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Chapter 12

GENERATOR, TYPE 164 (ROTAX N 0701/3)

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LEADING PARTICULARS

Generator, Type 164	Ref. No. 5UA/6489
Output	208V, 83 amp. 3-phase a.c. 104V, 71 amp. 3-phase a.c. 65V, 116 amp. 3-phase a.c.
Input	
<i>Main rotor</i>	28V, 45 amp. d.c.
<i>Booster rotor</i>	28V, 10 amp. d.c.
Speed range	6,175 to 11,200 r.p.m.
<i>Over-speed limit</i>	12,000 r.p.m.
Frequency	400 c/s at 8,000 r.p.m.
Rating ... ..	... Continuous
Direction of rotation (viewed from drive end) ... ..	... Clockwise
Altitude ceiling ... ..	... 40,000 ft.
Cooling (air-blast) (at ground level) ... ..	... 15.0 lb. per minute
Brush spring pressures	
<i>Main rotor and common positive</i>	23 to 27 oz.
<i>Booster</i>	8.5 to 11.5 oz.
Minimum brush length	
<i>Main</i>	0.80 in.
<i>Booster</i>	0.69 in.
Brush grade ... ..	... P.E.G. 11
Temperature range	-30 deg. C. to +45 deg. C.
Overall dimensions	
<i>Length</i>	16.275 in.
<i>Width</i>	11.500 in.
<i>Height</i>	11.700 in.
Weight	92 lb.

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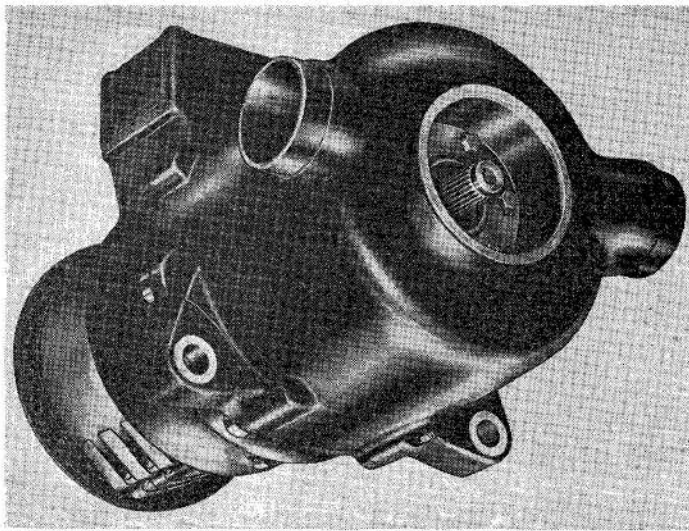


Fig. 1. Type 164 generator (drive end)

Introduction

1. The generator, Type 164, is designed for general application in aircraft to supply, (when operated with a suitable transformer rectifier unit) a combined load of, one three phase a.c. supply at 208-volts, one rectified a.c. supply at 112-volts (nominal) and one rectified a.c. supply at 28-volts nominal, each being separately regulated.

DESCRIPTION

2. The machine comprises a rotor assembly, a main stator and a booster stator, a brush-gear assembly, terminal block and bearings. The machine is enclosed in light alloy housings which include the main housing and the slip-ring end housing. A frame assembly, with an inspection cover fitted to it, is secured at the slip-ring end of the machine and this assembly forms the air outlet assembly. The bearing clamp at the drive end extends out beyond the serrated end of the drive shaft and thus affords protection for the shaft.

3. The rotor assembly consists of the rotor shaft, the main rotor winding and the booster rotor winding, and the slip-rings. The main rotor is situated nearest the drive end of the rotor shaft and comprises six salient poles each of which is keyed to a hexagonal yoke on the shaft and locked with taper pins. Each pole consists of approximately 288

laminations which are riveted together between two steel end pieces. A coil is wound on each pole and the six coils are connected in series to form the winding of the rotor.

4. The booster rotor also consists of six salient poles and six series connected coils, the pole shoes being similar to those of the main rotor and being fitted to a second hexagonal yoke on the rotor shaft in the same manner.

5. The slip-rings are fitted at the end of the rotor shaft, each being separated from the other by insulating washers and all secured to the shaft by a hexagonal nut screwed to the end of the shaft.

6. The main stator comprises two electrically independent three-phase windings, lap wound on a common stator frame. Both windings are star-connected, the star point of one winding (208-volt output) is brought out to the terminal block (terminal N). The stator is assembled to the main housing and secured in position by a locating bolt which is inserted into the main housing and locates in a machined groove in the stator frame.

7. The booster stator is a symmetrical three-phase lap winding. The winding is open star with all six leads brought out to the terminal block. The booster stator is assembled in the slip-ring end housing and is secured by a retaining plate bolted to the slip-ring end housing. A locating bolt which is inserted into the housing, locates in a machined groove in the stator frame.

8. The brushgear assembly consists of three brush plates, each with three brush boxes assembled to them. The brush springs are fitted over adjusting sleeves to spring posts. The adjusting sleeves are slotted to anchor the springs and are secured to the posts by split pins. The spring pressure can be adjusted by removing the split pins and adjusting the position of the sleeves on the spring posts.

9. The terminal block is an insulating moulding which fits over an aperture in the slip-ring end housing and is secured by four

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2 B.A. screws. A cover fits over the terminal block and is secured to the slip-ring end housing by four bolts. One side of the terminal cover is open and two rubber clamps, with cable entries formed between them, are fitted at the open side of the cover.

10. The main housing assembly houses the main stator and the slip-ring end housing houses the booster stator. The two housings are secured together by eight studs and nuts. The studs are $\frac{1}{4}$ in. B.S.F. and the nuts are locked with tab washers.

11. The rotor assembly is supported, at the drive end by a roller bearing and at the slip-ring end by a ballrace. The drive-end roller bearing is assembled in the liner of the main housing and is secured by a bearing clamp screwed to the housing by six $\frac{1}{4}$ in. bolts.

12. The slip-ring end ballrace is positioned on the rotor shaft between two spacers and is clamped with a sealing ring on each side of the ballrace, between the brush ring mounting plate and a clamp ring, the latter being assembled adjacent to the flange of the housing liner.

13. Two air inlet spouts are positioned at the drive-end and placed 180 degrees apart. Air outlet is via the slip-ring end of the machine.

14. The generator is sealed against the ingress of oil, at the drive end. An oil seal is pressed into the bearing clamp plate and secured in position by two circlips. Two rubber rings are also fitted between the bearing clamp plate and the liner of the main housing to provide effective oil sealing for the generator.

Electrical connections (terminals)

15. 208V output	$\frac{3}{8}$ in. B.S.F. stud
104V output	$\frac{5}{16}$ in. B.S.F. stud
65V output	$\frac{1}{4}$ in. B.S.F. stud
28V (+ VE) input	$\frac{1}{4}$ in. B.S.F. stud

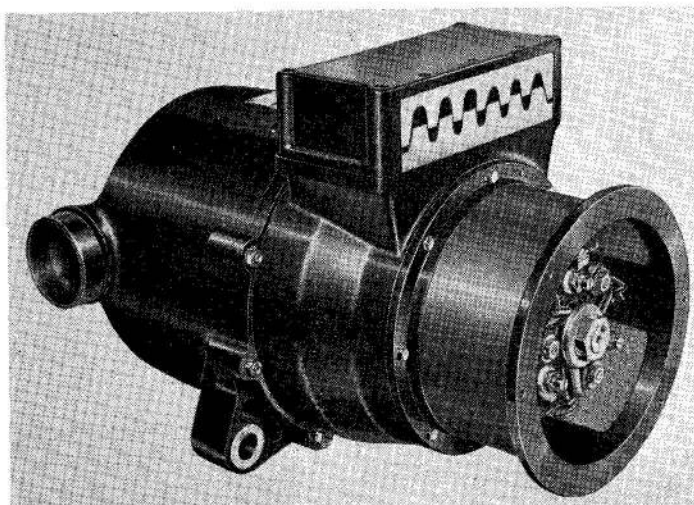


Fig. 2. Type 164 generator (brushgear end)

28V, 45 amp.	
(- VE) input	$\frac{1}{4}$ in. B.S.F. stud
28V, 10 amp.	
(- VE) input	2 B.A. stud
Star point of main stator (N)	4 B.A. stud

INSTALLATION

16. Protection covers, which are fitted at the drive-end and the slip-ring end and also over the air inlets and exits to protect the generator during transit or storage, must be removed when the machine is being installed. The drive shaft splines should be lightly greased prior to installation. After the generator has been installed, the security of the coupling to the drive shaft should be checked and also the security of mounting.

SERVICING

17. Remove the inspection cover at the slip-ring end. Examine the brushes and remove any carbon deposit with a supply of clean dry compressed air. Check that the brushes are a sliding fit in their boxes and examine the boxes for carbon dust in the corners. Remove any carbon with a cloth moistened with lead free gasoline. Check that the length of the brushes are such, that

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they will continue to operate satisfactorily until the next overhaul. The minimum brush length (long side) is 0.80 in. (Main) and 0.69 in. (Booster).

18. With a spring balance, check the tension of the brush springs. The spring pressure of the negative booster slip-ring brushes (the outside slip-ring) when measured at a point level with the top of the brush box, should be between 8.5 and 11.5 oz. The spring pressure of the negative main rotor slip-ring brushes and the common positive slip-ring brushes (centre and inside slip-rings) when measured at a point level with the top of the brush boxes, should be between 23 and 27 oz.

19. The electrical connections should be examined to ensure that they are secure and free from corrosion.

20. The slip-rings should be examined for scores or burns. If their condition is such that the efficiency is impaired, the machine must be removed for reconditioning or repair.

Insulation resistance test

21. The insulation resistance between all live parts and the frame should be measured, using a 500-volt insulation resistance tester, and should not be less than 50,000 ohms.

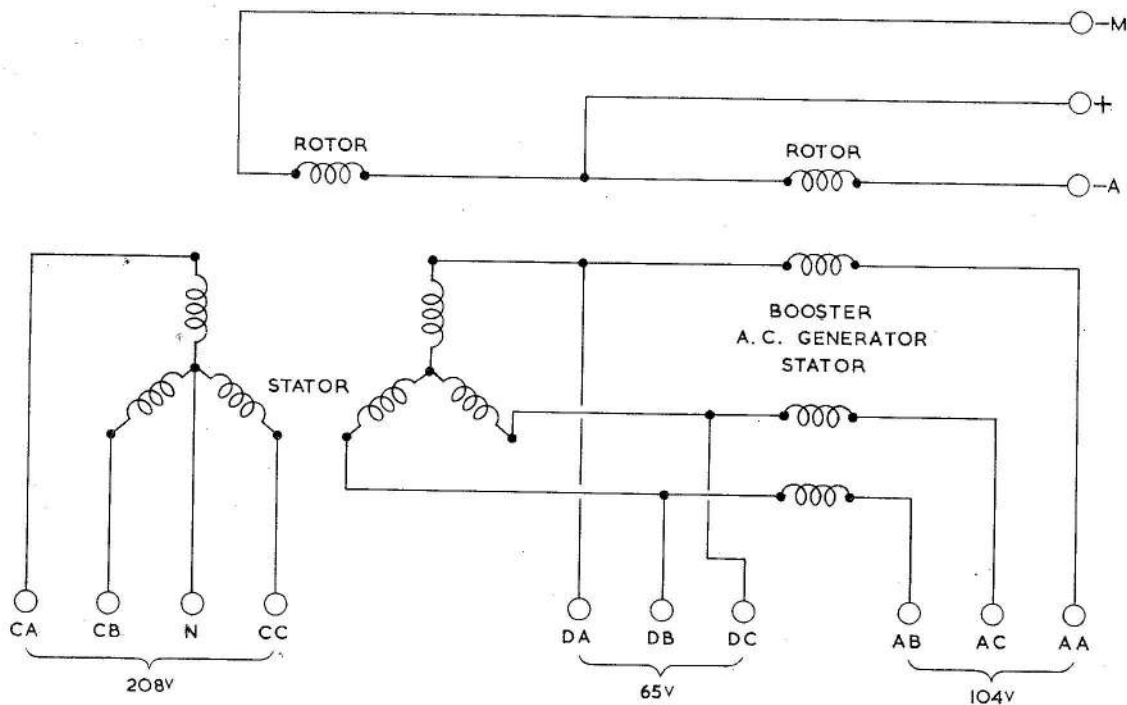


Fig. 3. Diagram of internal connections

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Appendix 1

GENERATOR, ROTAX, TYPE N 0701/5

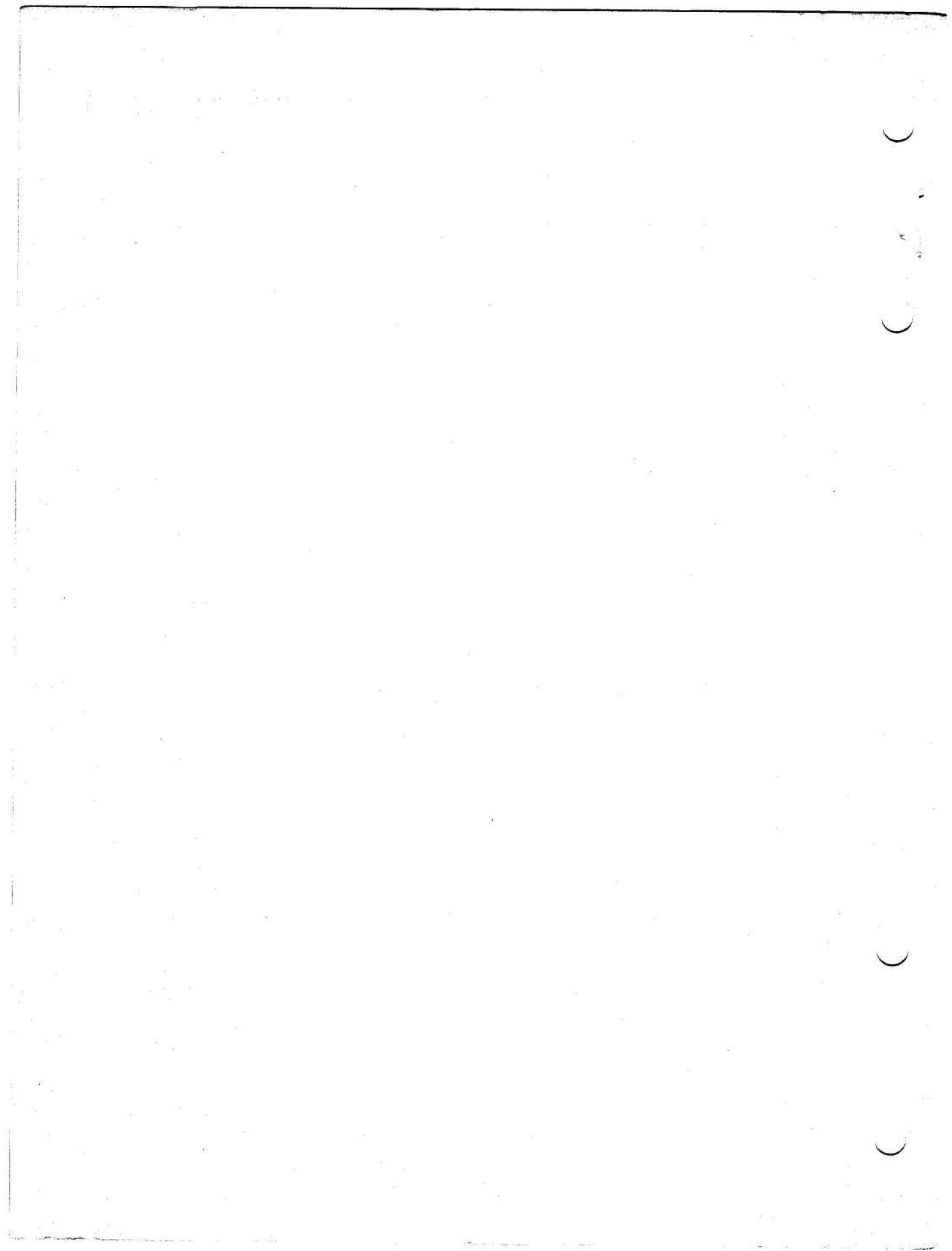
LEADING PARTICULARS

Generator, Type N 0701/5	Ref. No. 5UA/7197
Output	...	...	...	...	...	208V, 83 amp. 3-phase a.c. 104V, 71 amp. 3-phase a.c. 65V, 116 amp. 3-phase a.c.
Input —						
Main rotor	...	...	...	...	...	28V, 45 amp. d.c.
Booster rotor	...	...	...	...	...	28V, 10 amp. d.c.
Speed range	...	...	...	...	...	6,175 to 11,200 r.p.m.
Overspeed limit	...	...	...	...	...	12,000 r.p.m.
Frequency	...	...	...	...	...	400 c/s at 8,000 r.p.m.
Rating	...	...	...	...	...	continuous
Direction of rotation (viewed from driving end)	...	...	...	...	...	clockwise
Altitude	...	...	...	...	...	40,000 ft.
Blast air cooling (at ground level)	...	...	...	...	...	15.0 lb. per min.
Brush spring pressures —						
Main rotor and common positive	...	...	...	...	...	23 to 27 oz.
Booster	...	...	...	...	...	8.5 to 11.5 in.
Brush grade	...	...	...	...	...	K.C.E.G. 11
New brush length —						
Main	...	...	...	...	...	1.375 in.
Booster	...	...	...	...	...	1.125 in.
Minimum brush length —						
Main	...	...	...	...	...	0.80 in.
Booster	...	...	...	...	...	0.70 in.
Slipring diameter (new)	...	...	...	...	...	1.625 in.
Slipring diameter (minimum permissible)	...	...	...	...	...	1.531 in.
Temperature range	...	...	...	...	...	−30 deg. C. to 45 deg. C.
Overall dimensions —						
Length	...	...	...	...	...	16.275 in.
Width	...	...	...	...	...	11.500 in.
Height	...	...	...	...	...	11.700 in.
Weight	...	...	...	...	...	92 lb.

1. The generator, Type N 0701/5, is similar to the Type N 0701/3 described and illustrated in the main chapter. It differs in that, to give the generator a longer life, more durable

ball races and brushes have been fitted. The grade of these brushes is K.C.E.G.11 and their minimum length is for main brushes, 0.08 in. and for booster, 0.70 in.

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