

Aerodyne "Aeromagic"

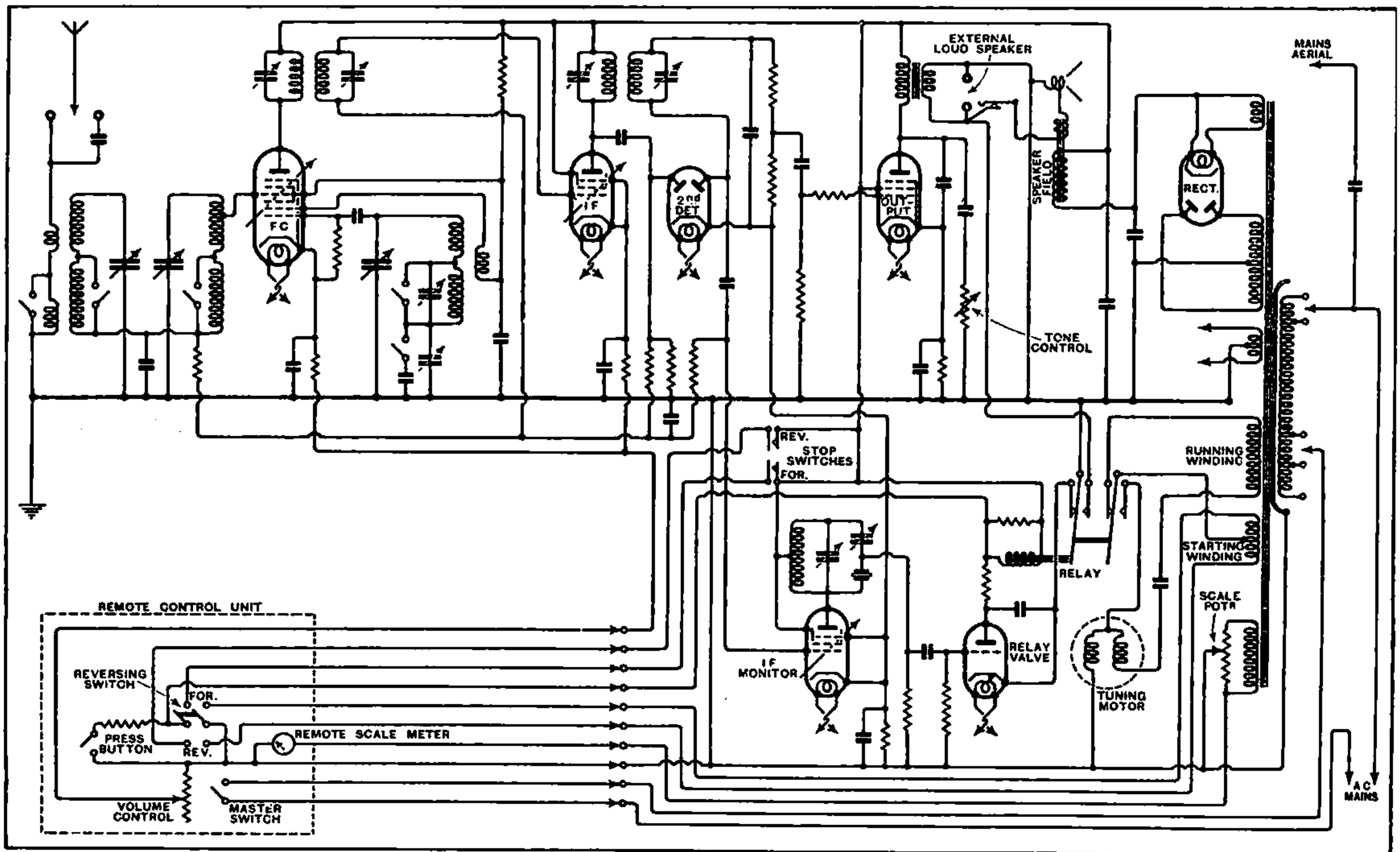
FEATURES.—*Type.*—Table model superhet for AC mains with automatic tuning and remote control. *Circuit.*—Octode frequency-changer—var.-mu pentode IF amplifier—double-diode detector—pentode output valve. *Automatic tuning valves*—pentode IF monitoring stage—triode relay valve. *Controls.*—(On set) (1) Tuning. (2) Tone. (3) Waverange. (On remote-control unit) (1) Volume and on-off switch. (2) Starting button. (3) Reversing switch.

Price.—23 guineas. *Makers.*—Aerodyne Radio Ltd.

WHATEVER may have been the conjectures of the technical experts when this set was first introduced at the Radio Exhibition, there was general agreement that any device which resulted in a really practical realisation of the idea of remote control was certain to have a large following. Hitherto schemes for controlling the set from an armchair have fallen through either because of backlash in the mechanical controls employed or because the devices used for stopping the tuning controls at predetermined positions were not readily adaptable to changes in the wavelengths of stations.

the set through a 10-way cable. It incorporates a press button for starting the small electric motor which drives the tuning condenser in the set, a reversing switch for retraversing the tuning scale and a combined master switch and volume control. There is also a meter-type instrument, calibrated in stations and wavelengths, which follows the setting of the main tuning scale and enables the

at work. After allowing the usual time for the valves to warm up the starting button is depressed and the scale pointer searches the waveband while the loud speaker is muted. The only sound during this phase is a faint whirring from the electric motor and gearing in the set itself. Eventually the pointer stops with a click and the station at which it has stopped breaks in at the volume which has been previously



Complete circuit diagram. The four-valve superheterodyne circuit is supplemented by a quartz crystal and two additional stages for automatic tuning.

The Aerodyne scheme circumvents both these difficulties; the remote control is electrical and not mechanical, and the station carrier wave itself is made to stop the tuning control when the set is exactly in tune with the station. Thus, if a slight change were made in the official wavelength of a station the "Aeromagic" set would find the new setting automatically and tune in the station precisely and without any trace of sideband distortion.

The remote control unit is connected to

user to identify the station to which the set has tuned itself.

The waverange switch is on the set itself. It could have been incorporated in the remote control, but the makers rightly considered that the additional cost was not justified, as usually this switch is used only two or three times during the course of an evening.

Apart from the obvious utility of the system in everyday listening there is an undeniable fascination in watching the set

determined by the setting of the control. There is no time delay, as the station was already accurately tuned before the loud speaker was switched on.

The volume control operates on the frequency changer and IF valves, and it can be so adjusted that the automatic tuning device stops only on those stations which are of programme value. This feature is also useful for cutting down background noise during periods when atmospheric conditions are prevalent, as a strong atmospheric as

Technical Details of the Self-Tuning and Remote-Control Devices

well as an authentic carrier wave is sufficient to trip the relay.

Any scepticism as to whether the station is, in fact, accurately tuned-in when the pointer stops is at once removed when the hand control of tuning on the set itself is operated and the station tuned in by ear. It will be found that the manual and automatic tuning positions do not differ by more than the thickness of the hair line on the pointer. Another check was obtained by reversing the motor and pressing the starting knob again immediately after a station had been tuned in, when it was found that if the pointer moved at all it was again only by about the thickness of the hair line.

Setting the Tuning Indicator

There is one point in connection with the remote tuning scale which must be watched. As this is virtually a voltmeter and derives its deflecting current from a potentiometer across a winding on the mains transformer the scale reading will depend to some extent upon the mains voltage. For this reason the makers have provided an intermediate tapping in the mains voltage adjustment so that the primary voltage can be adjusted in small steps to bring the remote scale into exact agreement with that on the set itself. In the set tested, incidentally, the range of the volume control was rather crowded

towards one end, but we understand that this matter, which is only a question of adjusting resistance values, is receiving attention.

The method by which the receiver is tuned exactly to the mid-point on any station is both ingenious and sound. A monitoring IF amplifier is fed with a part of the main IF output, and in its anode circuit is a quartz crystal having a resonance frequency exactly in the middle of the IF band-pass range. A bridge-type

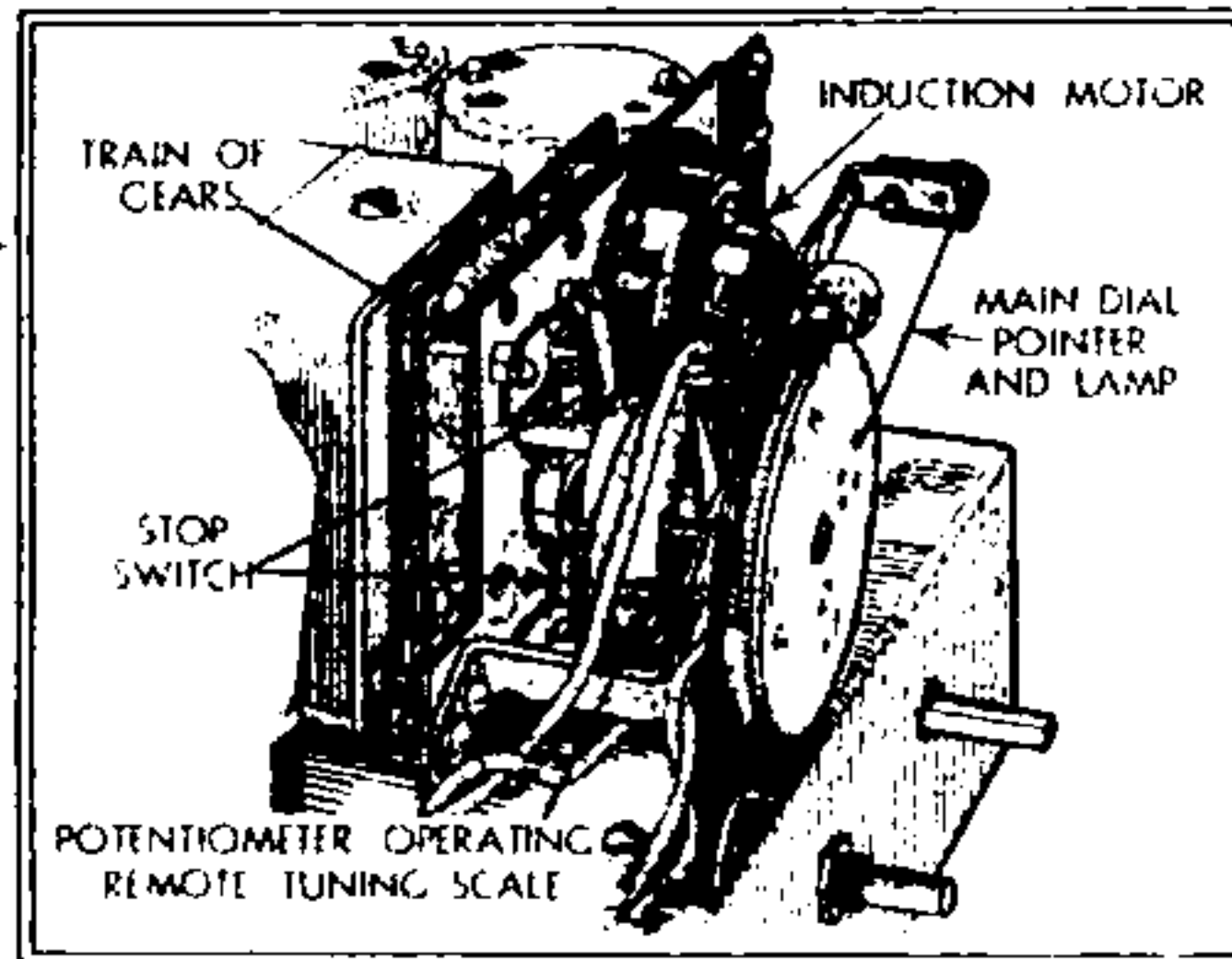
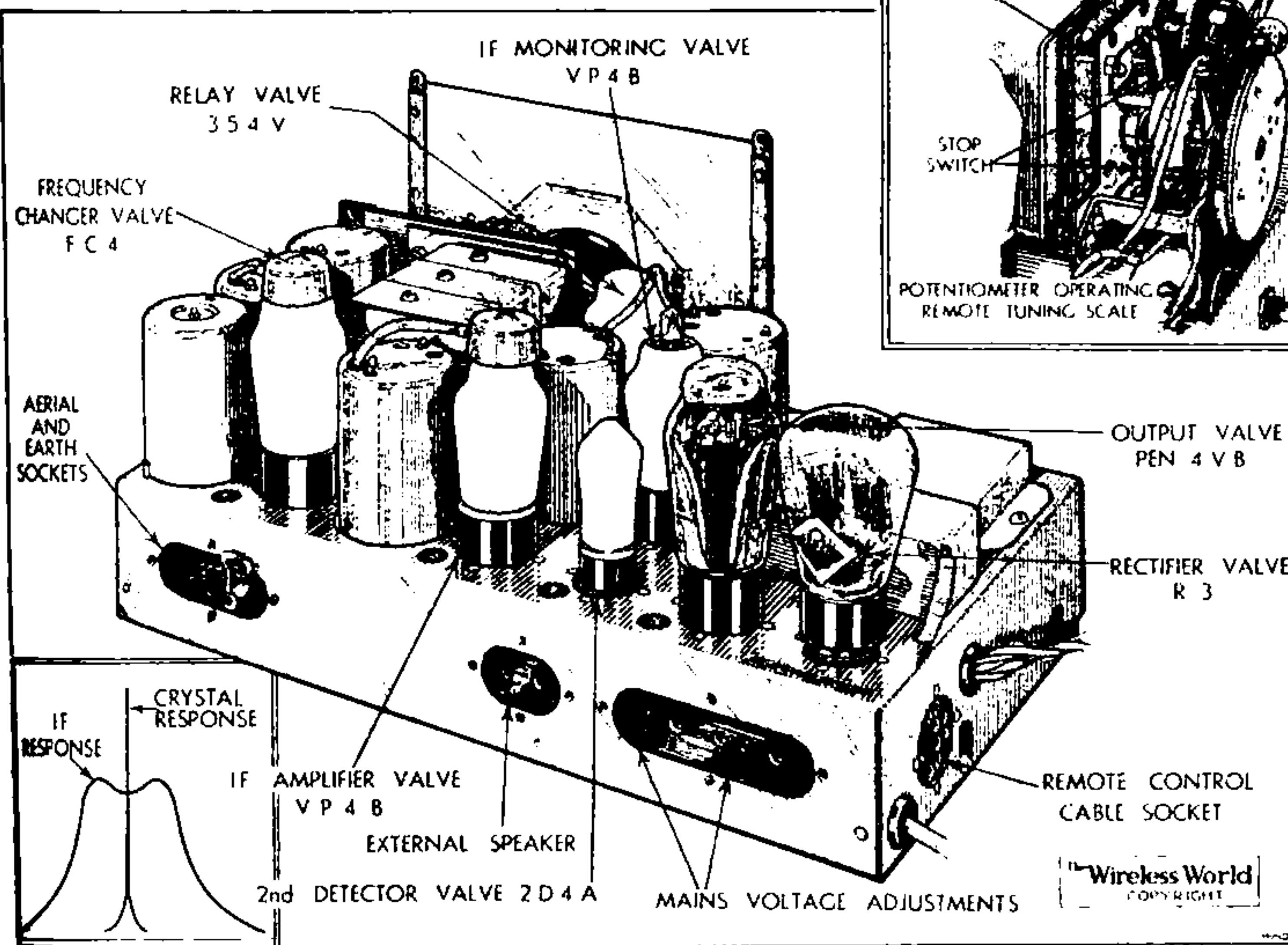
circuit is used to balance out the capacitance of the crystal, and the output from the anode circuit of the monitoring valve is passed to the grid of a triode relay valve. As the tuning scale slowly approaches the setting of a station the beat frequency between the oscillator and the carrier gradually approaches that of the quartz crystal. It does, in fact, pass one of the humps of the IF response curve, and unless the loud speaker were short-circuited quite strong signals would be heard before the crystal resonance frequency was reached. The sharpness of tuning of this circuit, however, ensures that the relay will not be released until the exact centre of the IF resonance curve is reached. When this occurs a pulse of short duration reaches the grid of the relay valve and reduces the anode current, so that the mechanical relay in its anode circuit operates and so stops the motor and opens the loud speaker circuit.

In developing the set it was found first that the duration of the pulse was too short to work the relay even when the speed of operation of this component was of the order of only a few milliseconds. Accordingly, the relay valve was given a time constant by connecting a suitable condenser and leak in its grid circuit. Contacts on the relay are arranged so that any change in the conditions in the relay valve will not cause the contacts to click again until the control button is pressed.

The motor which drives the spindle of the tuning condenser is of the self-starting induction type and is of Aerodyne design and manufacture. It is fitted with the usual running and starting windings on the stator and has a laminated rotor



The thirty-yard connecting cable makes it possible to control the receiver from a position convenient to the user.



General view of chassis and details of the driving mechanism for remote tuning control. The lower inset shows diagrammatically the crystal response in relation to the IF band-pass curve.

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with heavy copper eddy current rings. The voltage for the starting windings is obtained from a separate centre-tapped winding on the mains transformer which gives the necessary phase reversal to determine the direction of the starting impulse. To prevent the motor from over-running the limits of the tuning scale, switches are fitted at both ends which are operated by a peg on the condenser spindle.

The spindle is driven through a train of gears with a high reduction ratio, and to ensure against over-running after the impulse from the crystal has been received the motor, which necessarily has a high momentum, is declutched by withdrawing the driving pinion, much after the same principle as that employed in a car starter. The rotor is held out of centre by a light flat spring, and when the current is switched on the field of the stator pulls the rotor into line and so meshes the pinion with the main train of gears. Although the principle is straightforward, a good deal of time and research has gone to perfecting the detail of the mechanism and to ensure that it will be reliable and foolproof.

Receiver Performance

The set itself is a good, straightforward four-valve superheterodyne. Iron-cored coils are used in the medium-wave section of the input band-pass filter which is followed by an octode frequency-changer and a variable-mu pentode IF amplifier. The detector is a double-diode which provides AVC in addition to signal rectification. Incidentally, the circuit is so arranged that the IF monitoring valve provides some extension of the range of AVC. Resistance coupling is used between the detector and the pentode output valve. There is no LF volume control and the HF volume control at the remote-control panel consists of a variable resistance which is part of the bias resistances of the frequency changer and IF valves. The output from the pentode is shunted by the usual variable resistance and condenser tone control and the secondary of the output transformer is provided with sockets for the connection of an external loud speaker. These are so arranged that the external loud speaker, the internal loud speaker, or both, may be put into operation.

The range of the set is such that after dark the automatic tuning device will be stopping at every other degree on the tuning scale unless the volume control is turned down, and the selectivity is sufficient to give clear reception outside one channel on either side of the Brookmans Park transmitters when using the set in Central London. The long-wave selectivity is also excellent and the Deutschlandsender can be easily separated from Droitwich and Radio-Paris if the tone control is turned down slightly from the position of maximum brilliance. In actual fact the automatic tuning device will stop on the

Deutschlandsender when both the adjacent stations are working—an unusually severe test.

The balance of tone is good and the set excels in the reproduction of individual instruments of the orchestra. The high-note response is unusually good for a set of this type, and hand clapping, which is a good test of transient response, is very natural.

The success of a set of this type is largely dependent upon the reliability of the mechanical devices incorporated, but judging from the quality of workmanship throughout no fears need be entertained on this score.