

Chapter 28

GENERATOR, ROTAX, TYPE N0904

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LEADING PARTICULARS

Generator, Type N0904	Ref. No. 5UA/
<i>Output</i> 3 kVA
<i>Line voltage</i> 120 volts a.c.
<i>Phases</i> 1
<i>Frequency</i> 300 to 500 c/s
<i>Speed</i> 6,000 to 10,000 r.p.m.
<i>Direction of rotation</i> clockwise or anti-clockwise
<i>Initial d.c. excitation</i> 80 volts nominal
<i>Cooling air</i> minimum inlet head of 1.75 in. W.G.
Overall dimensions—	
<i>Length</i> 10.037 in.
<i>Weight</i> 18.25 lb.
<i>Minimum brush length (measured on the long side)</i> 0.281 in.

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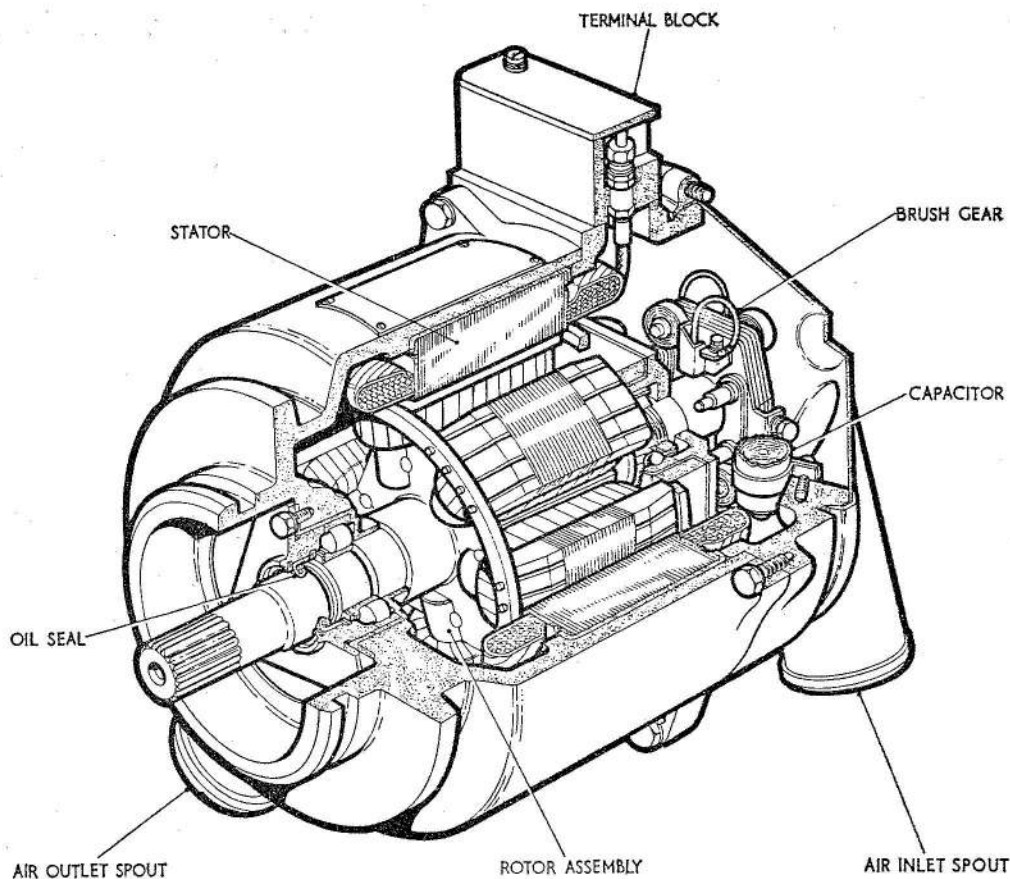


Fig. 1. Sectioned view of generator, Type N0904

Introduction

1. The generator, Type N0904, is a 3 kVA, 120 line volt, single-phase 400 c/s, 6-pole machine which is driven at a speed of 8,000 r.p.m. in either direction. Radio interference suppression is provided by the incorporation of two capacitors in the excitation circuit. These capacitors are mounted on the end housing.

DESCRIPTION

2. A sectioned view of the generator is shown in fig. 1, and a circuit diagram in fig. 2.

Casing

3. Two castings—the main housing and the end housing—form the casing of the generator, with the brush gear contained within the end cover. Integral with the main housing at the drive end is the manacle type mounting flange. The air inlet duct is an integral part of the end cover. Mounted on top of the end housing is the terminal block containing the four terminals.

4. Cooling is by ram air passing into the machine at the slip-ring end and escaping at the drive end.

Stator

5. The stator assembly is rigidly clamped between the main housing and the end housing, and the stator winding is connected to terminals A and A1.

Rotor and shaft

6. A six-pole rotor is supported in the machine by a roller bearing at the drive end and a ball bearing at the slip-ring end. The rotor winding is connected to the two 0.810/0.812 in. diameter slip-rings which are carried on the extended rotor shaft. This rotor shaft is serrated at the drive end to receive the drive coupling. In addition an oil seal is provided at the roller bearing end of the shaft to prevent oil entering the machine from the driving source. For efficient operation this oil seal requires a small, but

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continuous, supply of oil to prevent wear on the internal face of the oil seal in contact with the shaft.

Brushgear

7. The brushgear, containing the four carbon brushes, is mounted on a bracket secured to the end housing, and is accessible through the easily removable end cover. Brush spring pressure should be 2.75/3.25 ounces (78/92 grammes) when the contact point of the spring is level with the lower entry point at the top of the brush box.

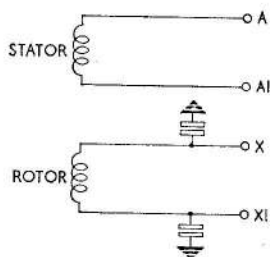


Fig. 2. Circuit diagram

Operation

8. Initial field excitation current is provided by a nominal 80-volt d.c. supply, from an associated control and protection unit, connected to terminals X and X1 in the generator terminal box, from where it is fed, via the brushes and slip-rings, to the rotor winding. As the rotor revolves, driven by an external source, the magnetic flux set up by the poles induces an alternating e.m.f. into the stator winding, the frequency of which depends upon the speed at which the rotor revolves.

9. The output voltage is maintained at a constant level by the controlling circuit of the associated unit as a.c. load and generator speed vary. This control circuit adjusts the excitation current returned to the generator field and thus holds the output constant.

INSTALLATION

10. Remove any transit protection covers before attempting to install the generator. Before assembly, check the fit and security of the drive coupling. Ensure that the mounting and mating flange surfaces are clean. Ensure also that a sealing ring is fitted to the mating flange in the slot provided.

11. Lightly grease the serrated drive end of the rotor shaft and connect it to the drive coupling from the engine. Engage the dowel

pin on the flange of the driving source, in the 0.3125 in. hole in the mating flange. This is to ensure correct positioning for connection of air supplies. Secure the manacle ring over the mated flanges. Connect the air supply system ducting.

12. Electrical connections should be made as follows to the four 10-32 U.N.F. terminals:—

- (1) Field excitation current to terminals X and X1.
- (2) A.C. single-phase output from terminals A and A1.

SERVICING

13. Examine the brushes and use clean, dry, pressurised air to remove any carbon deposit. Inspect the brush boxes and remove any accumulation of carbon dust with a cloth moistened with lead-free gasoline. Ensure that the brushes are a correct sliding fit in their boxes and that their length is sufficient to ensure satisfactory operation until the next overhaul. The minimum permissible brush length, measured on the long side, is 0.281 in.

14. Using a suitable tension gauge, check the tension of the brush springs when the contact point of the spring is level with the lower entry point at the top of the brush box. The spring pressure should be 2.75 to 3.25 oz.

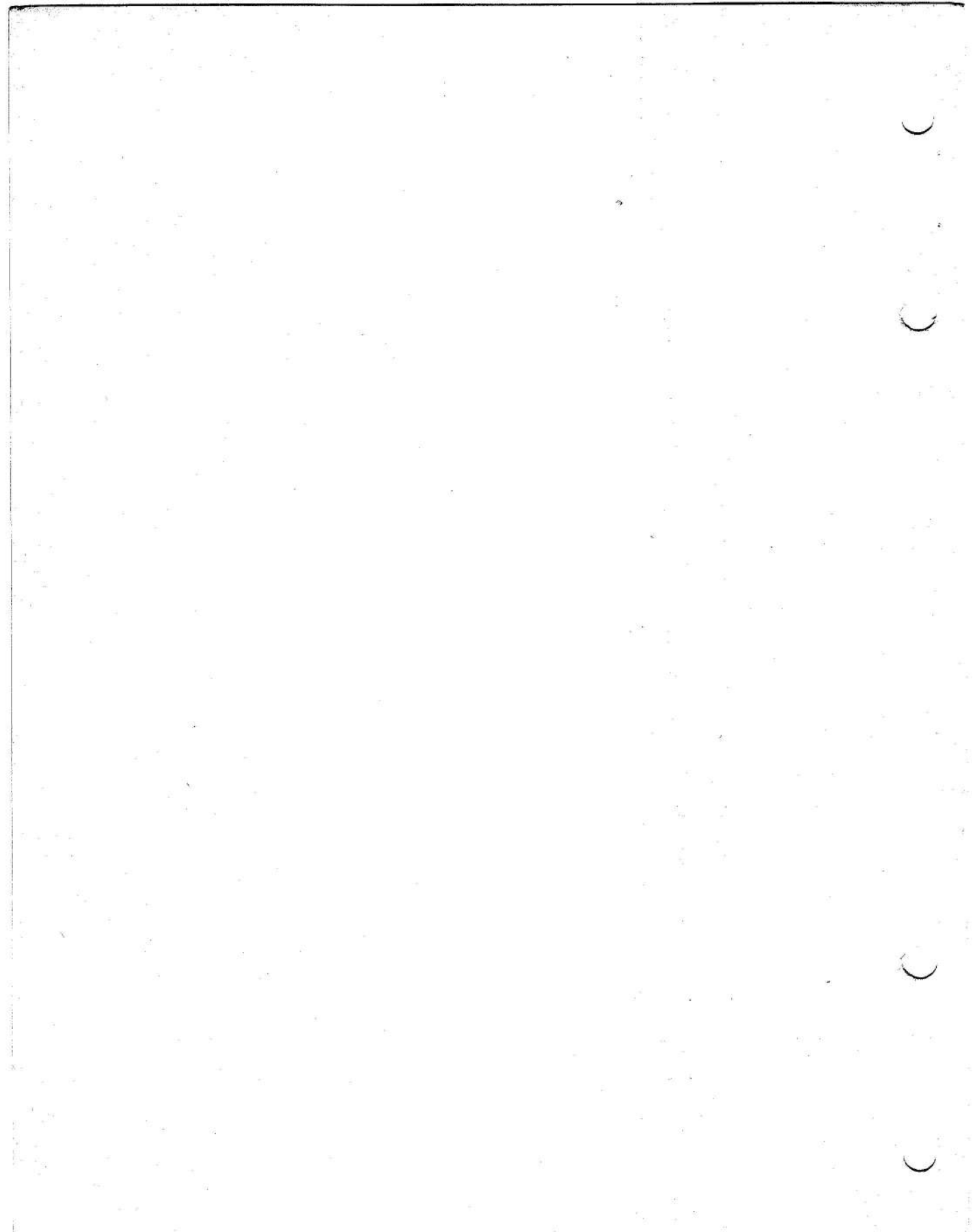
15. When fitting new brushes, the generator must be run at 4,000 r.p.m. with the rotor current being maintained at approximately 1 amp. until the brushes are bedded to a minimum of 50 per cent of the surface area of each brush.

16. The slip-rings should be examined for signs of undue sparking and measured to ensure their diameters are sufficient to give satisfactory operation until the next overhaul. The minimum permissible diameter of each slip-ring is 0.780 in.

17. The insulation of all connecting leads should be examined for signs of deterioration and the connections checked for security. Ensure that the oil seal is giving adequate protection against the ingress of oil.

Testing

18. If the serviceability of the machine is suspect, it may be tested in accordance with the test procedure laid down in Appendix A.



Appendix A

STANDARD SERVICEABILITY TEST

for

GENERATOR, ROTAX, TYPE N0904

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) Gauge, tension, 50–250 gm. (Ref. No. 1H/59).
- (3) Insulation resistance tester, Type C (Ref. No. 5G/152).
- (4) Insulation resistance tester, Type A (Ref. No. 5G/1621).
- (5) Bridge-Megger tester, Type B (Ref. No. 5G/1708).

The generator may be rotated in either direction but, unless specific instructions are issued to the contrary, the following testing should be carried out with the generator rotating in a clockwise direction when viewed from the drive end. During tests involving the rotation of the generator, blast air should be supplied to the air inlet spout at a pressure equivalent to a head of 1.75 in. water gauge. A nominal 80-volt d.c. supply should be connected to terminals X and X1 through an ammeter and a suitable variable resistor.

Testing

3. Before mounting the generator on the test set, check for freedom of rotating parts by turning the rotor by hand without using a coupling.

Resistance of windings

4. The resistance of windings when corrected for an ambient temperature of 20 deg. C is as follows:—

- (1) The resistance of rotor winding, measured at the slip-rings, should be between 28.6 and 30 ohms.

- (2) The resistance of the stator winding, measured between terminal A and A1, should be between 0.44 and 0.45 ohm.

Insulation resistance test

5. With the suppression capacitors disconnected at the brush gear, the insulation resistance, measured between the following points with a 500-volt insulation resistance tester, should be not less than 0.05 megohm.

- (1) Terminals A and X (combined) to frame.
- (2) Terminal A to terminal X.

6. With the suppression capacitors connected, the insulation resistance, measured between terminal X and the frame with a 250-volt insulation resistance tester, should be not less than 0.05 megohm.

Brush gear

7. Check the brush length and brush spring pressure. The brush length should be not less than 0.281 in., measured on the long side, and the spring pressure should be between 2.75 and 3.25 oz. (78 and 92 gm.).

Open-circuit test

8. Run the generator on open circuit at a speed of 8,000 r.p.m. With the line voltage set at 120 volts the rotor current should not exceed 0.66 amp.

Short-circuit test

9. Short-circuit terminals A and A1 through a current transformer, using short lengths of heavy cable. Run the generator at 8,000 r.p.m. With the line current set to 25 amp. the rotor current should not exceed 1.13 amp. Maintain the short circuit for 15 minutes.

Insulation resistance test

10. Repeat the tests described in para. 5 and 6.

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