ADMIRALTY PATTERN S.S.38.

BOOK OF INSTRUCTIONS FOR WAVEMETER G9.

CHAPTER I.

DESCRIPTION AND ACTION.

1. GENERAL.

Date of design - 1930.
Frequency range - 30 to 3,000 kc/s.
Valve used - ND3.

2. Wavemeter G9 is a wavemeter of the absorption type covering approximately the same range as Wavemeter, Pattern 1492B, which it is intended to replace. Comparison with Pattern 1492B shows that G9 has several advantages as follows:-

(a) Increased accuracy of reading and setting.

(b) Absence of lag and therefore increased speed of setting.

(c) Total weight about half that of Patt. 1492B.

(d) The diode valve used (ND3) is much cheaper than the vacuum thermo-couple used in Pattern 1492B.

3. In order to make the instruments as compact and portable as possible, the wavemeter itself and the coils to be used with it are contained in separate boxes. It is essential that the coils for one wavemeter should always be used with that wavemeter and no other, otherwise the calibration curves will be of very little value. This can be checked by comparing the serial numbers of coils and wavemeters.

4. A circuit diagram of the Wavemeter G9 is shown in Fig. 1 and photographs of the model in Figs. 2 and 3.

5. The wavemeter condenser (11) is provided with a scale fitted with a scroll slow-motion for fine tuning. The slow-motion device can be thrown out of gear by pulling outwards the graduated (0-10) knurled head (31), when the condenser can be freely adjusted by rotating the central knurled handle. To re-engage the slow-motion device the metal plate (32) carrying the slow-motion index line is pushed inwards, when a spring causes the scroll to mesh with the teeth on the edge of the circular drum carried on the central spindle.

6. The indicator used in the instrument is a small diode valve (9) and D.C. milliammeter. The filament of the valve is lit by means of a small coil (21) of one or two turns coupled to the main inductance coil (10) and connected to it at one end. H.T. voltage for the diode is supplied by means of a second coil (18) of several hundred turns also coupled to the main inductance coil (10). The D.C. milliammeter,

WAVEMETER G 9.

CIRCUIT DIAGRAM.

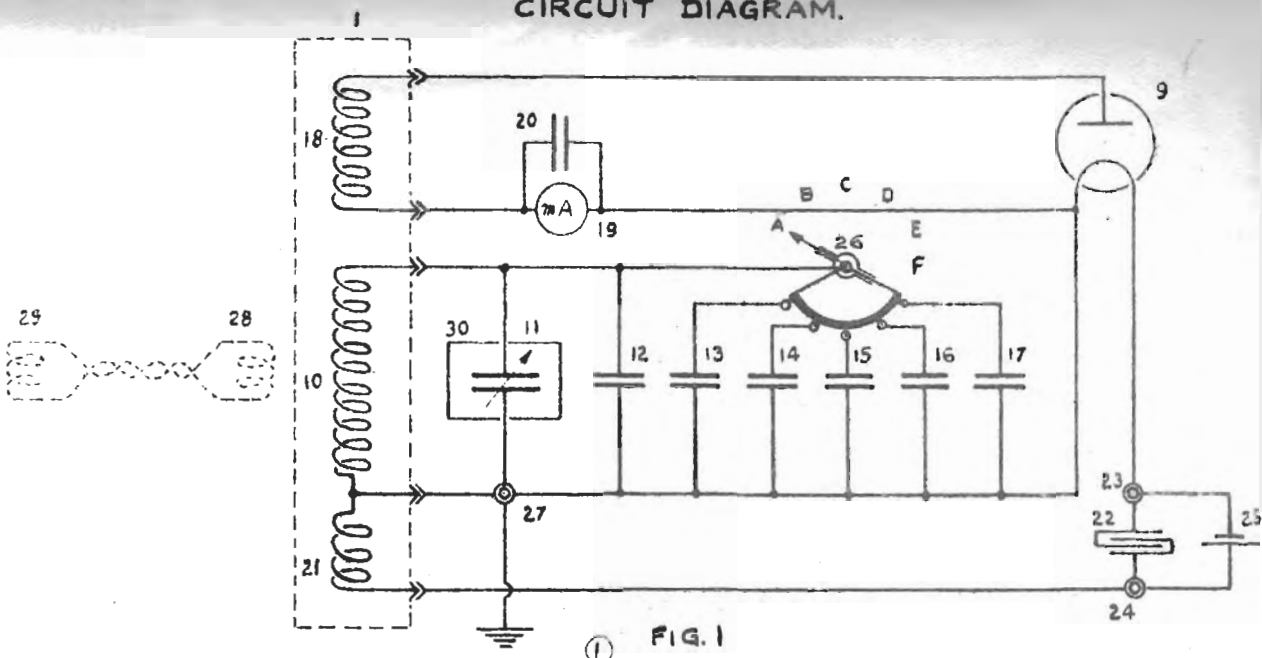


FIG. 1

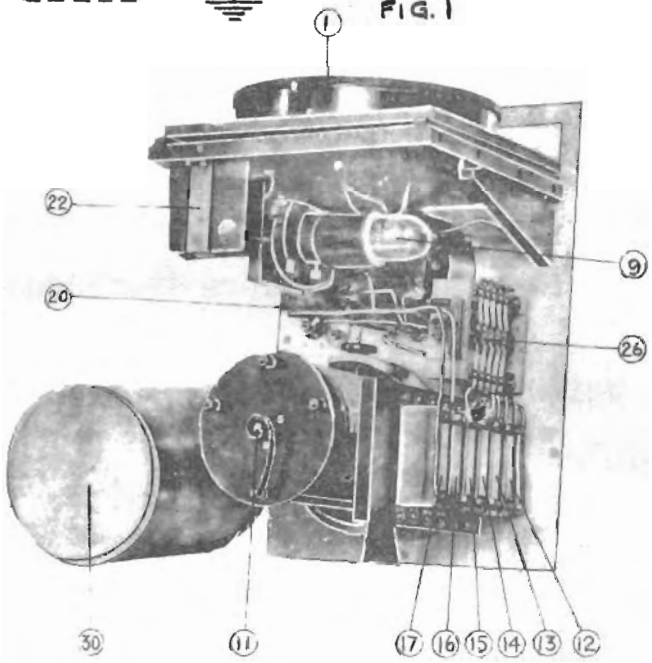
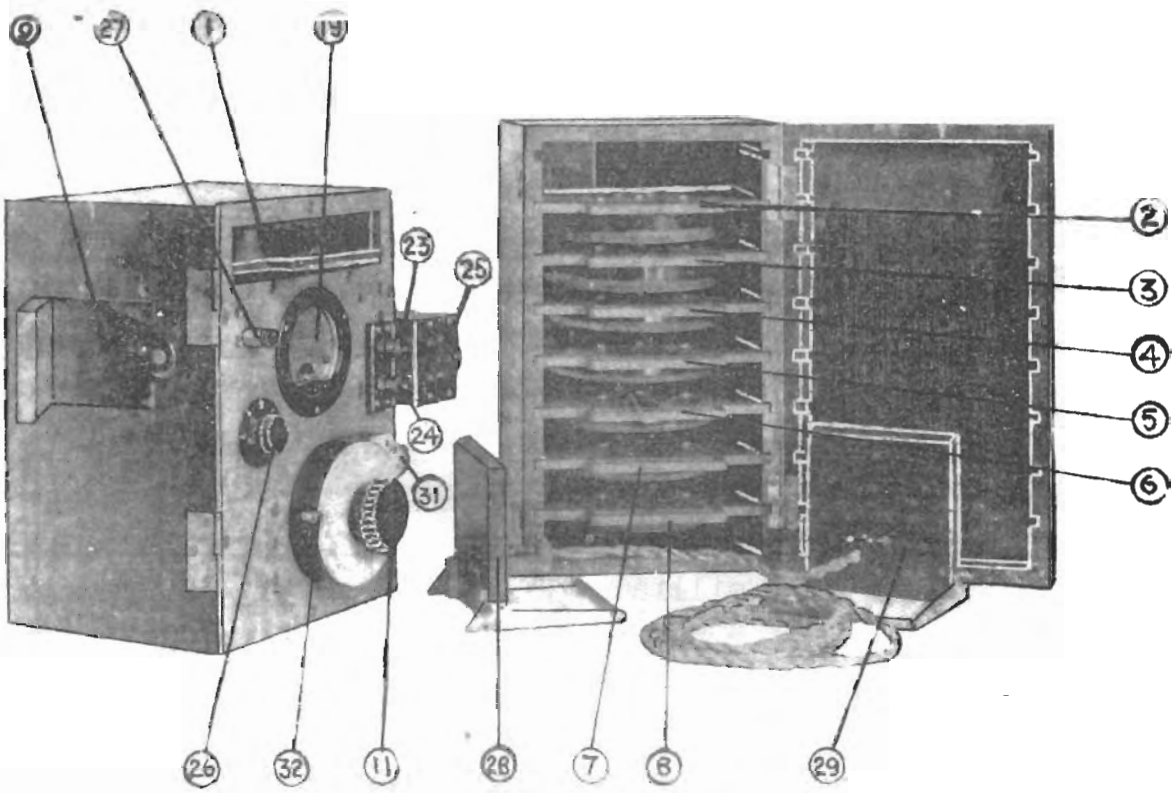


FIG. 2.



shunted by a condenser, is placed in the anode circuit of the valve and indicates the value of the rectified current. This value will obviously be a maximum when the wavemeter circuit is in tune with the wave that is being measured.

7. The advantage of this arrangement is the absence of lag between the deflection of the milliammeter pointer and the change in the setting of the variable condenser. There is a slight lag between the brightness of the diode filament and the setting of the variable condenser, but any such effect is entirely masked by the changes in anode voltage, which are instantaneous. The result is that the wavemeter can be tuned to any frequency both rapidly and accurately. There is no waiting such as is necessary when watching the galvanometer pointer of a Pattern 1492B.

8. Eight range coils are supplied, numbered (1) to (8) in ascending order of kc/s, each having suitable filament and anode coils permanently attached.

9. **ACTION.** A range switch (26) is employed to switch in one or more of the fixed condensers (13) to (17) in parallel with the variable condenser (11) and fixed condenser (12), the latter being always in circuit. The positions of the switch (26) are lettered A, B, C, D, E and F. In position A all fixed condensers are switched in parallel with the variable condenser (11). In position B one fixed condenser (13) is cut out and so on until in position F only the variable condenser (11) and the fixed condenser (12) are left in circuit. With coil (1) the five positions of the range switch, A to E, give five ranges. With coil (2) only positions D and E are used, giving two ranges. With the remaining coils (3) to (8), which cover the higher frequencies (85 to 3,000 kc/s), the switch must be left in position F, only the variable condenser (11) and the permanently fixed condenser (12) being used. It will be seen that there are altogether 13 ranges.

10. When in use, the instrument should be placed on a table or bench and not held in the hand, since any variation in coupling between the wavemeter coil and the transmitter would make it impossible to get accurate settings. It is also essential that the earth terminal (27) on the instrument should be connected to earth by a wire of low resistance so that hand capacity effects may be eliminated.

11. The wavemeter can be coupled to a high power transmitter some distance away (i.e., inside a cage) by means of two three-turn mutual coils (28) (29) with a length of twin flexible lead connecting them.

12. When this wavemeter is used with transmitters of low power, the filament of the diode is lit by a single inert cell (25) of 1.4 volts in addition to the voltage derived from the filament coil. This cell is shunted by a condenser (22) of capacity 1 μfd. which obviates the necessity of providing a switch for the cell, the condenser allowing R/F current to pass whether the cell is connected or not.

13. **RANGES.** The ranges with the different coils and settings of the range switch are approximately as follows:-

Coil.	Range Switch.	Frequency Range.
1	A	30 to 32 kc/s.
1	B	32 to 35 kc/s.
1	C	35 to 39 kc/s.
1	D	39 to 46 kc/s.
1	E	46 to 58 kc/s.
2	D	58 to 68 kc/s.
2	E	68 to 85 kc/s.
3	F	85 to 150 kc/s.
4	F	150 to 295 kc/s.
5	F	295 to 530 kc/s.
6	F	530 to 985 kc/s.
7	F	985 to 1800 kc/s.
8	F	1800 to 3000 kc/s.

CHAPTER II.

OPERATION.

TO MEASURE THE FREQUENCY OF A HIGH POWER TRANSMITTER.

(i) Select the appropriate coil and position of range switch.

(ii) Connect the earth terminal (27) to a good earth by means of a wire of low resistance. Pattern 611 cable is suitable for this purpose.

(iii) Hang one of the mutual coils inside the cage so that it picks up energy from the aerial coil of the transmitter and stand the other mutual coil on the table or bench near the wavemeter, adjusting the distance between them so that when in resonance the reading of the milliammeter is about 0.4 mA. Full scale deflection is 0.5 mA.

(iv) Adjust the variable condenser (11) by means of the slow-motion device until the milliammeter deflection is a maximum. The frequency can then be read off from the appropriate calibration curve.

TO MEASURE THE FREQUENCY OF A MEDIUM POWER TRANSMITTER.

(i) Adopt the same procedure as in paragraph 1 above, but in addition connect the 1.4 volt cell to the two terminals (23) and (24) on the wavemeter.

(ii) If sufficient energy to operate the wavemeter cannot be obtained when using the 3-turn mutual coils supplied with the instrument, temporary coils of, say, 10 turns each should be tried.