

TECHNICAL MANUAL

OVERHAUL INSTRUCTIONS

LINEAR ELECTROMECHANICAL ACTUATOR

PART NUMBERS

**541994-1-1, 541994-2-1,
541994-3-1, AND
541994-4-1**

This manual supersedes NAVAIR 03-5CHA-64 dated 1 May 2007.

All change data has been incorporated to make this a complete publication.

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None

SECTION I

INTRODUCTION

1-1. GENERAL.

1-2. This technical manual provides overhaul and test instructions for linear electromechanical actuator, part No. 541994-1-1, 541994-2-1, 541994-3-1 and 541994-4-1. Overhaul instructions are contained in section two and testing procedures are contained in section three. Overhauled actuators must be disassembled, cleaned, and inspected in accordance with section two. Capacitor and Motors must be tested prior to actuator assembly and entire assembly must be tested in accordance with section three prior to release. (See figure 1-1.)

1-3. PURPOSE.

1-4. This actuator converts electrical energy into controlled mechanical linear movement.

1-5. LEADING PARTICULARS.

1-6. The leading particulars of the actuator are given in table I.

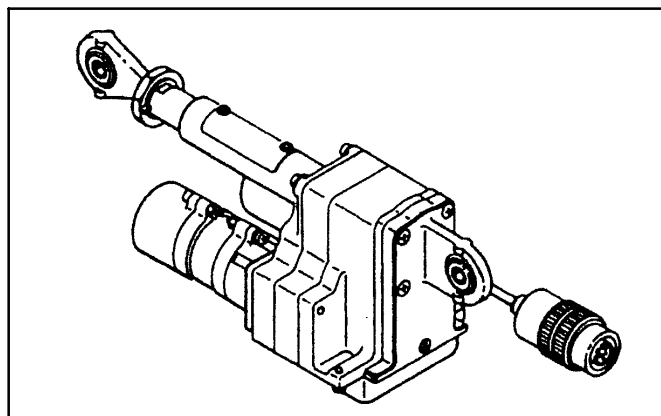


Figure 1-1. Linear Electromechanical Actuator, Part No. 541994-1-1, 541994-2-1, 541994-3-1, and 541994-4-1

TABLE I. LEADING PARTICULARS

Actuator:		Electrical connections:	
Type	Two motor with positive non jamming mechanical stops	Green lead	*Clockwise
Operating voltage	115 vac, 400 Hz, single-phase	Red lead	*Counterclockwise
Ambient operating temperature range	53.9° to 93.3°C (-65° to 200°F)	White lead	Ground
Duty cycle at 26.7°C(80°F)	Continuous	Duty cycle	Continuous
Normal operating load (rated load)	100 lb (tension or compression)	Stall load:	
Maximum operating load	200 lb (tension or compression)	Torque	3.2 in. oz.
Stroke length	1.493 to 1.593 inch	Current	0.60 amp. (max)
Stroke adjustment length	1.00 to 2.00 ±0.010 inch	Brake requirements:	
Electrical connector:		Brake release voltage	90 vac (max)
Pin A	High-speed motor extend	Static brake torque	1.8 in. oz.
Pin B	High-speed motor retract	Weight	0.52 lb
Pin C	Common	Alternating current motor, part No 516026-3-1 (low-speed):	
Pin D	Low-speed motor extend	Horsepower	0.001 (rated)
Pin E	Low-speed motor retract	Electrical connections:	
Pin F	Not used	Black lead	*Clockwise
Pin H	Not used	Red lead	*Counterclockwise
Weight	2.5 lb (approx.)	White lead	Ground
Alternating current motor, Part No 516027-1-2 (high-speed):		Duty cycle	Continuous
Horse power	0.01 (rated)	Current (at stall)	0.25 amp. (max) at 115 vac
*Viewing Shaft End		No load:	
		Speed	5,500 rpm (min.)
		Current	0.20 amp. (max)
		Brake requirements:	
		Brake release voltage	85 vac (max)
		Static brake torque	0.50 in. oz.
		Weight	0.38 lb

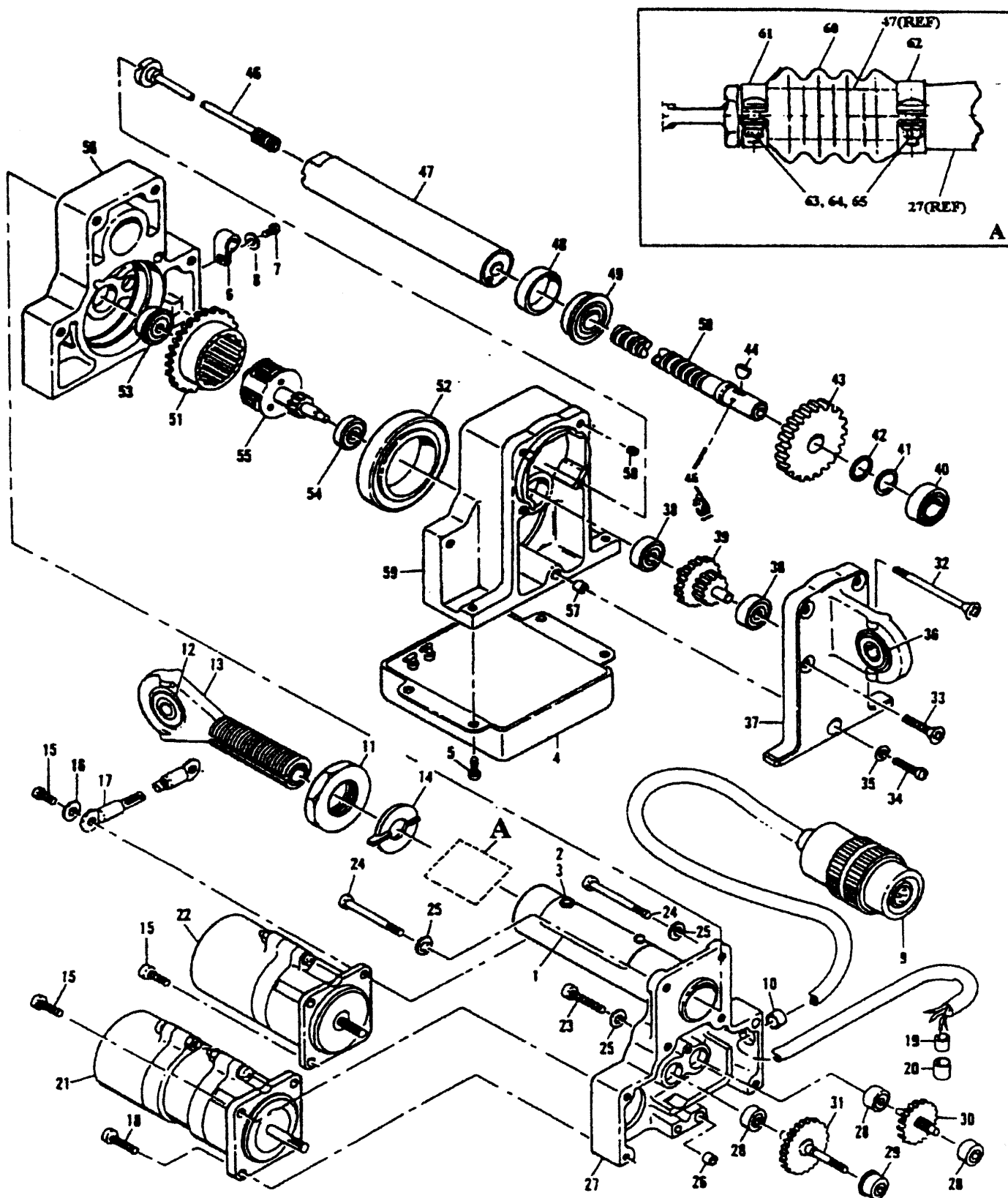


Figure 2-1. Linear Electromechanical Actuator

WIRING DATA				
LEAD	PART NO.	COLOR	SIZE (AWG)	LENGTH (IN.)
1	*S8935F2S360	RED	22	30
2	*S8935F0S360	BLACK	22	30
3	*S8935F90S360	WHT/BLK	22	30
4	*S8935F92S360	WHT/RED	22	30
5	*S8935F93S360	WHITE	22	30

*CONFORMS WITH MIL. SPEC MIL-W-16878 (NAVY) TYPE "E"

SLEEVING DATA				
SLEEVE	PART NO.	ID (IN.)	LENGTH (IN.)	NO. REQD
A	*S9046-8-1-2900	0.166	27	1

*EXTRUSION COATED SILICONE-RUBBER SLEEVING BEN-HAR 1151 MFD BY BENTLY-HARRIS MFG CO, CONSHOHOCKEN, PENNSYLVANIA.

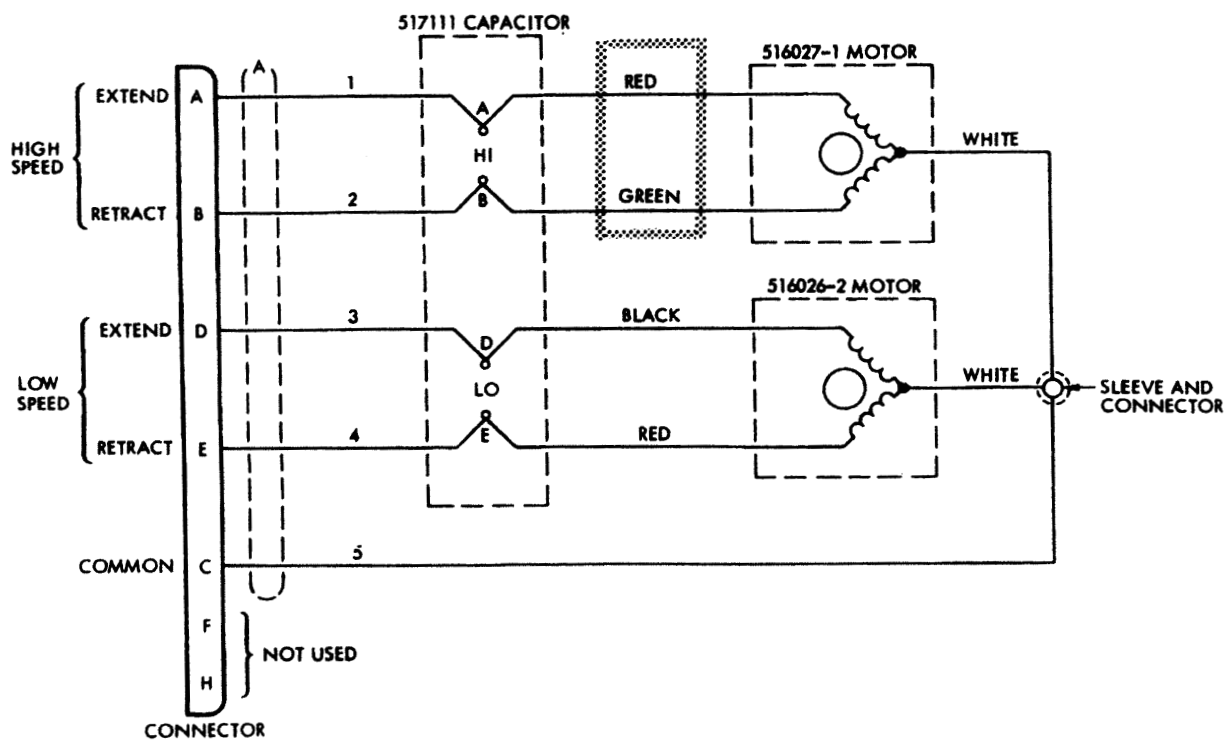


Figure 2-3. Wiring Diagram

SECTION III

TEST PROCEDURE

3-1. GENERAL

3-2. Conduct all testing at room temperature. See figure 2-3 for wiring diagram. Use test data sheet, Table VI for recording test information.

3-3. ALTERNATING CURRENT MOTOR, PART NO. 516027-1-2 (21, figure 2-1).

a. Connect a 1.0 microfarad, 115-volt nonpolarized capacitor between red and green motor leads. Use 257916-1 Electrical Power Test Set, to supply power and monitor motor performance.

b. Apply single-phase, 115 volts at 400 Hz between white and red leads; motor shaft must rotate counterclockwise (viewing shaft end).

c. Apply single-phase, 115 volts at 400 Hz between white and green leads; motor shaft must rotate clockwise (viewing shaft end).

d. Operate the motor with an input power of 115 ± 2 VAC, 400 ± 1 Hz. and at a load of 1.7 ± 0.1 in. oz. The motor speed shall be 5,000 to 6,300 rpm in both CW and CCW directions. The motor current reading shall not exceed 0.55 amps in both directions.

e. Connect motor to 253724 Motor Test Dynamometer (refer to NAVWEPS 17-15BAB-17 for operating instructions). Using dynamometer, measure stalled load current and torque while applying single-phase, 115 volts at 400 Hz between green and white motor leads. Torque must be 3.2 inch ounce, and current must be 0.60 ampere maximum. Repeat test with power applied to red and white motor leads: torque must be 3.2 inch ounce, and current must be 0.60 ampere maximum. (See figure 3-1.)

f. With motor operating at 5500 rpm minimum, momentarily interrupt circuit; brake must engage and disengage.

g. With motor operating normally, reduce voltage from 115 volts to 90 volts. Interrupt power and allow motor to stop. Reapply power; brake must release.

h. With no power applied, check that torque required to turn shaft is a minimum of 1.8 inch ounce.

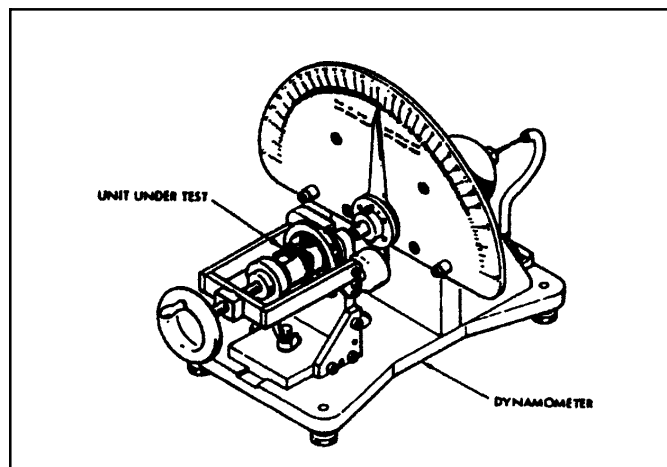


Figure 3-1. Using Motor Test Dynamometer

i. Using insulation tester, part No. 13700-1-A (Eclipse Pioneer Division of Bendix Corp., Teterboro, New Jersey) or equivalent, check dielectric strength of motor at 1500 volts 60 Hz for one second. Leakage shall not exceed 2 milliamperes.

j. Refer to table III for trouble shooting information.

3-4. ALTERNATING CURRENT MOTOR, PART NO. 516026-3-1 (22, figure 2-1). Use test data sheet, Table VII for recording test information.

a. Connect a 0.30 microfarad, 115-volt nonpolarized capacitor between red and black motor leads. Use 257916-1 Electrical Power Test Set to supply power and monitor motor performance.

b. Apply single-phase, 115 volts at 400 Hz between black and white leads; motor shaft must rotate clockwise (viewing shaft end).

TABLE III. MOTOR TROUBLESHOOTING INFORMATION

TROUBLE	PROBABLE CAUSE	REMEDY
Motor does not operate; no current flows	Power circuit defective	Repair power unit.
Motor does not operate under no-load conditions. but stalled motor current is approximately normal	Test capacitor defective	Replace capacitor.
	Interference between rotor assembly and stator assembly	Replace Motor.
	Bearing defective	Replace Motor.
Motor operates in one direction only	Stator assembly defective	Replace Motor.
Stalled motor current excessive	Stator Windings shorted	Replace Motor.
Motor operates at less than specified speed and current is excessive	Interference between rotor assembly and stator assembly	Replace Motor.
Brake releases. but cuts in at high speed	Dirt between armature and end bell assembly	Replace Motor.
	Brake armature distorted	Replace Motor.

c. Apply single-phase, 115 volts at 400 Hz between black and white leads; motor shaft must rotate clockwise (viewing shaft end).

d. Connect motor to 253724 Motor Test Dynamometer (refer to NAVWEPS 17-15BAB-17 for operating instructions). Using dynamometer, measure stalled load current and torque while applying single-phase, 115 volts at 400 Hz between black and white motor leads. Torque must be 3.2 inch ounce, and current must be 0.60 ampere maximum. Repeat test with power applied to red and white motor leads; torque must be 3.2 inch ounce and current must be 0.60 ampere maximum. (See figure 3-1.)

e. With no power applied, check that torque required to turn shaft is a minimum of 0.50 inch ounce.

f. With motor operating at no-load speed, momentarily interrupt circuit: brake must engage and disengage.

g. With motor operating normally, reduce voltage from 115 volts to 85 volts. Interrupt power and allow motor to stop. Reapply power; brake must release.

h. With no power applied, check that torque required to turn shaft is a minimum of 1.8 inch ounce.

i. Refer to table III for troubleshooting information.

NOTE

Ensure actuator bonding jumper is connected to ground during paragraphs 3-5 through 3-9

a. Mount actuator on Linear Actuator Test Stand NY200. Use 272419-1-1 Actuator Test Cable to connect actuator to 257916-1 Electrical Power Test Set. (See Figure 3-2.)

b. Operate the actuator with no load into each mechanical stop five times under high-speed motor velocity. Apply single phase, 115 vac at 400 Hz between pins A and C for extend, and between pins B and C for retract. Retracted length, measured between mounting hole centers, must be 7.96 to 8.04 inches. Extended length, measured between mounting hole centers, must be 9.533 to 9.553 inches.

NOTE

Extended and retracted lengths may be adjusted by loosening nut (11, figure 2-1) and turning fitting (13) with bearing (12) in or out to meet dimensional requirements. Tighten nut (11) after final adjustments are made.

CAUTION

Use a wrench on outer shaft of trim actuator to prevent outer shaft from rotating when jam nut is tightened or damage will occur to actuator.

3-5. ACTUATOR TEST PROCEDURES. Use test data sheet, Table V for recording testing information.

c. Apply single phase, 115 vac at 400 Hz between pins A and C; interrupt the circuit and measure over-travel of