

PHILCO 282 "EMPIRE FIVE"

Service Engineer Section

CIRCUIT.—Signals are fed to the grid of the frequency changer, V1, via a single tuned pre-selector circuit, which incorporates an image rejector, WT2 and C15, and an I.F. trap circuit, WT1 and VC2.

Selector switching is used on all the signal and oscillator coils, and separate padding condensers and trimmers are used for each waveband.

The I.F. signal of 451 kc. is fed via an I.F. band-pass transformer, IFT1, to the grid of the variable-mu H.F. pentode, V2, which is the I.F. amplifier. The amplified I.F. signal is then applied through the second I.F. band-pass transformer, IFT2, to the diode portion of V3, a double-diode-triode valve.

The diode portion of V3 is coupled to its grid through a filter network, the volume control, VR1, and the L.F. coupling condenser, C2. V3 is coupled to the output pentode, V4, via a resistance-capacity network, V4 being tone corrected by C16 and VR2.

A.V.C. is applied to the grids of V1 and V2 by feeding back the D.C. voltage developed across the diode load after being filtered free of H.F. and L.F. currents.

The H.T. supply is obtained from a full-wave rectifier type 80, V5, and is smoothed by the electrolytic condensers EC1, EC2, EC3 and the speaker field. This gives a total smoothed H.T. voltage of 250 when the set is operating on 200-volt mains.

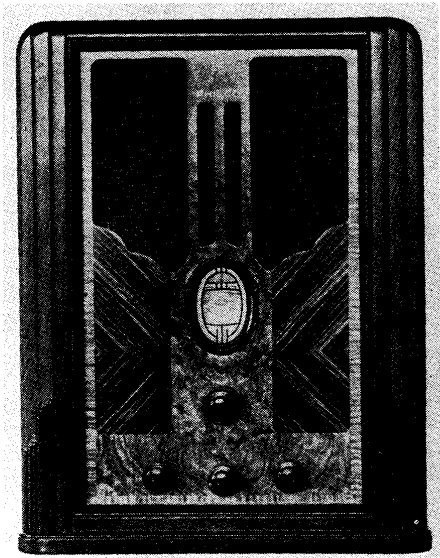
Removing Chassis.—Removing the chassis is fairly simple, as the control knobs are held on their shafts by spring clips and are easily pulled off.

The speaker cable must be unanchored from its cleat, and the four fixing bolts underneath the cabinet removed.

The chassis will then slide out of the cabinet.

Special Notes.—The visual tuning indicator is located in the H.T. lead of V2. The red lead to the indicator is H.T., and the black lead is the H.T. supply to the anode of V2 via the primary of IFT2.

The terminals marked red and black on the socket strip on the back left-hand side of the chassis are connections for a special short-wave aerial.



The Philco model 282 is an all-wave receiver for A.C. mains. The four-valve plus rectifier chassis makes provision for the use of a Philco all wave anti-static aerial.

ALIGNMENT NOTES

Alignment of circuits should be carried out with an all-wave signal generator.

Before commencing to gang the receiver, turn the wave-change switch to the M.W. position and tune the gang condenser to minimum. Check that the light indicator reads on the index just above 1,500 kc. If the indicator does not check up, it can be altered by adjusting the pivot arm that is connected to the wave-change switch.

Connect an output meter across the primary of the output transformer (green and white leads) and turn volume to maximum and tone to brilliant.

I.F. Circuits.—The I.F. padding condensers should be adjusted by feeding 451 kc. from the signal generator to the grid of V1 with the grid lead disconnected.

The I.F. condensers are then adjusted for maximum output in the following order: VC6, VC7, VC4 and VC5.

Transfer the signal generator, via a standard dummy aerial, to the aerial and earth sockets of the set and feed in a 451-kc. signal, and adjust the pad screw of VC2 for minimum output. This is the pad of the I.F. trap circuit.

Long-wave Band.—Turn wave-change switch to L.W. and set the dial to 290 kc. Feed in a signal from the generator of 290 kc. and adjust the padder VC12 for maximum. If two points give maximum response use the one produced by minimum capacity.

Adjust the pre-selector padders VC3 —3 and VC3 —4 for maximum response. Tune the receiver and oscillator to 160 kc. and adjust the nut of VC2 for maximum response. Re-check at 290 kc., and readjust VC12 to compensate for any shift in oscillator frequency.

Medium-wave Band.—Turn wave-change switch to M.W. and tune both receiver and oscillator to 1,400 kc. Adjust VC8 and VC11 for maximum output. If two peaks are obtained, use the one produced by minimum capacity. Now tune receiver and oscillator to 600 kc. and adjust the screw of VC1 for maximum output. Re-check at 1,400 kc.

Short-wave Band.—To align the short-wave band substitute the standard dummy aerial by a 400-ohm resistor.

To prevent inaccurate results due to various harmonics of the signal generator and the set oscillator, proceed as follows:

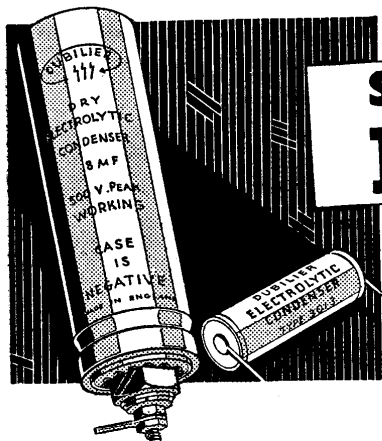
Tune both receiver and signal generator to 18 megacycles. Connect a .0005-mfd. condenser across the oscillator gang, VC13, and, using the second harmonic of the signal generator, adjust VC3 —1 for maximum output.

Remove the shunt condenser from VC13, and adjust the short-wave pad, VC9, carefully for maximum output. Two peaks are obtainable, and the one produced by minimum capacity should be used.

Tune signal generator and receiver to 6 megacycles, and adjust the nut of VC1 for maximum output. Re-check at 18 meg., and check calibration.

In aligning circuits be sure to keep the input below A.V.C. level.

(Circuit and Layouts on next page.)



STOCK AND REPLACE WITH DUBILIER ELECTROLYTIC CONDENSERS

Some of the most important features are :-

- COMPLETELY DRY
- CONSTANT CAPACITY
- LOW LEAKAGE CURRENT AND RAPID RE-FORMING
- LOW POWER FACTOR

Ask any Radio Designer which electrolytic condensers he recommends for all-round efficiency and dependability and the unhesitating answer will be—"DUBILIER." No other condensers enjoy so great a reputation for sterling service under the most exacting conditions. Dubilier Electrolytic Condensers stand supreme. The Dubilier range of electrolytic condensers is most extensive, every need of the manufacturer and designer being catered for. Radio Manufacturers are invited to send for details of the latest developments in Dubilier Electrolytic Condensers and prices for 1936.

DUBILIER CONDENSER CO. (1925) LTD.,
DUCON WORKS, VICTORIA RD., N. ACTON, W.3

Service Engineer Section

PHILCO MODEL 282 "EMPIRE FIVE" (Continued)

| CONDENSERS | | |
|------------|-----------------------------|--------------------|
| C. | Purpose. | Mfd. |
| 1 | Diode coupling | .00011 |
| 2 | L.F. coupling | .015 |
| 3 | V2 H.T. decoupling .. . | .1 |
| 4 | H.F. by-pass | .00011 |
| 5 | H.T. decoupling | .25 |
| 6 | Short wave padding .. . | .00225 |
| 7 | H.F. by-pass | .00011 |
| 8 | V4 anode decoupling .. . | .001 |
| 9 | V1 osc. grid | .00025 |
| 10 | V3 anode decoupling .. . | .25 |
| 11 | L.F. coupling | .015 |
| 12 | V3 bias decoupling .. . | .15 |
| 13 | V4 bias decoupling .. . | .15 |
| 14 | A.V.C. decoupling | .05 |
| 15 | L.W. padding | 70 mmfd |
| 16 | Trap circuit | 50 mmfd |
| 17 | Tone control | .015 |
| 18 | H.F. by-pass | .015 |
| EC1 | H.T. smoothing | 8 x 8 |
| EC2 | H.T. smoothing | 16 |
| EC3 | H.T. smoothing | 12 |
| VC1 | Medium and short pad .. | 1,500 and 600 mmfd |
| VC2 | L.W. and image rejector pad | 235 by 50 mmfd |

| RESISTANCES | | |
|-------------|-----------------------------|-------------|
| R. | Purpose. | Ohms. |
| 1 | Diode load | 1 meg. (1) |
| 2 | Diode load | 1 meg. (1) |
| 3 | V3 bias decoupling .. . | 1 meg. (1) |
| 4 | Diode decoupling | 51,000 (1) |
| 5 | V3 H.T. decoupling .. . | 51,000 (1) |
| 6 | V3 anode decoupling .. . | 190,000 (1) |
| 7 | V1 osc. grid leak | 51,000 (1) |
| 8 | V3 bias decoupling .. . | 490,000 (1) |
| 9 | V4 bias decoupling .. . | 490,000 (1) |
| 10 | V4 bias decoupling .. . | 490,000 (1) |
| 11 | H.T. decoupling | 10,000 (1) |
| 12 | V1 and V2 screen decoupling | 25,000 (1) |
| 13 | V1 osc. anode decoupling .. | 32,000 (1) |
| 14 | V3 and V4 bias ptr.— | — |
| | Section 2 | 225 |
| | Section 3 | 25 |
| | Section 4 | 25 |
| 15 | Bias decoupling | 51,000 (1) |
| VR1 | Volume control | 350,000 |
| VR2 | Tone control | 125,000 |
| — | Speaker field resistance .. | 1,100 |

QUICK TESTS

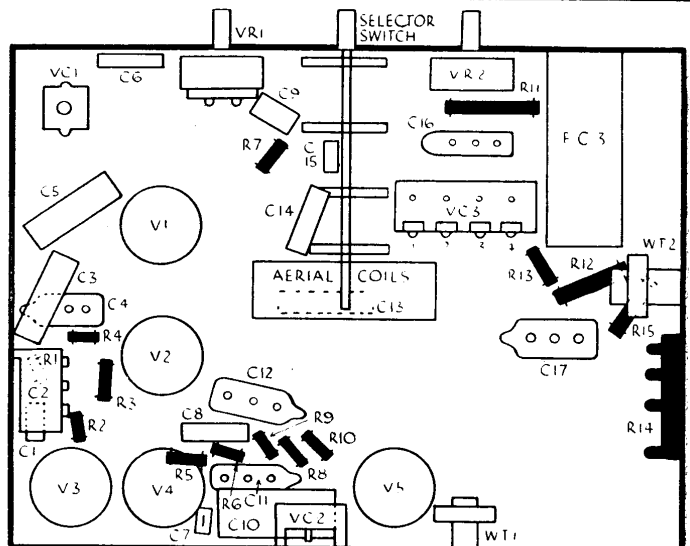
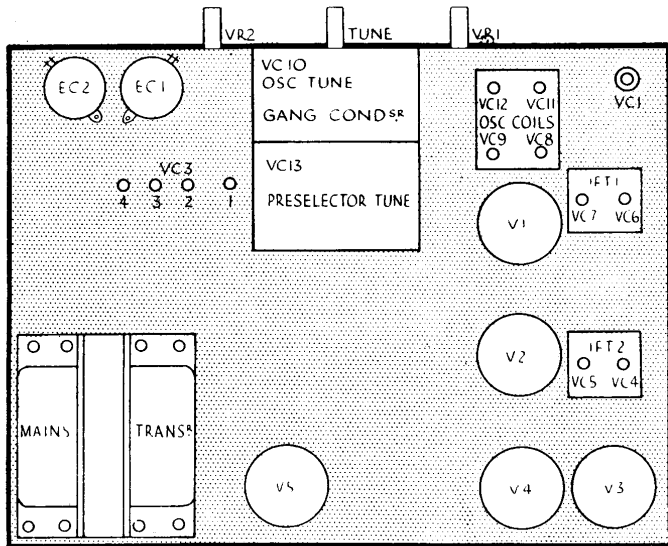
Terminals for quick tests are available on the output transformer mounted on the right-hand side of the speaker. The volts measured between the terminals and chassis are as follows:—

- Red lead (external speaker).
- Black lead (external speaker).
- Green/white lead (unsmoothed H.T.) .300 volts
- White lead (smoothed H.T.) .250 volts
- Green lead (V5 anode) .244 volts

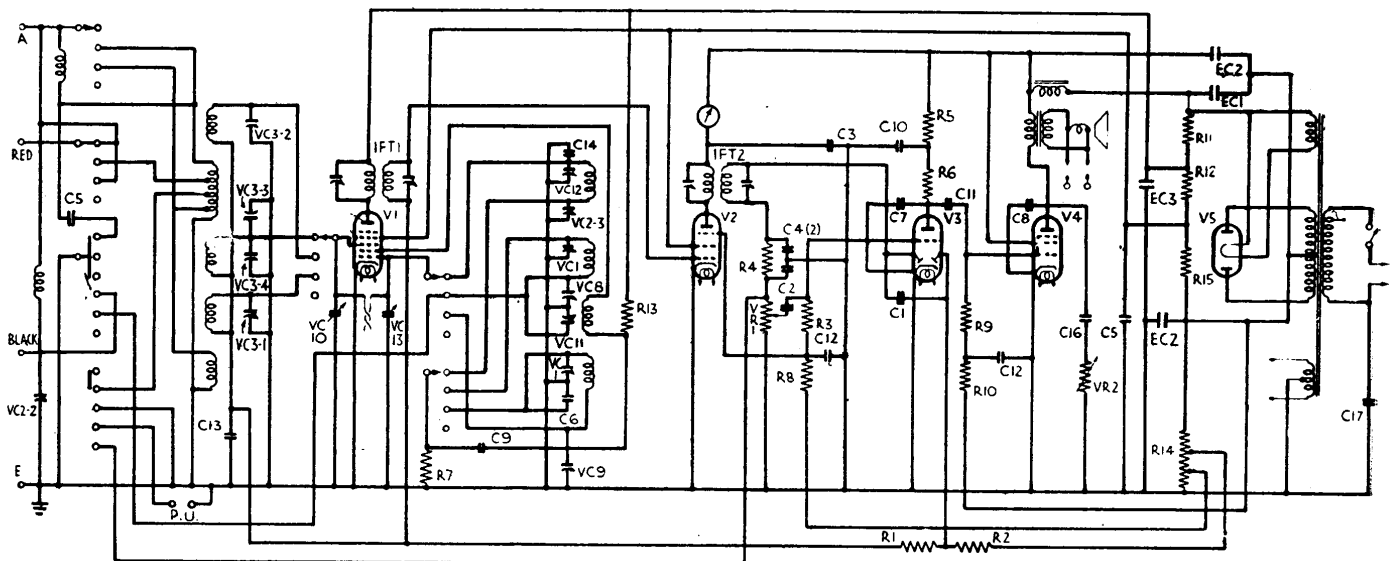
VALVE READINGS

(Taken with volume control "up," no signals, operating on 200 volt mains.)

| V. | Type. | Electrode. | Volts. |
|----|-----------------------|---------------|--------|
| 1 | Philco 6A7 (7) .. | Anode .. | 195 |
| | | Screen .. | 72 |
| | | Osc. anode .. | 90 |
| 2 | Philco 78E (6) .. | Anode .. | 205 |
| | | Screen .. | 65 |
| 3 | Philco 75 (6) .. | Anode .. | 53 |
| 4 | Philco 42E (6) .. | Anode .. | 244 |
| | | Screen .. | 240 |
| 5 | Philco 80 (4) .. | Rectifier .. | — |
| — | Pilot lamps (Foreign) | — | 6.3 |



Details of the construction of the 282 chassis are given by these diagrams. The connections to the visual indicator are given under "Special Notes."



Apart from provision for a special all-wave aerial, the pre-selector circuit of the 282 incorporates an image rejector and a trap circuit for the intermediate frequency.