

Chapter 10

STARTER MOTOR, ROTAX, TYPE C10501

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LEADING PARTICULARS

Starter motor, Type C10501

◀ Incorporating—

<i>Motor, Type C0624</i>	<i>Ref. No. 37F/4508</i>
<i>Gearbox, Type ZA12701</i>	<i>Ref. No. ▶</i>
<i>Supply voltage</i>	24 volts
<i>Supply characteristic</i>	1 volt drop per 25 amp.
<i>Output power</i>	2.15 B.H.P.
<i>Output speed</i>	1340 R.P.M.
<i>Current</i>	125 amp.
<i>Rating</i>	1 minute
<i>Stall torque</i>	35 lb. ft. for given characteristic
<i>Rotation</i>	Anti-clockwise (looking on drive end)
<i>Brush spring pressure</i>	14 to 16 oz. when compressed to 0.437 in.
<i>Brush length (new)</i>	0.500 in.
<i>Minimum permissible brush length</i>	0.481 in.
<i>Brush grade</i>	E.G.O. H.A.M.
<i>Commutator diameter (new)</i>	1.505 ⁺⁰ / _{-.005} in.
<i>Commutator diameter (minimum) permissible</i>	1.490 in.
<i>Gear ratio</i>	459:1

Overall dimensions—

<i>Length Terminal shroud to gearbox face</i>	9.500 in.
<i>Gearbox face to tacho housing end face</i> 2.062 ^{+0.002} / _{-.0} in.	
<i>Width</i>	6.562 in.
<i>Height Casting boss to top locating face</i>	4.324 in.
<i>Axis of machine to top locating face</i> 1.324 ⁺⁰ / _{-.008} in.	
<i>Weight</i>	13.5 lb.

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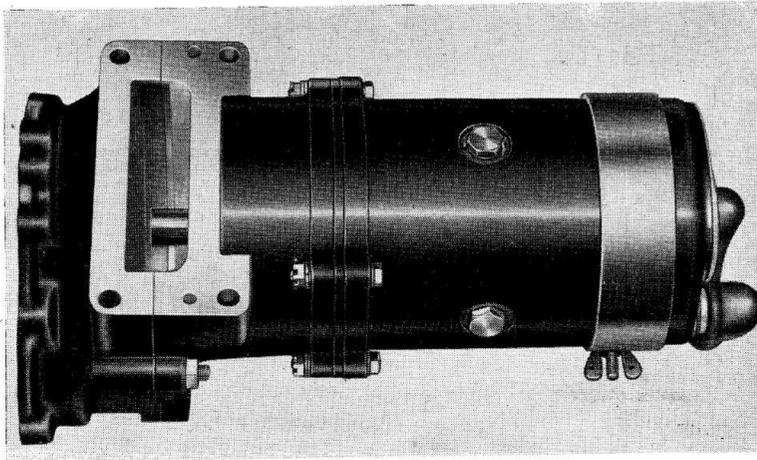


Fig. 1. Starter motor, Type C10501

Introduction

1. The Type C10501 starter motor is designed to start a gas turbine engine which drives an auxiliary alternator. An associated starter panel automatically controls the 24 volt d.c. supply to the starter motor and both units will operate satisfactorily up to 30,000 feet. Starting is not proposed at higher altitudes..

DESCRIPTION

2. The motor (*fig. 1 and 2*) is a totally enclosed 4 pole machine. The armature is wave wound with the field coils con-

nected in series parallel to it. In general the starter comprises a tachometer and gearbox housing assembly, D.E. frame assembly, motor housing, yoke and field coil assembly, and armature assembly.

3. The driving end frame, tachometer and gearbox housing assembly are fitted together, and provide a mounting frame and support at one end for the motor housing..

4. The driving end frame and the motor housing each include a ballrace which supports both ends of the armature (*fig. 3*).

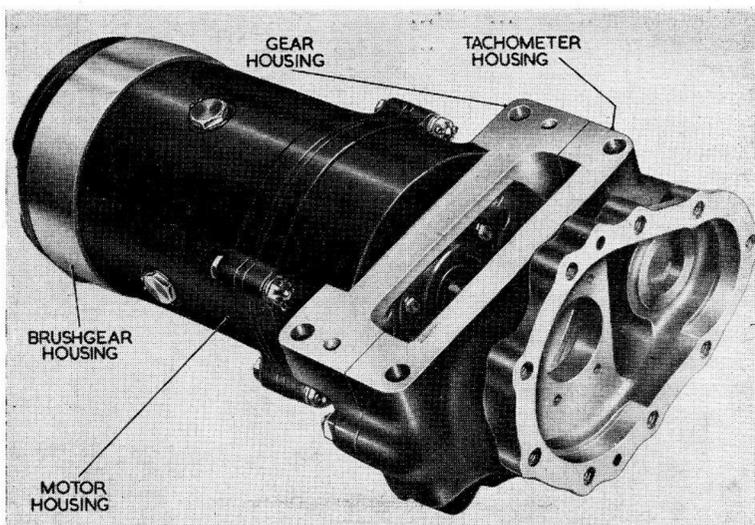


Fig. 2. View looking on tachometer end

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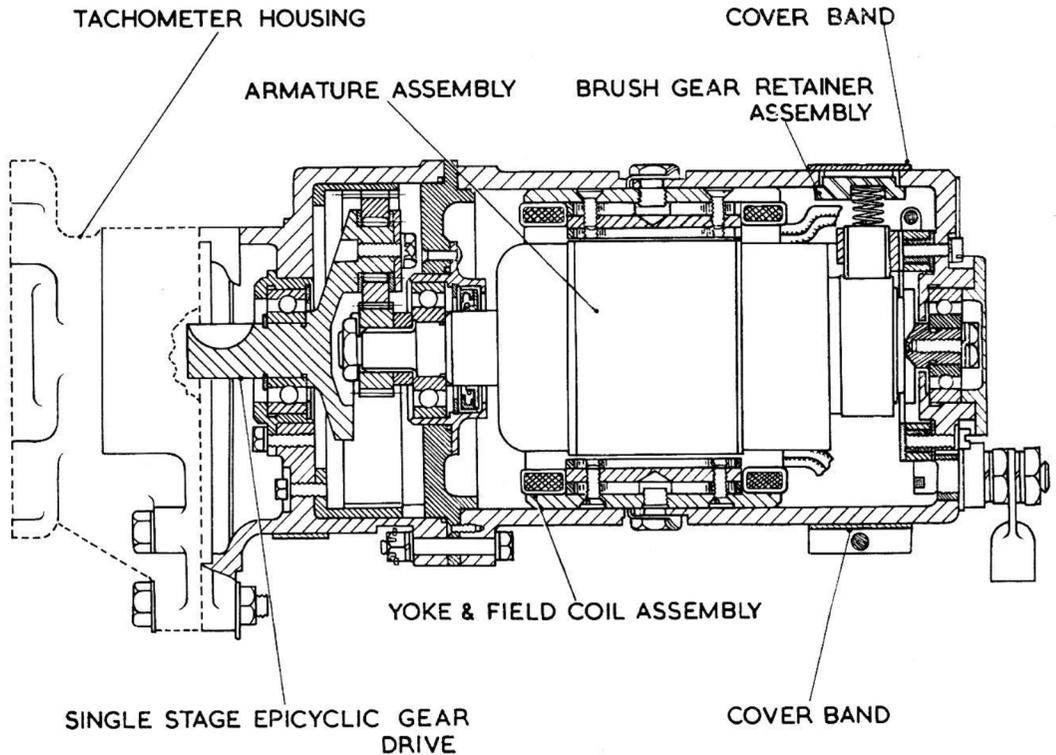


Fig. 3. Sectional view of starter

An oil seal is also housed in the driving end frame together with the ballrace, and is secured by a steel circlip.

5. A further ballrace assembled in the gearbox housing supports the single stage epicyclic gear drive assembly (*fig. 4*). In addition the motor housing carries the brush gear assembly with the two terminal posts, mounted at the armature end of the housing.

6. Access to the brushgear is gained via a window strap clamped over the four brush apertures in the motor housing, and secured by a wing nut and stud at the ends.

Yoke and field coil assembly

7. Located in the motor housing between the brushgear assembly and the D.E. frame is the yoke and field coil assembly (*fig. 3*). The yoke is manufactured from low carbon mild steel, and the pole shoes contained therein from Lohys iron laminations, held together by a flat rivet of S.I. steel.

8. Four field coils each having 14 turns of

strip copper conductor, wound on edge, using Lewmex 'M' insulation, are fitted to the four pole shoes contained within the yoke.

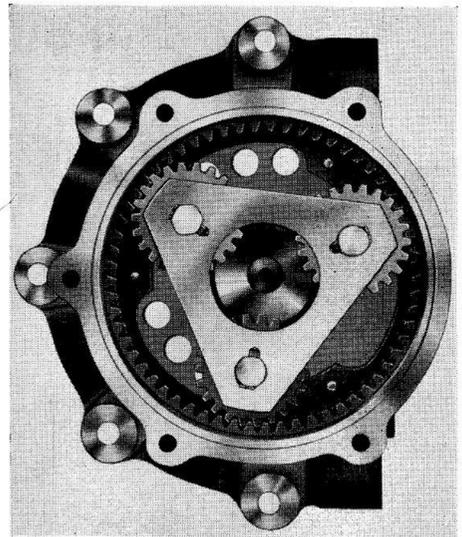


Fig. 4. Gearbox assembly

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Armature

9. The armature is wave wound and has 33 slots, Lewmex 'M' slot insulation being used for the conductors. The armature core is keyed to its steel shaft with the drive to the associated equipment by a woodruff key fitted in the drive end of the shaft, which is coupled with its mating driven member.

10. The commutator end of the armature shaft is located in a ballrace, which is secured by an end cap fitted to the motor housing. A ballrace and oil seal, contained within the driving end frame, support the shaft at the driving end, while the seal locates on an adjacent ground diameter, to prevent any ingress of oil to the armature (fig. 3).

Electrical connections

11. The starter is connected to its supply via two terminal lugs fitted to the two 0.375 in. B.S.W. terminals, located externally on the motor housing end face. Protective rubber shields are provided with the terminals, for subsequent fitting on installation.

INSTALLATION

12. Before installing the starter the appropriate aircraft and engine hand books should be consulted. Installation consists of accurately aligning the starter mounting top machined face for dowel positioning, and bolting in position when the tachometer end housing machined face is aligned with the associated equipment.

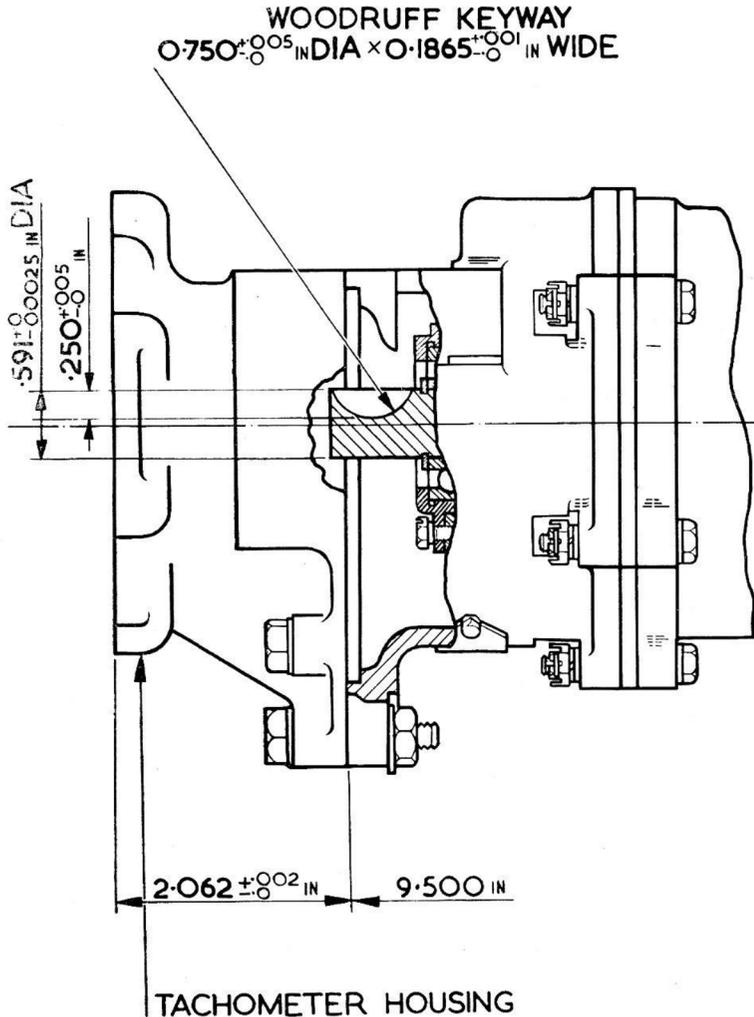


Fig. 5. Installation details

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13. There are two mounting faces on this machine as follows:—

(a) The top mounting face:

There are two holes $0.252 \begin{smallmatrix} +.0005 \\ -.0 \end{smallmatrix}$ in. diameter positioned at $0.522 \pm .001$ in. and $0.343 \pm .005$ in. dimensions respectively, on $4.875 \begin{smallmatrix} +.001 \\ -.0 \end{smallmatrix}$ in. centres, for accurately locating the unit. Also, there are four holes $0.344 \begin{smallmatrix} +.003 \\ -.0 \end{smallmatrix}$ in. diameter positioned on $4.875 \pm .010$ in. \times $1.750 \pm .010$ in. centres for mounting the unit (*fig. 2*).

(b) The end mounting face:

The tachometer and gear box housing is mounted to the associated equipment. (*fig. 5*).

SERVICING

14. Servicing will normally be in accordance with the information contained in A.P.4343, Vol. 1, Sect. 15, Chap. 1, appertaining to 12/24V starters, and the relevant servicing schedule.

Brushgear

15. Service the brushgear in the following manner:—

- (1) Remove the locking tie-wire and unscrew the wing nut from the cover-band captive screw.
- (2) Remove the cover band and insulated lining.
- (3) Release the brush and spring bakelite retainer.

(4) Press down in the housing aperture, then turn the retainer to release the brush spring and brush for checking. (See Leading Particulars for brush and spring details).

(5) Replace the brushes in the boxes from which they were removed, and fit and reassemble springs and spring retainers.

Lubrication

16. The ball bearings of the motor are grease lubricated during manufacture with grease XG-275 (*Ref. No. 34B/9100512*), 1/3rd. full. The drive end bearings are oil lubricated from the associated equipment, also the gearbox is lubricated during manufacture with oil OX-38 (*Ref. No. 34A/9100591*) and should not normally require lubrication during servicing periods.

General

17. Ensure that all external screws and studs and locking devices are secure. Examine the connections to the supply terminals for security and damage, also the brushgear connections.

18. At the conclusion of the servicing operations, ensure that the inspected components are in their correct position and replace the cover band and lining and finally secure wing nut with new locking tie-wire.

Insulation resistance test

19. The overall insulation resistance for satisfactory aircraft service must not be less than 50,000 ohms, measured with a 250V insulation resistance tester, between the positive terminal and the frame.

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