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Chapter 5

GENERATORS, ROTAX, B1800 SERIES

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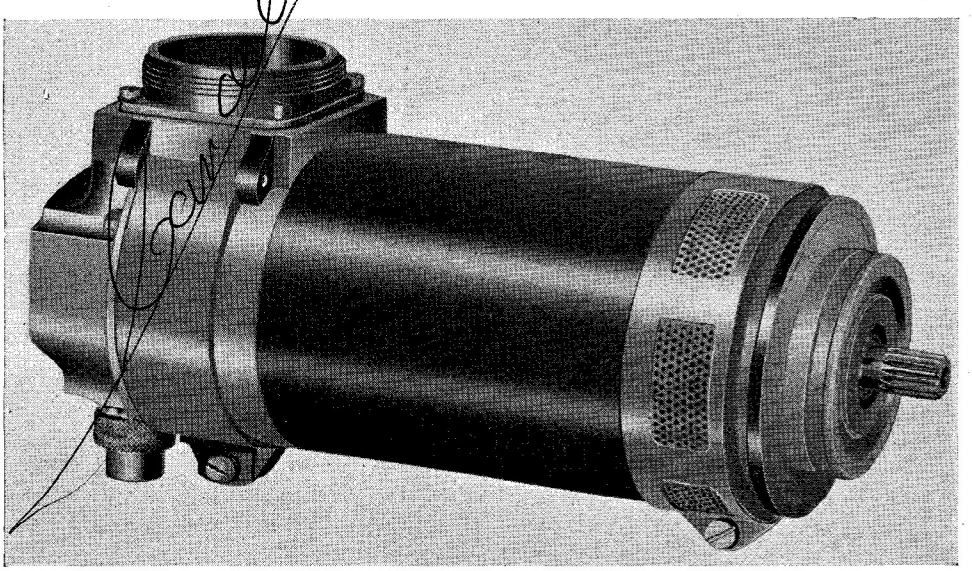

Fig. 1. Typical B1800 series generator (manacle-ring mounted)

Introduction

1. Generators in the B1800 series are 28-volt, 500 watt engine-driven machines. The output is maintained constant at 28±0·5 volts by a voltage regulator and cut-out unit, Type C (Rotax F3301). Details of particular generators will be found in Appendices to this chapter.

DESCRIPTION

2. A typical manacle-ring mounted generator is illustrated in fig. 1, and a sectional view of a flange-mounted generator with oil seal in fig. 2. They are 2-pole, shunt wound machines of conventional design, screened to prevent radio interference.

3. The armature shaft, which is splined at the drive end for coupling the generator to the engine, is carried in two ball bearings, housed in the commutator end frame and the drive end frame. A fan, mounted on the shaft between the drive end ball bearing and the armature, provides for internal cooling of the machine. In some types an oil seal at the drive end prevents oil from reaching the armature windings.

4. The brushgear incorporates two diametrically opposed brushes, connected as shown in the internal wiring diagram (*fig.* 3). Access to the brushgear is obtained by removing the commutator end cover band.

Cooling

5. The generator is blast cooled by air from the slipstream, assisted by the fan at the driving end. An air pipe union is fitted over the commutator end cover band, through which air from the slipstream enters the machine; the air outlet is through perforations in the driving end cover band.

INSTALLATION

6. Generators in the B1800 series may be mounted either by a manacle ring, or by means of four 0·265 in. dia. holes on a 4 in. p.c.d. in the mounting flange. The armature shaft is splined at the driving end for coupling to the engine, and may have either six serrations (coarse spline) or sixteen serrations (fine spline).

Electrical connections

7. Unless otherwise stated, the terminal arrangement is as shown in fig. 3. External connections are made to terminals F, G+ and G— by means of suitable 3-core screened cable.

SERVICING

8. Repair information on some generators in this series 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.

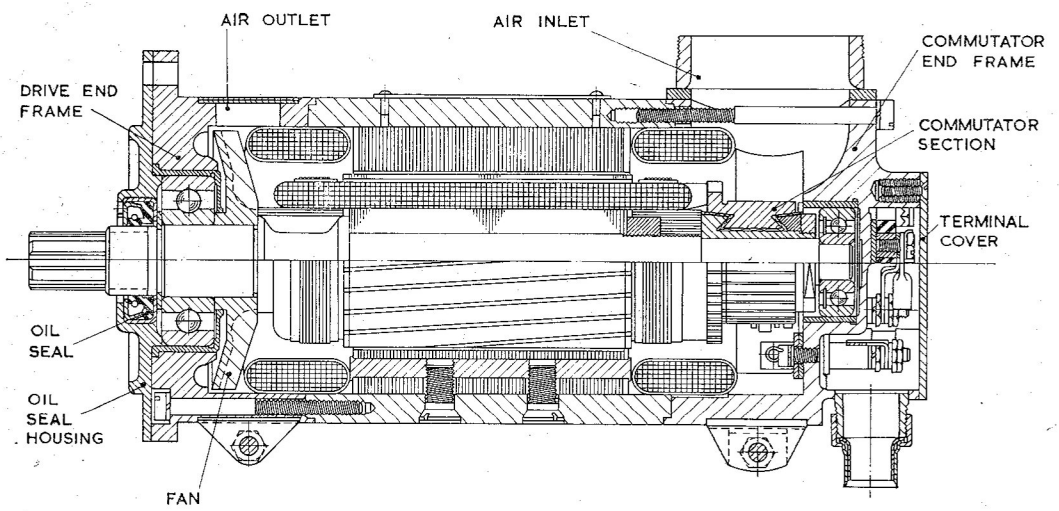

Fig. 2. Sectional view of generator with oil seal (flange mounted)

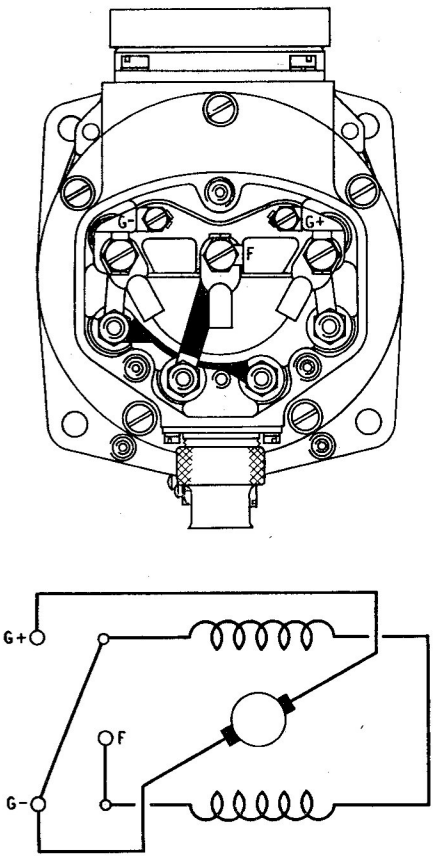

Fig. 3. Internal wiring diagram and terminal arrangement

Brushgear

9. Access to the brushgear is obtained by removing the commutator end cover band. 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.

10. The brush spring pressure should be checked with a suitable spring balance and the readings taken at a point where the spring just leaves the brush.

Lubrication

11. Bearings are lubricated on manufacture 1/3 full with grease XG-271, and should not normally require lubrication except when the generator is dismantled for repair. The oil seal should be lubricated with oil OM-170. It is recommended that the oil seal be removed before a long testing or bedding run, unless adequate lubrication is possible during the test.

Dismantling and assembling

Oil seal

12. When applicable, remove the oil seal from the drive end of the generator as follows:—

(1) Remove the oil seal housing or mounting spigot, complete with oil seal, from the drive end frame.

(2) Using a suitable punch and block, press the oil seal from its housing.

13. Assemble a new oil seal as follows:—

(1) Using a suitable punch and block, assemble the oil seal squarely into its housing.

(2) Fit the housing complete with oil seal to the drive end frame, and secure with four 4 B.A. screws.

(3) Lubricate the oil seal with oil OM-170 after assembly on the armature shaft.

Bearings

14. Remove the bearings from the drive end frame as follows:—

(1) Remove the oil seal housing complete with oil seal, as described in para. 12.

(2) Remove the drive end frame, complete with bearing and armature, from the yoke.

(3) Spring the circlip from the armature shaft. This will allow the ball bearing to be removed from the end frame easily.

15. The bearing at the commutator end is an interference fit on the armature shaft and will come away with the armature when the armature is removed from the yoke. The bearing can then be removed using a suitable extractor.

16. Assemble a new bearing at the commutator end as described in A.P.4343, Vol. 1, Sect. 2, Chap. 1, ensuring that it is packed 1/3 full with grease XG-271.

17. The bearing at the drive end should be selected to have 0·001 to 0·004 in. clearance on the armature shaft and in the drive end frame. Having lubricated the bearing, assemble it as follows:—

(1) Place the bearing in the drive end frame, and assemble the end frame and armature to the yoke. Ensure that packing shims which may have been fitted originally are reassembled.

(2) Temporarily secure the drive end frame to the yoke, and check that the end play of the armature does not exceed 0·003 in. When satisfactory, finally secure the end frame to the yoke.

(3) Assemble the oil seal and housing as described in para. 13.

Testing

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

Appendix A

STANDARD SERVICEABILITY TEST FOR GENERATORS, ROTAX, B1800 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) Tester, generator, one in the Mk. 5 series.

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

(3) Bridge megger tester, Type B (Ref. No. 5G/1708).

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

Note . . .

The oil seal, if fitted, should be adequately lubricated with oil OM-170.

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 0·312 in., and the spring pressure should lie between 12 and 16 oz.

Resistance of windings

5. The winding resistance, corrected to 20 deg. C, should be as follows:—

	Type	*Resistance value (ohms)*
(1)	Armature	
	◀500 (Rotax B1804)	0·36 to 0·44▶
	504 (Rotax B1815)	0·4 ± 10 per cent
	520 (Rotax B1825)	0·4 ± 10 per cent
(2)	Shunt field	
	◀500 (Rotax B1804)	14·4 to 17·6▶
	504 (Rotax B1815)	16 ± 10 per cent
	520 (Rotax B1825)	16 ± 10 per cent

Polarity

6. Run the generator in the correct direction of rotation, as indicated below, with a suitable voltmeter connected across the output terminals. The meter reading should confirm the terminal markings.

Type	Rotation
500 (Rotax B1804)	Anti-clockwise
504 (Rotax B1815)	Clockwise
520 (Rotax B1825)	Anti-clockwise

Performance

7. With the generator mounted on the test set, run up on no load to approximately 4,300 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 (8·5 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 fully in their boxes.

Insulation resistance

9. While the machine is still warm, the insulation resistance, measured with a 250-volt insulation resistance tester between all live parts and the frame should be not less then 0·05 megohm.

Appendix 1

GENERATOR, TYPE 500 (ROTAX B1804)

LEADING PARTICULARS

Generator, Type 500	*Ref. No.* 5*UA*/4945
Output	17 *amp at* 28 *volts*
Speed range	4,300 *to* 7,000 *r.p.m.*
Rotation	*Anti-clockwise*
Brush grade	*EG*11 (*HAM*)
Brush length—	
New	0·510 *in.*
Minimum permissible	0·312 *in.*
Commutator diameter—	
New	1·323 *in.*
Minimum permissible	1·303 *in.*
Brush spring pressure	12 *to* 16 *oz.*
Resistance of windings at 20 *deg. C*—	
◀*Armature*	0·36 *to* 0·44 *ohm*▶
◀*Shunt field*	14·4 *to* 17·6 *ohms*▶
Weight	11 *lb.* 4 *oz.*

1. The generator, Type 500 (Rotax B1804) is generally similar to others in the B1800 series as described in the main chapter. It is a flange mounted machine, with no oil seal, designed for anti-clockwise rotation. The armature shaft has six splines at the drive end.

2. The internal connections differ from those shown in fig. 3 of the main chapter, in that the field is connected to terminals F and F1, and terminal F is linked to G—.

Appendix 2

GENERATOR, TYPE 504 (ROTAX B1815)

LEADING PARTICULARS

Generator, Type 504	*Ref. No. 5UA/5904*
Output	17 *amp at* 28 *volts*
Speed range	4,300 *to* 7,000 *r.p.m.*
Rotation	*Clockwise*
Brush grade	*EG* 11 (*HAM*)
Brush length—	
New	0·510 *in.*
Minimum permissible	0·312 *in.*
Commutator diameter—	
New	1·323 *in.*
Minimum permissible	1·303 *in.*
Brush spring pressure	12 *to* 16 *oz.*
Resistance of windings at 20 *deg. C—*	
Armature	0·4 *ohm* ± 10 *per cent*
Shunt field	16 *ohms* ± 10 *per cent*
Weight	11 *lb.* 4 *oz.*

1. The generator, Type 504 (Rotax B1815) is generally similar to others in the B1800 series as described in the main chapter. It is a flange-mounted machine, fitted with oil seal, and designed for clockwise rotation. The armature shaft has six splines at the drive end.

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Appendix 3

GENERATOR, TYPE 520 (ROTAX B1825)

LEADING PARTICULARS

Generator, Type 520	*Ref. No. 5UA/6644*
Output	17 *amp at* 28 *volts*
Speed range	4,300 *to* 7,000 *r.p.m.*
Rotation	*Anti-clockwise*
Brush grade	*EG*11 (*HAM*)
Brush length—	
New	0·510 *in.*
Minimum permissible	0·312 *in.*
Commutator diameter—	
New	1·323 *in.*
Minimum permissible	1·303 *in.*
Brush spring pressure	12 *to* 16 *oz.*
Resistance of windings at 20 *deg. C—*	
Armature	0·4 *ohm* ± 10 *per cent*
Shunt field	16 *ohms* ± 10 *per cent*
Weight	11 *lb.* 4 *oz.*

1. The generator, Type 520 (Rotax B1825) is generally similar to others in the B1800 series as described in the main chapter. It is a manacle-ring mounted machine, fitted with oil seal, and designed for anti-clockwise rotation. The armature shaft has sixteen splines at the drive end.