

Cancelled obsolete

Chapter 19

GENERATORS, ROTAX, B3000 SERIES

LIST OF CONTENTS

				<i>Para.</i>					<i>Para.</i>
<i>Introduction</i>	...	...	...	1	Installation	...	...	...	7
Description	...	...	...	2	Servicing	...	...	...	8
<i>Cooling</i>	...	...	...	3	<i>Brushgear</i>	...	...	...	10
<i>Suppression</i>	...	...	...	4	<i>Lubrication</i>	...	...	...	12
<i>Electrical connections</i>	...	...	...	5	<i>Testing</i>	...	...	...	13
<i>Operation</i>	...	...	...	6					

LIST OF ILLUSTRATIONS

				<i>Fig.</i>					<i>Fig.</i>
<i>Type 522 generator</i>	...	...	...	1	<i>Diagram of internal connections...</i>	...	...	...	2

LIST OF APPENDICES

				<i>App.</i>					<i>App.</i>
<i>Standard serviceability test for generators, Rotax, B3000 series</i>	A	<i>Generator, Type 522 (Rotax B3001/1)</i>	1
					<i>Generator, Rotax, Type B3002/1</i>	2

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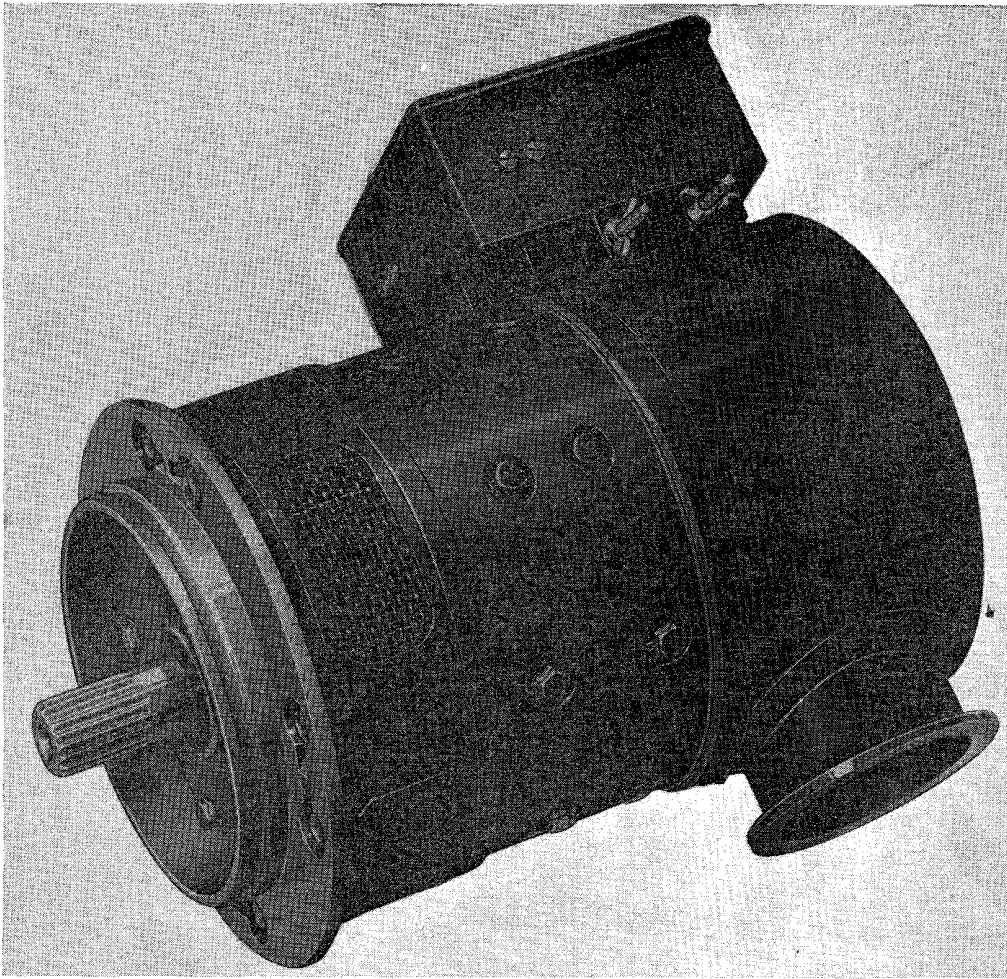


Fig. 1. Type 522 generator

Introduction

1. Generators in the B3000 series are designed for use with a speed governed turbine. The machine is spigot mounted, fully suppressed and tropicalized, and the direction of rotation is anti-clockwise, looking on the driving end. Details of particular types will be found in Appendices to this Chapter.

DESCRIPTION

2. The generator (fig. 1) is a four pole, shunt wound machine fitted with interpoles and compensating windings. The armature is wave wound on a laminated core having

51 slots, and is supported by a ball bearing at the commutator end and a roller bearing at the drive end. The machine is blast cooled. Air enters a spout at the commutator end, and is expelled at the drive end through gauze covered windows. The brushes are PEG 11 grade. Four connections are brought out to a terminal box which also contains the suppression capacitors.

Cooling

3. The generator is required to operate in ambient temperatures varied from -50 deg. C. to $+150$ deg. C. when blast cooled from ram intake.

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Suppression

4. The windings in series with the armature are split, one half being connected to the positive output terminal. A 2 mfd. capacitor is connected between each output terminal and the frame to provide radio suppression. The four capacitors are housed in the terminal box.

Electrical connections

5. The terminal box accommodates the following terminal studs to suit crimped lugs on Uniglasef cable:—

No. 1 (+VE) and No. 2 (-VE)— $\frac{5}{16}$ in. B.S.F.

No. 3 (equaliser) and No. 4 (shunt)—2 B.A.

Operation

6. The generator is designed to provide a d.c. supply in aircraft and is continuously rated at 28 volts, 150 amp. d.c. at altitudes up to 60,000 ft. with blast cooling. The generator is to be driven at a speed of 8,000 r.p.m. \pm 5 per cent by a speed governed turbine. A voltage regulator (e.g., Type 31/53933E) should be incorporated in the system. The voltage will thereby be maintained at 28 ± 1 volt.

INSTALLATION

7. The generator is designed for spigot mounting with manacle ring fixing, and has one locating hole of 0.312 in. diameter by 0.450 in. deep on a 2.675 in. P.C.D. Ensure prior to mounting the unit, that the rubber sealing ring is correctly positioned within the groove provided in the mounting spigot. The machine may be mounted in any attitude, the terminal box being reversible to provide an alternative cable entry.

The air intake pipe is of 2.5 in. internal diameter and is an integral part of the commutator end brush gear housing cover band. Each end of the intake pipe is attached to the terminal box assembly.

The drive shaft is 0.875 in. diameter and serrated to B.S.2059 fit 3, the end being tapped with a 0.375 in. dia. hole, 0.750 in. deep threaded 24-UNF-2B.

SERVICING

8. General information on the servicing of generators will be found 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. To examine the machine, the air pipe should be disconnected and the inlet duct removed. The cover straps at the commutator and driving ends should also be removed, together with the terminal box cover.

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, the reading being taken from the top of the brush box. This may conveniently be done by using a small length of wire hooked to engage in the loop on the brush spring when it bears on the brush, and engaged to a suitable pull-type spring balance.

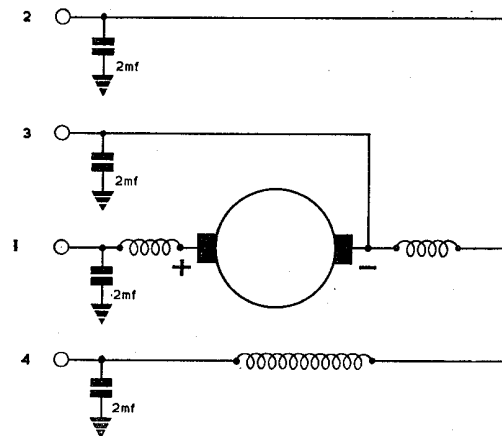


Fig. 2. Diagram of internal connections

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Lubrication

12. Bearings are lubricated on manufacture with grease XG-271, and should not normally require lubrication between major servicing periods. The oil seal at the driving end should be adequately 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.

Testing

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

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Appendix A

STANDARD SERVICEABILITY TEST FOR GENERATORS, ROTAX, B3000 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) Multimeter, Type 12889 (Ref. No. 5QP/17447) or equivalent.
- (5) Insulation resistance tester, Type C (Ref. No. 5G/152).

Note . . .

If the oil seal is in position during testing, care should be taken to ensure that it is adequately lubricated with the appropriate grade of engine oil. Adequate cooling must also be provided.

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 0.637 in., and the spring pressure should lie between 30 and 32 oz.

Resistance of windings

5. With the machine cold, the resistance of the shunt field winding and the negative half of the compensating and interpole windings should be measured and corrected to 20 deg. C. The former is measured between terminal 4 and terminal 2 and should lie between 4.8 and 5.3 ohms. The latter should be measured by passing at least 10 amp. between terminals 1 and 2 and measuring the millivolt drop across terminals 2 and 3. The resistance should be calculated from the above values and should lie between 0.0048 and 0.0053 ohms.

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

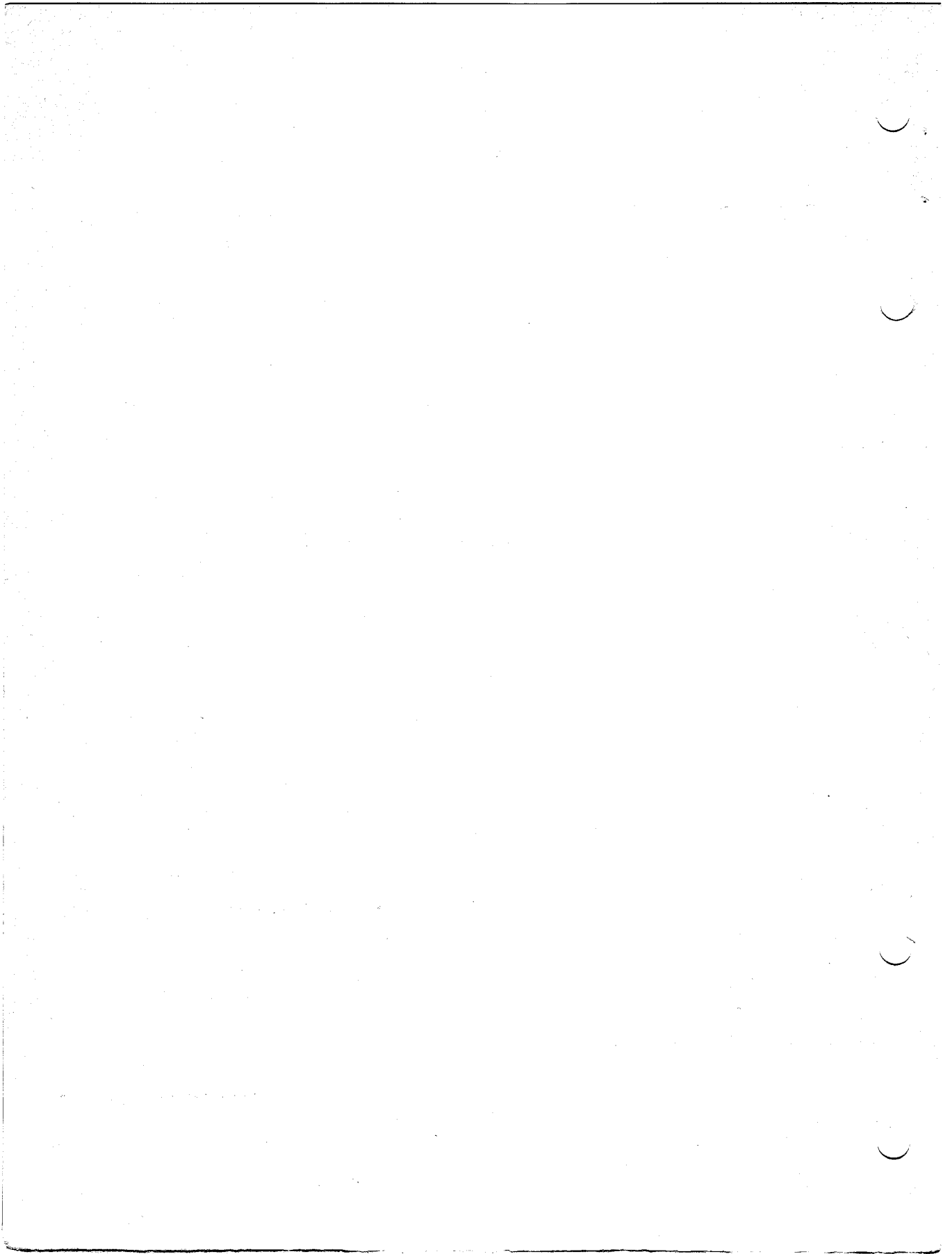
7. With the generator connected to the test set, run up on no load to approximately 7,600 r.p.m. There should be no hesitation in build-up, and the correct voltage should be attained.

8. Run at the same speed on half-load (75 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 live parts and the frame with the machine still warm should not be less than 0.05 megohm.

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Appendix 1

GENERATOR, TYPE 522 (ROTAX B3001/1)

LEADING PARTICULARS

Generator, Type 522	<i>Ref. No. 5UA/7891</i>
<i>Output</i>	150 amp., 28V d.c. at 8000 r.p.m.
<i>Speed range</i>	7,600-8,400 r.p.m.
<i>Rotation (looking on D.E.)</i>	Anti-clockwise
<i>Brush spring pressure</i>	31±1 oz.
<i>Brush grade</i>	P.E.G.11
<i>Brush length (new)</i>	0.937 in. (over long edge)
<i>Brush length (minimum permissible)</i>	0.637 in. (over long edge)
<i>Comm. diameter (new)</i>	2.750 in.
<i>Comm. diameter (minimum permissible)</i>	2.675 in.
<i>Maximum eccentricity of commutator</i>	0.0005 in.
<i>Comm. bar to bar lift</i>	0.0001 in.
<i>Estimated airflow required (external source)</i>	7.5 lb/min 6.0 in. W.G.
<i>Resistance of windings (at 20 deg. C)—</i>	
<i>Shunt field</i>	4.8 to 5.3 ohms
<i>Compensating and interpole</i>	0.0048 to 0.0053 ohms
<i>Overall dimensions—</i>	
<i>Length</i>	11.275 in.
<i>Length to flange face</i>	9.375 in.
<i>Width</i>	9.470 in.
<i>Maximum diameter</i>	6.450 in.
<i>Locating spigot diameter</i>	4.7484 in. ⁺⁰ / _{-0.0016} in.
<i>Weight</i>	31 lb.

1. The generator, Type 522 (Rotax B3001/1) is similar to that described and illustrated in the main chapter except that a new air inlet pipe (similar to A.S.5465) and brushgear cover band, incorporating four wire meshed brush inspection windows, has been intro-

duced for brush inspection and additional cooling purposes by Mod. R6116 (Elec. A/402). The machine illustrated is the B 3001 (Ref. No. 5UA/6460), which is superseded by the B3001/1.

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Appendix 2

GENERATOR, ROTAX, TYPE B3002/1

LEADING PARTICULARS

Generator, Type B3002/1	Ref. No. 5UA/7378
<i>Output</i>	...	...	...	...	...	...	...	...	150 amp., 28V d.c. at 8000 r.p.m.
<i>Speed range</i>	...	...	...	...	...	...	...	...	7,600-8,400 r.p.m.
<i>Rotation (looking on D.E.)</i>	...	...	...	...	...	...	...	...	Anti-clockwise
<i>Brush spring pressure</i>	...	...	...	...	...	...	...	...	31±1 oz.
<i>Brush grade</i>	...	...	...	...	...	...	...	...	P.E.G.11
<i>Brush length (new)</i>	...	...	...	...	...	...	...	...	0.937 in. (over long edge)
<i>Brush length (minimum permissible)</i>	...	...	...	...	...	...	...	...	0.637 in. (over long edge)
<i>Comm. diameter (new)</i>	...	...	...	...	...	...	...	...	2.750 in.
<i>Comm. diameter (minimum permissible)</i>	...	...	...	...	...	...	...	...	2.675 in.
<i>Maximum eccentricity of commutator</i>	...	...	...	...	...	...	...	...	0.0005 in.
<i>Comm. bar to bar lift</i>	...	...	...	...	...	...	...	...	0.0001 in.
<i>Estimated air flow required (external source)</i>	...	...	...	...	...	...	...	...	7.5 lb/min. 6.0 in. W.G.
<i>Resistance of windings (at 20 deg. C)—</i>									
<i>Shunt field</i>	...	...	...	...	...	...	...	...	4.8 to 5.3 ohms
<i>Compensating and interpole</i>	...	...	...	...	...	...	...	...	0.0048 to 0.0053 ohms
<i>Overall dimensions—</i>									
<i>Length</i>	...	...	...	...	...	...	...	...	11.275 in.
<i>Length to flange face</i>	...	...	...	...	...	...	...	...	9.375 in.
<i>Width</i>	...	...	...	...	...	...	...	...	9.470 in.
<i>Maximum diameter</i>	...	...	...	...	...	...	...	...	6.450 in.
<i>Locating spigot diameter</i>	...	...	...	...	...	...	...	...	4.7484 in. ⁺⁰ / _{-0.0016} in.
<i>Weight</i>	...	...	...	...	...	...	...	...	31 lb.

1. The B3002/1 generator is similar to that described and illustrated in the main chapter except that a new air inlet pipe and brush gear cover band, incorporating four wire meshed brush inspection windows, has been introduced for brush inspection and additional

cooling purposes. Mod. R6116 (Elec. A/402) alters the B3002 code to B3002/1.

Note . . .

The air inlet coupling flange on the cover band conforms to S.D.M.(A) I.S.250-2.

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