See AP 1138-0208-1

Chapter 28

GENERATOR, TYPE AE 2511

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Generator, Type AE 2511	*Ref. No.* 5UA/6552
Rated output	3 *kW*
Rated voltage	30 *Volts*
Current	100 *amps*
Rotation	*Clockwise*
Speed range	3,600 - 10,000 *r.p.m.*
Rating	*Continuous*
Cooling requirements	*Blast air,* 60 *c.f.m. at* 6 *in. W.G.*
Voltage regulator	*Type* 70 *or* 121
Regulated voltage	28*V.* (+ 2·5 *per cent*)
Brush grade	*P.E.G.* 16
Brush spring pressure	$17\frac{1}{2}$ — $22\frac{1}{2}$ *oz.*
New brush length	$\frac{19}{32}$ *in.* (*Measured to apex*)
Minimum permissible length	$\frac{5}{16}$ *in.* (*on shortest side*)
Minimum commutator diameter	2·95 *in.*
Commutator undercut	$\frac{1}{32}$ *in.*
Dimensions	
Overall length	10·85 *in.*
Overall width	7·85 *in.*
Overall height	10·68 *in.*
Weight	26 *lb.*

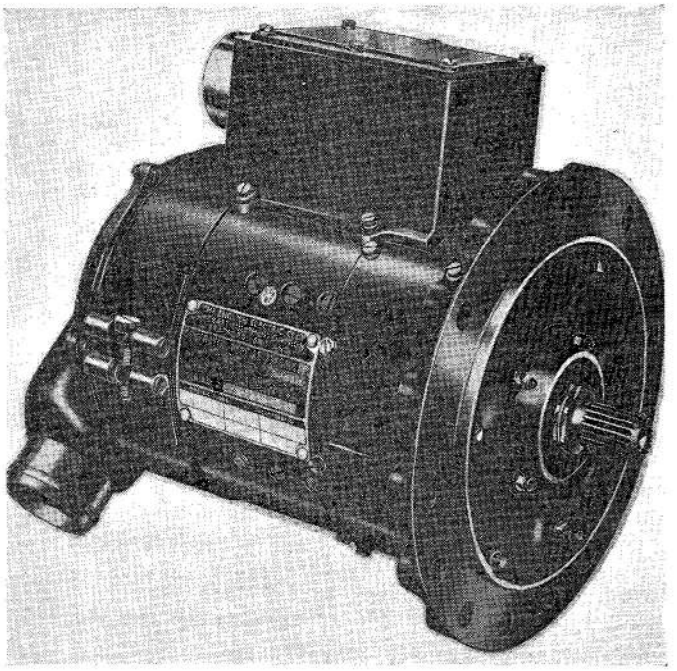

Fig. 1. Generator, Type AE2511

Introduction

1. The Type AE2511, 3kW d.c. generator (*fig.* 1) is a wide speed range machine designed to supply power in conjunction with a Type 70 or Type 121 voltage regulator over a wide range of speeds as shown in the leading particulars.

DESCRIPTION

General

2. The generator is a 6-pole, compound wound machine, with compensating windings. The armature which is retrogressive wave wound is supported on ball and roller bearings at the driving and tail end respectively. A standard type flange is used for mounting purposes.

Frame

3. The rolled and welded steel frame houses the armature and carries the main poles within the central yoke portion of its bore. The main terminal box is mounted on top, housing the output leads and interference suppressors.

Commutator end, end plate

4. The c.e. end plate is a light alloy forging which houses the c.e. bearing, supports the brushgear assembly and provides the connection for the blast air supply. The end plate is secured to the frame by six cheese head 4 B.A. screws. The position of the air inlet pipe is infinitely variable, this is achieved by the use of five clamp fittings which locate on a flange on the end plate.

Roller bearing

5. The roller bearing on the commutator end of the armature shaft is a push fit into a bearing bush pressed into the endplate. The outer bearing cap is retained in position by four 2 B.A. screws. The inner race is an interference fit on the armature shaft, secured in position by a ring nut.

Armature

6. The armature is retrogressive wave wound and has a hollow shaft to allow a flow of air for cooling purposes. The drive end of the armature shaft is splined to pro-

vide a driving medium. The drive end ball bearing may be removed complete with the inner bearing cap by means of a suitable bearing extractor. After removal of the bearing ring nut the inner race of the commutator end roller race may be extracted by use of a suitable wedge shaped drift, inserted between the inner race and the shoulder on the armature shaft.

Brushgear

7. The brushgear is mounted on a moulded brush rocker and consists of six brush boxes, each housing a split brush. A brass plate is fitted across each split brush, through which spring pressure is transmitted to hold the brush against the commutator.

Drive end, end plate

8. The d.e. end plate is a light alloy forging which is attached to the frame by six 2 B.A. studs. The end plate has a bearing bush insert into which the outer race of the bearing is a push fit. An oil seal is fitted on the drive side of the bearing the seal is retained in position by a circlip. The purpose of the oil seal is to prevent oil from the driving medium entering the machine.

Cooling

9. Blast air is fed into the machine by the air inlet pipe on the commutator end of the machine. The cooling air passes over the commutator, brushgear, field windings and armature, through the hollow armature shaft finally leaving the machine at the drive end through holes in the frame.

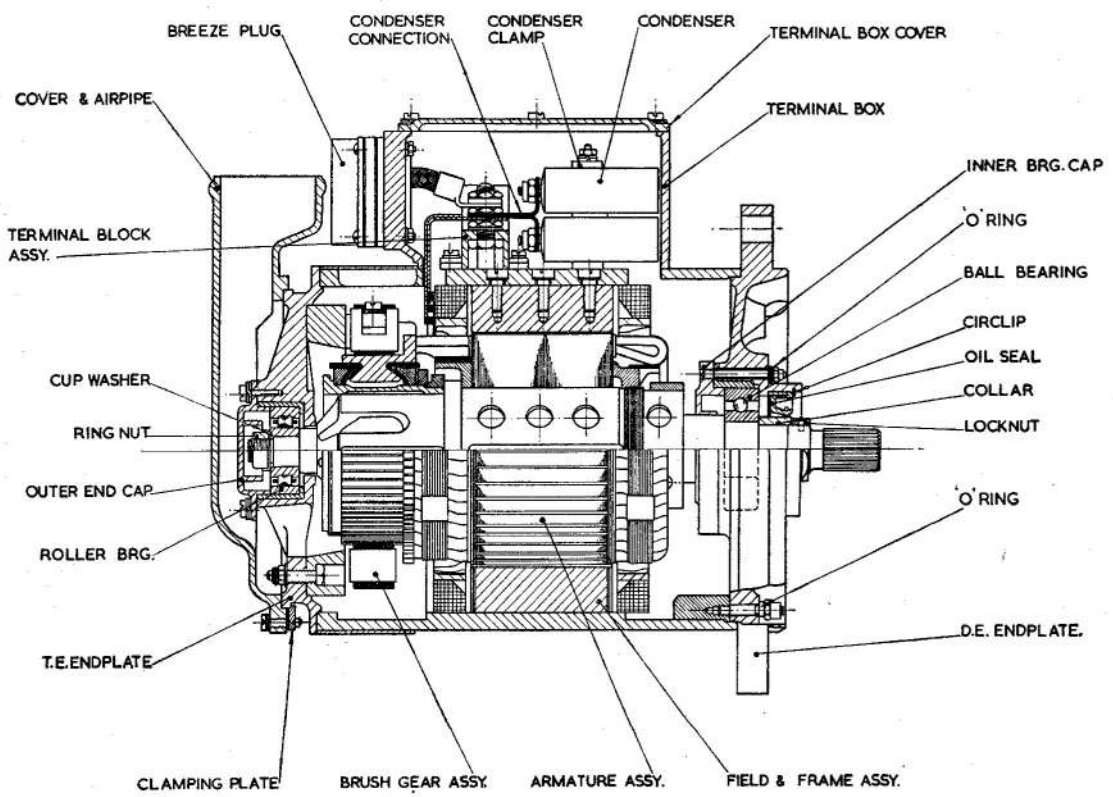

Fig. 2. Sectional view

Terminal box

10. The connections from the brush gear and field are brought out to a terminal box where they terminate in a Breeze plug (Ref. No. 5CZ/6338).

SERVICING

General

11. Information on servicing common to all d.c. generators will be found in A.P.4343, Vol. 1, Sect. 2, Chap. 1. The following paragraphs shoud be read in conjunction with that chapter and the relevant servicing schedule.

12. To examine the machine the air pipes must be disconnected and the commutator end cover band removed. The terminal box cover and blanking off plates at the drive-end should also be removed.

13. Clean and examine the frame, commutator, and brush gear, ensuring that all nuts, bolts, screws and locking devices are secure. Check the insulation of all connecting leads for damage and deterioration and ensure that all connections are tight. Before replacing the cover band examine it for distortion and renew if necessary.

Oil seal

14. If the machine is to be run on the test bench, either for the purpose of brush bedding or testing, the oil seal must first be removed. Under these conditions the seal is unlubricated and failure to remove the seal will result in damage occuring to the seal and consequent failure in service.

15. Removal of the oil seal is effected by removal of the circlip and annular spring; the seal can then be removed. Care should be exercised in effecting the operation if it is intended to use the old seal again. If the generator has been dismantled it will be easier to remove the seal from the end plate before fitting the end plate to the frame.

The oil seal should be examined for signs of wear or damage and renewed if necessary. This operation is facilitated by lightly smearing the seal with grease XG-271 (Ref. No. 34B/9100510).

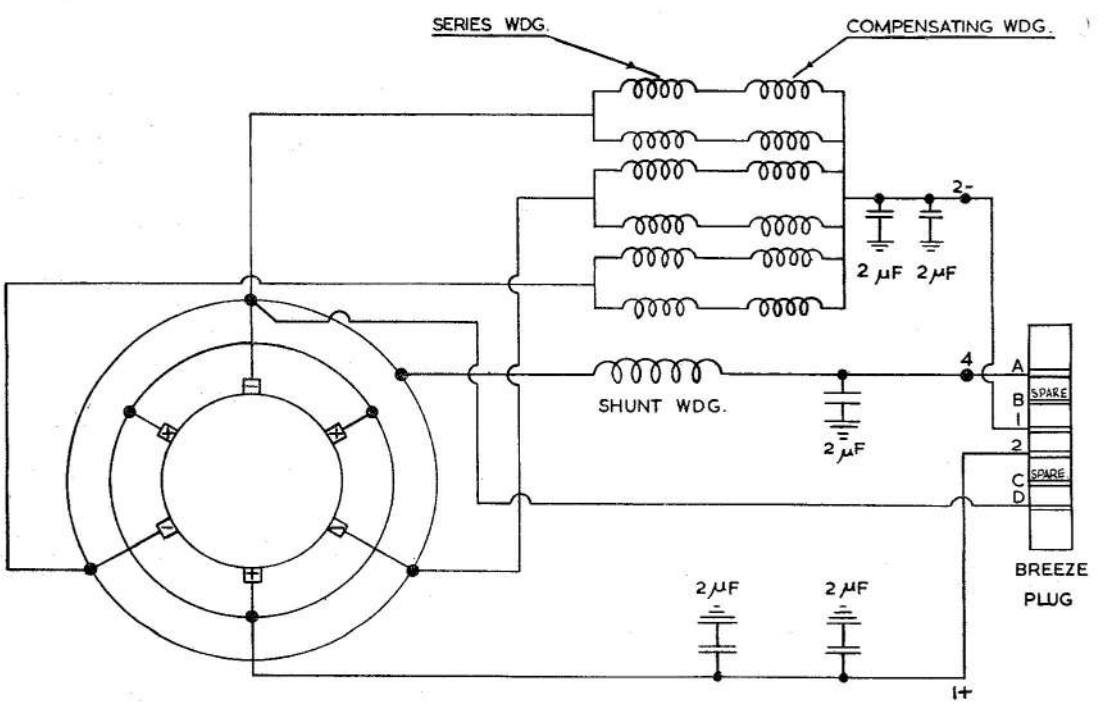

Fig. 3. Circuit diagram

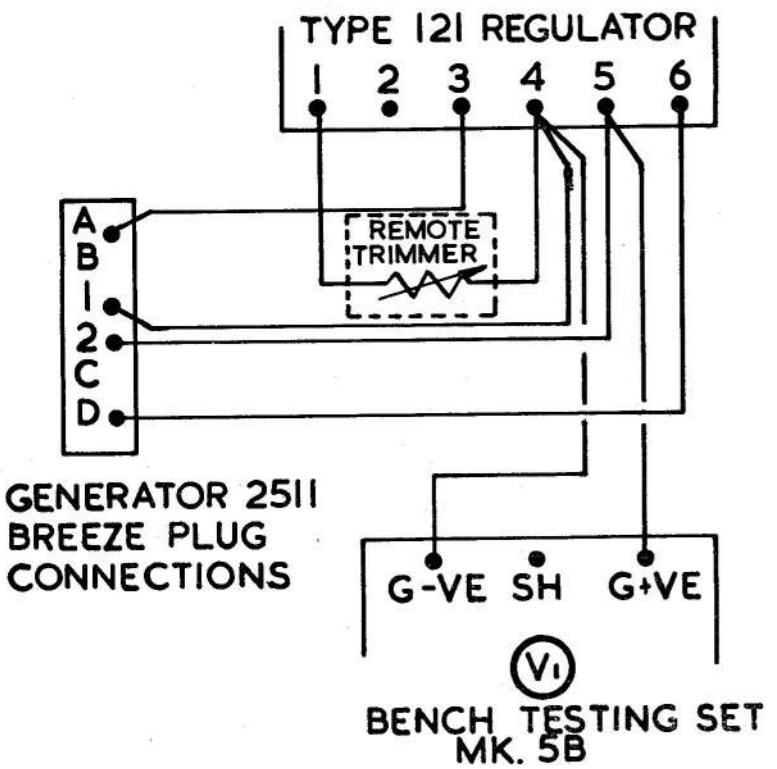

Fig. 4. Test circuit diagram

Carbon brushes

16. Brush grade and minimum permissible length are quoted in the leading particulars. If the brushes are removed from their respective boxes, care should be taken to ensure that the brushes are not damaged and are replaced the same way round. Brushes should be removed in accordance with the bay servicing schedule, and at any examination when the state of wear indicates that the minimum length may be reached before the next servicing.

Bedding

17. Where new brushes are fitted they must be bedded on the commutator for their full thickness over at least 80 per cent of their axial width. Bedding should be effected by running the machine as a motor on the bench with 15V d.c. applied to the armature. This supply should be connected direct to the brush gear. The field should be connected to a 3V d.c. supply, pin A of the Breeze plug being connected to the positive lead and the internal junction to the negative. Ensure that the generator is rotating in the correct direction and that the oil seal has been removed. The machine should motor at approximately 1,500 r.p.m. During brush bedding operations it is advisable to use an airblower for cooling purposes if the machine shows any tendency to overheat.

Bearing lubrication

18. The ball and roller bearings are $\frac{1}{3}$ filled with grease XG-271 (Ref No. 34B/9100510) during manufacture and at bay servicing

periods should be thoroughly cleaned and similarly lubricated. The bearing caps should be similarly cleaned, all traces of old lubricant removed and then $\frac{2}{3}$ filled with the same grade of lubricant.

Testing

19. Before running, turn the armature by hand to check that it does not foul any leads or fixed parts of the machine. Rotation should be smooth and end play in the bearings should not be excessive. The machine should also be observed for undue vibration during the following tests.

No load test

20. Mount the generator on a test bench and connect as shown in *fig.* 4, using a Type 121 voltage regulator of proven serviceability. Before running the generator remove the oil seal from the drive end. The generator should be run at normal speed in the correct direction of rotation when the voltage should build up without hesitation in the correct polarity. Should the generator fail to build up or the polarity prove to be incorrect, the poles must be remagnetised. To remagnetise the poles, connect a 6 volt battery in series with a single pole, quick break switch across the shunt field connections. The positive battery lead must be connected to pin A and the negative lead to the internal field connection at the drive end. Using the switch, make and break the circuit once only, to energise the poles. Run the generator to ensure that the machine has been correctly magnetised.

Insulation test

21. Whilst the machine is still warm after running, measure the insulation resistance between the generator terminals and frame using a standard 250 V insulation resistance tester. The reading obtained should be not less than 50,000 ohms.

537712/Wt.33807/D.2844 3,000 12/60 E.S.Ltd. Gp.375/7