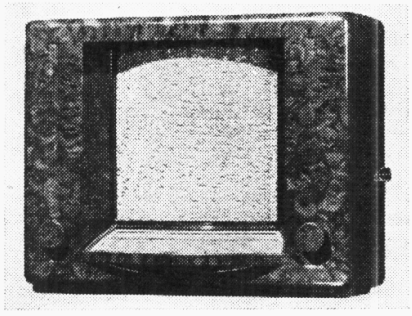
'TRADER' SERVICE SHEET

326

PHILIPS V7U

3-BAND AC/DC SUPERHET



THE Philips V7U is a 4-valve (plus rectifier) AC/DC 3-band superhet with a short-wave range of 16·7-51 m and suitable for mains of 200-260 V (40-100 C/S in the case of AC).

An outstanding feature is the unconventional form of construction used in that the components are mounted direct on to the cabinet, instead of on a chassis.

CIRCUIT DESCRIPTION

Aerial input on MW and LW via isolating condenser **C1,** coupling coils **L2, L3** and coupling condenser **C4,** to mixed coupled band-pass filter. Primary coils **L4, L5** are tuned by **C30**; secondaries **L10, L11** by **C32**; coupling by condensers **C6, C7** and coils **L6, L7.** IF filtering by **L1, C3** across coupling coils. Image suppression by **C5.** On SW, input is via **C1** and coupling coil **L8** to single-tuned circuit **L9, C32. R1** across aerial circuit provides a DC path between sockets **A** and **E** so that **C1** cannot develop a charge.

First valve (**V1, Mullard metallised FC13C**) is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L12** (SW), **L13** (MW) and **L14** (LW) are tuned by **C33**; parallel trimming by **C34** (LW); series tracking by **C14** (MW) and **C13** (LW). Reaction by coils **L15** (SW), **L16** (MW) and **L17** (LW).

Second valve (**V2, Mullard metallised VP13C**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C35, C11, L18, L19, C12, C36** and **C17, L20, L21, C18.**

Intermediate frequency 128 KC/S.

Diode second detector is part of double diode triode valve (**V3, Mullard metallised TDD13C**). Audio frequency component in rectified output is developed across load resistance **R7** and manual volume control **R8,** which also forms part of the load, and passed via fixed tone corrector **C20,** AF coupling condenser **C21** and CG resistance **R9** to CG of triode section, which operates as AF amplifier.

Second diode of **V3,** fed from **V2** anode via **C22,** provides DC potential which is developed across load resistance **R13** and fed back through decoupling circuit as GB to FC and IF valves, giving automatic volume control. Delay voltage, together with GB potential for triode section, is obtained from drop along **R17** in HT negative lead to chassis.

Resistance-capacity coupling by **R11, C24, R14** between **V3** triode and pentode output valve (**V4, Mullard Pen36C**). Two position tone control in anode circuit by **S14, C26.** Metal grill frame, speaker frame and one side of speaker speech coil **L23,** are connected to socket **E.**

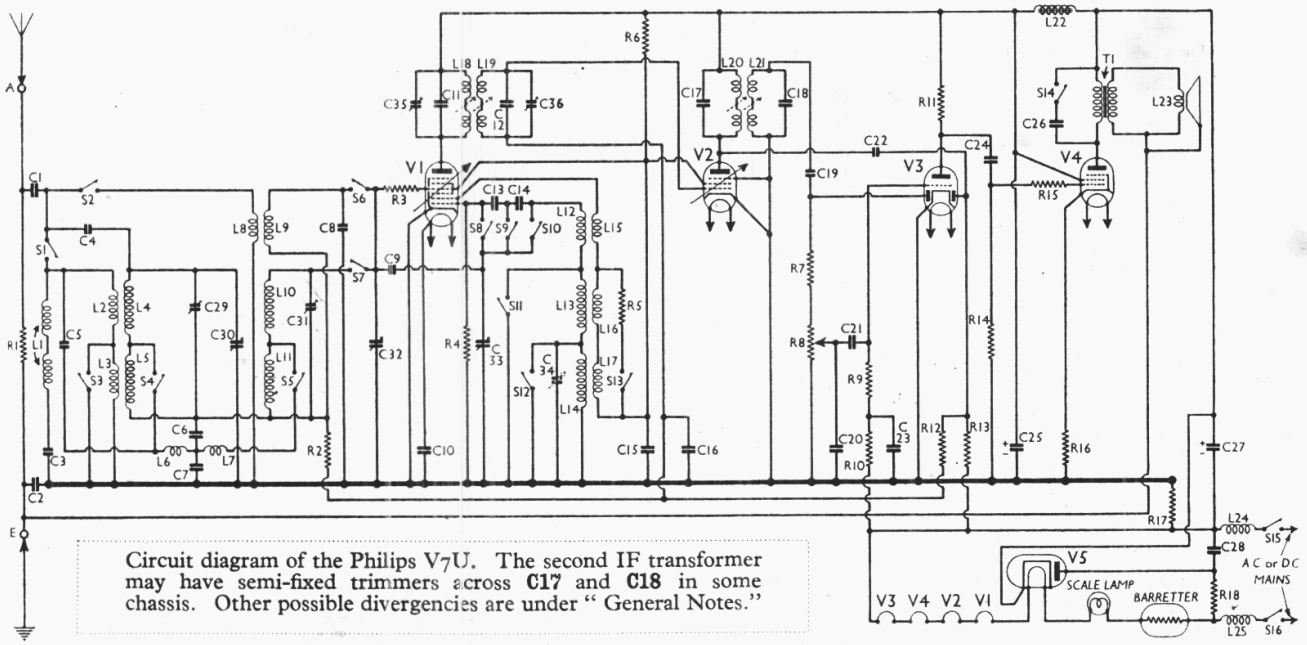
When the receiver is used with AC mains, HT current is supplied by IHC half-wave rectifying valve (**V5, Philips CY1C**) which, on DC mains, behaves as a low resistance. Smoothing is effected by iron-cored choke **L22** and large capacity wet electrolytic condensers **C25, C27.** RF filtering in rectifier anode circuit by **C28.**

Valve heaters are connected in series, together with scale lamp and current regulating barretter (**Philips C1**), across mains input. Filter chokes **L24, L25** suppress mains-borne interference.

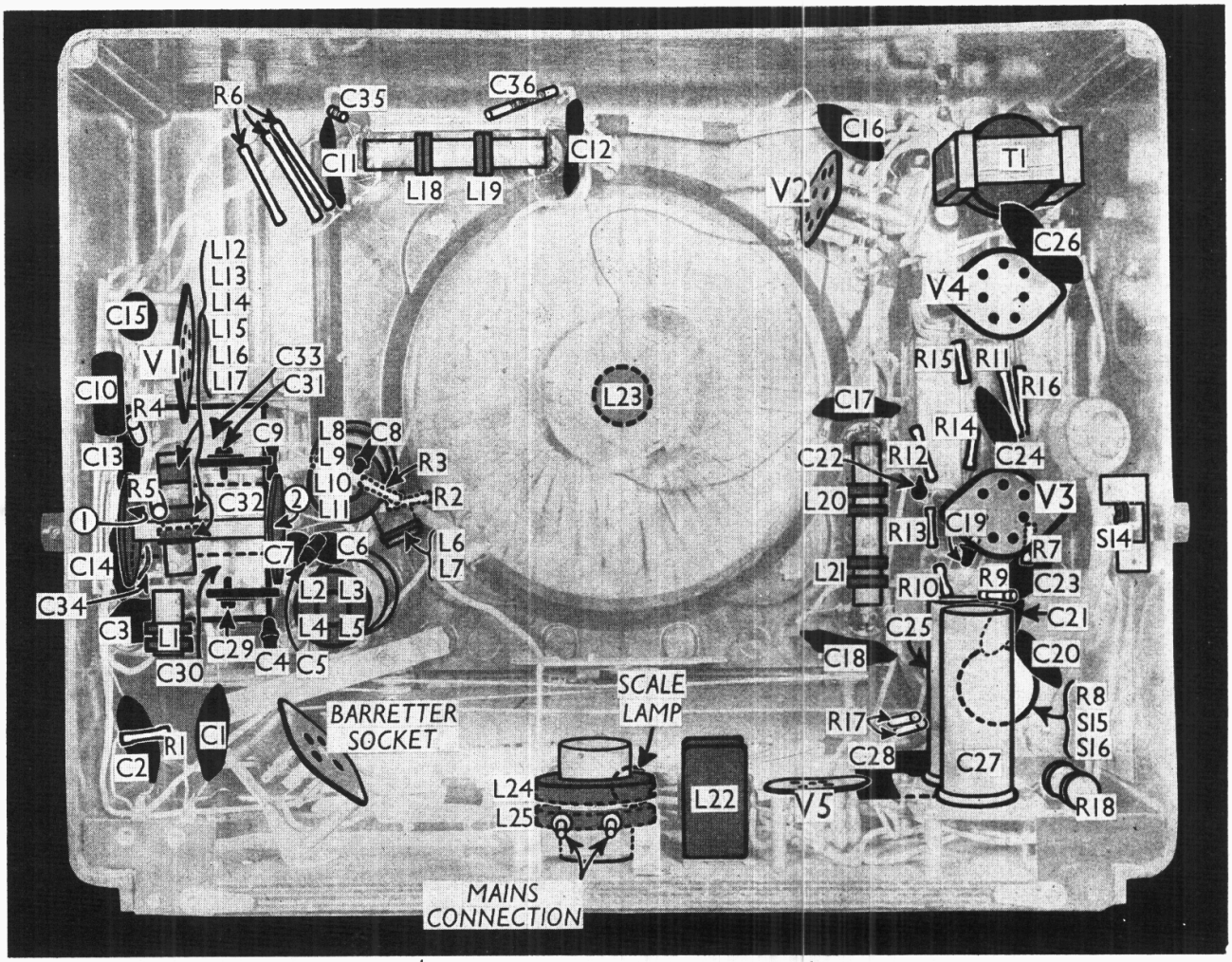
COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	Aerial circuit safety shunt ..	100,000
R2	V1 pentode CG decoupling ..	100,000
R3	V1 pentode grid stabiliser ..	50
R4	V1 osc. CG resistance ..	50,000
R5	Osc. circuit SW stabiliser ..	40
R6	V1, V2 SG's and V1 osc. anode HT feed (approx.)	19,500*
R7	Part V3 signal diode load ..	200,000
R8	Manual volume control; part V3 signal diode load ..	500,000
R9	V3 triode CG resistance ..	800,000
R10	V3 triode CG decoupling ..	250,000
R11	V3 triode anode load	320,000
R12	AVC line decoupling	1,000,000
R13	V3 AVC diode load	500,000
R14	V4 CG resistance	800,000
R15	V4 grid stopper	200,000
R16	V4 GB resistance	180
R17	V3 triode GB and AVC delay (approx.)	30†
R18	V5 anode current limiter ..	125

* Two 64,000 Ω and one 50,000 Ω in parallel.
† One 125 Ω and one 40 Ω in parallel.



Circuit diagram of the Philips V7U. The second IF transformer may have semi-fixed trimmers across **C17** and **C18** in some chassis. Other possible divergencies are under "General Notes."



Rear view of the receiver, which has no removable chassis. The two switch units are shown in detail on page VIII. **C34, C35** and **C36** are semi-fixed trimmers.

	CONDENSERS	Values (μF)
C1	Aerial isolating condenser ..	0·005
C2	Earth isolating condenser ..	0·005
C3	Aerial IF filter tuning ..	0·00009
C4	Aerial MW and LW coupling	0·00002
C5	Image suppressor	0·00004
C6	LW band-pass coupling ..	0·016
C7	MW band-pass coupling ..	0·025
C8	Aerial SW trimmer	0·00001
C9	Small coupling	0·000002
C10	V1 heater RF by-pass ..	0·01
C11	1st IF trans. pri. fixed trimmer	0·000155
C12	1st IF trans. sec. fixed trimmer	0·000165
C13	Osc. circuit LW tracker ..	0·0007
C14	Osc. circuit MW tracker ..	0·00149
C15	V1, V2 SG's and V1 osc. anode decoupling	0·1
C16	V2 CG decoupling	0·1
C17	2nd IF trans. pri. tuning ..	0·000155
C18	2nd IF trans. sec. tuning ..	0·000165
C19	Coupling to V3 signal diode	0·000016
C20	Fixed tone corrector	0·001
C21	AF coupling to V3 triode ..	0·01
C22	Coupling to V3 AVC diode ..	0·0000065
C23	V3 triode CG decoupling ..	0·25
C24	V3 triode to V4 AF coupling	0·01
C25*	Part HT smoothing	32·0
C26	Tone control condenser ..	0·02
C27*	Part HT smoothing	32·0
C28	V5 anode RF by-pass.. ..	0·1
C29‡	Band-pass pri. MW trimmer	0·000055
C30†	Band-pass primary tuning ..	0·00049
C31‡	Band-pass sec. MW trimmer..	0·000055
C32†	Aerial SW and band-pass sec. tuning	0·00049
C33†	Oscillator circuit tuning ..	0·00049
C34‡	Osc. circuit LW trimmer ..	0·00002
C35‡	1st IF trans. pri. tuning ..	0·00003
C36‡	1st IF trans. sec. tuning ..	0·00003

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial IF filter coil	130·0
L2	Aerial MW and LW coupling coils ..	25·0
L3		90·0
L4	Band-pass primary coils	4·5
L5		50·0
L6	Band-pass coupling coils	0·75
L7		0·75
L8	Aerial SW coupling coil ..	2·0
L9	Aerial SW tuning coil.. ..	0·2
L10	Band-pass secondary coils	4·4
L11		45·0
L12	Osc. circuit SW tuning coil ..	0·2
L13	Osc. circuit MW tuning coil ..	10·0
L14	Osc. circuit LW tuning coil ..	25·0
L15	Oscillator SW reaction ..	25·0
L16	Oscillator MW reaction ..	0·05
L17	Oscillator LW reaction ..	6·5
L18	1st IF trans. Pri... ..	100·0
L19	1st IF trans. Sec... ..	100·0
L20	2nd IF trans. Pri... ..	100·0
L21	2nd IF trans. Sec... ..	100·0
L22	HT smoothing choke ..	400·0
L23	Speaker speech coil	1·5
L24	Mains RF filter chokes	4·5
L25		4·5
T1	Output trans. Pri... ..	300·0
	Output trans. Sec... ..	0·4
S1-S13	Waveband switches	—
S14	Tone control switch	—
S15,16	Mains switches, ganged R8	—

DISMANTLING THE SET

It is not possible to remove the receiver from the cabinet as a whole but there are various sub-assemblies which can be taken out as complete units, if necessary. Some of the components are held in place with pitch and a similar material will have to be used for re-fixing them.

Removing Speaker.—If it is desired to remove the speaker from the cabinet, unsolder the speech coil leads (taking a careful note of the points to which they are connected) and then remove the four screws (with washers), one at each corner of the speaker moulding. The grille covering the speaker aperture can then be removed, exposing the heads of four bolts (with nuts and lock nuts) which hold the speaker to the cabinet. These should be removed, when the speaker can be withdrawn from the front of the cabinet.

When replacing, make sure that the three earthing tags are secured by the appropriate fixing screws.

VALVE ANALYSIS

Valve voltages and currents given in the table (p. VIII) are those measured in our receiver when it was operating on AC mains of 230 V. The receiver was tuned to the lowest wavelength on the medium band, and the volume control was at

Continued overleaf

PHILIPS V7U—*Continued*

maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, the can of **C25,** one of the electrolytic smoothing condensers, being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 FC13C	240	3·0	97	4·1
	Oscillator			
	97	2·2		
V2 VP13C	240	2·4	97	1·1
V3 TDD13C	36	0·7	—	—
V4 Pen36C	235	44·0	240	3·2
V5 CY1C†	—	—	—	—

† Cathode to chassis, 245 V DC.

GENERAL NOTES

Switches.—**S1-S13** are the waveband switches, in two ganged rotary units mounted on the left centre, looking at the rear of the cabinet. They are indicted by numbers in circles and arrows in the inside cabinet view, and are shown in detail in separate diagrams, where the units are seen looking from the right-hand side of the cabinet, with the cabinet face downwards. The table (col. 2) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C** closed.

S14 is the QMB tone control switch at the left-hand side of the cabinet (viewed from the front). It is closed when the lever knob is down.

S15, S16 are the two mains circuit switches, ganged with the volume control **R8,** and mounted between it and the front of the cabinet.

Coils.—**L1** is in two sections on a tubular former, and is unscreened. **L2-L5** and **L8-L11** are in two tubular screened units. **L6** and **L7** are on another small tubular unscreened former, between the two screened units. The oscillator coils, **L12-L17** are also unscreened, and are on a tubular former under the switch assembly.

The IF transformers **L18, L19** and **L20, L21** are to the top left and bottom right of the speaker. They are unscreened, and the primary and secondary in each case consists of two coils in series, whose relative position can be altered if alignment becomes necessary.

External Speaker.—No provision is made for this, but a low impedance type could be connected across the internal speaker speech coil (**L23**).

Scale Lamp.—This is a special Philips MES type, with a frosted bulb, Part No. 8080. It can be removed and replaced more easily if its holder and mounting bracket are first twisted anti-clockwise through 90 degrees.

Resistances R6, R17.—**R6** consists of two 64,000 and one 50,000 O resistor in parallel, giving an effective resistance of 19,500 O. **R17** consists of a 125 O and a 40 O resistor in parellel, giving an effective resistance of 30 O approx.

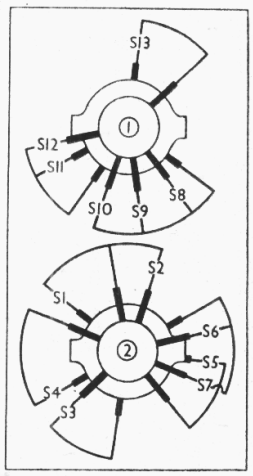
Condenser C34.—This is a small condenser consisting of a spiral of insulated wire wound over a thick insulated wire.

Chassis Divergencies.—In our chassis

TABLE AND DIAGRAMS OF THE SWITCH UNITS

Switch	SW	MW	LW
S1	—	C	C
S2	C	—	—
S3	—	C	—
S4	—	C	—
S5	C	C	—
S6	C	—	—
S7	—	C	C
S8	—	—	C
S9	—	C	—
S10	C	—	—
S11	C	—	—
S12	—	C	—
S13	C	—	—

Diagrams of the switches, as seen with the set lying face downwards, looking towards the units from the **S14** end of the cabinet.



semi-fixed trimmers (**C35, C36**) are wired in parallel with the fixed trimmers (**C11, C12**) of the first IF transformer. The makers' diagram shows similar semi-fixed trimmers associated with the second IF transformer, but they are not included in our receiver.

In the makers' diagram, the screening grids of **V1** and **V2** are not common as in our set and diagram. Instead, there are two resistors in series between the HT line and the screen of **V1** (6,400 and 9,600 O), while **V2** screen goes to the junction of the two resistors, and has a separate 0·1 μF decoupling condenser. Incidentally, the second of the two resistors consists of a 6,400 and 3,200 O unit in series.

CIRCUIT ALIGNMENT

IF Stages.—Feed a 128 KC/S signal via a 0·032 μF condenser to the control grid of **V2.** Warm the *outer* coils of **L20, L21** until the wax softens, by means of a soldering iron. First adjust the outer coil of **L21,** then the outer coil of **L20,** until maximum output is obtained. The coils should be moved along the former very slightly, taking care not to break the fine connecting wires.

Next apply the 128 KC/S signal via the 0·032 μF condenser to the control grid (top cap) to **V1.** In this case the wire-wound trimmers **C35** and **C36** must be adjusted by removing or adding turns until maximum output is secured in each case.

NOTE.—In some chassis **L20** and **L21** may also be provided with wire-wound trimmers, in which case these should be adjusted, and not the coils.

Feed the 128 KC/S signal to the **A** socket via a 0·0005 μF condenser, switch set to LW and turn the gang to 1,875 m. Heat **L1,** and adjust the spacing of the two coils until the *minimum* output is obtained.

RF and Oscillator Stages.—Switch set to MW. Rotate adjusting screw of **C31** completely clockwise, and that of **C29** about half-way. Feed a 1,450 KC/S (207 m) signal via a 0·0005 μF condenser to the **A** socket, and rotate the tuning condenser until the first signal from the minimum position becomes audible. Adjust the gang accurately for maximum output. Now adjust **C29** and **C31** for maximum output.

Without altering the tuning condenser setting, switch set to LW. Feed in a 411 KC/S (730 m) signal, and adjust **C34** for maximum output. If the capacity is too high, unwind some of the spiralled wire; if it is too low, a new and longer piece of thin wire must be wound over the thicker wire.

MAINTENANCE PROBLEMS

Vibration produces Hum

A PHILIPS 585U receiver was brought in with the complaint that a very loud mains hum occurred at times, usually, but not always, when the set was first switched on. The fault, it appeared, had existed since the set was new, but although various attempts had been made to effect a cure, including the fitting of new valves, no improvement had resulted.

As so frequently happens, the set was switched on and off time and time again, but the noise did not occur once until the cabinet was drastically thumped. After this it was easy to get the noise as one wished, and after all kinds of tests it was concluded that a vibration was the probable cause. This led, of course, to trial and error testing, and ultimately the trouble was traced to the cover of the tuning condenser. This was wedged with a small piece of wood, and the set has been quite satisfactory since.

A possible explanation of the reduced tendency of the noise to occur in different circumstances is that environment may have had something to do with it. The nature of the noise together with the fact that it most usually occurred when the set was first switched on suggested that the condenser cover's resonant frequency was the same as that of the AC mains.—J. T. HARVEY, CAMBRIDGE.

Re-Soldering Valve Top Caps

I HAD in for service recently an Ekco and a Mullard receiver. Both had the same fault, bad crackling after they had been switched on for a few minutes.

On changing the FC4 valves the trouble was put right. I unsoldered the top caps of the valves, and found dry joints, the cause being that when the valve caps were originally soldered up, air locks were formed.

To prevent this, a small hole should be drilled in the side of the top cap before re-soldering.—A. S. WATFORD, WINDSOR.

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