

NUMBER FORTY-SIX  
(VOLUME TWO)

# TRADER SERVICE SHEETS

## HALCYON A.C.7

A.C. SUPERHET

### COMPONENTS AND VALUES

**T**HE Halcyon A.C.7 receiver is a 4-valve (plus valve rectifier) table model superhet for A.C. mains. The circuit is fairly conventional, with an octode operating as frequency-changer. A neon tuning indicator is fitted.

#### CIRCUIT DESCRIPTION

Aerial input via pre-set series condenser **C22** and switch **S1** to tappings on primary winding of inductively coupled band-pass filter. Primary **L2, L3**, tuned by **C23**; secondary **L6, L7**, tuned by **C25**; coupling coils **L4, L5**. Choke coil **L1** prevents break-through on long waveband.

First valve (**V1, Mullard metallised FC4**) is an octode operating as frequency-changer with electron coupling. Oscillator grid tuning coils **L8, L9** tuned by **C27**; anode reaction coils **L10, L11**; L.W. tracking by pre-set condenser **C29**.

Second valve, a variable-mu H.F. pentode (**V2, Mullard metallised VP4**), operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **L12, L13** and **L14, L15**. Neon tuning indicator is connected in the S.G. H.T. feed circuit.

#### Intermediate frequency 110 KC/S.

Diode second detector forms part of double diode triode valve (**V3, Osram metallised MHD4**) and also provides D.C. potential which is fed back through decoupling circuit **R7, C6** as G.B. to I.F. valve, giving automatic volume control.

Second diode, fed from secondary of I.F. transformer by condenser **C14**, provides D.C. potential used for A.V.C. of the frequency-changer valve. Delay voltage in this case is obtained from voltage drop along **V3** cathode resistance **R20**.

Audio-frequency output from rectifier diode is passed by way of I.F. stopper **R15**, coupling condenser **C10**, manual volume control **R16**, and I.F. stopper **R17** to grid of **V3** triode which operates as L.F. amplifier. Variable tone control by condenser **C34** shunted across grid circuit. Provision for connection of gramophone pick-up across volume control.

Resistance-capacity coupling to output pentode (**V4, Mullard Pen4VA**). **V3** cathode by-pass condenser **C13**, being connected to a tapping on the G.B. resistance of **V4**, improves the bass response of the circuit. Provision for connection of low-resistance external speaker across secondary of transformer **T1**. Plug and socket device (**S8**) enables internal speaker to be cut out.

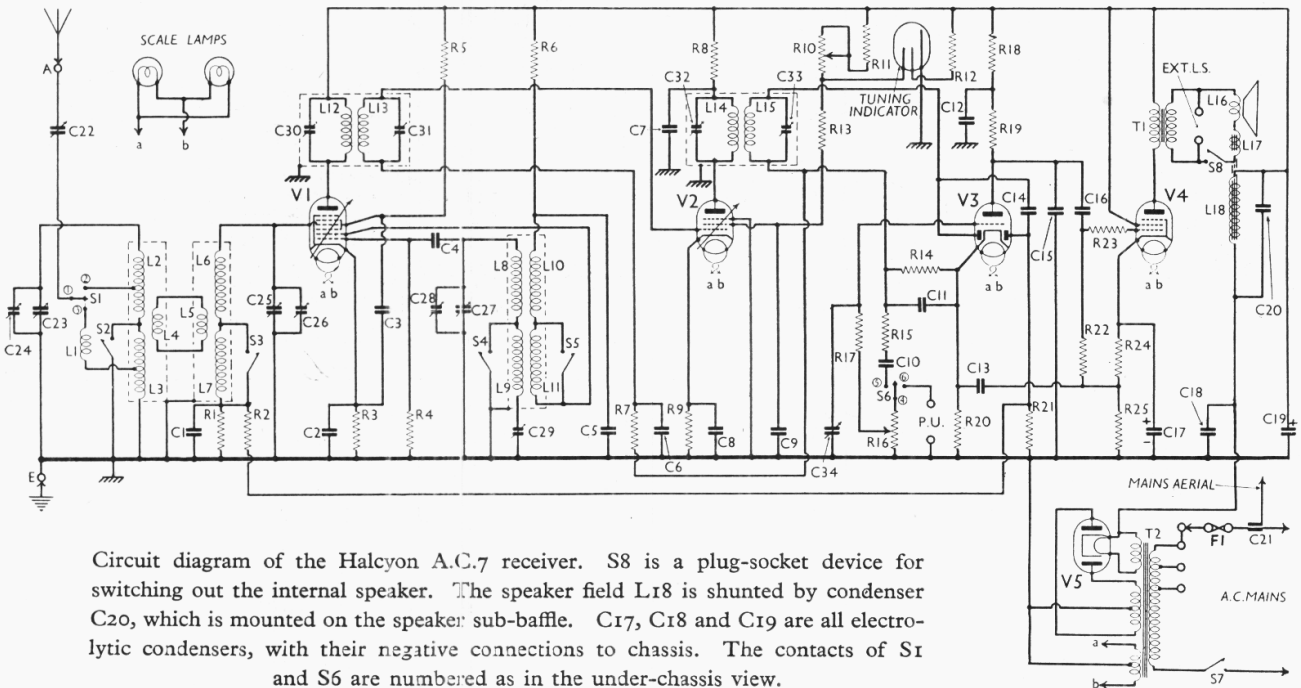
H.T. current is supplied by full-wave rectifying valve (**V5, Mullard IW3**). Smoothing by speaker field winding **L18**, which is shunted by **C20**, and electrolytic condensers **C18, C19**. Mains aerial condenser **C21** consists of an extra wire in the mains lead.

| Resistances |                                 | Values (ohms) |                           |
|-------------|---------------------------------|---------------|---------------------------|
| R1          | } V1 cont. grid decoupling      | 250,000       |                           |
| R2          |                                 |               |                           |
| R3          | V1 fixed G.B. resistance ..     | 250           |                           |
| R4          | V1 osc. grid resistance ..      | 19,000        |                           |
| R5          | V1 S.G.'s H.T. feed ..          | 40,000        |                           |
| R6          | V1 osc. anode decoupling ..     | 40,000        |                           |
| R7          | V2 cont. grid decoupling ..     | 2,000,000     |                           |
| R8          | V2 anode decoupling ..          | 10,000        |                           |
| R9          | V2 fixed G.B. resistance ..     | 300           |                           |
| R10         | } V2 S.G. H.T. feed resistances | 50,000        |                           |
| R11         |                                 |               | and neon tuning indicator |
| R12         |                                 |               | supply .. ..              |
| R13         |                                 | 33,000        |                           |
| R14         | V3 rectifier diode load ..      | 1,000,000     |                           |
| R15         | I.F. stopper .. ..              | 250,000       |                           |
| R16         | Manual volume control ..        | 1,000,000     |                           |
| R17         | V3 grid I.F. stopper ..         | 500,000       |                           |
| R18         | V3 anode decoupling ..          | 30,000        |                           |
| R19         | V3 anode resistance ..          | 50,000        |                           |
| R20         | V3 G.B. resistance ..           | 1,000         |                           |
| R21         | V3 A.V.C. diode load ..         | 1,000,000     |                           |
| R22         | V4 grid resistance ..           | 250,000       |                           |
| R23         | V4 grid I.F. stopper ..         | 100,000       |                           |
| R24         | } V4 G.B. resistances ..        | 500           |                           |
| R25*        |                                 |               |                           |

\* Two 400 O resistances in parallel.

| Condensers |                                | Values (μF) |
|------------|--------------------------------|-------------|
| C1         | V1 cont. grid decoupling ..    | 0.25        |
| C2         | V1 cathode by-pass ..          | 0.1         |
| C3         | V1 S.G.'s by-pass ..           | 0.1         |
| C4         | V1 osc. grid condenser ..      | 0.001       |
| C5         | V1 osc. anode decoupling ..    | 0.1         |
| C6         | V2 cont. grid decoupling ..    | 0.1         |
| C7         | V2 anode decoupling ..         | 0.1         |
| C8         | V2 cathode by-pass ..          | 0.1         |
| C9         | V2 S.G. by-pass ..             | 0.1         |
| C10        | L.F. coupling to V3 ..         | 0.001       |
| C11        | I.F. by-pass ..                | 0.0001      |
| C12        | V3 anode decoupling ..         | 0.25        |
| C13*       | V3 cathode by-pass ..          | 1.0         |
| C14        | Coupling to V3 A.V.C. diode .. | 0.0001      |
| C15        | V3 anode I.F. by-pass ..       | 0.0005      |

\* Two 0.5 μF tubulars in parallel.



Circuit diagram of the Halcyon A.C.7 receiver. S8 is a plug-socket device for switching out the internal speaker. The speaker field L18 is shunted by condenser C20, which is mounted on the speaker sub-baffle. C17, C18 and C19 are all electrolytic condensers, with their negative connections to chassis. The contacts of S1 and S6 are numbered as in the under-chassis view.

| Condensers (contd.) |                                   | Values ( $\mu\text{F}$ ) |
|---------------------|-----------------------------------|--------------------------|
| C16                 | L.F. coupling to V4               | 0.01                     |
| C17                 | V4 cathode by-pass                | 30.0                     |
| C18                 | H.T. smoothing                    | 4.0                      |
| C19                 |                                   | 8.0                      |
| C20†                | Speaker field shunt               | 0.005                    |
| C21‡                | Mains aerial condenser            | —                        |
| C22                 | Aerial series, condenser, pre-set | 0.0003                   |
| C23                 | Band-pass primary tuning          | 0.0005                   |
| C24                 | Band-pass primary trimmer         | —                        |
| C25                 | Band-pass secondary tuning        | 0.0005                   |
| C26                 | Band-pass secondary trimmer       | —                        |
| C27                 | Oscillator tuning                 | —                        |
| C28                 | Oscillator main trimmer           | —                        |
| C29                 | Oscillator L.W. tracker, pre-set  | 0.0016                   |
| C30                 | 1st I.F. trans. pri. tuning       | —                        |
| C31                 | 1st I.F. trans. sec. tuning       | —                        |
| C32                 | 2nd I.F. trans. pri. tuning       | —                        |
| C33                 | 2nd I.F. trans. sec. tuning       | —                        |
| C34                 | Tone control condenser, variable  | 0.0005                   |

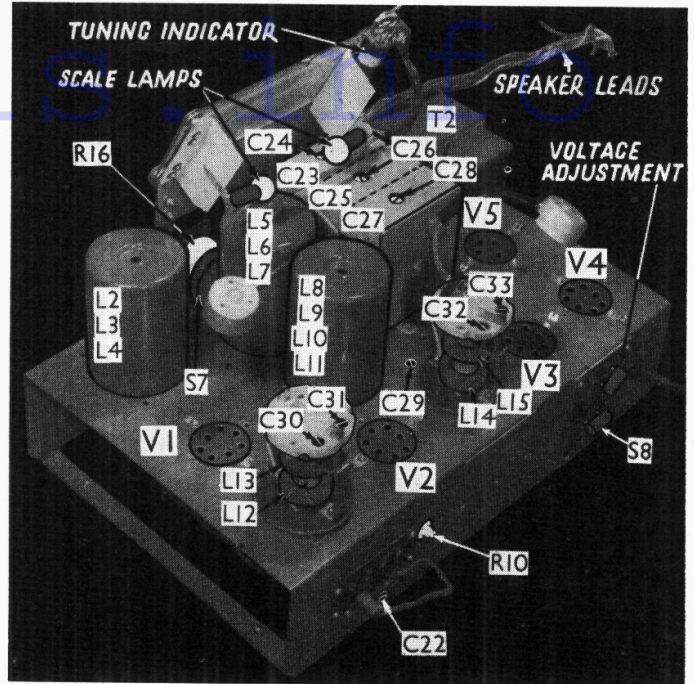
† In cabinet.

‡ Formed by extra wire in mains lead.

| Other Components |                              | Values (ohms) |
|------------------|------------------------------|---------------|
| L1               | Aerial choke coil (L.W.)     | 9.5           |
| L2               | Band-pass primary coils      | 2.3           |
| L3               |                              | 33.0          |
| L4               | Band-pass coupling coils     | 0.25          |
| L5               |                              | 0.25          |
| L6               | Band-pass secondary coils    | 2.3           |
| L7               |                              | 33.0          |
| L8               | Oscillator tuning coils      | 2.2           |
| L9               |                              | 20.5          |
| L10              | Oscillator reaction coils    | 3.4           |
| L11              |                              | 5.2           |
| L12              | 1st I.F. trans. . . . . Pri. | 90            |
| L13              |                              | 90            |
| L14              | 2nd I.F. trans. . . . . Pri. | 90            |
| L15              |                              | 90            |
| L16              | Speaker speech coil          | 2.4           |
| L17              | Hum neutralising coil        | 0.05          |
| L18              | Speaker field winding        | 3,000*        |
| T1               | Speaker input { Pri. . . . . | 675           |
|                  | { Sec. . . . .               | 0.5           |

\* May be 2,000  $\Omega$  in some receivers.

Three-quarter plan chassis view. The I.F. transformer screens have been removed. The other coil screens are not easily removable. R10 is the neon tuning indicator adjustment. S8 is the internal speaker switch, in plug and socket form.



| Other Components (contd.) |                             | Values (ohms) |
|---------------------------|-----------------------------|---------------|
| T2                        | Mains trans. { Pri. total   | 17.5          |
|                           | { Heater sec. . . . .       | 0.1†          |
|                           | { Rect. heater sec. . . . . | 0.1           |
|                           | { H.T. sec. . . . .         | 280           |
| S1-S5                     | Waveband switches, ganged   | —             |
| S6                        | Radio-gramophone switch     | —             |
| S7                        | Mains switch, ganged R16    | —             |
| S8‡                       | Internal speaker switch     | —             |
| F1                        | Mains circuit fuse          | —             |

† Measured at valve-holder sockets.

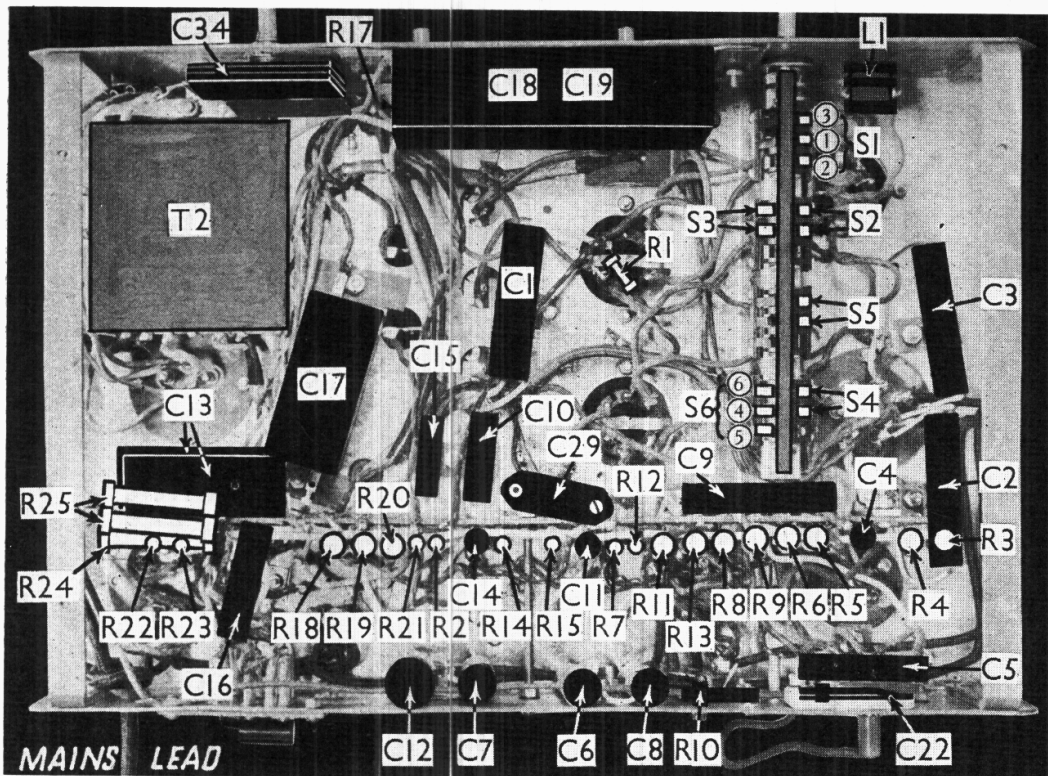
‡ Plug and socket device.

### DISMANTLING THE SET

With this receiver it will be possible to carry out many under-chassis repairs by removing the wooden false bottom of the cabinet, which is held in position by six wood screws.

**Removing Chassis.**—If this becomes necessary, remove the knobs (grub screws), and the four screws and washers holding chassis to base of cabinet. Before

(Continued overleaf)



Under-chassis view. The contacts of S1 and S6 are numbered as in the circuit diagram. C13 is formed by two tubular condensers in parallel. Resistance R17 is hidden inside a length of screened Empire sleeving passing beneath C18, C19. R25 consists of two similar resistances in parallel.

**HALCYON MODEL A.C.7  
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(Continued)**

the chassis can be taken out, it will be necessary to unsolder the six speaker leads, and also the brown lead from the tuning indicator to the speaker chassis. All the leads are colour-coded, and we give a diagram showing the connections to the speaker transformer and speaker chassis, which can be followed when replacing the chassis.

The two clips holding the speaker leads in position should now be loosened, and

All voltages were measured on the 1,200 V scale of an Avometer with chassis as negative.

| Valve     | Anode Volts | Anode Current (mA) | Screen Volts | Screen Current (mA) |
|-----------|-------------|--------------------|--------------|---------------------|
| V1 FC4*   | 230         | 0.5                | 60           | 4.0                 |
| V2 VP4    | 170         | 4.5                | 75           | 2.5                 |
| V3 MHD4   | 75          | 2.0                | —            | —                   |
| V4 Pen4VA | 210         | 30.0               | 230          | 6.0                 |
| V5 IW3    | 350†        | —                  | —            | —                   |

\* Osc. anode (G2) 75V, 3 mA.  
† Each anode, A.C.

**GENERAL NOTES**

**Switches.**—S1-S5 are the waveband switches, and S6 is the radio-gram switch. All these are ganged together in one unit, seen in the under-chassis view, and their positions are clearly marked. It will be noticed that several of the contacts on the switch unit are not employed.

In the case of S1 and S6, there are single pole change-over switches, and their three contacts are numbered in each case, both in the chassis view and on the circuit diagram. Following are the switch positions for

the various settings.

**M.W.**—S1, contacts 1 and 2 closed; S2, S3, S4, S5, all closed; S6, contacts 4 and 5 closed.

**L.W.**—S1, contacts 1 and 3 closed; S2, S3, S4, S5, all open; S6, contacts 4 and 5 closed.

**Gram.**—S1, all contacts open; S2, S3, closed; S4, S5, open; S6, contacts 4 and 6 closed.

The remaining switches are S7 and S8. S7 is the Q.M.B. mains switch, ganged with R6. S8 is really a plug and socket device at the rear of the chassis, which cuts out the internal speaker when required.

**Coils.**—L1 is a small choke coil mounted underneath the chassis, and seen at the top right hand of our under-chassis view. The other coils are contained in five screened units mounted on top of the chassis. Three of these house the band-

pass and oscillator coils, and the other two the I.F. transformers. Only in the case of these transformers can the screens be easily removed, as shown in our plan chassis view.

In the case of the other coil units, these must be removed complete with their screens, which are each held to the chassis by two nuts and bolts. Naturally, all the external coil connections must first be unsoldered.

**Chassis Divergencies.**—Early models have a speaker with a 3,000 O field, and small coils of 18-gauge Eureka resistance wire are inserted in series with each side of the T2 heater secondary to reduce the voltage output. Later models may have a 2,000 O speaker field, and a slightly different mains transformer.

**Scale Lamps.**—There are two of these in parallel. They are of the Osram M.E.S. type, rated at 4.5 V, 0.3 A.

**Mains Aerial.**—This is shown in our circuit diagram as a condenser, formed by the capacity between the flexible lead to which the mains aerial plug is connected and the mains lead.

**Extension Speaker.**—This should be of the low resistance type, with a speech coil of about 2 O.

**Condensers C18, C19.**—These are two dry electrolytics mounted in one unit, and seen in the under-chassis view. C18 is a 4 μF type (blue lead) and C19 is an 8 μF type (red lead). The black lead emerging from the unit is the common negative connection.

**Condenser C17.**—This is a 30 μF, 20 V working electrolytic. In our chassis a double unit is fitted, but one-half is not used. This could be used as a spare in case of failure of the other half.

**Pre-set Condensers C22, C29.**—C22, the aerial series condenser, is operated through a hole in the rear of the chassis, while C29, the oscillator L.W. tracker, is reached through a hole in the top of the chassis behind the second I.F. transformer. The slotted screw-head is normally waxed over.

**Resistance R10.**—This is a pre-set resistance, adjustable at the rear of the chassis, controlling the operation of the tuning indicator.

**Tuning Indicator.**—To remove this, unplug the 4-socket connector at the top, and withdraw the tube from its housing. It is a G.E.C. "Tuneon" type.

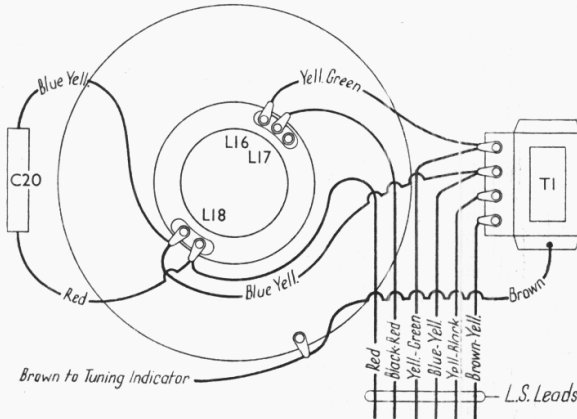


Diagram showing the colour-coded speaker connections.

the receiver chassis can then be withdrawn.

**Removing Speaker.**—It is best to remove this by undoing the four nuts and bolts holding it to the sub-baffle. Actually there are eight bolts in all, but only four of them attach the speaker to the baffle. In our case, the nuts to remove were those on the longer set of four bolts. Before the speaker chassis can be withdrawn, the leads to C20 and the transformer T1 must be unsoldered. Use the diagram for the colour-coding when replacing.

**VALVE ANALYSIS**

The voltage and current readings listed in the table are those given by Halcyon for an average chassis working with no signal input (aerial short-circuited to earth) and with the tuning condenser set at 1,500 KC/S.

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