

THE Q.U.A.D./R. TUNER UNIT

**I N S T A L L A T I O N
O P E R A T I O N
M A I N T E N A N C E**



PART I.—INSTALLATION

FITTING

The tuner unit is intended to be fitted to a cabinet or panel in exactly the same manner as the quality control unit of the Q.U.A.D. amplifier.

The cabinet or panel, may be of any thickness from $\frac{1}{8}$ " to $\frac{7}{8}$ " and it is only necessary to cut an oblong opening $10 \frac{1}{16}$ " x $3 \frac{1}{16}$ ". This opening should have $\frac{1}{2}$ " radius corners and can best be started by drilling four one inch holes. The distance between hole centres will be $9 \frac{1}{16}$ " horizontally and $2 \frac{1}{16}$ " vertically. The unit is inserted from the front and will locate automatically. The cover is fitted from the rear and will hold the unit firmly in position.

In some instances, it may be possible to allow sufficient room in the back of the cabinet to enable tuning to be carried out "in situ." This is however unimportant since it is a simple matter to withdraw the chassis for this purpose.

There are two leads from the tuning unit. The lead with a four pin plug should be connected to the four pin socket provided on the Q.U.A.D. main amplifier. The lead with jack termination should be plugged into input A on the Q.U.A.D. control unit. It is important that there is sufficient spare length on these leads to allow the tuner to be withdrawn for tuning purposes without unplugging.

The gramophone pickup should be plugged into one of the sockets A or B on the back of the tuner unit, in exactly the same way that it would be plugged into input A or B on the control unit if there were no tuner unit.

Aerial Earth System

A good aerial-earth system is essential for any worthwhile receiver and this becomes even more important when wide range reproduction is contemplated.

A full length vertical rod type is probably the most suitable for general purposes. These are available as straightforward aerials with unscreened down lead or they can be of the anti-interference type. It should be pointed out that "anti-interference" refers only

to man-made electrical interference and not to atmospheric or unwanted station interference. Such an aerial should only be used therefore if electrical interference is present. These cases occur frequently in large blocks of flats where there may be hair dryers, vacuum cleaners, etc., or where the aerial is adjacent to industrial premises radiating electrical interference.

Directional or semi-directional acrials can sometimes be used with advantage to increase the ratio of direct to reflected waves but they are complicated and require considerable local experiment.

An earth socket is provided at the back of the tuner and also on the main amplifier. Either one or the other should be used but not both.

In some applications, an advantage can be obtained by connecting a .01 mfd condenser from the earth terminal to one side of the mains supply. This can sometimes remove certain forms of electrical interference and it should also be employed if modulation hum is experienced (a hum which is present only when a station is received and stops when the aerial plug is removed).

PART II.

TUNING

Each tuner unit will require tuning for each installation. It is most essential that this tuning is carried out most carefully because subtle detail of quality is dependant upon it.

The radio engineer will be able to short-cut many of the operations detailed in this handbook by the use of oscillators and other aids to tuning. The instructions, however, enable the receiver to be tuned without any auxiliary apparatus whatever and will result in the finest possible quality being obtained from each station.

Selecting the Stations

It is first of all necessary to decide on the stations to be received and to allocate them to the four channels available on the tuner unit. It will probably not be necessary to utilise more than three channels since Home, Light and Third will normally be all that is required. Four channels are provided so that all contingencies can be covered. For example, in certain areas the Light programme on 247 metres provides better reception than the 1500

metre Light programme during daylight, the reverse being true during the hours of darkness. In such a case, two channels would be used for the Light programme so that the user can switch to the best channel, depending upon the time of day.

Fig. 1 is an illustration of the tuner front panel showing the order in which the channels are numbered. Fig. 3 shows the wavelengths employed by the various B.B.C. transmissions and also the range of wavelengths which each channel will cover.

Mark on Fig. 3 the Home, Light and Third stations which are applicable to the area where the equipment is used. These will normally be well known among listeners in the area and there will rarely be any doubt concerning the best choice. Should there be more than one wavelength transmitting the same programme and both appear equally well received in the area, then expert advice should be sought for the best choice or alternatively both alternatives can be included.

Having marked the three or possibly four selected stations, the next step is to allocate them to appropriate channels, one station to each channel.

The horizontal lines above the wavelength chart in Fig. 3 show the tuning range of all four channels. It is now a simple matter to allocate each station to an independent channel.

Suppose the stations selected are Third (194 metres), Light (247 metres), Home (330 metres) then the channels would be 1, 2 and 3 respectively. Suppose the stations are Third (464), Light (247), and Home (330), then the channels would be 3, 1 and 2 respectively.

The station indicator caps can now be pushed into place in the appropriate holes in the panel (see fig. 1).

Locating the Stations

The operations under this heading are best carried out during the hours of daylight. After dark, the foreign stations received are numerous and since they are not always easy to identify they merely confuse the search for the wanted stations.

For tuning, there must be free access to the twelve tuning screws (trimmers) on the left hand side of the unit and also to the four pre-set volume controls on the underside of the chassis. The tuner may be withdrawn from the front of the cabinet without disconnecting it, should this be necessary.

The twelve tuning screws may be recognised from Fig. 2. Each channel requires the adjustment of three trimmers or tuning screws and these are marked on the diagram. Thus for channel 1 the trimmers concerned are A1, B1, C1. For channel 2 they are A2, B2, C2 and so on.

The channels may be tuned in any order but it should be remembered that only those trimmers appropriate to the channel should be altered during adjustment.

The pre-set volume controls V1, V2, V3 and V4 adjust the volume level of each channel so that all the stations will be reproduced at approximately the same level when tuning is complete.

The following instructions apply to the tuning of channel 1. Exactly the same instructions apply to the other channels except that of course the designation of the trimmers and the pre-set volume control concerned will terminate with the number of the appropriate channel.

Set the amplifier control switch to CONTROLS OUT and set the volume control to position 7.

Turn down V1 to zero (anti-clockwise) and switch on. One of the programme indicator caps should now be illuminated. Turn the programme selection switch so that channel 1 station is illuminated.

Turn VI slowly up to maximum (clockwise) or until signal or noise is received at comfortable level.

Trimmers A1, B1 and C1 are now used to tune to the required station. Turning them anti-clockwise tunes the channel to a lower wavelength and vice-versa.

It is very important to keep the three trimmers in step. Each one has to be in tune at the same time for the station to be received. It follows that if the trimmers get into random adjustment considerable time has to be wasted in lining them up together again.

Assuming it is desired to tune to a lower wavelength, commence by tuning trimmer A1 anti-clockwise, one eighth of a turn. Follow this with trimmer B1 anti-clockwise, one eighth of a turn and similarly with C1. Repeat this process, keeping in step until a station of some sort is heard. This station may not be the one required but it provides an opportunity to re-align the trimmers should they have become slightly out of step. Adjust each trimmer so that the station is as loud as possible when they will then be truly in step.

Proceed in the above way until the desired station is reached, keeping as far as possible in step, not more than one eighth of a turn at a time and utilising intermediate stations as an opportunity to re-align and keep in step.

During this process, V1 should be kept as near as possible to maximum (clockwise), turning this down only when tuning past powerful stations in order that the sounds shall not be unnecessarily loud.

When the wanted station is found, adjust the three trimmers for maximum volume and at the same time if necessary reducing V1, to keep the volume at a comfortable listening level.

Care should be taken to ensure that the station found is truly the one for which one is searching. For example Welsh Home Service (340 metres), London Home Service (330 metres) and Midland Home Service (271 metres) may all be transmitting the same programme. If the power of the stations does not give a clue to this, then it will be necessary to re-check when the programmes are known to be different.

The trimmers will be approximately in step when leaving works and adjusted at about 245 m., 330 m., 435 m., and 1500 m. for channels 1, 2, 3 and 4 respectively. This will give some guide in commencing to tune to the desired stations.

Accurate Alignment—Staggering

Having tuned the unit as outlined in the preceding section, the following procedure should be carried out during the hours of darkness. The procedure is described as applying to channel 1 but it will be obvious that it should be repeated in the same way for each channel to be tuned.

Switch on. Set amplifier volume to 7 with control switch out. Set the programme selector switch to channel 1.

Adjust V1 to comfortable listening level. This adjustment should be such that when the main amplifier volume control is turned to 10 there is more than enough volume for any requirements yet the amplifier is not operating above its capable undistorted output. Return main volume control to position 7.

If the station is now received free from all station interference or is accompanied only by a slight very high whistle (which is easily removable with the filters on the amplifier control unit) tuning should be staggered in the manner to be described.

If the station is received together with a prominent whistle and possibly high pitched distorted sound from an unwanted station, then the tuning should be left as it is. Adjustment of the filters on the main control unit will result in the optimum reproduction from that station.

Before staggering, listen carefully to the volume of the station with the volume control set to 7.

Now reduce the volume control to position 5 and turn V1 clockwise to restore the volume to the previous level.

Re-check very carefully that trimmers A1, B1, and C1, are each adjusted to give the loudest signal.

Proceed by increasing the main volume control to position 6 and turn trimmer B1, slightly *anti-clockwise* until the sound is reduced again back to the same level. Next, increase the volume control to 7 and turn trimmer C1, slightly *clockwise* until the volume is again back to the same level.

This procedure should be carried out most carefully. It will be seen that turning the trimmer reduces the volume equivalent to one division of the main volume control. It is essential that turning trimmer B1 anticlockwise, and C1 clockwise, reduces the volume by the same amount in each case and that as far as possible the reduction each time is just sufficient to offset the one division increase of the volume control.

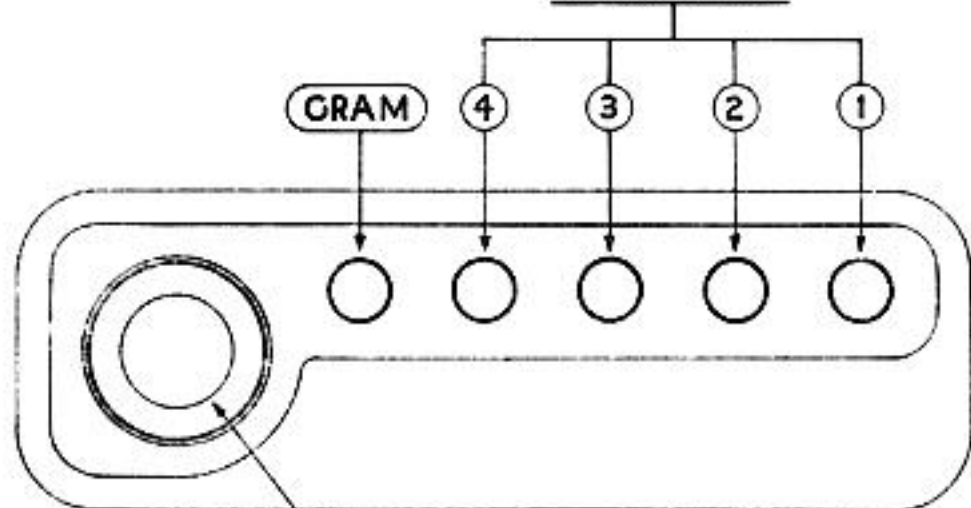
Trimmer A should not be touched during these operations.

The channel as it is now set, will reproduce the full quality of the transmitter without attenuation. It only remains to check that interference, if any, is removable with the filters on the main control unit. Should this not be the case, then the station should not have been staggered and the channel should be re-aligned to its previous condition.

When tuning is complete the tuner unit can be re-inserted in the cabinet. The greatest care must be taken not to disturb the trimmers by allowing them to foul the cabinet during this operation.

FIG 1.

CHANNELS



STATION SELECTOR.

FIG 2

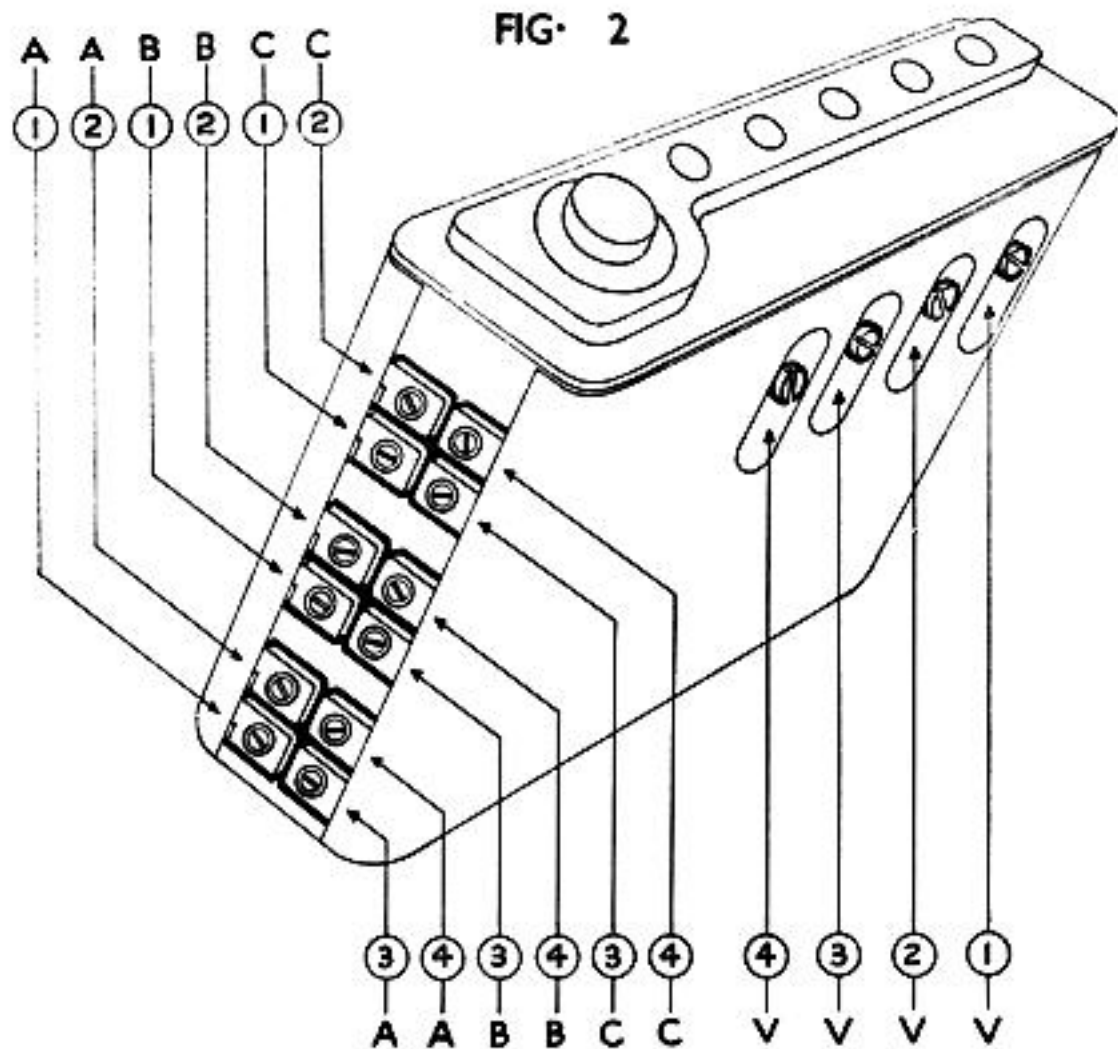
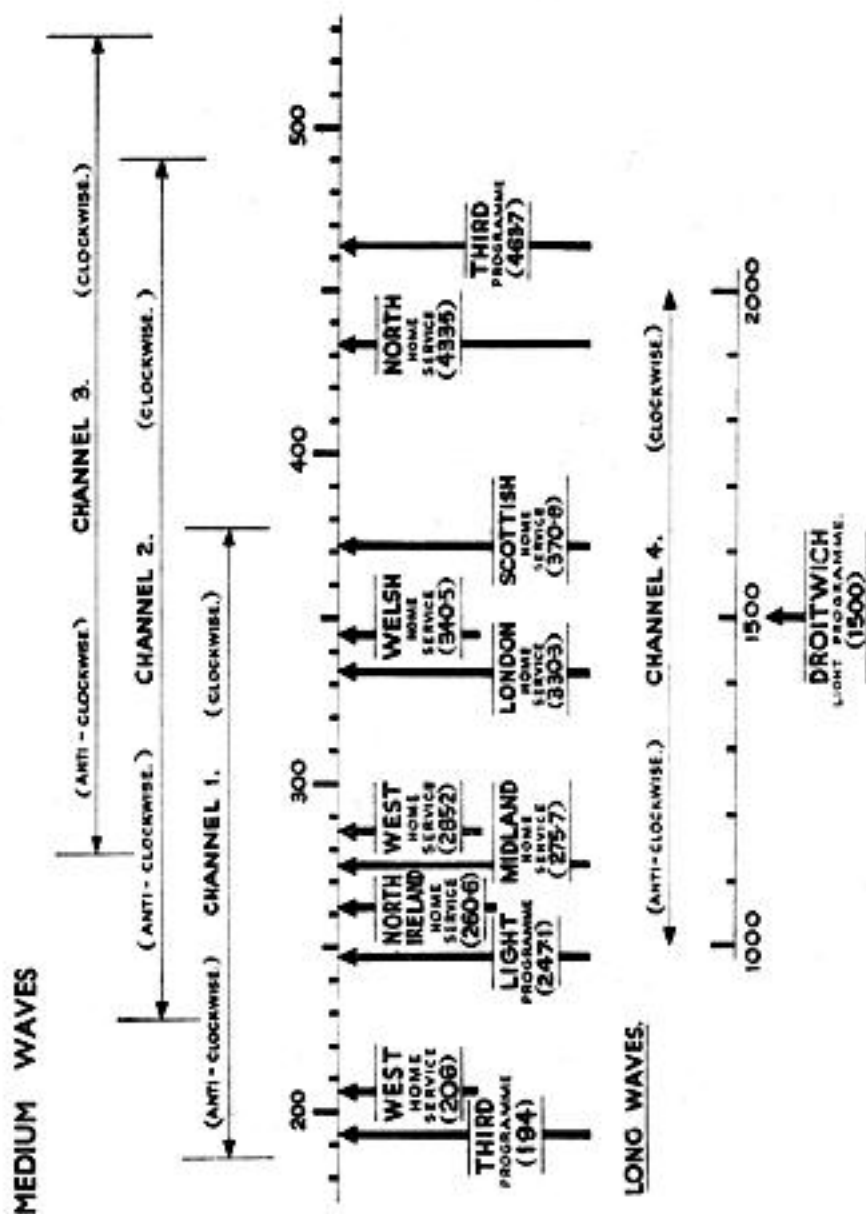
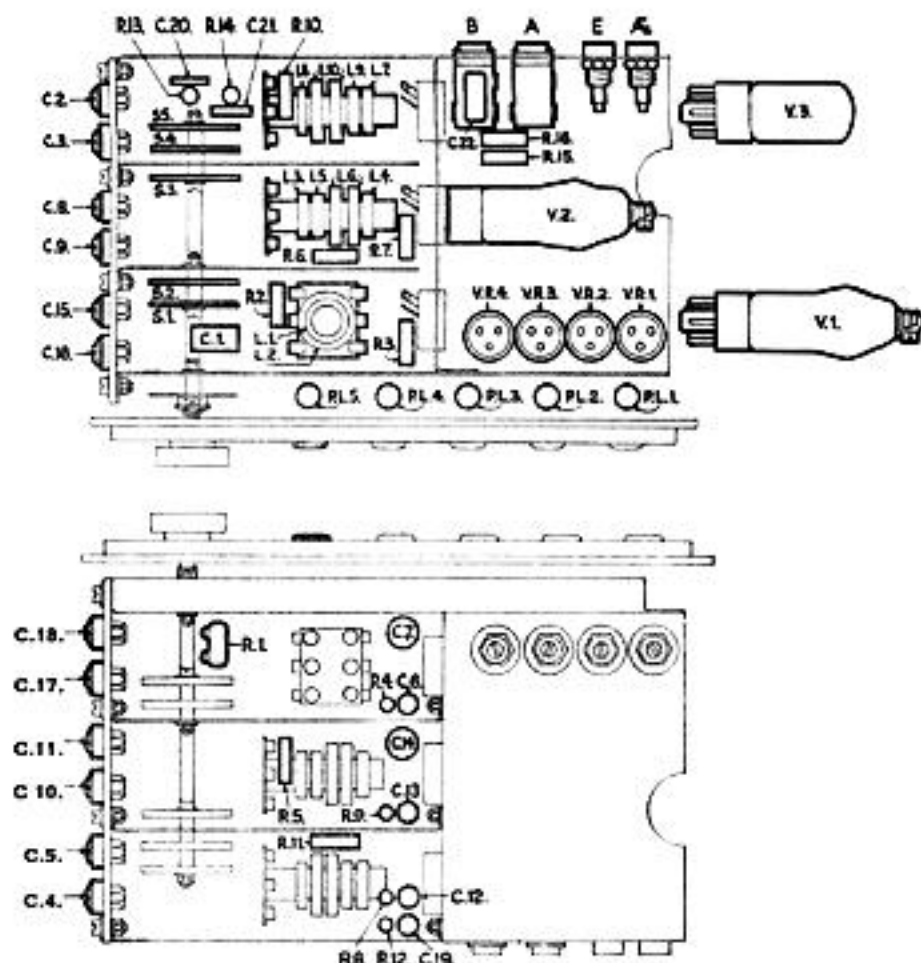


FIG. 3



N.B. THIS DIAGRAM IS IN ACCORDANCE WITH THE COPENHAGEN WAVELENGTH PLAN AT PRESENT IN FORCE (JAN. 1951.)

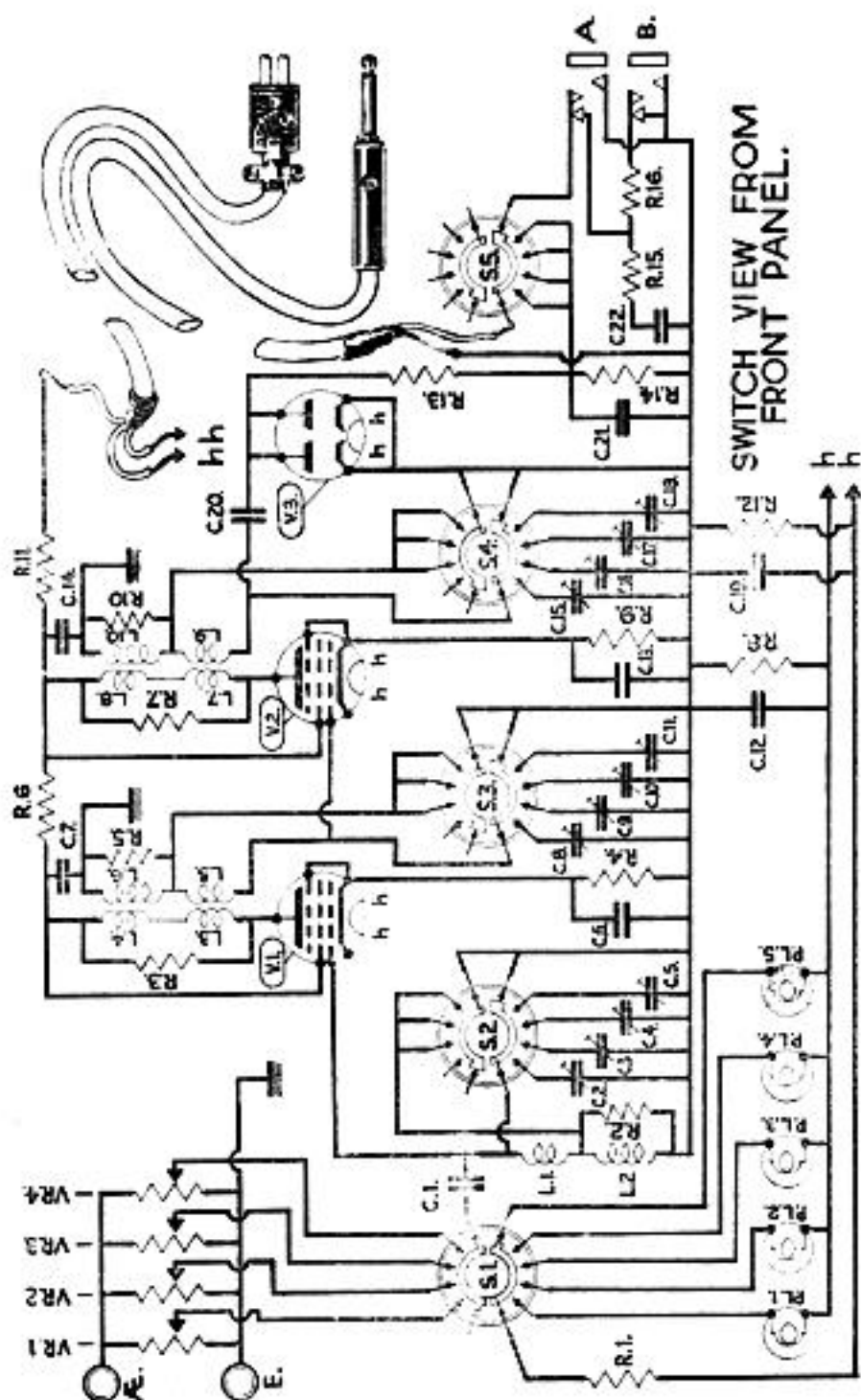


COMPONENTS LIST

R.1	5 ohms.	3 watt $\pm 10\%$
R.2	50,000 ohms.	watt $\pm 10\%$
R.3	15,000 ohms.	watt $\pm 10\%$
R.4	1,500 ohms.	watt $\pm 10\%$
R.5	50,000 ohms.	watt $\pm 10\%$
R.6	100,000 ohms.	watt $\pm 10\%$
R.7	15,000 ohms.	watt $\pm 10\%$
R.8	27,000 ohms.	watt $\pm 10\%$
R.9	1,500 ohms.	watt $\pm 10\%$
R.10	50,000 ohms.	watt $\pm 10\%$
R.11	27,000 ohms.	watt $\pm 10\%$
R.12	27,000 ohms.	watt $\pm 10\%$
R.13	470,000 ohms.	watt $\pm 10\%$
R.14	4,700 ohms.	watt $\pm 10\%$
R.15	10,000 ohms.	watt $\pm 10\%$
R.16	50,000 ohms.	watt $\pm 10\%$
V.R.1, V.R.2, V.R.3, V.R.4,	50,000 ohms linear 10%	
C.1	45 pf. silvered mica.	
C.2	20-250 pf. 500v. D.C. wkg.	

C.3	75-450 pf. 500v. D.C. wkg.
C.4	100-580 pf. 500v. D.C. wkg.
C.5	75-450 pf. 500v. D.C. wkg.
C.6	0.1 mfd. 150v. D.C. wkg.
C.7	0.1 mfd. 350v. D.C. wkg.
C.8	20-250 pf. 500v. D.C. wkg.
C.9	75-450 pf. 500v. D.C. wkg.
C.10	100-580 pf. 500v. D.C. wkg.
C.11	75-450 pf. 500v. D.C. wkg.
C.12	0.01 mfd. 350v. D.C. wkg.
C.13	0.1 mfd. 150v. D.C. wkg.
C.14	0.1 mfd. 350v. D.C. wkg.
C.15	20-250 pf. 500v. D.C. wkg.
C.16	75-450 pf. 500v. D.C. wkg.
C.17	100-580 pf. 500v. D.C. wkg.
C.18	75-450 pf. 500v. D.C. wkg.
C.19	0.01 mfd. 350v. D.C. wkg.
C.20	45 pf. silvered mica.
C.21	600 pf. moulded mica.
C.22	0.05 mfd. 250v. D.C. wkg.

S.1	Switch P/No. 661F.	L.3	1st Inter-stage coil,	P.L.1	6.5v. 0.3A. 12m/m R.D. Mes. Bulbs.
S.2		L.4		P.L.2	
S.3		L.5		P.L.3	
S.4		L.6		P.L.4	
S.5		L.7	2nd Inter-stage coil,	P.L.5	
L.1	Aerial Coil.	L.8		V.1 E.F.36	R.F. Pentode
L.2		L.9		V.2 E.F.36	
		L.10		V.3 E.B.34	



VOLTAGES

Test Point	Static No Signal	Remarks
Pin 6, V.3.	280v. D.C. pos.	— —
Across Pins 2 & 7 V.3	6.3v. A.C. rms.	h.h. is C.T. to chassis
Pin 4, V.2.	162v. D.C. pos.	Valve voltmeter
Pin 3, V.2.	< 162v. D.C. pos.	Valve voltmeter
Pin 8, V.2.	4v. D.C. pos.	— —
Pin 3, V.1.	< 63v. D.C. pos.	Valve voltmeter
Pin 4, V.1.	63v. D.C. pos.	Valve voltmeter
Pin 8, V.1.	1.3v. D.C. pos.	— —

NOTE.—All voltages taken with respect to chassis unless otherwise stated.

THE ACOUSTICAL MANUFACTURING CO., LTD.
HUNTINGDON, HUNTS. **Tel. : 361.**