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Chapter 27

GENERATORS, ROTAX, B3500 SERIES

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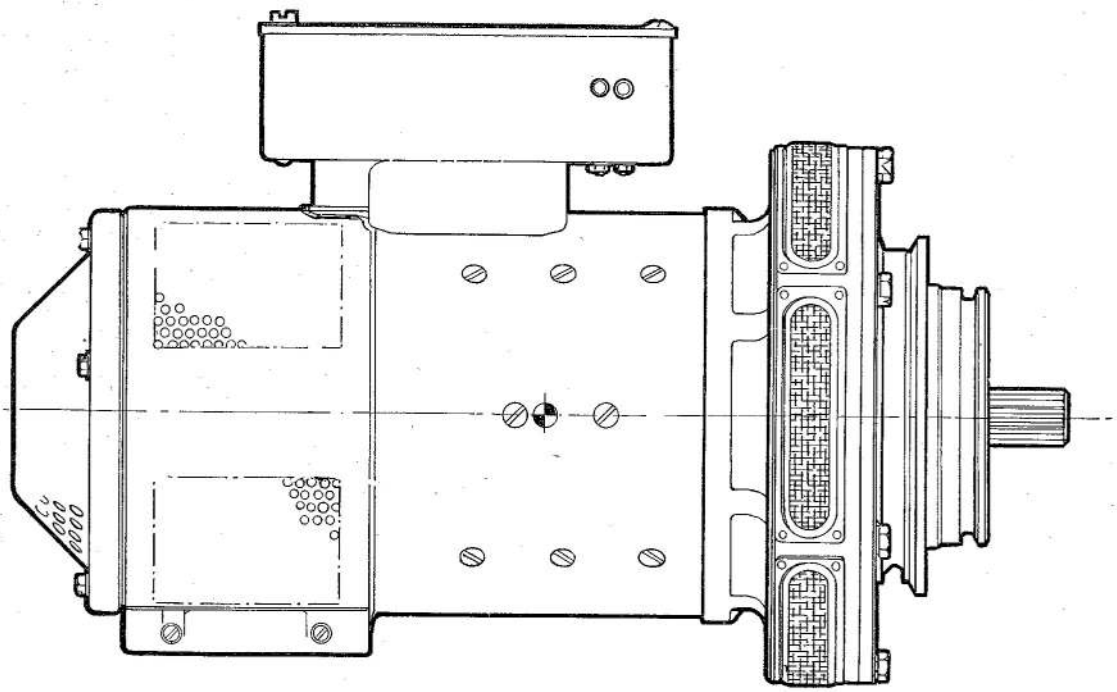


Fig. 1. General view of typical generator

Introduction

1. The B3500 series generators are designed for use in aircraft to provide a **d.c.** power supply at 28-volts (nominal).
The machines are fully tropicalised and are designed to operate in ambient temperatures between −50 deg. C. to +50 deg. C. and at altitudes up to 20,000 ft.

DESCRIPTION

2. The generators are four-pole, shunt-wound machines with interpole decompounding and compensating windings to ensure sparkless commutation over the normal speed range.

Cooling

3. Cooling is provided by means of an integral fan which gives 85 cu. ft. of air per minute at 4,500 r.p.m. The air is drawn in and expelled through vents at either end of the machines.

Suppression

4. Radio interference is suppressed by a system of capacitors housed in the main terminal box which is mounted externally.

Electrical connections

5. The external electrical connections are contained within the terminal box mounted on the body of the machine.

Brushes and brushgear

6. The brushgear incorporates two pairs of diametrically opposite brushes connected together. Access to the brushgear is gained by removing the window strap which incorporates the cooling air induction inlet.

INSTALLATION

7. The generators are designed for either manacle ring or flange fixing and may be mounted in any attitude. Rotation is anti-clockwise when viewed from the driving end.

SERVICING

8. Full repair information will be found in Vol. 6 of this publication. General information on the servicing of generators is given in A.P.4343, Vol. 1, Sect. 2, Chap. 1, which should be read in conjunction with the following paragraphs and the relevant Servicing Schedule.

9. The window strap at the commutator end (where fitted) should be removed and the internal wiring connections examined for security and serviceability. All nuts, screws and locking devices should be checked and secured where necessary. The terminal box cover should be removed and the cable connections checked and examined for security.

Brushgear

10. 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. If new brushes have been fitted, they should be bedded to the surface of the commutator as laid down in A.P.4343, Vol. 1, Sect. 1, Chap. 2. Check that brushes slide freely in their boxes.

11. The brush spring pressure should be checked with a suitable spring balance, the reading being taken when the arm is level with the top of the brush box.

12. Upon completion of the examination, replace the window strap and terminal box cover, relocking both finally in position.

Lubrication

13. The two ballraces are of the pre-lubricated and double seal type. They are initially lubricated with grease XG-277, and should require no further attention during service. When fitted, the oil seal at the driving end should be lubricated. It is recommended that the oil seal be removed before a long testing or bedding run, unless adequate lubrication is possible during the test.

Testing

14. If the serviceability of the machine is suspect, it may be tested as laid down in Appendix A.

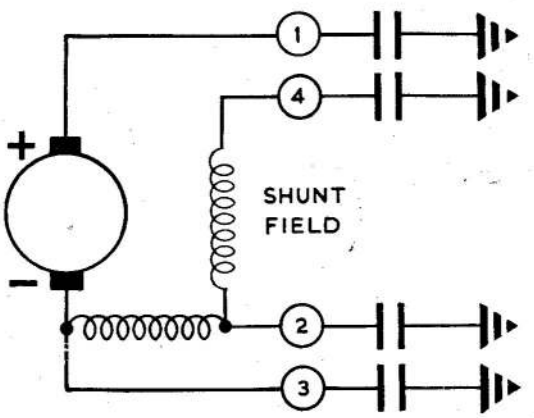
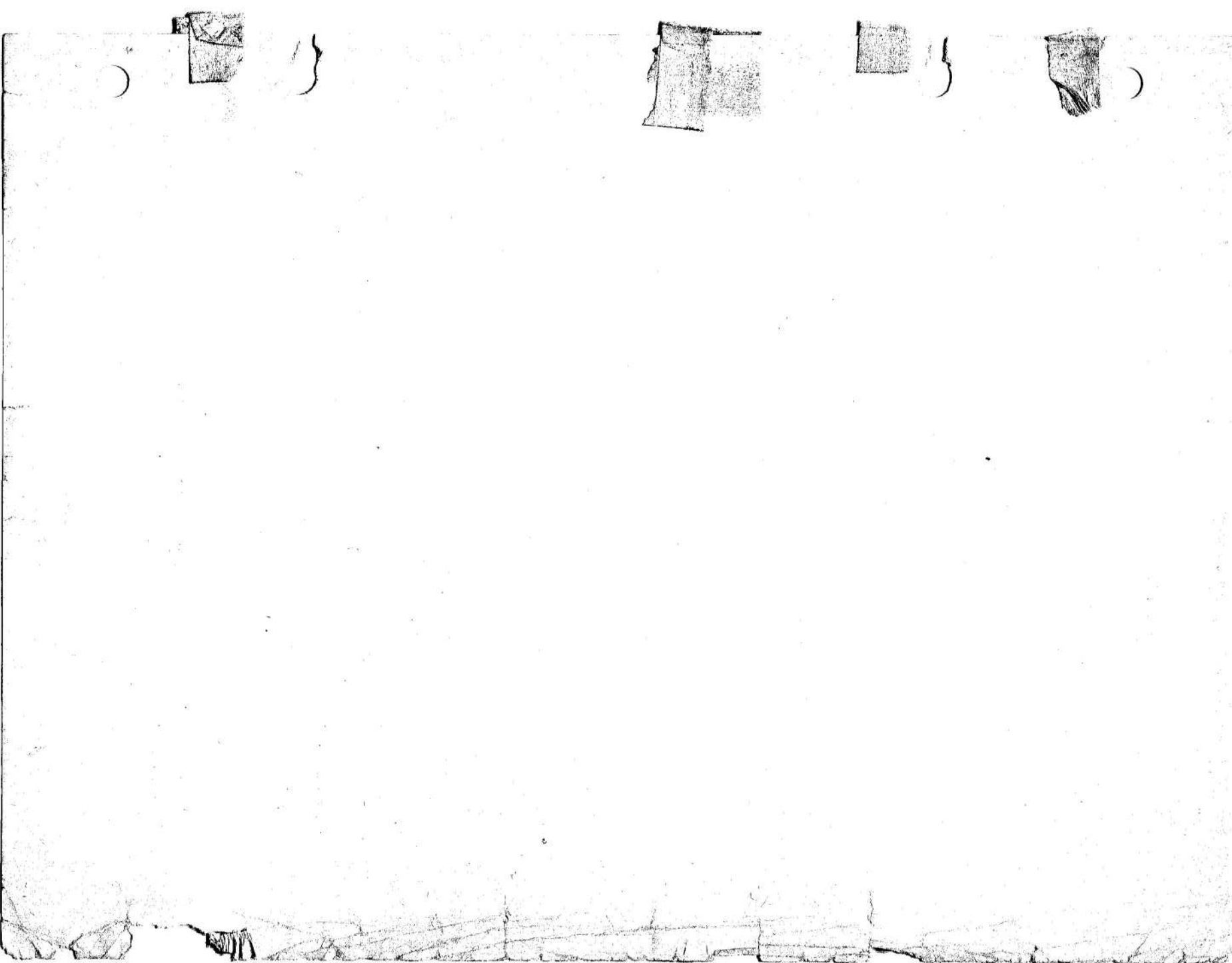


Fig. 2. Diagram of internal connections



Appendix A

STANDARD SERVICEABILITY TEST FOR GENERATORS, ROTAX, B3500 SERIES

Introduction

1. The following tests may be applied to the machine before it is put into service, or at any time when its serviceability is suspect.

Test equipment

2. The following test equipment is required.

(1) Bridge-Megger tester, Type B (Ref. No. 5G/1708).

(2) Tester, generator—one in the Mk. 5 series.

(3) Balance, spring, 0-4 lb. (Ref. No. 1H/97).

(4) Insulation resistance tester, Type C (Ref. No. 5G/152) (for R.A.F.) or Type 0557/A.P.5047 (for R.N.).

Note . . .

In generators fitted with an oil seal, care must be taken to ensure that it is adequately lubricated during testing with the appropriate grade of engine oil. Generators designed for blast cooling should have an adequate supply of cooling air.

Type	*Oil seal*	*Cooling*
B3501	No	Internal fan
B3502	Yes	Internal fan
B3503	No	Blast air
B3505	No	Blast air
B3507	No	Internal fan
B3508	No	Blast air

Testing

3. Before mounting the generator on the test set, check for freedom of rotating parts by turning the armature by hand. There should be no excessive end play in the bearings; a slight radial play which can just be felt by hand is permissible.

Brushgear

4. Check the brush length and brush spring pressure; the brush length should be not less than 0·730 in., and the spring pressure should be between 49 and 55 oz. ◄ Examine the insulating sleeving on the brush pigtail for deterioration, if the sleeving is cracked or broken the affected brush must be renewed following which the new brush should be bedded using the procedure given in A.P.4343, Vol. 1, Sect. 1, Chap. 2. ►

Resistance of windings

5. The winding resistance values measured between terminals as indicated and corrected to 20 deg. C. should be as follows:—

Winding	*Terminals*	*Resistance value (ohms)*
Shunt field	2 and 4	1·8 to 2·15
Series field	2 and 3	0·0058 to 0·0066

Polarity

6. Run the generator in an anti-clockwise direction with a suitable voltmeter across the output terminals. The meter reading should confirm the terminal markings.

Performance

7. With the generator connected to the test set, run up on no load to approximately 4,500 r.p.m. There should be no hesitation in build up, and the correct voltage should be attained.

8. Run at the same speed on half load (150 amp.) for 10 min. During this run, there should be no more than pin-point sparking at the brushes. At the end of the test the brushes should still slide freely in their boxes.

Insulation resistance

9. With the suppression capacitors disconnected, the insulation resistance, measured with a 250-volt insulation resistance tester between all line parts and the frame with the machine still warm, should not be less than 0·05 megohm.

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P32771/372196/3128 2000 4/64 Gp 375

Appendix 6

GENERATOR, ROTAX, TYPE B3508

LEADING PARTICULARS

Generator, Type B3508	*Ref. No.* 5UA/8142
Rated output (continuous)	30 *volts d.c.* 300 *amp.* 9*kW with air at* 6 *in. W.G.*
Rated output (continuous)	30 *volts d.c.* 375 *amp. with air at* 6 *in. W.G.*
Rated output (emergency overload)	30 *volts d.c.* 400 *amp. with air at* 10 *in. W.G. for* 30 *minutes*
Speed range	4,500–8,500 *r.p.m.*
Rotation (viewed from drive end)	*Anti-clockwise*
Cooling	*Blast cooled*
Brush length (new)	1·187 *in.*
Brush length (minimum permissible)	0·730 *in.*
Commutator diameter (new)	2·875 *in.*
Commutator diameter (minimum permissible)	2·785 *in.*
Brush grade	*H.A.M. EG.*11
Brush spring pressure	49–55 *oz.*
Ambient temperature range	−50 *deg. C to* +50 *deg. C.*
Altitude	60,000 *ft.*
Lubrication	*Pre-lubricated (double-seal) ballrace*
Mounting details	*Flange mounting optional in increments of* 60 *degrees*
Drive shaft	16 *teeth of involute form* 20/30 *pitch* 30 *deg. pressure angle* 0·867 *in. outside diameter*
Electrical connections	
Terminal 1 *(positive output)*	0·375 *in.* −24 *U.N.F. studs (two)*
Terminal 2 *(negative output)*	
Terminal 3 *(series drop)*	*No.* 10–32 *U.N.F. studs (two)*
Terminal 4 *(positive field)*	
Overall dimensions—	
Length	14·796 *in.*
Height	10·075 *in.*
Width	6·375 *in.*
Weight	54 *lb. approx.*

1. The B3508 generator is similar to that described in the main chapter, except that cooling is by blast air supply from the aircraft. The air enters at the commutator end and leaves at the drive end. Air ducts are not provided.

2. Installation differs to that described and illustrated in the main chapter in that the B3508 is designed for flange and spigot mounting, which is similar to B3503. For Installation details see fig. 1 of Appendix 3 referring to B3503.

3. The quill drive, with an involute type of spline, forms an integral part of the main armature drive shaft. The spline details will be found in the leading particulars, and are illustrated in fig. 1 of appendix 3 for B3503.

4. The electrical connections are identical to those shown in fig. 2 of the main chapter.

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