

PHILIPS 855X

Five-valve, plus rectifier, three waveband table model superhet with electronic tuning indicator and mechanical push-button tuning. Suitable for 100-260 v., 50-100 cycle A.C. supplies. Made by Philips Lamps, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

Circuit.—The tuning stages of this receiver are unusual in a way that is not immediately apparent from the circuit diagram. The input circuit on medium and long waves is a band-pass arrangement, the V1 grid coils being

L16, L17, tuned by a condenser shown between V1 and V2. The coupling between V1 and V2 is then aperiodic, the signals being developed across R4 and applied to V2 grid through C20.

On the short waves, the aerial is connected to V1 through transformer coils. A similar arrangement, with the gang section transferred to the grid circuit, forms the coupling between V2 and V3.

V1 is a radio-frequency amplifier, and V2 is the frequency-changer. Both valves receive A.V.C. bias via resistances with D.C. isolating condensers before the grids. The oscillator section of V2 has the tuned coils fed by resistance coupled windings in the grid circuit.

The first I.F. transformer has a switched extra winding on the secondary for increased band-width. V3 is the I.F. amplifier. Both I.F. transformers are permeability trimmed.

Both demodulation and A.V.C. diodes are housed with the output pentode in V5. The demodulation network is basically straightforward and includes a pick-up "break" radio and connect a pick-up. The volume control feeds the pentode in V4, a combined I.F. amplifier and tuning indicator.

The bottom end of the volume control and a tapping on it are connected through a resistance-condenser network to a third winding on the output transformer for negative feedback. This winding is centre-tapped, and the other half is connected back to R23, which is a variable

tone control, and to L37, C65, which form a whistle filter.

The anode circuit of the V4 pentode section provides H.T. for the indicator section and amplified L.F. for the grid of V5. The A.V.C. diode of this valve receives a delay bias from a voltage divider consisting of R40, R41, R31, R43. Negative A.V.C. voltages developed across R31, R43, are fed back to V1, V2 and V3.

The full-wave rectifier, V6, provides H.T. without a choke for smoothing. R1 and C2 provide a smoothed supply for V1—V4, and a resistor, R36, in the main negative line provides a voltage drop used to bias V5.

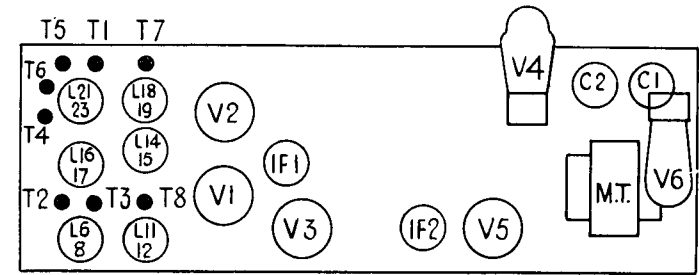
PILOT LAMP: Philips M.E.S. type, No. 8,091D. Provision is made for a pick-up and a 5-7 ohm extension speaker.

SWITCHES.—The switch sections of the circuit diagram represent the actual construction. The two concentric rings of dots and small circles represent the stator (fixed part) of each switch unit. The lines between these concentric rings, whether short radial lines or arcs (which may be in dot lines), represent the elements on the rotor which perform the various connections between the stator contacts.

As drawn, the switches, 1-4, are in the S.W. position. M. and L.W. positions follow in the direction shown by the arrows. The selectivity switch, No. 5, is "narrow," and the P.U. switch, No. 6, is set for radio.

GANGING

L.F. CIRCUITS.—Set to 180 m., volume max., tone treble and selectivity narrow. Inject 473 kc. to V2 grid.



This receiver has an R.F. stage before the frequency-changer and the electronic tuning indicator incorporated an L.F. amplifier. The circuit follows the usual Philips lines, and is not affected by the mechanical auto-tuning system. The switch diagrams are explained in the text.

Connect 80 mmfd. across L27-28, and adjust L29-30 for maximum. Connect the 80 mmfd. across L30 and successively adjust L27-28, L25 and L24.

Remove capacity. Seal coil cores. **M.W. BAND.**—Adjust gang with Philips trimming gauge (or dial to 188 m.). Inject 1,590 kcs. and adjust T1, T2 and T3.

Inject and tune to 546 kcs. and pad with T4. Repeat 1,590 kcs. adjustment.

L.W. BAND.—Inject 400 kcs., tune to 750 m., and adjust T5. Inject and tune in 160 kcs., and pad with T6. Repeat 400 kcs. adjustment.

Philips recommend the following method of padding: After trimming at the low wavelength end of the band, connect the anode of V2 through a small capacity to the aerial of an additional receiver. Transfer output meter to this set. Short-circuit the oscillator. Tune both receivers to maximum on padding frequency.

Dial 855X first to left, then to right, finding two points at which output drops to a third. Set dial midway between these points, remove extra set, and adjust padding condenser for maximum.

S.W. BAND.—Inject and tune to 20.3 mc. Adjust T7 (first peak from minimum capacity) and T8.

Inject and tune to 6 mc., adjust loop X (see circuit) for maximum. Repeat trimming at 20.3 mc.

PUSH KEYS

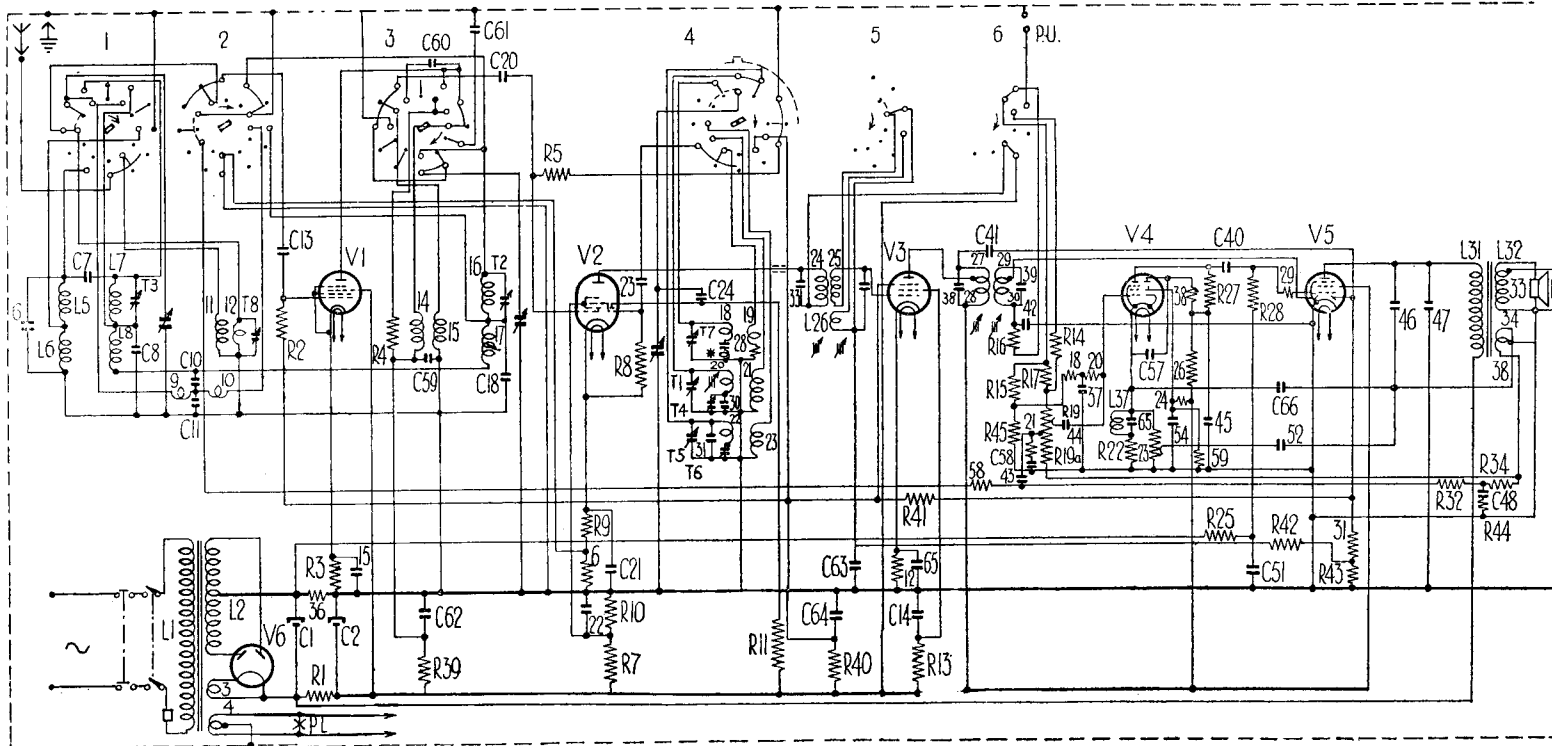
Push down key, insert special tool (kept in back of cabinet) into aperture below keyboard, and rotate adjusting screw until required station is tuned in accurately by dial and tuning indicator.

To change the waveband of one of three left-hand keys, insert tool (without depressing key) and turn anti-clockwise a few turns for M.W., or turn clockwise until tight for L.W.

VALVE READINGS

| V. | Type. | Electrode. | Volts. Ma. | |
|----|---------|------------|------------|------|
| 1 | .. EF8 | Anode | 170 | 6 |
| | | Screen | 210 | 2 |
| 2 | .. ECH3 | Cathode | 4 | 6.2 |
| | | Anode | 210 | 5.3 |
| | | Screen | 115 | 7 |
| | | Osc. anode | 70 | 5.5 |
| 3 | .. EF9 | Cathode | 2.3 | 11.5 |
| | | Anode | 210 | 4.8 |
| | | Screen | 90 | 1.4 |
| 4 | .. EFM1 | Anode | 100 | .52 |
| | | Screen | 22 | — |
| | | Indicator | 150 | .34 |
| | | Cathode | 1.2 | .86 |
| 5 | .. EBL1 | Anode | 235 | 2.3 |
| | | Screen | 210 | 3.3 |
| | | Cathode | — | 26.3 |
| 6 | .. AZ1 | Cathode | 250 | 53 |

Continued on opposite page



PHILIPS 7882C

D.C.-A.C. VIBRATOR CONVERTER

Vibrator converter unit for operating A.C. mains receivers from 110-145 or 200-245 volt D.C. supplies. Made by Philips Lamps, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

Circuit.—The circuit is easier to follow if it is remembered that it falls into two sections. One path is solely D.C. and drives the vibrator. The other path is D.C. up to the vibrator, which acts as a "cross-over" switch, and from there on is A.C.

The principal items in the circuit are: the vibrator with energising coil L3, springs X and Y, and contacts A, B, C, D, E; an overload protection relay comprising L1, L2, and circuit breaker, RY, shunted by C1; and a mains voltage adjustment consisting of S2 and S3, which are operated together. The other components are mostly filters to prevent "noise," being fed into either the D.C. input or the A.C. output.

As shown the circuit is set for operation at 110-145 volts. In this position the first of the paths mentioned above, that is, the current driving the vibrator, flows through: S1 (mains switch), fuse, L1, L2, R2, L3, contact A, spring X, L11, L12, R3 and R4 in parallel, mains switch.

When the current passes through L3, the spring X is attracted to the magnetised core (Y also moves, being coupled to X). The movement of X breaks the contact A, the current ceases, the core of L3 demagnetises and X springs back. The contact A is remade and the whole process is repeated continuously.

The second or combined D.C.-A.C. path can now be followed. With the springs in the position shown, the current flows through S1, L1, L2, relay switch, L10, Y, C, L4, L5, L6. Passing through the mains transformer primary it returns via, fuse, L7, L8, L9, E, X, L11, L12, R3 and R4 in parallel, mains switch.

As this pulse of current flows, the springs are attracted towards L3 core. This breaks con-

tacts C, E, and makes contacts B, D. The current then flows through S1, fuse, L1, L2, RY and L10 as before, and then through Y, D, L9, L8, L7, fuse, transformer, L6, L5, L4, B, X, L11, L12, R3 and R4, mains switch.

With each swing of the springs, therefore, the current changes its direction through the transformer primary.

When operating from 200-245 volt mains S2, S3 are switched over. This reduces the relay field by shorting out L2, and increases the circuit resistance by depriving R3 of its shunt, R4, and by putting R1 in series with R2.

The filter (C5, C17, L1, L2, L12, C2, C3, C4, L10, L11, C16, C6 and C7 prevents interference from the vibrator from entering the mains.

The filter (C8, C9, L4, L9, C10, C11, L5, L8, C12, C13, L6, L7 prevents interference from the vibrator from entering the receiver.

The relay L1, L2, RY temporarily breaks the current on small overloads and prevents the fuse blowing unnecessarily.

PRACTICAL

The change-over from A.C. to D.C. operation is effected simply by rotating the safety contact on the backplate half a turn. The safety contact, not involving circuit features, is not shown in our theoretical diagram.

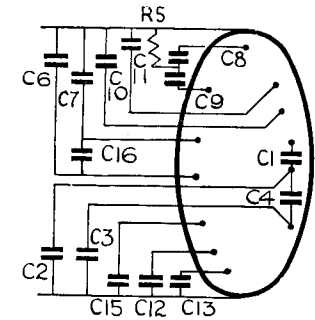
The vibrator unit, 7934, cannot be repaired, and if defective must be replaced. It is important that all leads should be returned to their original positions after any repairs.

The vibrator is replaced by demounting the two boxes. To replace other components:—

1. Slacken off the screw in outer box.
2. Take off nuts on voltage switch plate.
3. Withdraw inner box from outer box. (Remember the lead.)

To change the filter coils, condenser box or R1, R2, heat the three soldered joints and remove the condenser box from the screen box. Do not bend condenser box seams.

The order of the filter coils is: R2, R1, L11,



Details of the condenser block in the Philips converter.

L10, L8, L5, L4, L9, L6 and L7 are wound round C5 and C17.

INTERFERENCE

If interference is experienced, the leads to the anodes of the receiver rectifier valve should be screened and one or two ripple condensers fitted.

RESISTANCES

| R. | Ohms. | R. | Ohms. |
|----|-------|----|-------|
| 1 | 3,500 | 4 | 20 |
| 2 | 2,500 | 5 | 47 |
| 3 | 20 | | |

CONDENSERS

| C. | Mfds. | C. | Mfds. |
|----|-------|----|-------|
| 1 | .9 | 10 | .1 |
| 2 | .1 | 11 | .1 |
| 3 | .1 | 12 | .1 |
| 4 | .2 | 13 | .1 |
| 5 | .022 | 14 | .2 |
| 6 | .2 | 15 | .05 |
| 7 | .2 | 16 | .1 |
| 8 | .02 | 17 | .022 |
| 9 | .02 | | |

WINDINGS

| L. | Ohms. | L. | Ohms. |
|----|-------|----|-------|
| 1 | 1 | 8 | 1.5 |
| 2 | 1 | 9 | 1 |
| 4 | 1 | 10 | 1.5 |
| 5 | 1.5 | 11 | 1.5 |
| 6 | 1 | 12 | 1 |
| 7 | 1 | | |

When Tone Changes

WHEN a set comes in for overhaul because of defective tonal response what are the most probable causes? Such a defect usually takes the form of too little or too much bass.

First points to check are the speaker cone centring, and, if power is also lacking, the resistance of the speaker transformer windings.

An open circuit bias decoupling condenser causes an overall loss of amplification. If the capacity is merely reduced, however, this will discriminate against the lower frequencies.

An open L.F. coupling condenser will cause a big loss in amplification and complete loss of the lower frequencies.

An open anode decoupling condenser can also modify tone by introducing feed-back. It may increase or decrease bass according to the feed-back phase.

The shape of the tuning circuits also affects tonal response. Very selective tuning reduces the high notes. If a set is too boomy it is worth while to try "staggering" the L.F. circuits to flatten the peak.

Where tone control circuits are fitted, faults in these or the associated switching should be looked for.—C. S. R.

WINDINGS

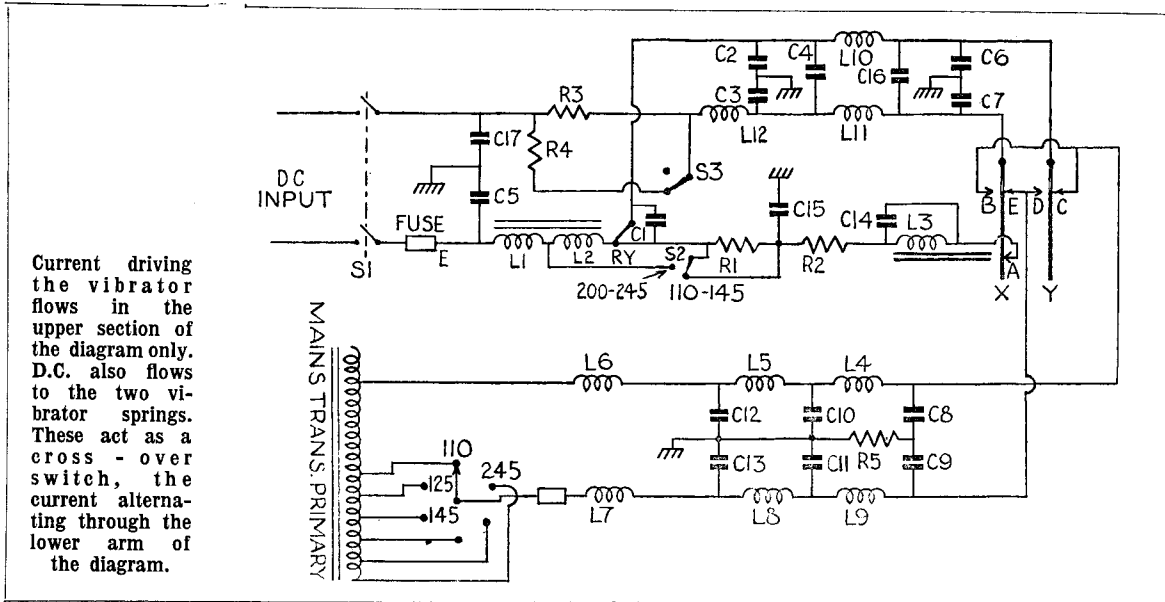
| L. | Ohms. | L. | Ohms. |
|----|--------|----|--------|
| 2 | 2X 915 | 17 | 382 |
| 3 | 14 | 18 | 10 |
| 4 | 2X 11 | 19 | 5 |
| 5 | 242 | 20 | 77 |
| 6 | 790 | 21 | 24 |
| 7 | 157 | 22 | 207 |
| 8 | 401 | 23 | 45 |
| 9 | 7 | 24 | 291 |
| 10 | 7 | 25 | 2X 167 |
| 11 | 23 | 26 | 8.5 |
| 12 | 14 | 27 | 1,154 |
| 14 | 10 | 27 | 134 |
| 15 | 14 | 28 | 200 |
| | 154 | 29 | 167 |
| | | 30 | 167 |

CONDENSERS

| C. | Mfds. | C. | Mfds. |
|----|------------|----|--------------|
| 1 | .50 | 38 | 103 mmfds. |
| 2 | .50 | 39 | 113 " |
| 6 | .39 mmfds. | 40 | .047 " |
| 7 | .10 " | 41 | .18 mmfds. |
| 8 | .15 " | 42 | .39 " |
| 10 | .012 " | 43 | .056 " |
| 11 | .039 " | 44 | .033 " |
| 13 | 100 mmfds. | 45 | .18 " |
| 14 | .047 " | 46 | 150 mmfds. |
| 15 | .047 " | 47 | 2,200 " |
| 18 | 3.9 mmfds. | 48 | .068 " |
| 20 | .180 " | 51 | .22 " |
| 21 | .047 " | 52 | .0022 " |
| 22 | .047 " | 54 | .056 " |
| 23 | 47 mmfds. | 57 | .18 " |
| 24 | .470 " | 58 | .18 " |
| 28 | 4,200 " | 59 | 1,600 mmfds. |
| 30 | 330 " | 60 | .180 " |
| 31 | .33 " | 61 | .180 " |
| 33 | .94 " | 62 | .033 " |
| 34 | .97 " | 63 | .068 " |
| 35 | .047 " | 64 | .15 " |
| 37 | .068 " | 65 | .027 " |
| | | 66 | 390 mmfds. |

RESISTANCES

| R. | Ohms. | R. | Ohms. |
|-----|----------|----|----------|
| 1 | 1,200 | 23 | 50,000 |
| 2 | .82 meg. | 24 | .33 meg. |
| 3 | 680 | 25 | .18 " |
| 4 | 6,800 | 26 | 39,000 |
| 5 | .82 meg. | 27 | .12 meg. |
| 6 | 470 | 28 | .47 " |
| 7 | 22,000 | 29 | 1,000 |
| 8 | 47,000 | 31 | .82 meg. |
| 9 | 220 | 32 | 4,700 |
| 10 | 34,000 | 34 | 1,500 |
| 11 | 27,000 | 36 | 100 |
| 12 | 330 | 38 | 47,000 |
| 13 | 82,000 | 39 | 6,800 |
| 14 | 82,000 | 40 | 9.4 meg. |
| 15 | .33 meg. | 41 | 1.2 " |
| 16 | .27 " | 42 | 1.8 " |
| 17 | .27 " | 43 | .22 " |
| 18 | .82 " | 44 | 680 |
| 19 | .65 " | 45 | .33 meg. |
| 19a | .2 " | 58 | 1,500 |
| 20 | 1 " | 59 | .47 meg. |
| 21 | 22,000 | 60 | 47 |
| 22 | 1,000 | | |



Current driving the vibrator flows in the upper section of the diagram only. D.C. also flows to the two vibrator springs. These act as a cross-over switch, the current alternating through the lower arm of the diagram.