Chapter 60

ACTUATOR, ROTAX, TYPE C 10001

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LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Actuator, Rotax, Type C10001	Ref. No. 5UD/6699
Voltage	28V, d.c.
Current at normal load	2·3 amp.
Stall current at normal voltage	5 amp.
Brush spring pressure	3 + ½ oz.
Brush grade	KC.EG.11
Minimum brush length	0·260 in.
Normal load	30 lb. in.
Maximum working load	45 lb. in.
Maximum static load	83 lb. in.
Speed of rotation	3·5 r.p.m.
Gear ratio	4580 : 1
Rotation	Continuous
Rating	Intermittent
Operational ceiling	50,000 ft.
Operational temperature range	—70 deg. C. to + 90 deg. C.
Length	5·858 in.
Height	3·780 in.
Width	2·687 in.
Weight	1 lb. 12 oz.

Introduction

1. The Type C10001 actuator is a 28V d.c. reversible machine providing continuous rotation in either direction. The actuator draws a current of 2·3 amperes at normal load of 20 lb. in. It can operate throughout a temperature range of —70 deg. C. to +90 deg. C. and at altitudes up to 50,000 ft.

DESCRIPTION

2. The actuator comprises a reversible motor, gearbox, brake, clutch and output shaft with a bevel pinion drive and an attachment for hand drive. A split casing contains the motor, brake and clutch in one half, and the gear train and final drive pinion in the other half. The four-pole plug

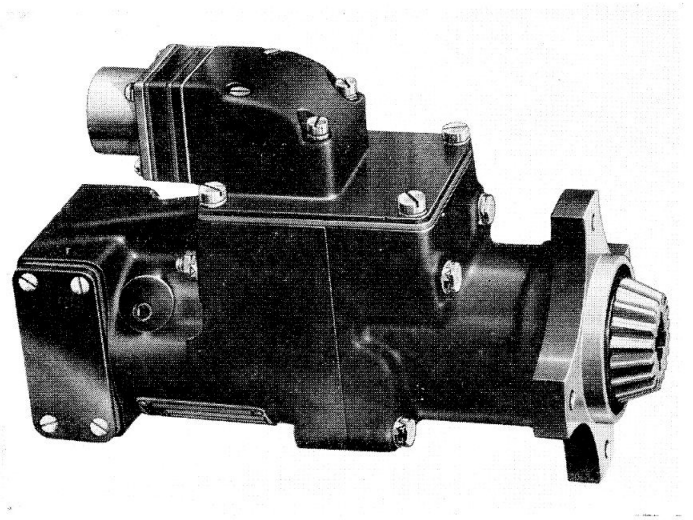

Fig. 1. Type C10001 actuator

is mounted parallel to and above the joint in the centre of the main casing. Connection to the plug is made through a terminal block on top of the gearbox casing but under the plug supporting plate. The casing is secured together by four bolts and a mounting flange is provided at the output shaft end.

Motor

3. The motor is enclosed in one half of the main casing. The closed end of the casing carries the ball bearing for the commutator end of the rotor shaft. The open mating end of the casing has a web screwed into it carrying the ball bearing supporting the integral clutch plate and first sun gear. The rotor shaft is extended through the brake coil into the clutch plate and first sun gear.

4. Access to the brush gear is by two inspection plates, secured by four screws, either side of the casing in line with the commutator. Allan screws secure the field coils to the casing.

Brake and clutch

5. A brake solenoid is mounted about the extension to the rotor shaft. The circular brake shoe is forced against the outside portion of the driven clutch plate by helical springs. The brake shoe is located by pins in the brake solenoid coil. The brake solenoid is connected in series with the field coils and when the motor is energized the solenoid withdraws the brake shoe to allow the clutch plate to rotate.

6. The driving clutch plate is mounted on the rotor shaft with the boss extending into the brake solenoid. A pin through the rotor shaft locates in a slot in the clutch plate boss. A helical spring about the rotor shaft extends from the armature to the clutch plate boss and forces the clutch plates together. The clutch plate mating surface is inside the brake shoe contact area.

Gearbox

7. The five stage epicyclic gearbox and output shaft is contained within the remaining half of the split casing. The driven clutch plate is integral with the first sun gear and engages with the first planetary gear series. The common annulus gear is located in the casing by pins engaging in the bearing web screwed into the motor casing. The final stage planet gear assembly carries a spur gear which engages inside the output shaft. The output shaft is carried inside the hollow bevel pinion shaft which is supported in a plain bearing. The output shaft and the bevel pinion have internal splines.

Operation

8. Pole " A " of the four-pole plug is the negative line; pole " B " is positive for clockwise rotation and pole " C " is positive for anti-clockwise rotation.

9. When positive supply is connected to the required pole of the plug, the appropriate motor field is energized and the brake solenoid is energized via the armature. The circular brake shoe is withdrawn from the clutch plate and the motor drives the output shaft via the clutch and reduction gear. When the supply is broken, the brake shoe is released on to the driven clutch plate and arrests the output shaft. The clutch slips to dissipate kinetic energy in the motor armature.

INSTALLATION

10. Four 0·189 in. diameter holes are provided in the mounting flange, which is 0·312 in. thick. The holes are equispaced on a 2·250 in. P.C.D. concentric with the output shaft.

11. The output shaft mates with a special quill shaft. The internal splines on both the output shaft and the bevel pinion are B.S. specification A.20 and are 0·5 in. nominal diameter.

12. Electrical connection is made via a four-pole breeze plug (Ref. No. 5X/6006).

SERVICING

13. Make a general inspection of the actuator for damage and ensure that it is secure on its mounting. Cover plates must be in place and tight, electrical connections must be clean and secure.

Brushes and commutator

14. Remove the two cover plates from the motor casing and make the following inspections.

15. Remove the brushes and examine them for cracks, security of flexible connections and wear. Ensure that the length of the brush (see Leading Particulars) is of adequate length to give satisfactory performance until the next servicing.

16. Examine the commutator for scores and burns. If its condition is such that commutation is likely to be impaired, the actuator is to be considered unserviceable.

17. Ensure that the brushes are free but not slack in their boxes. If they are tight as a result of carbon being deposited in the brush boxes, the deposits should be removed.

18. Measure the pressure of each brush spring with a tension gauge (Ref. No. 1H/59). Each spring should exert a pressure of $3\pm\frac{1}{2}$ oz. (85 ± 15 gm.) when it leaves the top of its brush.

Insulation resistance test

19. Measure the insulation resistance between live parts and frame, using a 250V insulation resistance tester. A reading of at least 50,000 ohm should be obtained.

Note . . .

The value of insulation resistance given in para. 19 applies to the actuator being tested under normal workshop conditions. Due allowance should be made for the climatic conditions of the locality and those of the aircraft servicing area or dispersal point where the tests are being applied. In particularly damp climates, the readings obtained may be low enough to give apparently sufficient reason for rejection and, in these instances, discretion should be exercised.

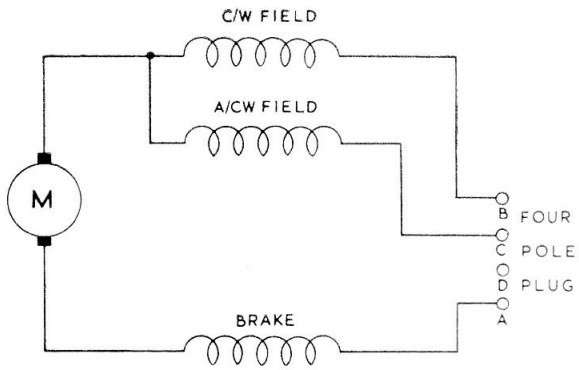

Fig. 2. Diagram of internal connections