'TRADER' SERVICE SHEET

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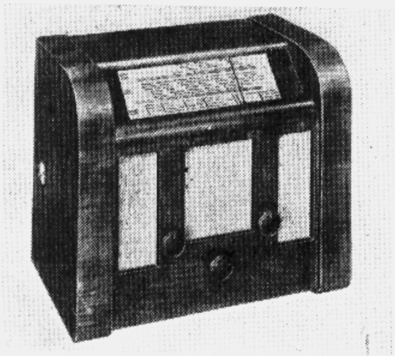
HALCYON U573

3-BAND AC/DC SUPERHET



SUITABLE for mains of 190-260 V (40-60 C/S in the case of AC), the Halcyon U573 is a 4-valve (plus rectifier) AC/DC 3-band superhet with a short-wave range of 16·5-51 m. A double-pole fuse is provided for the mains input circuit.

CIRCUIT DESCRIPTION

Aerial input via isolating condenser **C1**; on MW and LW to mixed coupled band-pass filter via tappings on primary coils **L2, L3** and, on LW, series choke **L1. L2, L3** are tuned by **C23**; secondary coils **L5, L6** by **C25**; coupling by mutual inductance, bottom coupling condenser **C3** and, on LW, a few turns of **L6** which are common to **L3, L6.** On SW, input is via tapping on **L4** to single-tuned circuit **L4, C25.**

First valve (**V1, Tungsram metallised TX21**) is a triode hexode operating as frequency changer with internal coupling. Triode oscillator grid coils **L7** (SW), **L8** (MW) and **L9** (LW) are tuned by **C27**; parallel trimming by **C28** (SW) and **C29** (MW); series tracking by **C7, C31** (MW) and **C30** (LW). Reaction by coils **L10** (SW), **L11** (MW) and **L12** (LW).

Second valve (**V2, Tungsram metallised VP13B**, or **Mullard VP13C**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C32, R3, L13, L14, C33** and **C34, L15, L16, C35.**

Intermediate frequency 130·5 KC/S.

Diode second detector is part of double diode triode valve (**V3, Mullard metallised TDD13C** or **Tungsram DDT13**). Audio frequency component in rectified output is developed across load resistance **R11** and passed via AF coupling condenser **C13** and manual volume control **R10** to CG of triode section, which operates as AF amplifier.

Second diode of **V3,** fed from **V2** anode via **C12,** provides DC potential which is developed across load resistance **R15** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control.

Resistance-capacity coupling by **R14, C16** and **R16,** via stopper **R17,** between **V3** triode and pentode output valve (**V4, Mullard Pen36C**). Fixed tone correction by **C17,** and two-position tone control by **S10, C19** in anode circuit.

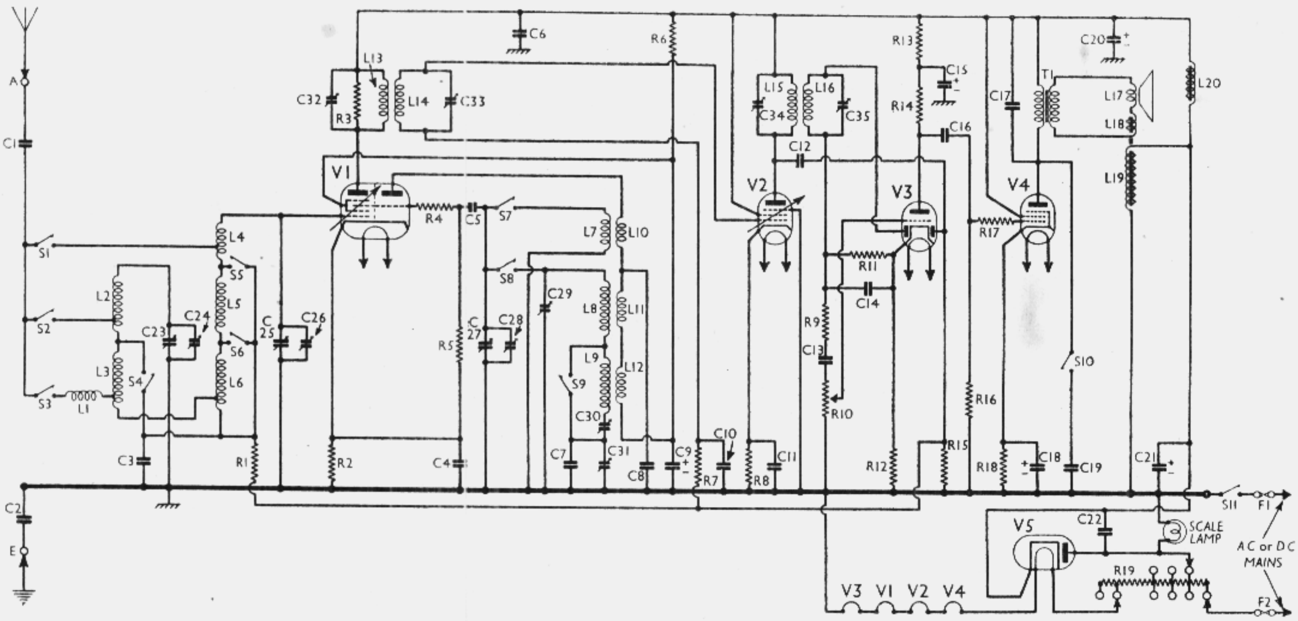
When the receiver is used on AC mains HT current is supplied by half-wave rectifying valve (**V5, Tungsram V30,** or **Mullard UR1C**) which, with DC supplies, behaves as a low resistance. Smoothing by iron-cored choke **L20** and dry electrolytic condensers **C20, C21.** Speaker field coil **L19** is connected across rectifier output. RF filtering by **C22.**

Valve heaters are connected in series together with voltage dropping resistance **R19** across mains input. Scale lamp is connected between chassis and mains voltage adjustment tapping appropriate to the supply on **R19,** unless this exceeds 230 V, when the scale lamp lead remains connected to the 230 V tapping. Fuses **F1, F2** protect mains input circuit in case of accidental short-circuit.

COMPONENTS AND VALUES

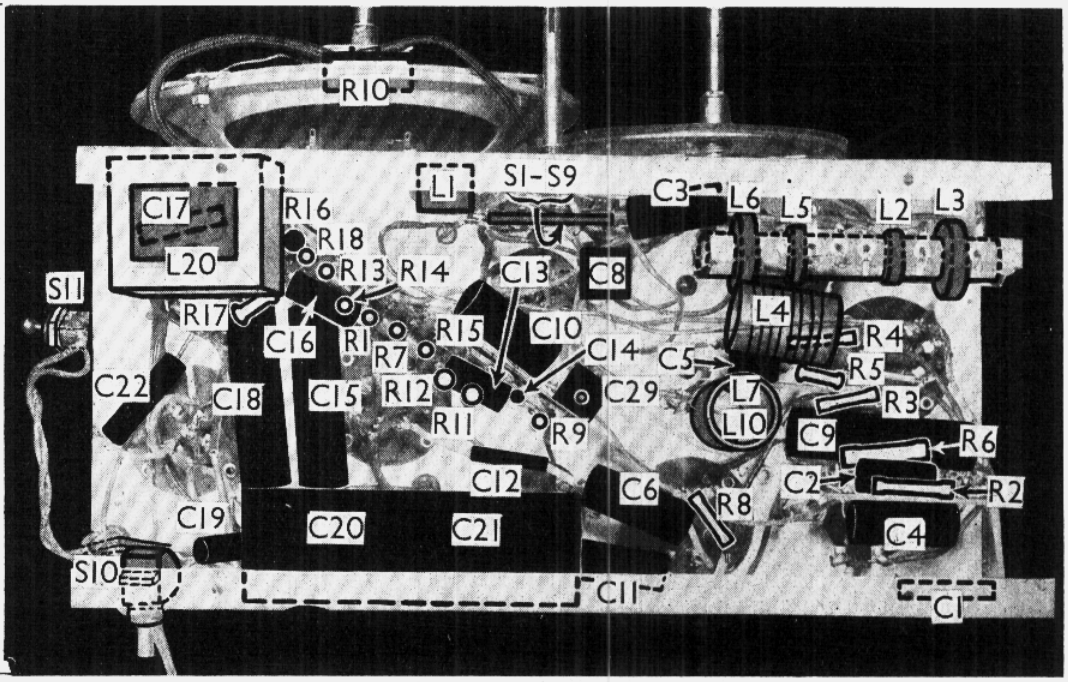
RESISTANCES		Values (ohms)
R1	V1 hex. CG decoupling ..	1,000,000
R2	V1 hex. fixed GB	150
R3	1st IF trans. pri. damping ..	500,000
R4	V1 osc. CG stabiliser	50
R5	V1 osc. CG resistance.. ..	33,000
R6	V1 SG and osc. anode HT feed	10,000
R7	V2 CG decoupling	1,000,000
R8	V2 fixed GB resistance ..	300
R9	IF stopper	250,000
R10	Manual volume control ..	1,000,000
R11	V3 signal diode load	100,000
R12	V3 GB and AVC delay resistance	1,000
R13	V3 triode anode decoupling ..	10,000
R14	V3 triode anode load	10,000
R15	V3 AVC diode load	1,000,000
R16	V4 CG resistance	100,000
R17	V4 grid stopper	100,000
R18	V4 GB resistance	150
R19	Heater circuit ballast, total ..	760*

* 60 O + 400 O + 100 O + 100 O + 100 O.



Circuit diagram of the Halcyon U573 AC/DC superhet. Note the scale lamp and mains voltage adjustments.

Under-chassis view. A diagram of the switch unit is on page IV. The choke **L20** is employed for smoothing, the speaker field coil being connected across the rectifier output in our chassis.



CONDENSERS		Values (μF)
C1	Aerial isolating condenser ..	0·0003
C2	Earth isolating condenser ..	0·01
C3	Band-pass bottom coupling ..	0·25
C4	V1 cathode by-pass	0·1
C5	V1 osc. CG condenser.. ..	0·00005
C6	HT circuit RF by-pass ..	0·1
C7	Osc. circuit MW fixed tracker	0·0015
C8	V1 osc. anode SW RF by-pass	0·0003
C9*	V1 SG and osc. anode decoupling	2·0
C10	V2 CG decoupling	0·1
C11	V2 cathode by-pass	0·1
C12	Coupling to V3 AVC diode ..	0·0001
C13	AF coupling to V3 triode ..	0·01
C14	IF by-pass	0·0001
C15*	V3 triode anode decoupling ..	2·0
C16	V3 triode to V4 AF coupling..	0·01
C17	Fixed tone corrector	0·001
C18*	V4 cathode by-pass	50·0
C19	Tone control condenser ..	0·025
C20*	HT smoothing	16·0
C21*	HT smoothing	16·0
C22	Rectifier RF by-pass	0·025
C23†	Band-pass primary tuning ..	—
C24‡	Band-pass pri. MW trimmer..	—
C25†	Band-pass sec. and SW aerial tuning	—
C26‡	Band-pass sec. MW trimmer..	—
C27†	Oscillator circuit tuning ..	—
C28‡	Osc. circuit SW trimmer ..	—
C29‡	Osc. circuit MW trimmer ..	0·000035
C30‡	Osc. circuit LW tracker ..	0·00075
C31‡	Osc. circuit MW tracker ..	0·00075
C32‡	1st IF trans. pri. tuning ..	0·00015
C33‡	1st IF trans. sec. tuning ..	0·00015
C34‡	2nd IF trans. pri. tuning ..	0·00015
C35‡	2nd IF trans. sec. tuning ..	0·00015

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial LW choke	30·0
L2	Band-pass primary coils, totals ..	2·5
L3	Band-pass primary coils, totals ..	14·0
L4	Aerial circuit SW tuning coil	0·05
L5	Band-pass secondary coils	2·5
L6	Band-pass secondary coils	14·0
L7	Osc. circuit SW tuning coil ..	0·05
L8	Osc. circuit MW tuning coil ..	2·2
L9	Osc. circuit LW tuning coil ..	23·0
L10	Oscillator SW reaction coil ..	0·1

OTHER COMPONENTS (*Continued*)			Approx. Values (ohms)
L11	Oscillator MW reaction coil		3·0
L12	Oscillator LW reaction coil		
L13	1st IF trans.	Pri. ..	75·0
L14	1st IF trans.	Sec. ..	75·0
L15	2nd IF trans.	Pri. ..	75·0
L16	2nd IF trans.	Sec. ..	75·0
L17	Speaker speech coil		2·1
L18	Hum neutralising coil.. ..		0·15
L19	Speaker field coil		7,000·0
L20	HT smoothing choke		290·0
T1	Speaker input trans.	Pri. ..	330·0
		Sec. ..	0·3
F1, F2	Mains circuit fuses		—
S1-S9	Waveband switches		—
S10	Tone control switch		—
S11	Mains switch		—

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, remove the three knobs (recessed grub screws) and felt washers from the control spindles at the front of the cabinet, and the mains switch from the side of the cabinet (nut and lock nut). Now remove the four bolts (with washers) holding the chassis to the bottom of the cabinet, when the chassis and speaker can be removed together.

Removing Speaker.—If it is desired to remove the speaker, first remove the chassis as described above, then unsolder the leads. Now remove the self-tapping screw holding the bracket at the top to the scale assembly and the two self-tapping screws holding the brackets at the bottom to the chassis deck.

When replacing, connect the leads as follows, numbering the tags from left to right :—1, green/black ; 2, no external connection ; 3, green/black ; 4, yellow ; 5, red.

VALVE ANALYSIS

Valve voltages and currents given in the table (col 3) are those measured in our receiver when it was operating on AC mains of 226 V, using the 230 V tapping on the mains resistance. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

In our case **V1** became unstable at the bottom of the medium band and gave rise to erroneous readings, but it was stabilised by connecting a non-inductive condenser of 0·1 μF from grid (top cap) to chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TX21 ..	213 Oscil 100	5·0 lator 4·5	100	7·7
V2 VP13B	213	9·3	213	2·8
V3 TDD13C	132	3·3	—	—
V4 Pen36C	198	39·0	213	5·4
V5 V30† ..	—	—	—	—

† Cathode to chassis 233 V, DC.

GENERAL NOTES

Switches.—**S1-S9** are the waveband switches, in a single rotary unit beneath the chassis. It is indicated in our under-chassis view, and shown in detail in the diagram on page IV, where it is as seen looking from the rear of the underside of the chassis.

The table (page IV) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C** closed.

S10 is the QMB rotary tone control switch, at the rear of the chassis. It is closed in the clockwise position. **S11** is the QMB mains switch, normally fitted in an escutcheon at the left-hand side of the cabinet.

Continued overleaf

HALCYON U573—*Continued*

Coils.—**L1** is beneath the chassis, by the side of the wavechange switch unit. **L2, L3, L5, L6** are in an unscreened tubular unit, also beneath the chassis, while **L4,** and **L7, L10** are in two other small unscreened tubular units. **L8, L9, L11, L12** and the I.F. transformers **L13, L14** and **L15, L16** are in three screened units on the chassis deck, each containing also two pre-set condensers. The oscillator unit contains **C7** in addition.

Scale Lamp.—This is an Ismay Type C high voltage type, rated at 230 V, 10 W. It has a large bulb and an MES base.

Fuses F1, F2.—These are two standard 1¼ in. glass tubular types, rated at 1·0 A.

External Speaker.—No provision is made for this, but a low impedance type could be connected across the secondary of **T1.**

Condensers C20, C21.—These are two 16 μF dry electrolytics in a single carton beneath the chassis, with a common negative (black) lead. The red lead is the positive of **C20** and the yellow lead the positive of **C21.**

Voltage Adjustment.—The ballast resistor **R19** has tappings at each end for voltage adjustment. The main adjustment (190, 210, 230 and 260 V) is at the upper end, while at the lower end (nearest chassis) there are two taps giving a 10 V variation. The higher of the two is zero, and the lower is +10V. The scale lamp lead should be on the same upper terminal as the mains adjustment lead, unless this is on the 260 V tapping, in which case the lamp lead should be on 230 V.

Chassis Divergencies.—The makers' blue print differs from our chassis in several respects. For instance, the speaker field coil **L19** takes the place of the choke **L20,** which is omitted. **L1** is also not shown.

SWITCH TABLE AND DIAGRAM

Switch	SW	MW	LW
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	C	C	—
S5	C	—	—
S6	—	C	—
S7	C	—	—
S8	—	C	C
S9	—	C	—

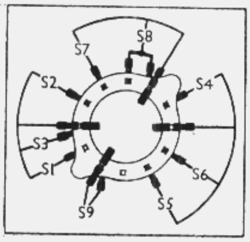


Diagram of the switch unit, looking from the rear of the underside of the chassis.

CIRCUIT ALIGNMENT

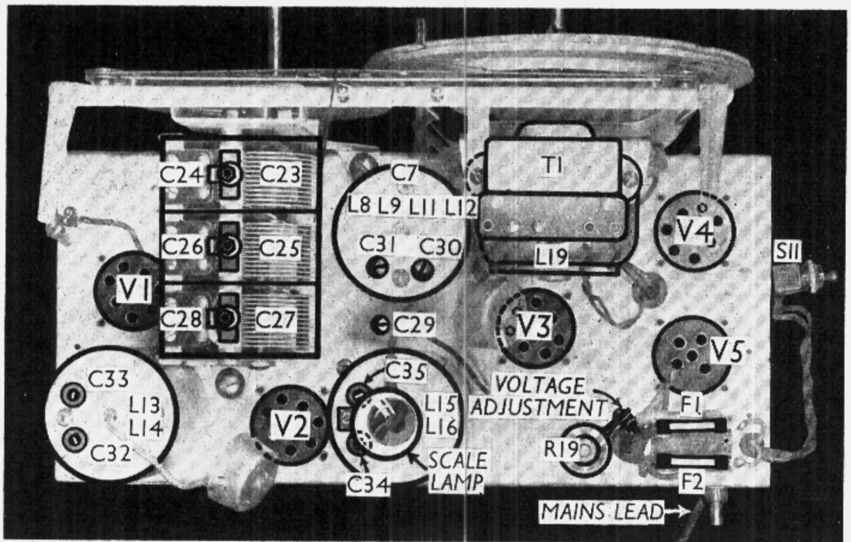
IF Stages.—Connect signal generator to control grid (top cap) of **V1** and chassis, via a 0·1 μF condenser. Feed in a 130·5 KC/S signal, and adjust **C35, C34, C33** and **C32** in turn for maximum output.

RF and Oscillator Stages.—Connect signal generator to **A** and **E** sockets.

SW.—Switch to SW, tune to 17 m on scale, and feed in a 17 m (17·6 MC/S) signal. Adjust **C28** for maximum output. Check calibration and sensitivity at 50 m.

MW.—Switch set to MW, tune to 250 m on scale, feed in a 250 m (1,200 KC/S) signal, and adjust **C29, C26** and **C24** for maximum output. Feed in a 500 m (600 KC/S) signal, tune it in, and adjust **C31** for maximum output, rocking the gang for optimum results.

LW.—Switch set to LW, tune to 1,875 m on scale, feed in an 1,875 m (160 KC/S) signal, and adjust **C30** for maximum output, while rocking the gang. Check calibration and sensitivity at 1,000 m.



Plan view of the chassis. Note the scale lamp fitted in a holder mounted on one of the screened coil units.

MAINTENANCE PROBLEMS

Driver Transformer Fault

RECENTLY a Pye TP/B was brought in with a complaint of weak signals and distortion. A quick preliminary test narrowed the field of inquiry to the output circuit. A test of the output valve, a Mazda QP240, with the circuit analyzer, revealed screen and anode voltages O.K., but anode current to anode A was 6 mA, and to anode B, nil.

Rather puzzled as to the cause of the absence of current to anode B, the writer carried out a systematic test of the output circuit. Both sides of the OP transformer primary tested O.K., as did the two halves of the driver transformer secondary. To make doubly sure, the screen voltages were again read for possible discrepancies, and the bias tested on the grids of the QP240.

Now definitely puzzled, the writer paused to think things out; then began to test further back in the circuit.

The driver transformer primary was found to be O/C, consequently this transformer was removed and a new one fitted. A further test of the output valve now showed correct current readings on both anodes, and on radio test the receiver was found to be quite up to standard.

The writer is still wondering what caused the loss of current from anode B of the QP240.—W. E. Woolacott, Newton Abbot.

Low Convertor Output

IT is a point of interest that in some cases the convertors used in the current Philips universal range are low in output.

The local mains here are 210 V DC, but I make a point of setting the voltage adjustment at 200 V. The effect on short wave reception is distinctly noticeable, and the tuning indicator is clearer.—E. R. Heale, Guernsey.

A DC to AC Conversion

A MARCONI receiver was sent to me for repair, and upon examination I found that it was a DC receiver, to which a rectifying valve had been added. This addition had resulted in the lowering of filament voltage to the other valves, which could only be corrected by altering the tapping on the mains voltage dropping resistance.

The low filament voltage resulted in a peculiar fault which I hope one of your readers can explain. It had the effect that under these conditions no reception could be obtained between 275 and 290 m. The long waves and all other stations on medium waves were receivable. Raising the filament voltage completely cured the fault. Can it be explained? The frequency changer, an SG valve, ceased to oscillate between the wavelengths mentioned above. — R. A. Walker, Swansea.

[Note.—Surely our contributor has answered his own query. Owing to incorrect operating conditions the oscillator portion of the frequency changer failed to oscillate over a small part of the band.—Tech. Ed.]