Chapter 36

ACTUATOR, WESTERN, TYPE EJ50, Mk. 25

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LEADING PARTICULARS

Actuator, Type EJ50, Mk. 25	**Ref. No. 5W/348**
Voltage (nominal 28)	*22 to 29 V d.c.*
Current consumption (normal load)	*1·0 A*
Output of motor	*0·008 h.p. at 5,800 rev/min*
Rating	*1 minute at normal load*
Nominal working load	*50 lb.*
Maximum working load	*120 lb.*
Maximum static load	*1,000 lb.*
Stroke	*2 in.*
Fixing centres (piston extended)	*9·57 in.* $^{+0}_{-0·01}$
Fixing centres (piston retracted)	*8·67 in.* $^{+0·01}_{-0}$
Brush spring pressure	*1½ to 2 oz.*
Brush length (new)	*0·25 in.*
Minimum brush length	*0·20 in.*
Resistance of field coils (together)	*3 ohms*
Weight	*2 lb. 2 oz.*
Operating temperature range	*—55° to +90° C.*

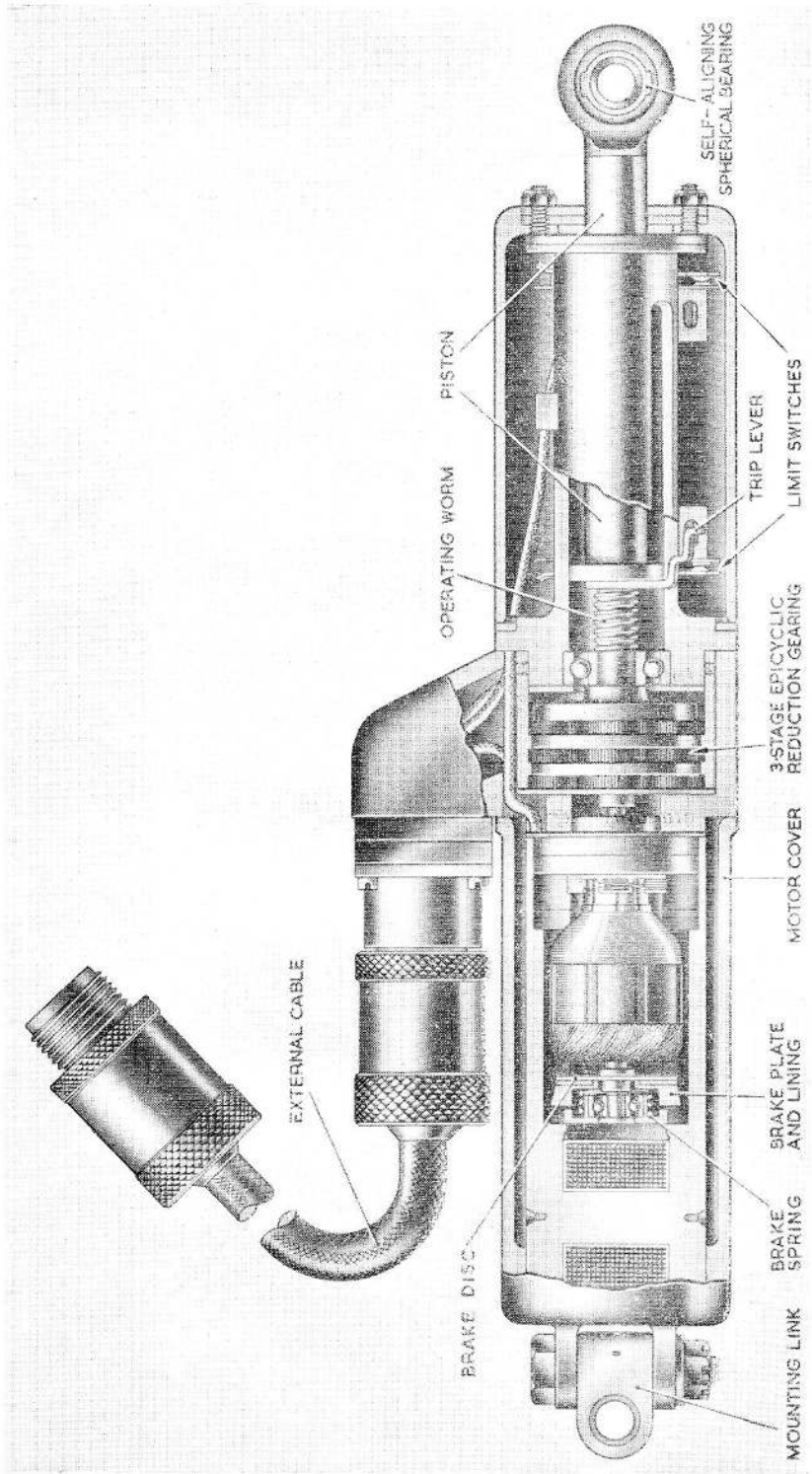

Fig. 1. Sectional view of actuator, Western, Type EJ50, Mk. 25

Introduction

1. The actuator, Western, Type EJ50, Mk. 25 is a linear in-line actuator, and is sometimes known as the Miles, Type EJ50, Mk. 25. It is rated to operate for 1 minute at a nominal load of 50 lb. with a current consumption not exceeding 1·4 amp.

DESCRIPTION

2. A general description of the Western actuators is contained in A.P.4343, Vol. 1, Sect. 17, Chap. 2, and most of the information therein applies to the EJ50, Mk. 25. Additional information peculiar to the EJ50, Mk. 25 is contained in the following paragraphs.

Motor and reduction gearing

3. The motor is a split series type whose field coils also control the operation of the brake. The drive from the motor passes through a 3-stage epicyclic reduction gear train with a reduction ration of 119 to 1.

Brake

4. The brake (fig. 1) consists of a spring loaded brake plate with a friction lining on one face. The lined face is adjacent to the face of the brake disc which is fixed to the motor armature shaft. The brake plate can move only longitudinally, and the brake disc rotates with the motor. Operation of the brake is controlled by the motor field coils so that when the coils are energized the brake is held off the brake disc, and when the coils are de-energized the brake plate contacts the brake disc and prevents the motor over-running.

End fittings

5. An operating worm, driven by the motor, extends and retracts a piston at one end of the actuator. This piston has a self-aligning spherical bearing which forms an eye for connecting the actuator to the equipment it operates. The fitting at the motor end is a fixed mounting provided with a link which allows for misalignment up to 6 degrees.

Limit switches

6. Travel of the piston is controlled by two make-and-break limit switches operated by a trip lever attached to the inner end of the piston. Switching of the actuator takes place at the fully extended and fully retracted positions of the piston.

Electrical connections

7. The internal wiring (fig. 2) of the actuator is brought out to a 4-pole Breeze plug mounted on an elbow of the gear casing. A cable assembly is connected to the Breeze plug and both ends of the cable have Breeze sockets attached.

SERVICING

8. The servicing of this actuator is the same as that for Western actuators described in A.P.4343, Vol. 1, Sect. 17, Chap. 2, with reference being made to the information contained in the Leading Particulars of the EJ50, Mk. 25. Access to the brake, motor and brush-gear is obtained by removing the motor cover. This is done by removing the four nuts securing the cover to the gear casing and drawing the cover from the actuator. As the pole pieces and yoke are located in a bore in the bottom of the cover, removal of the cover allows the motor to sag.

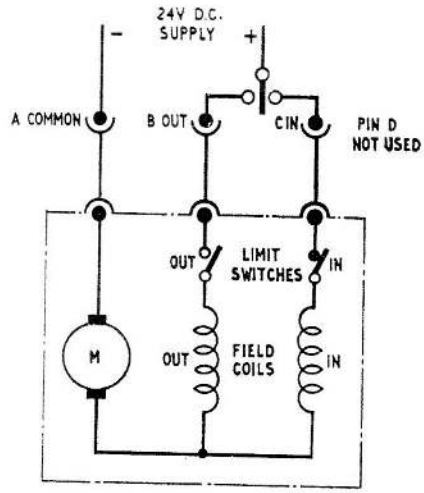

Fig. 2. Internal wiring diagram

Brake

9. When the field coils are energized, there should be a gap of 0·012 in. $^{+0·03}_{-0·02}$ in. allowing the motor to rotate freely on no load.

Brushgear

10. Carbon dust should be removed with a blast of dry air and the brushes and commutator examined for serviceability. New brushes should be fitted at the intervals detailed in the relevant Servicing Schedule and whenever examination reveals that they may reach the minimum permissible length before the next servicing. Information on brush bedding is contained in A.P.4343, Vol. 1, Sect. 1, Chap. 2.

Lubrication

11. The bearings should be washed with lead-free gasoline and dried with a blast of dry air. After examination for serviceability, grease XG.275 should be pressed into the space between the inner and outer races for a distance of one-third of their circumference. The bearings should be rotated by hand to distribute the grease evenly over the ball tracks.

Testing

12. A functional test can be made by connecting the actuator to a 24V supply and applying loads of 50 and 100 lb. The time taken to complete the 2 in. stroke, and the current consumption should not exceed the following values—

No load	1·1A	7·5 sec.	± 3 sec.
50 lb. load	1·4A	9·5 sec.	
100 lb. load	1·9A	12·0 sec.	

Further testing details are contained in Appendix A to this chapter.

13. On completion of the servicing of the motor, refit the cover and lock the securing screws with 24 S.W.G., cadmium plated, soft iron wire.

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Appendix A

STANDARD SERVICEABILITY TEST FOR ACTUATOR, WESTERN, TYPE EJ50, Mk. 25

Introduction

1. The tests detailed in this appendix may be applied to this actuator immediately prior to installation in an aircraft, or whenever its serviceablity is suspect.

Test equipment

2. The following test equipment is required :—

(1) Linear actuator test rig (Ref. No. 4G/5420)

(2) Tension gauge, Mk. 3 (Ref. No. 1A/56)

(3) 250V d.c. insulation resistance tester, Type C (Ref. No. 5G/152) or equivalent.

(4) A d.c. supply, variable between 18 and 29V d.c.

TEST PROCEDURE

Brushgear

3. Using a tension gauge, Mk. 3 or equivalent, check the brush spring pressure; this should be within 43 and 57 grammes inclusive. A defective spring must be replaced with new.

4. The minimum permissible brush length is 0·20 in., if below, or very near this figure, the brushes must be replaced by new.

Note . . .

Before commencing actuator tests, ensure that the travel of the loading arm on the test rig is not restricted by stop bolts. When fitting front end fitting and tie bar to the vernier carriage, care should be exercised not to allow the end fitting or tie bar end fitting to drop on the vernier carriage assembly, or damage will result.

Functional tests

No-load test

5. The linear actuator test rig is described and illustrated in A.P.4343S, Vol. 1, Book 2, Sect. 8. To test the actuator loading at no-load, 50 lb and 100 lb. on the test rig, proceed as follows :—

(1) Fit the fixed end fitting, code letter 'D' to the test bench.

(2) Fit the moving end fitting, code letter 'Z' to the loading carriage.

(3) Fit the actuator to the test bench, using selected shackle pins.

(4) Fit adjustable rod to the loading carriage.

(5) Connect the actuator to the test bench d.c. supply and adjust the voltage to 24 volts, ensuring that the actuator worm is in the fully retracted position.

(6) Set the test bench clock and vernier scale to zero.

(7) Run the actuator to its fully extended position and check that the load current does not exceed 0·9 amperes.

(8) Check the length of the piston travel on the test bench vernier scale, this should be 0·6 in., adjusting as necessary by means of the 'OUT' limit switch.

(9) Check the time on the test bench clock; the time should not exceed 28 seconds.

(10) Set the test bench clock to zero.

6. Run the actuator to its fully retracted position and ensure that the current consumption does not exceed 0·9 amperes.

(1) Check the reading on the test bench vernier scale; this should be zero inches.

(2) Check that the time on the test bench clock does not exceed 28 seconds.

Normal load test

7. Load the compression arm to 10 lb., this is equivalent to a 50 lb. actuator load.

(1) Set the test bench clock to zero.

(2) Run the actuator to its fully extended position and ensure that the load current does not exceed 1·0 ampere.

(3) Check the time on the test bench; this is not to exceed 30 seconds.

(4) Transfer weights to tension arm and set the test bench clock to zero.

8. Repeat the normal load test as described in previous paragraph, running the actuator to its fully retracted position.

(1) The time taken for the actuator to reach its fully retracted position and the current consumption should remain the same.

(2) Remove weights.

Max load test

9. Load the compression arm to 24 lb., this is equivalent to a 100 lb. actuator load.

(1) Set the test bench clock to zero.

(2) Run the actuator to its fully extended position and ensure that the load current does not exceed 1·1 ampere.

(3) Check the time on the test bench clock; this is not to exceed 32 sec.

(4) Transfer weights to the tension arm and set test bench clock to zero.

10. Repeat the maximum load test as described in previous paragraph, running the actuator to its fully retracted position.

(1) Remove weights.

(2) Disconnect the test bench d.c. supply and remove the actuator from the test bench.

Insulation resistance test

11. Using a 250V d.c. insulation resistance tester, Type C, or equivalent, measure the insulation resistance between each pin of the Breeze plug and the frame. The reading should not be less than 50,000 ohms.

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