Chapter 84

ACTUATORS, ROTAX, A0800 SERIES

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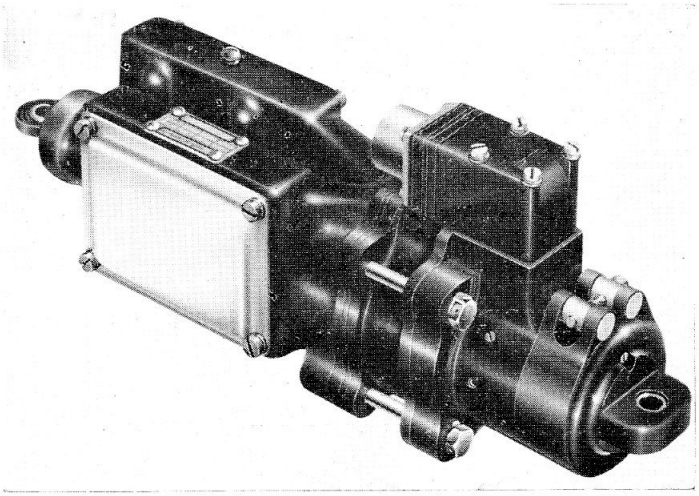

Fig. 1. Typical A0800 series actuator

Introduction

1. Actuators in the A0800 series may be used for general application in aircraft fitted with a 28-volt d.c. supply. The unit is of the linear type and is desinged so that three ram positions can be selected i.e., "fully in", "intermediate" and "fully out". Four limit switches are incorporated to make this selection possible. By operation of the control switch, (forming part of the aircraft installation) marked "extend" and "retract" and returning it to its "OFF" position before the limit switch trips, any intermediate ram position may be obtained.

DESCRIPTION

2. Typical actuators are illustrated in fig. 1 and 2. The machine is of inline construction and in general comprises five main assemblies. They are motor, brake and clutch, gearbox, ram and screw-shaft and limit switches. Of these all except the limit switches are disposed on the motor/ram axis. The limit switches are located in the ram housing assembly, parallel with the ram and screwshaft but off set and diametrically opposed.

Motor

3. The motor is of two pole, two brush construction. Laminations forming both the yoke and the poleshoes surround the armature, and a field winding is wound on each pole. The windings are wound in such a manner that one causes the motor to rotate in a clockwise direction, and the other anticlockwise. Thus when one winding of the field is energized, the ram extends and when the other is energized the ram retracts. The commutator end of the armature runs in a ball bearing recessed in the motor housing, the driving end being supported in a bush pressed into the brake drum.

Brake and clutch

4. Between the motor and its gearing is an electro-magnetic brake and a single plate clutch. The brake consists of a double flanged core on which the coil is wound, the magnetic path being completed through shoes placed around the periphery, and connecting the two flanges. When the motor is switched on, the coil is energized and attracts the shoes, against the force of helical springs, on to the flanges. When the motor is switched off, the coil is de-energized and the shoes are then held away from the flanges and are on to the brake drum by the helical springs. The brake is thus applied automatically. There are four springs per shoe and they are located in holes drilled around the periphery of the flanges. The brake has four shoes, locating pins protruding from the flanged core prevent their displacement.

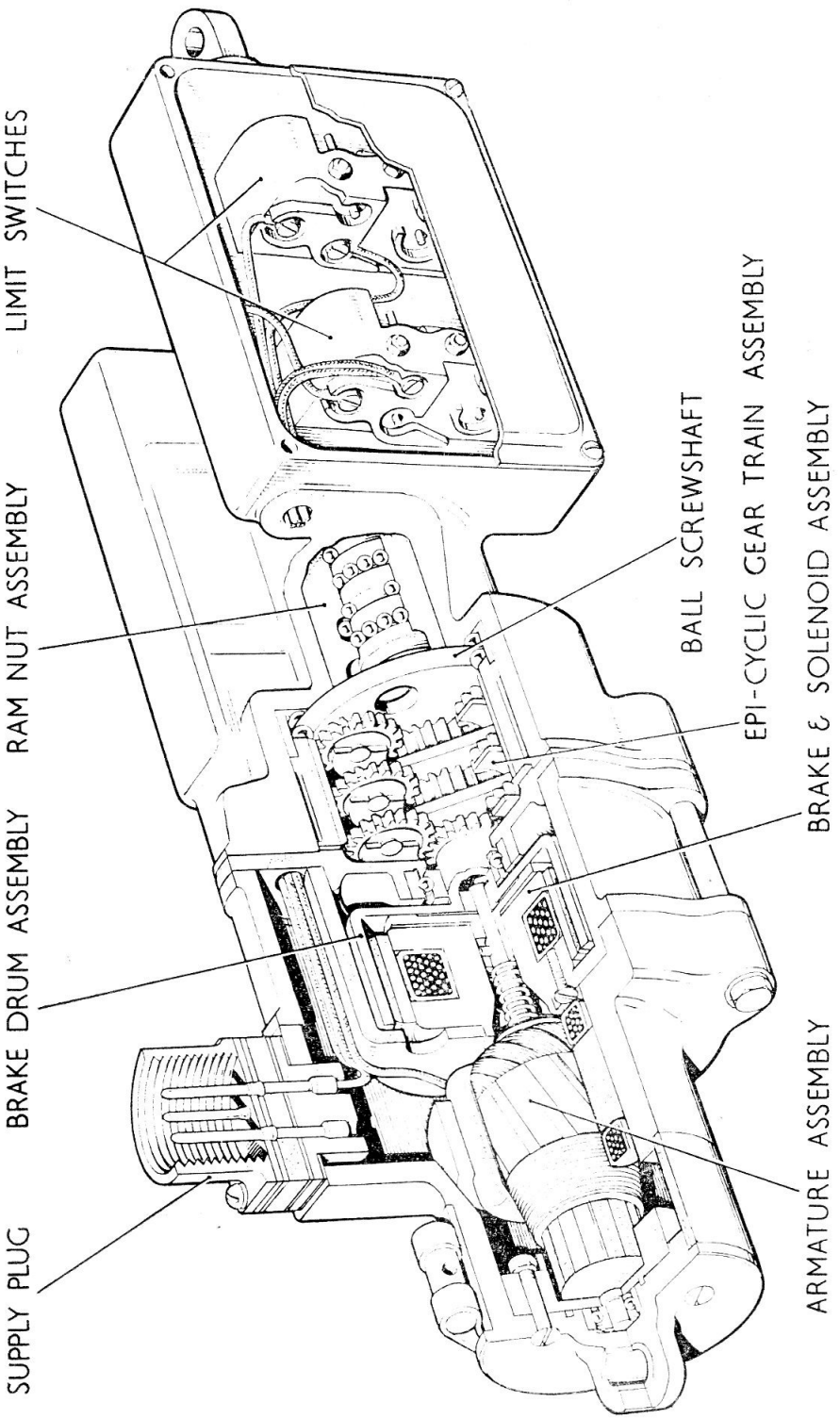

Fig. 2. Sectional view of actuator

5. The drive between the motor and the epicyclic gearbox is taken through a clutch plate. A spring on the armature shaft keeps the clutch plate pressed against the inner face of the brake drum. The pressure of the spring loaded clutch plate is such that the clutch will minimise overrun when the brake operates.

Gearbox

6. The gearbox is of three stage epicyclic construction. The first stage sun gear is integral with the hub of the brake drum. The final stage planet gears are carried as an integral part of the ram screwshaft. The gear ratio is 166·5 : 1.

Ram and screwshaft

7. The hollow ram is driven by a high efficiency screw thread having two tracks of recirculating balls. Torque reaction is absorbed by two sets of balls located in the ram and sliding in guides in the ram housing. The ram shackle contains a self aligning bearing with a $0{\cdot}250 \begin{smallmatrix} +{\cdot}0002 \\ -{\cdot}0003 \end{smallmatrix}$ in. dia. hole

Limit switches

8. Four limit switches controlling the ram travel of the actuator are mounted two in each of two boxes cast integral with the ram housing and positioned one on each side of the housing. The switches are so placed that their plungers protrude through slots in the housing into the ram chamber. These plungers are directly operated by the cams ground on the ram. The cams are not adjustable but provision is made for effecting small changes in ram travel distance, by slotted mounting holes in the limit switch bases.

Electrical connections

9. The actuator is connected to its supply via a 4 pole plug (Ref. No. 5X/6006) which mates with a 4 pole socket on the aircraft installation.

INSTALLATION

10. The actuator may be installed in any attitude and is supported by a fixed lug as an integral part of the motor housing at one end, and is by a self aligning bearing fixed to the ram lug at the other.

SERVICING

11. These actuators should be serviced in accordance with one general chapter in A.P.4343, Vol. 1, Sect. 17, Chap. 2, and the instructions contained in the relevant Servicing Schedule.

Brushgear

12. The minimum length beyond which brushes should not be used is 0·200 in. Brushes should be renewed at periods prescribed in the relevant Servicing Schedule, and whenever examination reveals that they will not remain serviceable for the period that must elapse before the next servicing.

13. The brush spring pressure should be between $2\frac{1}{2}$ and $3\frac{1}{2}$ oz. (71 and 99 gm.). The reading should be taken with a suitable spring balance from the point where the trigger bears on the brush, in a direction parallel to the centre line of the brush, and as the trigger leaves the top of the brush. Care should be taken not to damage the light spring in the process.

Lubrication

14. The actuator is lubricated during manufacture, and should not normally require further lubricant until the unit is dismantled and repaired.

Insulation resistance test

15. The insulation resistance between all live parts and the frame should be measured using a 250-volt insulation resistance tester, and should not be less than 50,000 ohms.

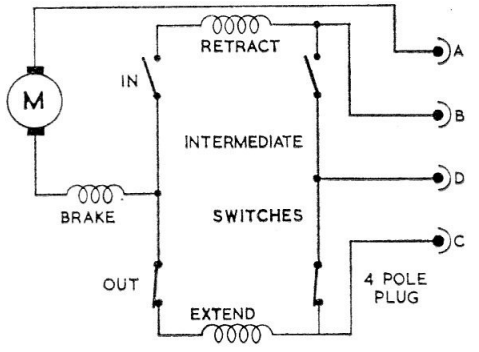

Fig. 3. Diagram of internal connections

Appendix 1

ACTUATOR, ROTAX, TYPE A0804/1

LEADING PARTICULARS

Actuator, Type A0804/1	*Ref. No. 5W/2389*
Normal voltage	28*V d.c.*
Operating voltage range	18 *to* 28*V d.c.*
Current at rated load	3 *amp.*
Ram speed at rated load	2·875 *in. in* 8 *sec.*
Rated load	135 *lb.*
Maximum load	270 *lb.*
Over-run	0·020 *in (max.)*
Brush spring pressure	$2\frac{1}{2}$ *to* $3\frac{1}{2}$ *oz.* (71 *to* 99 *gm.*)
Brush grade	*CM5-B (H.A.M.)*
Brush length (new)	0·328 – 0·358 *in.*
Brush length (minimum permissible)	0·200 *in.*
Commutator diameter (new)	0·566 – 0·571 *in.*
Commutator diameter (minimum permissible)	0·535 *in.*
Dimensions between shackle centres—	
Extended length	12·500 *in.*
Intermediate length	10·875 *in.*
Retracted length	9·625 *in.*
Weight	3 *lb.*

1. The A0804/1 actuator is similar to that described and illustrated in the main chapter, but differs from others in the series in that the ram stroke is 2·875 in., and the position of the supply plug is as illustrated in fig. 1. Other details are as given under Leading Particulars in this Appendix.

Appendix 2

ACTUATOR, ROTAX, TYPE A0807

LEADING PARTICULARS

Actuator, Type A0807	*Ref. No.* 5*W*/4130
Normal voltage	28*V d.c.*
Operating voltage range	18 *to* 28*V d.c.*
Current at rated load	2·7 *amp.* (*max.*)
Ram speed at rated load	*Not less than* 1 *in. in* 5·5 *sec.*
Rated load	135 *lb.*
Stroke	2·775 *in.*
Maximum load	270 *lb.*
Stall load at 28*V d.c.*	400 *lb.*
Maximum static load	900 *lb.*
Current at maximum load	3·2 *amp.* (*max.*)
Ram speed at maximum load	*Not less than* 1 *in. in* 10 *sec.*
Over-run	0·020 *in* (*max.*)
Brush spring pressure	2·5 *to* 3·5 *oz* (71 *to* 99 *gm.*)
Brush grade	*Morganite CM5-B* (*H.A.M.*)
Brush length (*new*)	0·328 –0·358 *in.*
Brush length (*minimum permissible*)	0·200 *in.*
Commutator diameter (*new*)	0·566 – 0·571 *in.*
Commutator diameter (*minimum permissible*)	0·535 *in.*
Dimensions between shackle centres—	
Extended length	12·400 *in.*
Intermediate length	10·875 *in.*
Retracted length	9·625 *in.*
Weight	3 *lb.*

1. The A0807 actuator is similar to that described and illustrated in the main chapter, but differs from others in the series in that the ram stroke is 2·775 in., and the position of the supply plug is as illustrated in fig. 2. Other details are as given under Leading Particulars in this Appendix.

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