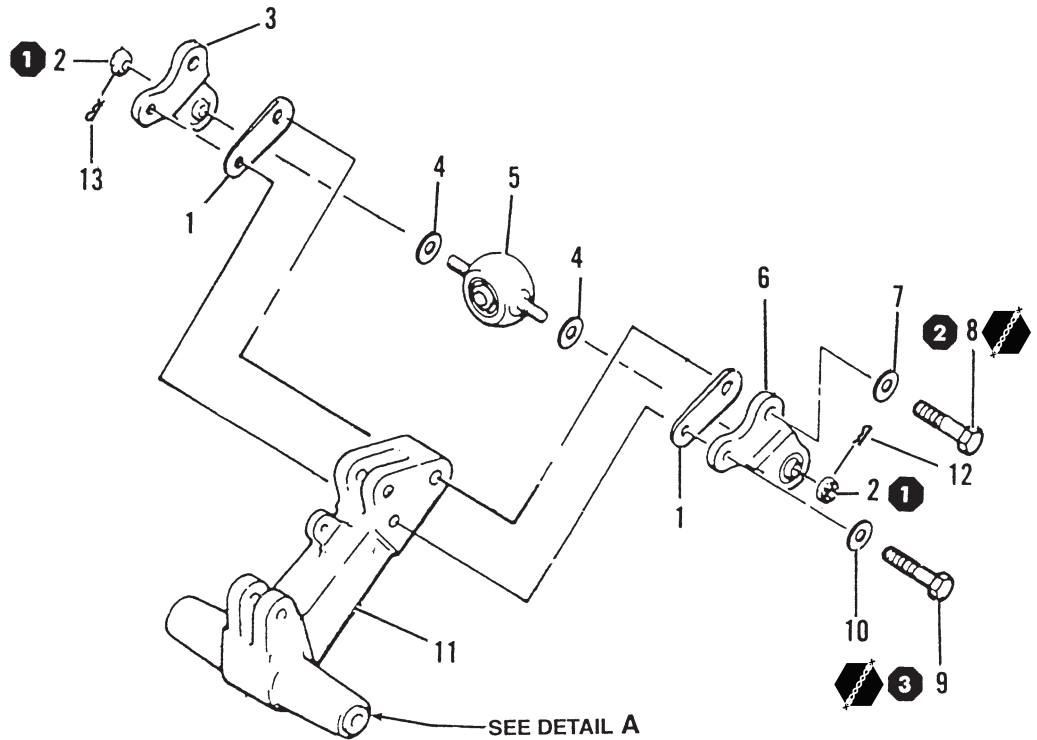
g. If condition in step f is met, install cotter pin (28).

4. Install control tube (12) on bellcrank (29) end using bolt (13), washers (11), and nut (10). Install cotter pin (28).

5. Install control tube (12) on trunnion and lever (25) using bolt (13), washers (11), and nut (10). Install cotter pin (28).

6. Install link (26) on trunnion and lever (25) using bolt (8), washer (9), and nut (18) . Install cotter pin (28).





- 1. Shim
- 2. Nut
- 3. Plate assembly
- 4. Thin steel washer
- 5. Trunnion bearing
- 6. Plate assembly
- 7. Aluminum washer
- 8. Bolt
- 9. Bolt
- 10. Aluminum washer
- 11. Lever assembly
- 12. Cotter pin

 LOCKWIRE (C-405)

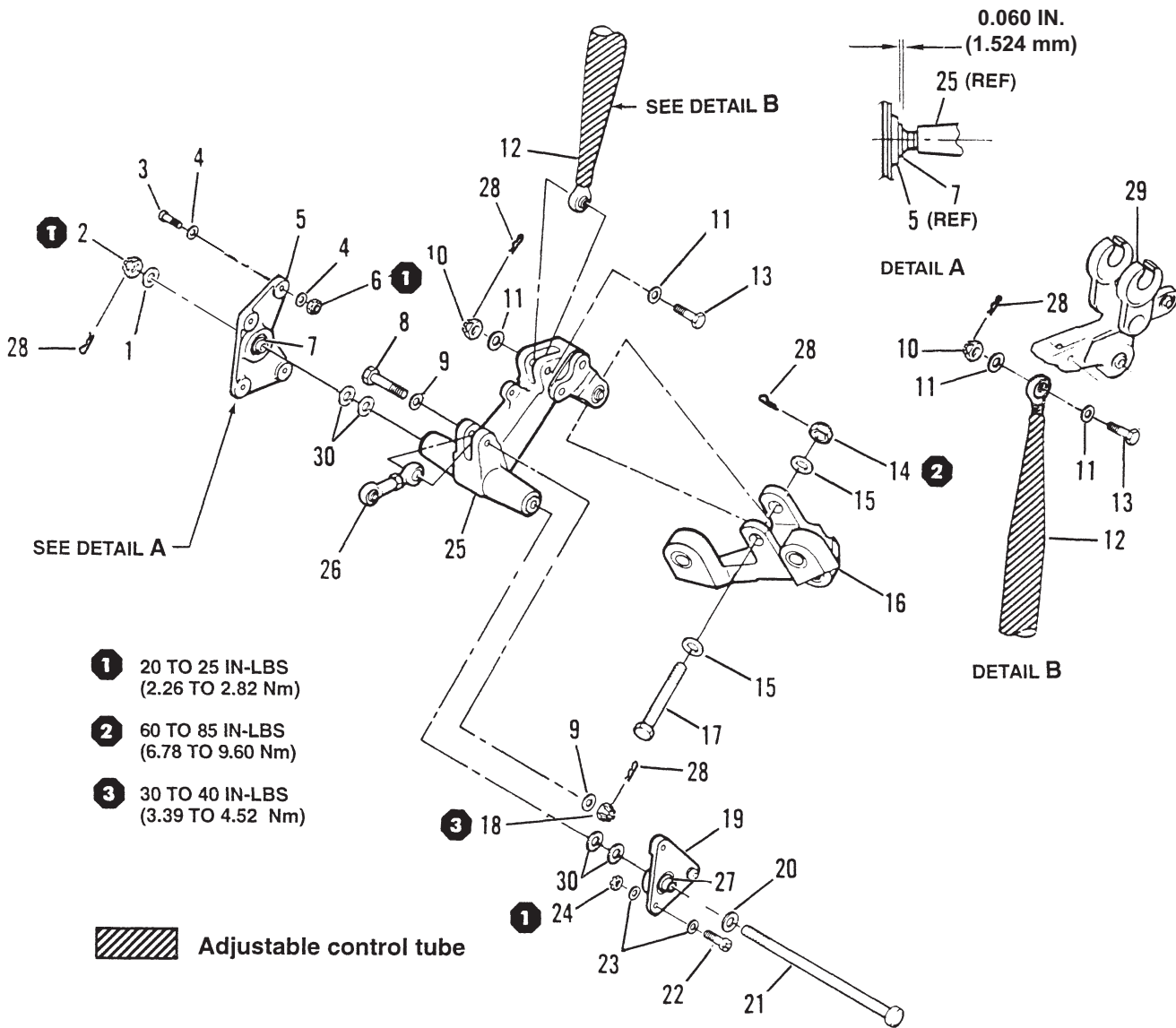
**1** 20 TO 35 IN-LBS  
(2.26 TO 3.95 Nm)

**2** 60 TO 85 IN-LBS  
(6.78 TO 9.60 Nm)

**3** 30 TO 40 IN-LBS  
(3.39 TO 4.52 Nm)

Figure 67-8. Trunnion and Lever Installation

206AB\_MM\_67\_0008




- 1** 20 TO 25 IN-LBS  
(2.26 TO 2.82 Nm)
- 2** 60 TO 85 IN-LBS  
(6.78 TO 9.60 Nm)
- 3** 30 TO 40 IN-LBS  
(3.39 TO 4.52 Nm)

Adjustable control tube

- |                     |                         |                        |
|---------------------|-------------------------|------------------------|
| 1. Washer           | 11. Washer              | 21. Bolt               |
| 2. Nut              | 12. Control tube        | 22. Screw              |
| 3. Screw            | 13. Bolt                | 23. Washer             |
| 4. Washer           | 14. Nut                 | 24. Nut                |
| 5. Support assembly | 15. Washer              | 25. Trunnion and lever |
| 6. Nut              | 16. Cyclic mixing lever | 26. Link               |
| 7. Bearing          | 17. Bolt                | 27. Bearing            |
| 8. Bolt             | 18. Nut                 | 28. Cotter pin         |
| 9. Washer           | 19. Support             | 29. Bellcrank          |
| 10. Nut             | 20. Washer              | 30. Washer             |

206AB\_MM\_67\_0009

Figure 67-9. Collective Trunnion and Lever

7. Install bolt (21), washer (20), and nut (2) on trunnion and lever (25) . Install cotter pin (28).
8. Install link assembly (18, [Figure 67-4](#)) in elbow assembly (8) using bolt (17), washer (16), and nut (15). Install cotter pin (14).
9. Install control tube (33) on bellcrank (32) using bolt (31), washer (30), and nut (29). Install cotter pin (28).
10. Install extension control tube (40) on bellcrank (32) using bolt (36), washer (30), and nut (35). Install cotter pin (34).
11. Install extension control tube (40) on servo actuator (39) using bolt (38), washer (30), and nut (35). Install cotter pin (37).
12. Install servo actuator (39) ([paragraph 67-79](#)).
13. Rig collective pitch controls ([paragraph 67-8](#)).

### **67-30. COLLECTIVE TRUNNION AND LEVER**

The collective trunnion and lever is installed between the collective jackshaft and control tube. The trunnion ties the collective controls to the mixing lever of the cyclic controls. When the collective stick is moved to change rotor pitch, the cyclic control servo actuators and linkage will move to maintain the swashplate in its relative plane.

#### **67-31. COLLECTIVE TRUNNION AND LEVER — REMOVAL**

1. Remove lower access door from aft side of center support column.
2. Remove cotter pin (28, [Figure 67-9](#)), nut (18), washer (9), and bolt (8) to separate link (26) from trunnion and lever (25).
3. Remove cotter pin (28), nut (10), washer (11), and bolt (13) to separate control tube (12) from trunnion and lever (25).
4. Remove cotter pin (28), nut (14), washer (15), and bolt (17) to separate cyclic mixing lever (16) from trunnion and lever (25).

5. Remove cotter pin (28), nut (2), and washer (1). Remove bolt (21) and washer (20).
6. Remove trunnion and lever (25).

#### **NOTE**

Earlier helicopters may have a shim (27, [Figure 27-3](#)) installed between support assembly (5, [Figure 67-9](#)) and the mounting structure. The shim must be removed.

7. Remove nut (6), washer (4), and screw (3), and remove support assembly (5).
8. Remove nut (24), washer (23), and screw (22), and remove support (19).

#### **67-32. COLLECTIVE TRUNNION AND LEVER — DISASSEMBLY**

1. Remove bolts (8 and 9, [Figure 67-8](#)) and aluminum washer (7 and 10).
2. Separate lever assembly (11) from plates (3 and 6) and retain shim (1) for use at assembly.
3. Remove cotter pins (12) and nuts (2), and separate plates (3 and 6) and thin steel washers (4) from trunnion bearing (5).

#### **67-33. COLLECTIVE TRUNNION AND LEVER — INSPECTION AND REPAIR**

1. Inspect plate assembly (3 and 6, [Figure 67-8](#)) for damage and worn or rough bearings. Replace plates if play in bearings exceeds 0.005 inch (0.13 mm) radial or 0.030 inch (0.76 mm) axial, or if bearings are rough.
2. Inspect trunnion bearing (5) for damage and worn or rough bearing. Replace trunnion bearing if play in bearing exceeds 0.006 inch (0.15 mm) radial or 0.030 inch (0.76 mm) axial, or if bearing is rough.
3. Inspect lever assembly (11). If bushings in ends of lever are elongated in excess of 0.005 inch (0.13 mm), replace as follows:
  - a. Support lever assembly (11) and press out old bushing.

b. Clean primer from bushing bore of lever assembly (11).

c. Coat new bushings with epoxy polyamide primer (C-204). Press bushings into lever while primer is still wet.

d. Line ream bushings 0.312 to 0.313 inch (7.92 to 7.95 mm).


4. Inspect support assemblies (5 and 19, Figure 67-9) for damage and worn or rough bearings. Replace bearings if play exceeds 0.013 inch (0.30 mm) radial or 0.030 inch (0.76 mm) axial.

#### 67-34. COLLECTIVE TRUNNION AND LEVER — ASSEMBLY

1. Position trunnion bearing (5, Figure 67-8) with thin steel washers (4) on each side between plates (3 and 6).

2. Install nuts (2) . Install cotter pins (12).

3. Position plates (3 and 6) over end of lever assembly (11) with shim (1) under each side. Adjust shim as necessary for a maximum total gap of 0.002 inch (0.05 mm). Shim must be equal in thickness within 0.009 inch (0.23 mm).

4. Install bolt (9) with aluminum washer (10), and bolt (8) with aluminum washer (7) .

5. Check trunnion bearing (5) for a maximum breakout torque of 24 inch-ounces (0.169 Nm) along its mounting axis. If breakout torque is excessive, ensure that shims (1) are of correct thickness. If shims are correct, check bearings in plates (3 and 6) for roughness.


6. Secure heads of bolts (8 and 9) together with lockwire.


#### 67-35. COLLECTIVE TRUNNION AND LEVER — INSTALLATION

##### NOTE

Earlier helicopters had a shim (27, Figure 27-3) installed between support assembly (5, Figure 67-9) and the mounting structure. The shim is no longer

required for future installation of trunnion and lever (25).

1. Position support assembly (5, Figure 67-9) to mounting structure and install four screws (3) with washers (4) and nuts (6) .

2. Position support (19) to mounting structure and install three screws (22) with washers (23) and nuts (24) .

3. Install trunnion and lever (25) as follows:

a. Make sure bearing (7) is pushed all the way in the support assembly (5), against shoulder. Bearing will move toward trunnion and lever (25) during the application of the following steps.


b. Install trunnion and lever (25) between support assemblies (5 and 19) and temporarily install bolt (21) and washer (20).

c. Push the trunnion and lever (25) against support (19). Use washers (30) and fill the gap between the trunnion and lever and the support assembly (5).

##### NOTE

A maximum of two washers (30) can be installed on each side of the trunnion and lever (25), if required.

d. After the correct quantity of washers (30) has been established, install the trunnion and lever (25) with the same quantity of washers on each side.



e. Install bolt (21), washer (20), washer (1), and nut (2) .

##### NOTE

The outer race of the bearing (7) may protrude from the inboard face of the support assembly (5) a maximum of 0.060 inch (1.524 mm).

f. Determine if the outer race of the bearing (7) on support assembly (5) is correct (Detail A).

g. If condition in step f is met, install cotter pin (28).

4. Install bolt (17) with washers (15) and nut (14) to connect trunnion and lever (25) to cyclic mixing lever (16) . Install cotter pin (28).
5. Connect link (26) to clevis of trunnion and lever (25) with bolt (8), washers (9), and nut (18) . Install cotter pin (28).
6. Check collective control rigging ([paragraph 67-8](#)).
7. Install lower access door on center support column.





## CYCLIC CONTROLS

### 67-36. CYCLIC CONTROLS.

The cyclic control system utilizes a linkage system to transmit movement to a swashplate, which actuates rotating controls of main rotor to control helicopter attitude and direction. Fore, aft, and lateral control use independent linkages from control stick to an intermixing bellcrank. From this point on, linkage to swashplate horns cannot be considered separately. Two hydraulic servo actuators are incorporated to reduce effort required for control and to reduce feedback forces from main rotor.

For helicopters with dual controls, the copilot cyclic stick is installed in front of the copilot seat. A quick-disconnect feature permits rapid removal or installation of the stick. A pin assembly is provided to ensure positive engagement of the stick.

### 67-37. CYCLIC CONTROL RIGGING.

#### NOTE

Rig cyclic pitch control with hydraulic boost OFF.

1. Rig collective controls prior to rigging cyclic controls (paragraph 67-8).

#### NOTE

For removal of cyclic controls, refer to paragraph 67-58. For installation of cyclic controls, refer to paragraph 67-60.

2. Ensure control tubes (15, figure 67-10) are correctly installed. Disconnect adjustable control tubes (7 and 8) at upper end. Disconnect adjustable control tubes (2 and 3) from horns of swashplate inner ring (1) (paragraph 67-58).

3. If not previously accomplished, set position of pilot cyclic control stick (12) with AN5 rigging bolt (14, detail C). Position the collective control stick to the full down position.



MAXIMUM ALLOWABLE EXPOSED THREAD AREA ON ALL ADJUSTABLE END FITTINGS IS 1.0 INCH (25.40 MM).

ENSURE THAT ADJUSTABLE CLEVIS END OF CONTROL TUBES (2 AND 3) ARE INSTALLED ONTO BELLCRANKS (4 AND 5) WITH BOLTHEADS POSITIONED OUTBOARD (DETAIL E).

4. Position two bellcranks (4 and 5) to 3.09 inches (78.49 mm) from deck (detail E). Bottom the two servo actuator valves (detail B). Adjust and connect control tubes (7 and 8) (paragraph 67-60).

5. Keep the two servo actuator valves bottomed as accomplished in step 4. Position the swashplate inner ring (1) as shown in detail A. Adjust and connect control tubes (2 and 3) (paragraph 67-60).

6. Remove AN5 rigging bolt (14).

#### NOTE

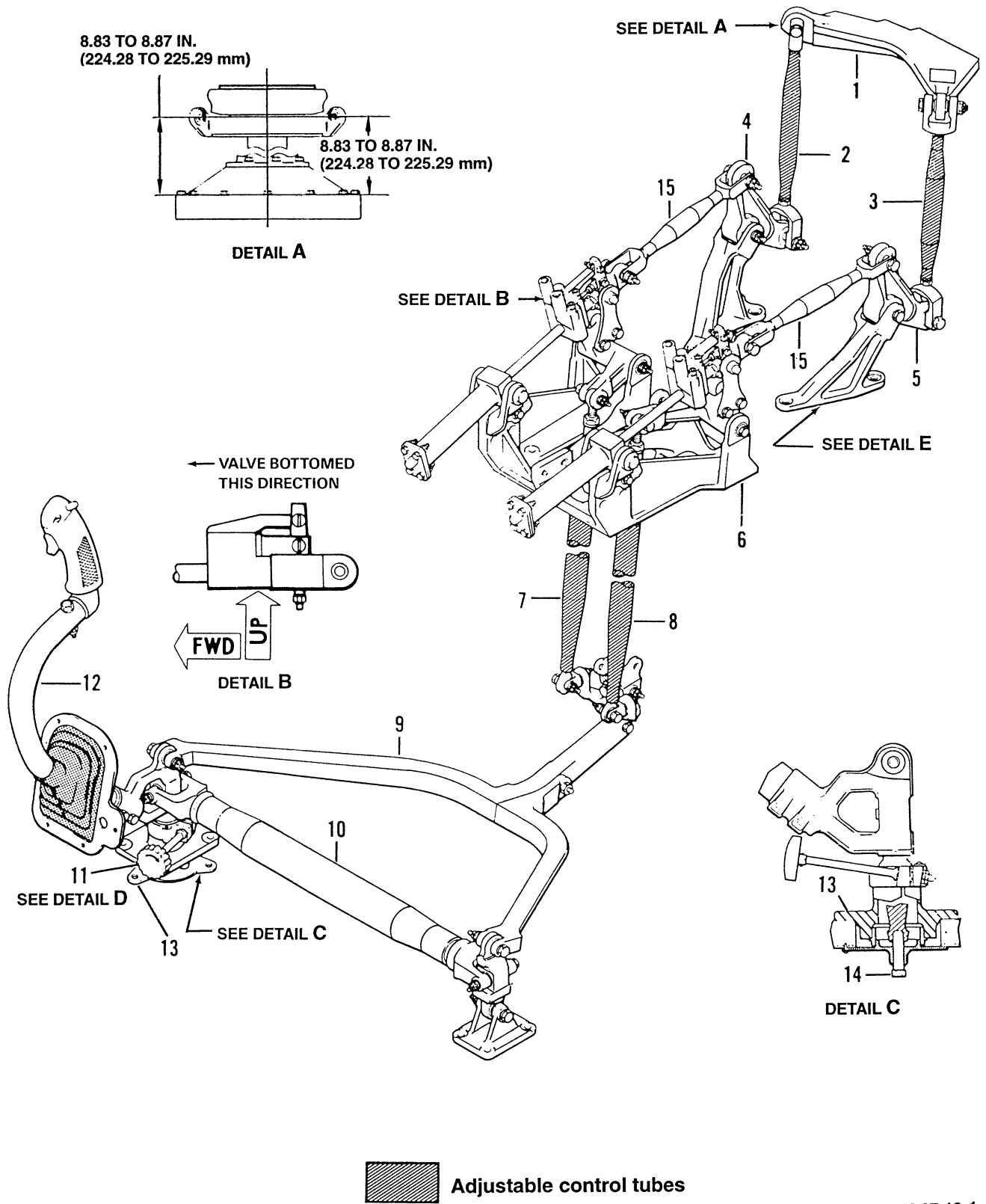
Perform clearance check between swashplate inner ring and pivot sleeve after rigging collective and cyclic pitch controls.

7. Check clearance between swashplate inner ring (1) and pivot sleeve at extreme control positions with hydraulic boost on.

**a.** If contact between the swashplate inner ring (1) and pivot sleeve is made on aft side, shorten control tubes (2 and 3) the same amount to obtain 0.010 to 0.030 inch (0.25 to 0.76 mm) clearance.

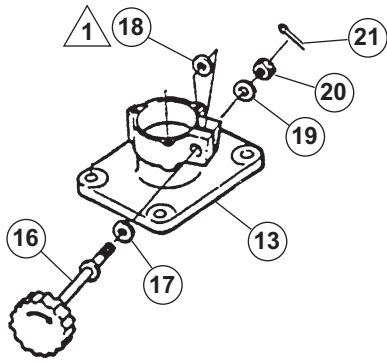
**b.** Actuate cyclic control stick (12) to extreme position and check the forward side of swashplate inner ring (1) for contact. If contact is made, lengthen control tubes (2 and 3) the same amount to obtain 0.010 to 0.030 inch (0.25 to 0.76 mm) clearance on the forward side of pivot sleeve or until the minimum clearance on aft side is reduced to 0.010 inch (0.25 mm).

8. Refer to Chapter 62 for swashplate to main rotor blade pitch link rigging.

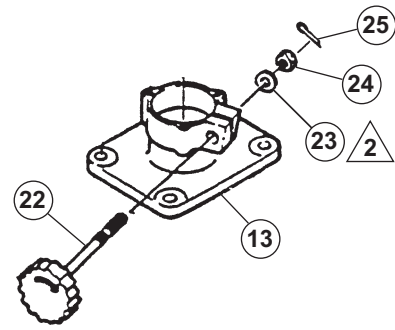


206A/BS-M-67-10-1

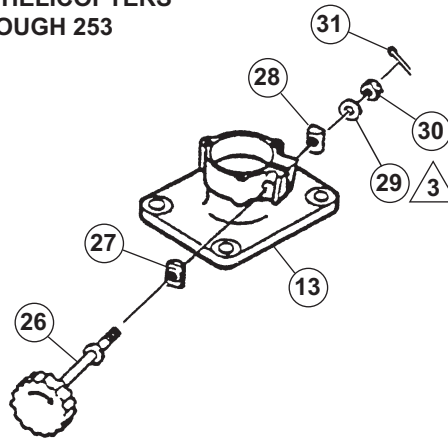
Figure 67-10. Cyclic control rigging (Sheet 1 of 3)



INSTALLED ON HELICOPTERS  
S/N 4 THROUGH 253

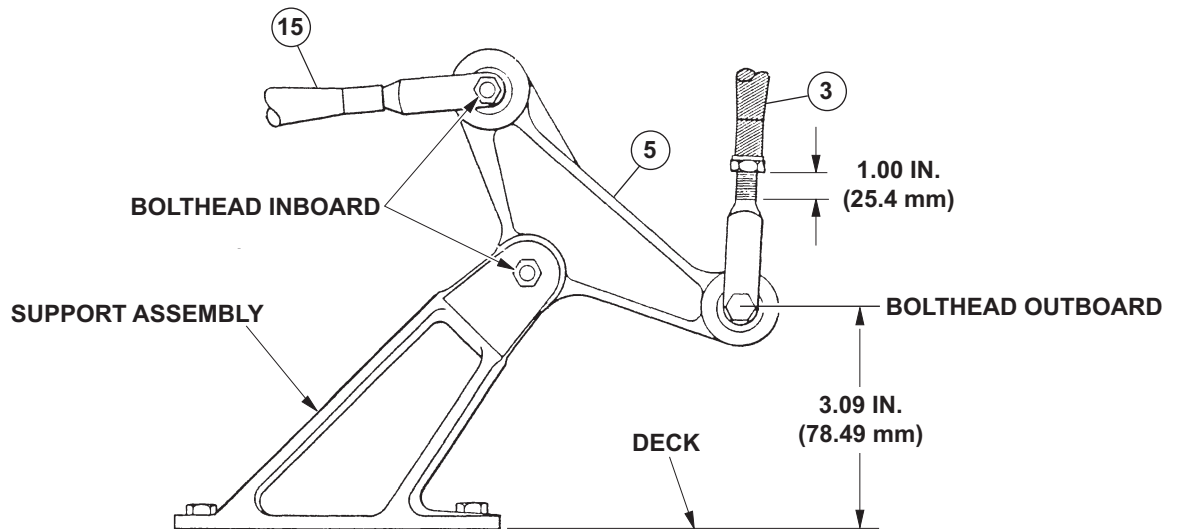


INSTALLED ON HELICOPTERS  
S/N 254 THROUGH 1657



INSTALLED ON HELICOPTERS  
S/N 1658 AND SUBSEQUENT

**DETAIL D**



**DETAIL E**  
LOOKING INBOARD FROM LEFT SIDE OF  
CYCLIC CONTROL BELLCRANK AND SUPPORT

206AB\_MM\_67\_0010b

**Figure 67-10. Cyclic Control Rigging (Sheet 2 of 3)**

- |                              |                      |
|------------------------------|----------------------|
| 1. Swashplate inner ring     | 17. Washer           |
| 2. Control tube              | 18. Spacer           |
| 3. Control tube              | 19. Shim             |
| 4. Bellcrank                 | 20. Nut              |
| 5. Bellcrank                 | 21. Cotter pin       |
| 6. Cylinder support assembly | 22. Friction knob    |
| 7. Adjustable control tube   | 23. Washer           |
| 8. Adjustable control tube   | 24. Nut              |
| 9. Yoke                      | 25. Cotter pin       |
| 10. Torque tube              | 26. Friction knob    |
| 11. Cyclic friction adjuster | 27. Large barrel nut |
| 12. Cyclic control stick     | 28. Small barrel nut |
| 13. Pivot support            | 29. Aluminum washer  |
| 14. Rigging bolt             | 30. Nut              |
| 15. Control tube             | 31. Cotter pin       |
| 16. Friction knob            |                      |

### NOTES




-  Shim as required.
-  Shim as required, with maximum of six washers (23).
-  Shim as required, with maximum of eight washers (29).

Figure 67-10. Cyclic Control Rigging (Sheet 3 of 3)

206AB\_MM\_67\_0010c

**67-38. CYCLIC STICK CONTROL BALANCE  
SPRING CLIP (OR EYEBOLT) AND  
CONNECTING HARDWARE  
INSTALLATION AND ADJUSTMENT**

1. Remove left forward seat cushion. Remove hardware securing honeycomb panel to gain access to work area.

**NOTE**

On Stability and Control Augmentation System (SCAS) equipped helicopters, the bolts securing the pitch transducer bracket to airframe structure must be temporarily removed to allow bracket to be inserted inside of cyclic stick balance spring bracket. Secure both brackets (utilizing bolts previously removed) in same location where pitch transducer bracket was previously installed (Figure 67-11, Detail A).

**NOTE**

Precise balance of the cyclic control stick may be obtained by positioning eyebolt in bracket. To increase or decrease tension on balance spring, extra washers may be used or removed as necessary.

2. Install one nut and one washer on eyebolt. Insert eyebolt into cyclic stick balance spring bracket. Secure eyebolt in bracket with washer(s) and nut.

**WARNING**

HELICOPTERS S/N 304 THROUGH 413 UTILIZE A CYCLIC STICK BALANCE SPRING CLIP. THIS SPRING CLIP MUST BE INSTALLED ON LEFT (OUTBOARD) SIDE OF CYCLIC LEVER (OR CYCLIC CONTROL STICK WHEN DUAL CONTROLS ARE INSTALLED) WITH FLANGE (CONTAINING HOLE) OF CLIP POSITIONED OUTBOARD AND IN LINE WITH UPPER SURFACE OF YOKE CLEVIS (FIGURE 67-11, VIEW A).

**NOTE**

Helicopters S/N 414 and subsequent utilize a cyclic stick balance spring eyebolt (in place of the balance spring clip) installed in left (outboard) side of yoke clevis (Figure 67-11, View B).

**NOTE**

Helicopters equipped with cyclic stick balance spring clip may use eyebolt as spares replacement whenever it becomes necessary to replace cyclic stick balance spring clip.

3. Install cyclic stick balance spring on balance spring clip and the other end of spring into eyebolt installed in balance spring bracket.

4. Ground run helicopter (refer to appropriate Flight Manual); release all friction from pilot cyclic friction adjuster. DO NOT release minimum friction. Increase or decrease tension of balance spring as required to eliminate any tendency for cyclic controls to move fore or aft when cyclic controls are released by pilot.

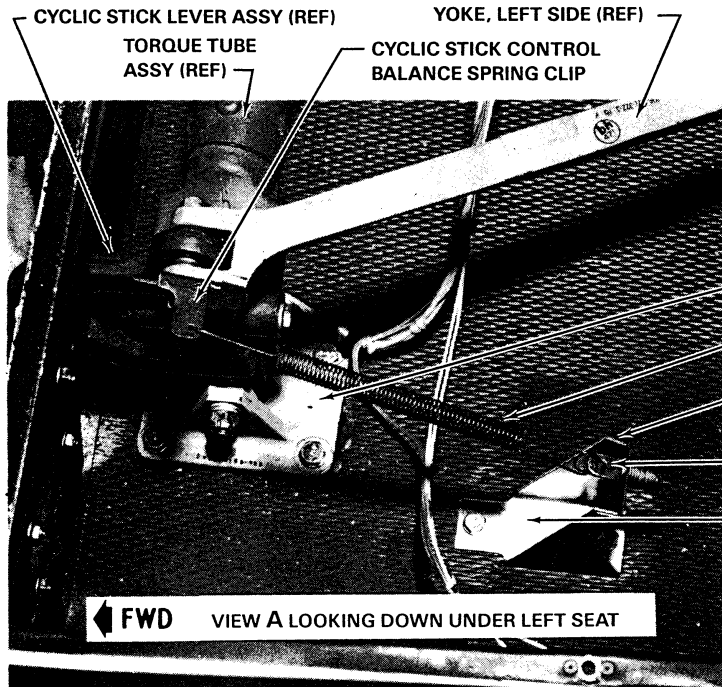
5. Inspect work area for security of all attaching hardware, interferences, loose tools, etc. Reinstall honeycomb panel and seat cushions; test fly helicopter (refer to appropriate Flight Manual) and return helicopter to service.

**67-39. CYCLIC FRICTION ADJUSTMENT**

A knob and shaft assembly is installed in the pivot support assembly to support a friction lock for the cyclic control stick. The knob and shaft assembly is turned clockwise or counterclockwise to increase or decrease the force required to move the cyclic control stick.

1. Deleted.
2. Deleted.
3. On helicopters S/N 4 through 253 (equipped with cyclic friction support as shown in Figure 67-10, Detail D), adjust minimum cyclic friction as follows, boost off.

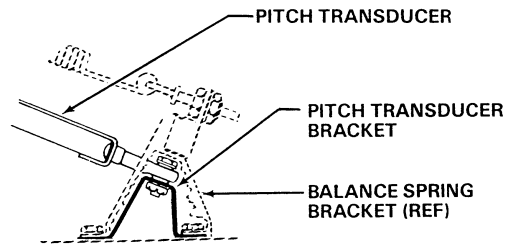
- a. Remove pilot seat cushion and seat support.



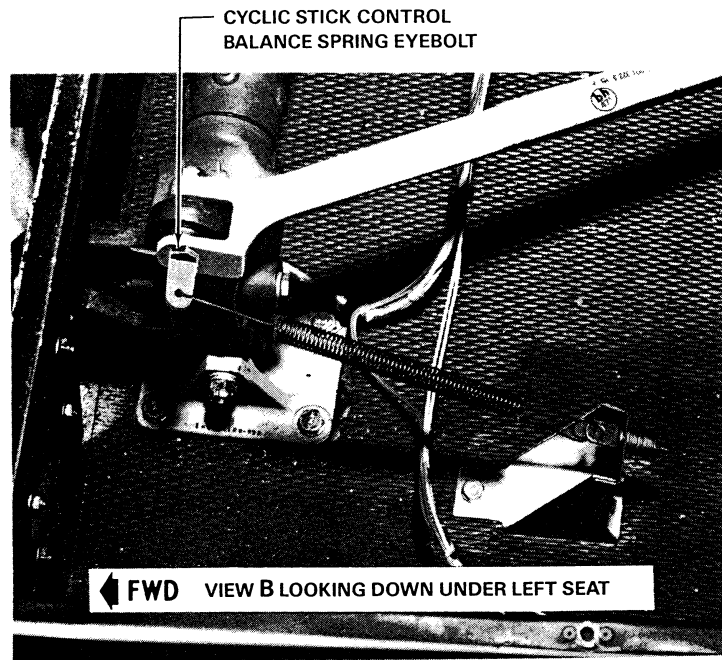
**WARNING**

HELICOPTERS WITH SERIAL NO. 304 THROUGH 413 UTILIZE A CYCLIC STICK CONTROL BALANCE SPRING CLIP. THIS CLIP MUST BE INSTALLED WITH FLANGE OF CLIP POSITIONED OUTBOARD AND IN LINE WITH UPPER SURFACE OF YOKE CLEVIS AS SHOWN IN VIEW A

CYCLIC STICK LEVER PIVOT SUPPORT ASSY (REF)  
CYCLIC STICK CONTROL BALANCE SPRING  
CYCLIC STICK CONTROL BALANCE SPRING BRACKET  
BALANCE SPRING BRACKET EYEBOLT  
LOCATION OF PITCH TRANSDUCER BRACKET ON SCAS EQUIPPED HELICOPTERS  
SEE DETAIL A



DETAIL A



**NOTE**

Helicopters with Serial No. 414 and subsequent utilize a cyclic stick balance spring eyebolt (in place of the balance spring clip) installed as shown in view B.

The balance spring eyebolt may be used as spares replacement for balance spring clip whenever it becomes necessary on helicopters with Serial No. 4 through 413.

206A/BS-M-67-11

Figure 67-11. Cyclic Stick Control Balance Spring Clip (or Eyebolt) and Connecting Hardware Installation

b. Disconnect yoke (9, [Figure 67-10](#)) ([paragraph 67-54](#)) and torque tube (10) ([paragraph 67-41](#)) from the pivot assembly.

#### NOTE

Ensure washer (17) and spacer (18) are in place on friction knob (16).

c. Position cyclic control stick (12) in neutral position. Adjust friction knob (16) until force of 0.5 to 1.0 pound (2.22 to 4.44 N), measured on a spring scale applied at center of grip, is required to move the cyclic stick forward.

d. Install shim (19) and nut (20) on friction knob (16). Use shims (19) as required between nut (20) and pivot support (13) to maintain friction as required in step c. Once friction requirement is met, install new cotter pin (21).

e. Connect yoke (9) ([paragraph 67-56](#)) and torque tube (10) ([paragraph 67-43](#)) to pivot assembly.

f. Install pilot seat support and cushion.

4. On helicopters S/N 254 through 1657 (equipped with cyclic friction support as shown in [Figure 67-10](#), Detail D), adjust minimum cyclic friction as follows:

a. During ground run (refer to Flight Manual), position cyclic control stick (12) in neutral position. Adjust friction knob (22) until a force of 0.5 to 1.5 pounds (2.22 to 6.67 N), measured on a spring scale applied at center of grip, is required to move the cyclic control stick forward. Shut down helicopter.

b. Remove pilot seat cushion and seat support.

c. Shimming with a maximum of six washers (23), install washers (23) and nut (24) as required to maintain friction set in step a. Once friction requirement is met, install new cotter pin (25).

d. Install seat support and seat cushion.

5. On helicopters S/N 1658 and subsequent (equipped with cyclic friction support as shown in [Figure 67-10](#), Detail D), adjust minimum cyclic friction as follows:

a. During ground run (refer to Flight Manual), and with friction knob (26) in full decrease friction position, position cyclic control stick (12) in neutral position and, using a spring scale, check for a breakout force of 0.5 to 1.5 pounds (2.22 to 6.67 N) measured at center of grip. Shut down helicopter.

b. If adjustment is required, remove knob and shaft (26) from pivot support (13). Assemble and adjust as follows:

(1) Remove pilot seat cushion and seat support.

(2) Hold large and small barrel nuts (27 and 28) to slots on pivot support (13). Thread friction knob and shaft (26) through large barrel nut, pivot support, and small barrel nut until large threads on knob and shaft contact the large barrel nut. Hold the large barrel nut approximately 0.030 inch (0.76 mm) from pivot support and thread knob and shaft into the large barrel nut until it is pulled into contact with pivot support.

(3) Install seat support and seat cushion.

(4) Ground run helicopter (refer to Flight Manual) and accomplish step a, tightening friction knob and shaft (26) into barrel nuts (27 and 28) and pivot support (13) until required breakout force is obtained. Shut down helicopter.

(5) Remove pilot seat cushion and seat support.

(6) Hold friction knob and shaft (26) stationary and install aluminum washers (29) (8 maximum), as required, nut (30), and new cotter pin (31). Check breakout force set in step a with knob and shaft loosened. Breakout force must be maintained.

(7) Install seat support and seat cushion.





## CYCLIC STICK AND TORQUE TUBE

### 67-40. CYCLIC STICK AND TORQUE TUBE.

The cyclic stick extends upward and forward from the front of the pilot seat. Switches are installed on the stick grip for the intercom system and radio. The torque tube connects to the cyclic stick support.

#### NOTE

For helicopters equipped with dual controls, the copilot cyclic stick extends upward and forward from the front of the copilot seat.

### 67-41. REMOVAL.

1. Remove seats and access panels as required.
2. Remove cyclic stick (34, figure 67-12) as follows:
  - a. Disconnect electrical connector from terminal block (TB4) (Chapter 96).
  - b. Remove screws (32) and slide boot (33) upward on cyclic stick (34).
  - c. Remove two nuts (1), four aluminum washers (2 and 30), and two bolts (29) from lever assembly (31).
  - d. Remove cyclic stick (34) from lever assembly (31) and boot (33). Guide electrical cable through lever assembly as stick is removed.
3. Remove copilot cyclic stick (paragraph 67-45).
4. Remove torque tube (63) as follows:
  - a. Remove cotter pin (58), nut (60), washers (59 and 56), and bolt (55).
  - b. Remove cotter pin (58), nut (52), washers (51 and 49), and bolt (48).
  - c. Remove cotter pin (58), nut (61), washers (62 and 64), and bolt (65).
  - d. Remove torque tube (63).
5. Remove cotter pin (14), nut (7), special washers (8), and bolt (5) to separate right yoke (6) from lever assembly (31).

6. Remove knob and shaft (25) as follows:
  - a. For helicopters S/N 4 through 253, remove cotter pin (14), nut (13), shim (12), spacer (11), washer (26), and knob and shaft (25).
  - b. For helicopters S/N 254 through 1657, remove cotter pin (14), nut (15), washer(s) (16), and knob and shaft (25).
  - c. For helicopters S/N 1658 and subsequent, remove cotter pin (14), nut (15), washer (16), barrel nuts (17 and 23), and knob and shaft (25).

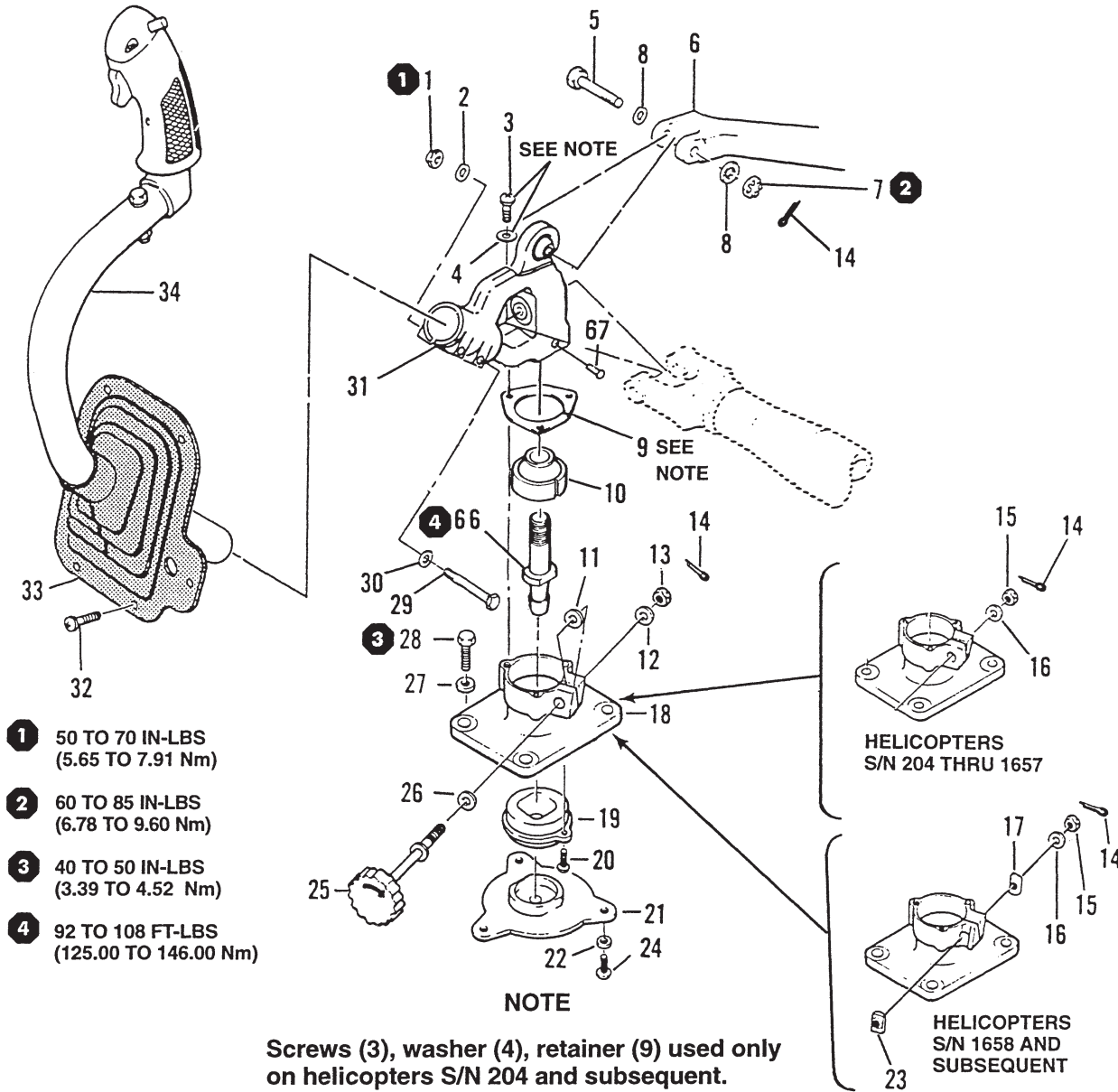


DO NOT SPREAD SLOT OR REMOVE OUTER RACE FROM SPLIT FRICTION BEARING. DAMAGE TO BEARING OR SUPPORT MAY OCCUR.

7. Remove three screws (3) and three thin aluminum washers (4) from retainer (9) and pivot support (18). Lift lever assembly (31), retainer, and split friction bearing (10) from pivot support.
8. Remove bolts (28), aluminum washers (27), and pivot support (18).
9. Remove screws (24) and special washers (22) to remove cover (21) from bottom of cabin floor.
10. Remove balance spring (38) from clip (46) or eyebolt (47). Remove cotter pin (58), nut (35), washers (36), and eyebolt (47) to separate left yoke (37) from lever assembly (50).
11. Remove bolts (53) and washers (54) to remove pivot support (57).

### 67-42. INSPECTION AND REPAIR.

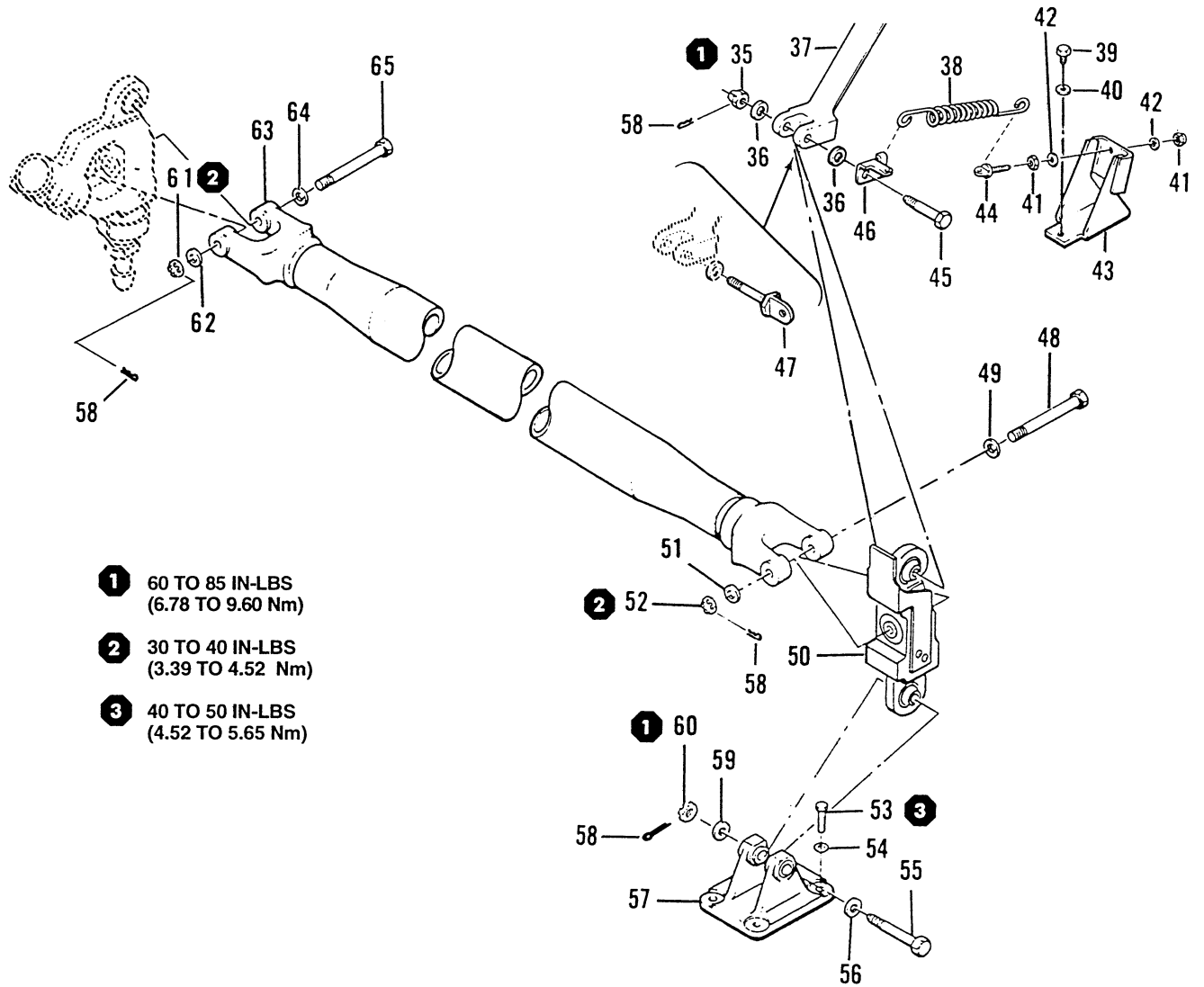
1. Inspect and repair control tubes (paragraph 67-3).
2. Inspect cyclic stick tube (Chapter 5).
3. Inspect and repair levers and supports (paragraph 67-5).
4. Inspect split friction bearing (10, figure 67-12) for roughness. Replace if damaged.



- |                            |                      |                     |
|----------------------------|----------------------|---------------------|
| 1. Nut                     | 13. Nut              | 24. Screw           |
| 2. Aluminum washer         | 14. Cotter pin       | 25. Knob and shaft  |
| 3. Screw                   | 15. Nut              | 26. Washer          |
| 4. Thin aluminum washer    | 16. Washer           | 27. Aluminum washer |
| 5. Bolt                    | 17. Small barrel nut | 28. Bolt            |
| 6. Right yoke              | 18. Pivot support    | 29. Bolt            |
| 7. Nut                     | 19. Sleeve           | 30. Aluminum washer |
| 8. Special washer          | 20. Screw            | 31. Lever assembly  |
| 9. Retainer                | 21. Cover            | 32. Screw           |
| 10. Split friction bearing | 22. Special washer   | 33. Boot            |
| 11. Spacer                 | 23. Large barrel nut | 34. Cyclic stick    |
| 12. Shim                   |                      |                     |

206AB\_MM\_67\_0012a

Figure 67-12. Cyclic Stick and Torque Tube (Sheet 1 of 2)



- 1** 60 TO 85 IN-LBS  
(6.78 TO 9.60 Nm)
- 2** 30 TO 40 IN-LBS  
(3.39 TO 4.52 Nm)
- 3** 40 TO 50 IN-LBS  
(4.52 TO 5.65 Nm)

- |                     |                    |                   |
|---------------------|--------------------|-------------------|
| 35. Nut             | 46. Clip           | 57. Pivot support |
| 36. Washer          | 47. Eyebolt        | 58. Cotter pin    |
| 37. Left yoke       | 48. Bolt           | 59. Washer        |
| 38. Balance spring  | 49. Washer         | 60. Nut           |
| 39. Bolt            | 50. Lever assembly | 61. Nut           |
| 40. Aluminum washer | 51. Washer         | 62. Washer        |
| 41. Nut             | 52. Nut            | 63. Torque tube   |
| 42. Washer          | 53. Bolt           | 64. Washer        |
| 43. Bracket         | 54. Washer         | 65. Bolt          |
| 44. Eyebolt         | 55. Bolt           | 66. Lever         |
| 45. Bolt            | 56. Washer         | 67. Rivet         |

206A/BS-M-67-12-2


Figure 67-12. Cyclic stick and torque tube (Sheet 2)

5. Replace split friction bearing (10) as follows:

a. Remove rivet (67). Unscrew lever (66) from lever assembly (31). Remove split friction bearing (10) and retainer (9), if installed.


b. For helicopters S/N 4 through 203:

(1) Install split friction bearing (10) on lever (66).

(2) Thread lever (66)  into lever assembly (31).

c. For helicopters S/N 204 and subsequent:

(1) Install split friction bearing (10) and lever (66) and position retainer (9) over bearing and lever.

(2) Thread lever (66)  into lever assembly (31).


**NOTE**


If rivet hole in lever (66) and lever assembly (31) do not align within torque range, a new lever must be installed.

d. Drill rivet hole through lever (66). Use hole in lever assembly (31) as a drill guide.

e. Install rivet (67).

**67-43. INSTALLATION.**


1. Apply barrier tape (C-430) to mating surfaces of pivot support (57, figure 67-12) and helicopter floor. Install pivot support using washers (54) and bolts (53) .

2. Position lever assembly (50) in pivot support (57). Install bolt (55) with washers (56 and 59) and nut (60) . Install cotter pin (58).

3. Install pivot support (18) as follows:

a. Apply barrier tape (C-430) to faying surfaces of helicopter structure and base of pivot support (18).

b. Install sleeve (19) to base of pivot support (18) with two screws (20). Secure screws with lockwire.

c. Install pivot support (18) to structure with drilled flange for knob and shaft (25) to the left outboard side of the helicopter. Secure assembly to structure with aluminum washers (27) and four bolts (28) .

4. Prior to installing lever assembly (31) in pivot support (18), apply dry lubricant (C-028) to bearing bore of pivot support as follows:

a. Remove oil, paint, and primer from bearing bore of pivot support (18) using MEK (C-309) and air dry.

b. Spray dry lubricant (C-028) into bearing bore of pivot support (18) from distance of approximately 8.0 inches (203.20 mm). Protect surrounding area from overspray.

c. Allow to air dry thoroughly. Lightly buff surface with clean soft cloth to improve lubrication.

5. Apply barrier tape (C-430) to mating surfaces of cover (21) and bottom of cabin floor. Install cover using screws (24) and special washers (22).

6. Install assembled lever assembly (31) in pivot support (18) as follows:



DO NOT USE SCREWDRIVER OR WEDGE OF ANY KIND TO SPREAD SLOT IN PIVOT SUPPORT TO AID IN INSTALLATION OF SPLIT FRICTION BEARING. SPREADING SLOT IN PIVOT SUPPORT RESULTS IN EXCESSIVE STRESS IN RELIEF HOLE OF SLOT, WHICH COULD CAUSE CRACKS.

**NOTE**

No retainer used on helicopters S/N 4 through 203.

a. For helicopters S/N 4 through 203:

(1) Position lever assembly (31) into pivot support (18) with split in split friction bearing (10) outer race aligned with split in pivot support.

(2) Install three screws (3) and thin aluminum washers (4) to secure split friction bearing (10).

(3) Insert knob and shaft (25) through hole in boot (33). Install washer (26) on knob and shaft and engage partway into pivot support (18). Position spacer (11) in pivot support slot and engage with knob and shaft. Engage knob and shaft completely into pivot support.

(4) Attach a spring scale to center of cyclic stick (34) grip. A force of 0.5 to 1.0 pound (2.22 to 4.44 N) should be required to move the cyclic stick forward from an approximate neutral position.

(5) Install shim (12), nut (13), and cotter pin (14). Adjust shim thickness as required between nut (13) and pivot support (18) until the minimum built-in friction of 0.5 to 1.0 pound (2.22 to 4.44 N) is obtained.

7. Install assembled lever assembly (31) in pivot support (18) as follows:

a. For helicopters S/N 204 through 1657:

(1) Position lever assembly (31) into pivot support (18) with split in split friction bearing (10) outer race aligned with split in pivot support.

(2) Install three screws (3) and thin aluminum washers (4) to secure split friction bearing (10).

(3) Insert knob and shaft (25) through hole in boot (33). Engage knob and shaft completely into pivot support (18).

(4) Attach a spring scale to center of cyclic stick (34) grip. A force of 0.5 to 1.0 pound (2.22 to 4.44 N) should be required to move the cyclic stick forward from an approximate neutral position.

(5) Install washer (16), nut (15), and cotter pin (14). Adjust washer thickness, as required, until the minimum built-in friction of 0.5 to 1.0 pound (2.22 to 4.44 N) is obtained.

8. Install assembled lever assembly (31) in pivot support (18) as follows:

a. For helicopters S/N 1658 and subsequent:

(1) Position lever assembly (31) into pivot support (18) with split in split friction bearing (10) outer race aligned with split in pivot support.



(2) Install three screws (3) and thin aluminum washers (4) to secure split friction bearing (10).



(3) Insert knob and shaft (25) through hole in boot (33). Hold large and small barrel nuts (23 and 17) against slots in pivot support (18). Thread knob and

shaft through large barrel nut (23), pivot support, and small barrel nut (17) until large threads on knob and shaft contact large barrel nut.

(4) Hold large barrel nut (23) approximately 0.030 inch (0.67 mm) from pivot support (18) and thread knob and shaft (25) into large barrel nut until it is pulled into contact with pivot support. Install washer (16) and nut (15) fingertight.

9. Adjust cyclic friction ([paragraph 67-40](#)).

10. Position torque tube (63) between lever assembly (31) and lever assembly (50). Install bolt (65), washers (62 and 64), and nut (61) . Install cotter pin (58). Install bolt (48), washers (49 and 51), and nut (52) . Install cotter pin (58).

11. Connect right yoke (6) to lever assembly (31) with bolt (5), special washers (8), and nut (7) . Install cotter pin (14). Connect left yoke (37) to lever assembly (50) with bolt (45) and clip (46) or eyebolt (47), as applicable, washers (36), and nut (35) .

12. Connect balance spring (38) as follows:

a. Position bracket (43) to structure with open side forward and secure with two bolts (39) and two aluminum washers (40).

b. Thread nut (41) on eyebolt (44) and insert washer (42). Insert eyebolt in hole in bracket (43) and install washer and nut.

c. Install balance spring (38) between two eyebolts (44 and 47) or eyebolt (44) and clip (46), as applicable, and temporarily adjust nuts (41) to remove slack from spring.

d. Adjust preload by use of nuts (41) on balance spring (38) to offset cyclic stick (34) mass imbalance forces at first ground runup with hydraulic boost ON ([paragraph 67-39](#)).


#### NOTE

Before installing cyclic stick, ensure that the lever assembly is properly aligned with a 5/16 bolt rigging workaid installed in cover located on lower skin of fuselage and pivot assembly. Check that cyclic stick is perpendicular to the pilot seat support

when viewed through right chin bubble.  
Remove rigging workaid bolt.

**13.** Install cyclic stick (34) as follows:

**a.** Insert end of cyclic stick (34) through boot (33). Guide electrical cable through lever assembly (31) and insert end of cyclic stick into lever assembly.

**b.** Install bolts (29) with aluminum washers (2 and 30) and nuts (1) .

**c.** Connect electrical connector to terminal block (TB4) ([Chapter 96](#)).

**d.** Install screws (32) to secure boot (33) in position.

**14.** Check cyclic control rigging ([paragraph 67-38](#)).

**15.** Install seat panels.

**COPILOT CYCLIC STICK****67-44. COPILOT CYCLIC STICK  
QUICK-DISCONNECT****67-45. COPILOT CYCLIC STICK  
QUICK-DISCONNECT — REMOVAL**

1. Disconnect electrical connector (5, [Figure 67-13](#)).
2. To gain access, remove screws (3) and washers (4). Loosen boot assembly (2) and slide forward and upward.
3. Disengage pin assembly (7, Detail A).
4. Grasp and turn nut (8) to disengage threads.
5. Remove copilot cyclic stick (1, Detail B) from lever assembly (9, Detail C).
6. For helicopters with SCAS installed, to keep SCAS operational, install adapter (10, Detail D) on electrical connector (6).

**67-46. COPILOT CYCLIC STICK  
QUICK-DISCONNECT — INSTALLATION**

1. If installed, remove adapter (10, Detail D, [Figure 67-13](#)) from electrical connector (6).
2. Insert copilot cyclic stick (1, Detail B) into lever assembly (9, Detail C). Ensure tabs on copilot cyclic stick (1) engage with notches on lever assembly (9).
3. Grasp and turn nut (8) to engage threads on lever assembly (9). Tighten nut fingertight.
4. Engage pin assembly (7, Detail A).
5. Slide boot assembly (2) down and aft into position. Install screws (3) and washers (4). Tighten boot assembly around copilot cyclic stick (1).
6. Connect electrical connector (5) to electrical connector (6).

**67-47. COPILOT CYCLIC STICK AND LEVER  
ASSEMBLY****67-48. COPILOT CYCLIC STICK AND LEVER  
ASSEMBLY — REMOVAL**

1. Remove copilot cyclic stick (1, [Figure 67-14](#)) ([paragraph 67-46](#)).
2. Remove cotter pin (40), nut (27), washers (28), and eyebolt (30) from left yoke (29) and lever assembly (31).
3. Remove cotter pin (40), nut (33), washers (32 and 25), and bolt (26) from torque tube (39) and lever assembly (31).
4. Remove cotter pin (40), nut (37), washers (35 and 38), and bolt (34) from pivot support (36) and lever assembly (31).
5. Remove torque tube (39).

**67-49. COPILOT CYCLIC STICK AND LEVER  
ASSEMBLY — DISASSEMBLY**

1. Remove electrical connector (14, [Figure 67-14](#)).
2. Remove grommet (22, Detail A).
3. Remove nut (6), washers (2), and bolt (3). Remove elbow (5) and grip (4). Pull electrical cable through hole in tube (24, Detail B).
4. Remove nut and screw furnished with grip (4) and remove grip from elbow (5).
5. Remove grommet (7) with cyclic boot (13).

**67-50. COPILOT CYCLIC STICK AND LEVER  
ASSEMBLY — INSPECTION AND REPAIR**

1. Inspect grip (4, [Figure 67-14](#)) for cracks and/or other damage. Replace damaged grip.
2. Inspect elbow (5) for cracks, damaged mounting holes, and/or other damage. Replace damaged elbow.

3. Inspect tube (24, Detail B) for bent or damaged pin assembly (23), stripped or cracked nut (20), and other bending, cracks, and damage. Replace damaged tube.

**NOTE**

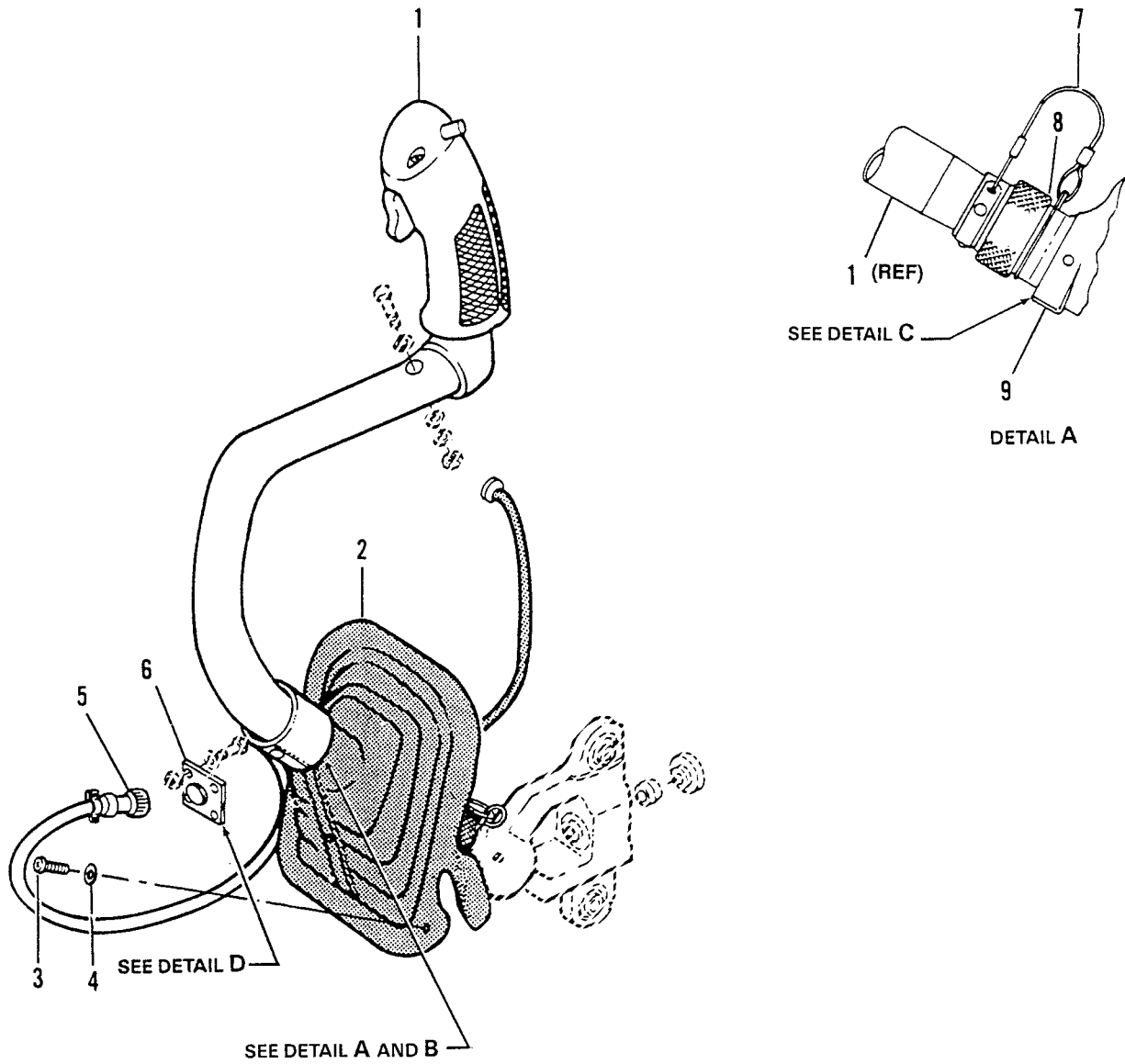
Removal of rivets, pin (12), sleeve (19), nut (20), collar (21), and pin assembly (23) may

be necessary. If any part is damaged, replace part.

4. Inspect cyclic boot (13) for missing or damaged snap fastener(s), tears and/or other damage. Replace damaged boot.

5. Inspect electrical connectors (14 and 16) for damage. Replace damaged connector(s).



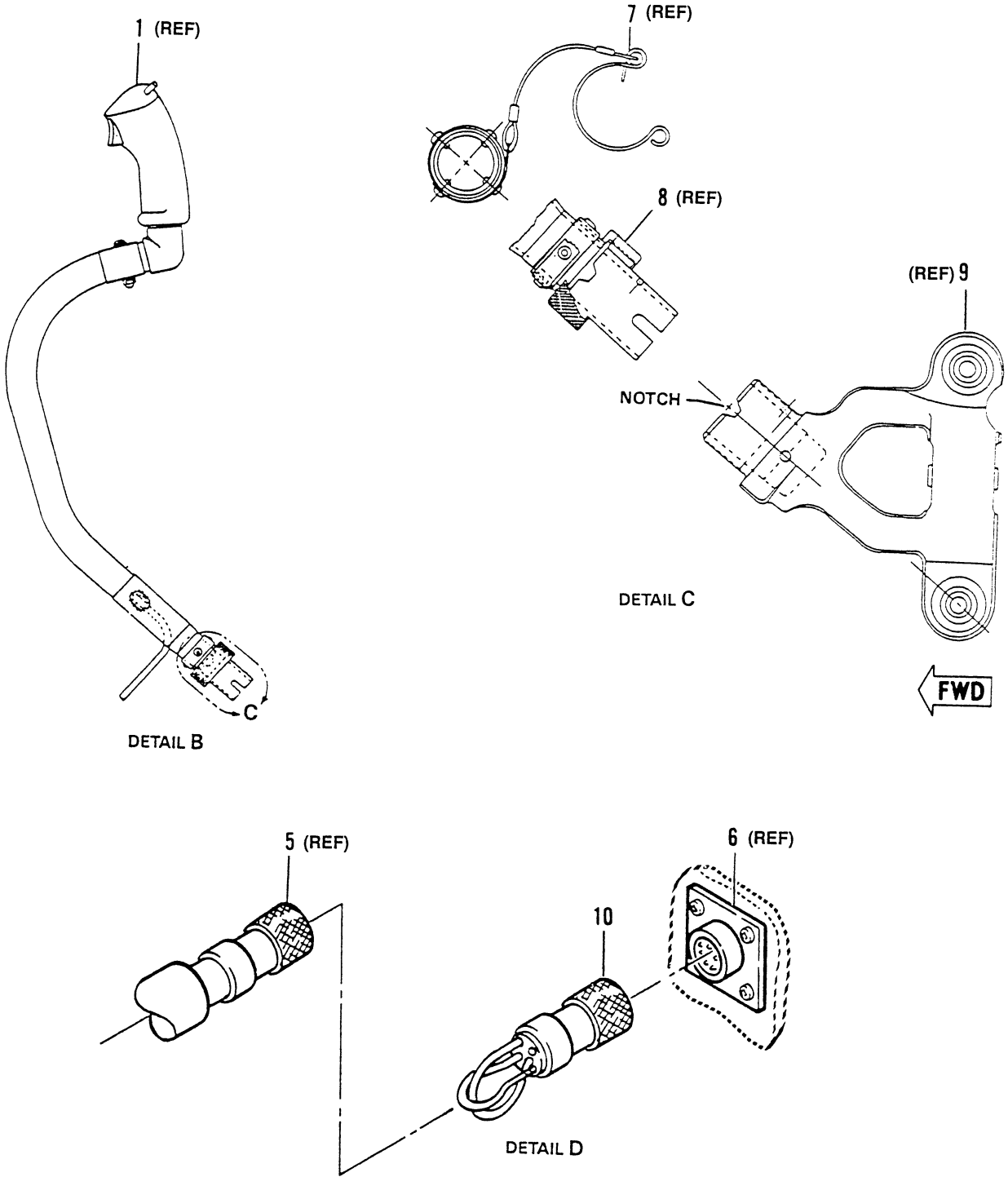


- |                         |                         |
|-------------------------|-------------------------|
| 1. Copilot cyclic stick | 6. Electrical connector |
| 2. Boot assembly        | 7. Pin assembly         |
| 3. Screw                | 8. Nut                  |
| 4. Washer               | 9. Lever assembly       |
| 5. Electrical connector | 10. Adapter             |

206A/BS-M-67-13-1

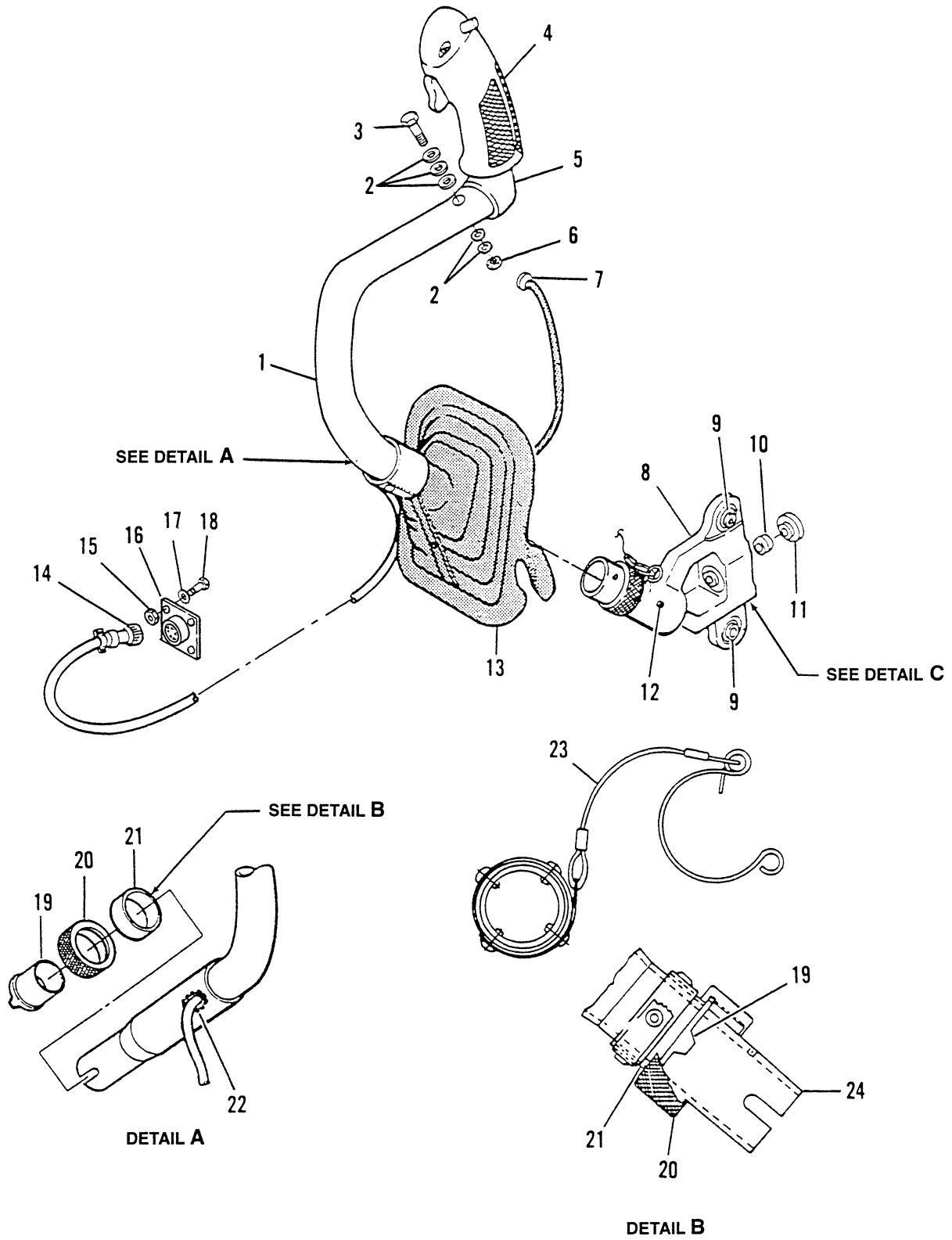
Figure 67-13. Copilot Cyclic Stick Quick-disconnect (Sheet 1 of 2)





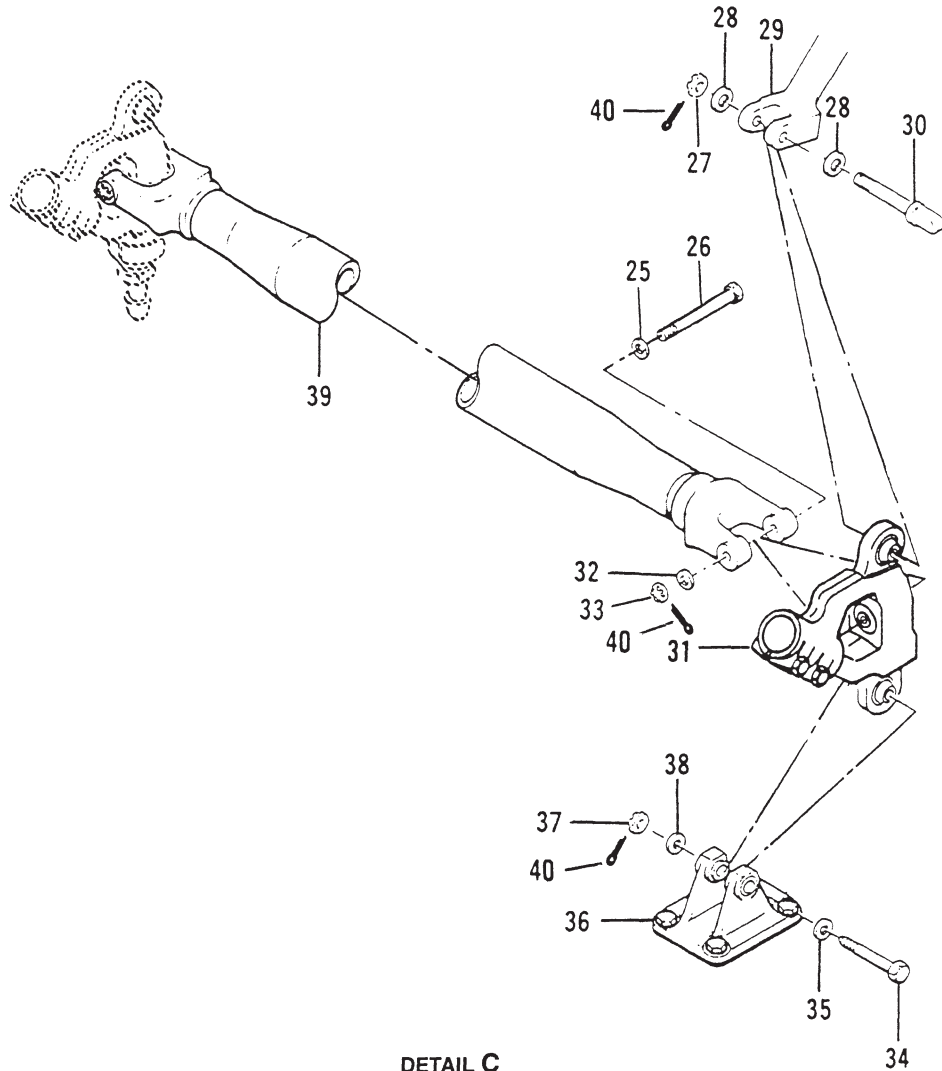
206A/BS-M-67-13-2

Figure 67-13. Copilot cyclic stick quick-disconnect (Sheet 2)



206A/BS-M-67-14-1

Figure 67-14. Copilot cyclic stick (Sheet 1 of 2)



DETAIL C

- |                         |                          |                  |                    |
|-------------------------|--------------------------|------------------|--------------------|
| 1. Copilot cyclic stick | 11. Bearing              | 21. Collar       | 31. Lever assembly |
| 2. Washer               | 12. Pin                  | 22. Grommet      | 32. Washer         |
| 3. Bolt                 | 13. Cyclic boot          | 23. Pin assembly | 33. Nut            |
| 4. Grip                 | 14. Electrical connector | 24. Tube         | 34. Bolt           |
| 5. Elbow                | 15. Nut                  | 25. Washer       | 35. Washer         |
| 6. Nut                  | 16. Electrical connector | 26. Bolt         | 36. Pivot support  |
| 7. Grommet              | 17. Washer               | 27. Nut          | 37. Nut            |
| 8. Lever assembly       | 18. Screw                | 28. Washer       | 38. Washer         |
| 9. Bearing              | 19. Sleeve               | 29. Left yoke    | 39. Torque tube    |
| 10. Spacer              | 20. Nut                  | 30. Eyebolt      | 40. Cotter pin     |

**NOTE**

Sleeve (19), collar (21), and pin assembly are attached to tube (24) with MS2060MP4 rivets. Nut (20) is held captive by sleeve (19) and collar (21).

206AB\_MM\_67\_0014b

Figure 67-14. Copilot Cyclic Stick (Sheet 2 of 2)

6. If disassembled, assemble electrical connector (16) with screw (18), washer (17), and nut (15).

7. Inspect lever assembly (8) for corrosion, cracks, worn or damaged bearing(s) (9 and 11), and/or other mechanical damage (BHT-206A/B-SERIES-CR&O).

#### 67-51. COPILOT CYCLIC STICK AND LEVER ASSEMBLY — ASSEMBLY

1. Slip cyclic boot (13, [Figure 67-14](#)) over cyclic stick (1).

2. Attach grip (4) to elbow (5) using nut and screw furnished with grip.

#### NOTE

Three washers (2) are to be placed under head of bolt (3). Two washers (2) are to be placed under nut (6).

3. Pull electrical cable through hole in tube (24, Detail B). Install grommet (22, Detail A).

4. Attach elbow (5) and grip (4) using bolt (3), washers (2), and nut (6).

5. Connect electrical connector (14) to electrical connector (16).

#### 67-52. COPILOT CYCLIC STICK AND LEVER ASSEMBLY — INSTALLATION

1. Install lever assembly (31, [Figure 67-14](#)).

2. Install bolt (34), washers (35 and 38), nut (37), and cotter pin (40) to attach lever assembly (31) to pivot support (36).

3. Install bolt (26), washers (25 and 32), nut (33), and cotter pin (40) to attach lever assembly (31) to torque tube (39).

4. Install eyebolt (30), washers (28), nut (27), and cotter pin (40) to attach lever assembly (31) to left yoke (29).

5. Install copilot cyclic stick (1) ([paragraph 67-47](#)).

6. Ensure electrical cable is secure and free of interference.

7. Perform check of copilot cyclic control circuits ([Chapter 96](#) and [Chapter 98](#)).

## OTHER COMPONENTS OF CYCLIC CONTROL

### 67-53. CYCLIC YOKE AND MIXING LEVER.

The cyclic system yoke extends aft from the cyclic stick support and torque tube. Movement of the cyclic stick is transmitted by the yoke to the mixing lever. The mixing lever transmits cyclic movement to the swashplate through mechanical linkage and servo actuators.

### 67-54. REMOVAL.

1. Remove right yoke (6, figure 67-15) and left yoke (26) as follows:

- a. Remove seat panels as required.
- b. Remove lower access panel from aft side of center support column.
- c. Remove cotter pin (43), nut (10), washers (9 and 22), and bolt (23) to separate yoke (6) from mixing lever (20).
- d. Remove cotter pin (43), nuts (25), washers (8 and 24), and bolts (7) to separate the two yokes (6 and 26).
- e. Remove cotter pin (43), nut (2), washers (3 and 4), and bolt (5). Remove right yoke (6).
- f. Disconnect balance spring (27) from eyebolt (40) or clip (37), as applicable.
- g. Remove cotter pin (43), nut (42), washers (38 and 41), clip (37), if installed, and bolt (36) or eyebolt (40), as applicable. Remove left yoke (26).

2. Remove mixing lever (20) as follows:

- a. Disconnect two control tubes (16) from mixing lever (20) by removing cotter pin (43), nuts (11), two washers (12), and bolts (15).
- b. Remove cotter pin (43), nut (19), washers (13 and 18), and bolt (14). Remove mixing lever (20).

3. Disassemble mixing lever (20) to the extent necessary for parts replacement as follows:

- a. Remove cotter pin (7, figure 67-16), nut (6), shim (5), thrust and slotted thrust washers (2 and 4), and clevis (1).

- b. Remove cotter pin (7), nut (6), shim (5), thrust and slotted thrust washers (2 and 4), and bearing (9).




### 67-55. INSPECTION AND REPAIR.

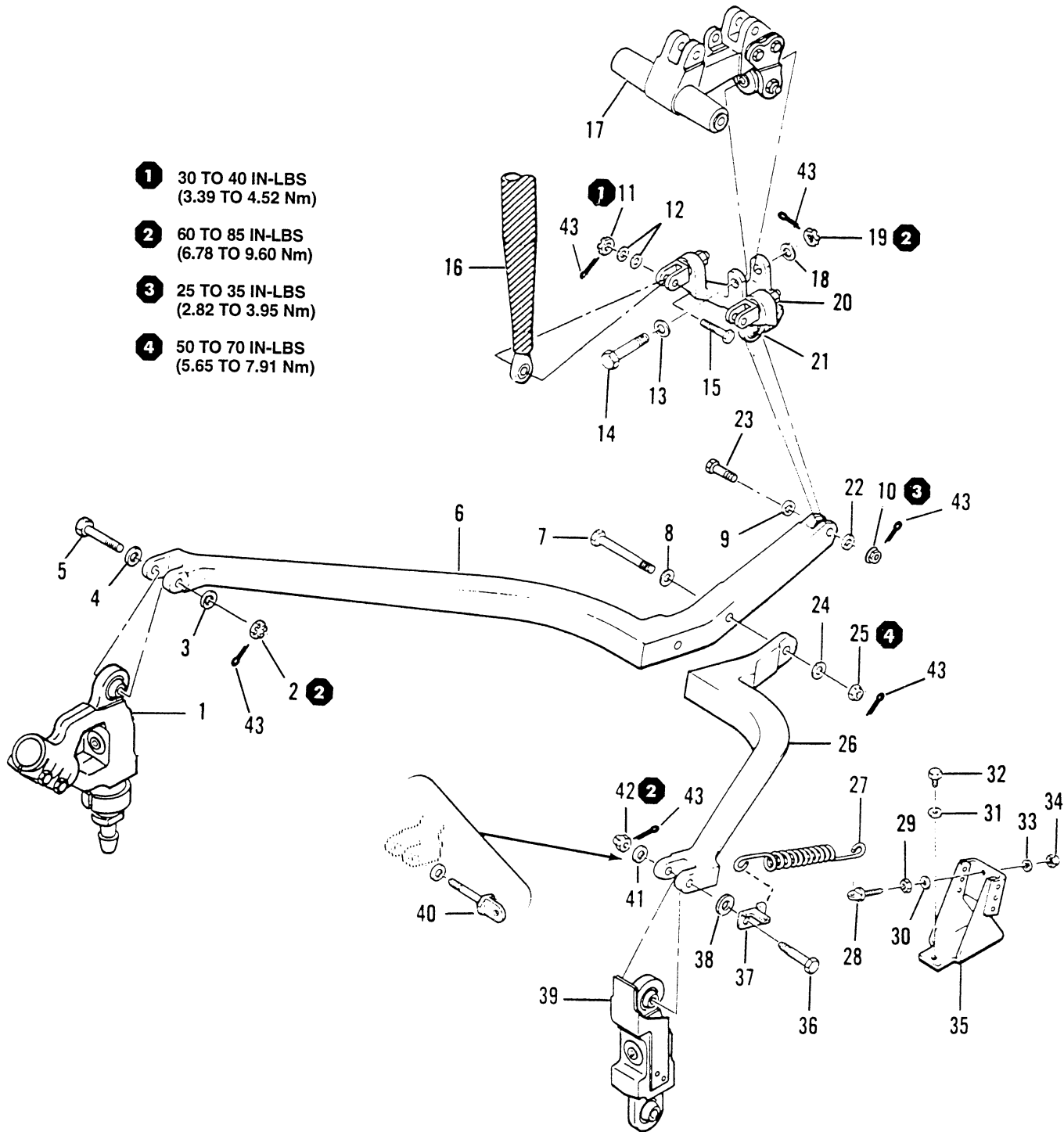
1. Inspect and repair control tubes (paragraph 67-3).
2. Inspect and repair levers and supports (paragraph 67-5).

### 67-56. INSTALLATION.

#### NOTE

It is necessary to apply corrosion preventive compound (C-104) to all bolt shanks prior to installation. After bolts are installed and torquing is completed, it is also required that boltheads, nuts, and washers be coated with corrosion preventive compound (C-101), unless otherwise noted.

1. Attach mixing lever (20, figure 67-15) to trunnion of collective trunnion and lever (17) with bolt (14), washers (13 and 18), and nut (19) . Install cotter pin (43).
2. If disassembled, assemble clevis (1, figure 67-16) and bearing (9) to mixing lever (8) as follows:
  - a. Install clevis (1) and thrust washer (2) on lever (8). Install thrust washer (4), shims (5), and nut (6). Add or subtract shims and tighten nut to provide a 0.002 inch (0.05 mm) maximum gap between shim and thrust washer so that breakout force at bushing (3) is 18 inch-ounces (0.13 Nm) maximum (detail A). Secure with cotter pin (7).
  - b. Repeat step a. for bearing (9), thrust washers (2 and 4), shims (5), nut (6), and cotter pin (7).
  - c. Repeat step a. for remaining clevis (1), thrust washers (2 and 4), shims (5), nut (6), and cotter pin (7).
3. Position aft end of right yoke (6, figure 67-15) over bearing (21) on mixing lever (20). Install bolt (23), washers (22 and 9), and nut (10) . Install cotter pin (43).
4. Position forward end of right yoke (6) over lever assembly (1). Install bolt (5), washers (3 and 4), and nut (2) . Install cotter pin (43).



206A/BS-M-67-15-1

Figure 67-15. Cyclic yoke and mixing lever (Sheet 1 of 2)




|                   |                                   |                    |
|-------------------|-----------------------------------|--------------------|
| 1. Lever assembly | 16. Control tube                  | 31. Washer         |
| 2. Nut            | 17. Collective trunnion and lever | 32. Bolt           |
| 3. Washer         | 18. Washer                        | 33. Washer         |
| 4. Washer         | 19. Nut                           | 34. Nut            |
| 5. Bolt           | 20. Mixing lever                  | 35. Bracket        |
| 6. Right yoke     | 21. Bearing                       | 36. Bolt           |
| 7. Bolt           | 22. Washer                        | 37. Clip           |
| 8. Washer         | 23. Bolt                          | 38. Washer         |
| 9. Washer         | 24. Washer                        | 39. Lever assembly |
| 10. Nut           | 25. Nut                           | 40. Eyebolt        |
| 11. Nut           | 26. Left yoke                     | 41. Washer         |
| 12. Washer        | 27. Balance spring                | 42. Nut            |
| 13. Washer        | 28. Eyebolt                       | 43. Cotter pin     |
| 14. Bolt          | 29. Nut                           |                    |
| 15. Bolt          | 30. Washer                        |                    |




Adjustable control tubes


206A/BS-M-67-15-2

**Figure 67-15. Cyclic yoke and mixing lever (Sheet 2)**

5. Install aft end of left yoke (26) and attach to right yoke (6) with two bolts (7), washers (8 and 24), and nuts (25) .

6. Attach forward end of left yoke (26) to lever assembly (39) with bolt (36) and clip (37), if removed, or eyebolt (40), as applicable, washers (38 and 41), and nut (42) . Install cotter pin (43).

7. Connect balance spring (27) to eyebolt (28) and clip (37) or eyebolt (40), as applicable.

8. Connect two control tubes (16) to mixing lever (20) with head of bolts (15) inboard, and two thin washers (12) under nuts (11) . Install cotter pin (43).

9. Check cyclic control rigging (paragraph 67-38).

10. Install seats and access panel on aft side of center support column.

**67-57. CYCLIC CONTROL LINKAGE.**

The cyclic control linkage consists of control tubes, mixing levers, bellcranks, hydraulic servo actuators, and supports.

**67-58. REMOVAL.****NOTE**

Parts of the control system can be removed separately as need occurs, or completely in practical sequence (figure 67-17). Take precautions against damage by accidental movement of linkage while disconnected.

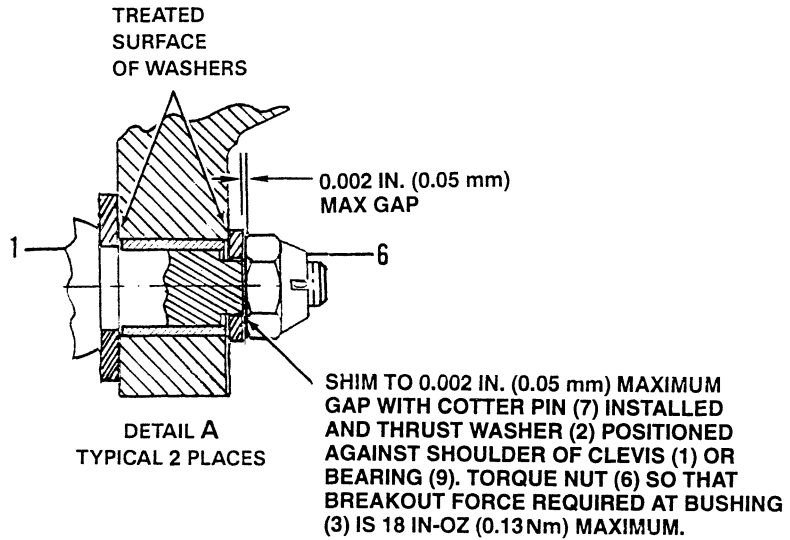
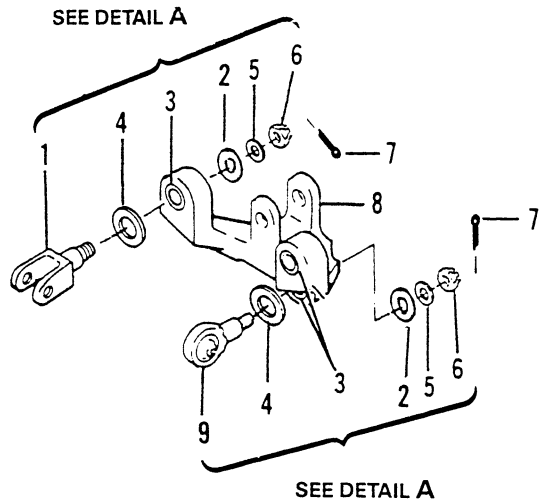
1. Remove adjustable control tubes (6, figure 67-17) as follows:

a. Remove access panels from aft side of center support column.

b. Open forward pylon fairing.

c. Remove cotter pins (36), nuts (37), washers (38), and bolts (39) connecting control tubes (6) to mixing lever (7).

d. Remove cotter pins (40), nuts (41), washers (42), and bolts (43) connecting control tubes (6) upper end to bellcranks (10, detail B). Remove control tubes.



1. Clevis
2. Thrust washer
3. Bushing
4. Thrust washer
5. Shim
6. Nut
7. Cotter pin
8. Lever
9. Bearing

206A/BS-M-67-16

Figure 67-16. Mixing lever



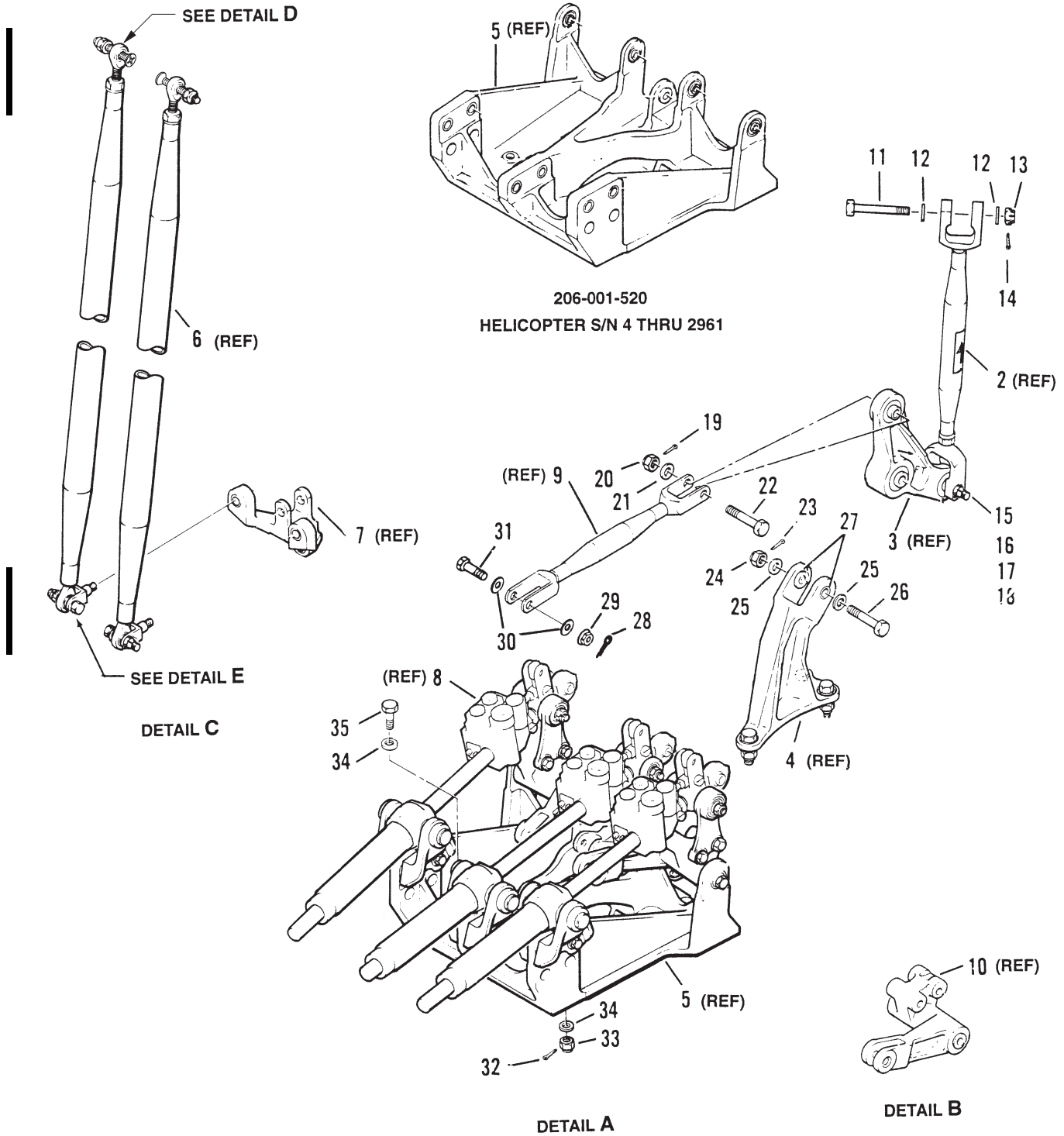
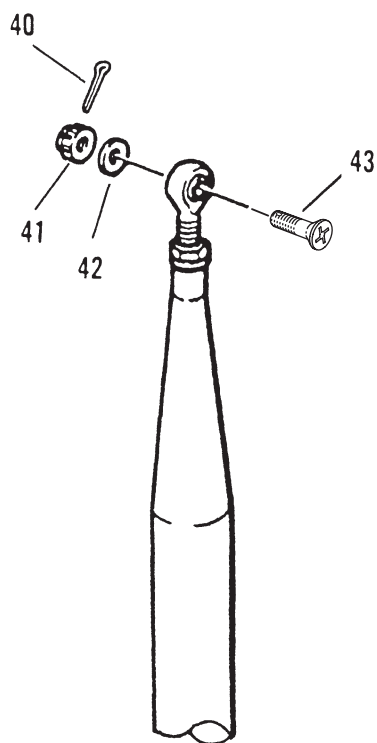
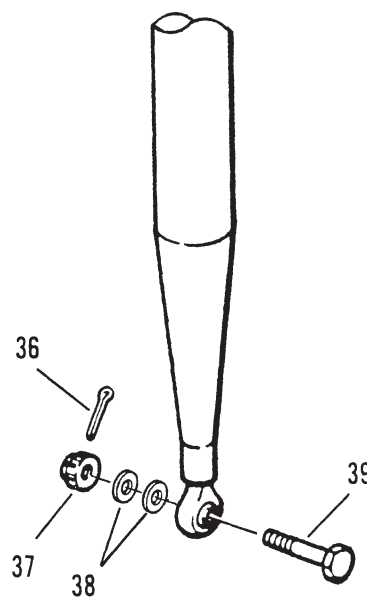


Figure 67-17. Cyclic Control Linkage (Sheet 2 of 3)

206AB\_MM\_67\_0017b



DETAIL D



DETAIL E

- |                           |                |                |
|---------------------------|----------------|----------------|
| 1. Swashplate inner ring  | 16. Nut        | 31. Bolt       |
| 2. Control tube           | 17. Washer     | 32. Cotter pin |
| 3. Bellcrank              | 18. Bolt       | 33. Nut        |
| 4. Support                | 19. Cotter pin | 34. Washer     |
| 5. Servo actuator support | 20. Nut        | 35. Bolt       |
| 6. Control tube           | 21. Washer     | 36. Cotter pin |
| 7. Mixing lever           | 22. Bolt       | 37. Nut        |
| 8. Servo actuator         | 23. Cotter pin | 38. Washer     |
| 9. Control tube           | 24. Nut        | 39. Bolt       |
| 10. Bellcrank             | 25. Washer     | 40. Cotter pin |
| 11. Bolt                  | 26. Bolt       | 41. Nut        |
| 12. Washer                | 27. Bushing    | 42. Washer     |
| 13. Nut                   | 28. Cotter pin | 43. Bolt       |
| 14. Cotter pin            | 29. Nut        |                |
| 15. Cotter pin            | 30. Washer     |                |

206AB\_MM\_67\_0017c

Figure 67-17. Cyclic Control Linkage (Sheet 3 of 3)

2. Remove control tubes (9) as follows:

a. Remove cotter pins (28), nuts (29), washers (30), and bolts (31) connecting control tubes (9) to servo actuators (8).

b. Remove cotter pins (19), nuts (20), washers (21), and bolts (22) connecting control tubes (9) to bellcranks (3). Remove control tubes.

3. Remove adjustable control tubes (2) as follows:

a. Remove cotter pins (14), nuts (13), washers (12), and bolts (11) connecting control tubes (2) to horns on swashplate inner ring (1).

b. Remove cotter pins (15), nuts (16), washers (17), and bolts (18) connecting control tubes (2) to bellcranks (3). Remove control tubes.

4. Remove bellcranks (3) as follows:

a. Remove cotter pins (23), nuts (24), washers (25), and bolts (26) attaching bellcranks (3) to supports (4).

b. Remove bellcranks (3) and remove bushing (27) from outboard leg of supports (4).

5. Remove servo actuators (8) from servo actuator support (5) ([paragraph 67-81](#)).

6. Remove cotter pins (32), nuts (33), washers (34), and bolts (35). Remove servo actuator supports (5).

### 67-59. CYCLIC CONTROL LINKAGE — INSPECTION AND REPAIR

a. Inspect and repair control tubes ([paragraph 67-3](#)).

b. Inspect and repair bellcranks, levers, supports, and walking beams ([paragraph 67-5](#)).

### 67-60. CYCLIC CONTROL LINKAGE — INSTALLATION

1. Install servo actuators (8), [Figure 67-17](#) ([paragraph 67-80](#)).

2. Position servo actuator support (5) on mounting points. Install bolts (35), washers (34), nuts (33), and

cotter pins (32). Reference [paragraph 67-90](#) for shimming.

3. Deleted.

4. Position bellcranks (3) in supports (4) with arrow on bellcrank pointing aft. Install bolts (26) inboard with washers (25) under bolt heads and under nuts (24), with bolt heads inboard. Install cotter pin (23).

5. Install adjustable control tubes (2) as follows:

a. Position control tubes (2, Detail A) between horn on swashplate inner ring (1) and bellcranks (3) with adjustable clevis ends down.

b. Connect upper clevis end using bolts (11) with washers (12) under bolt heads and under nuts (13). Install cotter pin (14).

c. Connect lower clevis end using bolts (18) with washers (17) under bolt heads and under nuts (16), with bolt heads outboard. Install cotter pin (15).

6. Install fixed length control tubes (9) as follows:

a. Position control tubes (9) between servo actuators (8) and bellcranks (3).

b. Connect bellcrank ends using bolts (22) with washers (21) under nuts (20), with bolt heads inboard. Install cotter pins (19).

c. Connect servo actuator (8) ends using bolts (31) with washers (30) under bolt heads and nuts (29). Install cotter pins (28).

7. Install adjustable control tubes (6) as follows:

a. Position control tubes (6) between mixing lever (7) and bellcranks (10) with adjustable rod ends up.

b. Connect control tubes (6) to bellcranks (10) with a countersunk head bolt (43), washer (42), and nut (41). Install cotter pin (40).

c. Connect control tubes (6) to mixing lever (7) using bolts (39) with two thin washers (38) under nuts (37), with bolt heads inboard. Install cotter pin (36).

8. Check cyclic control rigging ([paragraph 67-38](#)).

9. Install access panels on aft side of center support column.
10. Close forward pylon fairing.





## TAIL ROTOR CONTROLS

### 67-61. TAIL ROTOR CONTROLS.

The tail rotor (antitorque) control system includes control pedals, pedal adjuster, push-pull tubes, bellcranks, and a pitch control mechanism mounted through the tail rotor output shaft. Actuation of pedals causes pitch change of tail rotor blades to offset main rotor torque and provides directional control of helicopter.

For helicopters with dual controls, the copilot tail rotor control pedal assembly is installed on the floor in front of the copilot seat. Two fully functioning control pedals are included in the assembly. Control pedals are linked to pilot control pedals by means of control tubes and a bellcrank.

### 67-62. TAIL ROTOR CONTROL RIGGING (Helicopters S/N 4 through 303, with Tail Rotor Boost).

#### SPECIAL TOOLS REQUIRED

| NUMBER      | NOMENCLATURE                            |
|-------------|---|
| T101740     | Tail Rotor Blade Rigging Tool           |
| T101741-101 | Tail Rotor Flapping Axis Centering Tool |



MAXIMUM OF 1.0 INCH (25.40 MM) EXPOSED THREADS ALLOWED ON ALL ADJUSTABLE ROD END BEARINGS. TOLERANCE ON RIGGING DIMENSIONS ARE PLUS OR MINUS 0.03 INCH (0.76 MM) UNLESS OTHERWISE STATED.

#### NOTE

Rigging procedures require use of a blade rigging tool workaid and a propeller protractor or inclinometer to set the proper mean tail rotor blade angle. Workaids, shown in figure 67-18, can be locally fabricated.

Rigging procedures require use of a blade rigging tool workaid and a propeller protractor or inclinometer to set the proper mean tail rotor blade angle. Workaids, shown in figure 67-18, can be locally fabricated.

1. Set pedals (1, figure 67-19) to midtravel with pedal adjuster (2).

2. Ensure all fixed length control tubes (3, 4, 6, 7, 8, and 15) are installed (detail A, for typical rod end bearing installation).

3. Disconnect adjustable control tube (13) from adapter (11) on servo actuator (10). Adjust adapter to dimension of 1.22 inches (30.99 mm) as shown in detail B. Tighten adapter jamnut (12) .

4. Install workaid or T101740 rigging tool on forward blade, 5.00 inches (127.00 mm) from tip (detail C and section D-D). Secure tool in place to prevent rotor from flapping.

5. Using a level on leading edge of forward tail rotor blade, position and secure tail rotor hub and blade assembly (16) within 0.5 degree of horizontal (view C).

6. With tail rotor hub and blades (16) positioned in accordance with steps 4. and 5., place a propeller protractor or inclinometer on outboard surface of the workaid as shown in section D-D and record blade angle.

#### NOTE

Manufacturing tolerances on the tail rotor hub and blades and pitch links may cause a difference in nominal blade angle between forward and aft blades. If forward blade angle was 10° and aft blade angle was 9°, then mean blade angle would be 9.5°.

#### NOTE

Formula for obtaining mean blade angle is:

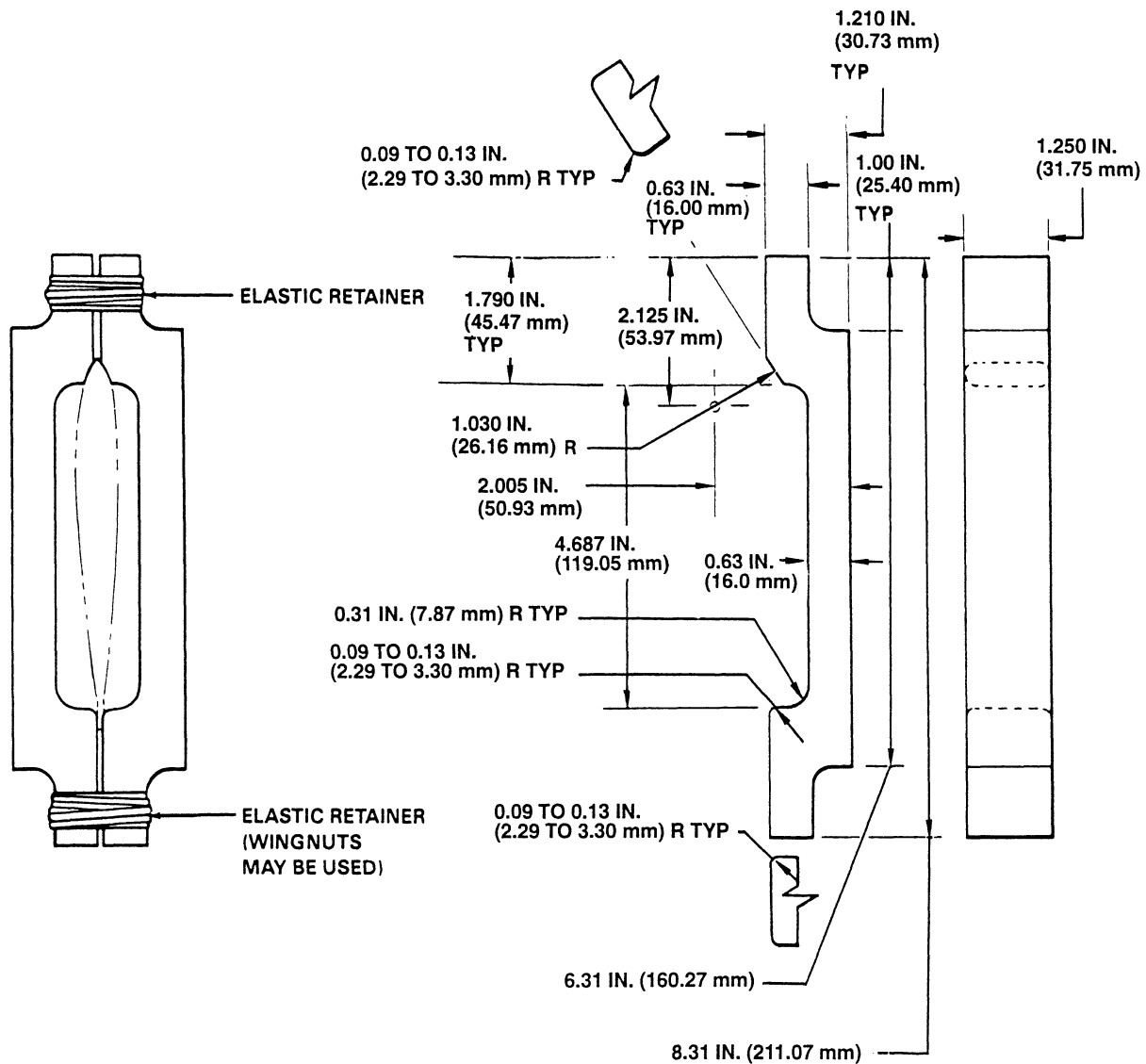
$$\frac{\text{FWD BLADE ANGLE} + \text{AFT BLADE ANGLE}}{2} = \text{MEAN BLADE ANGLE}$$

7. Rotate the blades 180° and repeat steps 5. and 6. on aft tail rotor blade and record blade angle.

8. Determine mean blade angle.

9. Move crosshead (17) inboard (left pedal position) to obtain a mean blade angle of 19 to 19.5° and hold.

10. Hold crosshead in place or mark position with reference line marked on pitch change shaft, or use feeler gage to hold desired angle of the blades. Measure gap between knurled nut and crosshead.

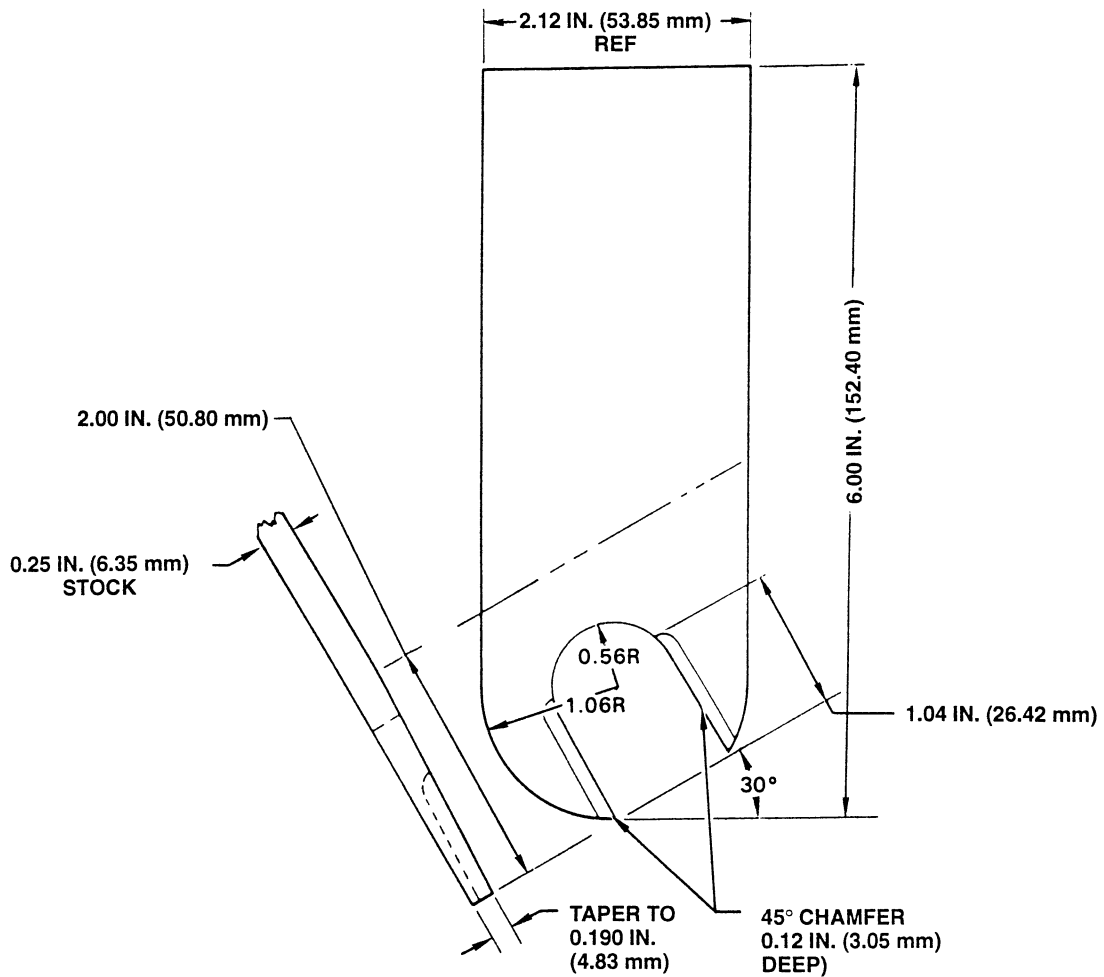


NOTES

1. Make from aluminum or hardwood (birch, ash, or maple). Ensure exposed areas are thoroughly sealed with polyurethane topcoat (C-218).
2. This workaid can be used in lieu of T101740 rigging tool.

206A/BS-M-67-18-1

Figure 67-18. Tail rotor rigging workaid (Sheet 1 of 2)

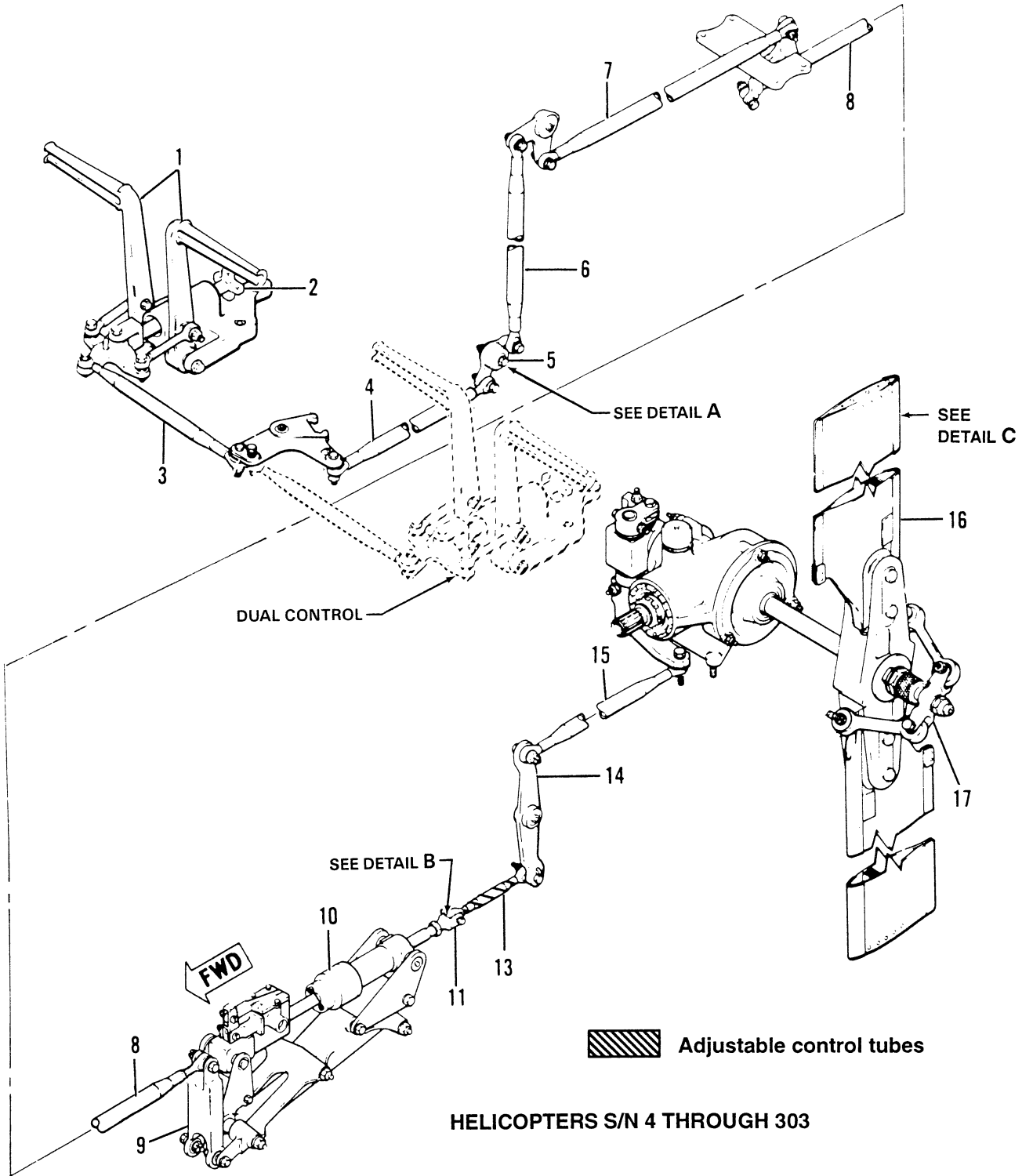


**NOTES (Cont)**

3. Make from 2024 T3 aluminum alloy.
4. This workaid can be used in lieu of T101741-101 centering tool.

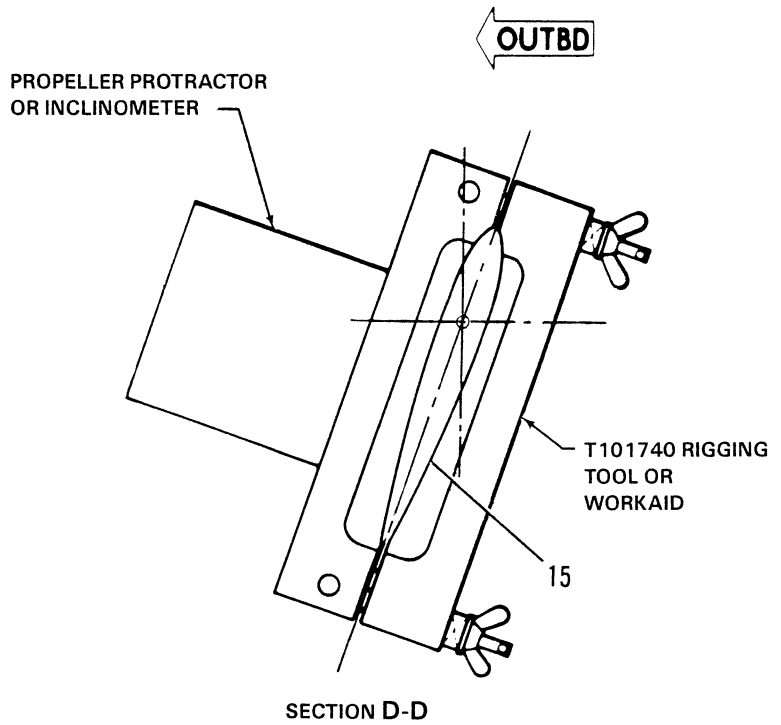
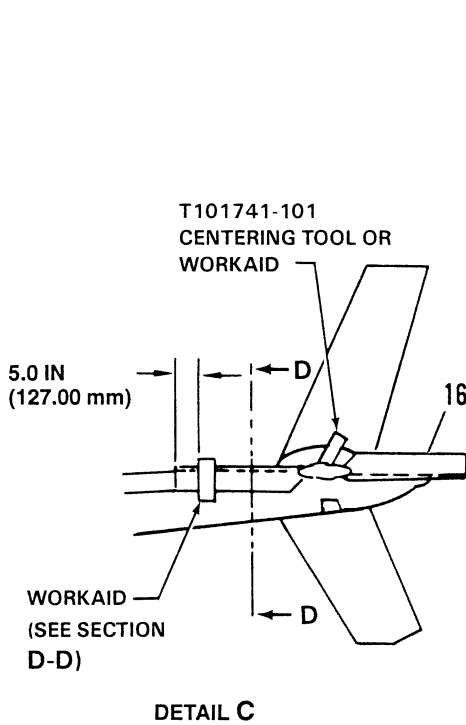
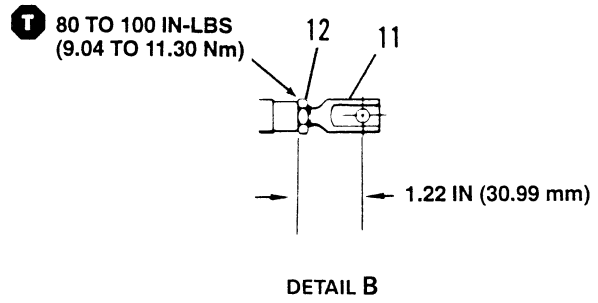
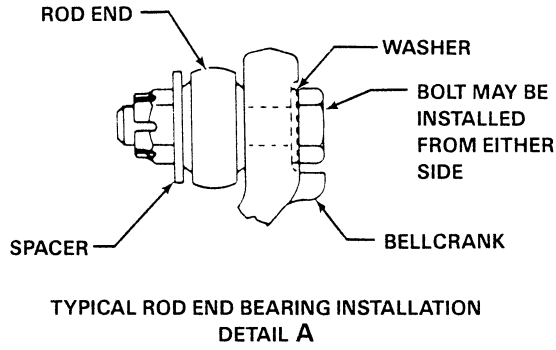
206A/BS-M-67-18-2

**Figure 67-18. Tail rotor rigging workaid (Sheet 2)**



206A/BS-M-67-19-1

Figure 67-19. Antitorque control system rigging (Sheet 1 of 2)



- |                   |                              |
|-------------------|------------------------------|
| 1. Pedals         | 10. Servo actuator           |
| 2. Pedal adjuster | 11. Adapter                  |
| 3. Control tube   | 12. Jamnut                   |
| 4. Control tube   | 13. Control tube             |
| 5. Bellcrank      | 14. Walking beam             |
| 6. Control tube   | 15. Control tube             |
| 7. Control tube   | 16. Tail rotor hub and blade |
| 8. Control tube   | 17. Crosshead                |
| 9. Lever          |                              |

HELICOPTERS S/N 4 THROUGH 303

206A/BS-M-67-19-2

Figure 67-19. Antitorque control system rigging (Sheet 2)

**11.** Make final rigging adjustments as follows:

- a. Hold left pedal (1) forward against stop.
- b. Position tail rotor hub and blades (16) in accordance with step 7.
- c. With portable hydraulic test stand, connect test stand to helicopter and operate at 550 to 650 psi (3792.00 to 4482.00 kPa). Adjust control tube (13) to fit adapter (11) and connect. Tighten rod end bearing jamnut (12) **T**.



**ACTUATOR VALVE MUST BE BOTTOMED AND HELD IN POSITION DURING ADJUSTMENT.**

- d. Without portable hydraulic test stand, push servo actuator (10) forward to bottom servo valve in the aft direction and hold. Adjust control tube (13) to fit adapter (11), then shorten one turn and connect. Tighten rod end bearing jamnut (12) **T**.
  - e. Cycle pedals (1). Position and hold left pedal forward against stop and verify that tail rotor blade angle is within required limits (refer to step 7.). If blade angle is not within limits, readjust control tube (13) as required.
- 12.** Remove all workaids and disconnect hydraulic test stand if used.
- 13.** Coat rod end bearing threads and jamnuts on adjustable control tube (13) and adapter (11) with corrosion preventive compound (C-104).
- 14.** Check antitorque control system to ensure that all safety devices (cotter pins, lockwire, jamnuts, etc.) are installed and secured. Check controls for freedom of movement without binding or interference with tail rotor hub and blades flapped in both extreme positions.
- 15.** During ground runup, balance tail rotor pedal forces in accordance with paragraph 67-65 or 67-66, as applicable.
- 16.** Dynamic balance tail rotor hub and blade using Chadwick-Helmuth Company track and balance equipment and procedures (Chapter 18).

**67-63. TAIL ROTOR CONTROL RIGGING (Helicopters S/N 304 through 497).**



**MAXIMUM OF 1.0 INCH (25.40 MM) EXPOSED THREADS ALLOWED ON ALL ADJUSTABLE ROD END BEARINGS. TOLERANCE ON RIGGING DIMENSIONS ARE PLUS OR MINUS 0.03 INCH (0.76 MM), UNLESS OTHERWISE STATED.**

**NOTE**

Rigging procedures require the use of a blade rigging tool workaid and a propeller protractor or inclinometer to set the proper mean tail rotor blade angle. Workaids, shown in figure 67-18, can be locally fabricated.

1. Set pedals (1, figure 67-20) to midtravel with pedal adjuster (2).
2. Ensure all fixed length control tubes (3, 6, 7, 12, and 14) are installed (detail A, for typical rod end bearing installation).
3. Disconnect adjustable control tube (4) from bellcrank (5) and adjustable control tube (8) from lever (9).
4. Hold left pedal forward against stop. Set bellcrank (5) to a dimension of 1.46 inches (37.08 mm) from floor line as shown in detail B. Adjust control tube (4) to fit bellcrank and connect. Tighten rod end bearing jamnut (17) **T**.
5. Disconnect control tube (12) from adapter (11) on servo actuator (10). Adjust adapter to a dimension of 1.22 inches (31.00 mm) as shown in detail C and reconnect control tube. Tighten adapter jamnuts (17) **T**.
6. Install workaid or T101740 rigging tool on forward blade, 5.0 inches (127.00 mm) from tip as shown in detail D and section E-E. Secure tool in place to prevent blade from flapping.
7. Using a level on leading edge of forward tail rotor blade, position and secure tail rotor hub and blade assembly (15) within 0.5 degree of horizontal as shown in detail D.
8. With tail rotor hub and blades (15) positioned in accordance with steps 6. and 7., place a propeller protractor or inclinometer on outboard surface of the workaid as shown in section E-E and record blade angle.

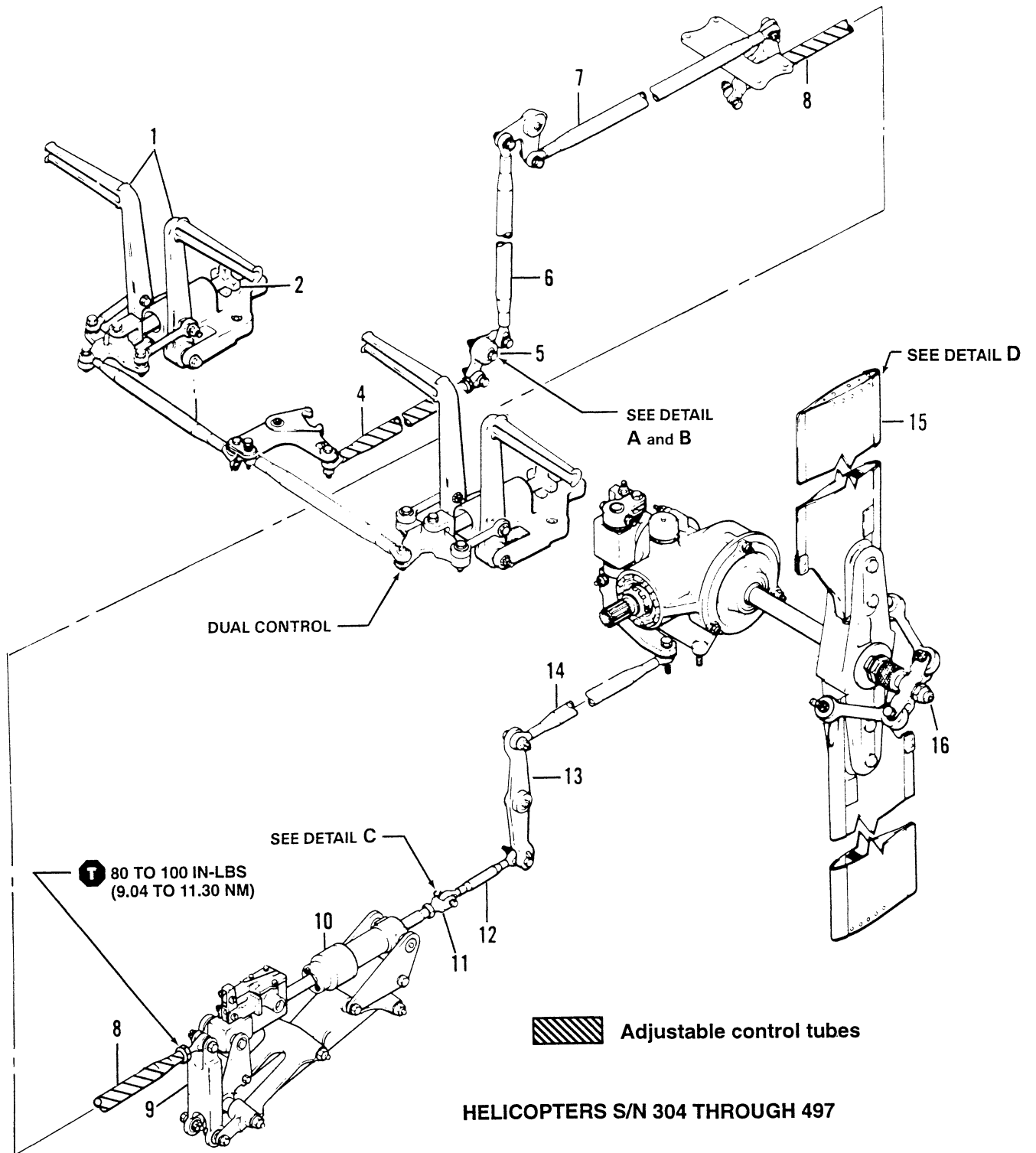
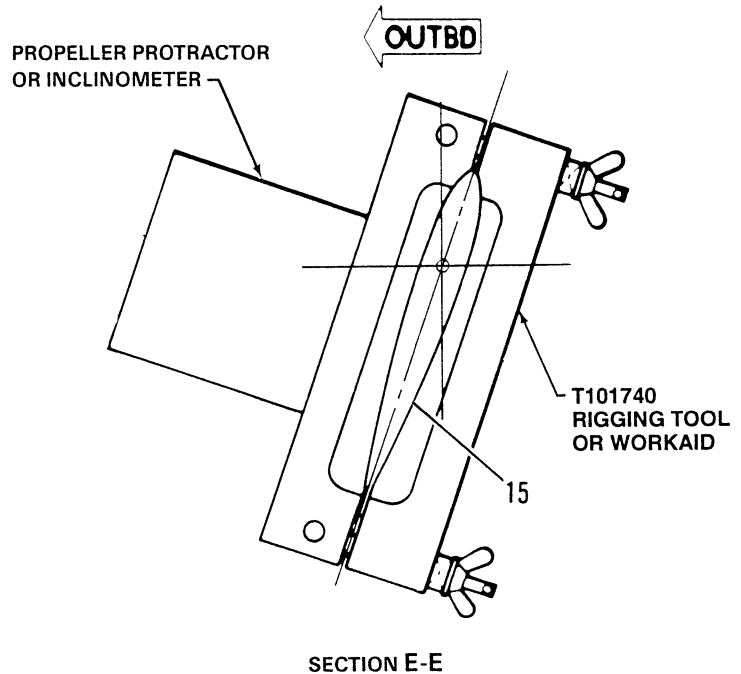
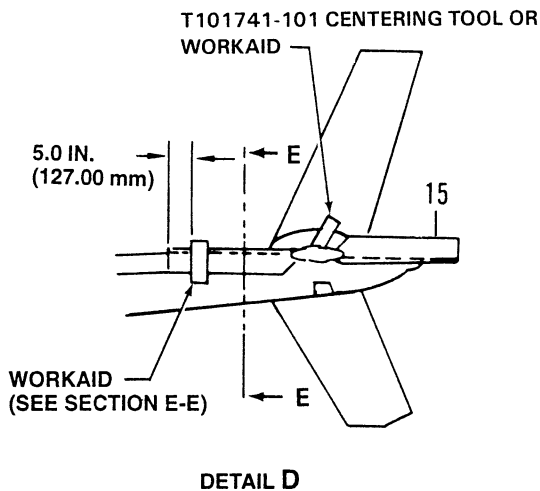
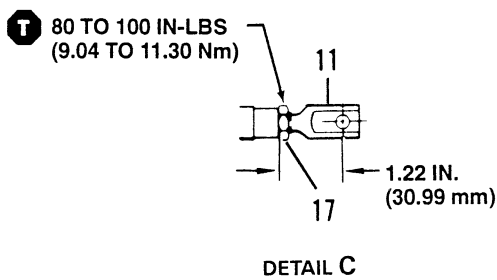
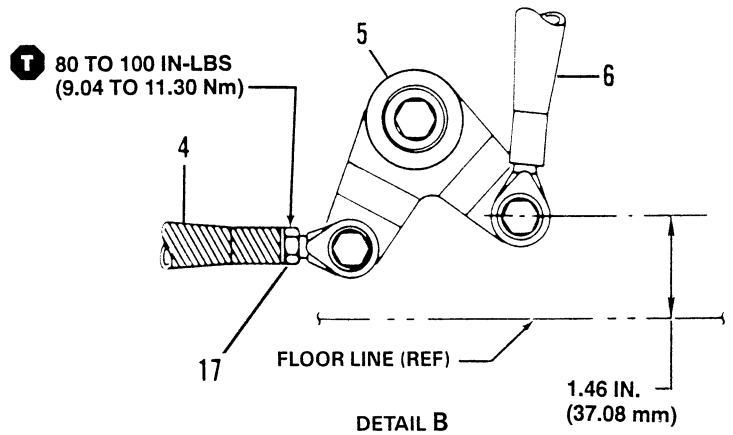
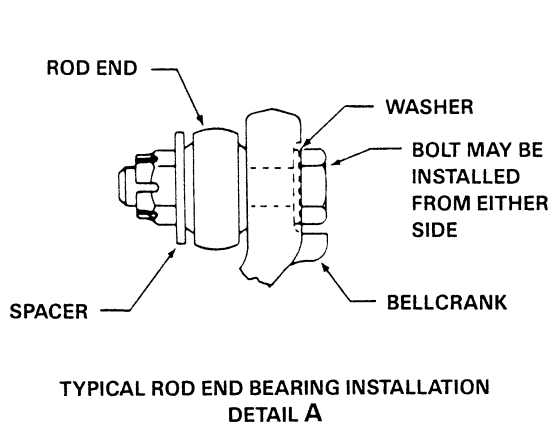


Figure 67-20. Antitorque control system rigging (Sheet 1 of 2)





- |                   |                    |                              |
|-------------------|--------------------|------------------------------|
| 1. Pedals         | 7. Control tube    | 13. Walking beam             |
| 2. Pedal adjuster | 8. Control tube    | 14. Control tube             |
| 3. Control tube   | 9. Lever           | 15. Tail rotor hub and blade |
| 4. Control tube   | 10. Servo actuator | 16. Crosshead                |
| 5. Bellcrank      | 11. Adapter        | 17. Jamnuts                  |
| 6. Control tube   | 12. Control tube   |                              |

Figure 67-20. Antitorque control system rigging (Sheet 2)



**NOTE**

Manufacturing tolerances on the tail rotor hub and blades and the pitch links may cause a difference in nominal blade angle between the forward and aft blades. If the forward blade angle was 10° and the aft blade angle was 9°, then the mean blade angle would be 9.5°.

9. Rotate tail rotor blades 180° and repeat steps 6. through 8. on aft tail rotor blade and record blade angle.
10. Determine mean blade angle.
11. Move crosshead (16) inboard (left pedal position) to obtain a mean blade angle of 19 to 19.5° and hold by hand pressure or use a feeler gage between knurled nut and crosshead.
12. Make final rigging adjustments as follows:
  - a. Hold left pedal forward against stop.
  - b. Position tail rotor hub and blades (15) in accordance with step 9.
  - c. With portable hydraulic test stand, connect test stand to helicopter and operate at 550 to 650 psi (3792.00 to 4482.00 kPa). Adjust control tube (8) to fit lever (9) and connect. Tighten rod end bearing jamnut .
  - d. Without portable hydraulic test stand, push servo actuator (10) forward to bottom servo valve in the aft direction and hold. Adjust control tube (8) to fit lever (9), then shorten one turn and connect. Tighten rod end bearing jamnut (17) .



ACTUATOR VALVE MUST BE BOTTOMED AND HELD IN POSITION DURING ADJUSTMENT.

- e. Cycle pedals. Position and hold left pedal forward against stop and verify that tail rotor blade angle is within required limits (refer to step 9.). If blade angle is not within limits, readjust control tube (8) as required.
13. Remove all workaids and disconnect hydraulic test stand if used.

14. Coat rod end bearing threads and jamnuts on adjustable control tubes (4 and 8) and adapter (11) with corrosion preventive compound (C-104).

15. Check antitorque control system to ensure that all safety devices (cotter pins, lockwire, jamnuts, etc.) are installed and secured. Check controls for freedom of movement without binding or interference with tail rotor hub and blades flapped in both extreme positions.

16. During ground runup, balance tail rotor pedal forces in accordance with paragraph 67-66 or 67-67, as applicable.

17. Dynamic balance tail rotor hub and blade using Chadwick-Helmuth Company track and balance equipment and procedures (Chapter 64).

#### 67-64. TAIL ROTOR CONTROL RIGGING (Helicopters S/N 498 and subsequent).



MAXIMUM OF 1.0 INCH (25.40 MM) EXPOSED THREADS ALLOWED ON ALL ADJUSTABLE ROD END BEARINGS. TOLERANCE ON RIGGING DIMENSIONS ARE PLUS OR MINUS 0.03 INCH (0.76 MM), UNLESS OTHERWISE STATED.

**NOTE**

Rigging procedures require the use of a workaid and a propeller protractor or inclinometer to set the proper mean tail rotor blade angle. Workaids, shown in figure 67-18, can be locally fabricated.

**NOTE**

Rigging procedures are included for helicopters equipped with the tail rotor boost kit.

1. Set pedals (1, figure 67-21) to midtravel with pedal adjuster (2).
2. Ensure all fixed length control tubes (3, 6, 7, 10, or 20, detail C, and 12) are installed and connected (detail A, for typical rod end bearing installation).
3. Disconnect adjustable control tube (4) from bellcrank (5), adjustable control tube (8) from idler (9) or lever (17, detail C) (with tail rotor hydraulic boost kit installed), and adjustable rod assembly (14) from bellcrank (13).

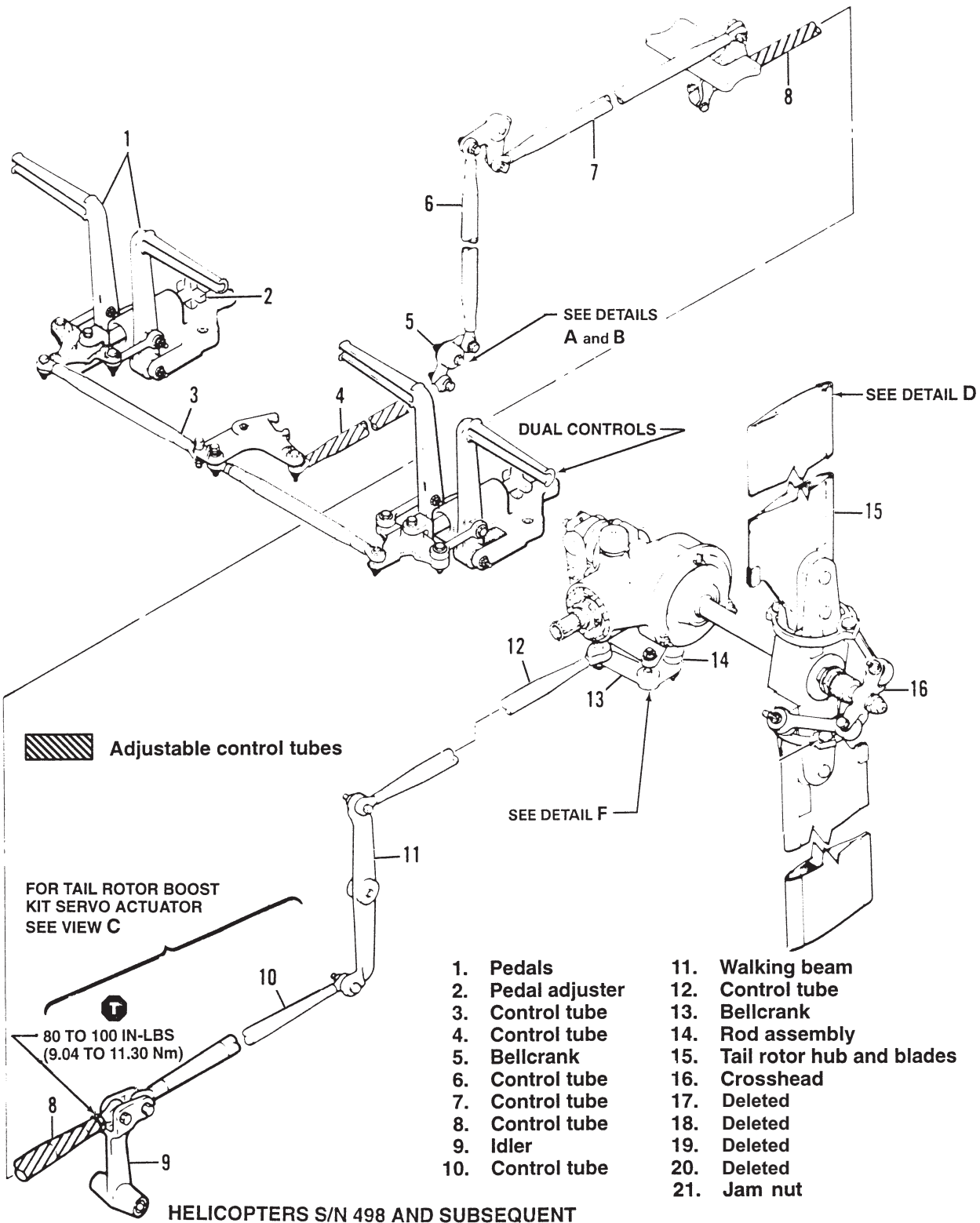
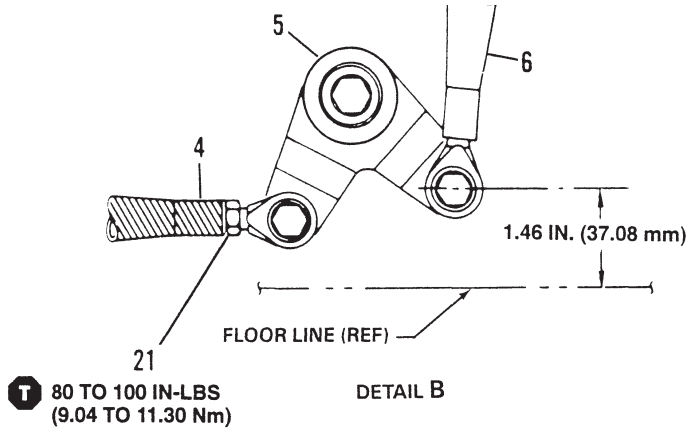
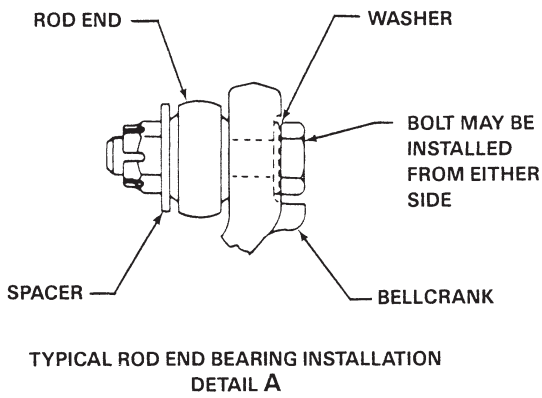
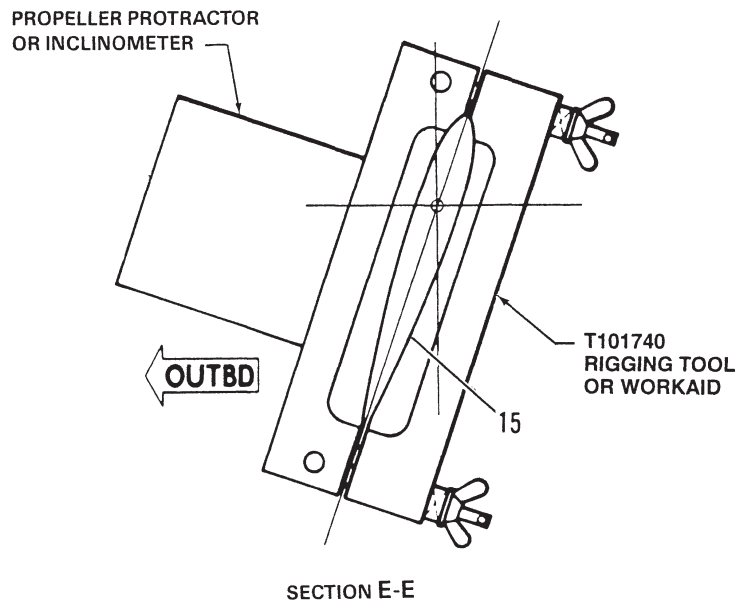
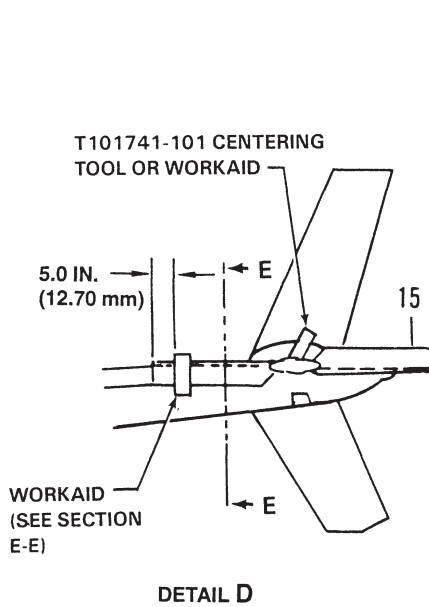


Figure 67-21. Antitorque Control System Rigging (Sheet 1 of 3)

206AB\_MM\_67\_0021a



DETAIL C  
DELETED



HELICOPTERS S/N 498 AND SUBSEQUENT

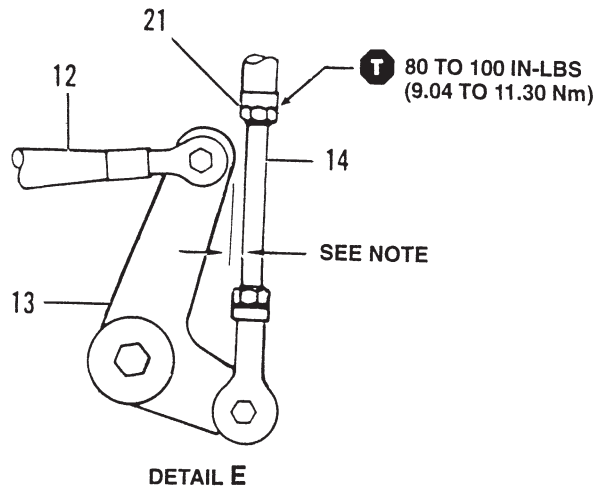
206AB\_MM\_67\_0021b

Figure 67-21. Antitorque Control System Rigging (Sheet 2 of 3)


**NOTE**

Applicable to 206A/B prior to S/N 4005  
0.17 to 0.45 inch (4.32 to 11.43 mm)

Applicable to 206B S/N 4005 and  
subsequent  
0.285 to 0.315 inch (7.34 to 8.00 mm)

**HELICOPTERS S/N 498 AND SUBSEQUENT****Figure 67-21. Antitorque Control System Rigging (Sheet 3 of 3)**

206AB\_MM\_67\_0021c

4. Hold left pedal forward against stop. Set bellcrank (5) to a dimension of 1.46 inches (37.08 mm) from floor line as shown in Detail B. Adjust control tube (4) to fit bellcrank and connect. Tighten rod end bearing jam nut (21) .

5. Deleted.

6. Using a level on leading edge of forward tail rotor blade, position and secure tail rotor hub and blade assembly (15) within 0.5° of horizontal as shown in Detail D. Position and hold blade within 0.5° of perpendicular to the gearbox output shaft.

7. Install workaid or T101740 rigging tool on forward blade, 5.0 inches (127.00 mm) from tip, as shown in Detail D and Section E-E. Secure tool in place.

8. With tail rotor hub and blade (15) positioned in accordance with step 6 and step 7, place a propeller protractor or inclinometer on outboard surface of the workaid as shown in Section E-E and record blade angle.

**NOTE**

Manufacturing tolerances on tail rotor hub and blades and pitch links may cause a difference in nominal blade angle between forward and aft blades. If forward blade angle was 10° and aft blade angle was 9°, then mean blade angle would be 9.5°.


9. Repeat step 6 through step 8 on aft tail rotor blade and record blade angle. Determine mean blade angle, then move crosshead (16) inboard (left pedal position) to obtain a mean blade angle, then hold:

a. 19 to 19.5° for helicopters with short tail rotor blades (S/N 4 through 2211 not modified per SI 206-112).

b. 17.5 to 18° for helicopters with long tail rotor blades (S/N 4 through 2211 modified per SI 206-112 and S/N 2212 through 4004).

c. 23.25 to 23.75° for helicopters S/N 4005 and subsequent.


10. With tail rotor hub and blades (15) positioned in accordance with step 9, reposition bellcrank (13) and rod assembly (14) to a dimension shown in Detail F.

Adjust rod assembly to fit bellcrank and connect. Tighten rod end bearing jam nut (21) .

11. Make final rigging adjustments as follows:

a. Hold left pedal forward against stop.

b. Position tail rotor hub and blades in accordance with step 9.

c. Adjust control tube (8) to fit idler (9) and connect. Tighten rod end bearing jam nut (21) .

d. Cycle pedals (1). Position and hold left pedal forward against stop and verify that blade angle is within required limits (step 9). If blade angle is not within limits, readjust control tube (8), as required.

12. Remove rigging tool and disconnect portable hydraulic test stand (when used).

13. Coat rod end bearing threads and jam nuts on adjustable control tubes (4 and 8) and rod assembly (14) with corrosion preventive compound (C-104).

14. Check complete antitorque control system to ensure that all safety devices (cotter pins, lockwire, jam nuts, etc.) are installed and secured. Check controls for freedom of movement without binding or interference with tail rotor hub and blades flapped in both extreme positions.

15. During ground run-up, balance tail rotor pedal forces in accordance with [paragraph 67-65](#) (with tail rotor boost kit) or [paragraph 67-66](#) (without tail rotor boost kit).

16. Deleted.

### **67-65. DYNAMIC BALANCING — TAIL ROTOR PEDAL FORCES (WITH TAIL ROTOR BOOST KIT)**

1. Remove bolts (1, [Figure 67-22](#), Detail A), counterweight washers (2), nuts (4), and cotter pins (5) from pitch horns (3) on tail rotor blades (6).

#### **NOTE**

Parts are not required on helicopters with tail rotor boost kit.

2. Remove access panel from underneath forward center of fuselage.

3. Ensure that eyebolt (7, Detail B) is secured in center hole of bracket (13).

4. Loosen screw (9) and nut (10) on clamp (12) until all friction is relieved from bellcrank (11).

5. Align pilot pedals in neutral position and adjust nuts on eyebolt (7) until all slack in spring (8) is removed.

6. With hydraulic boost ON (use of a portable hydraulic test stand is recommended), apply a slight forward force on either pedal and release. Pedal should remain in the same position as when force was removed.

7. If left pedal moves forward (motors-rapid movement) after release of forward force, relocate eyebolt (7) in left hole position of bracket (13).

#### **NOTE**

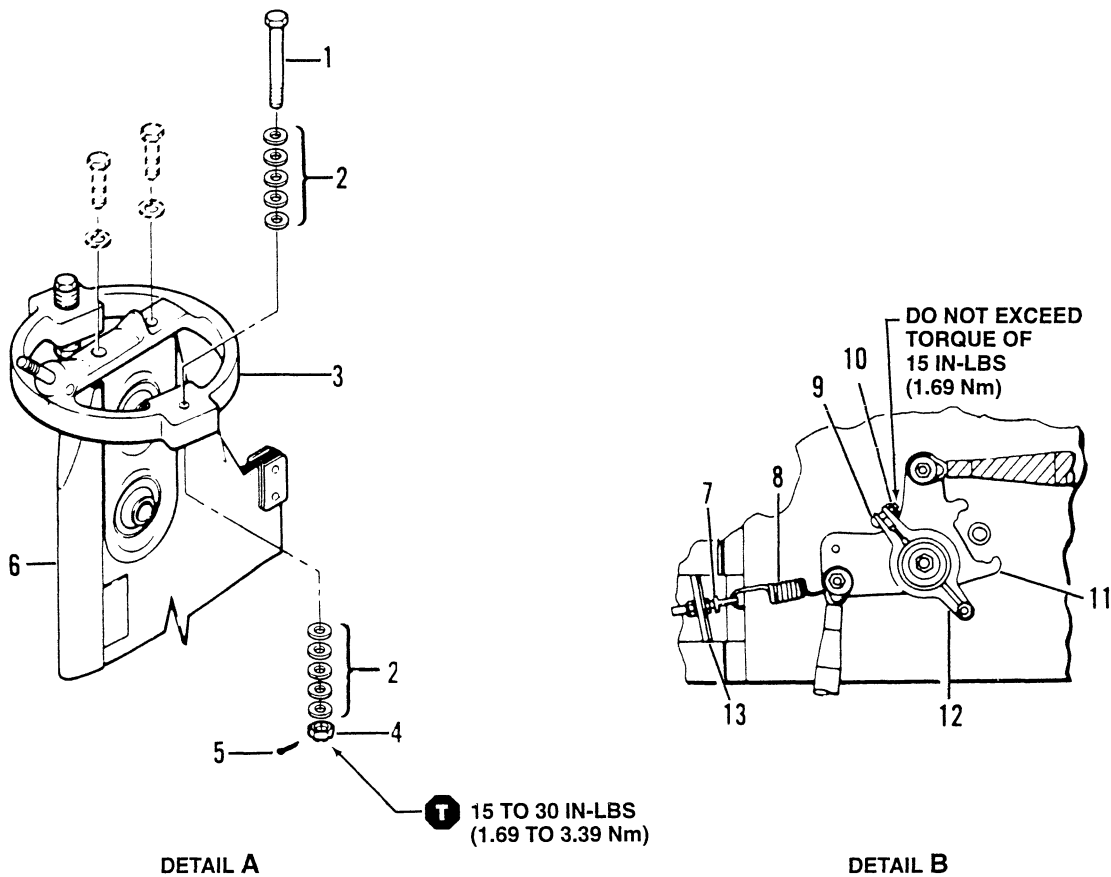
When accomplishing step 7 or step 8 and movement (motoring) is reduced to a slower rate (creep), adjust tension on spring (8) with nuts on eyebolt (7) until creep is eliminated.

8. If right pedal moves forward (motors-rapid movement) after release of force, relocate eyebolt (7) in right hole position of bracket (13).

9. Adjust friction on clamp (12) to obtain a breakaway force of 3 to 5 pounds (13.34 to 22.24 N) measured at each of the pilot pedals, using a spring scale.

a. Loosen screw (9) and nut (10) on clamp (12) until all friction is relieved, if not previously accomplished.

b. Position pilot pedals in neutral position and attach a spring scale perpendicular to pedals with hydraulic boost system ON (use of a portable hydraulic test stand is recommended).



- |                          |               |
|--------------------------|---------------|
| 1. Bolt                  | 8. Spring     |
| 2. Counterweight washers | 9. Screw      |
| 3. Pitch horn            | 10. Nut       |
| 4. Nut                   | 11. Bellcrank |
| 5. Cotter pin            | 12. Clamp     |
| 6. Tail rotor blade      | 13. Bracket   |
| 7. Eyebolt               |               |

Figure 67-22. Balance of tail rotor pedal forces

c. Adjust screw (9) and nut (10) on clamp (12) until a pedal friction breakaway force of 3 to 5 pounds (13.34 to 22.24 N) is obtained at each pedal. Do not exceed 15 inch-pounds (1.69 Nm) torque on screw and nut.

10. Reinstall access panel and disconnect hydraulic test stand.

### 67-66. DYNAMIC BALANCING — TAIL ROTOR PEDAL FORCES (without Tail Rotor Boost Kit).

1. Remove access panel from underneath forward center of fuselage.

2. Loosen screw (9, figure 67-22, detail B) and nut (10) on clamp (12) until all friction is relieved on bellcrank (11). Reinstall access panel.


#### NOTE

Eyebolt (7), spring (8), and bracket (13) are not used in this configuration.

3. Check pitch horns (3, detail A) on each tail rotor blade (6) to ensure that correct quantity of counterweight washers (2) are installed. Each hub and blade assembly must not have more than 40 counterweight washers (20 on each pitch horn), with five on each side of the lugs. If counterweight washers arrangement is incorrect, accomplish the following:

a. Remove cotter pin (5), nut (4), counterweight washers (2), and bolts (1) from two locations on each pitch horn (3).

b. Assemble 40 AN970-3 counterweight washers (2) in eight stacks.

c. Position five counterweight washers (2) next to head of bolts (1) and install from inboard side of lugs on pitch horns (3). Install five counterweight washers to outboard side with nuts (4) . Secure with cotter pins (5).

d. Accomplish counterweight washer (2) installation on lugs of opposite pitch horn (3).

4. Prepare helicopter for ground runup. Position helicopter into wind and ground run at 100 percent N2.

5. Place tail rotor pedals in neutral position and observe if pedals creep when not held by foot pressure.

6. If left pedal creeps forward, counterweight washers (2) are too heavy and shall be adjusted in accordance with step 7. Displace pedals approximately 1.0 inch (25.40 mm) from neutral and recheck for creep.



TO PREVENT UNBALANCING TAIL ROTOR HUB AND BLADE ASSEMBLY, MEASURE EACH COUNTERWEIGHT WASHER AS IT IS REMOVED TO ENSURE AN EQUAL THICKNESS AND QUANTITY OF WASHERS ARE REMOVED AT ALL FOUR POINTS ON THE TWO PITCH HORNS.

7. Adjust by removing counterweight washers (2) equally at four lugs on pitch horns (3). Replace removed AN970-3 washers with AN960PD10 washers equally at four lugs on pitch horns. Use NAS1303-13D through NAS1303-19D bolts (1) to obtain correct thread engagement. Quantity and type of washers and bolts must be the same on all four lugs of pitch horns.

8. Perform test flight and recheck pedal balance at normal cruise airspeed. Readjust as desired by pilot in accordance with steps 6. and 7.

9. Adjust pedal friction as follows:

a. Remove access panel from underneath forward center of fuselage.

b. Place pilot pedal in neutral position.

c. Using a spring scale positioned perpendicular to and connected to pedals, check for a friction force of 3 to 5 pounds (13.34 to 22.24 N) to move pedals from their neutral position.

d. Adjust nut (10, detail B) on screw (9) at clamp (12) until desired friction of 3 to 5 pounds (13.34 to 22.24 N) is obtained. Do not exceed torque of 15 inch-pounds (1.69 Nm) on screw and nut. Reinstall access panel.





## PILOT AND COPILOT TAIL ROTOR PEDALS AND ADJUSTER

### 67-67. TAIL ROTOR PEDALS AND ADJUSTER

Tail rotor control pedals mounted on the pilot and copilot compartment deck are connected under the center console to a bellcrank pedal adjuster which provides for manual adjustment of pedal position, according to pilot and copilot needs.

#### NOTE

For helicopters equipped with dual controls, the copilot pedal assembly provides a means for the copilot to control the tail rotor assembly. The pedals can be positioned as desired by means of the pedal adjuster.

### 67-68. TAIL ROTOR PEDALS AND ADJUSTER — REMOVAL

1. Disconnect links (34, [Figure 67-23](#)) to left and right pedals (1 and 4) by removing cotter pins (15), nuts (3), washers (2), spacers (35), and bolts (36).
2. Disconnect left and right pedals (1 and 4) by removing cotter pin (12), nut (13), washers (14), and bolt (33). Lift pedals clear of support (11).
3. Disconnect tube assembly (21) from bellcrank (28) by removing cotter pin (25), nut (26), washer (27), spacer (29), and bolt (30).
4. Remove support (11) from cockpit floor by removing bolts (5) and washers (6).
5. Remove bellcrank (28) from clevis (16) by removing cotter pin (19), nut (18), washers (17), and bolt (32). If required, remove links (34) from bellcrank (28) by removing cotter pins (23), nuts (24), washers (22), washer (39), spacers (37), and bolts (38).
6. Remove pedal adjuster from support (11) by removing cotter pin (31), nut (20), washer (9), and pulling bolt (8) from knob (10). Remove washer (9), and two Belleville washers (7) from bolt (8). Remove knob (10) and clevis (16).

### 67-69. TAIL ROTOR PEDALS AND ADJUSTER — INSPECTION AND REPAIR

1. Inspect bearings and bushings in left and right pedals (1 and 4, [Figure 67-23](#)), support (11), clevis (16), tube assembly (21), bellcrank (28), and links (34) for wear and roughness ([paragraph 67-3](#) and [paragraph 67-5](#)).
2. Operate pedal adjuster by use of knob (10) through full travel and check for corrosion and binding. Knob should turn freely.
3. Inspect pedal assembly and pedal support (11) for nicks, scratches, and cracks (BHT-206A/B-SERIES-CR&O).

### 67-70. TAIL ROTOR PEDALS AND ADJUSTER — INSTALLATION

1. Install pedal adjuster in support (11, [Figure 67-23](#)) as follows:
  - a. Install clevis (16) into forward side of support (11).
  - b. Thread knob (10) into aft side of support (11) until bottomed out and contacting clevis.
  - c. Insert two Belleville washers (7) with only outside diameters touching, and washer (9) under head of bolt (8). Insert bolt with washers (7 and 9) through knob (10) and clevis (16).
  - d. Install additional washer (9) and nut (20) on bolt (8) at end of clevis (16). Tighten nut until all freeplay is removed, then tighten one additional nut castellation and install cotter pin (31).
2. If filler pads in support (11) are loose or removed, bond with adhesive ([C-324](#)).
3. Install bellcrank (28) to clevis (16) and secure with bolt (32), washers (17), nut (18), and cotter pin (19).
4. Install left and right pedals (1 and 4) to support (11) and secure with bolt (33), washers (14), nut (13), and cotter pin (12).

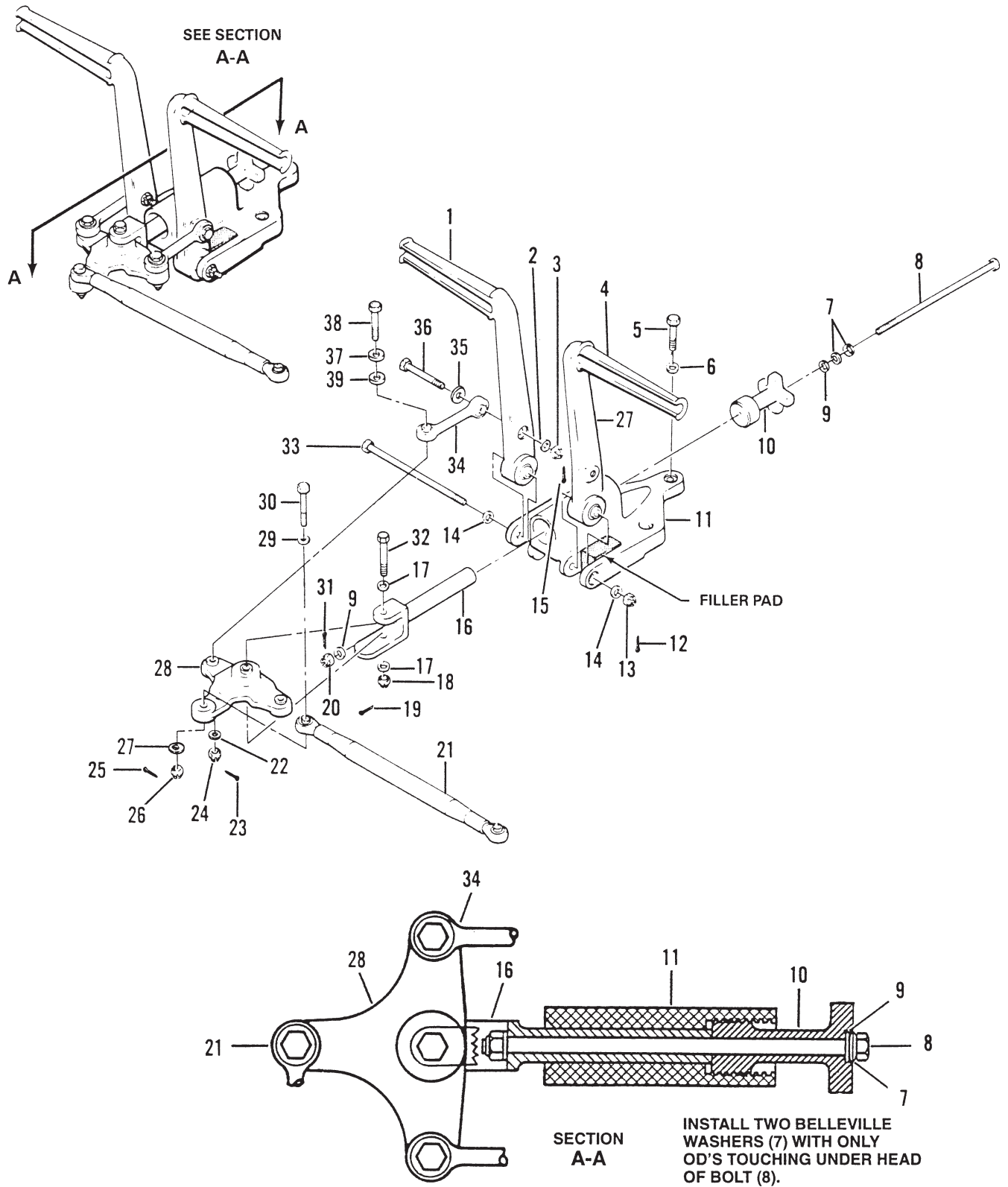
5. Connect links (34) to bellcrank (28). Align links to top surface of bellcrank and secure with bolts (38), spacers (37), washer (39), washers (22), nuts (24), and cotter pins (23).

6. Connect links (34) to left and right pedals (1 and 4). Align links to pedals and secure with bolts (36), spacers (35), washers (2), nuts (3), and cotter pins (15).

7. Position and align assembled pedals and adjuster assembly to mounting holes in cockpit floor and secure with bolts (5) and washers (6).

8. Connect tube assembly (21) to top surface of bellcrank (28) and secure with bolt (30), spacer (29), washer (27), nut (26), and cotter pin (25).

9. Copilots tail rotor pedals and adjuster are removed, inspected, repaired, and installed same as pilots. Therefore, only the pilots will be addressed.



206AB\_MM\_67\_0023a

**Figure 67-23. Tail Rotor Control Pedals and Adjuster (Sheet 1 of 2)**

- |                      |                   |                |
|----------------------|-------------------|----------------|
| 1. Right side pedal  | 14. Washer        | 27. Washer     |
| 2. Washer            | 15. Cotter pin    | 28. Bellcrank  |
| 3. Nut               | 16. Clevis        | 29. Spacer     |
| 4. Left side pedal   | 17. Washer        | 30. Bolt       |
| 5. Bolt              | 18. Nut           | 31. Cotter pin |
| 6. Washer            | 19. Cotter pin    | 32. Bolt       |
| 7. Belleville washer | 20. Nut           | 33. Bolt       |
| 8. Bolt              | 21. Tube assembly | 34. Link       |
| 9. Washer            | 22. Washer        | 35. Spacer     |
| 10. Knob             | 23. Cotter pin    | 36. Bolt       |
| 11. Support          | 24. Nut           | 37. Spacer     |
| 12. Cotter pin       | 25. Cotter pin    | 38. Bolt       |
| 13. Nut              | 26. Nut           | 39. Washer     |

206AB\_MM\_67\_0009

Figure 67-23. Tail Rotor Control Pedals and Adjuster (Sheet 2 of 2)

## TAIL ROTOR CONTROL LINKAGE

### 67-71. TAIL ROTOR CONTROL LINKAGE.

Connecting linkage consists of push-pull tubes, bellcranks, levers, and supports that connect pilot or copilot tail rotor control pedals to the tail rotor pitch change mechanism.

### 67-72. REMOVAL.

#### NOTE

Linkage can be removed in any logical sequence required for replacement of parts.

1. Remove components (39 through 123, figure 67-24) in any practical sequence.
2. Remove attaching hardware as required.

### 67-73. INSPECTION AND REPAIR.

1. Inspect and repair control tubes (21, 82, 91, 106, and 116, figure 67-24) (paragraph 67-3).
2. Inspect and repair bellcranks (28, 47, 90, and 103), supports (11 and 107), clevis (16), and walking beam (112) (paragraph 67-5).

### 67-74. INSTALLATION.

#### NOTE

The following procedure provides installation instructions for the complete tail rotor control system linkage. It is recommended that those control tubes that have adjustable rod ends be connected but not secured until the rigging procedure is accomplished.

1. Install interconnect bellcrank (47, figure 67-24) and control linkage to antitorque support (detail A) as follows:
  - a. If sleeve bearing (48) was removed, press new sleeve bearing onto interconnect bellcrank (47).
  - b. Position clamp (49) over sleeve bearing (48) on interconnect bellcrank (47). Loosely assemble screw

(56), washers (51), and nut (50) to open end of clamp (49). Open side of clamp should be positioned to the left side of the helicopter. Clamp tension shall be adjusted during rigging procedures.

- c. If pin (62) was removed, reinstall in antitorque support and secure with washers (63) and cotter pins (61).

- d. Insert interconnect bellcrank (47), with installed clamp (49), into antitorque support. Position stop ears of interconnect bellcrank on either side of installed pin (62). Secure interconnect bellcrank with bolt (60), washers (59), spacer 72), nut (71), and cotter pin (70).

- e. Reposition clamp (49) in antitorque support and secure with bolt (57), washers (52 and 58), and nut (69). Position washer (58) under head of bolt (57), and washers (52) on each side of antitorque support.

- f. Align rod end of tube assembly (21) to inboard hole of large ear on interconnect bellcrank (47). Install bolt (44) with washer (45) through top surface of interconnect bellcrank into rod end bearing of tube assembly and secure with spacer (55), nut (53), and cotter pin (54).

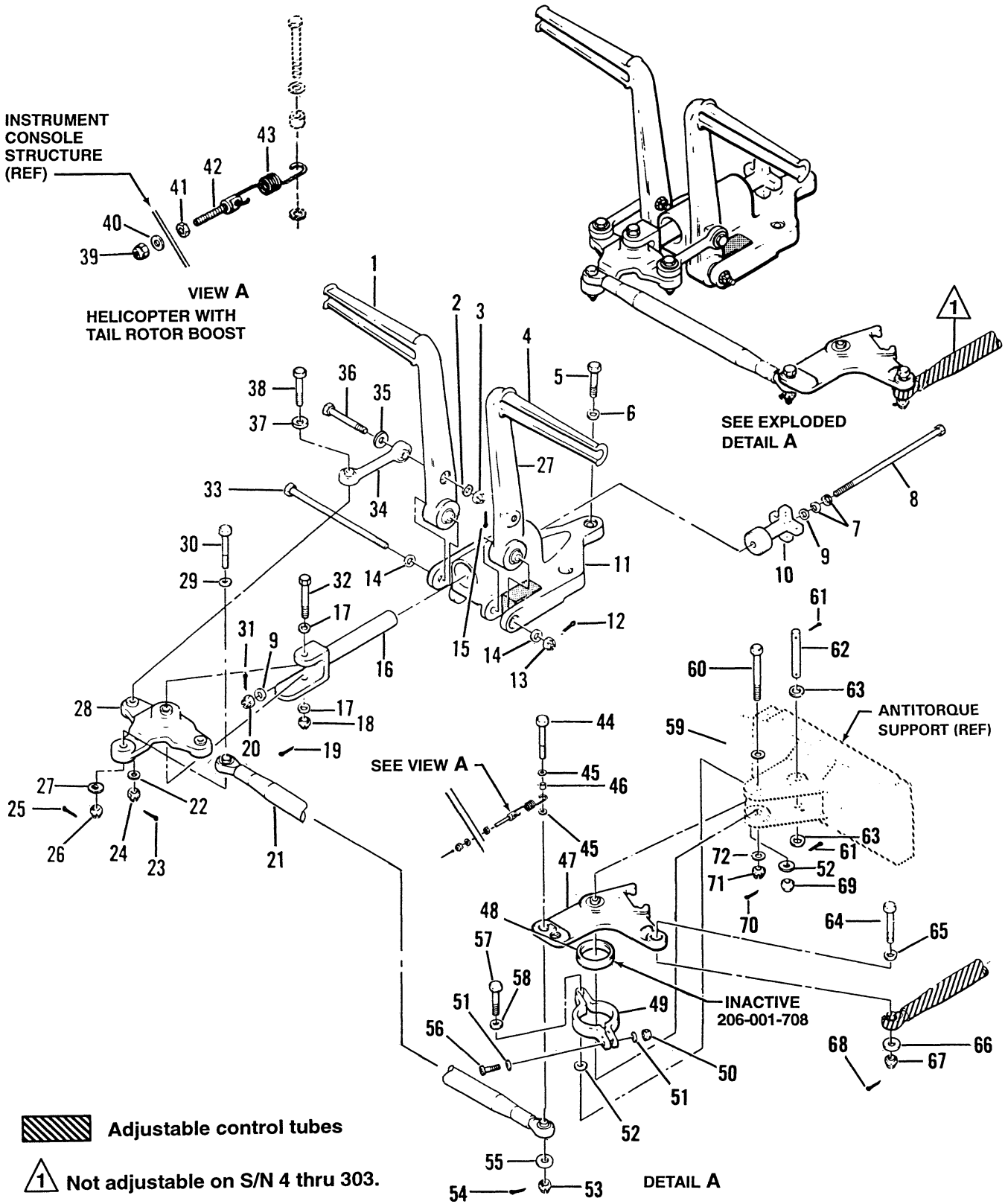
- g. On helicopters S/N 4 through 497, install pedal centering spring (43, detail A) as follows:

- (1) Repeat preceding step f. but install bolt (44) with two washers (45) and spacer (46) between the washers. Bolt is secured with spacer (55), nut (53), and cotter pin (54).

- (2) Thread nut (41) on shank of eyebolt (42) and insert through center hole in instrument console structure with centering spring (43) attached to eyebolt and around spacer (46). Install washer (40) and nut (39) to eyebolt.

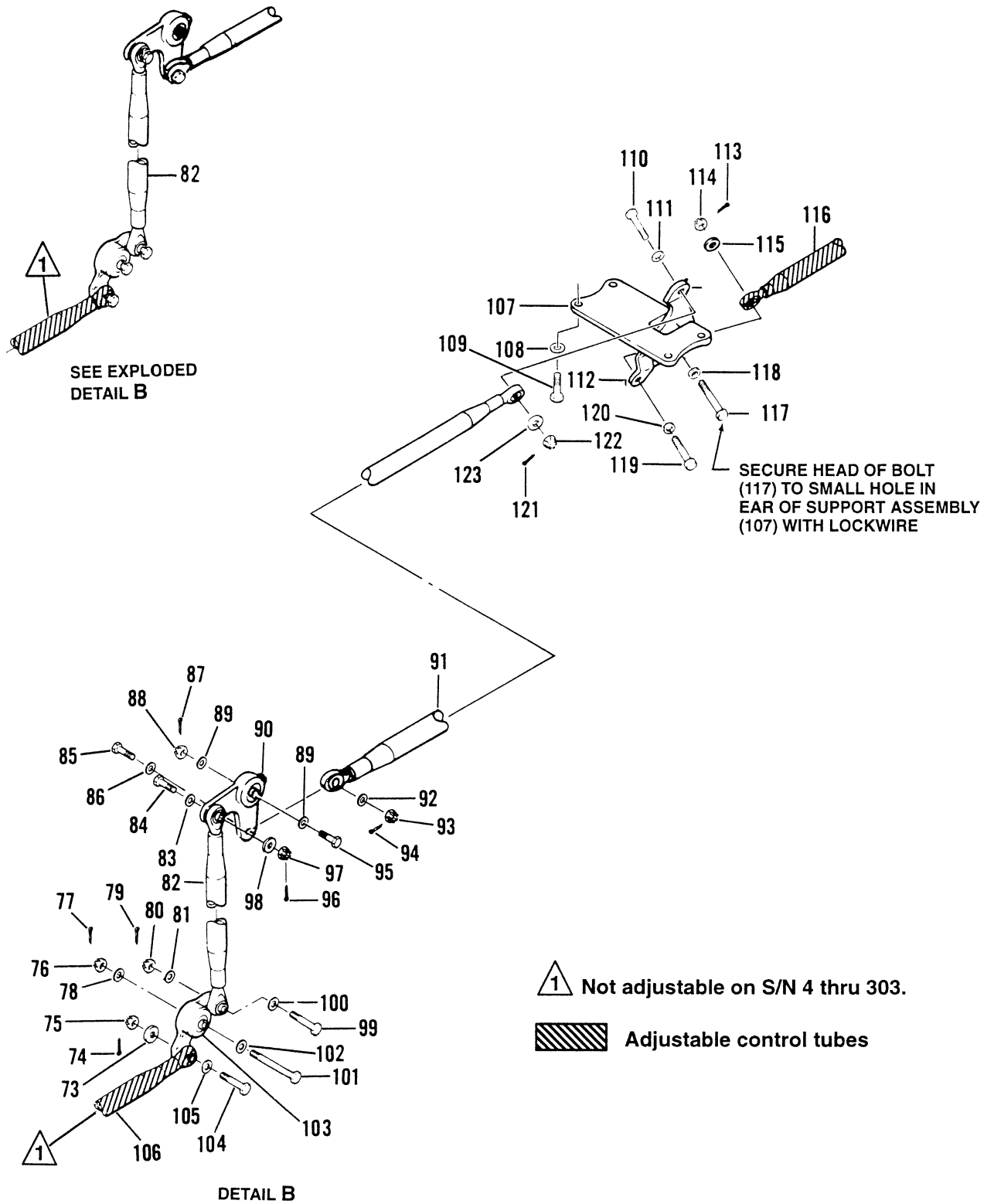
- (3) Position tail rotor control pedal in neutral position and adjust nut (39) on eyebolt (42) to remove all slack from centering spring (43). Final adjustment of centering spring shall be accomplished during rigging procedure.

- h. Position fixed end of tube assembly (106) to left lower side of interconnect bellcrank (47) at single arm. Secure with bolt (64), washer (65), spacer (66), nut (67), and cotter pin (68).



206A/BS-M-67-24-1

Figure 67-24. Tail rotor pitch control system (Sheet 1 of 3)



206A/BS-M-67-24-2

Figure 67-24. Tail rotor pitch control system (Sheet 2)

|                      |                            |                       |
|----------------------|----------------------------|-----------------------|
| 1. Right side pedal  | 42. Eyebolt                | 83. Washer            |
| 2. Washer            | 43. Centering spring       | 84. Bolt              |
| 3. Nut               | 44. Bolt                   | 85. Bolt              |
| 4. Left side pedal   | 45. Washer                 | 86. Washer            |
| 5. Bolt              | 46. Spacer                 | 87. Cotter pin        |
| 6. Washer            | 47. Interconnect bellcrank | 88. Nut               |
| 7. Belleville washer | 48. Sleeve bearing         | 89. Washer            |
| 8. Bolt              | 49. Clamp                  | 90. Bellcrank         |
| 9. Washer            | 50. Nut                    | 91. Tube assembly     |
| 10. Knob             | 51. Washer                 | 92. Spacer            |
| 11. Support          | 52. Washer                 | 93. Nut               |
| 12. Cotter pin       | 53. Nut                    | 94. Cotter pin        |
| 13. Nut              | 54. Cotter pin             | 95. Bolt              |
| 14. Washer           | 55. Spacer                 | 96. Cotter pin        |
| 15. Cotter pin       | 56. Screw                  | 97. Nut               |
| 16. Clevis           | 57. Bolt                   | 98. Spacer            |
| 17. Washer           | 58. Washer                 | 99. Bolt              |
| 18. Nut              | 59. Washer                 | 100. Spacer           |
| 19. Cotter pin       | 60. Bolt                   | 101. Bolt             |
| 20. Nut              | 61. Cotter pin             | 102. Washer           |
| 21. Tube assembly    | 62. Pin                    | 103. Bellcrank        |
| 22. Washer           | 63. Washer                 | 104. Bolt             |
| 23. Cotter pin       | 64. Bolt                   | 105. Spacer           |
| 24. Nut              | 65. Washer                 | 106. Tube assembly    |
| 25. Cotter pin       | 66. Spacer                 | 107. Support assembly |
| 26. Nut              | 67. Nut                    | 108. Washer           |
| 27. Spacer           | 68. Cotter pin             | 109. Bolt             |
| 28. Bellcrank        | 69. Nut                    | 110. Bolt             |
| 29. Spacer           | 70. Cotter pin             | 111. Washer           |
| 30. Bolt             | 71. Nut                    | 112. Walking beam     |
| 31. Cotter pin       | 72. Spacer                 | 113. Cotter pin       |
| 32. Bolt             | 73. Washer                 | 114. Nut              |
| 33. Bolt             | 74. Cotter pin             | 115. Spacer           |
| 34. Link             | 75. Nut                    | 116. Tube assembly    |
| 35. Spacer           | 76. Nut                    | 117. Bolt             |
| 36. Bolt             | 77. Cotter pin             | 118. Washer           |
| 37. Spacer           | 78. Washer                 | 119. Bolt             |
| 38. Bolt             | 79. Cotter pin             | 120. Washer           |
| 39. Nut              | 80. Nut                    | 121. Cotter pin       |
| 40. Washer           | 81. Washer                 | 122. Nut              |
| 41. Nut              | 82. Tube assembly          | 123. Spacer           |

Figure 67-24. Tail rotor pitch control system (Sheet 3)



2. Install bellcranks (90 and 103) with connecting control linkage (detail B) as follows:

a. Install lower bellcrank (103) to support and secure with bolt (101), washers (102 and 78), nut (76), and cotter pin (77).

b. Position tube assembly (106) to lower arm of bellcrank (103) and secure with bolt (104), spacer (105), washer (73), nut (75), and cotter pin (74).

c. Install vertical tube assembly (82) and secure to lower bellcrank (103) with bolt (99), spacer (100), washer (81), nut (80), and cotter pin (79).

d. Install upper bellcrank (90) to support and secure with bolt (95), washer (89), nut (88), and cotter pin (87). Connect vertical tube assembly (82) to upper bellcrank with bolt (84), washer (83), spacer (98), nut (97), and cotter pin (96).

e. Install tube assembly (91) and secure to lower arm of bellcrank (90) with bolt (85), washer (86), spacer (92), nut (93), and cotter pin (94).

3. Install walking beam (112) and support (107) with connecting control linkage (detail C) as follows:

a. Install walking beam (112) in support (107) and secure with bolt (117) and washer (118). Secure head of bolt to small hole in ear of support with lockwire.

b. Install support (107), with installed walking beam (112), to structure and secure with bolts (109) and washers (108).

c. Position tube assembly (91) to top arm of walking beam (112) and secure with bolt (110), washer (111), spacer (123), nut (122), and cotter pin (121).

d. Position fixed end of tube assembly (116) to lower arm of walking beam (112) and secure with bolt (119), washer (120), spacer (115), nut (114), and cotter pin (113). Ensure adjustable rod end of tube assembly (116) is aft and that exposed thread length does not exceed 1.0 inch (25.40 mm).

4. On helicopters S/N 4 through 497, install cylinder and support assembly (5, figure 67-25) with connecting control linkage as follows:

a. Install antitorque cylinder and support assembly (5) to structure (paragraph 67-94).

b. Position tube assembly (1) in clevis of lever (12) on cylinder and support assembly (5) and secure with bolt (11), washers (4), nut (2), and cotter pin (3).

c. If not previously accomplished, adjust clevis (9) on cylinder and support assembly (5) to 1.22 inches (30.99 mm) from end of piston to center of clevis bolt hole (detail A).

d. Connect tube assembly (13) to clevis (9) and secure with bolt (10), washers (6), nut (8), and cotter pin (7). Ensure exposed threads of adjustable rod end on tube assembly (13) does not exceed 1.0 inch (25.40 mm).

e. Install walking beam (37) to support structure and secure with bolt (36), washers (19), nut (18), and cotter pin (17).

f. Position tube assembly (13) to lower arm of walking beam (37) and secure with bolt (38), washer (39), spacer (16), nut (15), and cotter pin (14).

g. Position tube assembly (23) to top arm of walking beam (37) and secure with bolt (35), washer (34), spacer (22), nut (21), and cotter pin (20).

h. If not previously accomplished, install bellcrank (26) on shaft of pitch change mechanism aligning bolt in bellcrank with undercut on shaft. Secure bellcrank with bolt (28), washers (25 and 27), and nut (24).

i. Position tube assembly (23) on lower side of bellcrank (26) and secure with bolt (29), washer (30), spacer (31), nut (32), and cotter pin (33).

5. On helicopters S/N 498 and subsequent, install idler (38, figure 67-26), walking beam (16), and connecting control linkage as follows:

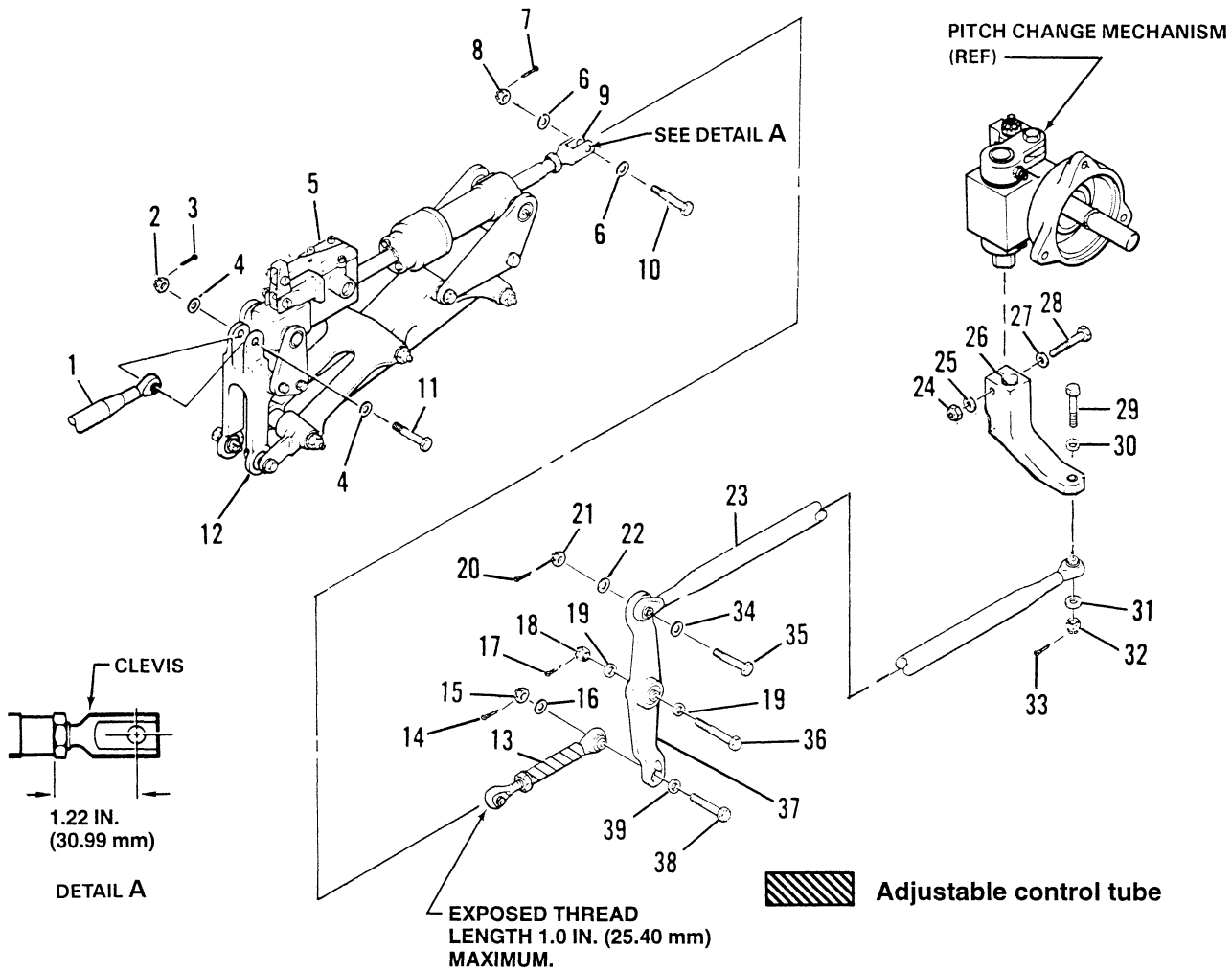
a. Install idler (38) in support structure and secure with bolt (36), washers (4), shims (37), nut (3), and cotter pin (3). Ensure spacer (39) is installed inside idler bore to prevent bearing preload. Position shims between idler and support as required to remove end play (section B-B).

#### NOTE

One bearing in idler boss is roll staked; the other bearing is loose fit.

b. Install tube assemblies (1 and 8) to idler (38) and secure with bolts (35), washers (7), nuts (6), and cotter pins (5). Ensure that adjustable rod end of tube assembly (1) is located at idler and that rod end exposed thread length does not exceed 1.0 inch (25.40 mm) (detail A).

c. Install walking beam (16) in support structure and secure with bolt (31), washers (13), nut (12), and cotter pin (11).

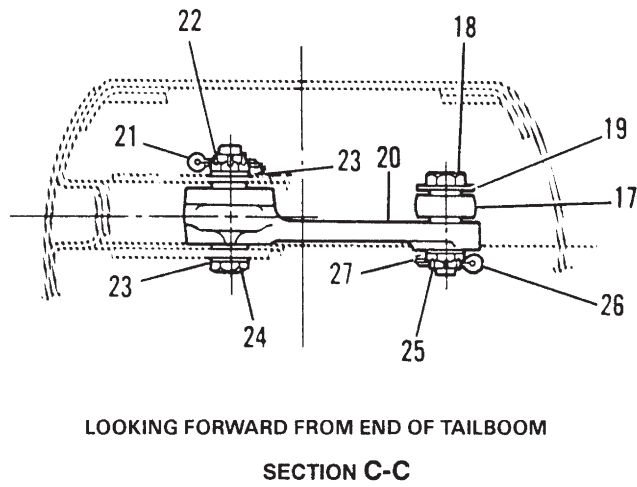
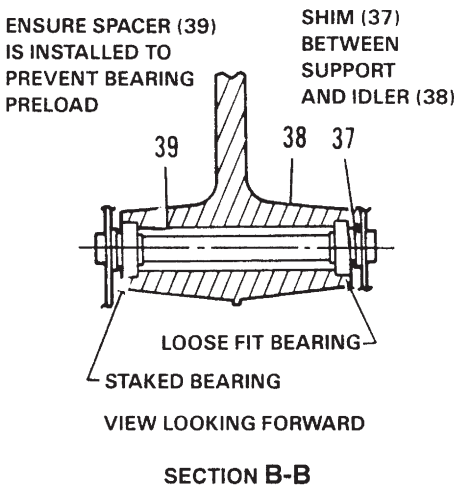
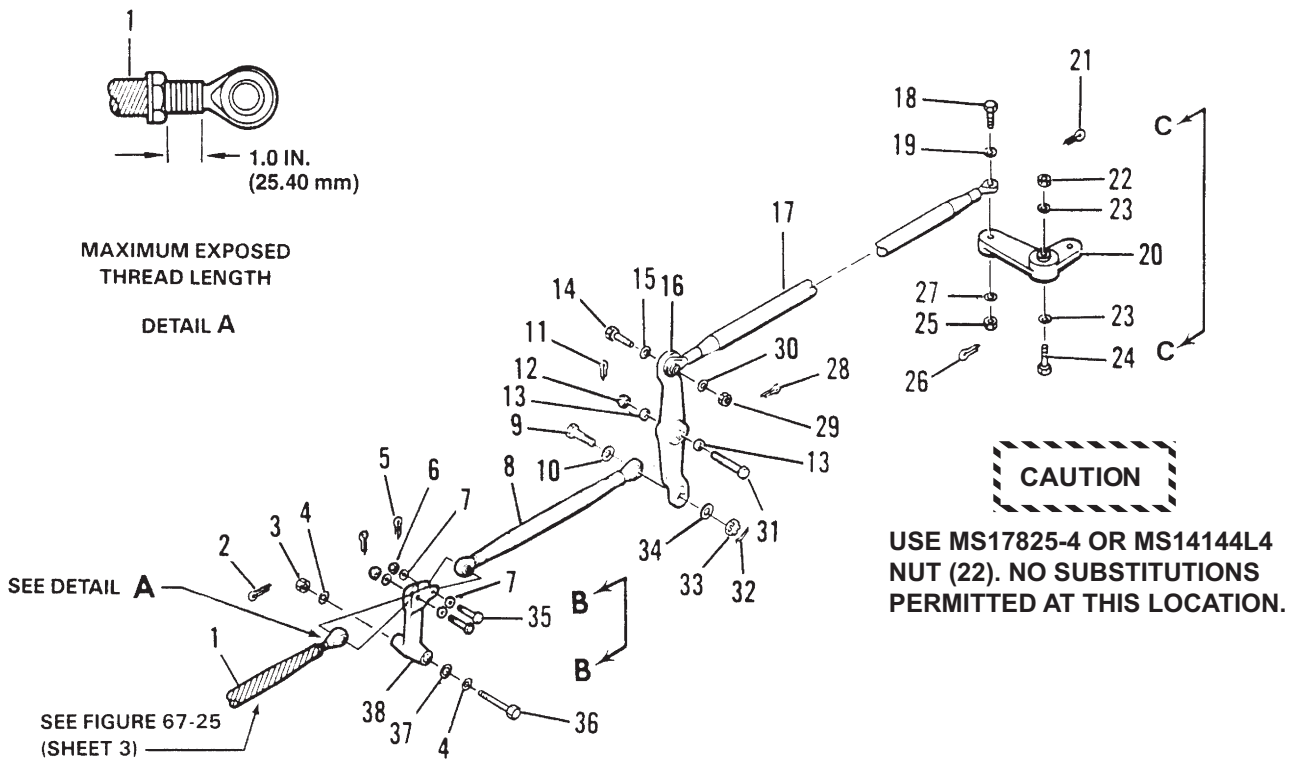


- |                                  |                   |                  |
|----------------------------------|-------------------|------------------|
| 1. Tube assembly                 | 14. Cotter pin    | 27. Washer       |
| 2. Nut                           | 15. Nut           | 28. Bolt         |
| 3. Cotter pin                    | 16. Spacer        | 29. Bolt         |
| 4. Washer                        | 17. Cotter pin    | 30. Washer       |
| 5. Cylinder and support assembly | 18. Nut           | 31. Spacer       |
| 6. Washer                        | 19. Washer        | 32. Nut          |
| 7. Cotter pin                    | 20. Cotter pin    | 33. Cotter pin   |
| 8. Nut                           | 21. Nut           | 34. Washer       |
| 9. Clevis                        | 22. Spacer        | 35. Bolt         |
| 10. Bolt                         | 23. Tube assembly | 36. Bolt         |
| 11. Bolt                         | 24. Nut           | 37. Walking beam |
| 12. Lever                        | 25. Washer        | 38. Bolt         |
| 13. Tube assembly                | 26. Bellcrank     | 39. Washer       |

HELICOPTERS S/N 4 THROUGH 497  
OR WITH SI 206-60 INCORPORATED

206A/BS-M-67-25

Figure 67-25. Tail rotor aft pitch controls system



Adjustable control tube

**HELICOPTERS S/N 498 AND SUBSEQUENT**

206AB\_MM\_67\_0026a

**Figure 67-26. Tail Rotor Aft Pitch Control System (Sheet 1 of 2)**

- |                  |                   |                |
|------------------|-------------------|----------------|
| 1. Tube assembly | 14. Bolt          | 27. Washer     |
| 2. Cotter pin    | 15. Washer        | 28. Cotter pin |
| 3. Nut           | 16. Walking beam  | 29. Nut        |
| 4. Washer        | 17. Tube assembly | 30. Spacer     |
| 5. Cotter pin    | 18. Bolt          | 31. Bolt       |
| 6. Nut           | 19. Spacer        | 32. Cotter pin |
| 7. Washer        | 20. Bellcrank     | 33. Nut        |
| 8. Tube assembly | 21. Cotter pin    | 34. Washer     |
| 9. Bolt          | 22. Nut           | 35. Bolt       |
| 10. Spacer       | 23. Washer        | 36. Bolt       |
| 11. Cotter pin   | 24. Bolt          | 37. Shim       |
| 12. Nut          | 25. Nut           | 38. Idler      |
| 13. Washer       | 26. Cotter pin    | 39. Spacer     |

**HELICOPTERS S/N 498 AND SUBSEQUENT**

206ABMM\_67000\_00260\_002\_C00

**Figure 67-26. Tail Rotor Aft Pitch Control System (Sheet 2)**

d. Position tube assembly (8) to lower arm of walking beam (16) and secure with bolt (9), spacer (10), washer (34), nut (33), and cotter pin (32).

e. Position tube assembly (17) to upper arm of walking beam (16) and secure with bolt (14), washer (15), spacer (30), nut (29), and cotter pin (28).

**CAUTION**

USE MS17825-4 OR MS14144L4 NUT (22) ONLY. NO OTHER SUBSTITUTION PERMITTED AT THIS LOCATION AND BOLT (24) MUST BE INSTALLED FROM LOWER SIDE.

f. Install bellcrank (20) to support structure with long arm to right side of helicopter and secure with bolt (24), washers (23), nut (22), and cotter pin (21) (Section C-C).

g. Position tube assembly (17) on top of long arm of bellcrank (20) and secure with bolt (18), spacer (19), washer (27), nut (25), and cotter pin (26) (Section C-C).

6. Install tail rotor pitch change mechanism (Paragraph 67-80).

7. Rig tail rotor controls (Paragraphs 67-63, 67-64, or 67-65) as applicable.

### 67-75. TAIL ROTOR PITCH CHANGE MECHANISM

The tail rotor pitch change control is accomplished by means of bellcrank, rod, and lever assembly mounted on tail rotor gearbox, actuating a control tube through a hollow gearbox output shaft to the crosshead and pitch links.

#### 67-76. Removal — Tail Rotor Pitch Change Mechanism (Helicopters S/N 4 through 497)

1. Remove tail rotor gearbox fairing and vertical fin (Chapter 53).

2. Remove tail rotor hub and blade assembly (Chapter 64).

3. Disconnect tube assembly (13, Figure 67-27) from bellcrank (14) by removing cotter pin (12), nut (11), spacer (10), bolt (8), and washer (9).

4. Remove slider housing (3) and control tube (5) from tail rotor gearbox by removing nuts (1) and washers (2). Pull slider housing from tail rotor gearbox; catch key (6) as the control tube (5) clears the tail rotor gearbox. Discard seal (4).

5. Remove bellcrank (14) by removing nut (17), washers (16), and bolt (15).

6. Seal openings to tail rotor gearbox to prevent contamination.

#### 67-77. Removal — Tail Rotor Pitch Change Mechanism (Helicopters S/N 498 and Subsequent)

1. Remove tail rotor gearbox fairing and vertical fin (Chapter 53).

2. Remove hub and blade assembly (2, Figure 67-28) (Chapter 64).

3. Remove rod (20) from aft arm of bellcrank (3) by removing cotter pin (25), nut (24), washers (23 and 22), and bolt (21).

4. Remove rod (20) from lever assembly (28) by removing cotter pin (27), nut (26), washers (19), and bolt (18).

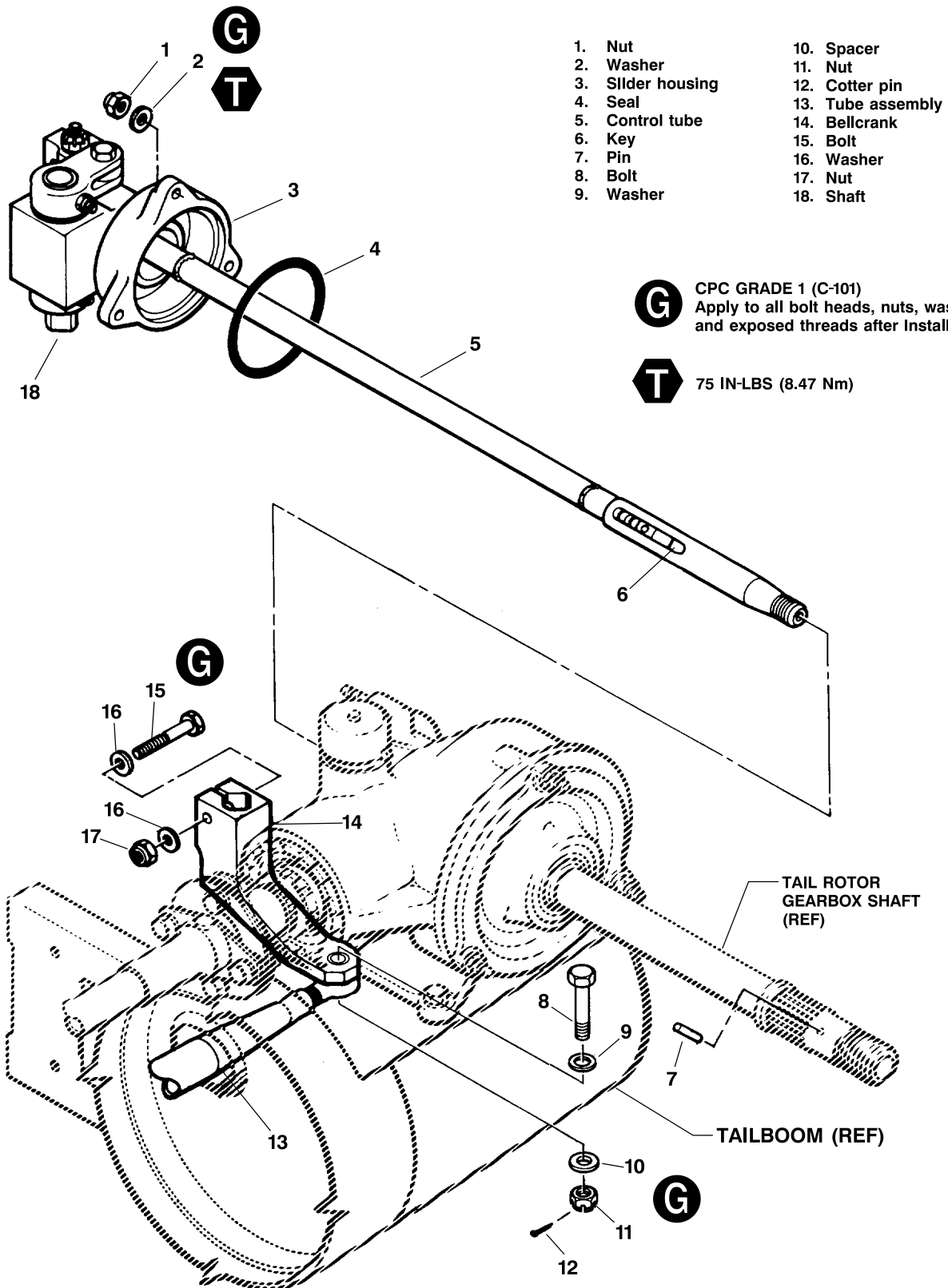
5. Remove four bolts (34) and washers (35), and remove cap (33).

6. Remove cotter pin (36), nut (32), and washer (31) from control tube (15).

7. Remove nuts (38) and washers (39) from housing (17). Pull housing from end of gearbox (1). Discard packing (16).

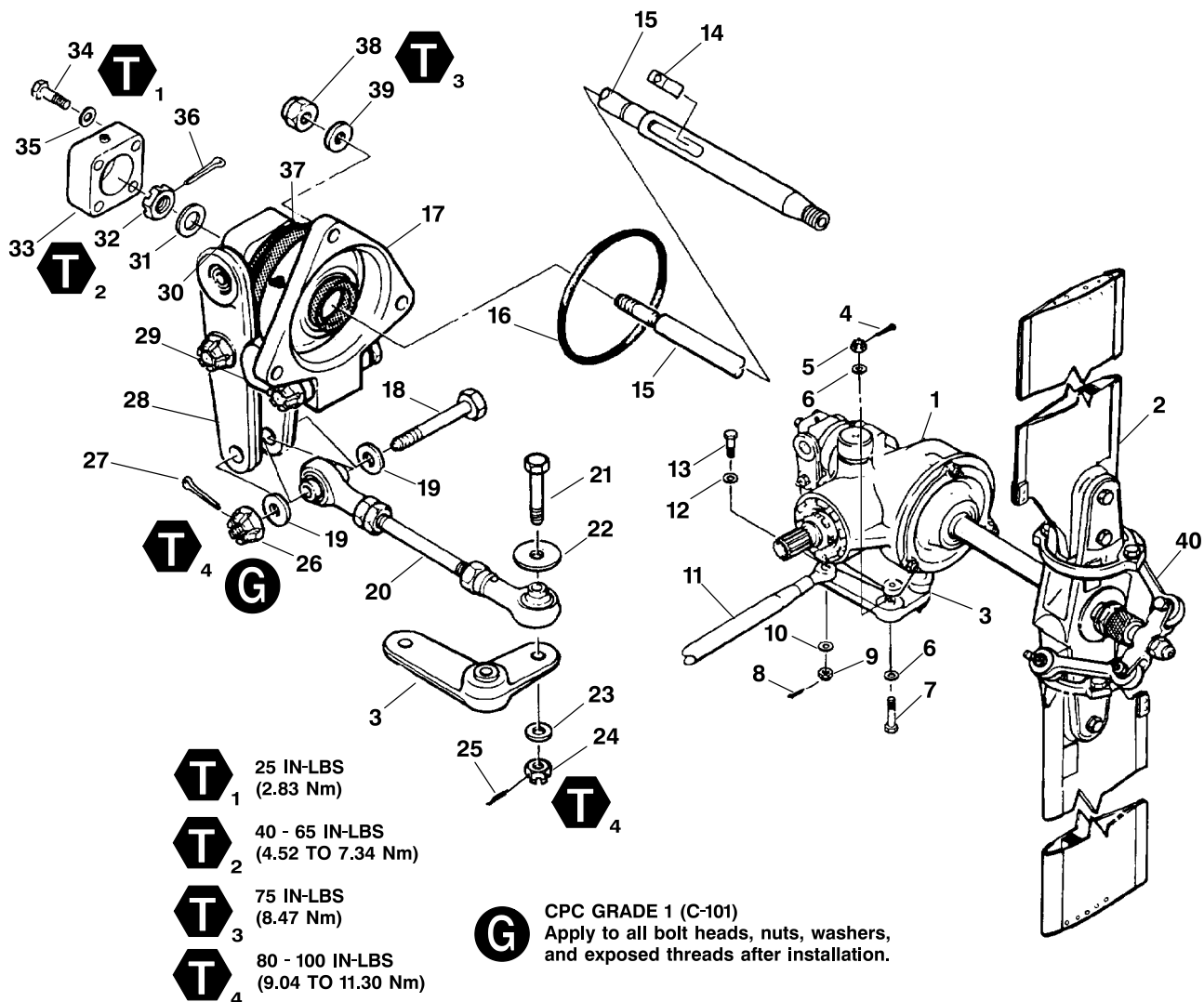
8. Carefully remove control tube (15) from output shaft of gearbox (1). Remove key (14) from slot in control tube (15).

9. Seal opening to gearbox to prevent contamination.



206ABMM\_67000\_00270\_001\_C01

Figure 67-27. Tail Rotor Pitch Change Mechanism (Helicopters S/N 4 through 497)



- T**<sub>1</sub> 25 IN-LBS (2.83 Nm)
- T**<sub>2</sub> 40 - 65 IN-LBS (4.52 TO 7.34 Nm)
- T**<sub>3</sub> 75 IN-LBS (8.47 Nm)
- T**<sub>4</sub> 80 - 100 IN-LBS (9.04 TO 11.30 Nm)

**G** CPC GRADE 1 (C-101)  
Apply to all bolt heads, nuts, washers, and exposed threads after installation.

- |                           |                    |                       |
|---------------------------|--------------------|-----------------------|
| 1. Gearbox                | 15. Control tube   | 29. Idler             |
| 2. Hub and blade assembly | 16. Packing        | 30. Trunnion          |
| 3. Bellcrank              | 17. Housing        | 31. Thin steel washer |
| 4. Cotter pin             | 18. Bolt           | 32. Nut               |
| 5. Nut                    | 19. Washer         | 33. Cap               |
| 6. Aluminum washer        | 20. Rod            | 34. Bolt              |
| 7. Bolt                   | 21. Bolt           | 35. Thin steel washer |
| 8. Cotter pin             | 22. Washer         | 36. Cotter pin        |
| 9. Nut                    | 23. Washer         | 37. Boot              |
| 10. Aluminum washer       | 24. Nut            | 38. Nut               |
| 11. Tube                  | 25. Cotter pin     | 39. Aluminum washer   |
| 12. Spacer                | 26. Nut            | 40. Pitch link        |
| 13. Bolt                  | 27. Cotter pin     |                       |
| 14. Key                   | 28. Lever assembly |                       |

206ABMM\_67000\_00280\_001\_C01

Figure 67-28. Tail Rotor Pitch Change Mechanism (Helicopters S/N 498 through Sub)

**67-78. Cleaning****MATERIALS REQUIRED**

For data on consumable materials, refer to [BHT-ALL-SPM](#).

| NUMBER | NOMENCLATURE |
|--------|--------------|
| C-304  | Solvent      |

Clean all parts with solvent (C-304) and dry with filtered compressed air. Do not allow bearings to spin while drying.

**67-79. Inspection**

1. Prior to disassembly, inspect for oil leakage around boot and seals.
2. Inspect bellcranks, levers, rod ends, and linkage for ease of operation.
3. Inspect pitch links, bellcranks, levers, rod ends, and linkage for damage. (Replace part exceeding allowable limits shown in [BHT-206B3-CR&O](#) or [206A/B Maintenance and Overhaul Manual](#)).

**NOTE**

For detailed inspection and repair procedures, refer to [BHT-206B3-CR&O](#) or [206A/B Maintenance and Overhaul Manual](#).

**67-80. Installation — Tail Rotor Pitch Change Mechanism (Helicopters S/N 4 through 497).**

1. Install bellcrank (14, [Figure 67-27](#)) on shaft (18) of slider housing (3) aligning bolt hole in bellcrank with undercut on shaft. Secure bellcrank with bolt (15), washers (16), and nut (17).
2. Clean mating faces of slider housing (3) and tail rotor gearbox. Install new seal (4) to slider housing (3) and position key (6) in slot of control tube (5). Position assembled slider housing into tail rotor gearbox and secure with washers (2) and nuts (1).
3. Inspect control tube (5) for axial play, maximum allowed is 0.020 inch (0.51 mm).
4. Position tube assembly (13) to lower side of bellcrank (14) and secure with bolt (8), washer (9), spacer (10), nut (11), and cotter pin (12).

5. Check three compensating arm bolts on slider housing (3) for presence of cotter pin. Install cotter pins, if required.

6. Install tail rotor hub and blade assembly ([Chapter 64](#)).

7. Rig tail rotor controls ([Chapter 67](#)).

8. Install vertical fin and tail rotor gearbox fairing ([Chapter 53](#)).

**67-81. Installation — Tail Rotor Pitch Change Mechanism (Helicopters S/N 498 and Subsequent)****MATERIALS REQUIRED**

For data on consumable materials, refer to [BHT-ALL-SPM](#).

| NUMBER | NOMENCLATURE |
|--------|--------------|
| C-001  | Grease       |
| C-405  | Lockwire     |

1. Carefully insert sleeve end of control tube (15, [Figure 67-28](#)) through bearing in housing (17), through boot (37), and through bearing in trunnion (30). Install thin steel washer (31) and nut (32). Torque nut (32) 40 to 65 inch-pounds (4.52 to 7.34 N-m) and secure with cotter pin (36). Trim ends of cotter pin. Ensure trimmed ends will not contact trunnion cap (33) or bearing in trunnion (30). If required, one additional thin steel washer may be used under nut for cotter pin alignment within torque tolerance.

2. Clean mating faces of housing (17) and gearbox (1). Install new packing (16) in housing (17), and position key (14) in slot of control tube (15). Position housing (17) and control tube (15) in output shaft of gearbox (1), and secure with aluminum washers (39) and nuts (38). Torque nuts (38) to 75 inch-pounds (8.47 N-m).

3. Install cap (33) and secure with four bolts (34) and thin steel washers (35). Torque bolts 25 inch-pounds (2.83 N-m) and secure bolts in pairs with lockwire (C-405).

4. Lubricate bearings in housing (17) and trunnion (30) at grease fittings in housing and cap (33) with grease (C-001). Wipe excess grease from inside of boot (37) and secure boot to flanges on trunnion (30)



and housing (17) with one wrap of lockwire (C-405) around end of boot.

5. Install hub and blade assembly (2) (Chapter 64).

6. If bellcrank (3) is removed, install as follows:



USE ONLY MS17825-4 OR MS14144L4 NUT (5) ON BOLT (7). NO SUBSTITUTION PERMITTED AT THIS LOCATION, AND BOLT (7) MUST BE INSTALLED FROM LOWER SIDE.

a. Position bellcrank (3) to tailboom support structure with long arm to right side of helicopter and short arm aft.

b. Align bolt holes and install bolt (7) with one aluminum washer (6) from lower side of support structure up through bellcrank (3), and secure with an

additional aluminum washer (6), nut (5), and cotter pin (4).

7. Position rod (20) to bellcrank (3) and to lever assembly (28). Secure rod assembly (20) to lever assembly (28) with bolt (18), washers (19), and nut (26). Torque nut (26) 80 to 100 inch-pounds (9.04 to 11.30 N-m) and secure with cotter pin (27).

8. Secure rod (20) to top surface of aft arm of bellcrank (3) with bolt (21), washers (22 and 23), and nut (24). Washer (22) is a large washer and is to be installed next to head of bolt (21). Torque nut (24) 80 to 100 inch-pounds (9.04 to 11.30 N-m) and secure with cotter pin (25).

9. Position tube (11) to top surface of bellcrank (3) and secure with bolt (13), spacer (12), aluminum washer (10), nut (9), and cotter pin (8).

10. Rig tail rotor controls (Chapter 67).

11. Install vertical fin and tail rotor gearbox fairing (Chapter 53).



## CYCLIC AND COLLECTIVE SERVO ACTUATORS AND SUPPORT

### 67-82. CYCLIC AND COLLECTIVE SERVO ACTUATORS AND SUPPORT

On helicopters S/N 4 through 497, the cyclic and collective control servo actuator support is installed on the cabin roof. It serves as a mount for servo actuators and associated bellcranks. Collective control servo actuator is mounted in center position, and two cyclic servo actuators are mounted in outboard positions. Cyclic and collective servo actuators reduce the operational loads of these flight control systems. Servo actuators in the cyclic and collective systems incorporate irreversible valves. In the event of loss of hydraulic pressure to a servo actuator, the plunger (12, [Figure 67-29](#)) in the sequence valve (3) is pushed up by the lower spring and poppet valve (10); the upper spring holds the valve seat (11) down. This action closes the hydraulic return port and maintains irreversibility independent of hydraulic system pressure. The pilot is provided with safe control of the helicopter even though hydraulic pressure is lost. The sequence valve also serves to relieve thermal pressure buildup should this occur while the system is inactive. The sequence valve would normally be closed when system pressure is below 100 to 180 psi (689.00 to 1241.00 kPa). If internal pressure builds up, the valve seat is pushed up, compressing the upper spring. The poppet valve on the lower spring is prevented from following by an internal obstruction in the valve, shown as a line above the poppet valve in the schematic. The differential relief valve (4) serves to relieve pressure buildup which could occur when slide and sleeve assembly (7) is centered with both return ports closed.

On helicopters S/N 498 and subsequent, the cyclic and collective control servo actuator support is installed on cabin roof. It serves as a mount for the servo actuators and associated bellcranks. The collective control servo actuator is mounted in the center position, and the two cyclic servo actuators are mounted in the outboard positions. Cyclic and collective servo actuators reduce operational loads of the flight control systems. An irreversible valve is incorporated in each servo valve.

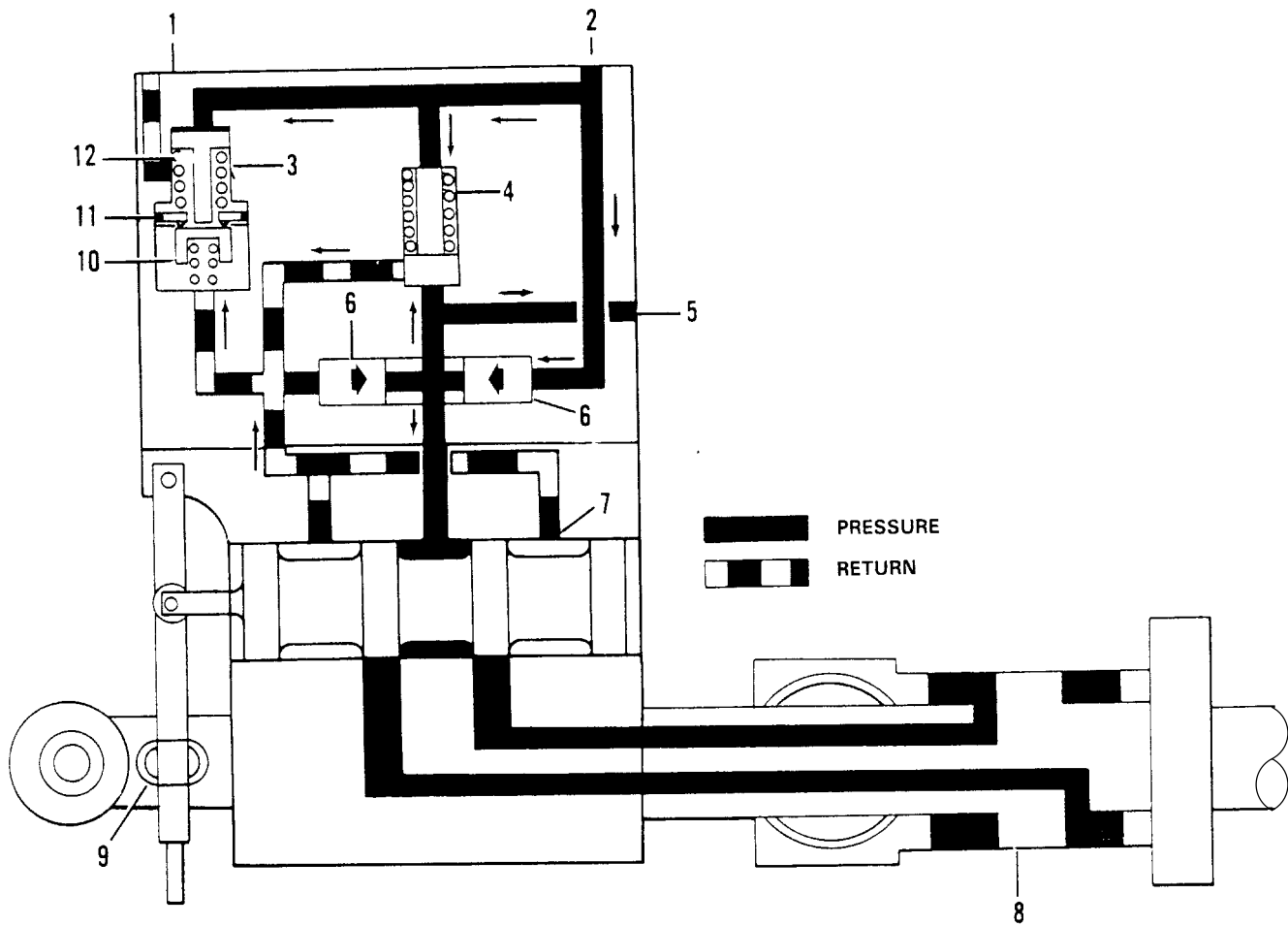
In event of loss of hydraulic pressure to a servo actuator, plunger (12) in the sequence valve (3) is pushed up by the lower spring and poppet valve (10); the upper spring holds the valve seat (11) down. This action closes the hydraulic return port and maintains

irreversibility independent of hydraulic pressure. This provides safe control of the helicopter even though hydraulic power is lost. The sequence valve also serves to relieve thermal pressure buildup should this occur while the system is inactive. The sequence valve would normally be closed when system pressure is below 100.00 to 180.00 psi (689 to 1241 kPa). If internal pressure builds up, the valve seat is pushed up, compressing the upper spring. The poppet valve on the lower spring is prevented from following by an internal obstruction in the valve, shown as a line above the poppet valve in the schematic. Differential relief valve (4) serves to relieve pressure buildup which could occur from excessive rotor loads.

### 67-83. CYCLIC AND COLLECTIVE SERVO ACTUATORS

#### 67-84. REMOVAL

1. For helicopters S/N 4 through 497, remove cyclic and collective servo actuators 206-001-520 support as follows:
  - a. If stabilization augmentation system kit is installed, disconnect electrical wiring at servo actuator to be removed.
  - b. Disconnect hydraulic lines from servo actuator. Cap or plug open lines and fittings on servo actuator.
  - c. Disconnect cylinder extension tube assembly (10, [Figure 67-30](#)) (typical three places) at servo actuator end of tube by removing cotter pin (27), nut (11), bolt (14), and two washers (12 and 13).
  - d. Remove nut (7), bolt (16), two washers (8 and 17), plate assemblies (9 and 15), and shim (26) (typical two places) at each side of two cyclic outboard servo actuators (6) and bearing plate (25) at each side of collective center servo actuator (24).
  - e. Remove nut (1), bolt (18), two washers (2 and 19), trunnion plates (3 and 20), spacers (4 and 21), and laminated shims (5 and 22) (typical two places) at each side of two cyclic outboard servo actuators (6) and one collective center servo actuator (24).
  - f. Remove the two cyclic and one collective servo actuators for inspection or replacement.



1. Return port
2. Pressure port
3. Sequence valve with thermal relief provisions, sequence valve cracks at 100 to 180 psi (689.00 to 1241.00 kPa), full flow at 250 psi (1724.00 kPa).
4. Differential relief valve — flow 375 to 445 psi (2586.00 to 3068.00 kPa) or 575 to 645 psi (3964.00 to 4447.00 kPa) above system pressure.
5. Test port
6. Check valves
7. Slide and sleeve assembly
8. Actuator
9. Input control
10. Poppet valve
11. Valve seat (floating)
12. Plunger

206ABMM\_67000\_00290\_001\_C00

Figure 67-29. Cyclic and Collective Servo Actuator Schematic

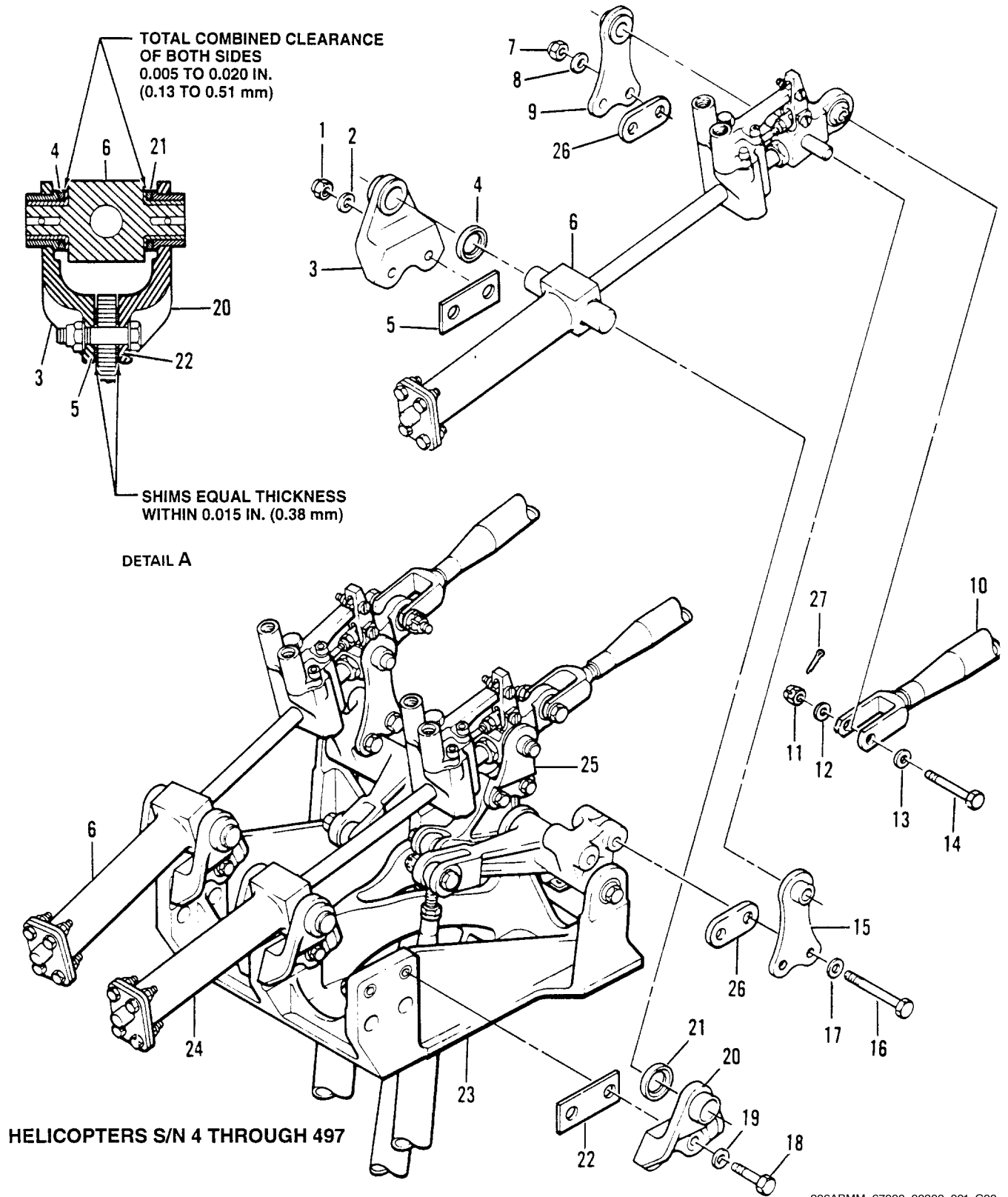


Figure 67-30. 206-001-520 Support — Cyclic and Collective Servo Actuator (Sheet 1 of 2)

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| 1. Nut                           | 15. Cylinder valve trunnion plate |
| 2. Washer                        | 16. Bolt                          |
| 3. Trunnion plate                | 17. Washer                        |
| 4. Spacer                        | 18. Bolt                          |
| 5. Laminated shim                | 19. Washer                        |
| 6. Servo actuator (cyclic)       | 20. Trunnion plate                |
| 7. Nut                           | 21. Spacer                        |
| 8. Washer                        | 22. Laminated shim                |
| 9. Cylinder valve trunnion plate | 23. Support                       |
| 10. Cylinder extension tube      | 24. Servo actuator (collective)   |
| 11. Nut                          | 25. Bearing plate                 |
| 12. Washer                       | 26. Shim                          |
| 13. Washer                       | 27. Cotter pin                    |
| 14. Bolt                         |                                   |

HELICOPTERS S/N 4 THROUGH 497

Figure 67-30. 206-001-520 Support — Cyclic and Collective Servo Actuator (Sheet 2)

2. For helicopters S/N 498 through 550, remove cyclic and collective servo actuators 206-001-520 support as follows:

a. Disconnect hydraulic lines from servo actuator to be removed. Cap or plug open lines and fittings on servo actuator.

b. Disconnect cylinder extension tube (10, [Figure 67-31](#), Sheet 1) (typical three places) at servo actuator end of tube assembly by removing cotter pin (45), nut (11), bolt (14), and two washers (12 and 13).

#### NOTE

During removal procedures, tag and identify location of shims and trunnion plates removed for proper reassembly.

c. Remove nut (6), bolt (16), two washers (7 and 15), plate assembly (8), and shim (9) (typical two places) at each of two cyclic outboard servo actuators (5) and one collective center servo actuator (20).

d. Remove nut (1), bolt (18), two washers (2 and 17), trunnion plate (3), and shim (4) (typical two places) at each of two cyclic outboard servo actuators (5) and one collective center servo actuator (20).

e. Remove the two cyclic (5) and one collective (20) servo actuators for inspection or replacement.

3. For helicopters S/N 551 through 913, remove cyclic and collective servo actuators 206-001-520 support as follows:

a. Disconnect hydraulic lines from servo actuator to be removed. Cap or plug open lines and fittings of servo actuator.

b. Disconnect cylinder extension tube (32, [Figure 67-31](#), Sheet 2) at servo actuator end of tube assembly by removing cotter pin (45), nut (33), bolt (36), and two washers (34 and 35).

#### NOTE

During removal procedures, tag and identify location of shims and trunnion plates removed for proper reassembly.

c. Prior to removing plate assembly (28) attaching hardware, remove cotter pin (45), nut (38), and washer (37). Remove nut (26), bolt (40), two washers (27 and 39), plate assembly (28), shim (29), sleeve (31), and washer (30) (typical two places) at each of two cyclic outboard servo actuators (25) and one collective center servo actuator (44).

d. Remove nut (21), bolt (42), two washers (22 and 41), trunnion plate (23), and laminated shim (24) (typical two places) at each of two cyclic outboard servo actuators (25) and one collective center servo actuator (44).

e. Remove the two cyclic (25) and one collective (44) servo actuators for inspection or replacement.

4. For helicopters S/N 914 and subsequent, remove cyclic and collective servo actuators 206-001-520 support as follows:

a. Disconnect hydraulic lines from servo actuator to be removed. Cap or plug open lines and fittings on servo actuator.

b. Disconnect cylinder extension tube (57, [Figure 67-31](#), Sheet 3) at servo actuator end of tube assembly by removing cotter pin (70), nut (58), bolt (61), and two washers (59 and 60).

#### NOTE

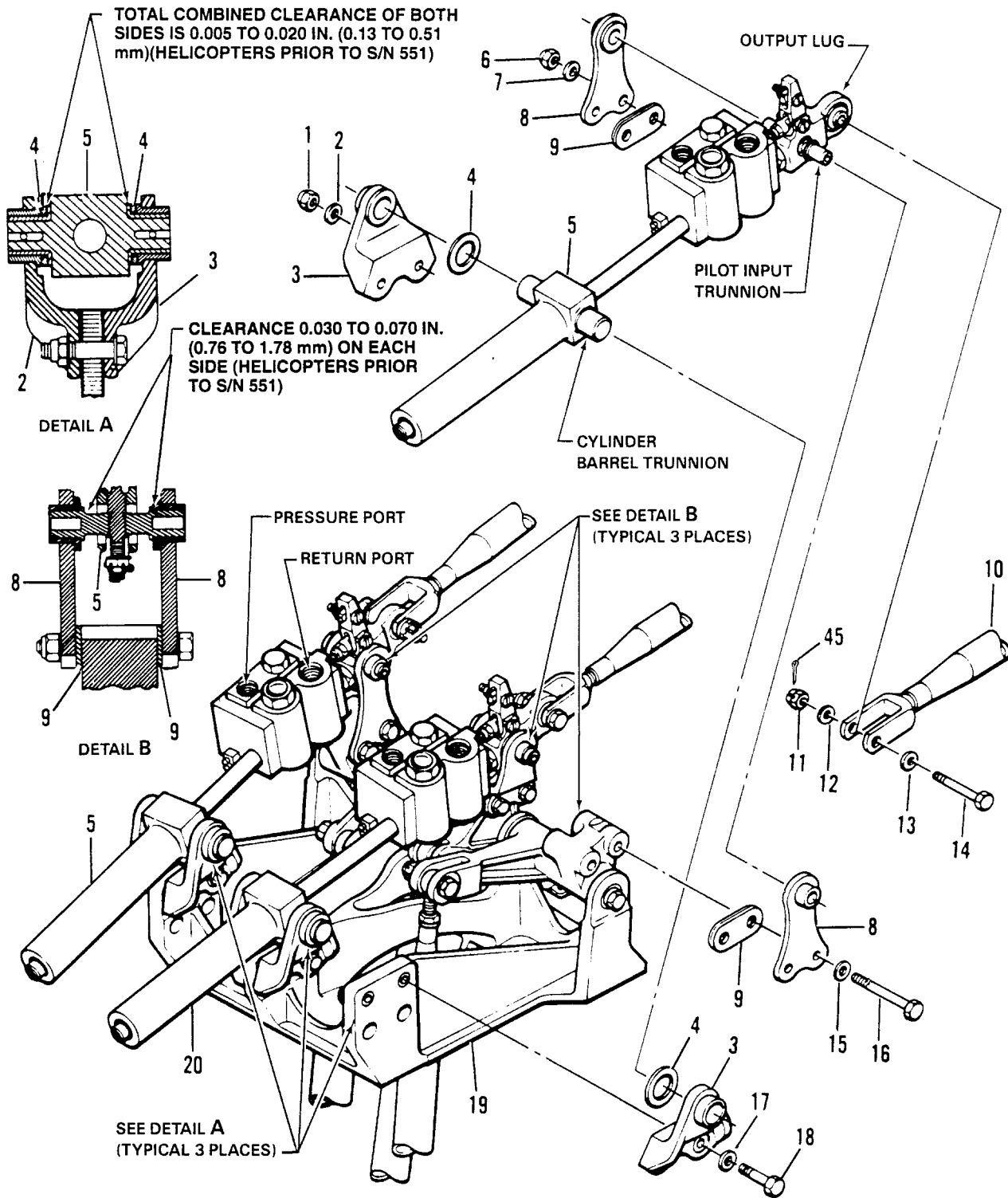
During removal procedures, tag and identify location of shims and trunnion plates removed for proper reassembly.

c. Prior to removing plate assembly (53) attaching hardware, remove cotter pin (70), nut (63), and washer (62). Remove nut (51), washer (52), bolt (65), washers (64), plate assembly (53), plate (71), shim (54), sleeve (56), and washer (55) (typical two places) at each of two cyclic outboard servo actuators (50) and one collective center servo actuator (69).

#### NOTE

Plate will be installed on the left outboard cyclic servo actuator only.

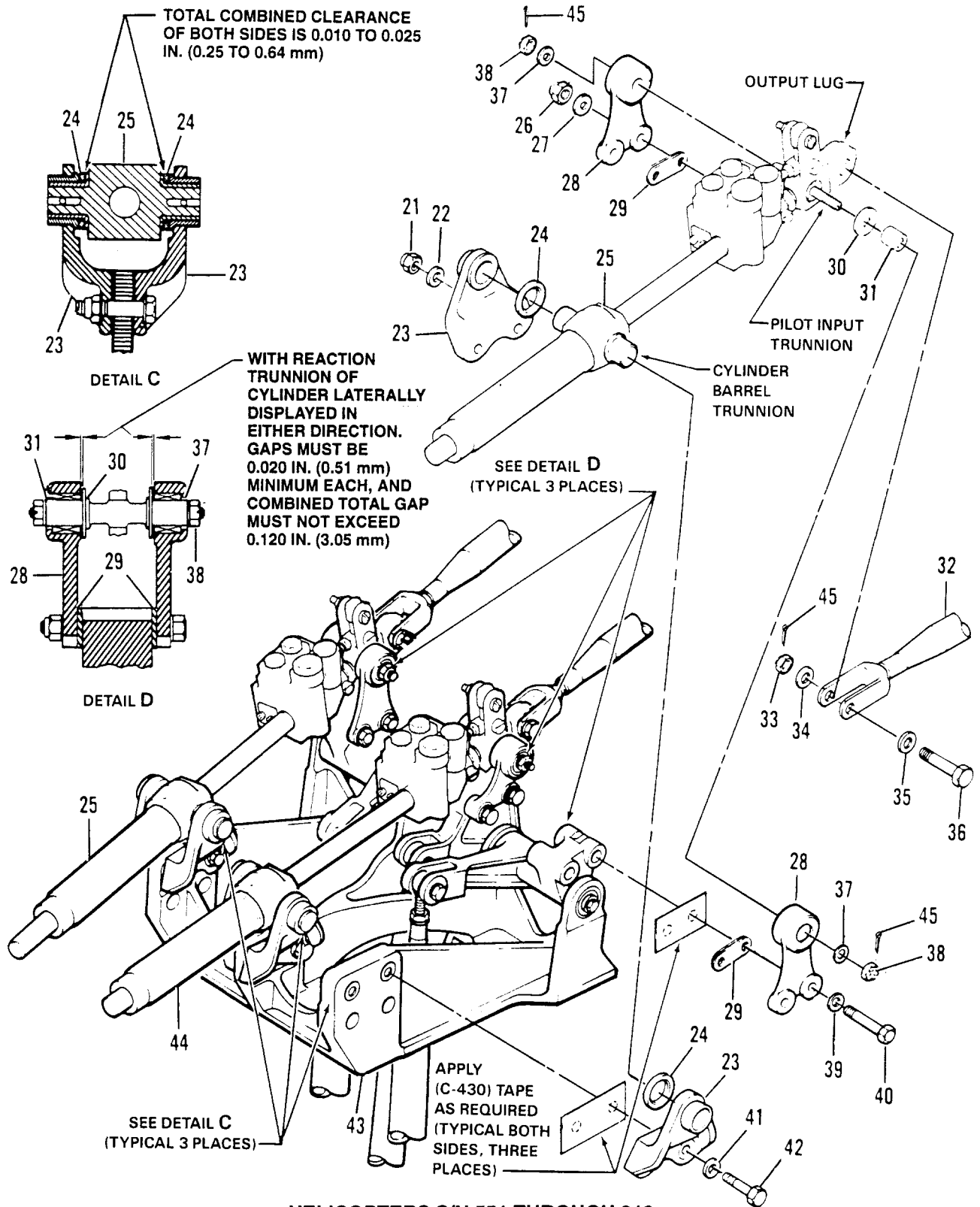
d. Remove nut (46), bolt (67), two washers (47 and 66), trunnion plate (48), and laminated shim (49) (typical two places) at each of two cyclic outboard servo actuators (50) and one collective center servo actuator (69).



206ABMM\_67000\_00310\_001\_C00

Figure 67-31. 206-001-520 Support — Cyclic and Collective Servo Actuator (Sheet 1 of 4)

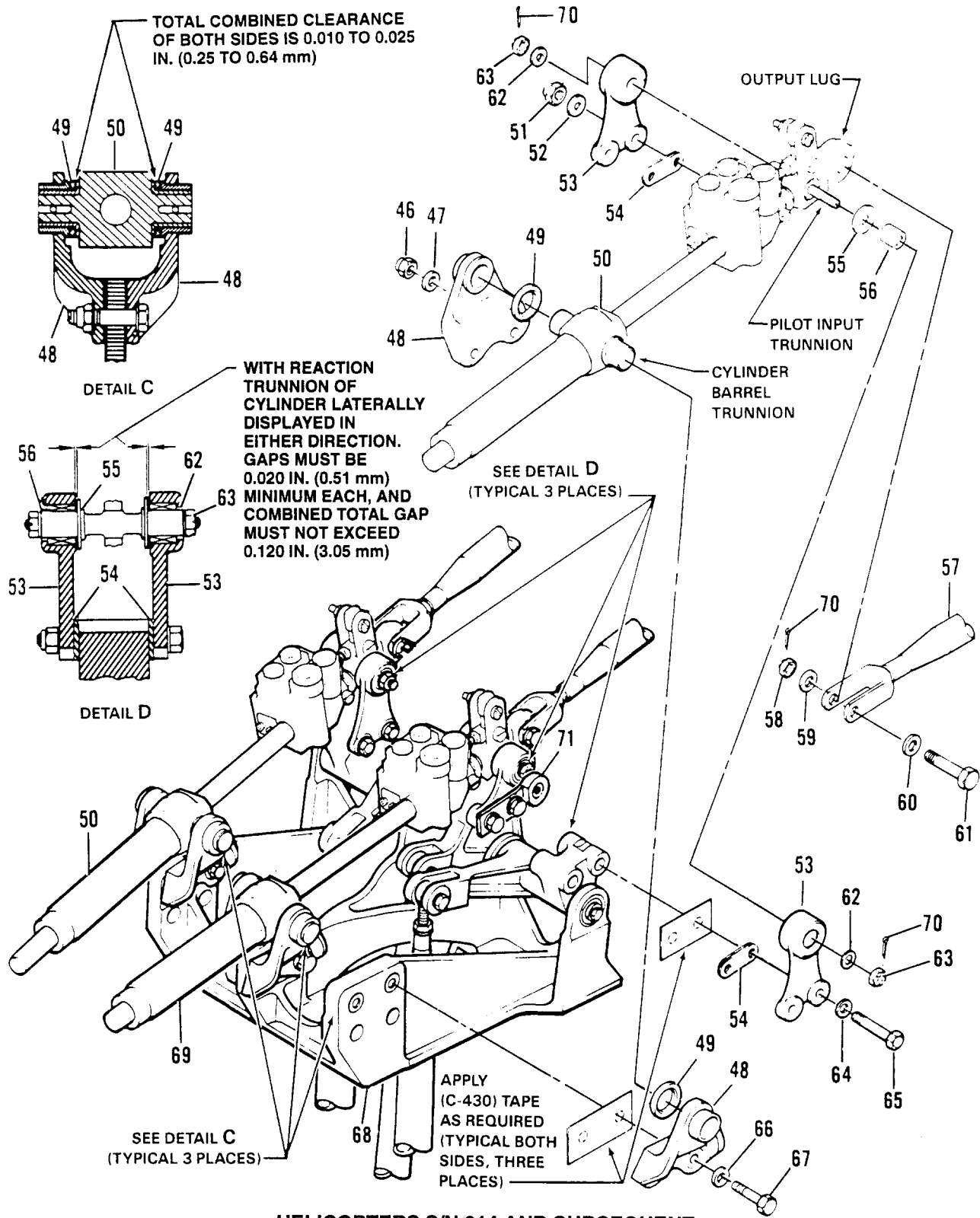




HELICOPTERS S/N 551 THROUGH 913

206ABMM\_67000\_00310\_002\_C00

Figure 67-31. 206-001-520 Support — Cyclic and Collective Servo Actuator (Sheet 2)



**HELICOPTERS S/N 914 AND SUBSEQUENT**

206ABMM\_67000\_00310\_003\_C00

**Figure 67-31. 206-001-520 Support — Cyclic and Collective Servo Actuator (Sheet 3)**

- |                                 |   |   |
|---------------------------------|---|---|
| 1. Nut                          | 26. Nut                                 | 49. Laminated shim                      |
| 2. Washer                       | 27. Washer                              | 50. Servo actuator (cyclic)             |
| 3. Trunnion plate               | 28. Plate assembly                      | 51. Nut                                 |
| 4. Laminated shim               | 29. Shim                                | 52. Washer                              |
| 5. Servo actuator (cyclic)      | 30. Washer                              | 53. Plate assembly                      |
| 6. Nut                          | 31. Sleeve                              | 54. Shim                                |
| 7. Washer                       | 32. Cylinder extension<br>tube assembly | 55. Washer                              |
| 8. Plate assembly               | 33. Nut                                 | 56. Sleeve                              |
| 9. Shim                         | 34. Washer                              | 57. Cylinder extension<br>tube assembly |
| 10. Cylinder extension tube     | 35. Washer                              | 58. Nut                                 |
| 11. Nut                         | 36. Bolt                                | 59. Washer                              |
| 12. Washer                      | 37. Washer                              | 60. Washer                              |
| 13. Washer                      | 38. Nut                                 | 61. Bolt                                |
| 14. Bolt                        | 39. Washer                              | 62. Washer                              |
| 15. Washer                      | 40. Bolt                                | 63. Nut                                 |
| 16. Bolt                        | 41. Washer                              | 64. Washer                              |
| 17. Washer                      | 42. Bolt                                | 65. Bolt                                |
| 18. Bolt                        | 43. Support                             | 66. Washer                              |
| 19. Support                     | 44. Servo actuator<br>(collective)      | 67. Bolt                                |
| 20. Servo actuator (collective) | 45. Cotter pin                          | 68. Support                             |
| 21. Nut                         | 46. Nut                                 | 69. Servo actuator<br>(collective)      |
| 22. Washer                      | 47. Washer                              | 70. Cotter pin                          |
| 23. Trunnion plate              | 48. Trunnion plate                      | 71. Plate                               |
| 24. Laminated shim              |   |   |
| 25. Servo actuator (cyclic)     |   |   |

Figure 67-31. 206-001-520 Support — Cyclic and Collective Servo Actuator (Sheet 4)

e. Remove two cyclic (50) and one collective (69) servo actuators for inspection or replacement.

5. Remove cyclic and collective servo actuators 206-001-566 support as follows:

a. Disconnect hydraulic lines from servo actuator to be removed. Cap or plug open lines and fittings on servo actuator.

b. Remove cyclic or collective servo actuator (15 or 16, [Figure 67-32](#)) as follows:

(1) Remove cotter pin (9), nut (10), bolt (13), and washers (11 and 12) from end of extension tube (8).

(2) Remove cotter pin (1), nuts (2), washers (3 and 4), special washers (5), washers (4), bearings (6), and spacers (7).

(3) Remove nuts (17), washers (18), and bolts (19).

(4) Rotate bushings (20) to align with slot in support (14) and remove servo actuator (15 and/or 16). Mark bushings (20) in order of removal to ensure proper order for installation.

c. Remove bushings (20) from reaction trunnion.

d. Inspect servo actuator ([Paragraph 67-85](#)).

## 67-85. INSPECTION

1. Visually inspect servo actuators for cracks, and other signs of obvious damage.
2. Inspect all threaded parts for damaged threads.
3. Inspect ports for dirt or other foreign material.
4. Inspect exposed portion of shaft at end of actuator for scoring and evidence of corrosion.
5. Inspect cylinder extension tube assemblies. Cylinder extension tube assemblies have a threaded clevis on both ends. Each clevis should be bonded to the tube at the threaded connection. If a clevis bond joint has failed, refer to [BHT-ALL-SPM](#).

## 67-86. INSTALLATION

### MATERIALS REQUIRED

Refer to [BHT-ALL-SPM](#) for specifications.

| NUMBER | NOMENCLATURE |
|--------|--------------|
| C-001  | Grease       |
| C-430  | Barrier Tape |

1. For helicopters S/N 4 through 497, install cyclic and collective servo actuators 206-001-520 support as follows:

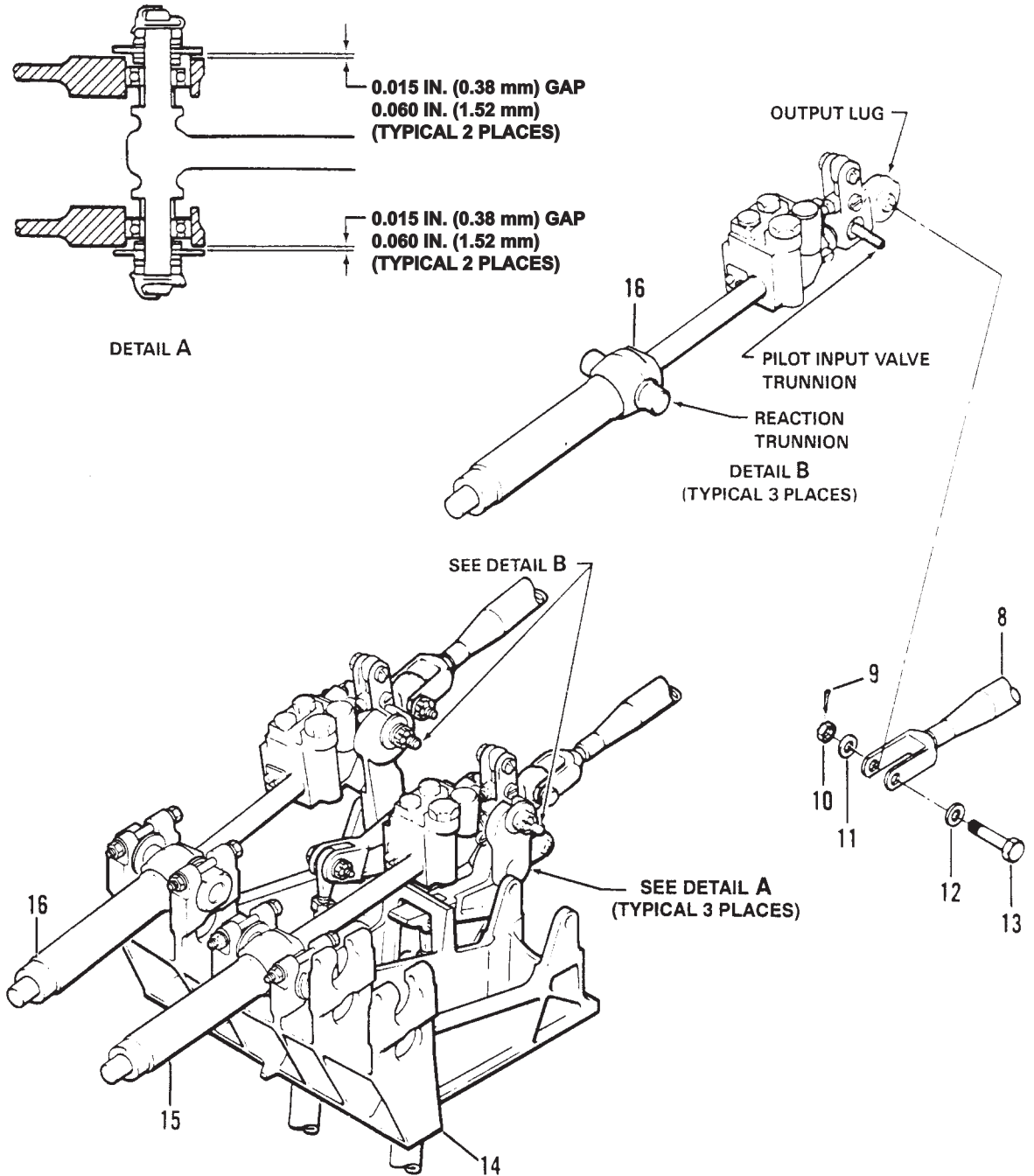


WHEN SECURING CYLINDER VALVE TRUNNION PLATES, ALLOW SUFFICIENT THREADS OF BOLTS TO EXTEND THROUGH NUTS, BUT ENSURE THERE IS ADEQUATE CLEARANCE AT ENDS OF BOLTS AND ADJACENT BELLCRANK PIVOT BOLTS.

### NOTE

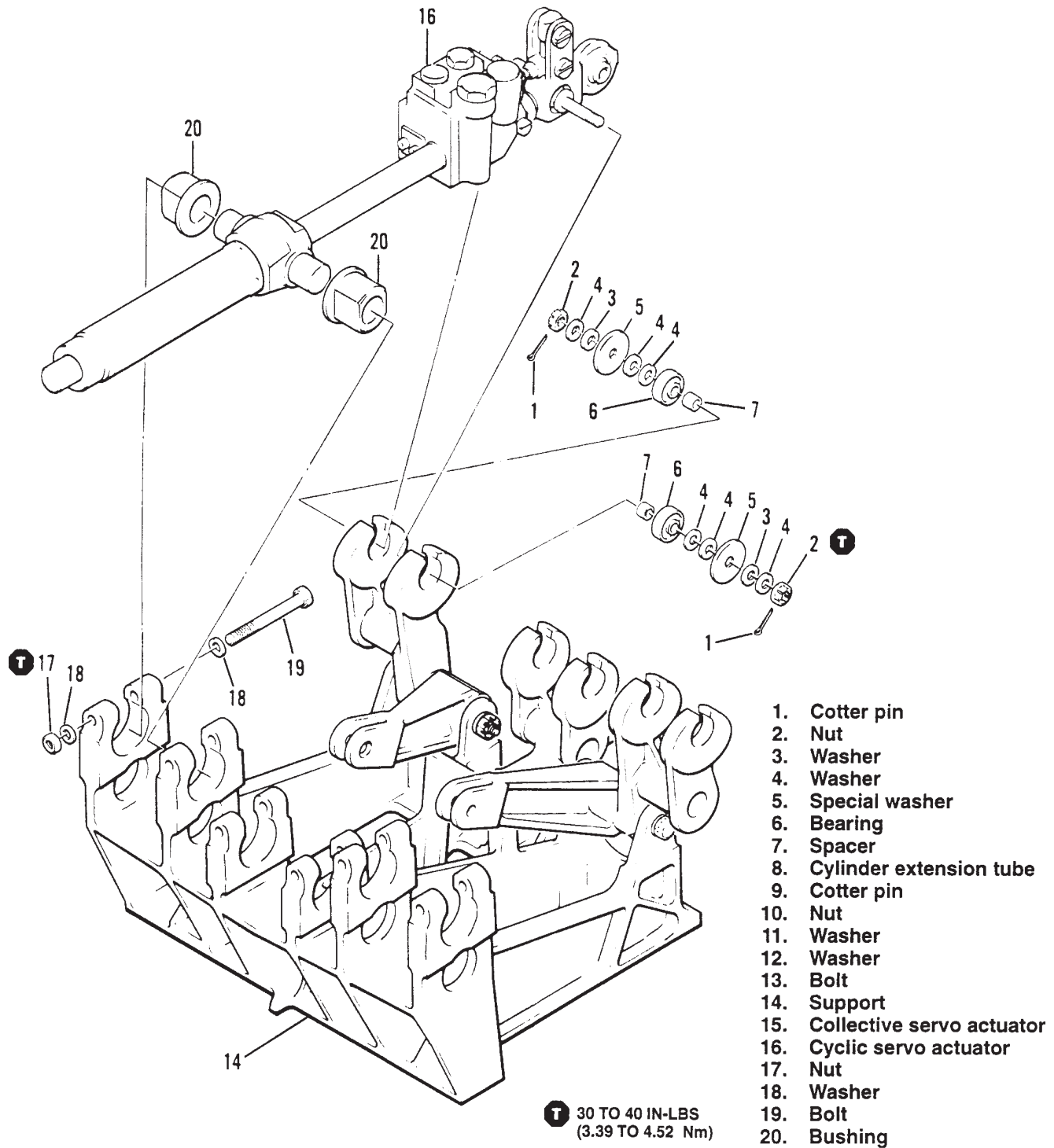
Use one washer (17, [Figure 67-30](#)) under head of bolt (16) and two washers (8) under nut (7). Omit one washer under nut, if needed, to allow two threads to be exposed.

- a. Place two cylinder valve trunnion plate assemblies (9 and 15) or bearing plates (25), as applicable for cyclic or collective servo actuator (6 or 24) being installed, on the servo actuator with flanged bushings inboard. Install the servo actuator on support (23) with shims (26) in position. Shim until a gap of 0.030 to 0.070 inch (0.76 to 1.78 mm) exists between each side of cylinder valve trunnion and trunnion plate. Install two bolts (16) with washer (17) under boltheads and washer (8) under nut (7).



206AB\_MM\_67\_0032a

**Figure 67-32. 206-001-566 Support — Cyclic and Collective Servo Actuator (Sheet 1 of 2)**



206AB\_MM\_67\_0032b

Figure 67-32. 206-001-566 Support — Cyclic and Collective Servo Actuator (Sheet 2 of 2)

**NOTE**

Use one washer (19) under head of bolt (18) and two washers (2) under nut (1). Omit one washer under nut if needed to allow two threads to be exposed.

**b.** Position two spacers (4 and 21) and two trunnion plates (3 and 20) on servo actuator (6 or 24) with flanged side of bushings in trunnion plates inboard. Install two bolts (18) to secure trunnion plates to support (23) with one each shims (5 and 22) between each trunnion plate and the support and one washer (19) under each bolthead and one washer (2) under each nut (1). Check clearance between spacers and servo actuator. If necessary, peel laminated shims to obtain 0.005 to 0.020 inch (0.13 to 0.51 mm) total combined clearance between spacers and servo actuator. In addition, shims must be of equal thickness within 0.015 inch (0.38 mm) (Detail A).

**c.** Connect cylinder extension tube assembly (10) at aft end of servo actuator (6 or 24) with bolt (14), washers (13 and 12), and nut (11). Install cotter pin (27).

**d.** Connect hydraulic lines to servo actuator (6 or 24).

**e.** If stabilization and augmentation system kit is installed, connect electrical wiring to SCAS servo actuator.

**2.** For helicopters S/N 498 through 550, install cyclic and collective servo actuators 206-001-520 support as follows:

**a.** Install servo actuator (5, [Figure 67-31](#), Sheet 1) onto support (19) (typical three places) by installing two laminated shims (4), one on each side of cylinder barrel trunnion. Install two trunnion plates (3) onto trunnion with flanged side of bushings inboard toward servo actuator.

**NOTE**

Do not install a clamp on servo actuator.

**b.** If necessary, add additional laminated shims (4) on each side of cylinder barrel trunnion to obtain proper clearance. Total combined clearance of both sides is 0.005 to 0.020 inch (0.13 to 0.51 mm) (Detail A).

**c.** Secure the two trunnion plates (3) to support (19) with two washers (17 and 2), bolt (18), and nut (1) (typical two places).

**CAUTION**

WHEN SECURING CYLINDER VALVE TRUNNION PLATES, ALLOW SUFFICIENT THREADS OF BOLTS TO EXTEND THROUGH NUTS, BUT ENSURE THERE IS ADEQUATE CLEARANCE AT ENDS OF BOLTS AND ADJACENT BELLCRANK PIVOT BOLTS.

**NOTE**

Use one washer (15) under head of bolt (16) and two washers (7) under nut (6). Omit one washer under nut, if needed, to allow two threads to be exposed.

**d.** Hold shim (9) in position on bellcrank assembly, attached to support (19), while installing plate assembly (8), with bushing flange inboard toward servo actuator (5) (typical both sides), onto pilot input trunnion of cyclic servo actuator. Place washer (15) onto bolt (16) and install bolt through plate assembly and shim, through bellcrank assembly. Install shim and plate assembly, place washers (7) onto bolt, and install nut (6).

**e.** Check clearance between plate assemblies (8) and servo actuators (5, [Detail B](#)). Add or take out shims (9) to obtain a gap of 0.030 to 0.070 inches (0.76 to 1.78 mm) between each side of servo actuator and plate assemblies.

**f.** Connect cylinder extension tube (10) at aft end of servo actuator (5) (typical three places). Place washer (13) on bolt (14) and install bolt in end of extension tube clevis. Install washer (12) on bolt and secure with nut (11) and cotter pin (45).

**g.** After all parts are assembled and the three servo actuators and extension tubes are secured together, remove caps and plugs and connect proper hydraulic lines to servo actuators.

**h.** Bleed hydraulic system and test servo actuators (5 and 20) ([Chapter 29](#)).

3. For helicopters S/N 551 through 913, install cyclic and collective servo actuators 206-001-520 support as follows:

a. Check adhesive barrier tape installed between the support (43, [Figure 67-31](#), Sheet 2) and trunnion plate (23), both sides of support, and between bellcrank and shim (29), both sides of bellcrank. If tape is damaged, apply barrier tape ([C-430](#)) as required.

b. Install servo actuator (25) onto support (43) (typical three places) by installing two laminated shims (24), one on each side of cylinder barrel trunnion. Install two trunnion plates (23) onto trunnion, with flanged side of bushings inboard toward servo actuator. Secure the two trunnion plates to support with two washers (41 and 22), bolt (42), and nut (21) (typical two places).

c. If necessary, add additional laminated shims (24) on each side of cylinder barrel trunnion to obtain proper clearance. Shim at any one point may consist of multiple pieces (four maximum), but shall NOT exceed thickness of shim (one shim thickness is 0.062 inch (1.57 mm)). Total combined clearance of both sides is 0.010 to 0.025 inch (0.25 to 0.64 mm) (Detail C).



WHEN SECURING CYLINDER VALVE TRUNNION PLATES, ALLOW SUFFICIENT THREADS OF BOLTS TO EXTEND THROUGH NUTS, BUT ENSURE THERE IS ADEQUATE CLEARANCE AT ENDS OF BOLTS AND ADJACENT BELLCRANK PIVOT BOLTS.

#### NOTE

When installing washer (30) and sleeve (31) to pilot input trunnion, the following procedure is required for each side of each cylinder (typical three places).

d. Hand pack each bearing with grease ([C-001](#)) and install washer (30) on the pilot input trunnion with inside chamfer toward trunnion flange. Install sleeve (31) on trunnion.

#### NOTE

Use one washer (39) under head of bolt (40) and two washers (27) under nut (26). Omit one washer under nut, if needed, to allow two threads to be exposed.

e. Hold shim (29) in position on bellcrank assembly (attached to support (43)) while installing plate assembly (28) onto the pilot input trunnion. Place washer (39) onto bolt (40) and install bolt through plate assembly and shim, through bellcrank assembly. Install shim and plate assembly on opposite side.

f. Check clearance between plate assemblies (28) and servo actuators (25 and 44). Add or take out shims (29) as required to obtain minimum gap. With reaction trunnion of cylinder laterally displaced in either direction, gaps must be 0.020 inch (0.51 mm) minimum each, and combined total gap must NOT exceed 0.120 inch (3.05 mm). To check 0.020 inch (0.51 mm) minimum gap, laterally displace and hold the reaction trunnion. Cycle the valve input bellcrank back and forth through several inches (millimeters) of travel to allow valve trunnion to seek its free position, then check gap. Repeat with opposite lateral displacement of reaction trunnion (Detail D).

g. After shimming operation is completed, install washer (37) next to boss of plate assembly (28) and install nut (38) and cotter pin (45) (typical both sides). Install washer (27) onto bolt (40) and secure plate assembly (28), with nut (26) and cotter pin (45) (typical two places), to each pilot input trunnion.

h. Connect cylinder extension tube (32) at aft end of servo actuator (25 and 44) (typical three places). Place washer (35) on bolt (36) and install bolt in end of extension tube clevis. Install washer (34) on bolt and secure with nut (33) and cotter pin (45).

i. After all parts are reassembled and the three servo actuators and extension tubes are secured together, remove caps and plugs and connect proper hydraulic lines to servo actuators.

j. Bleed hydraulic system and test servo actuators (25) ([Chapter 29](#)).

4. For helicopters S/N 914 and subsequent, install cyclic and collective servo actuators 206-001-520 support as follows:



a. Check adhesive barrier tape installed between the support (68, [Figure 67-31](#), Sheet 3) and trunnion plate (48), both sides of support, and between bellcrank and shim (54), both sides of bellcrank. If tape is damaged, apply barrier tape ([C-430](#)) as required.

b. Install servo actuator (50) onto support (68) (typical three places) by installing two laminated shims (49), one on each side of cylinder barrel trunnion. Install two trunnion plates (48) onto trunnion, with flanged side of bushing inboard toward servo actuator. Secure the two trunnion plates to support with two washers (66 and 47), bolt (67), and nut (46) (typical two places).

c. If necessary, add additional laminated shims (49) on each side of cylinder barrel trunnion to obtain proper clearance. Shim at any one point may consist of multiple pieces (four maximum), but shall NOT exceed thickness of shim (one shim thickness is 0.062 inch (1.57 mm)). Total combined clearance of both sides is 0.010 to 0.025 inch (0.25 to 0.64 mm) (Detail C).



WHEN SECURING CYLINDER VALVE TRUNNION PLATES, ALLOW SUFFICIENT THREADS OF BOLTS TO EXTEND THROUGH NUTS, BUT ENSURE THERE IS ADEQUATE CLEARANCE AT ENDS OF BOLTS AND ADJACENT BELLCRANK PIVOT BOLTS.

#### NOTE

Use one washer (64) under head of bolt (65) and two washers (52) under nut (51). Omit one washer under nut, if needed, to allow two threads to be exposed.

When installing washer (55) and sleeve (56) to pilot input trunnion, the following procedure is required for each side of each cylinder (typical three places).

d. Hand pack each bearing with grease ([C-001](#)) and install washer (55) on the pilot input trunnion with inside chamfer toward trunnion flange. Install sleeve (56) on trunnion.

e. Hold shim (54) in position on bellcrank assembly (attached to support (68)) while installing plate assembly (53) and plate (71) onto pilot input trunnion. Place washer (64) onto bolt (65) and install bolt through plate (71), plate assembly (53), and shim (54), through bellcrank assembly. Install shim and plate assembly on opposite side.

#### NOTE

Plate (71) will be installed on the left outboard collective servo actuator only.

f. Check gaps between plates (53) and servo actuators (50 and 69) at pilot input valve trunnion. Add or remove shims (54) between sides of bellcrank (below pilot input valve trunnion) and plates as required to obtain minimum gap. Gaps must be 0.020 inch (0.51 mm) minimum on each side of pilot input valve trunnion and total gap must NOT exceed 0.120 inch (3.05 mm), with reaction trunnion laterally displaced in either direction. To check for 0.020 inch (0.51 mm) minimum gap, laterally displace and hold reaction trunnion. Cycle pilot input valve bellcrank back and forth through several inches (millimeters) of travel to allow pilot input valve trunnion to seek its free position, then check gap. Repeat lateral displacement of reaction trunnion in opposite direction, then check gap (Detail D).

g. After shimming operation is completed, install washer (62) next to boss of plate assembly (53) and install nut (63) and cotter pin (70) (typical both sides). Install washer (52) onto bolt (65) and secure plate assembly, with nut (51) and cotter pin (70) (typical two places), to each pilot input trunnion.


h. Connect cylinder extension tube (57) at aft end of servo actuators (50 and 69) (typical three places). Place washer (60) on bolt (61) and install bolt in end of extension tube clevis and install washer (59) on bolt and secure with nut (58) and cotter pin (70).

i. After all parts are assembled and the three servo actuators (50 and 69) and extension tubes (57) are secured together, remove caps and plugs and connect proper hydraulic lines to servo actuator.

j. Bleed hydraulic system and test servo actuators (50 and 69) ([Chapter 29](#)).

5. Install cyclic and collective servo actuators 206-001-566 support as follows:

a. Install bushings (20, [Figure 67-32](#)) on reaction trunnion in the sequence and order in which they were removed, and place in support (14). Rotate bushings 90°.

b. Install bolt (19), washers (18), and nut (17) .

c. Install spacers (7), bearings (6), washers (3 and 4), and special washers (5) on pilot input valve trunnion. Arrange washers as required to obtain a clearance of 0.015 to 0.060 inch (0.38 to 1.52 mm) between special washers and bellcrank on each side of pilot input valve trunnion (Detail A). Tighten nuts (2). Check that trunnion is free to move without binding. Install cotter pins (1).

d. Position cylinder extension tube (8) at servo actuator end of tube assembly and install bolt (13), two washers (11 and 12), and nut (10). Secure with cotter pin (9).

e. After all parts are assembled and installed, remove caps and connect proper hydraulic line to servo actuators (50 and 69).

f. Bleed hydraulic system and test servo actuators (50 and 69) ([Chapter 29](#)).

**67-87. 206-001-520 SERVO ACTUATOR SUPPORT ASSEMBLY**

**67-88. 206-001-520 SERVO ACTUATOR SUPPORT ASSEMBLY — REMOVAL**

1. Remove cyclic and collective servo actuators from support assembly (40, [Figure 67-33](#)) ([Paragraph 67-84](#)).

2. Disconnect two cyclic control tubes (20 and 35) from cyclic bellcranks (1 and 9) by removing cotter pins (22 and 37), nuts (21 and 36), washers (19 and 34), and bolts (18 and 33).

3. Disconnect collective control tube (32) from collective bellcrank (6) by removing cotter pin (31), nut (30), washers (29), and bolt (28).

4. Disconnect tail rotor bellcrank (26) from support assembly (40) by removing cotter pin (23), nut (24), washers (25), and bolt (27). Control tube on arms of tail rotor bellcrank (26) may be disconnected as desired.

5. Remove two nuts (17), aluminum washers (3), and bolts (2) from aft end of support assembly (40).

6. Remove two nuts (38), aluminum washers (39 and 41), and bolts (42) from forward end of support assembly (40).

7. Remove two bolts (44) and aluminum washers (43) from near forward end of support assembly (40). Bolts (44) are threaded into nutplates in the cabin roof.

**NOTE**

Sealant was applied to faying surfaces of support to cabin roof at assembly. It may be necessary to bump support with fiber mallet or hard rubber mallet to separate support from cabin roof.

8. Remove support assembly (40) from cabin roof.

9. Remove tapered shim (46).

10. Remove two cyclic bellcranks (1 and 9) from support assembly (40) by removing cotter pins (5 and 7), nuts (4 and 8), and bolts (45 and 16).

11. Remove collective bellcrank (6) and cover assembly (14) from support assembly (40) by removing cotter pin (11), nut (12), aluminum washers (10), bolt (15), and screws (13).

**67-89. 206-001-520 SERVO ACTUATOR SUPPORT ASSEMBLY — CLEANING**

**MATERIALS REQUIRED**

Refer to [BHT-ALL-SPM](#) for specifications.

| NUMBER | NOMENCLATURE |
|--------|--------------|
| C-304  | Solvent      |

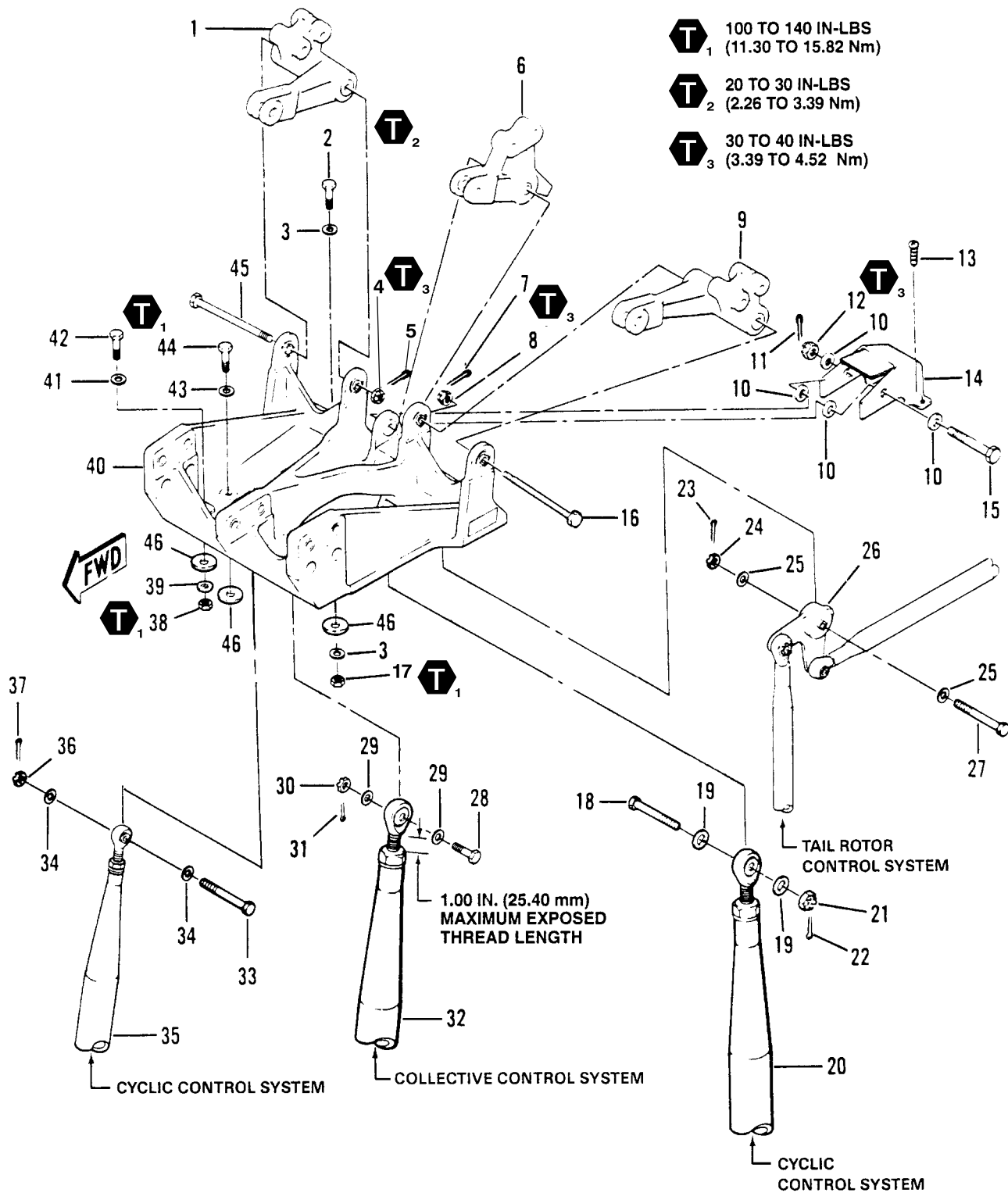
1. Clean servo actuator support assembly with drycleaning solvent ([C-304](#)). Dry with filtered compressed air. Do not allow solvent to contact bearings.

2. Remove old sealant from support assembly and cabin roof with plastic scraper.

**67-90. 206-001-520 SERVO ACTUATOR SUPPORT ASSEMBLY — INSPECTION AND REPAIR**

1. Inspect and repair servo actuator support assembly (40, [Figure 67-33](#)) and bellcranks (1, 6, 9, and 26) ([Paragraph 67-5](#)).

2. Replace bushings, sleeves, and bearings that are worn or damaged ([BHT-ALL-SPM](#)).



206ABMM\_67000\_00330\_001\_C00

Figure 67-33. 206-001-520 Servo Actuator Support Assembly (Sheet 1 of 2)

- |                                  |                                     |                                      |
|----------------------------------|-------------------------------------|--------------------------------------|
| 1. Cyclic bellcrank (right side) | 17. Nut                             | 33. Bolt                             |
| 2. Bolt                          | 18. Bolt                            | 34. Washer                           |
| 3. Aluminum washer               | 19. Washer                          | 35. Cyclic control tube (right side) |
| 4. Nut                           | 20. Cyclic control tube (left side) | 36. Nut                              |
| 5. Cotter pin                    | 21. Nut                             | 37. Cotter pin                       |
| 6. Collective bellcrank          | 22. Cotter pin                      | 38. Nut                              |
| 7. Cotter pin                    | 23. Cotter pin                      | 39. Aluminum washer                  |
| 8. Nut                           | 24. Nut                             | 40. Support assembly                 |
| 9. Cyclic bellcrank (left side)  | 25. Washer                          | 41. Thin aluminum washer             |
| 10. Aluminum washer              | 26. Tail rotor bellcrank            | 42. Bolt                             |
| 11. Cotter pin                   | 27. Bolt                            | 43. Aluminum washer                  |
| 12. Nut                          | 28. Bolt                            | 44. Bolt                             |
| 13. Screw                        | 29. Washer                          | 45. Bolt                             |
| 14. Cover assembly               | 30. Nut                             | 46. Tapered washer (shim)            |
| 15. Bolt                         | 31. Cotter pin                      |                                      |
| 16. Bolt                         | 32. Collective control tube         |                                      |


Figure 67-33. 206-001-520 Servo Actuator Support Assembly (Sheet 2)




**67-91. INSTALLATION**

**MATERIALS REQUIRED**

For data on consumable materials, refer to [BHT-ALL-SPM](#).

| NUMBER | NOMENCLATURE           |
|--------|------------------------|
| C-204  | Epoxy Polyamide Primer |
| C-308  | Adhesive Sealant       |

1. If not previously accomplished, clean aged sealant from support assembly (40, [Figure 67-33](#)) and mating surface area on cabin roof.
2. Position support assembly (40) on cabin roof and install two aft attachment bolts (2) .
3. Place a 10- to 20-pound (4.5 to 9.1 kg) weight, equally distributed, on forward end of support assembly (40).
4. Measure gaps between bottom of support assembly (40) and upper surface of cabin roof at center of each remaining bolt hole. Adjust and install tapered shims (46) at each of four forward bolt hole locations as follows:
  - a. If gap at each of four forward bolt holes is 0.013 inch (0.33 mm) or more, peel tapered shims (46) to thickness of gaps, as required.
  - b. If gap at any of four forward bolt holes is less than 0.013 inch (0.33 mm), determine smallest gap. Measure gap at bolt hole directly opposite and record measurements. Peel tapered shim (46) to a thickness of 0.013 to 0.019 inch (0.33 to 0.48 mm) and install at bolt hole with smallest gap. At bolt hole directly opposite, install a tapered shim which is equal in thickness to first shim plus difference between measured gaps.
  - c. Remeasure gaps at two remaining bolt hole locations and peel tapered shims (46), as required, to fill gaps. Maximum gap allowed 0.001 inch (0.025 mm).
5. Remove support assembly (40) from cabin roof. Check mating surfaces of support assembly and cabin roof for scratches in protective finish that may have occurred during cleaning or shimming. Refinish scratched surfaces with epoxy polyamide primer ([C-204](#)).

6. Apply adhesive sealant ([C-308](#)) to bottom surface of support assembly (40) that will mate with cabin roof. Position support assembly against cabin roof and install tapered shims (46) at appropriate locations. Ensure that tapered surface of each shim is against cabin roof with high side of taper outboard.
7. Install two bolts (2), aluminum washers (3), and nuts (17) through support assembly (40) and cabin roof. Ensure aluminum washers are installed under boltheads and nuts.
8. Install two bolts (44) with aluminum washers (43) through support assembly (40) and into nutplates in cabin roof.
9. Install two bolts (42) with thin aluminum washers (41) under boltheads through support assembly (40) and cabin roof. Secure with aluminum washers (39) and nuts (38).
10. After all bolts and washers are installed, tighten nuts (17 and 38)  and bolts (44)  evenly. Fair out squeeze-out to fill edge voids. Remove any excess adhesive.
11. Install collective bellcrank (6), cover assembly (14) with bolt (15), four aluminum washers (10), nut (12), and cotter pin (11) in support assembly (40). Position aluminum washers on both sides of cover assembly. Install two screws (13) to secure cover assembly.
12. Insert cyclic bellcranks (1 and 9) in support assembly (40) and install bolts (16 and 45) with nuts (4 and 8) . Secure with cotter pins (5 and 7).



ADJUSTABLE ROD END BEARINGS ON CYCLIC AND COLLECTIVE CONTROL TUBES (20, 32, AND 35) HAVE A 1.0 INCH (25.40 MM) MAXIMUM EXPOSED THREAD LENGTH. REFER TO CYCLIC OR COLLECTIVE CONTROL SYSTEM RIGGING, AS REQUIRED.

13. Position tail rotor bellcrank (26) into lower arms on support assembly (40) and secure with bolt (27), washers (25), nut (24), and cotter pin (23).

14. Connect collective control tube (32) to arm on collective bellcrank (6) with bolt (28), washers (29), nut (30), and cotter pin (31).

15. Connect two cyclic control tubes (20 and 35) to arms on cyclic bellcranks (9 and 1) with bolts (18 and 33), washers (19 and 34), nuts (21 and 36), and cotter pins (22 and 37).

16. Install cyclic and collective servo actuators on support assembly (40) ([Paragraph 67-86](#)).

## 67-92. 206-001-566 SERVO ACTUATOR SUPPORT ASSEMBLY

### 67-93. REMOVAL

1. Remove servo actuators ([Paragraph 67-84](#)).
2. Remove cotter pins (22 and 37, [Figure 67-34](#)), nuts (21 and 36), washers (19 and 34), bolts (18 and 33), and both cyclic control tubes (20 and 35).
3. Remove cotter pin (31), nut (30), washers (29), bolt (28), bushing (46), and collective control tube (32) from collective bellcrank (6).
4. Remove cotter pin (23), nut (24), washers (25), bolt (27), and tail rotor bellcrank (26) from support (40). Control tube on arms of tail rotor bellcrank may be disconnected as desired.
5. Remove two nuts (17), aluminum washers (3), and bolts (2) from aft end of support (40).
6. Remove two nuts (38), aluminum washers (39), thin aluminum washer (41), and bolts (42) from forward end of support (40).
7. Remove nut plates (13), two aluminum washers (43), and bolts (44) from near forward end of support (40).

#### NOTE

Sealant was applied to faying surfaces of support and cabin roof at assembly. It may be necessary to bump support with fiber mallet or hard rubber mallet to separate support from cabin roof.

8. Remove support (40) and four shims (14) from cabin roof.

9. Remove cotter pins (5 and 7), nuts (4 and 8), aluminum washers (10), bolts (45 and 16), bushings (47), and both cyclic bellcranks (1 and 9).

10. Remove cotter pin (11), nut (12), aluminum washers (10), bolt (15), and collective bellcrank (6).

### 67-94. CLEANING

#### MATERIALS REQUIRED

For data on consumable materials, refer to [BHT-ALL-SPM](#).

| NUMBER | NOMENCLATURE |
|--------|--------------|
| C-304  | Solvent      |

1. Clean servo actuator support (40, [Figure 67-34](#)) with solvent (C-304). Dry with filtered compressed air.
2. Remove old sealant from support and cabin roof with plastic scraper.

### 67-95. INSPECTION AND REPAIR

1. Inspect and repair servo actuator support (40, [Figure 67-34](#)) and bellcranks (1, 6, 9, and 26) ([Paragraph 67-5](#)).
2. Replace bushings, sleeves, and bearings that are worn or damaged ([BHT-ALL-SPM](#)).

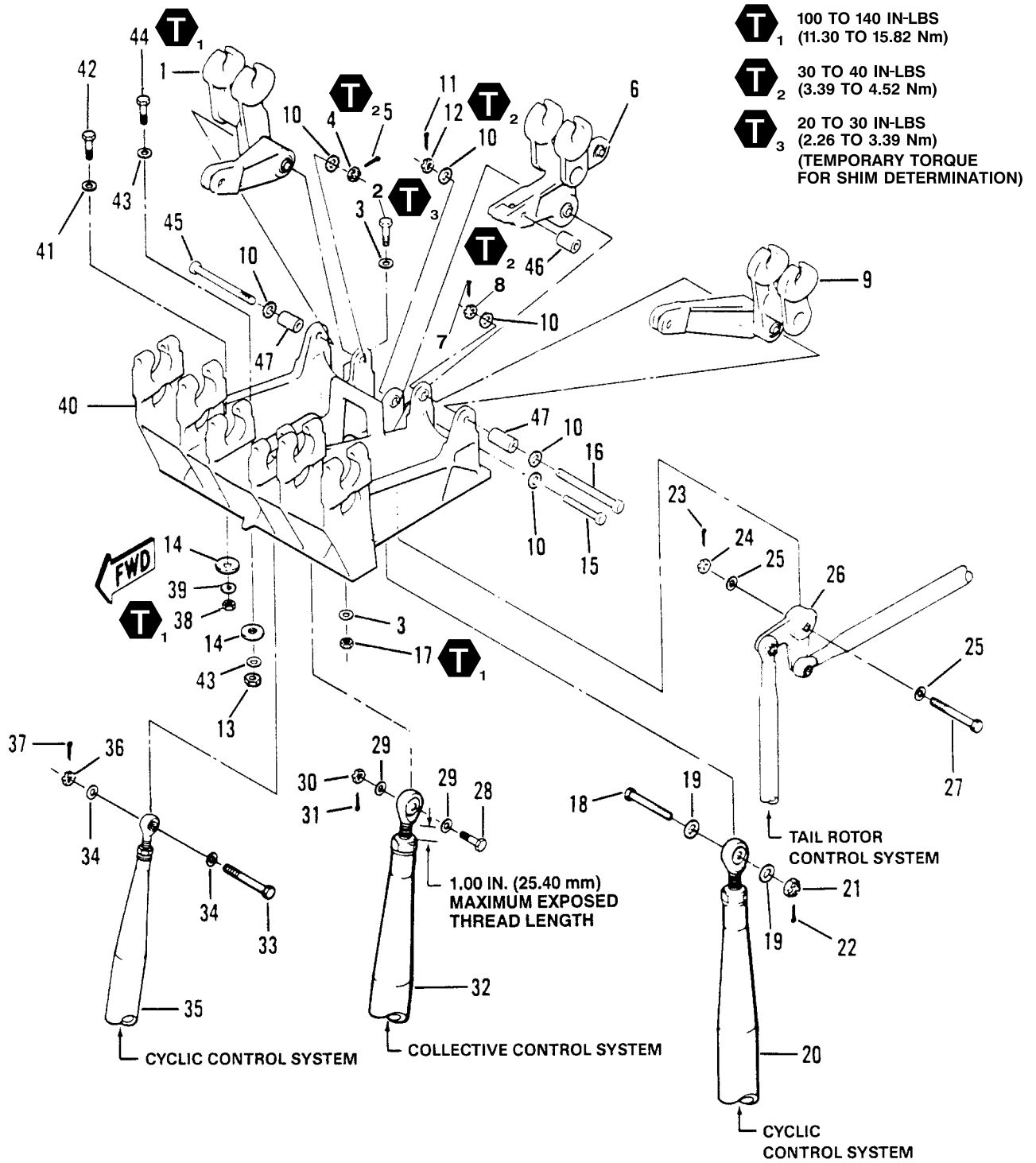
### 67-96. INSTALLATION

#### MATERIALS REQUIRED

For data on consumable materials, refer to [BHT-ALL-SPM](#).

| NUMBER | NOMENCLATURE           |
|--------|------------------------|
| C-204  | Epoxy Polyamide Primer |
| C-308  | Adhesive Sealant       |

1. If not previously accomplished, clean aged sealant from support (40, [Figure 67-34](#)) and mating surface area on cabin roof.
2. Position support (40) on cabin roof and install two aft attachment bolts (2), aluminum washers (3), and nuts (17). Temporarily tighten bolts 20 to 30 inch-pounds (2.26 to 3.39 N-m).



206ABMM\_67000\_00340\_001\_C00

Figure 67-34. 206-001-566 Servo Actuator Support Assembly (Sheet 1 of 2)

- |                           |                              |                               |
|---------------------------|------------------------------|-------------------------------|
| 1. Right cyclic bellcrank | 17. Nut                      | 33. Bolt                      |
| 2. Bolt                   | 18. Bolt                     | 34. Washer                    |
| 3. Aluminum washer        | 19. Washer                   | 35. Right cyclic control tube |
| 4. Nut                    | 20. Left cyclic control tube | 36. Nut                       |
| 5. Cotter pin             | 21. Nut                      | 37. Cotter pin                |
| 6. Collective bellcrank   | 22. Cotter pin               | 38. Nut                       |
| 7. Cotter pin             | 23. Cotter pin               | 39. Aluminum washer           |
| 8. Nut                    | 24. Nut                      | 40. Support                   |
| 9. Left cyclic bellcrank  | 25. Washer                   | 41. Thin aluminum washer      |
| 10. Aluminum washer       | 26. Tail rotor bellcrank     | 42. Bolt                      |
| 11. Cotter pin            | 27. Bolt                     | 43. Aluminum washer           |
| 12. Nut                   | 28. Bolt                     | 44. Bolt                      |
| 13. Nutplate (REF)        | 29. Washer                   | 45. Bolt                      |
| 14. Shim                  | 30. Nut                      | 46. Bushing                   |
| 15. Bolt                  | 31. Cotter pin               | 47. Bushing                   |
| 16. Bolt                  | 32. Collective control tube  |                               |

Figure 67-34. 206-001-566 Servo Actuator Support Assembly (Sheet 2)




3. Place a 10- to 20-pound (4.5 to 9.1 kg) weight, equally distributed, on forward end of support (40).

4. Determine the shim thickness of each of the four bolts (42 and 44) for a maximum of 0.001 inch (0.03 mm) gap at each mounting hole.



5. Remove two aft nuts (17), aluminum washers (3), and bolts (2). Remove support (40) from cabin roof. Check lower mounting surfaces of support and cabin roof for scratches in protective finish that may have occurred during cleaning or shimming. Refinish scratched surface with epoxy polyamide primer (C-204).


6. Apply adhesive sealant (C-308) to bottom surface of support (40) that will mate with cabin roof. Position support against cabin roof and install shims (14) at appropriate locations.


7. Install two aft bolts (2), aluminum washers (3), and nuts (17)  through support (40) and cabin roof. Ensure aluminum washers are installed under boltheads and nuts.

8. Install two center bolts (44) with aluminum washers (43) and shim (14), through support (40), and into nutplates (13) in cabin roof.

9. Install two forward bolts (42), with thin aluminum washers (41) under boltheads, through support (40) and into cabin roof. Secure with aluminum washers (39), shim (14), and nuts (38).

10. After all bolts and washers are installed, tighten nuts (17 and 38)  and bolts (44)  evenly. Fair out adhesive squeeze-out to fill edge voids. Remove any excess adhesive.

11. Install collective bellcrank (6) with bolt (15), aluminum washer (10), and nut (12)  in support (40). Secure with cotter pin (11).

12. Install bushings (47) in outboard ears of support (40). Insert cyclic bellcranks (1 and 9) in support and install bolts (16 and 45), aluminum washers (10), and nuts (4 and 8) . Secure with cotter pins (5 and 7).



ADJUSTABLE ROD END BEARINGS ON CYCLIC AND COLLECTIVE CONTROL TUBES (20, 32, AND 35) ARE ALLOWED 1.0 INCH (25.40 MM) MAXIMUM EXPOSED THREAD LENGTH. REFER TO CYCLIC OR COLLECTIVE CONTROL SYSTEM RIGGING, AS REQUIRED.

13. Position tail rotor bellcrank (26) into lower arms on support (40) and secure with bolt (27), washers (25), nut (24), and cotter pin (23).

14. Install bushing (46) on right side of collective bellcrank (6). Connect collective control tube (32) to arm on collective bellcrank with bolt (28), washers (29), nut (30), and cotter pin (31).

15. Connect two cyclic control tubes (20 and 35) to arms on cyclic bellcranks (9 and 1) with bolts (18 and 33), washers (19 and 34), nuts (21 and 36), and cotter pins (22 and 37).

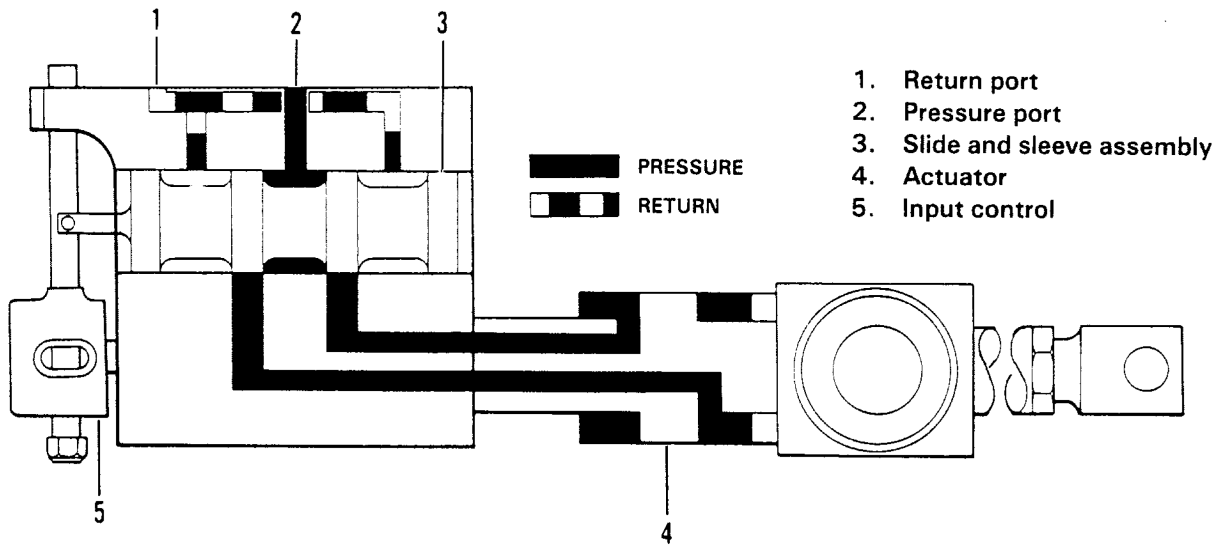
16. Install cyclic and collective servo actuators on support (40) ([Paragraph 67-86](#)).

17. Check collective rigging, if required ([Paragraph 67-8](#)).

18. Check cyclic rigging, if required ([Paragraph 67-38](#)).

## **67-97. ANTITORQUE SERVO ACTUATOR AND SUPPORT**

The antitorque control servo actuator support is installed in the fuselage above and aft of the baggage compartment. It serves as a mount for the antitorque servo actuator and associated lever assembly. The servo actuator reduces the operational loads of the antitorque control system but does not incorporate the irreversible feature used on the cyclic and collective servo actuators. Refer to [Figure 67-35](#) for schematic diagram.



206ABMM\_67000\_00350\_001\_C00

Figure 67-35. Antitorque Servo Actuator Schematic

### **67-98. REMOVAL**

1. Remove access door in roof of baggage compartment.
2. If stabilization augmentation control system kit is installed, disconnect electrical wiring at SCAS servo actuator.
3. Disconnect hydraulic lines from servo actuator (6, [Figure 67-36](#)). Cap or plug open lines and fittings on servo actuator.
4. Disconnect control tube assembly (7) at aft end of servo actuator (6).
5. Disconnect tube assembly (17) from lever (16).

#### **NOTE**

The antitorque servo actuator (6) may be removed intact with support (15) prior to accomplishment of steps 5. and 6. as an alternate removal procedure, if desired, by removing three bolts (1).

6. Remove two bolts (12) and two plate assemblies (14) at forward end of servo actuator (6).
7. Remove two bolts (9) and two plate assemblies (5) at aft end of servo actuator (6). Remove servo actuator.

### **67-99. INSPECTION**

1. Visually inspect anti-torque servo actuator (6, [Figure 67-36](#)) for cracks, breaks, and other signs of obvious damage.
2. Inspect all threaded parts for damaged threads.
3. Inspect ports for dirt or other foreign matter.
4. Inspect exposed portion of shaft at end of servo actuator (6) for scoring and evidence of corrosion.

### **67-100. INSTALLATION**

1. Set dimension of adapter in output end of servo actuator (6, [Figure 67-36](#)) to 1.22 inches (30.99 mm) (Detail B).

#### **NOTE**

The antitorque servo actuator (6) may be installed in support (15) on the bench and then installed in the helicopter as an assembly, if desired.

2. Position two plate assemblies (5) on servo actuator (6) with flanged side of bushing inboard. Install two bolts (9) to secure plate assemblies to support (15). Place one washer (8) under heads of bolts (9) and one washer (4) under nuts (3).
3. Position two plate assemblies (14) on servo actuator (6) with flanged side of bushing inboard. Install two bolts (12) to secure plate assemblies to lever assembly (16). Place one washer (13) under heads of bolts (12) and one washer (18) under nuts (19).
4. Connect control tube assembly (7) at aft end of servo actuator (6). Install bolt (20), two washers (21), one under bolt head and one under nut (22). Install cotter pin (23).
5. Connect hydraulic lines to servo actuator (6).
6. If stabilization augmentation control system kit is installed, connect electrical wiring at SCAS servo actuator.

### **67-101. STABILIZATION AUGMENTATION CONTROL SYSTEM KIT**

Refer to Service Instructions 206-13, 206-16, or 206-71 for installation and maintenance instructions for the SCAS system kit.

- |                               |                    |
|-------------------------------|--------------------|
| 1. Bolt                       | 13. Washer         |
| 2. Washer                     | 14. Plate assembly |
| 3. Nut                        | 15. Support        |
| 4. Washer                     | 16. Lever assembly |
| 5. Plate assembly             | 17. Tube assembly  |
| 6. Anti-torque servo actuator | 18. Washer         |
| 7. Tube assembly              | 19. Nut            |
| 8. Washer                     | 20. Bolt           |
| 9. Bolt                       | 21. Washer         |
| 10. Nut                       | 22. Nut            |
| 11. Washer                    | 23. Cotter pin     |
| 12. Bolt                      |                    |

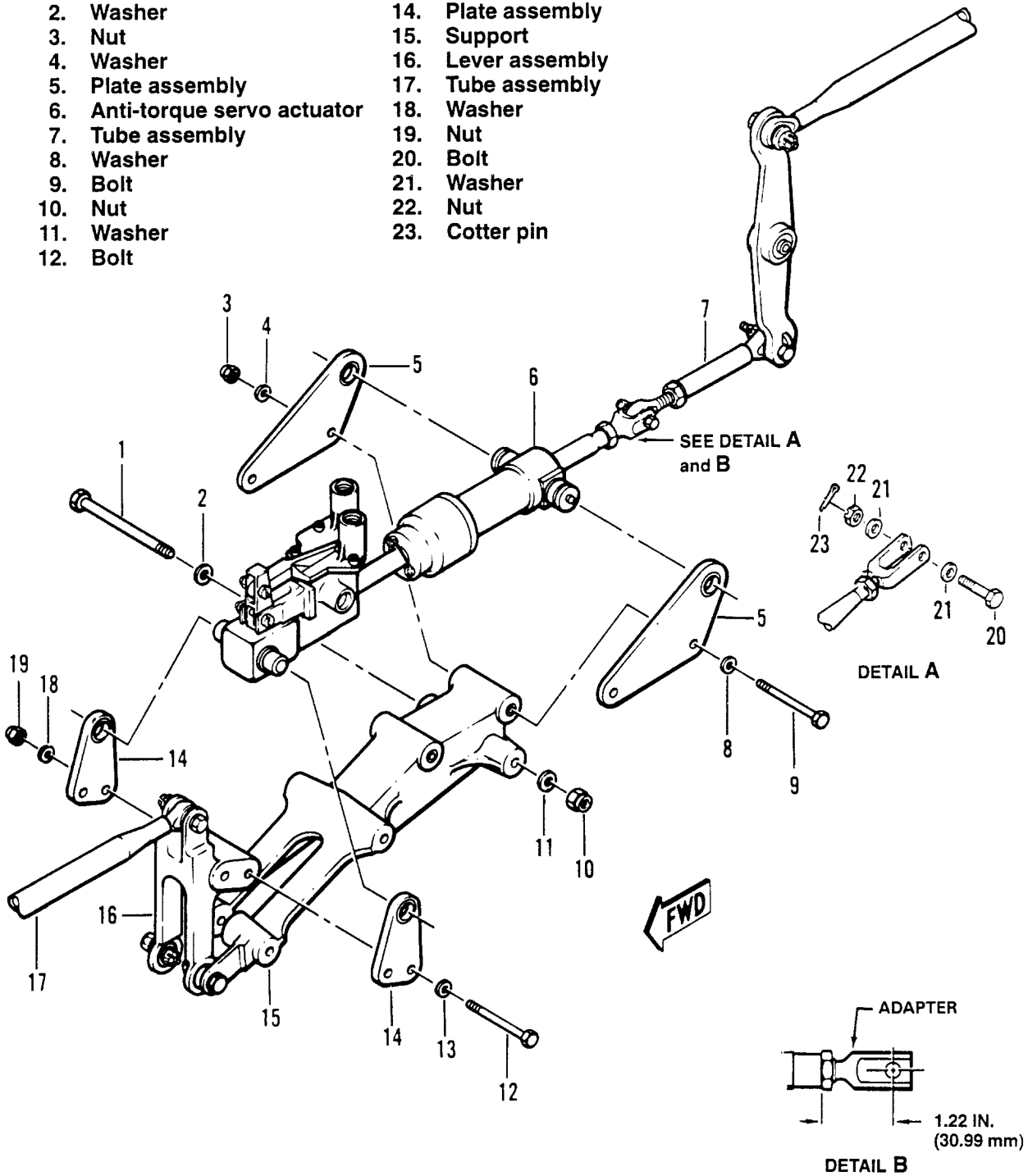


Figure 67-36. Antitorque Servo Actuator and Support

206ABMM\_67000\_00360\_001\_C00