Chapter 64

ACTUATOR, WESTERN, TYPE EOJ 600, Mk. 1

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Actuator, Western, Type EOJ 600, Mk. 1	*Stores Ref. 5W/411*
Voltage	*28 volt d.c.*
Weight	*10 lb. 10 oz.*
Normal working load	*600 lb.*
Maximum working load	*900 lb.*
Length of stroke	*4·093 in.*
Time of stroke at nominal load	*7·7 to 12·25 sec.*
Distance between extended centres	*16·03±0·035 in.*
Distance between retracted centres	*11·937±0·035 in.*
Rating of motor	*1 min.*

Introduction

1. The off-set Linear Actuator, Western Type EOJ 600, Mk. 1, is designed to provide a thrust or pull for situations requiring a linear movement under remote control, within the ranges given under the heading Leading Particulars. It is rated to operate for 1 minute at a nominal load of 600 lb. with a current consumption not exceeding 10·38 amp.

DESCRIPTION

2. The actuator comprises a d.c. motor, gearbox and worm operated piston. The piston is mounted alongside the motor, and parallel with the motor axis. The assembly is sealed against the ingress of dust, oil, moisture, etc.

Motor

3. This is a fractional horsepower motor operating from a d.c. supply ranging from 25 to 29 volts. It is of the reversible series split field type and incorporates a magnetic brake to prevent overrun of the armature shaft. The field assembly is secured to the motor housing. The armature is supported between two ballraces and is free to rotate within the field assembly. Both ballraces are housed in end plates, which are held in position about the armature by tie rods. The rear end plate also supports the brake solenoid assembly, and on its inner face supports the brush gear assembly. Brushes are high altitude electrographitic type with adjustable spring pressures. The complete brush assembly can be rocked radially to equalize speeds in both directions of rotation.

Brake

4. The brake comprises a spring loaded brake shoe with a friction lining on one face. The lined face is adjacent to the face of

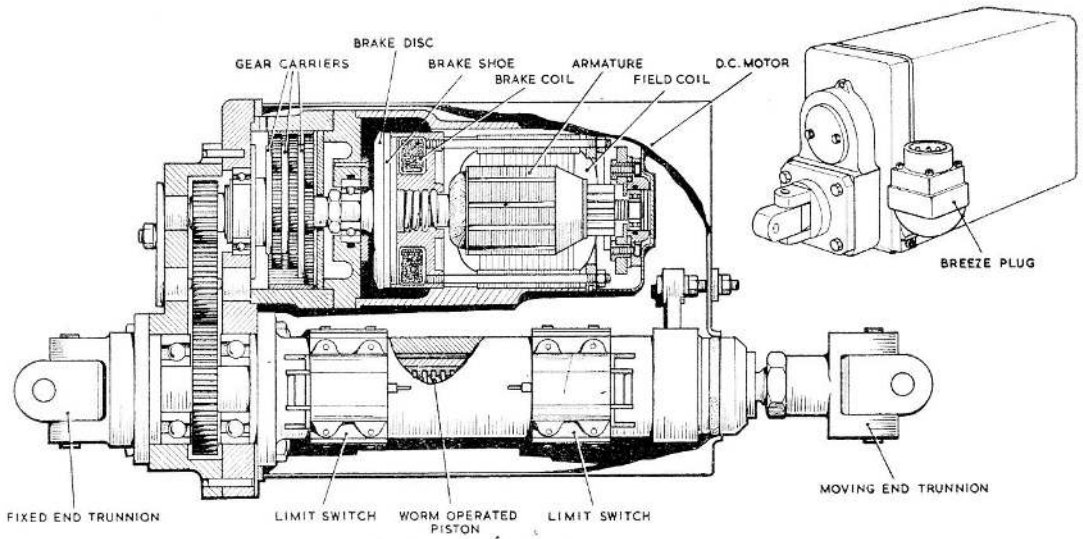

Fig. 1. Sectional view of actuator

the brake disc which is pinned to the armature shaft. The brake shoe can only move longitudinally and the brake disc rotates with the shaft. Operation of the brake is controlled by the brake solenoid which is connected in series with the armature.

Gearbox

5. Bolted to the motor housing is the three stage epicyclic gearbox consisting of three gear carriers, the first supporting four planet gears and the succeeding carriers each supporting three planet gears, all contained within an annulus. Motor input drive to the gears is via a pinion pinned to the armature shaft, in engagement with the planet gears of the first stage. The total reduction ratio is approximately 140 : 1.

Piston and worm

6. The worm shaft rotates in two ballraces and engages directly into the internally screwed shank of the piston. Two ears integral with the piston engage in longitudinal slots in the housing and restrict the piston to a linear motion.

End fittings

7. Both fixed and moving end fittings consist of a universal link trunnion. The fixed end fitting is bolted to the rear bearing housing and the moving end fitting is screwed over the free end of the piston.

Limit switches

8. Two snap action limit switches are mounted on the piston housing and are operated by an ear integral with the piston. Switching off the actuator takes place at the fully extended and the fully retracted positions of the piston. Wiring connections are brought out to a 4-pole Breeze plug, of which pin No. 4 is spare. Internal wiring connections are shown in the circuit diagram, (*fig.* 2).

OPERATION

9. The motor is of conventional design and has its rotary output transmitted and translated into a linear motion by the epicylic gear train driving a worm operated piston. The limit switches break the motor circuit and control the limits of the piston at each end of its travel.

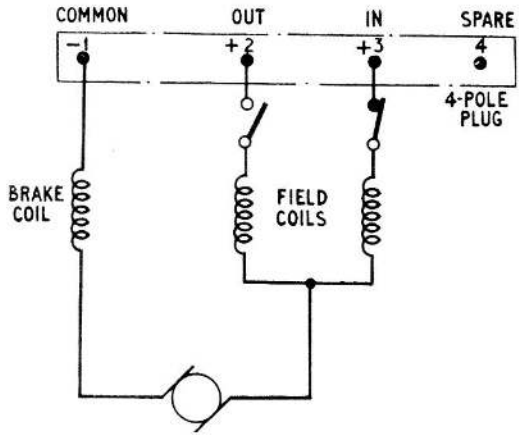

Fig. 2. Circuit diagram

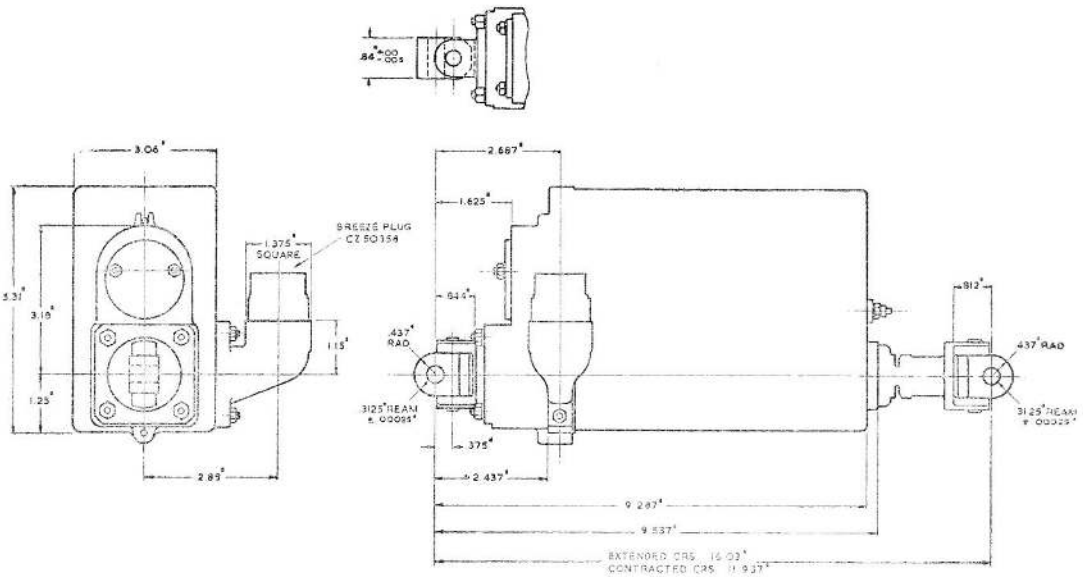

Fig. 3. Installation drawing of actuator

10. On braking the motor circuit, overrun of the armature is prevented by a magnetic brake. The brake solenoid is energized by the motor supply and holds the spring loaded brake shoe away from the brake disc fixed to the armature shaft. As soon as the supply is discontinued however, the brake shoe springs back and engages the brake disc, thus limiting the shaft overrun.

INSTALLATION

11. Installation of the unit in the aircraft may be anywhere and in any position, subject to an ambient temperature range of −55 to +90 deg. C. For details of individual installations, reference should be made to the appropriate aircraft handbook.

SERVICING

12. The servicing of this actuator is as given in A.P.4343, Vol. 1, Sect. 17, Chap. 2 on Western type actuators.

Testing

13. A functional test should be performed by connecting the actuator to a 28-volt d.c. supply and applying loads of 0, 600 and 900 lb. The maximum current consumption and the time the piston takes to complete its 4·093 in. travel, should not exceed the values given in the following table : —

Load (*lb.*)	*Max. Current* (*amp.*)	*Max. Time* (*sec.*)
0	6·88	8·63
600	10·38	12·25
900	12·38	13·75

Insulation resistance test

14. The insulation resistance should be measured with a 250-volt insulation resistance tester. This should be accomplished by testing between each pin terminal on the connector plug, and the actuator body. If a reading of less than 2 megohms is obtained the actuator will be unfit for service.

Note . . .

Due to the humid conditions prevalent in the aircraft when in service the permissible insulation resistance allowed may be reduced to 50,000 ohms.

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