

Chapter 91

ACTUATOR, ROTAX, TYPE C14101

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LEADING PARTICULARS

Actuator, Type C14101	Ref. No. 5W/3901
Maximum operating voltage	28.5V d.c.
Minimum operating voltage	18V d.c.
Current at maximum voltage—	
Motor and brake	0.5 amp.
Motor, brake and clutch	0.75 amp.
Normal load	20 lb. in.
Maximum allowable working load	100 lb. in.
Maximum static load	150 lb. in.
Angle of rotation—	
Travel between limit switches (clutch engaged)	up to 72 deg. ± 2 deg. max.
Travel between mechanical stops (clutch disengaged)	up to 130 deg. max.
Maximum overshoot of output arm	$\frac{1}{2}$ deg.
Maximum backlash (taken on pin of operating forked arm)	0.006 in. at 1.5 in. radius with 5 lb. in. torque applied.
Gear ratio and type	17,250 : 1—spur gear and helical gear train
Ambient temperature range of operation	—54 deg. C. to +71 deg. C.
Altitude range	up to 15,000 ft.
Speed at rated load	0.54 to 0.80 r.p.m. at 28V
Rating (duty cycle)	1 sec. on—1 sec. off for 1 min. followed by 20 sec. on—20 sec. off
Minimum brush length	0.211 in.
Brush spring pressure	2 oz. ± 5 per cent (53.9 – 59.5 gm.)
Overall dimensions—	
Length	9.883 in.
Width	2.062 in.
Height	4.014 in.
Weight	3 lb.

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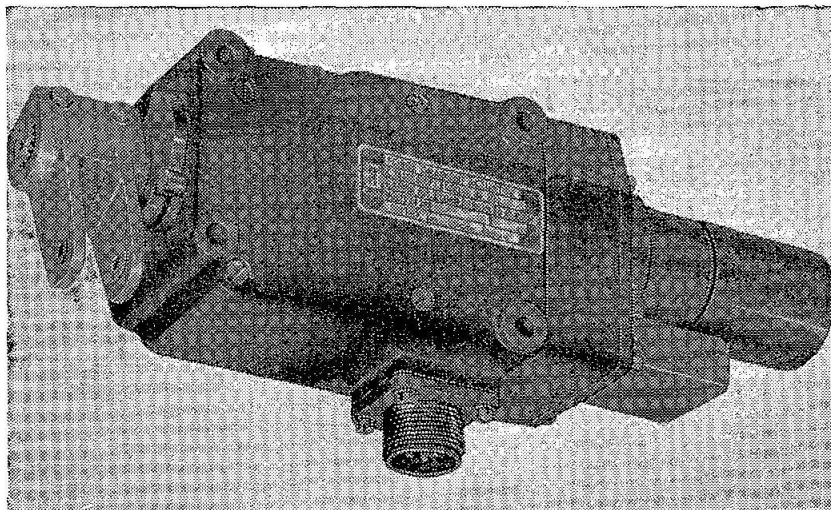


Fig. 1. Type C1401 actuator

Introduction

1. The unit is designed to operate as a force gradient actuator, in conjunction with ASE (auto stabilizer equipment), on helicopters having a 28-volt (nominal) d.c. supply. It will operate satisfactorily within an ambient temperature range of -54 deg. C. to $+71$ deg. C. and at altitudes up to 15,000 ft.

DESCRIPTION

2. The actuator (*fig. 1*) consists of a light alloy case containing a reversible d.c. motor with brake, reduction gear train, a solenoid operated clutch incorporating a centrifugal

governor, limit switches, mechanical stops and a splined output shaft fitted with a fork arm.

Motor and brake

3. The motor is a reversible, split series field machine, at the commutator end of which is mounted an electro-magnetic brake which is released when energized, the coil being connected in series with the motor (*fig. 2*).

Limit switches

4. The two limit switches are operated by cams on the output shaft and may be

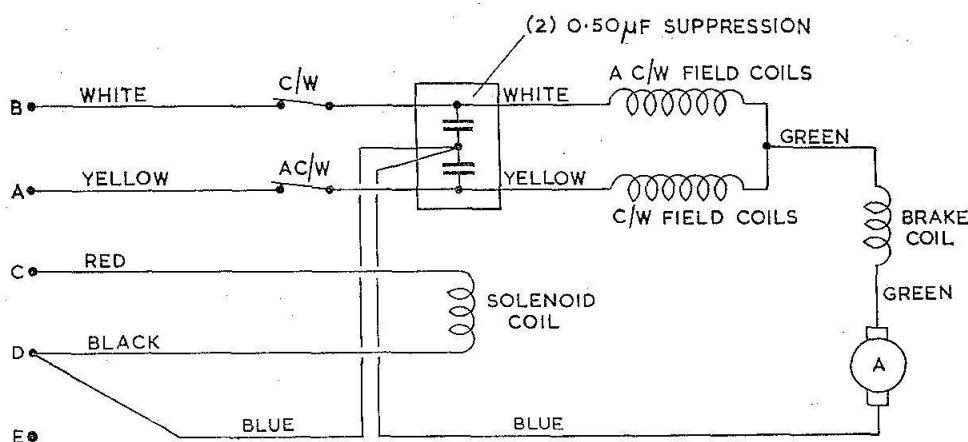


Fig. 2. Diagram of internal connections

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adjusted to give an angle of operation of 72 deg. \pm 2 deg. Mechanical stops are provided to limit the travel in the event of limit switch failure.

Operation

5. With the clutch energized, the motor drives the output arm through the reduction gear train which is in two sections, the clutch and governor being interposed between the sections. When the motor and brake are de-energized with the clutch energized, the motion of the output arm is arrested with the assistance of the brake in the motor.

6. When the clutch is disengaged, the output arm is free, requiring only the force necessary to overcome the effect of damping provided by the governor, and the friction and inertia of the gear train. The governor is used to prevent the inertia of the unit from causing the output arm to overshoot, when a sudden input to the actuator arm, for example, releases the clutch when the force gradient spring (part of the ASE system) is fully compressed.

7. When the clutch, motor and brake are de-energized simultaneously, the output shaft may be back driven under the control of the governor, the maximum angle of travel being 130 degrees.

INSTALLATION

8. Four $0.257 \pm .003$ in. diameter holes are provided in the main body casting for mounting the unit. Hole centres are $2.000 \pm .005$ in. and $2.375 \pm .005$ in. respectively, the axial centre distance between them being $3.590 \pm .005$ in.

9. The forked end of the operating arm is provided with a $0.190 \pm .001$ in. diameter locating hole for coupling the unit to the ASE associated equipment.

10. All electrical connections are made to the Cannon plug No. AN.3102E-14S-5P.

SERVICING

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

Brushgear

12. The minimum length beyond which brushes should not be used is quoted under Leading Particulars. 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. Brush spring pressure, measured with a tension gauge (Ref. No. 1H/59), should be between 53.9 and 59.5 gm. when the spring leaves the top of the brush.

Insulation resistance test

14. The insulation resistance, when measured with a 250-volt insulation resistance tester between all live parts and the frame, should not be less than 50,000 ohms for satisfactory aircraft service.

Note . . .

Before commencing the insulation test, ensure that the suppression capacitors are isolated from the frame.