'TRADER' SERVICE SHEETS

RECEIVER SERIES (NUMBER TWENTY-ONE)

HALCYON MODEL 701 A.C. SUPERHET

THE chassis embodied in the 1934-5 Halcyon 701 A.C. table consolette receiver is also fitted in the floor console model, so that the following information applies in most respects to both instruments. A 6-valve (plus rectifier) super-heterodyne circuit is employed and there are no fewer than nine tuned stages. Features of particular interest are the separate triode oscillator, two I.F. amplifiers, and the double diode triode, giving diode detection and A.V.C.

CIRCUIT DESCRIPTION

Aerial input by way of aperiodic coupling coils **L1, L2** to inductively coupled band-pass filter. Primary **L3, L4** tuned by **C23**; secondary **L7, L8** tuned by **C25**; coupling coils **L5, L6.** First valve (**V1, Osram MS4B**) is a tetrode functioning as an amplifying first detector. Separate triode oscillator (**V2, Osram MH4**) with cathode injection. Grid coils **L9, L10** tuned by **C27**, anode reaction coil (in two sections) **L11.**

Two variable-mu tetrode intermediate frequency amplifiers (**V3 and V4, Osram metallised VMS4's**) with tuned-primary tuned-secondary band-pass transformer couplings **L12, L13, L14, L15** and **L16, L17. I.F. 110KC/S.** Moving-iron meter tuning indicator in anode feed circuit to **V3.**

Diode second detector (coupled by **C10**) forming part of double diode triode (**V5, Osram metallised MHD4**). Second diode, coupled by **C14,** develops voltage across **R13** which is fed back through decoupling circuit **R12, C5** as G.B. to first I.F. valve **V3,** thus giving automatic volume control. Delay voltage obtained by means of cathode resistance **R17.** Output from rectifier diode is tapped off from load resistance **R14, R16** and passed through H.F. filtering circuit **R15, C11** and L.F. coupling condenser **C12** to manual volume control **R18,** thence to grid of triode section which operates as first L.F. amplifier. Provision for connecting gramophone pick-up across **R18** by means of switch **S6.**

Resistance-capacity coupling to I.H.C. output pentode (**V6, Osram MPT4**). Normal tone compensation by condenser **C18** in anode circuit. Additional two-point tone control by switch **S9** and condenser **C17.**

H.T. current supplied by I.H.C. full-wave rectifying valve (**V7, Osram MU12**). Main smoothing by speaker field **L19** and dry electrolytic condensers **C20, C21.** Additional smoothing of H.T. supply to **V5** by choke **L18** and electrolytic condenser **C15.** Fuse (1A) in mains transformer primary circuit.

DISMANTLING THE SET

Removing Chassis.—The receiver has two separate interconnected chassis, and both must be removed. First of all, remove the three control knobs (grub screws). Remove the metal bush through which volume control spindle projects (large flat nut and washer). Remove rectifier valve **V7.** Unsolder loud-speaker leads at the speaker input transformer terminal panel. Unsolder switch leads from mains switch **S10** at the back of volume control. Unsolder earthing wire from tag on speaker chassis. Remove 5-pin plug from power supply chassis. Remove 4 screws and washers holding power supply chassis to base of cabinet. Remove this chassis. Remove 4 screws and washers holding main chassis to base of cabinet. This chassis may now be removed.

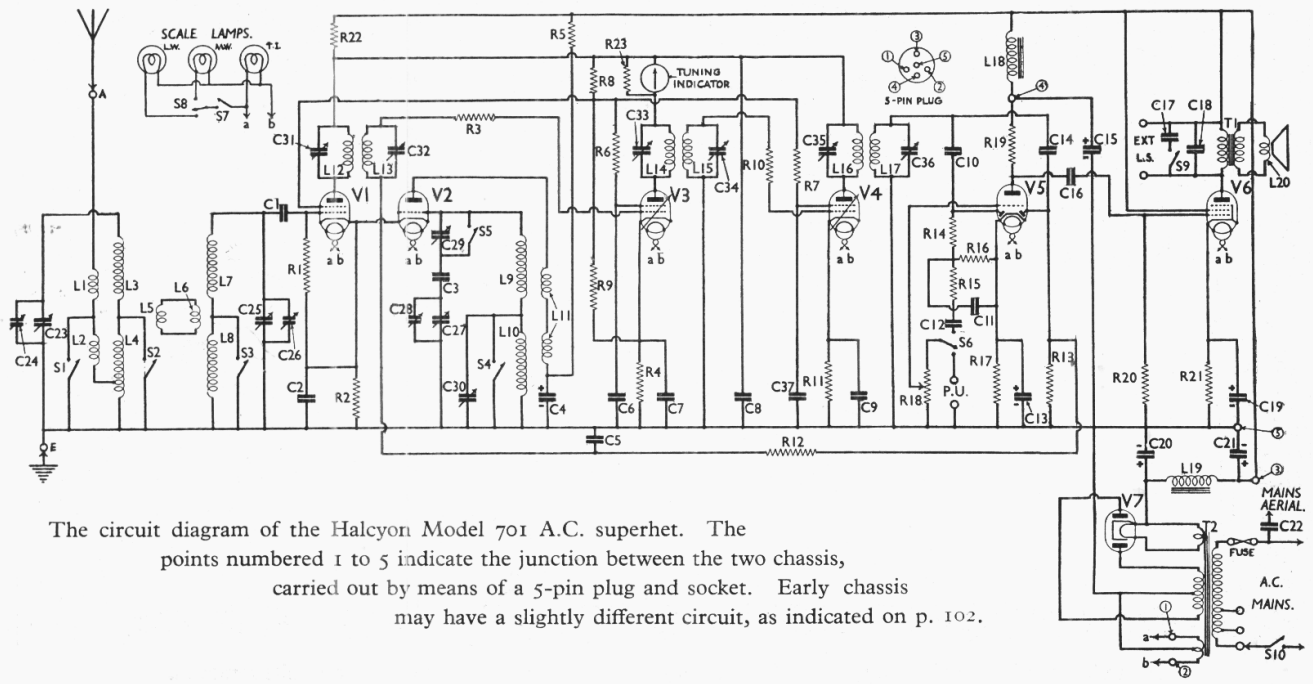
NOTE.—In the case of the console model, the tone control switch must be removed from back of cabinet.

When replacing speaker leads, the following coding must be observed. Top tag: blue lead from power supply chassis. Second from top: yellow lead from main chassis. Centre tag: blank. Second tag from bottom: green and blue leads from main chassis. Bottom tag: yellow lead from power supply chassis.

Do not forget to re-solder the mains switch leads and speaker earth lead after replacing chassis.

Removing Speaker.—This is held to a sub-baffle by four nuts and bolts. Removal of the nuts and spring washers permits the speaker to be taken out of

(*Continued overleaf*)



The circuit diagram of the Halcyon Model 701 A.C. superhet. The points numbered 1 to 5 indicate the junction between the two chassis, carried out by means of a 5-pin plug and socket. Early chassis may have a slightly different circuit, as indicated on p. 102.

HALCYON MODEL 701 (A.C.) (cont'd)

the cabinet. *When replacing*, the mains transformer should be at the left of the chassis, looking into the back of the cabinet, while the earthing tag under the bottom left-hand nut and washer should not be forgotten.

COMPONENTS AND VALUES

	Condensers	Values (μF)
C1	V1 grid condenser	0·0001
C2	V1 & V2 cathodes by-pass	0·0001
C3	Oscillator main tracker, fixed	0·0023
C4	V2 anode decoupling, electrolytic	1·0
C5	V3 cont. grid decoupling	0·1
C6	V3 S.G. by-pass	0·1
C7	V3 cathode by-pass	0·1
C8	V1, V3 & V4 anodes decoupling	0·25
C9	V4 cathode by-pass	0·1
C10	Rect. diode coupling	0·0001
C11	H.F. by-pass	0·0005
C12	L.F. coupling to V5 grid	0·01
C13	V5 cathode by-pass, electrolytic	50·0
C14	A.V.C. diode coupling	0·0001
C15*	V5 H.T. smoothing, electrolytic	4·0
C16	L.F. coupling to V6	0·01
C17, C18	Tone control condensers	0·015, 0·002
C19	V6 cathode by-pass, electrolytic	45·0
C20*, C21*	H.T. smoothing, electrolytic	4·0, 8·0
C22	Mains aerial condenser	0·0003
C23	Band-pass pri. tuning	0·0005
C24	Band-pass pri. trimmer, pre-set	—
C25	Band-pass sec. tuning	0·0005
C26	Band-pass sec. trimmer, pre-set	—
C27	Oscillator tuning	0·0005
C28	Oscillator trimmer, pre-set	—
C29	Oscillator L.W. tracker, pre-set	—
C30	Oscillator L.W. trimmer, pre-set	—
C31	1st I.F. trans. pri. tuning	—
C32	1st I.F. trans. sec. tuning	—
C33	2nd I.F. trans. pri. tuning	—
C34	2nd I.F. trans. sec. tuning	—
C35	3rd I.F. trans. pri. tuning	—
C36	3rd I.F. trans. sec. tuning	—
C37	V4 S.G. by-pass	0·1

* In condenser block.

	Resistances	Values (ohms)
R1	V1 grid resistance	2,000,000
R2	V1 & V2 fixed G.B. resistance	500
R3	V3 grid circuit stabiliser	500,000
R4	V3 fixed G.B. resistance	300
R5	V2 anode decoupling	16,000
R6	V3 S.G. decoupling	5,500
R7	V4 S.G. decoupling	5,500
R8	V1, V3 and V4 S.G.'s pot.	45,000
R9	divider	22,000
R10	V4 grid circuit stabiliser	260,000
R11	V4 fixed G.B. resistance	500
R12	V3 cont. grid decoupling	1,000,000
R13	A.V.C. diode load	2,000,000
R14	Part of rect. diode load	250,000
R15	H.F. stopper	260,000
R16	Part of rect. diode load	250,000
R17	V5 G.B. resistance	600
R18	Manual volume control	250,000
R19	V5 anode resistance	33,000
R20	V6 grid resistance	110,000
R21	V6 G.B. resistance	330
R22	H.T. feed to V1, V3 and V4	2,200
R23	Tuning indicator shunt	2,000

	Other Components	Values (ohms)
L1	Aerial coupling coils	1·0
L2		12·0
L3	Band-pass primary coils	4·0
L4		21·0
L5	Band-pass coupling coils	1·0
L6		1·0
L7	Band-pass secondary coils	4·0
L8		21·0
L9	Oscillator tuning coils	4·0
L10		16·0
L11	Oscillator reaction coil	1·5
L12	1st I.F. transformer Pri.	130·0
L13	1st I.F. transformer Sec.	130·0
L14	2nd I.F. transformer Pri.	130·0
L15	2nd I.F. transformer Sec.	130·0
L16	3rd I.F. transformer Pri.	130·0
L17	3rd I.F. transformer Sec.	130·0
L18	V5 H.T. smoothing choke	800·0
L19	Speaker field	1800·0
L20	Speaker speech coil	1·25
T1	Speaker input trans. Pri.	500·0
	Speaker input trans. Sec.	0·2
T2	Mains trans. Pri. total	17·5
	Mains trans. Heater sec.	0·05
	Mains trans. Rect. fil. sec.	0·1
	Mains trans. H.T. sec.	280·0
S1-S5	Waveband switches, ganged	—
S6	Radio-gramophone switch	—
S7-S8	Scale lamp switches	—
S9	Tone control switch	—
S10	Mains switch, ganged R18	—

VALVE ANALYSIS

The voltage and current readings given in the table below were obtained from a representative chassis with no aerial or earth connected. All voltages were read on the 1,200 V scale of an Avometer with the chassis as negative, and the anode and screen currents were measured, where necessary, with a milliammeter inserted in the low H.F. potential ends of the circuits to avoid instability.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 MS4B	210	4·5	115	0·25
V2 MH4	100	8·5	—	—
V3 VMS4	230	7·0	105	1·0
V4 VMS4	210	6·0	105	1·0
V5 MHD4*	140	2·5	—	—
V6 MPT4	220	32·9	240	6·5
V7 MU12	350†	—	—	—

* Triode section. † Each anode, A.C.

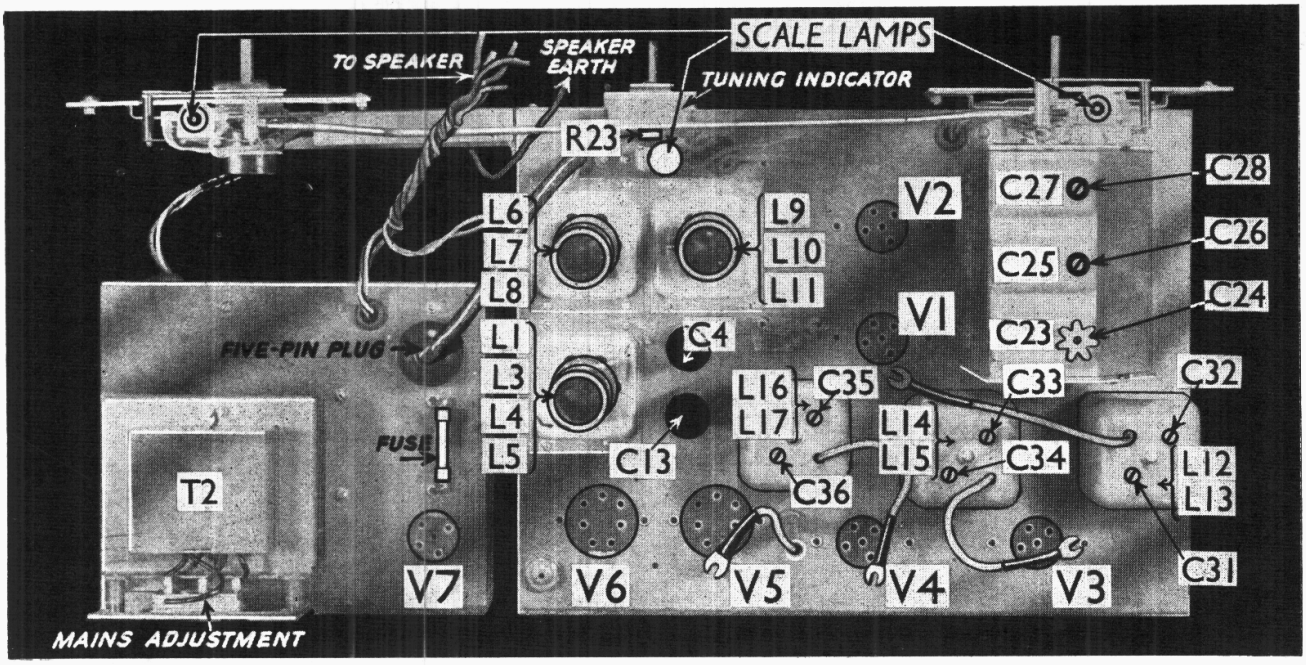
GENERAL NOTES

Switches.—**S1-S8** are the wavechange, radio-gramophone and scale lamp switches, in one unit. A separate diagram of this is given, showing the tags of the contacts looking into the right-hand end of the main chassis. Since **S6** and **S8** are of the single-pole changeover type, their three contacts each are numbered in our diagram to prevent confusion. The remaining switches in the assembly are of the single-pole shorting type.

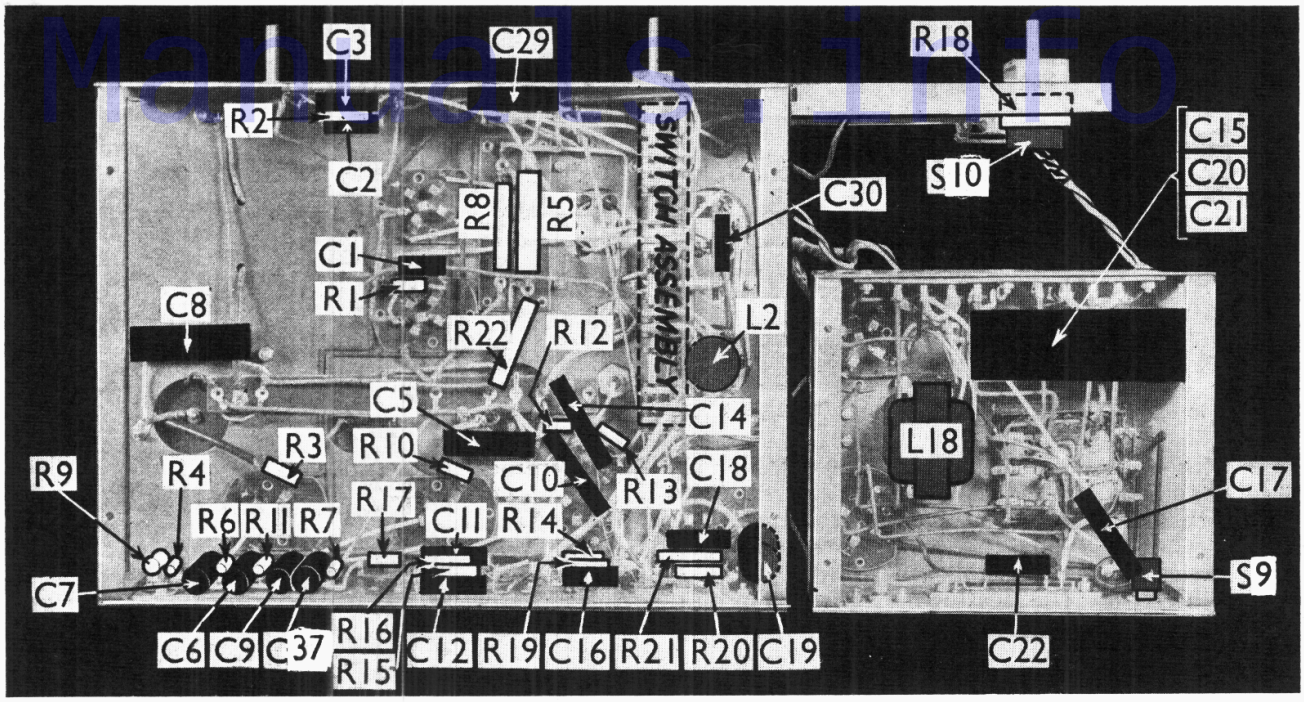
S1, S2, S3, S4, S5 and **S7** are *closed* on the M.W. band.

S1, S2, S3, S4 and **S5** are *open* on the L.W. band, **S7** still being closed.

S7 opens in the "gramophone" position, switching off the tuning scale lamps. The tuning indicator lamp is always on provided the mains switch is on.



Plan view of the two chassis, shown side by side, with the screens of some of the coil units removed.



The under-chassis view, with the two chassis arranged side by side as they are in the set.
The connections of the condenser block C15, C20, C21 are given in the text.

S6 is the radio-gramophone changeover switch, contacts 2 and 3 being closed on radio, with 1 and 2 open, and 1 and 2 being closed on gramophone, with 2 and 3 open.

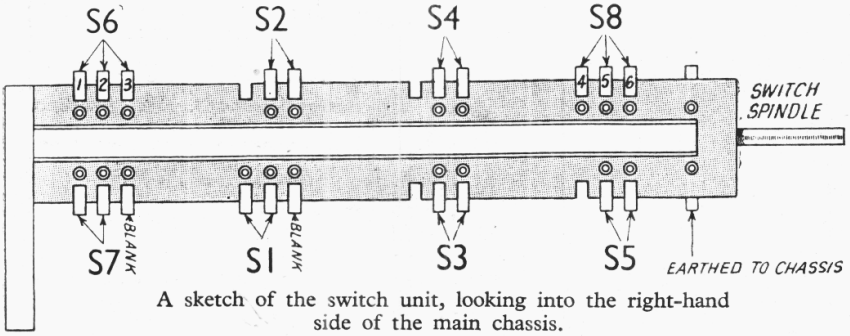
S8 is the changeover switch for the tuning scale lamps, contacts 4 and 5 being closed on M.W., with 5 and 6 open, and 5 and 6 being closed on L.W., with 4 and 5 open.

S9 is the two position Q.M.B. tone control switch at the rear of the chassis, and **S10** is the mains switch, ganged with **R18.**

they may be identified as follows:—**Primary Band Pass Unit, L1, L2, L3, L4, L5.**—**L3** is the top coil, with **L1** wound over it. **L5** is next, while **L4** is the multi-layer coil at the bottom. **L2** is on a slotted former just beneath the chassis, but concentric with the coil former of the primary unit.

Secondary Band Pass Unit, L6, L7, L8.—**L7** is at the top, **L6** in the centre, and **L8** at the bottom (multi-layer).

Oscillator Unit, L9, L10, L11.—**L9** is at the top, with part of **L11** wound over it. **L10** (multi-layer) is at the bottom,



A sketch of the switch unit, looking into the right-hand side of the main chassis.

Coils.—There are six coil units in all, three for the signal frequency and oscillator circuits, and three for the I.F. transformers. The covers over the first three can be easily removed, while those over the I.F. transformers are held to the chassis by two screwed studs each. In addition, a central rod, with a hexagon nut clamps the coil to the cover, and the nut must be removed to free the cover.

In the plan view of the chassis it has not been possible to indicate the relative positions of the coils in each unit, but

wound over a single layer forming the other part of **L11.**

I.F. coil units.—These each have the secondary coil at the top, and the primary at the bottom.

Resistance R23.—This is seen in the plan view of the chassis, and is shunted across the tuning indicator to reduce the current through this meter. It may not be present in all chassis.

Condensers C15, C20, C21.—These are of the dry electrolytic type, fitted in a single carton shown in the under-chassis view. Four leads emerge, one black and three red. The black one is the common negative. With the black lead at the bottom, the top red lead is **C21** (8μF), the next **C15** (4μF) and the lowest (next to the black), **C20** (4μF).

Chassis Divergencies.—The circuit appears to have been modified in various details since the first chassis were issued.

In a few early chassis, **C12** may be joined to the bottom end of **R15** instead of the junction between **R14, R15, R16.** Also, **C5** may be ·0005 μF instead of ·0001 μF.

In addition, a few very early chassis were not fitted with the tone control, and **C17** and **S9** were therefore omitted. In these cases, **C18** is ·02 μF. Further, in these models A.V.C. was applied to **V1** and **V3** instead of **V3** only. **R22** was omitted. Also, in one or two instances, **C1** and **R1** were not included.

CIRCUIT ALIGNMENT

Set the tuning control to the exact wavelength on the scale of a station which is actually transmitting below 260 metres. Turn oscillator trimmer **C28** slightly until maximum deflection of the tuning indicator is arrived at, and then leave this trimmer set. Now tune the other two trimmers, **C24, C26,** to increase the deflection. There is no need to re-track at the top of the scale.

One precaution should be taken in this tracking procedure—there is more than one position of the oscillator trimmer where the same station is received at the same tuning point on the scale. To avoid getting the wrong position, the oscillator trimmer should be unscrewed to its fullest extent before commencing this trimming. When screwing up the oscillator condenser, the first position of maximum signal strength found is the correct one.