Bell Helicopter
A Textron Company

TECHNICAL BULLETIN 214ST-90-117
9 November 1990
Revision A, 31 May 2012

**MODEL AFFECTED:** **214ST Helicopters**

**SUBJECT:** **REPAIR AND OVERHAUL OF AFCS ACTUATORS P/N'S 214-001-540-107; -113 (ROLL), 214-001-540-109; -115 (PITCH), 214-001-540-111; -117 (YAW)**

**HELICOPTERS AFFECTED:** **Model 214ST helicopter serial numbers 28101 and subsequent**

**COMPLIANCE:** At customer's option.

**DESCRIPTION:**

The purpose of this revision is to provide the corrected ohmic values necessary to perform the continuity checks of the Kearfott motor, P/N: 214-001-550-101; -105, in the subject SCAS Actuators. Applicability of this bulletin to any spare part shall be determined prior to its installation on an affected aircraft.

**APPROVAL:**

The engineering design aspects of this bulletin are FAA/ODA approved.

**CONTACT INFO:**

For any questions regarding this bulletin, please contact:

Bell Helicopter Product Support Engineering - Medium Military Helicopters
Tel: 817-280-3548 / mts-medium@bellhelicopter.textron.com

**MANPOWER:**

Approximately 6.0 man-hours are required to complete this bulletin. This estimate is based on hands-on time, and may vary with personnel and facilities available.

**WARRANTY:**

There is no warranty credit applicable for parts or labor associated with this bulletin.

**MATERIAL:**

**Required Material:**

To be determined during overhaul from reference listed in Paragraph 2.6

**SPECIAL TOOLS:**

See Paragraph 2.2

**WEIGHT AND BALANCE:**

Not affected.

**ELECTRICAL LOAD DATA:**

Not affected.

**REFERENCES:**

BHT-214ST-IPB Illustrated Parts Breakdown
BHT-214ST-MM Maintenance Manual
BHT-214ST-CR&O Component Repair and Overhaul Manual

**PUBLICATIONS AFFECTED:**

BHT-214ST-CR&O Component Repair and Overhaul Manual

**ACCOMPLISHMENT INSTRUCTIONS:**

Overhaul of a SCAS actuator involves analysis component disassembly, assembly and alignment / checkout. The following procedure covers the complete overhaul of roll, pitch and yaw SCAS actuators.

TABLE OF CONTENTS

## 1.0 **SCOPE:**

These instructions are for the use of repair shop or operator personnel authorized by local by local aviation authorities to overhaul the Model 214ST pitch, roll and yaw SCAS actuators.

## 1.1 **REPORTING ERRORS:**

We welcome your letter / customer feedback form to:

Bell Helicopter Textron
Manager, Military Technical Support
Product Support Engineering
P.O. Box 482
Fort Worth, TX 76101

## 1.2 **DESCRIPTION:**

The stability and control augmentation system (SCAS) provides angular rate damping and a pilot control loop for the Model 214ST. Three electro mechanical actuator assemblies (pitch, roll and yaw) are mounted to act in series with the aircraft's mechanical control system.

Each actuator assembly contains a servo motor / generator, an engage solenoid and interconnect linkage mounted into a support assembly as shown in Figure 67-23. The motor responds to electronic signals generated within the electronic circuitry control loops. SCAS actuator displacement is summed (plus or minus) with the pilot's fixed controls to establish main rotor and tail rotor positions.

The difference between actuator assembly part numbers is due to the mounting hole pattern in the support assemblies, item 82 and 83, Figure 67-23 and stop / lock, item 75, Figure 67-23. The stop / lock determines the control authority.

## 1.3 **TECHNICAL CHARACTERISTICS:**

The table below lists technical characteristics of the electro-mechanical SCAS actuator assembly.

| | |
|---|---|
| OPERATING VOLTAGE: | 115 V.A.C. 400 Hz<br>26 V.A.C. 400 Hz<br>15 V.A.C. 400 Hz<br>28 V.D.C. |
| MOTOR CURRENT: | 5.0 AMP. MAX |
| SOLENOID CURRENT: | 5.0 AMP. MAX |
| OPERATING TEMPERATURE: | -55 DEGREES C to 71 DEGREES C |
| ALTITUDE: | SEA LEVEL to 30,000 FT. |

## 1.4 **DATA PLATES:**

Assemblies' identification and serial numbers are ink stamped to each actuator housing, item 83, of Figure 67-23 as follows:

Assembly: 214-001-540-107, -113 (Roll)
214-001-540-109, -115 (Pitch)
214-001-540-111, -117 (Yaw)

Vendor's data plates are affixed to each servo motor. Identify the motor manufacturer as either: 214-001-550-101, -105 (Kearfott) or 214-001-550-103, -107 (MPC Products)

-NOTE-

The latest dash number motors (-105 and -107) are improved waterproof units. The waterproof solenoid P/N is 214-001-570-103.

## 2.0 **FACILITIES, TOOLS AND MATERIALS REQUIREMENTS:**

### 2.1 **FACILITIES:**

No special facilities are required for overhaul of SCAS actuator assemblies. However, 115 VAC 400 HZ, 26 VAC 400 HZ, 15 VAC HZ and 28 VDC electric power is required.

### 2.2 **TOOLS AND TEST EQUIPMENT:**

Table 2-1 is a list of special tools and test equipment required to overhaul actuators.

TABLE 2-1 SPECIAL TOOLS AND EQUIPMENT

| Nomenclature | Part Number | Reference |
|---|---|---|
| SCAS Actuator Test Set | T103284-101 | Woodward HRT |
| Digital Multimeter | HP 345A or equivalent<br>Model 8000A or equivalent | Hewlett Packard<br>Fluke |
| Oscilloscope | Model 549 or equivalent | Tektronic |
| Push-Pull Scale | 0-5 pound | Generic |
| Bearing Staking Tools | T102095-3<br>T102095-13 | Bell Helicopter Textron<br>Bell Helicopter Textron |

### 2.3 **EXPENDABLE MATERIALS:**

Lockwire: MS20995C20 or MS20995C32
Inspection Sealant (black)
Pin, cotter: MS24665-151
Pin, cotter: MS24665-132

### 2.4 **QUALITY OF MATERIALS:**

Repair parts and materials used for replacement, repair or modification shall meet Bell Helicopter drawings and specifications.

## 2.5 **WEAR LIMITS, DAMAGE, FITS AND CORROSION:**

Refer to BHT-214ST-MM, Chapter 67 for wear limits, damage and fits for:

a. Stop Lock

b. Support

c. Idler

d. Walking Beam

e. Arm

f. Latch

Refer to BHT-ALL-SPM for corrosion control and protective coatings, painting and bearing limits.

## 2.6 **REPAIR PARTS:**

Repair parts required for overhaul or repair of SCAS actuator assemblies are listed in BHT-214ST-IPB, Figure 67-23.

# 3.0 **PRE-OVERHAUL ANALYSIS:**

## 3.1 **GENERAL:**

This section provides information concerning examination and preliminary actuator testing required to prepare work estimates and to procure spare parts in preparation for overhaul and / or repair.

## 3.2 **EXAMINATION / INSPECTION:**

Check all tags and forms attached to the electro-mechanical SCAS actuator assembly to determine the reason for removal from service. Perform a visual inspection of the actuator assembly. Inspect electrical connectors, cables, motor assembly and engage solenoid for damage and corrosion. Electrical connectors with cracks or bent or recessed pins must be replaced. Inspect the mechanical integrity for binding or damaged bearings, binding and clearance of lock mechanism, spring mechanism, damage to linkages, broken safety wire and missing cotter pins. Document all discrepancies found during examination and list those parts needed for repair.

## 3.3 **EVALUATION:**

When the SCAS actuator assembly is being disassembled for replacement of parts instead of overhaul, disassemble only to the extent necessary to replace those parts. Refer to Paragraph 4 below for details.

To determine the extent of overhaul required and / or verification of discrepancy, perform Paragraph 6.0 “Continuity and Functional Tests”. After overhaul is completed, actuator must pass the Functional Test described in Paragraph 6.3.

## 4.0 DISASSEMBLY OF SCAS ACTUATOR P/N: 214-001-540-XXX, FIGURES 67-23 AND 67-24 in BHT-214ST-IPB (attached)

During the disassembly continue to inspect as parts are removed. Look for stripped and crossed threads. Clean corrosion and dirt from individual parts as they are removed from the assembly.

## 4.1 REMOVAL OF THE DRIVE AND CENTERING ASSEMBLY (Figure 67-23, Item 15)

a. Remove wire harness clamp (Item 11) by removing screw (Item 10), washer (Item 9) and nut (Item 8).

b. Disconnect turnbuckle assembly (Item 22) from arm assembly by removing bolt (Item 21) and washer (Item 21).

c. Remove bracket (Item 14) by removing screw (Item 12) and washer (Item 13), three places. Drive and centering assembly is now free from housing.

## 4.2 SEPARATION OF DRIVE MOTOR ASSEMBLY (Figure 67-24 Item 24) from CENTERING ASSEMBLY (Item 7)

a. Loosen screw (Item 20) on arm assembly (Item 21) until arm assembly rotates freely.

-NOTE-

Use appropriate box end wrench to hold nut while loosening screw.

b. Cut and remove safety wire securing screws (Item 15) three places.

c. Remove screws (Item 15) from case (Item 17) three places.

d. Separate motor assembly (Item 24) from centering assembly (Item 7) by pulling them apart.

-NOTE-

Motor assembly (Item 24) P/N: 214-001-560-105 / -109 consists of motor (Item 31), adapter assembly (Item 29), screws (Item 26) and washers (Items 27 and 28).

## 4.3 DISASSEMBLY OF CENTERING ASSEMBLY (Figure 67-24 Item 7)

a. Remove cap (Item 3) by removing screws (Item 1) and washers (Item 2) two places.

b. Remove screws (Item 15) and washers (Item 16) from case (Item 17) and slide outer ring assembly (Item 4) from case (Item 17).

c. Slide out centering assembly (Item 7) from case (Item 17) by separating arm assembly (Item 21) from centering assembly (Item 7).

d. Remove cotter pin (Item 7A) from shaft assembly (Item 13), nut (Item 8) and washer (Item 9).

e. Rotate retainer (Item 11) counterclockwise against spring (item 12), drop out pin (Item 10) and allow spring (Item 12) to unload.

f. Remove retainer (item 11), spring (Item 12) from shaft assembly (Item 13).

## 4.4 REMOVAL AND DISASSEMBLY OF TURNBUCKLE ASSEMBLY (Figure 67-23 Item 22)

a. Remove cotter pin (Item 16) from bolt (Item 19) washers (Item 18) and nut (Item 17).

b. Release latch (Item 39), advance walking beam (Item 56) to stop, remove bolt (Item 19) to free turnbuckle assembly (Item 22).

c. Refer to Figure 5-3 to disassemble turnbuckle P/N: 214-001-516-101.

## 4.5 REMOVAL OF ENGAGE SOLENOID (Figure 67-34 Item 50)

a. Remove harness clamp (Item 74) by removing nut (Item 70), washer (Item 71) and bolt (Item 73).

b. Disconnect link end, female (Item 45) from engage solenoid (Item 50) by removing cotter pin (Item 40), nut (Item 41), washers (Item 42) and bolt (Item 44).

c. Remove cotter pin (Item 46), nut (Item 47, washer (Item 48) and bolt (Item 49) two places. Remove solenoid (Item 50) from walking beam (Item 56).

## 4.6 REMOVAL OF WALKING BEAM ASSEMBLY (Figure 67-23 Item 56)

a. Disconnect link end, male (Item 35) by removing cotter pin (Item 30), nut (Item 31), washer (item 32) and bolt (Item 34).

b. Remove cotter pin (Item 37) and washer (Item 38) to release latch (Item 39) from walking beam assembly (Item 56).

c. Remove cotter pin (Item 51), nut (Item 52), washers (Item 53) and bolt (Item 54).

d. Remove walking beam assembly (Item 56) from idler assembly (Item 76).

4.7 **REMOVAL OF IDLER ASSEMBLY (Figure 67-23 Item 76)**

a. Remove cotter pins (Item 64) from bolts (Item 67). Remove nuts (Item 65), washers (Item 66), two places, and remove bolts (Item 67).

b. Remover idler assembly (Item 76) from support assembly (Item 83).

c. Remove stop lock (Item 75) from idler assembly (Item 76) by removing nuts (Item 70), washers (Items 69 and 71) and bolts (Items 68, 72 and 73).

5.0 **SCAS ACTUATOR OVERHAUL AND ADJUSTMENTS**

P/N: 214-001-540-107 / -113 (ROLL)
P/N: 214-001-540-109 / -115 (PITCH)
P/N: 214-001-540-111 / -117 (YAW)

5.1 **REBUILD IDLER ASSEMBLY (Figure 67-23 Item 76)**

a. Install stop lock assembly (Item 75) into idler assembly (Item 76) using bolt (Item 68 and washer (Item 69). Torque 7 – 12 in. lbs. and safety wire bolt head. Install bolts (Items 72 and 73), washers (Item 71) and nuts (Item 70). Torque nuts to 20 – 25 in. lbs. and apply inspection sealant to threads and nuts.

-NOTE-

Stop lock (Item 75), P/N: 214-001-518-103, is to be used on actuator assembly, P/N: 214-001-540-109 / -115 (pitch) and P/N: 214-001-540-111 / -117 (yaw). Stop lock (Item 75), P/N: 214-001-518-105, is to be used on actuator assembly, P/N: 214-001-540-107 / -113 (roll).

b. Install idler assembly (Item 76) into support assembly (Item 83), P/N: 214-001-541-101 (roll), P/N: 214-001-541-103 (pitch), P/N: 214-001-541-105 (yaw) by installing bolts (Item 67), washers (Item 66) (three each) and nuts (Item 65) two places.

c. Torque bolts (Item 67) and nuts (Item 65) to 30 – 40 in. lbs. Install cotter pins and apply inspection sealant to threads and nuts.

## 5.2 REBUILD WALKING BEAM ASSEMBLY (Figure 67-23 Item 56)

a. Install latch lockout (Item 39) into walking beam assembly (Item 56) and install washer (Item 38) and cotter pin (Item 37).

b. Install walking beam assembly (Item 56) into idler assembly (Item 76) and support assembly (Item 83) with bolt (Item 54), washers (Item 53), two places, and nut (Item 52).

c. Torque bolt (Item 54) and nut (Item 52) to 30 – 40 in. lbs., install cotter pin (Item 51) and apply inspection sealant.

## 5.3 REBUILD DRIVE AND CENTERING ASSEMBLY, P/N: 214-001-560-101, -107 (Figure 67-24)

-NOTE-

Motor assemblies, P/N: 214-001-560-105 / -109 (Item 24) are the drive portion of the drive and centering assembly. Motor P/N: 214-001-550-101 / -105 (Item 31) can be attached to the adapter assembly, P/N: 214-001-558-101 (Item 29) to make a motor assembly.

a. Rebuild motor assembly, P/N: 214-001-560-105 / -109 (Item 24). Install motor adapter, P/N: 214-001-558-101 (Item 29) onto motor, P/N: 214-001-550-101 / -105 (Item 31) with washers (Items 27 and 28) screws (Item 26) and screw (Item 25).

b. Rebuild centering assembly, P/N: 214-001-560-103 (Item 7). Install spring (Item 12) onto shaft (Item 13). Align spring tang with notch on shaft (Item 13).

c. Slide retainer (Item 11) onto shaft (Item 13). Align retainer notch onto spring tang.

d. Wind retainer clockwise against spring to obtain 7.0 in. lbs. torque.

-NOTE-

Exercise care not to damage centering assembly during spring torquing operation. Centering assembly, P/N: 214-001-560-103, is available as a unit from the factory if desired.

e. Align indexing hole by tightening clockwise to the next hole and install pin (Item 10).

f. Install washer (Item 9) onto shaft (Item 13) and secure with nut (Item 8) and cotter pin (Item 7A).

g. Reassemble drive and centering assembly by placing centering assembly (Item 7) into case (Item 17) with spring tang against case notch.

h. Slip arm assembly (item 21) over centering assembly shaft (item 13). Arm assembly (item 21) should fit loosely over shaft (item 13) and must be oriented as shown in Figure 5-1.

i. Place centering assembly shaft (Item 13) over motor assembly shaft (Item 31). Secure case (Item 17) to motor assembly (Item 31) with three screws (Item 15) and washers (Item 16). Secure with safety wire.

j. Place ring assembly (Item 4) into case (Item 17). Engage ring assembly (Item 4) notch against spring tang. Install two screws (Item 15) and washers (Item 16). Rotate ring assembly (Item 4) against spring tang until all free play is removed. Secure screws (Item 15) with safety wire.

k. Place cap (Item 3) against ring assembly (Item 4). Install two screws (Item 1) and washers (Item 2) and secure with safety wire.

l. Position arm assembly (Item 21) around the centering drive collar until centerline is approximately in line with the centerline of motor mount screw hole. See view A-A in Figure 5-1. Install screw (Item 20, two washers (Item 19) and nut (Item 18). Torque to 30 +/- 2 in. lbs.

m. Rotate arm assembly (Item 21) in both directions against centering spring. Upon release, arm assembly should return and maintain centering position as set in previous step.

## 5.4 ATTACH DRIVE AND CENTERING ASSEMBLY (Figure 67-23 Item 15) TO ACTUATOR SUPPORT (Item 83)

a. Place drive and centering assembly (Item 15) into support assembly (Item 83) and secure with screws (Item 12) and washers (Item 13) three places.

b. Install bracket (Item 14), clamp (Item 11), washer (Item 9), screw (Item 10) and nut (Item 8). Place motor harness through clamp (Item 11). Do not secure until solenoid harness is included.

## 5.5 INSTALL SOLENOID (Figure 67-23 Item 50)

a. Mount solenoid, P/N: 214-001-570-101 / -103, against walking beam assembly (Item 63) with bolt (Item 49) two places, washer (Item 48), nut (Item 47) and cotter pin (Item 46).

b. Route solenoid harness through clamp installed in step 5.4.b above and secure with screw (Item 72), washer (Item 71) and nut (Item 70).

c. Install link end, female (Item 45) to solenoid (Item 50) with bolt (Item 44), two washers (Item 42), one washer (Item 43), nut (Item 41) and cotter pin (Item 40).

d. Drive nut (Item 36) onto link end, male (Item 35). Engage link end, male (Item 35) to link end, female (Item 45). Adjust link end, male (Item 35) to fit latch, SCAS lockout (Item 39) while maintaining 0.030 inch gap with solenoid plunger full depressed as shown in Figure 5-2. Install bolt (Item 34), washers (Items 32 and 33), nut (Item 31) and cotter pin (Item 30).

e. Tighten nut (Item 31) sufficiently to eliminate axial play without deforming the clevis on the latch, SCAS lockout (Item 39).

-NOTE-

Clevis, P/N: 214-001-517-101, on the latch, SCAS lockout is left hand threaded.

## 5.6 ASSEMBLY AND INSTALLATION OF TURNBUCKLE ASSEMBLY (Figure 67-23 Item 22)

a. Assemble turnbuckle assembly (Item 22) as detailed in Figure 67-23, Figure 5-2 and the text below.

b. Install turnbuckle (Item 22) to walking beam (Item 56) with bolt (Item 19), washers (Item 18), nut (Item 17) and cotter pin (Item 16).

c. Place latch, SCAS lockout (Item 39) in stop lock (Item 75). Maintain latch lockout and motor drive arm centered. Adjust turnbuckle clevises until bolt (Item 20) turns freely. With bolt (Item 20) temporarily installed, disengage lockout (Item 39) from stop lock (Item 75). Manually displace SCAS drive against limit stop and release. Centering spring assembly should return latch lockout (Item 39) to center and lock. Repeat operation for the opposite limit.

-NOTE-

If latch lockout (Item 39) fails to center and lock, loosen jamnuts (Items 23 and 26) on turnbuckle (Item 22) and re-adjust clevises until centering drive arm position and latch lockout (Item 39) coincide and lock.

d. Torque bolt (Item 20) and washer (Item 21) until 1 thread minimum protrudes through clevis.

**CAUTION**

Do not deform clevis tangs. Use thinner washer (Item 21) if necessary.

e. Tighten jamnut (Item 23) and lock (Item 24) on turnbuckle (Item 22) until exposed threads on each clevis are equal within .06 inch.

f. Manually depress latch lockout (Item 39) along the solenoid plunger axis. Assure that latch lockout (Item 39) clears slot of stop lock (Item 75) without any binding friction.

g. Deflect motor arm in both directions, then release to assure that centering spring fully engages latch lockout (Item 39) into slot of stop lock (Item 75).

h. Safety wire turnbuckle and attaching hardware.

## 5.7 LINK AND SOLENOID PLUNGER ADJUSTMENTS (Figure 5-2)

a. With latch lockout (Item 39) engaged in the slot of stop lock (Item 75) check for spring latch force of 1.0 pound minimum, as measured along the solenoid axis.

-NOTE-

The .030 inch gap of paragraph 5.5.d may be reduced to .010 inch to accomplish this requirement.

b. Torque and safety wire nut (Item 36) on link end female (Item 35). Wire through one hole position and lock the ends together. Check other hole for no-go of wire to verify minimum thread engagement.

## 6.0 CONTINUITY AND FUNCTIONAL TESTS

### 6.1 GENERAL

a. Past experience has shown that most actuator problems can be isolated to an electrical component. Resistance readings as shown in the Continuity Test Tables can be used to determine defective components.

**CAUTION**

A complete functional test must be performed prior to flight after replacing any electrical component or changing any mechanical adjustment.

### 6.2 SOLENOID CONTINUITY TESTS (Figure 6-1)

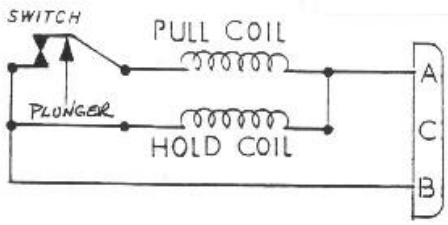



FIGURE 6-1

SOLENOID ELECTRICAL SCHEMATIC

a. Connect ohmmeter acros pins A and B of solenoid connector.

b. Place latch lock (Figure 67-23, Item 39) in the locked position.

c. Record ohmmeter reading of approximately 7 ohms.

d. Depress latch lock along center axis of solenoid until plunger bottoms out and hold.

e. When microswitch opens, measured resistance should be aaproximately 100 ohms.

### 6.3 ACTUATOR MOTOR CONTINUITY TESTS (Figure 6-2)

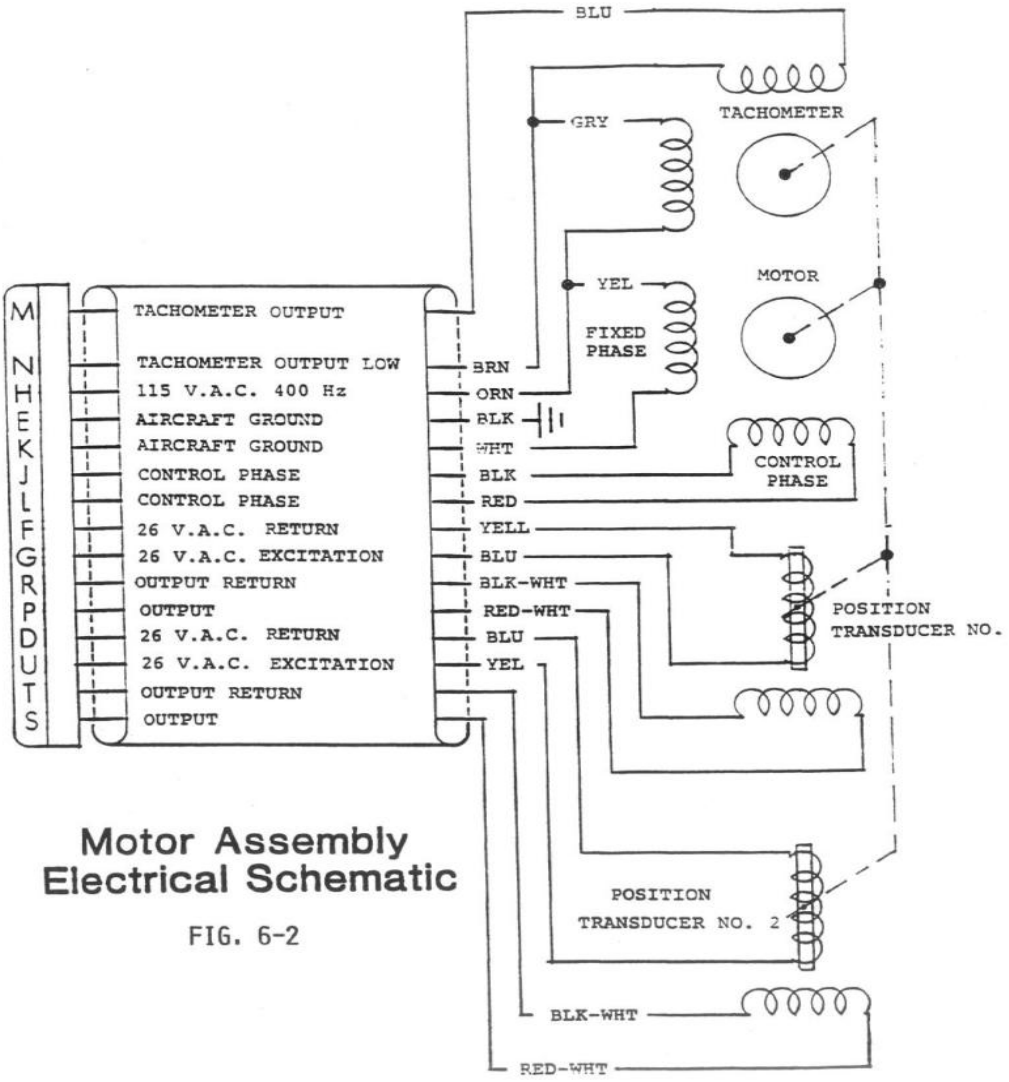
a. Connect ohmmeter across actuator motor connector pins as indicated in Table 6-1 or Table 6-2 as applicable.

-NOTE-

Refer to Figure 6-2 for electrical schematic.

| TABLE 6-1 CONTINUITY TEXT | | | * | TABLE 6-2 CONTINUITY TEST | | |
|---|---|---|---|---|---|---|
| KEARFOTT DIV MOTOR | | | * | MPC PRODUCTS MOTOR | | |
| P/N: 214-001-550-101 / -105 | | | * | P/N: 214-001-550-103 / -107 | | |
| CIRCUIT | CONNECTOR FROM – TO: | OHMS* | * | CIRCUIT | CONNECTOR FROM – TO: | OHMS* |
| TACH EXCITATION | H - N | 1080 TO 1320 | * | TACH EXCITATION | H - N | 1575 TO 1650 |
| TACH OUTPUT | N - M | 234 TO 286 | | TACH OUTPUT | N - M | 100 TO 160 |
| MOTOR FIXED PHASE | H - K | 43 TO 53 | | MOTOR FIXED PHASE | H - K | 24 TO 36 |
| CASE GND. | E - CASE GROUND | | | CASE GND. | E - CASE GROUND | |
| CNTL PHASE | J - L | 4.9 TO 5.9 | | CNTL PHASE | J - L | 0.3 TO 1.0 |
| XDCR NO.1 EXCITATION | G - F | 89 TO 121 | | XDCR NO.1 EXCITATION | G - F | 175 TO 260 |
| XDCR NO.1 OUTPUT | P - R | 119 TO 163 | | XDCR NO.1 OUTPUT | P - R | 110 TO 170 |
| XDCR NO.2 EXCITATION | U - D | 89 TO 121 | | XDCR NO.2 EXCITATION | U - D | 175 TO 260 |
| XDCR NO.2 OUTPUT | S - T | 119 TO 163 | | XDCR NO.2 OUTPUT | S - T | 110 TO 170 |

* VALUES ARE APPROXIMATE




**Motor Assembly Electrical Schematic**

FIG. 6-2

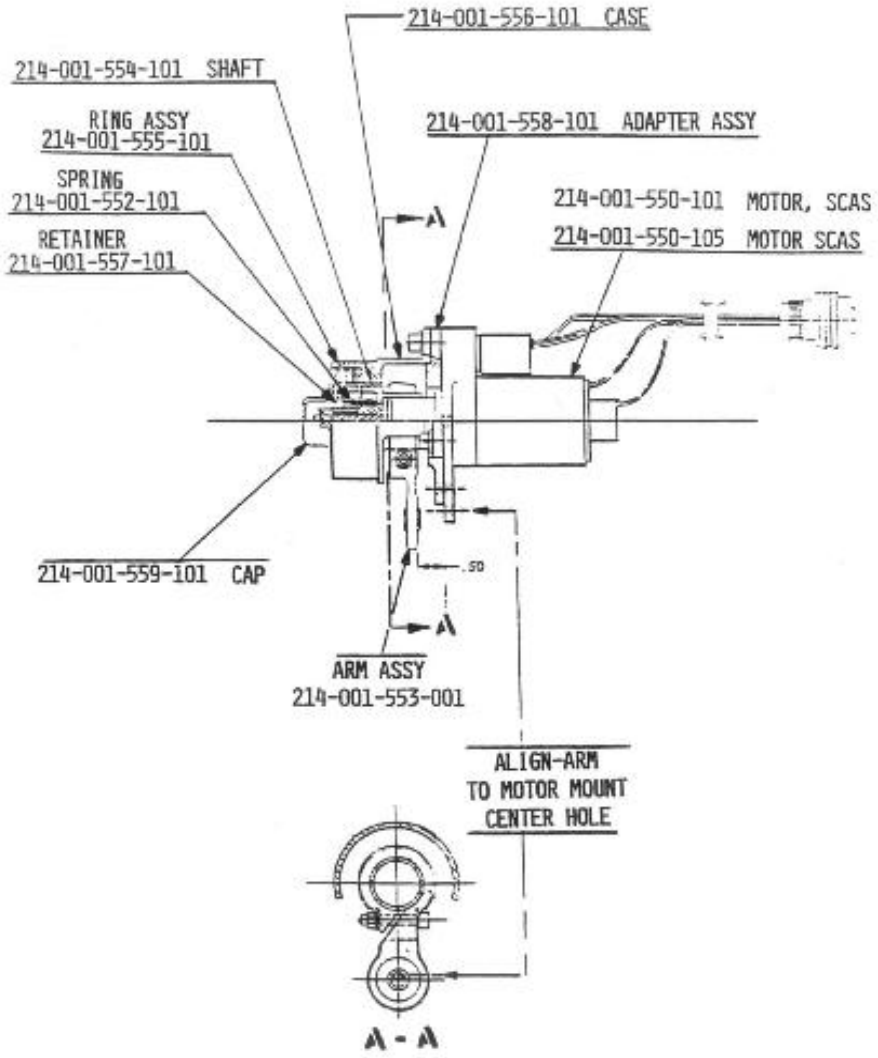



FIGURE 5-1 DRIVE AND CENTERING ASSEMBLY
P/N 214-001-560-101/-107

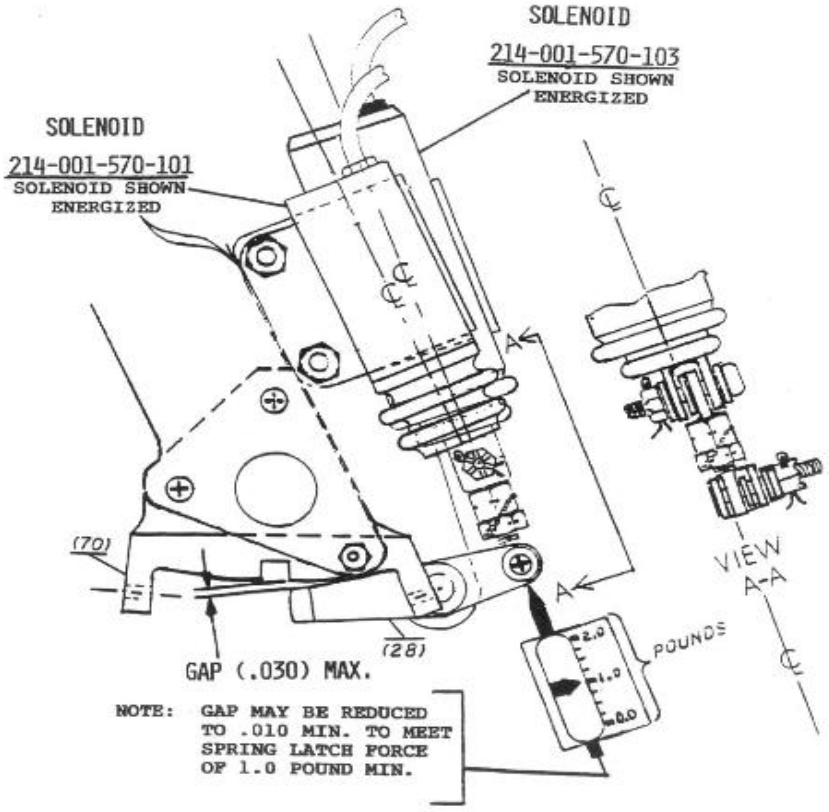
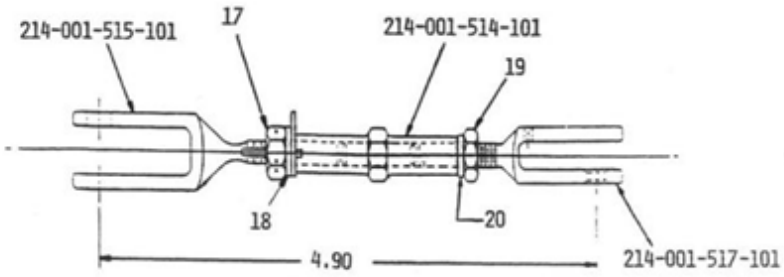



FIGURE 5-2 SOLENOID AND STOP-LOCK LATCH ASSEMBLY

TURNBUCKLE ASSY (214-001-516-101)




DO NOT SAFETY. LENGTH WILL
BE ADJUSTED AND ASSEMBLY
SAFETIED ON INSTALLATION.

FIGURE 5-3

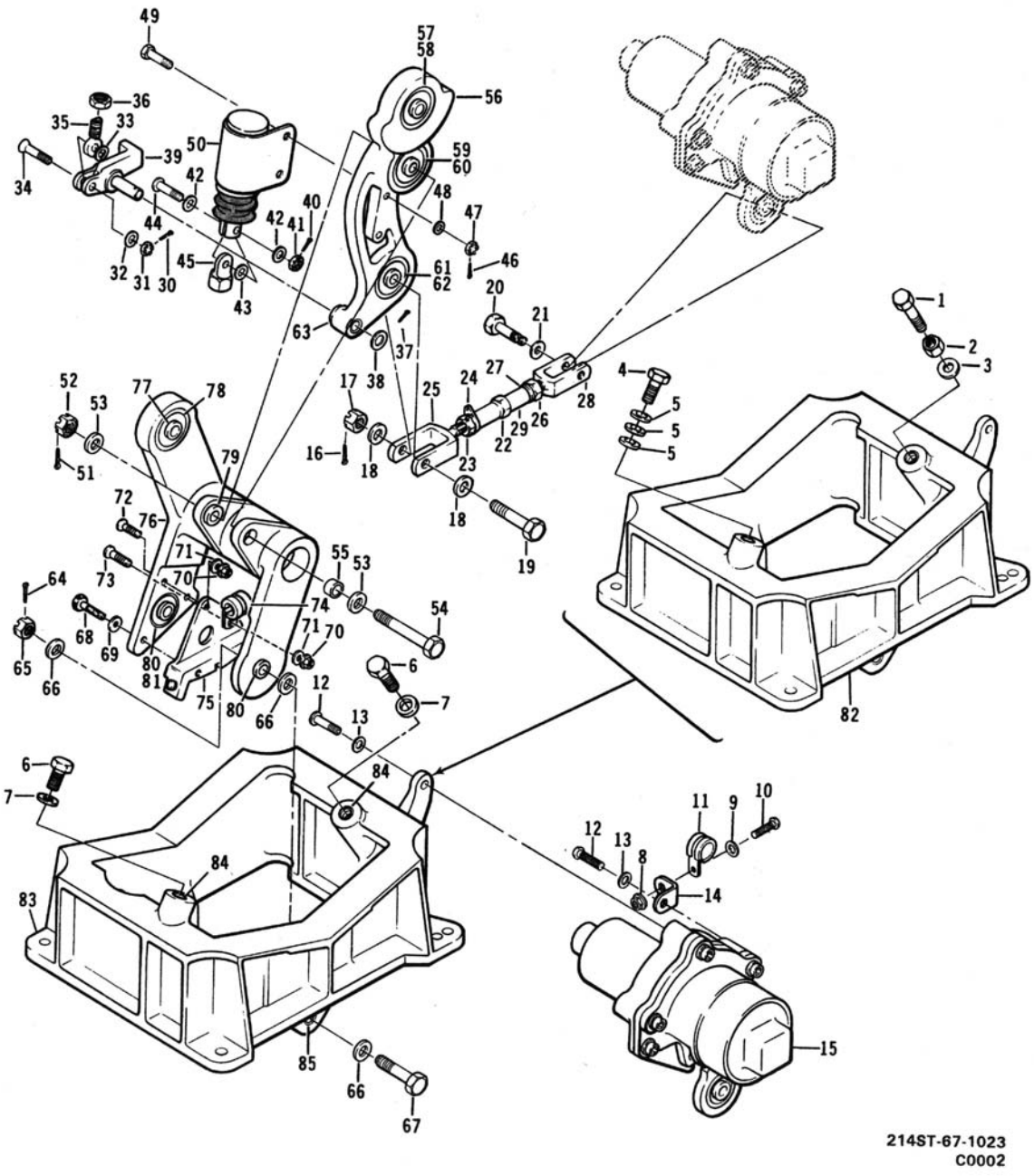



**Figure 67-23**

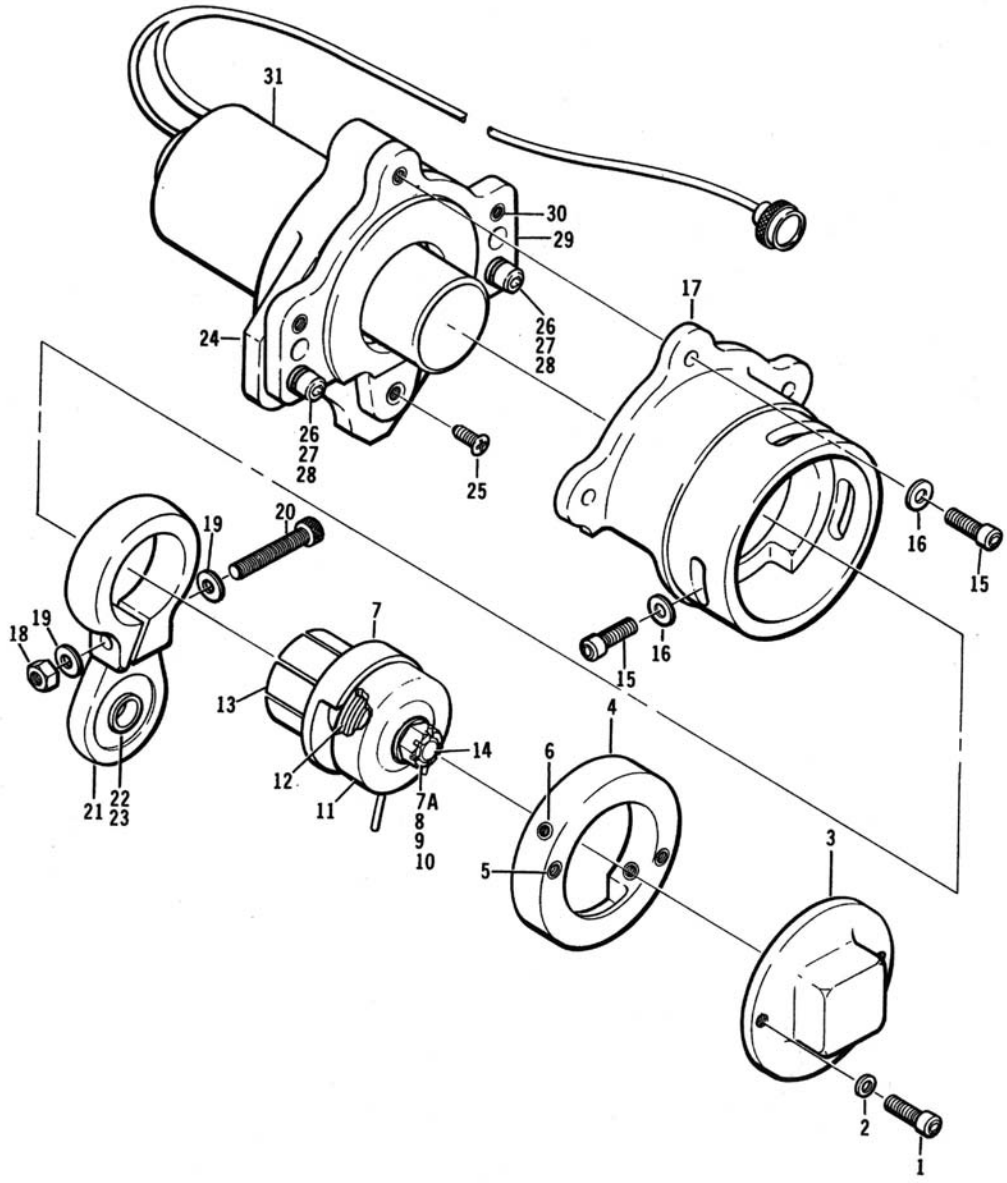

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**Figure 67-24**

## 6.4 **FUNCTIONAL TEST**

a. The following tests require the use of Test Set P/N: T103284-101 as shown in Figure 6-3. No quantitative tests are specified which require calibration back to a standard reference.

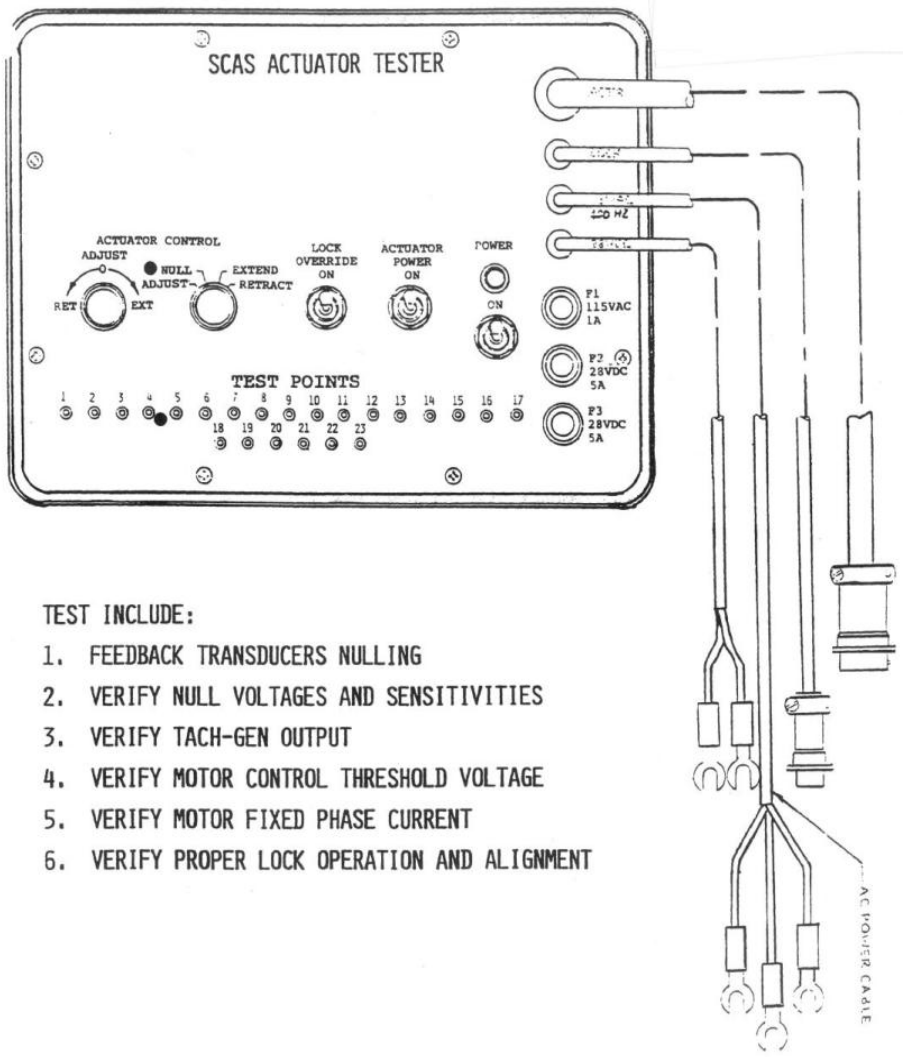


FIGURE 6-3 SCAS ACTUATOR TESTER (T103284)

b. Set up as follows:

| SWITCH | POSITION |
|---|---|
| Power | OFF |
| Actuator Power | OFF |
| Lock Override Control | ADJ. |
| Adjust | Centered |

Connect the actuator test set to 28 VDC and 115 VAC bench power. Connect the three ground leads to bench power grounds. Connect the appropriate test set connectors to the actuator being tested.

c. On the actuator test set, place the POWER switch to the ON position. Power light shall illuminate.

d. Place the LOCK OVERRIDE switch to the ON position. Solenoid is now energized. Gap clearance between latch and stop lock should be between 0.010 and 0.030 inch.

e. Manually move the walking beam assembly from stop to stop. Ensure that no excessive friction or binding exists.

f. Place the LOCK OVERRIDE switch in the OFF position.

g. Loosen nut (Item 18, Fig. 67-24) on the arm assembly (Item 21) to permit the motor to turn freely without arm movement.

h. Disconnect the electrical connector for the latch solenoid (Item 50, Fig. 67-23).

i. Place the ACTUATOR CONTROL switch to the ADJUST position, and ACTUATOR POWER switch to the ON position.

j. Verify that the latch does not engage.

k. Connect voltmeter between TP-3 and signal ground TP-17.

l. Rotate ACTUATOR CONTROL ADJUST between RET / EXT to drive actuator motor until the voltage measured between TP-3 and TP-17 is at its lowest electrical null. Electrical null should be less than 0.040 VRMS.

Center the walking beam assembly (Item 56, Fig.67-23) between stops and position the arm assembly (Item 21, Fig. 67-24) at a vertical position.

m. Tighten the set screw (Item 20, Fig. 67-24) on the arm assembly while maintaining the voltage null measured between TP-3 and TP-17. Torque set screw to 20 – 25 inch pounds.

-NOTE-

Electrical null should not exceed 0.15 VRMS, after set screw is torque. To maintain the voltage limit (0.15 VRMS) it may require that the null be offset to allow for change when tightening the set screw on the actuator arm.

n. Place the ACTUATOR POWER switch to the OFF position.

o. Connect the electrical connector of the latch solenoid.

p. Manually lift the latch (Item 39, Fig.67-23) to disengage the latch. The latch should move in and out of the stop lock (Item 75, Fig. 67-23) freely.

q. Move the walking beam assembly (Item 56, Fig. 67-23) off center approximately 1 / 4 inch and release. The walking beam shall return to center and lock.

r. Repeat step q. except, move the walking beam assembly to the other side of center.

s. If the latch does not center and lock, or bind in and / or out of stop lock (Item 75, Fig. 67-23) slot when being repositioned by the centering spring, adjust the turnbuckle assembly clevis (Item 25, Fig. 67-23) until the latch is centered in the lock slot of the stop (Item 75, Fig. 67-23).

t. Place the ACTUATOR CONTROL switch to the NULL position, and the ACTUATOR POWER switch to the ON position.

u. Place the ACTUATOR COTROL switch to the ADJUST position, and rotate the ACTUATOR CONTROL ADJUST until the actuator moves to within approximately 1 / 8 inch of the end limit.

v. Place the ACTUATOR POWER switch to the OFF position and verify that the centering spring returns the actuator to the center position and the latch (Item 39, Fig. 67-23 engages the stop lock (Item 75, Fig. 67-23).

w. Repeat step v. except, move the actuator to the opposite limit and verify results.

x. Place the ACTUATOR CONTROL switch to the NULL position and the ACTUATOR POWER switch to the ON position.

y. Place the ACTUATOR CONTROL switch to the ADJUST position, and rotate the ACTUATOR CONTROL ADJUST to center the actuator between the stop limits.

z. Connect A.C. voltmeter betweenTP-8 and TP-9, and slowly rotate the ADJUST control until actuator until actuator motion is observed.

aa. Verify that maximum voltage indicated on the meter does not exceed 1.5 VRMS above the value obtained at the center position.

-NOTE-

If the actuator is not centered, the return-to-center-spring will cause a larger voltage reading.

ab. Connect the oscilloscope between TP-14 and TP-17 (ground).

ac. Rotate the ACTUATOR CONTROL ADJUST until the actuator is centered between the stop limits.

ad. Place the ACTUATOR CONTROL switch in the EXTEND position. Verify that the actuator moves toward one of the stop limits and stops.

ae. Place the ACTUATOR CONTROL switch in the RETRACT position. Verify that the output voltage at TP-14 is 5.0 + / - 2.0 volts D.C.

-NOTE-

Output voltage will only be present when the actuator is in motion.

af. Place the ACTUATOR CONTROL switch in the EXTEND position. Verify that the output voltage at TP-14 is 5.0 + / - 2.0 volts D.C. when the actuator is moving.

ag. Connect an A.C voltmeter between TP-3 and TP-13.

ah. Place the ACTUATOR CONTROL switch in the ADJUST position. Slowly rotate the ACTUATOR CONTROL ADJUST to cause the actuator to move from stop to stop.

**CAUTION**

Do not hard drive the actuator full velocity toward either stop limit.

Verify that the voltage observed on the meter does not exceed 0.7 VRMS as the actuator is moved from stop to stop. An out of limit voltage indicates improper tracking between transducers No.1 and No.2.

ai. Connect an A.C. voltmeter between TP-10 and TP-11.

aj. Place the ACTUATOR CONTROL switch in the NULL position and verify that the voltmeter indicates less than 3.8 VRMS.

ak. Place the ACTUATOR POWER and test set POWER switches to the OFF position. Disconnect test set cable assemblies from unit under test.

al. Inspect and install safety wire as required. Inspect and install cotter pins as required. Apply inspection sealant between threads and nuts having been torque, safety wired, and / or cotter pinned.

am. Attach serviceable tag to unit if applicable.

an. Make an entry in helicopter historical service records indicating compliance with this Technical Bulletin.