'TRADER' SERVICE SHEETS

RECEIVER SERIES (NUMBER TEN)

ALBA SUPERHET FIVE

FOR A.C. MAINS

THE chassis embodied in the "Alba" Model 56 A.C. table consolette receiver is also fitted in the Model 67 floor console and the Model 78 radio-gramophone, so that the following information applies in most respects to all three instruments. A 4-valve (plus rectifier) super-heterodyne receiving circuit is employed, and although it is quite straightforward in general design it includes one or two somewhat unconventional features.

CIRCUIT DESCRIPTION

One aerial connection by way of I.F. trap **L1, C14** to coupling coils **L3, L4.** Second trap **L2, C15,** in parallel with **L4,** is tuned to 1147 KC/s and prevents medium-wave break-through on the long-wave band. Single tuned input circuit **L5, L6, C16** to combined first detector and oscillator valve (**V1, Mullard SP4**). Oscillator coils **L9, L10** tuned by **C17**; coupling coils **L7, L8** in cathode circuit. One variable-mu pentode intermediate frequency amplifier (**V2, Mullard metallised VP4**) with transformer couplings **L11, L12** and **L13, L14. I.F. 473 KC/s.** Volume on radio controlled by variable potentiometer **R3, R4** which varies G.B. applied to **V2** and also functions as an aerial shunt resistance. S.G. second detector (**V3, Mullard metallised S4VB**) functioning on anode bend system with G.B. obtained from voltage drop across **R7.** Provision in grid circuit (in series with **L14**) for gramophone pick-up. Switch **S5** prevents radio break-through on gramophone by short-circuiting screening grids of **V1** and **V2** to earth. Reaction is applied from anode of the detector valve to the anode of **V2** by means of pre-set condenser **C22.** (Knob at rear of chassis.) **V3** is R.C. coupled to a directly-heated output pentode (**V4, Mullard PM24M**), which obtains its G.B. voltage from a tapping on a potentiometer **R14, R15** across the speaker field **L15** in the H.T. negative lead. Usual tone compensating condenser **C11** in anode circuit.

H.T. current supplied by full-wave rectifier (**V5, Mullard DW3**). Smoothing by speaker field **L15** and two dry electrolytic condensers **C12, C13.**

DISMANTLING THE SET

Removing Chassis.—Remove two wood screws holding plywood base-board to bottom of cabinet. Remove knobs (grub screws). Unsolder wires from speaker terminal panel, after first removing metal cover (2 screws). Chassis, on its wooden base-board, can then be slid out. The base-board is held to the underside of chassis by four screws, one at each corner. Chassis cannot be removed without unsoldering speaker leads, or detaching speaker from its sub-baffle.

If leads to the speaker are unsoldered, the connections of the coloured wires when replacing are: Top tag, blue; 2nd tag, black; 3rd tag (centre), not connected; 4th tag, white; bottom tag, red. This, of course, only holds providing the speaker, if removed, is replaced with the transformer on the right of the field pot.

When replacing knobs, note that the one marked "off-volume" is on the left, the plain one in the centre, and that marked "M.W.—L.W." on the right.

Removing Speaker.—This is held to the sub-baffle by four bolts. When replacing, see that transformer is to the *right*, looking at the back of the cabinet.

COMPONENTS AND VALUES

	Resistances	Value (Ohms)
R1	V1 G.B. resistance	7,000
R2	Damping across part of L11	50,000
R3	} Radio volume control {	15,000
R4		280

	Resistances (contd.)	Value (Ohms)
R5	} V1 and V2 S.G.'s pot. divider {	30,000
R6		50,000
R7	V3 G.B. resistance	5,000
R8	V3 S.G. voltage-dropping resistance	2,000,000
R9	V3 anode H.F. stopper	50,000
R10	V3 anode resistance	250,000
R11	V3 anode decoupling	50,000
R12	V4 grid resistance	500,000
R13	V4 grid H.F. stopper	250,000
R14	} V4 G.B. potentiometer across	250,000
R15	L15	2,000,000

	Condensers	Value (μF)
C1*	V1 cathode by-pass	0·0025
C2	Oscillator H.T. blocking condenser	0·1
C3	V1 and V2 S.G.'s by-pass	0·05
C4	V2 cathode by-pass	0·01
C5	V3 cathode by-pass, electrolytic	25·0
C6	V3 S.G. by-pass	0·05
C7	V3 anode by-pass	0·0005
C8	V3 anode decoupling	0·5
C9	V4 grid L.F. coupling	0·001
C10	V4 grid decoupling	0·5
C11	V4 anode tone compensator	0·001
C12	} H.T. smoothing, dry electro-	6·0
C13	lytics	4·0
C14	I.F. trap tuning, pre-set	—
C15	1147 KC trap tuning, pre-set	—
C16	Aerial tuning	—
C17	Oscillator tuning	—
C18	1st I.F. pri. tuning, pre-set	—
C19	1st I.F. sec. tuning, pre-set	—
C20	} Oscillator padding con-	—
C21	densers, pre-set	—
C22	I.F. reaction condenser, pre-set	—
C23	2nd I.F. sec. tuning, pre-set	—
C24	Mains aerial condenser	0·0002

* 0·001 μF in our receiver.

(*Continued overleaf*)

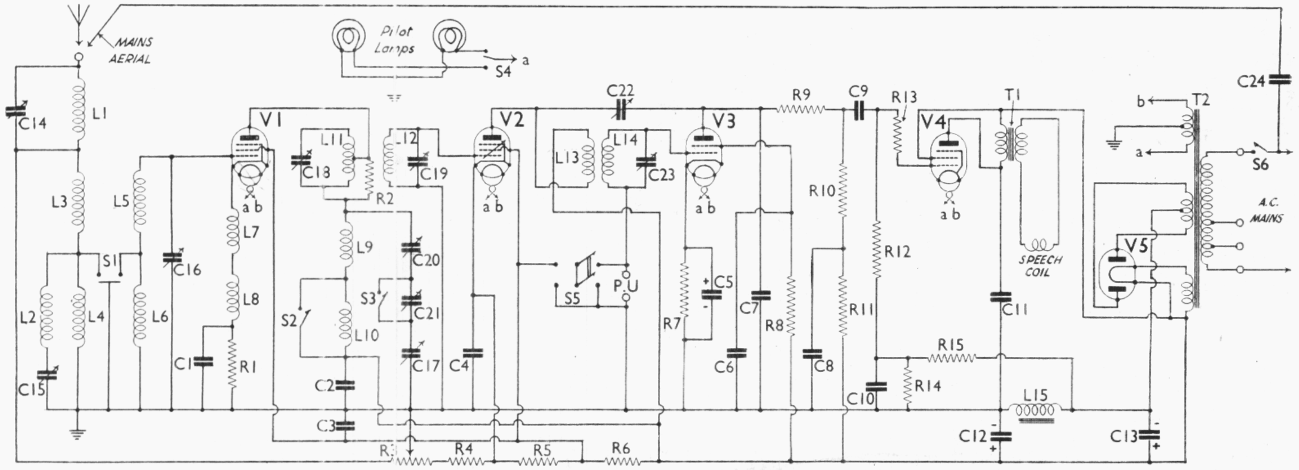

Fig. 1.—The circuit of the Alba Superhet Five for A.C. mains. The tuning condensers, C16 and C17, have the usual trimmers, which are not indicated above, but are shown in Fig. 3. R3 and R4 are both included in the volume control.

ALBA SUPERHET FIVE (contd.)

	Other Components		Value (ohms)
L1	I.F. trap coil		2·3
L2	M.W. trap coil (1147 KC)		1·7
L3	Aerial coupling coils		2·6
L4			20·0
L5	Aerial tuning coils		3·4
L6			11·0
L7	Oscillator coupling coils		2·3
L8			3·4
L9	Oscillator tuning coils		1·5
L10			1·7
L11	1st I.F. transformer	Pri.	10·0
L12		Sec.	5·5
L13	2nd I.F. transformer	Pri.	8·5
L14		Sec.	6·2
L15	Speaker field		2,500·0
T1	Speaker input transformer	Pri.	420·0
		Sec.	0·2
T2	Mains transformer	Pri. (total)	18·0
		Heater sec.	0·2
		Rect.fil.sec.	0·25
		H.T. sec.	350·0
S1-S3	Waveband switches (ganged)		—
S4	Dial lamp switch		—
S5	Radio-gramophone switch		—
S6	Mains switch (ganged with R3, 4)		—

VALVE ANALYSIS

The values below were obtained with a high resistance meter, connected, in the case of the voltage readings, from the anodes or screens of the valves to chassis. In the case of the screen of **V3,** since this is fed through a 2 MO resistance, the voltage reading obtained will be extremely low unless it is measured with an electrostatic voltmeter. On the 1,200 V range of an Avometer, only 10 V is recorded. The table below gives results for the types of valves indicated, and these will not necessarily be exactly the same when alternatives are fitted. **V1** may be a Mazda AC/SG and **V5** may be a Mullard IW2A or IW3. All readings in the table below are with the volume control at maximum.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 SP4	250	1·1	65	—
V2 VP4	250	2·5	65	—
V3 S4VB	80—90	0·2	*	—
V4 PM24M	240	32·0	255	6·0
V5 DW3	340†	—	—	—

* Very low when measured with a normal meter.
† Each anode.

GENERAL NOTES

Switches.—S1, S2, S3 and **S4** comprise the waveband switch, seen at the back right hand of the under-chassis view. Of these, the first three perform the coil switching, while **S4** switches the pilot lights so that the appropriate waveband scale is illuminated. **S1** is a 3-point shorting switch, **S2** and **S3** are 2-point shorting types, while **S4** is of the single-pole change-over type. **S1, S2** and **S3** are *closed* on M.W. and open on L.W.

The shorting contacts on the spindle can easily be cleaned by setting the switch in the L.W. position. To clean, or bend up the fixed contacts to make a heavier pressure, the spindle must first be removed. This is done by unscrewing the bracket acting as a bearing at the rear end (2 nuts and bolts through chassis), and threading the spindle towards the rear of the chassis.

S5 is connected as a double-throw shorting switch. It is of the Q.M.B. type.

S6 is the mains switch, ganged with the volume control **R3, R4.**

Volume Control.—This is made up of **R3** and **R4,** which actually form the single winding. **R3** is 15,000 O, while **R4** is an extra 280 O which the slider moves over while the switch **S6** is operating.

Resistance R6.—This is a 50,000 O, 1 W type. On radio it has about 140 V across it, but on gramophone, owing to the screens of **V1** and **V2** being shorted to earth, it has 230 V across it. This results in **R6** running at full load on gramophone.

Pilot Lamps.—These are switched by **S4,** and are connected across one half of the heater winding (2 V). They have a 2·5 V, 0·2 A rating. Removal of the lamps is quite easy, as they are both mounted on a shaped metal plate which can be pulled out upwards, and clipped back, in a few moments.

Electrolytic Condensers.—C12 and **C13,** the H.T. smoothing condensers, are of the dry electrolytic type mounted in a single waxed carton. This is mounted under a metal clip, held to the underside of the chassis by two nuts and bolts. **C12** has a capacity of 6 μF, and **C13,** 4 μF. Note that the positive connection of each is common, and is the red lead emerging from the end of the carton. The two negative leads are black.

C5 is a tubular 25 μF, 25 V D.C.

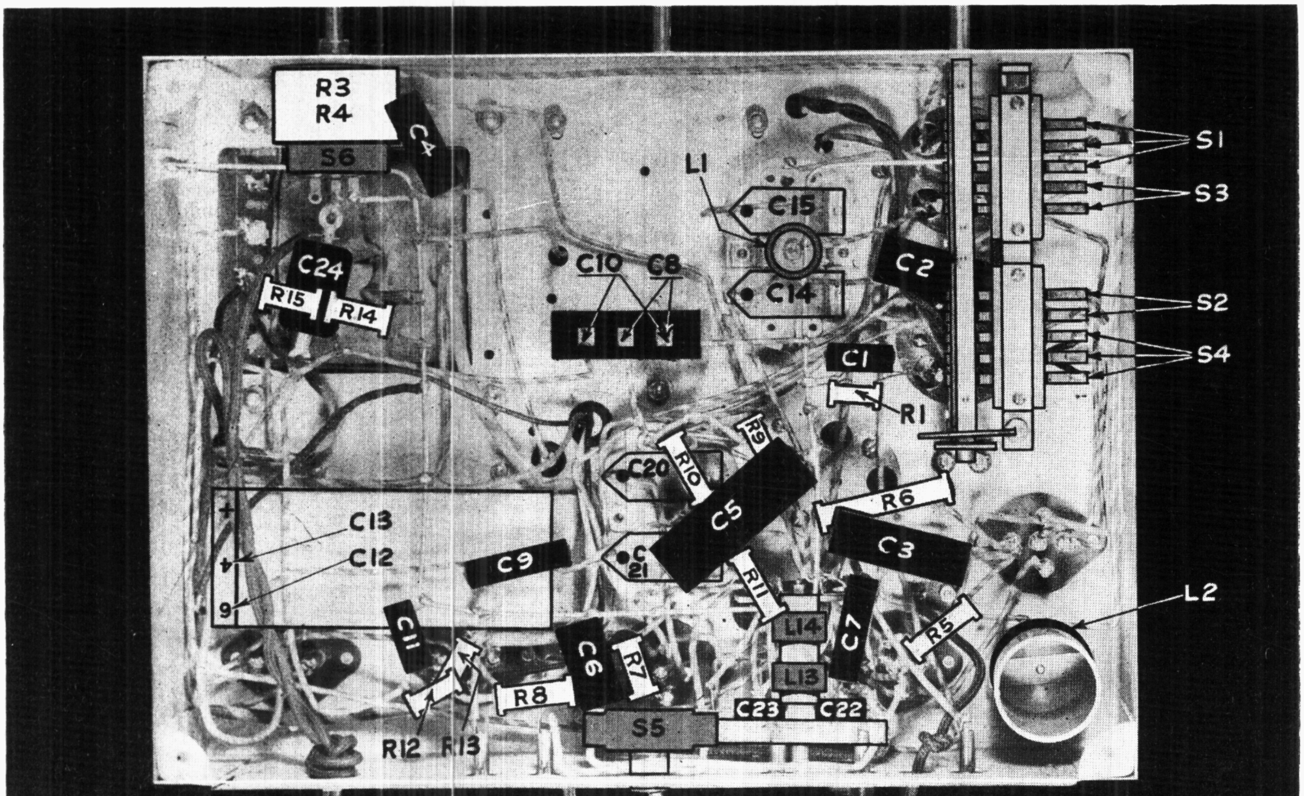

Fig. 2.—The under-chassis view. C22 and C23 are small pre-set condensers, the former being provided with a small knob at the rear of the chassis for controlling regeneration in the I.F. stage.

working type, across the detector bias resistance.

The electrolytics are not reversible, and their correct polarity is indicated on the circuit diagram.

Coil Screens.—All the coil screens on the upper side of the chassis can be easily removed. The coils beneath the chassis (2nd I.F. transformer and the two trap circuits) are not screened.

Condenser C22.—This is operated by the small black knob at the rear of chassis. It applies a certain amount of regeneration to the I.F. stage, and need only be adjusted initially when the set is installed, or after new valves have been fitted. It is not at all critical in setting.

External Speaker.—There is no provision for this, but connections could be made to the speaker terminal panel. A high resistance speaker should be connected across tags 2 and 4 (from the top of the panel), to which the wires coded black and white are already connected.

Intermediate Frequency.—This has the comparatively high value of 473 KC/s (about 635 metres). Some test oscillators do not cover this frequency.

V3 Anode Lead.—This is brought up through a metal tube for shielding purposes. See that the rubber insulation of the lead is not faulty where it emerges from the tube.

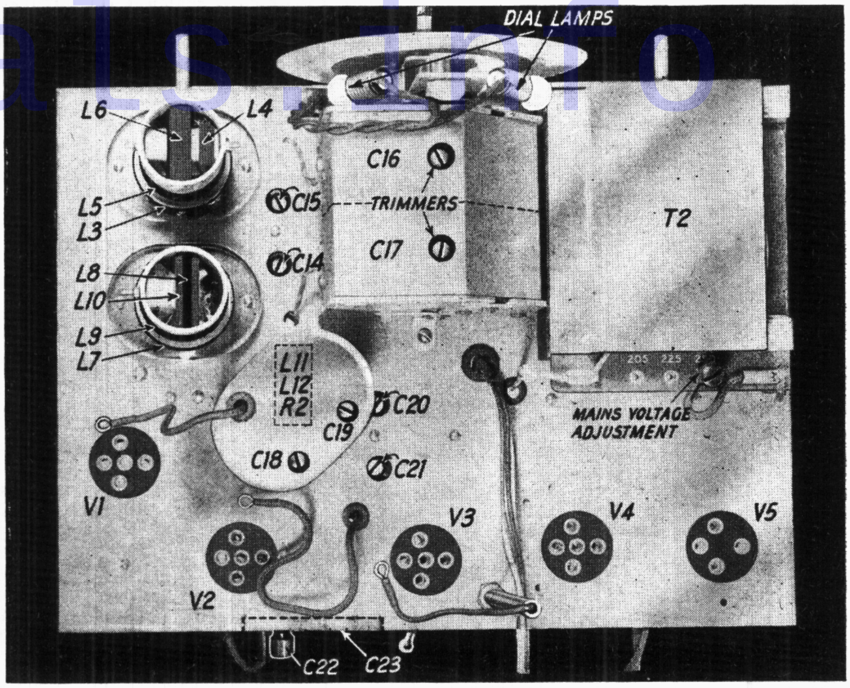

Fig. 3.—Plan view of the chassis. The valves and two of the coil screens have been removed. The third screen encloses L11, L12 and R2, also the trimmers C18 and C19. Note also the trimmers of C16 and C17, which are not separately numbered.

DATA FOR THE SERVICE MAN

No. 2.—RESISTANCES (contd.)

OHM'S LAW

THE law propounded by Ohm was that in any circuit carrying a continuous current the voltage developed across two points is proportional to the current flowing through it. In other words, the voltage is equal to the current multiplied by some constant. This constant is known as the "resistance" of the circuit. Ohm's Law then becomes the familiar formula: E=IR, where E is the E.M.F. or voltage, I the current and R the resistance. If E is in volts, I in amperes, then R is in ohms.

The formula E=IR, and its derivatives, are extremely important in service work, and every service man should be thoroughly familiar with them, and should be able to use them mentally and without effort.

The three formulæ for resistance problems are:

$$(1)\quad E = IR$$

$$(2)\quad I = \frac{E}{R}$$

$$(3)\quad R = \frac{E}{I}$$

Knowing any two of the quantities, the third can always be calculated. Do not forget that if the current is in milliamps, it must always be divided by 1,000 when substituting in any of the above formulæ.

It is a good plan to practise resistance problems in odd moments. To take an example: A valve passes 5 mA in its anode circuit with an anode voltage of 200 V. The available H.T. is 250 V. What value of resistance should be employed to drop the voltage to the required value of 200 V? Here we are given E and I and require R, hence formula (3) above must be used. The voltage to be dropped is 250 − 200 = 50 V.

The current is $\frac{5}{1{,}000}$ A. Therefore,

$$R = \frac{50 \times 1{,}000}{5} = 10{,}000\ \Omega.$$

COMBINATION OF RESISTANCES

In Series. The value of two or more resistances in series is equal to the sum of the values of the individual resistances. If R1 and R2 are in series, the value of R, the resulting resistance, is:

$$R = R1 + R2$$

In Parallel.—The reciprocal of the value of two or more resistances in parallel is equal to the sum of the reciprocals of the individual resistances. If R1 and R2 are in parallel, the value of R, the resulting resistance, is given by:

$$(1)\quad \frac{1}{R} = \frac{1}{R1} + \frac{1}{R2} \quad \text{or}$$

$$(2)\quad R = \frac{R1 \times R2}{R1 + R2}$$

EUREKA WIRE

ALTHOUGH most of the resistances used in radio work are of a specialised type having no appreciable inductance or capacity, the serviceman will find that comparatively simple wire-wound patterns can be used for a great variety of purposes. These can be wound with resistance wire on suitable formers. In the table below full data on the most useful gauges of "Eureka" resistance wire are given, as this is considered to be one of the most used wires of its type. The current carrying capacities are for wires coiled in air with free radiation.

S.W.G.	Resistance per 1,000 yards (ohms)	Weight per 1,000 yards (lbs.)	Current carrying cap. for 100° C Rise (amps.)
20	661·3	11·77	3·00
22	1093·0	7·12	2·20
24	1770·0	4·39	1·50
26	2645·0	2·94	1·00
28	3914·0	1·99	0·76
30	5575·0	1·40	0·59
32	7350·0	1·06	0·47
34	10128·0	0·77	0·37
36	14840·0	0·52	0·28
38	23808·0	0·33	0·19
40	37184·0	0·21	0·15
42	53564·0	0·15	0·13
44	83664·0	0·09	0·10
46	148764·0	0·05	0·07