MARINE DIRECTION FINDERS: TYPES 11G. AND D.F.M.3

With the increased use of Ship Direction Finders has come the need of an efficient and selective, though simple, class of instrument.

The 11G. and D.F.M.3 types of direction finder attempt to meet this demand in a very complete manner, the difference between the two receivers being described below.

The extreme simplicity of the apparatus, combined with high efficiency, make these two models peculiarly adapted to the needs of mercantile vessels which aim at perfection in the design of their direction finding gear.

THE 11G. Direction Finder is designed for use on board all classes of mercantile vessels as a navigational instrument. It is intended to supersede the Type 11F. Direction Finder.

The chief difference between the two types mentioned above lies in the Amplifier. By means of the use of two Marconi S.625 screened grid valves, a short description of the action of which has been given in the November issue of the "Marconi Review," greatly increased amplification has been obtained.

In considering the design of this receiver, it is necessary to bear in mind the fact that accommodation for it will, in many cases, be very limited, that it will be subject to extreme vibration, and that it will occasionally be operated by semi-skilled personnel.

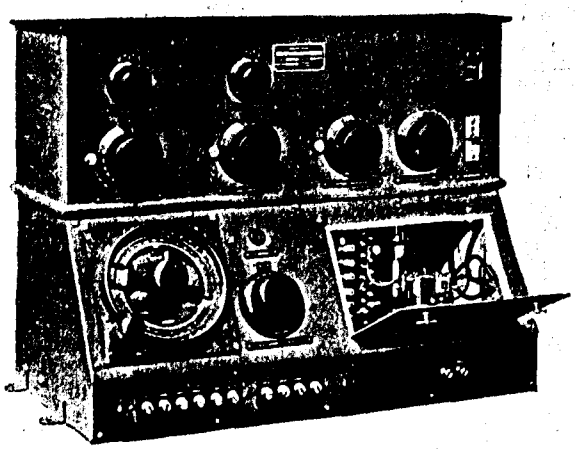
The receiver has consequently been designed

(A) In as compact a form as possible.

(B) As robustly as possible.

(C) As simply as possible.

As regards overall dimensions, the 11G. receiver has been made approximately the same size and general shape as the 11F. The copper screened teak cabinet of the 11F. has been replaced, however, by a sheet brass box, with all the screens, etc., of the same material well bonded to the main case. In this way greatly improved screening has been obtained; the instrument is robust; and the accessibility of the amplifier and tuner has been increased.



11G.

The apparatus operates on the well-known Marconi-Bellini-Tosi System, and incorporates a radiogoniometer, vertical aerial coupling system, two stages of screened grid high frequency magnification, an anode bend detector, and a resistance capacity coupled amplifier.

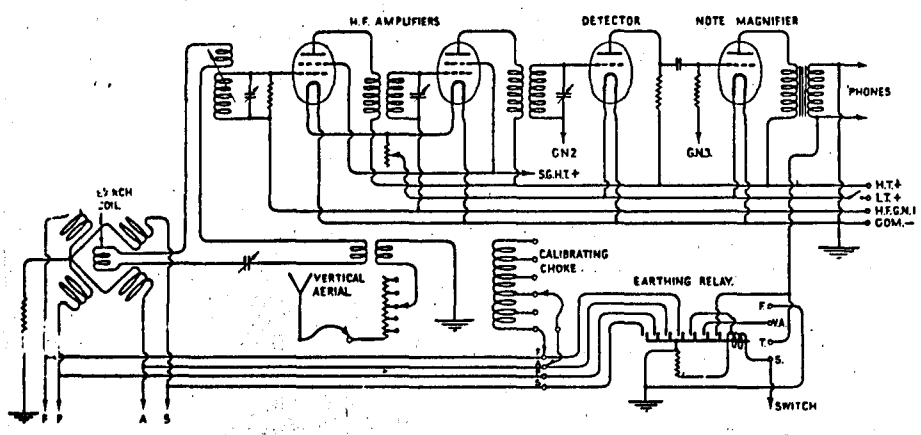


FIG. 1.

The instrument has a waverange of from 450-1,100 metres, and this is covered in a single range.

A simplified diagram of connections to the receiver is shown above (Fig. 1).

The radiogoniometer consists of two fixed coils of equal impedance, crossing each other at right angles. The four ends of these coils are marked "Port," "Starboard," "Fore," and "Aft," and are connected to the corresponding ends of the aerial loops, and the centre point of each coil is connected to earth through a resistance of 2,000 ohms. These coils are mounted on a hollow cylindrical former, and are well insulated from each other. A rotatable search coil is mounted symmetrically inside the former in such a manner that it can be set at any angle relative to the two field coils, and its direction read off accurately on a scale provided at the front of the receiver.

The vertical aerial itself is connected to the set by means of a plug which can be inserted into a socket on the front of the set. In this way either a figure of eight or cardioid diagram can be obtained.

The phasing resistance for the vertical aerial can be adjusted once for any particular aerial and then left. It will be found that this adjustment suffices to give a sharp minimum as long as this particular aerial is in use.

A calibrating choke is provided in parallel with one of the field coils of the radiogoniometer. This is to provide general compensation for the distortion of bearings by the metal work of the ship. The value of the inductance included in this choke can be altered by attaching a flexible lead to one of numerous tappings on the choke.

The earthing relay is provided for use when the ship's transmitter is working. It consists of a solenoid wound round a soft iron core, which operates contacts connecting aerial leads, telephones, etc., to earth when the magnetising current is cut off. While the relay current is on and the set is working, therefore, all the leads are insulated from earth, but as soon as the switch is broken, the whole aerial system is effectively earthed.

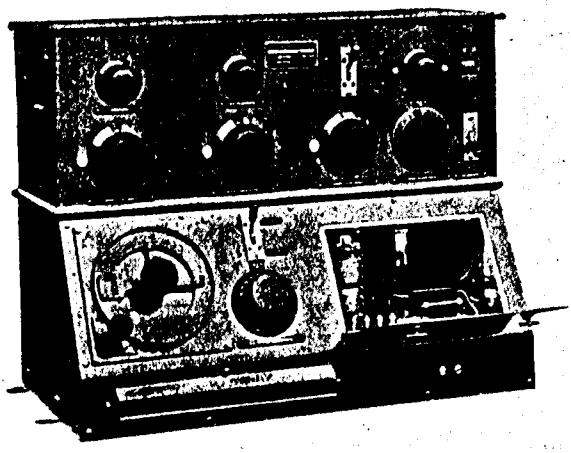
The switch operating the relay is ordinarily situated near the transmitting key.

The amplifier proper consists of two stages of transformer coupled screened grid amplifiers, a detector and note magnifier.

The high frequency transformers are wound in an efficient manner with stranded wire, and have their grid circuits tuned by means of variable condensers. Suitable grid negative is applied to the grids of these valves, and a filament control rheostat is provided.

The detector is of the anode bend type, and the note magnifier is resistance capacity coupled in the usual way.

A telephone transformer is provided for use with low resistance telephones, and has its secondary winding earthed when the set is not in use.



D.F.M.3.

It will be noticed that the set is not designed for use with continuous waves. This is, however, provided for in a modification of the 11G., known as the D.F.M.3.

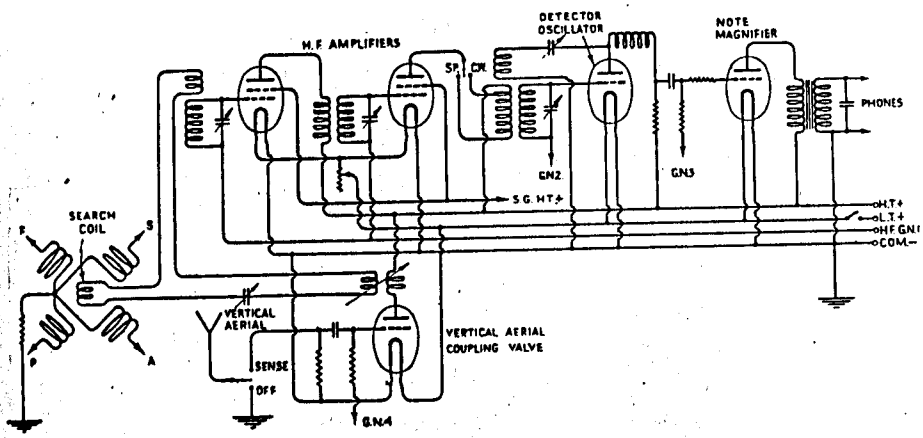


FIG. 2.

The D.F.M.3 has circuit connections very similar to the 11G. (Fig. 2), with the following exceptions:—

(1) Reaction is provided on the detector valve for continuous wave reception and for increasing the sensitivity of spark reception.

(2) The vertical aerial is coupled to the set by means of a valve. This method has the advantage of allowing the use of quite a small vertical aerial for obtaining "sense" indication by means of a heart-shaped polar diagram of signal strength.

(3) The vertical aerial is connected to the set by means of a switch, and not by a plug as in the case of the 11G.

(4) The D.F.M.3 does not contain an earthing relay. This is intended to be used as an accessory external to the receiver.

(5) A special tapping is provided in the anode coil of the second high frequency valve for the purpose of reducing the coupling during continuous wave reception. The necessary change is made by a switch marked "Spark" and "C.W."

(6) The detector has a coil in its anode circuit coupling back to the previous stage, and a condenser to enable reaction to be controlled.

In both the 11G. and D.F.M.3, S.625's are used in the high frequency stages, a D.E.H.610 for the detector, and a D.E.L.610 for the note magnifier.