

KOLSTER-BRANDES 640 ALL-WAVE FIVE

CIRCUIT.—The aerial is capacitively and inductively coupled to the grid of V1, the frequency changer, through a set of tuned H.F. transformer coils. A resistance is shunted across the primaries of the coils between aerial and earth to discharge static.

The signal, converted to the I.F. frequency of 464 kc., passes via an I.F. transformer to V2, an H.F. pentode, which is the I.F. amplifying valve.

The output passes by means of another I.F. transformer to the demodulating diode of V3, a double diode triode. The other diode provides a D.C. potential, which is fed back to valves V1 and V2 to give automatic volume control.

The rectified signal impulses pass via an L.F. coupling condenser and volume control to the grid of the triode section of V3.

V3 is resistance capacity coupled to V4, an output pentode, in the anode circuit of which is a pentode compensator condenser to modify the tone.

Mains equipment consists of a full wave rectifying valve, electrolytic smoothing condensers, smoothing choke (speaker field) and mains transformer.

Chassis Inspection.—A false bottom is incorporated in the receiver. This is secured by four wood screws and with its removal the underside of the chassis is accessible for most service requirements.

Chassis Removal.—The back of the receiver cabinet is held by two sliding clips and can be removed with a minimum of trouble.

The tuning knob on the front is of the grub screw type, the screw fitting into a recessed portion of the control shaft. The other two control knobs are spring fixed type and can be removed by a slight pull.

Turn up the receiver on end with the

mains transformer side nearest the test bench and remove the four nuts and bolts on the base of the cabinet. The cabinet can then be turned right way up again and the chassis can be removed to the extent of the speaker cable.

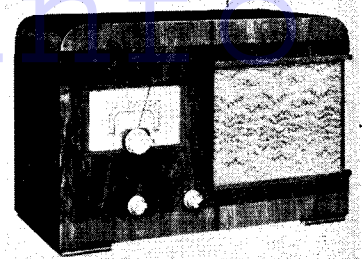
Connections to the speaker transformer are, counting from the left: Brown lead, blank, black, red and blue.

The speaker cable is clamped to the chassis; with the removal of this clamp the chassis can be further freed if it is not desired to remove the speaker and yet to obtain a slightly longer cable.

Special Notes.—The dial light is mounted in a screw-in holder fixed to the gang condenser located at the back of the dial assembly. It is rated at 13 volts 3 watts and has an MES type base.

The mains voltage arrangement takes the form of a wander plug and three sockets. This device is located on a bakelite panel mounted on the mains transformer at the back of the chassis.

There are no sockets for an external speaker but an external speaker can be used if required. This should be of the permanent magnet moving-coil type with a speech coil resistance of two ohms. It



The 640 by Kolster-Brandes, Ltd., is a four-valve plus rectifier A.C. superhet listing at 9 gns. Three wave bands are covered.

should be connected so that the speech coils of the set and external speakers are in parallel.

Circuit Alignment Notes

I.F. Circuits.—Connect a service oscillator between the top grip cap of V1 and chassis via a small fixed condenser if one is not already incorporated in the service oscillator. Connect an output meter across the primary of the speaker transformer. Turn the gang condenser to maximum capacity and the volume control to maximum.

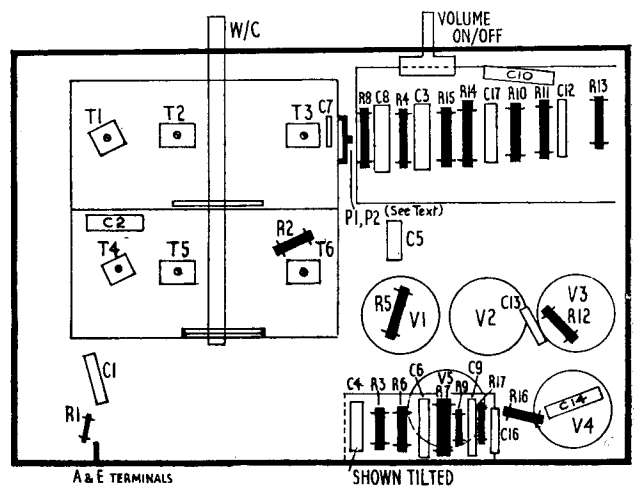
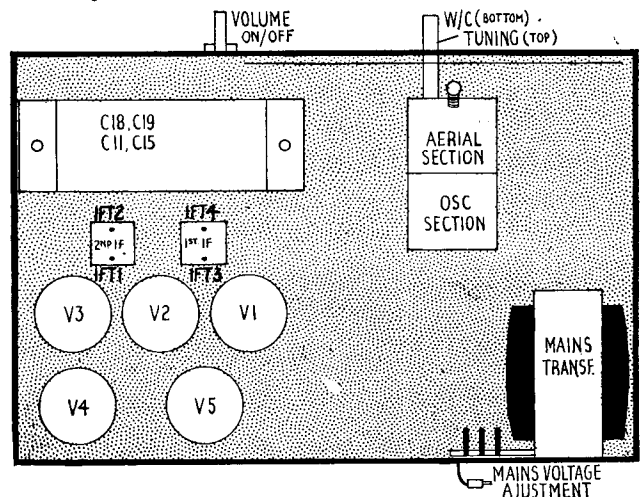
Tune the oscillator to 464 kc. and trim IFT1, IFT2, IFT3 and IFT4 for maximum, reducing the input from the service oscillator as the circuits come into line so as to render the A.V.C. inoperative.

VALVE READINGS				
Volume maximum. No signal. 200 volt A.C. mains.				
V.	Type.	Electrode.	Volts.	Ma.
1	(All Brimar). 15D1 (7)	Anode ...	233	4
		Osc. ...	125	5.9
		anode Screen ...	85	5.2
2	9D2 (7)	Anode ...	260	7
		Screen ...	85	1.8
3	11D3 (7)	Anode ...	82	.5
4	7D5 (7)	Anode ...	242	34
		Screen ...	258	7.2
5	R2 (5)	Filament	345	—

QUICK TESTS

Quick tests are available on this receiver between the speaker transformer and chassis. Volts measured should be:—

- Blue lead, 242 volts, smoothed H.T.
- Red lead, 258 volts, smoothed H.T.
- Brown lead, 345 volts, unsmoothed H.T.



Chassis layout diagrams of the 640. To correspond with the circuit the order of the switch banks, from the chassis front, are x, y, z.

Do not use the volume control of the receiver to effect a change in volume, but reduce the input from the service oscillator.

Signal Circuits.—Leave the output meter connected as before, but connect the oscillator to the aerial and earth terminals of the receiver. Replace top grid cap of V1.

Only feed sufficient input from the oscillator to obtain a half scale reading of the output meter. If too much input be fed the A.V.C. of the receiver begins to operate, which is precisely what is to be avoided.

Medium waves.—Tune the set and oscillator to 1400 kc. (approx. 214 metres) and adjust T2 and T5 for maximum.

Tune the set and oscillator to 600 kc. (500 metres) and adjust the nut of the

padding condenser (P1), located as in diagram, for maximum response in the output meter simultaneously rocking the gang to ensure optimum results.

Long waves.—Tune the set and oscillator to 250 kc. (1,200 metres), and adjust the long wave trimmers T3 and T6 for maximum.

Tune the set and oscillator to 175 kc. (1,720 metres) and adjust long wave padding condenser P2 (screw of padding condenser) for maximum simultaneously rocking the gang.

Short waves.—Turn the set and oscillator to 17 mc. (17.6 metres) and adjust short wave trimming condensers T1 and T4 for maximum results.

Check for calibration by injecting a signal of 6 mc. (50 metres) and tuning it in. Note the dial position and if necessary compensate by adjusting T1 slightly.

K.B. 640 on Test

MODEL 640.—Standard model for A.C. mains operation, 200-250 volts, 40-60 cycles. Price 9 gns.

DESCRIPTION.—Three waveband, four valves plus rectifier, table superhet with speaker at the side of the chassis.

FEATURES.—Full-vision scale calibrated in wavelengths and station names. There are no sockets for pick-up or external speaker.

LOADING.—70 watts.
Sensitivity and Selectivity.
SHORT WAVES (16.5-50 metres).—Average sensitivity, selectivity satisfactory. No appreciable drift. Easy to handle.

MEDIUM WAVES (195-550 metres).—Gain and selectivity up to standard for the valve combination employed, local stations spreading only on adjacent channels. Gain fairly well maintained over the entire waveband.

LONG WAVES (970-2,300 metres).—Adequate gain and average selectivity. No overlap on Deutschlandsender.

Acoustic Output.
Ample volume for an ordinary room with a well-balanced frequency characteristic. Only slight colouration noticeable.

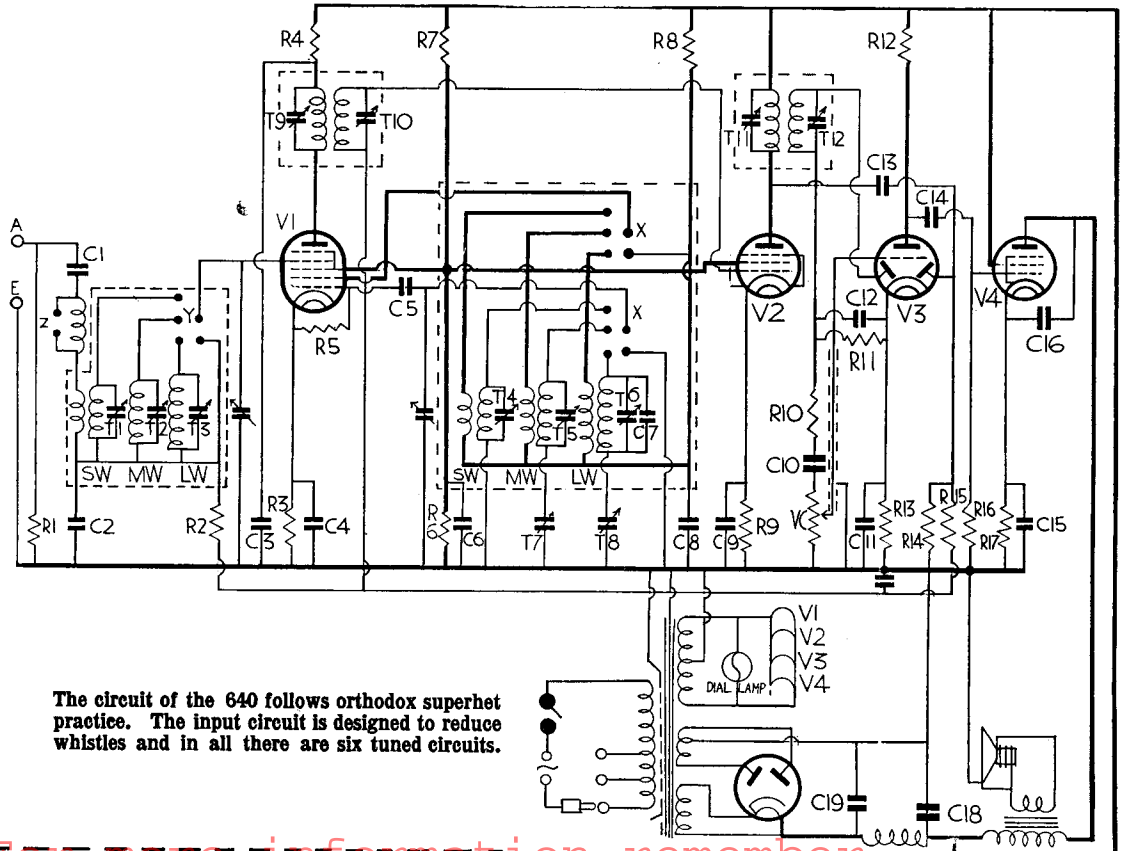
A. H. Hunt, Ltd., can supply a unit containing Cs. 18, 19, 11 and 15, list 3692. at 11s. 6d. retail.

CONDENSERS

C.	Purpose.	Mfds.
1	Aerial coupling ...	.0005
2	V1 A.V.C. decoupling ...	.005
3	V1 anode decoupling ...	.1
4	V1 cathode shunt ...	.1
5	Oscillator grid ...	.0001
6	V1, V2 screen decoupling ...	.1
7	Long-wave osc. trimmer ...	.00007
8	Osc. anode decoupling ...	.1
9	V2 cathode shunt ...	.1
10	L.F. coupling ...	.02
11	V3 cathode shunt ...	25
12	H.F. by-pass ...	.0005
13	A.V.C. diode coupling ...	.00005
14	L.F. coupling ...	.02
15	V4 cathode shunt ...	25
16	Pentode compensator ...	.001
17	A.V.C. line decoupling ...	.1
18	H.T. smoothing ...	16
19	H.T. smoothing ...	8

RESISTANCES

R.	Purpose.	Ohms.
1	Aerial shunt ...	10,000
2	V1 A.V.C. decoupling ...	100,000
3	V1 cathode bias ...	250
4	V1 anode decoupling ...	5,000
5	Oscillator grid leak ...	25,000
6	V1, V2 screen pot. (part) ...	50,000
7	V1, V2 screen pot. (part) ...	20,000
8	Oscillator anode decoupling ...	20,000
9	V2 cathode bias ...	250
10	H.F. filter ...	100,000
11	Demodulator diode load ...	500,000
12	V3 anode load ...	250,000
13	V3 cathode bias ...	10,000
14	A.V.C. diode load ...	500,000
15	V1, V2 A.V.C. decoupling ...	500,000
16	V4 grid leak ...	100,000
17	V4 cathode bias ...	400



The circuit of the 640 follows orthodox superhet practice. The input circuit is designed to reduce whistles and in all there are six tuned circuits.

KOLSTER-BRANDES 640, 650, 670

Four-valve, plus rectifier, three-waveband superhet. Sockets are provided for a low impedance extra loudspeaker on the 650 and 670 models. Pickup sockets are provided on the 650 while the 670, which is the radiogram version, has in addition a variable tone control. Suitable for operation from AC mains 200-260 v, 40-60 cycles. Marketed by Kolster Brandes, Cray Works, Sidcup, Kent.

SIGNALS are fed via C1 to the aerial coupling components L2, on SW, and C2 for MW and LW. On LW only L1 is in circuit for filtering.

The grid tuning coils are L3 (SW), L4 (MW), and L5 (LW), these being switched as required across VC1 section of the ganged condenser.

Signals are fed direct to the grid of the heptode frequency-changer V1 which has permanent cathode biasing by R3, decoupled by C4. The oscillator section of V1 employs tuned grid coils L6 (SW), L7 (MW), and L8 (LW), tuned by VC2 section of the gang C5, R5 are the grid condenser and leak, and feed-back is established through the anode coils L9, L10, L11.

An intermediate-frequency transformer L12, L13, transfers the IF signal from V1 to the grid of the variable-mu pentode V2, which has cathode-biasing derived from R9 decoupled by C9.

A second IF transformer L14, L15, hands on the signal to the detector diode of the double diode triode V3.

VALVE READINGS

V.	Type.	Electrode.	Volts.	Mas.
1	15D1 (All Brimar)	Anode	233	4
		Osc. Anode	125	5.9
		Screen	85	5.2
2	9D2	Anode	260	7
		Screen	85	1.8
3	11D3	Anode	82	.5
4	7D5	Anode	242	34
		Screen	258	7.2
5	R2	Heater	345	—

Pilot Lamp 13v 3 watt M.E.S., Vita.
NOTE: V1—V4 have 13v heaters connected in parallel. Readings taken with volume control at maximum, no signal input on 200v AC mains.

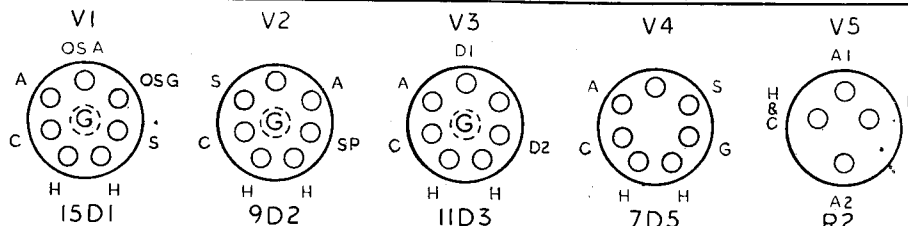
The audio-frequency load resistance is R11 filtered by C12 and the LF signal is passed via R10 and C10 to the volume control VR1 and thence to the grid of the triode section of V3.

The automatic volume control diode of V3 is fed from the anode of V2 through C13, the load resistance being R14. AVC bias is applied from R14 to the grid

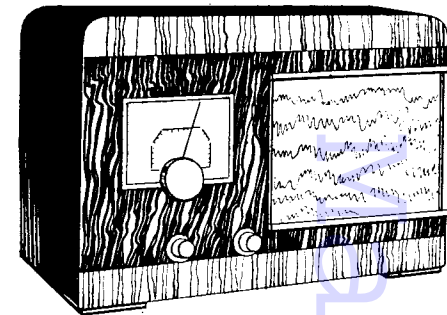
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WINDINGS

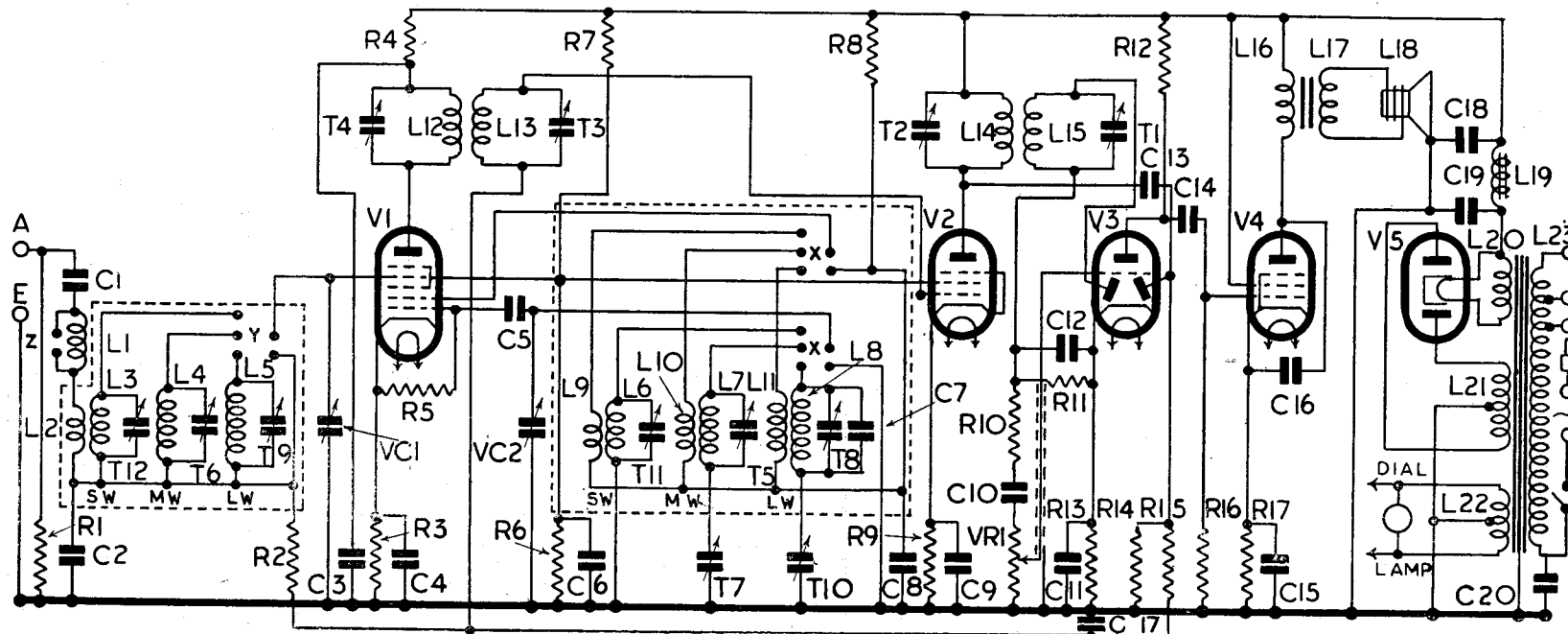
L.	Ohms.	L.	Ohms.
1	.. 16.5	13	.. 7.5
2	.. .1	14	.. 7.5
3	.. .05	15	.. 7.5
4	.. 3	16	.. 410
5	.. 13	17	.. .35
6	.. .05	18	.. 1.9
7	.. 3.5	19	.. 1,000
8	.. 7.25	20	.. .2
9	.. .1	21 (total)	.. 200
10	.. 2.7	22	.. .5
11	.. 4.4	23	.. 29
12	.. 7.5		



The circuit follows orthodox superhet practice but is distinguished by the special tuned circuits common to KB models and relying on bottom capacity coupling for signal input from the aerial.



Model 640 by Kolster-Brandes is a four-valve plus rectifier set originally listing at 9 gns. Three wavebands are covered.



RESISTORS

R.	Ohms.
1	.. 10,000
2	.. 100,000
3	.. 250
4	.. 5,000
5	.. 25,000
6	.. 50,000
7	.. 20,000
8	.. 20,000
9	.. 250
10	.. 100,000
11	.. 500,000
12	.. 250,000
13	.. 10,000
14	.. 500,000
15	.. 500,000
16	.. 100,000
17	.. 400
VR1	.. 500,000

CONDENSERS

C.	Mfds.
1	.. .0005
2	.. .005
3	.. .1
4	.. .1
5	.. .0001
6	.. .00007
7	.. .1
8	.. .1
9	.. .02
10	.. .25
11	.. .0005
12	.. .00005
13	.. .02
14	.. .25
15	.. .001
16	.. .1
17	.. .16
18	.. .8
19	.. .01
20*	.. .01

* May not be found in all models.

Radio Marketing Service

KB 640

—Continued—

circuit of V1 and V2 via decoupling components R15, C17, R2.

V3 is cathode biased by R13 decoupled by C11, and LF signals are resistance-capacity coupled by R12, C14, and R16 to the grid of the output pentode V4. This valve is cathode biased by R17, decoupled by C15 and a permanent degree of pentode tone correction is effected by C16.

V4 output is coupled by the output transformer L16, L17 to the speech coil L18 of the energised moving-coil loudspeaker whose field winding L19 is the smoothing choke for the HT supply, with C18 and C19 as reservoir and smoothing condensers. V5 is the full-wave rectifying valve.

The LT supply is unusual for the type of valve used, but all heaters are in parallel across the 13-volt LT winding L22.

GANGING

IF Circuits.—Adjust the ganged condenser to maximum capacity on MW and the volume control to maximum. Inject a 464kc signal into the grid of V1 (top cap) via a small capacity condenser and adjust T1, T2, T3, and T4 for maximum output, keeping the signal low to avoid AVC action.

MW Band.—Switch to MW and tune receiver to 1,400kc. Inject a signal of this frequency into the aerial and earth sockets of the receiver and adjust T5 and T6 for maximum output.

Tune receiver to 600kc and inject a signal of this frequency. Adjust the nut of the trimming condenser T7 for maximum output while rocking the gang.

LW Band.—Switch receiver to LW and tune it to 250kc. Inject a signal of this frequency and adjust T8 and T9 for maximum output.

Tune receiver to 175kc and inject a 175kc signal. Adjust the screw of the trimmer T10 while rocking gang, for maximum output.

SW Band.—Switch to SW and tune the receiver to 17mc and inject a signal of this frequency into the receiver. Adjust T11, and T12 for maximum output.

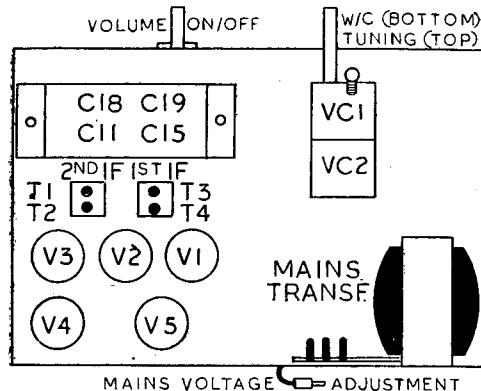
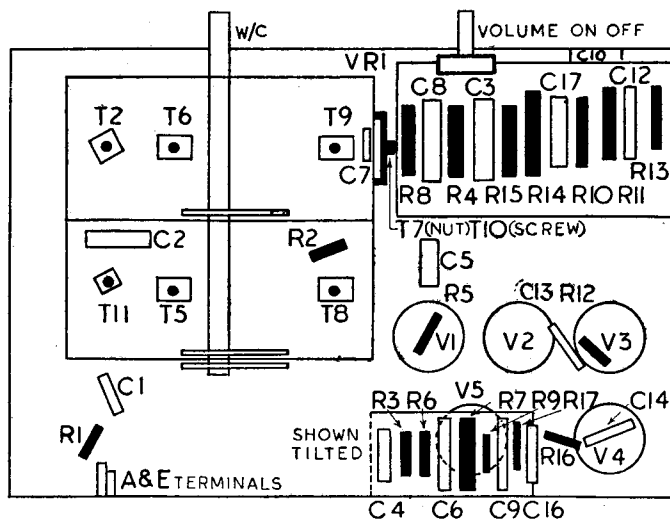
Check calibration at 6mc and, if necessary, compensate for any error by adjusting T12 slightly.

MODEL 650

Model 650 is practically identical with the Model 640 whose circuit is described above, the only difference being the provision of pick-up sockets for a high resistance pick-up across the volume control VR1.

MODEL 670

A few minor circuit modifications are incorporated in the chassis when it is used in the radiogramophone model 670.



There are three switch banks below the chassis and, corresponding to circuit lettering, they are X, Y, Z from chassis front to rear.

A double-pole radio-gram switch is incorporated which, when in the radio position, open circuits the pick-up input. On gram the pick-up circuit is re-established across VR1 and radio signals are muted by breaking the circuit between C10 and VR1.

In addition, pick-up signals are reduced by feeding the pick-up across a 10,000 ohm resistance in series with a 250,000 ohm resistance, the two resistances being connected across the volume control.

Extra decoupling in the anode circuit of V3 is also introduced by means of an additional 50,000 ohm resistance above R12 with a 2 mfd condenser connected between the junction of the two resistances and chassis.

A variable tone control comprising a .02 mfd condenser in series with a 50,000 ohm variable resistance is connected between the anode of V4 and chassis. The mains on-off switch is ganged to the tone control in the radiogramophone model 670.

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