GRID SIGNALLING AND ABSORBER CIRCUITS.

Grid signalling and Absorber Circuits. The normal method of signalling for both L/F and H/F transmissions is by grid control, with primary signalling as an emergency condition. The conditions required for grid signalling during the "spacing" and "marking" periods are as follows:-

Spacing.

(a) Transmitting valves shut down by a negative potential of about 2,400 volts applied to the grid circuit.

(b) Absorber valve grid connected to a positive potential of about 500 volts.

Marking.

(a) Transmitting valves grid circuit connected to filament (i.e., earth).

(b) Absorber valve shut down by a negative potential of about 800 volts applied to the grid.

The negative potentials are obtained from the valve and components of the rectifier unit which were fitted in the old 3GL low power transmitter. A simplified diagram of the circuit used for obtaining the 2,400 volts negative potential is shown in figure h.

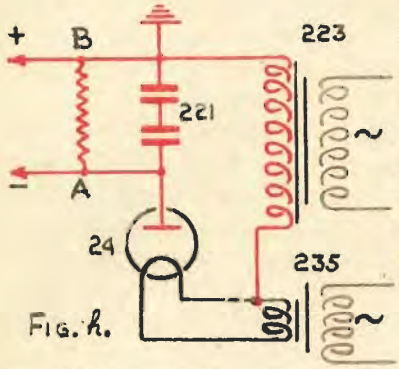

Fig. h.

When the A.C. supply to the transformers (223)(235) is made, the valve (24) acts as a half wave rectifier and the rectified anode current will produce a D.P. across the condensers (221) and the resistance between A and B slightly less than the peak value of the transformer secondary voltage. It should be noted that the point A on the resistance is negative with respect to point B and that the latter point is earthed. It will be seen that, by connecting point A to the grid of a valve which has its filament connected to earth, a negative bias, equal to the D.P. across the condensers (221), can be applied to the grid of the transmitting valve. The resistance between A and B in figure h consists of the resistances (152) (153) and part of (155) shown in figures hb, hc and k. The positive potential for the absorber valve grid is obtained by tapping a potentiometer resistance across the main H.T. supply.

A simplified diagram of the circuits used to obtain the necessary potentials for signalling, outlined above, is shown in figure ha, in which all keying circuits have been omitted. The absorber resistance (155) is connected across the H.T. supply to the anodes of the transmitting valves and a tapping on the resistance (155) is connected to the anode of the absorber valve. Another tapping is made on the resistance (155) at a point which is approximately 500 volts positive to earth. This tapping is used to provide the requisite potential on the grid of the absorber valve for "spacing" conditions. The 500 volts positive tapping is also connected to one end of a potentiometer resistance (152)(153), the other end of the resistance being connected to the 2,400 volts negative supply from the low power rectifier system. By connecting one side of an electrostatic voltmeter to earth and moving a connection on the other side of the voltmeter between the points C and D on the resistance (152)(153), it will be seen that potentials varying between 2,400 volts negative and 500 volts positive will be recorded. In passing from C to D, a zero potential point on the resistance (152)(153) will be reached where no reading will be shown on the voltmeter. Between this zero potential (or hypothetical earth) point and point C there will be a tapping point 800 volts negative to earth, as shown in figure ha. This point is used for supplying the requisite negative potential for shutting down the absorber valve during the "marking" periods. The full 2,400 volts negative supply is connected to the grids of the transmitting valves during "spacing" periods and the connection is taken from the point C.

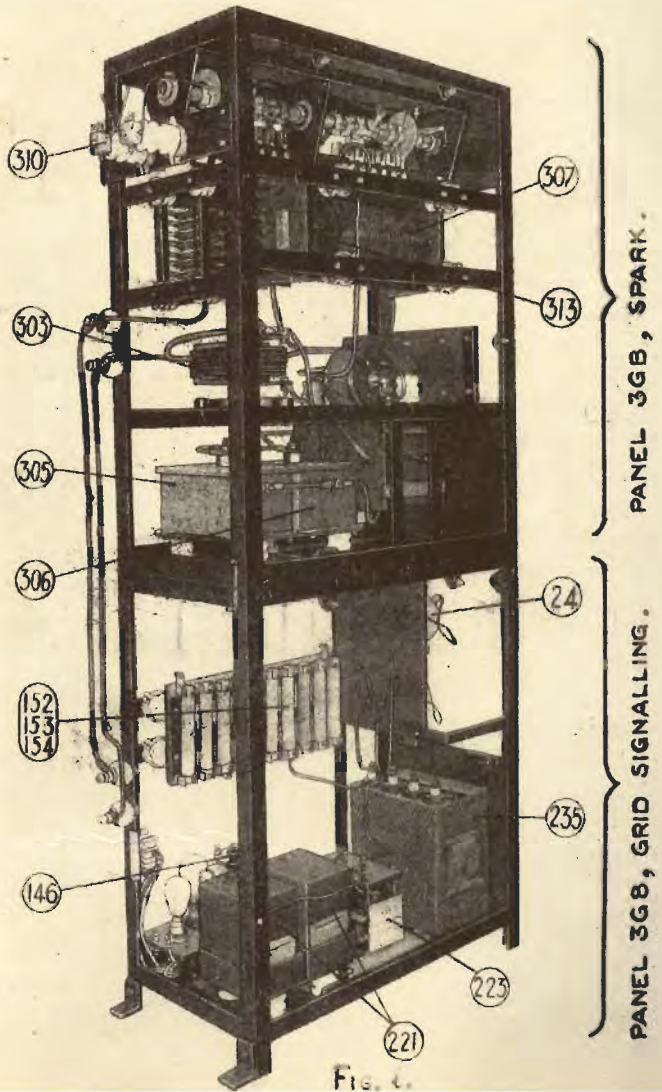

Fig. t.

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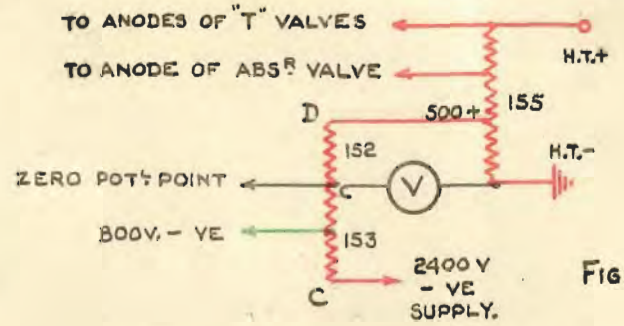

Fig. 4a.

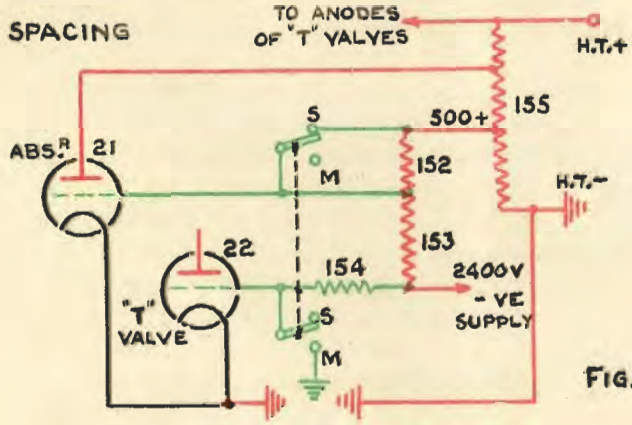

Fig. 4b.

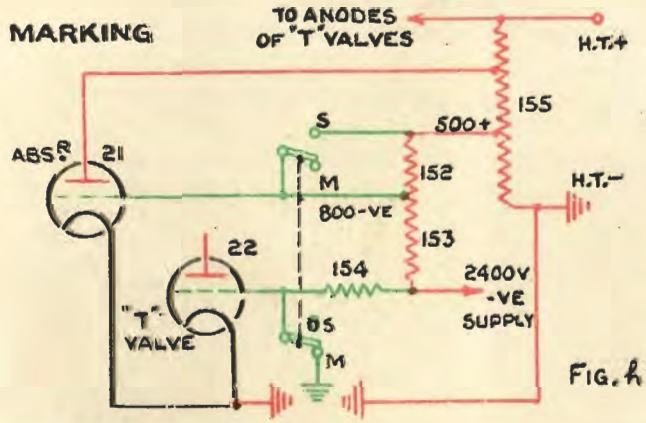

Fig. 4c.

Spacing. The functions of the grid signalling key in connecting the requisite potentials to the absorber and transmitting valves during "spacing" are shown in the simplified diagram, figure 4b. The grid of the absorber valve (21) is connected to the 500 volts positive tapping on the resistance (155) and the grid of the transmitting valve (22) to the 2,400 volts negative supply. Resistance (152) is short circuited and the zero potential point, explained above, will now be at some point on the resistance (153).

Marking. When the grid signalling key (219) is moved to the "marking" position, as shown in figure 4c, the short circuit on the resistance (152) is removed and the grid of the absorber valve (21) is connected to the 800 volts negative potential point between the resistance (152)(153). The zero potential point will now be at some point on the resistance (152). At the same time, the grid of the transmitting valve (22) is connected to earth and, as the positive side of the G.S. rectifying system is earthed, the high resistance (154) prevents a short circuit across the 2,400 volts negative supply.

Absorber Circuit. The absorber resistance (155) is fitted in Panel 3GB, Absorber Resistance, in the safety enclosure. The total resistance is 302,000 ohms and consists of one hundred 3000 ohms units and sixty-eight 4000 ohms units connected in series. The upper end and tappings on the resistance are connected to insulated terminals on the framework of the panel marked R1, R2, R3, and a portion of the resistance is short circuited by the absorber resistance switch (160) when using H/F (See figure k). The absorber circuit consists of the 302,000 ohms resistance (155) used as a potentiometer across the H.T. supply to the transmitting valves. During the "marking" periods of signalling, when the absorber valve (21) is shut down, the current taken from the H.T. supply by the absorber resistance (155) is negligible. During the "spacing" periods, when the grid of the absorber valve is connected to the 500 volts positive tapping on the potentiometer (155), the resistance of the absorber system is about 20,000 ohms as the resistance of the absorber valve (21) is then connected in parallel with the absorber resistance (155). A current comparable to the anode current of the transmitting valves will then be taken by the absorber circuit. The effective resistance of the H/F oscillatory circuit is less than that of the L/F circuit and a part of the absorber resistance (155) is short-circuited by the absorber resistance switch (36), with a consequent increase of absorber current, when using H/F. The bobbin circuit of the absorber resistance switch (160) is controlled by a contact arm on the L/F - H/F H.T. C.O.S. (26) (See figure v).

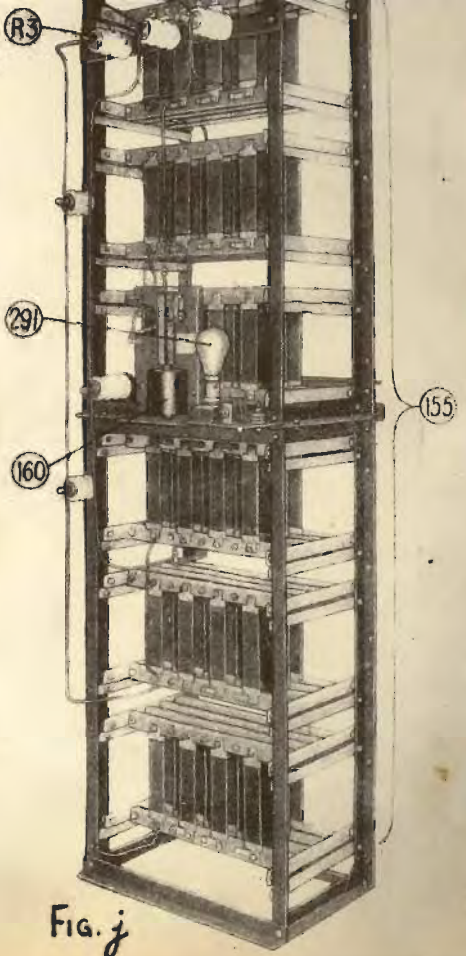

FIG. j

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Grid Signalling Rectifier Circuit. The H.T. and filament supplies for the rectifying valve (24) are obtained from two transformers (222)(225), the primaries of which are connected to the 3 kW. filament supply by the grid signalling relay (146). This relay (146) earths the anode of the rectifying valve (24) and also earths and short-circuits the smoothing condensers (221) when in the "OFF" position.

Negative and Positive Potentials for Absorber Valve (21). The 800 volts negative potential required for shutting down the absorber valve (21) during "marking" is obtained by connecting a potentiometer (152)(153) between the 500 volts positive tapping on the absorber resistance (158) and the 2,400 volts negative point at the anode of the rectifying valve (24). The resistance (152) consists of three units and resistance (153) four units of 30,000 ohms each. By tapping this potentiometer at the appropriate position the 800 volts negative potential is obtained.

The 500 volts positive potential required for making the valve (21) conduct during "spacing" is obtained by connecting the grid direct to the 500 volts positive tapping on the absorber resistance (155).

Negative Potential for Transmitting Valves. The whole 2,400 volts negative potential is required for shutting down the transmitting valves during "spacing" and this is obtained by connecting the grid of the transmitting valves in use direct to the anode of the rectifying valve (24). A 90,000 ohms resistance (154) is connected between the anode of the rectifying valve (24) and the transmitting valves grid circuit to prevent the negative potential supply from being short-circuited by the grid signalling key (219) during the "marking" periods.

The connections to the absorber and grid signalling circuits required for "spacing" and "marking" conditions described above are made by the grid signalling key (219) which is operated by the signalling key (See figure k).

When using low power, the main H.T. supply is reduced and the absorber valve is required to pass a correspondingly lower anode current. Since the potential at the original 500 volts positive tapping will be reduced, due to the lower H.T. supply, it will be seen that on low power a lower positive bias is applied to the grid of the absorber valve during spacing with a consequent reduction of absorber anode current. This arrangement can be considered as a self-adjusting system.

The 2,400 volts negative supply is independent of the power used for the transmitter but, as the negative potentials are only required for shutting down purposes, no adjustment of this supply is necessary.

The components used for the grid signalling circuits are fitted in the lower part of panel 3GF, Spark and Grid Signalling, and the absorber resistance (155) in panel 3GE, Absorber Resistance (See figures i and j).

The complete absorber and grid signalling circuits are shown in figure k.

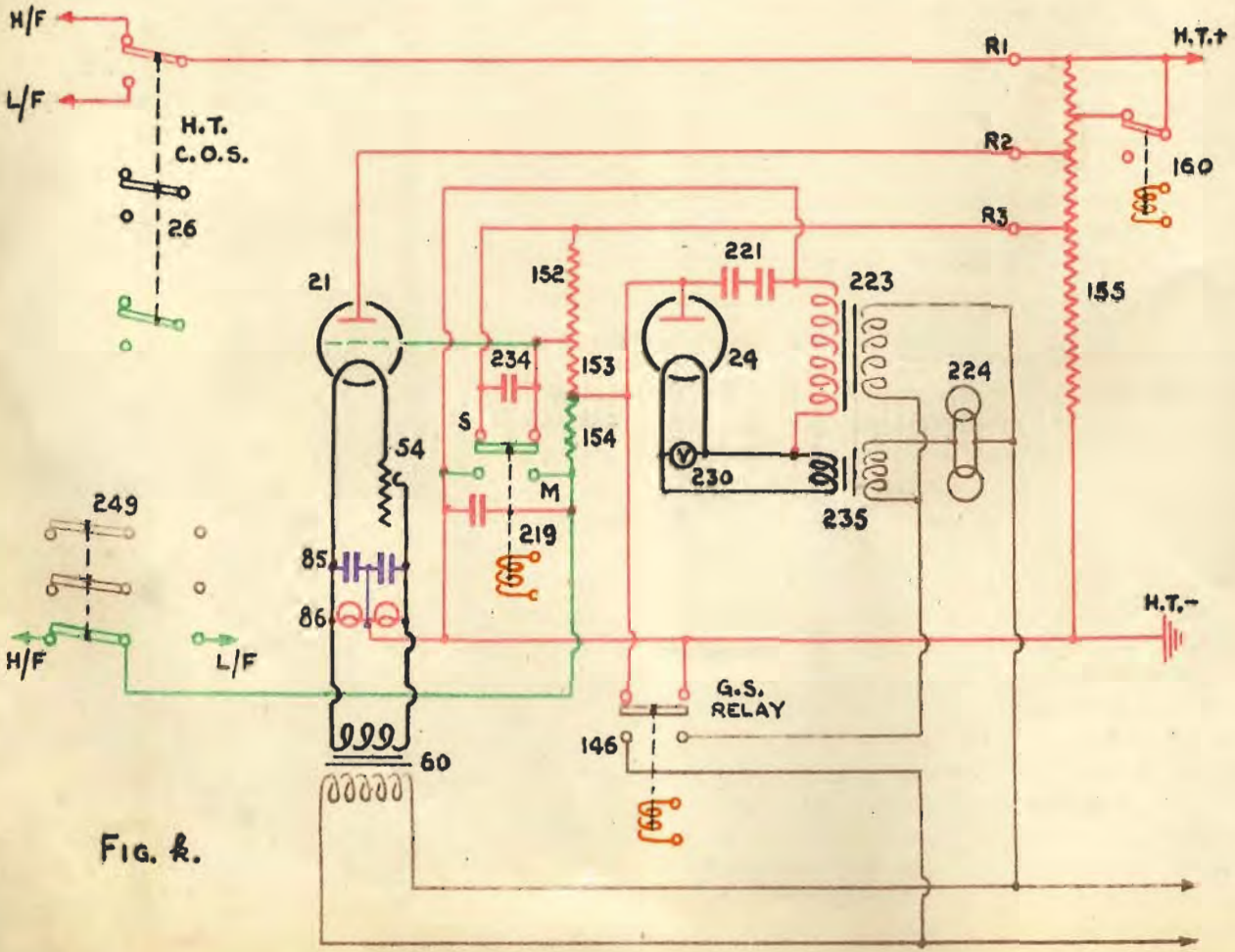
H/F
L/F
H.T.
C.O.S.
26
R1
R2
R3
H.T.+
160
155
21
152
221
223
234
153
24
224
S
154
54
M
230
235
249
219
85
86
H/F
L/F
H.T.-
G.S.
RELAY
146
60

FIG. 8.