M.212.

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MODEL-OUTFIT QBX - INSTRUCTIONS FOR USE.

Model-Outfit QBX is designed to receive I.C.W. and R/T transmissions on wavelengths between 17 and 26 metres. The receiver consists of two units, viz., Q4 and P1X. The wiring diagram is shown in Figure 1.

Receiver Q4. The connections of the unit Q4 are shown in Figure 2 and consist of an untuned aerial circuit coupled to a tuned secondary. The aerial circuit may consist of:-

(i) two wires about 20-ft. long connected to the coupling coil, one being vertical or approximately so; the other may be horizontal and so act as a counterpiece.

or (ii) an ordinary receiving aerial and earth.

The secondary consists of the circuit $L_2C_1L_3C_2$ connected to a standard NR7 valve.

The tuning of the secondary circuit is effected by means of a small variable condenser operated through gearing at the back of the receiver.

Action of the circuit. With this type of valve and circuit, and with an anode filament P.D. of about 100 volts, the circuit conditions are such that a very small high frequency induced potential in the oscillatory circuit between anode and grid, due to an incoming signal, will set up free high frequency oscillations in the circuit.

These oscillations are built up to a value depending on the valve characteristics and the constants of the oscillatory circuit. The arrangement is then equivalent to a circuit having negative resistance.

If, however, the P.D. be reduced to about 75 volts, the free high frequency oscillations will cease and the forced oscillation which is set up will persist only for the time of duration of the incoming signal.

In this receiver, arrangements have been made to supply at the anode an alternating voltage at an inaudible frequency of the order of 20,000 cycles per second superimposed on a D.C. anode-filament P.D. of about 100 volts. This A.C. voltage is called the quench. If a high frequency alternating E.M.F. be applied to the circuit, the free oscillation builds up to a large amplitude during the positive half of the quench cycle, but this large amplitude is not maintained owing to the fact that during the negative half cycle of the quench the effective

potential of the anode is reduced to such a value that the H.F. circuit will not oscillate. This process is continued through succeeding cycles of the quenching alternating voltage so long as the H.M.F. is impressed. As a result I.C.W. signals at the frequency of the alternator supplying the transmitter can be received in a telephone either directly or indirectly connected in the anode lead.

The grid leak and condenser perform two functions. They contribute largely to the rectifying function of the valve and also maintain the grid at a suitable potential for a satisfactory operation of the quenching device.

The two filament leads together with the one supplying the anode voltage are passed through a short length of armoured cable to the quench unit P1X.

Quenching Unit P1X. The quenching P1X, the connections of which are shown in Fig.3, contains the source of energy for supplying the alternating or quenching voltage to the anode of the NR7 valve in the receiver Q4. It consists of a NT9 valve connected to a divided oscillatory circuit L_2L_3 and two fixed condensers (2 mfd. and 6.2 jars) and tuned to a frequency of 20,000 cycles. Coupled to this with a variable coupling is another circuit L_1 and a 5.6 jar condenser tuned to the same frequency, the two branches of which form part of the anode circuit of the valve in the Q4 receiver.

By means of an adjustment of the variable coupling between these two tuned circuits, the amplitude of the alternating component of the anode voltage of the NR7 valve in the receiver Q4 is varied. The variation of this coupling and the tuning of Q4 are the only adjustments necessary in order to receive signals on this outfit.

The unit P1X also contains a rheostat for regulating the filament current of the valve in the Q4 receiver and instruments for measuring the filament and anode currents of this valve.

The three leads contained in the armoured cable from Q4 should be joined to either group of three terminals on the left hand side of the unit P1X. The telephone transformer should be connected to the terminals on P1X marked "Note Selector", and the two-way two-pole switch must always be in the position marked "Note Selector".

Tuning and Adjustment of Model-Outfit QBX.

(a) Switch on current to the filaments of the valves in Q4 and P1X. The minimum filament current for that in Q4 is 0.7 amps; this entails somewhat overheating the filament but it is essential to the correct functioning of the set. The filament current should not be increased beyond 0.8 amp. or the life of the valve will be very short.

WIRING DIAGRAM OF MODEL OUTFIT QBX.

13 TO 21 METRES.

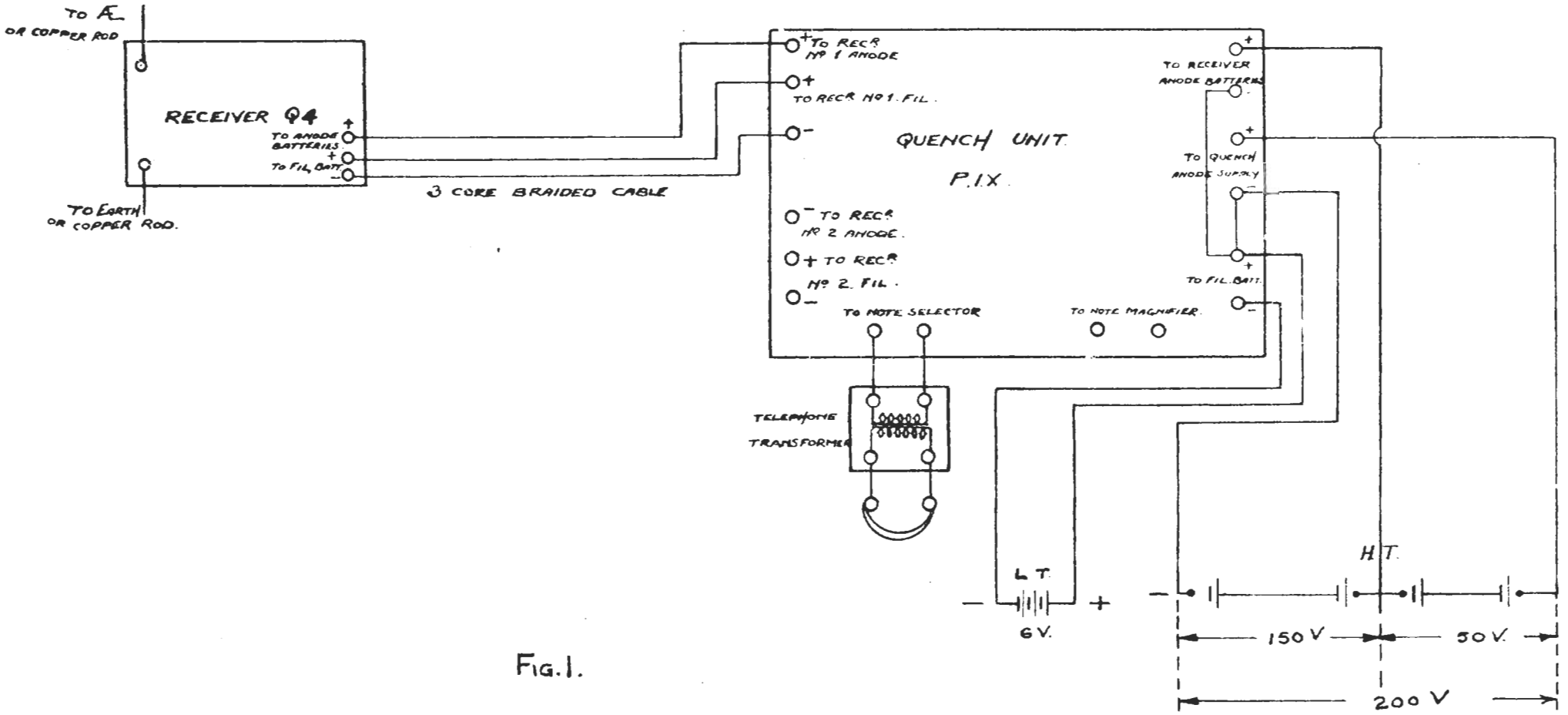


Fig. 1.

DIAGRAMMATIC SKETCH OF Q4.

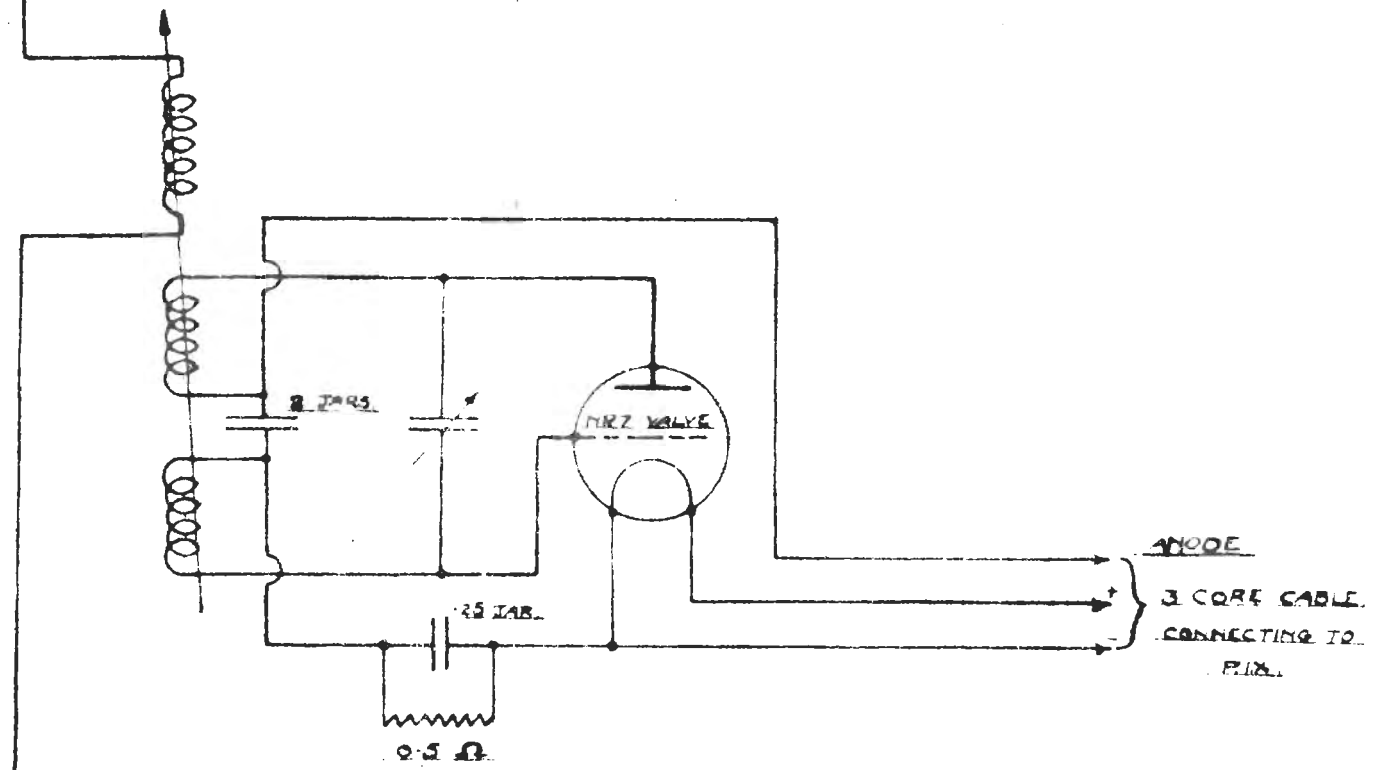
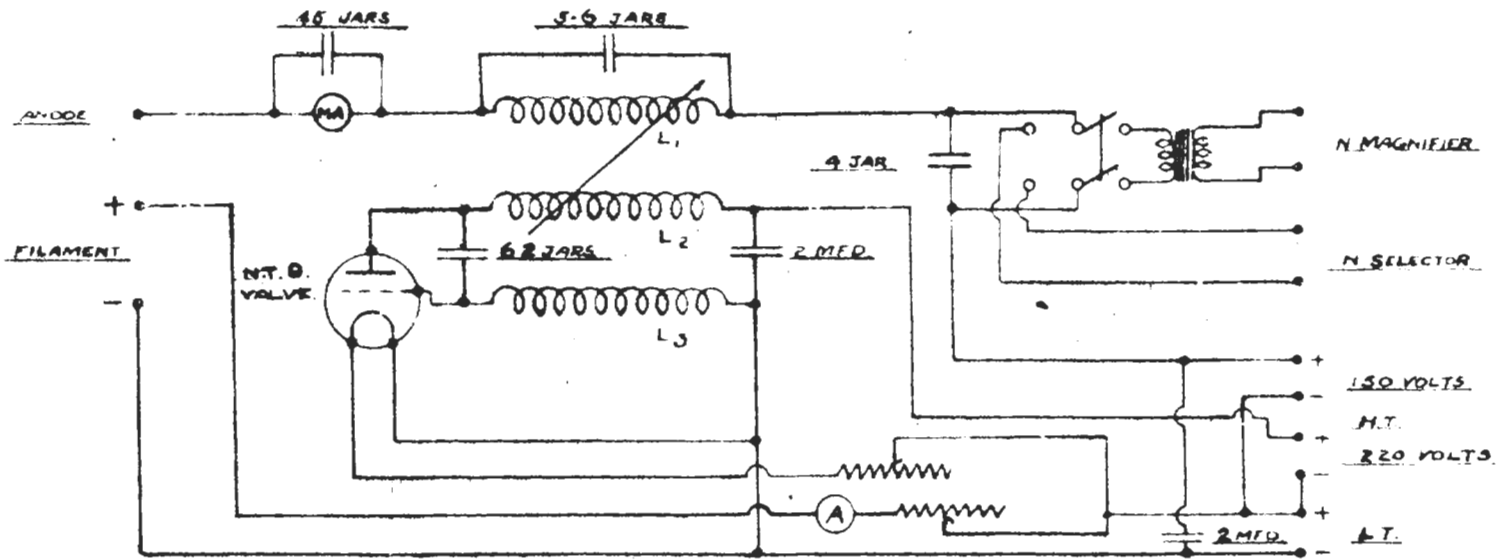


FIG 2.

DIAGRAMMATIC SKETCH OF P I X.



L1 IGRANIC COIL Nº 400

L2 AND L3 DITTO Nº 250

(b) Set the quench adjustment to about the middle of the scale. With a little experience the correct setting can be determined by the quality of the "mush" which is always heard when the set is working at its best.

(c) Tune the secondary of the Q4 by means of the handle. This adjustment is very critical and must be performed with the greatest care. When the signal is tuned in on Q4, readjust both rheostats on the P1X to give maximum signal strength.

Notes.

The NR7 valve should be inserted in Q4 with the metal strip underneath the valve. Care should be taken that the anode and grid clips make good contact.

The average NR7 valve requires about 100 to 120 volts applied to the anode via P1X, but a few valves may be found that require as much as 150 volts.

Too little anode potential prevents the regenerative effect; too much increases the mush of the set.

The anode current when the quench is correctly adjusted is between 1.5 and 2 milliamps.

The life of the NR9 valve may be prolonged by using tight coupling on the quench adjustment and reducing the brightness of the valve.

It will probably be found that the valves require to be burnt brighter on the upper portion of the wavelength range than is necessary on the lower.

In some instruments the new inter-service valve holder is fitted. In these cases NR13 valves must be used instead of NR7.

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