Chapter 4

ROTARY INVERTER, TYPE MG7

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Rotary inverter, Type MG7 ... ... Stores Ref. 5UB/3286

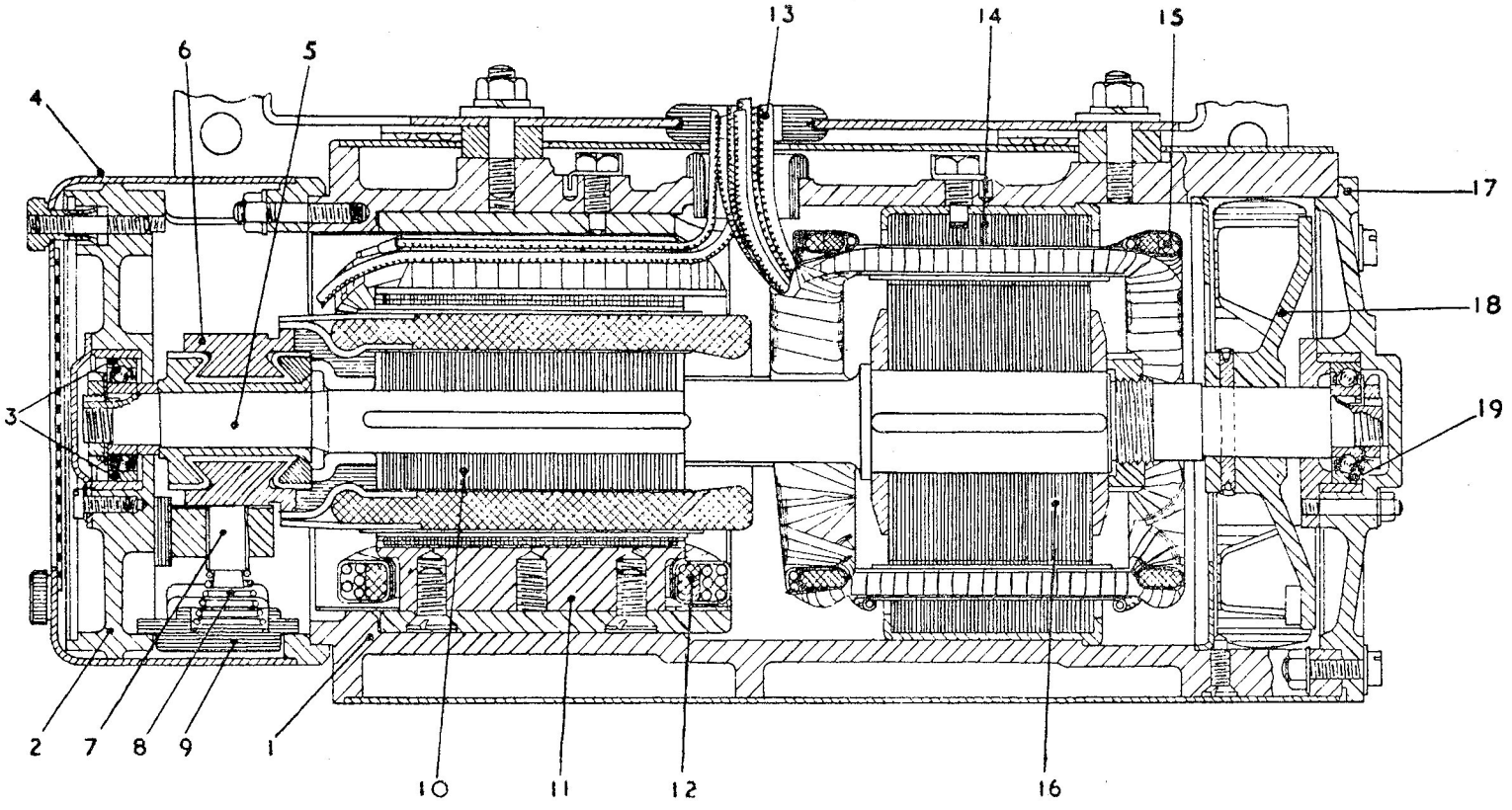
Input: 22-29 volts d.c. ... ... Output: 80 volts a.c., 240 watts, 1,600 cycles per second

Weight			14 lb. 10 oz.
Field resistance	a.c.	d.c.	
Shunt	9·18 ohms	20·8 ohms	at 20 deg. C.
Series	0·108 ohm	0·0235 ohm	
Field current	1·57—0·66 amp.		
Armature resistance	0·524 ohm	0·0525 ohm	
Brushes	Grade EGO (HAM) (Stores Ref. 5UB/4306)		
Brush pressure			12 to 13½ oz.
Lubrication	Grease XG–275 (Stores Ref. 34B/9100512)		
Regulator	Type E3 (Stores Ref. 5UC/364)		
Fuse	Type S (Stores Ref. 5CZ/880)		
Fuse holder	Type E (Stores Ref. 5CZ/882)		
Trimmer resistor, 55 ohms	Stores Ref. 5UC/3436		
Plugs	d.c. input:—Type WW594 (Stores Ref. 10H/4519)		
	a.c. output:—Type WW597 (Stores Ref. 10H/4522)		

Introduction

1. The rotary inverter, Type MG7, is designed to supply a.c. at 80 volts, 240 watts, 1,600 cycles per second at a nominal speed of 8,000 r.p.m. It is operated from the aircraft general service supply, which varies between 22 and 29 volts d.c., and enables current to be fed to the aircraft radio equipment without the necessity of running the main aircraft engine. The inverter consists of a d.c. motor driving an inductor type a.c. generator, and is supplied complete with its own control box.

(A.L.1, Sep. 57)



1 MAIN FRAME
2 MOTOR END SHIELD
3 COMMUTATOR END BEARING
4 COMMUTATOR END COVER
5 MAIN SHAFT
6 COMMUTATOR
7 CARBON BRUSH
8 BRUSH SPRING
9 BRUSH SPRING REST
10 ARMATURE
11 POLE PIECE
12 FIELD COIL
13 CONNECTIONS TO CONTROL BOX
14 STATOR
15 STATOR WINDINGS
16 ROTOR
17 A.C. END SHIELD
18 FAN
19 A.C. END BEARING

Fig. 1. Sectional view of rotary inverter, Type MG7

DESCRIPTION

2. The inverter unit (fig. 1) and the control box are mounted on a metal table suitable for mounting either vertically or horizontally. Three pairs of fixing holes are drilled in the baseplate. The d.c. motor and a.c. generator are housed in a common frame enclosed by an aluminium cover made in two sections. An opening in this cover enables the leads to be taken direct from the generator to the control box. The connections are shown in fig. 2.

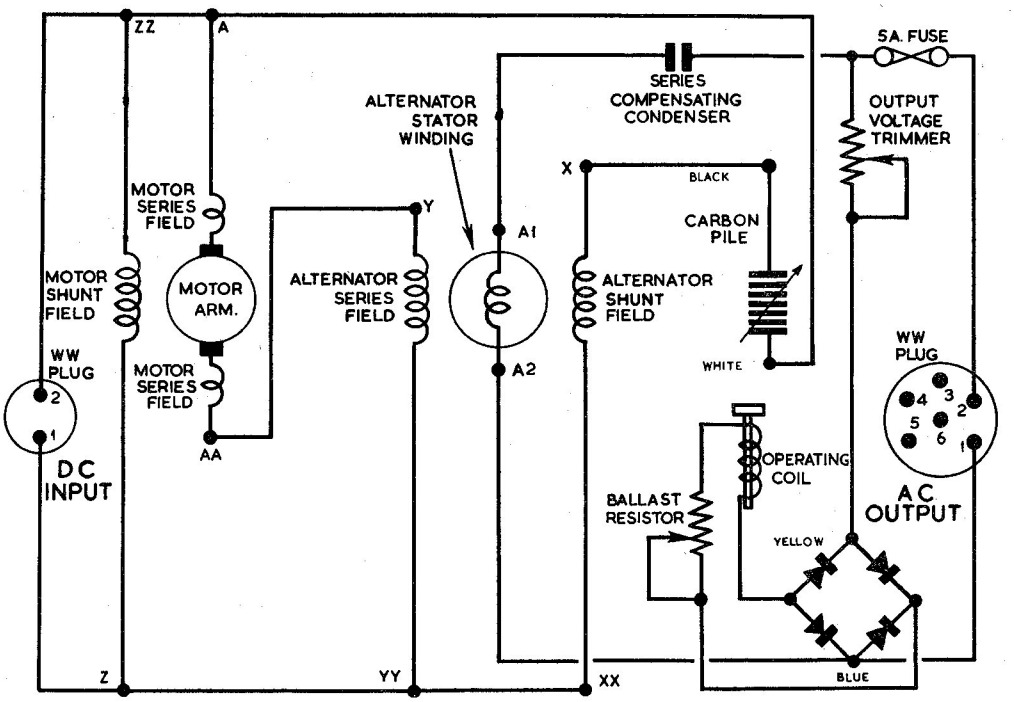


Fig. 2. Circuit diagram

Control box

3. The control box contains the voltage regulator, Type E3, an additional trimmer resistance, a fuse holder, a ◀2μF▶ series compensating condenser and two plugs, Types WW594 and WW592, for the d.c. input and a.c. output connections respectively.

4. The voltage regulator, which is described in Sect. 1 of this publication, maintains the a.c. output approximately constant at 80 volts with the d.c. input varying between 22 and 29 volts, irrespective of load conditions. The carbon pile of the regulator is connected in series with the shunt field of the a.c. generator, and the operating coil is energized, through rectifiers, by current from the a.c. generator. The trimmer resistance of 55 ohms, which enables small voltage adjustments to be made whilst the equipment is in service, is connected in series with the operating coil of the regulator. It is mounted in the control box so that the slotted adjusting screw is accessible from the outside of the box.

5. A 5A fuse, Type S, in a holder, Type E, is inserted in the a.c. output line, and a spare fuse is carried in the holder.

Inverter unit

6. The machine embodies a compound wound d.c. motor, driving a small inductor type a.c. generator. The main frame of the unit is an aluminium casting in which are housed the d.c. field system and the a.c. stator. The d.c. field system consists of a steel tube with four poles, which are forgings, carrying four shunt field coils, with a few

series turns to assist starting. The a.c. stator consists of toothed laminations carrying the main output windings and two exciting windings. The main exciting winding is shunted across the d.c. supply and has the carbon pile of the regulator connected in series with it. The other exciting winding carries the main motor input and its function is to reduce the load on the voltage regulator.

7. The motor armature and a.c. rotor are mounted on a common shaft. The armature is of normal construction, and the rotor consists of toothed laminations which operate with the teeth of the stator to produce the a.c. output.

8. At either end of the main frame are two aluminium end shields which house the grease lubricated ball bearings in which the shaft rotates. The motor end shield carries the brush gear and is enclosed by the commutator end cover.

9. The brush boxes are secured directly to the end shield, the holding screws being suitably bushed. Brush pressure is maintained by helical coil springs to which no adjustment can be made. The brush spring rest is fitted across the aperture in the commutator end frame, and the spring is eccentrically disposed on the rest.

10. Cooling is effected by a six-bladed fan mounted on the shaft at the a.c. end of the machine. Air is drawn in through a perforated plate in the commutator end cover, passes through the d.c. and a.c. machines, and is expelled radially through slots in the cover at the a.c. end.

INSTALLATION AND OPERATION

11. The complete assembly may be mounted in the aircraft either horizontally, with the inverter unit and control box side by side, or vertically with the control box above the inverter. It should be noted that it is necessary to use only two of the three pairs of fixing holes in the baseplate, preferably the two pairs farthest apart. This may be difficult where screws are used for fixing, as one pair of holes is under the inverter. In this case the middle pair of holes should be used. If studs can be used for fixing it is possible to use the holes located under the inverter.

12. No special operating instructions are necessary. When the external supply connection is made to the d.c. input plug on the control box and the supply switched on, the operation of the machine is automatic.

SERVICING

13. General information on the servicing of inverters is given in A.P.4343, Vol. 1, Sect. 8.

Brush gear

14. Brushes should not be allowed to wear down to less than $\frac{3}{8}$ in.; details of brush grade and correct spring pressure are given under Leading Particulars.

Bearings

15. The bearings are lubricated with grease XG–275 (Stores Ref. 34B/9100512) during manufacture and should not require attention between major overhaul periods. To obtain access to the bearings the following procedure should be adopted:—

(1) *Commutator end bearing*

The commutator end cover should be removed, the supply having first been disconnected. The bearing end plate can then be taken off by removing the screws securing it to the end shield. The ring nut threaded on to the end of the shaft should be removed. Access can then be obtained to the bearing.

(2) *A.C. end bearing*

The nuts securing the inner bearing plate to the a.c. end shield should first be removed and then the nuts securing the end shield to the main frame. The end shield can then be removed. The ring nut threaded on to the shaft should next be removed and access can then be obtained to the bearing.

Voltage regulator

16. Servicing instructions for the voltage regulator, Type E3, are given in Sect. 1 of this publication.

Note . . .

The first hundred of these machines were supplied with the trimmer resistance incorporated in the regulator assembly. It will, therefore, be necessary with these machines to remove the lid of the control box to obtain access to the regulator for adjustment of the trimmer resistance.

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