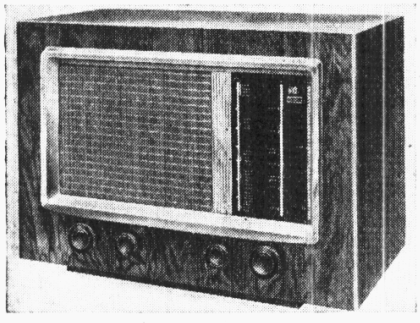
Supplement to The Wireless & Electrical Trader, December 15, 1945

"TRADER" SERVICE SHEET 751

PYE 15A

AC SUPERHET



THE first Pye post-war receiver, the Pye 15A, is a 3-valve (plus rectifier) 3-band superhet designed to operate from AC mains of 200-250V, 40-100 c/s. The SW range is 16—52m.

The chassis design represents a complete breakaway from pre-war pattern, with quick-release facilities for rapid dismantling and an identity plate showing the type number and other details.

Release date and price: November, 1945; £15 0s., plus £3 4s. 6d. purchase tax.

CIRCUIT DESCRIPTION

Aerial input is via coupling coils **L1** (SW) and **L2** (MW and LW) to single-tuned circuits **L3, C28** (SW), **L4, C28** (MW) and **L5, C28** (LW), which precede a triode hexode valve **(V1, Mullard metallised ECH35)** operating as frequency changer with internal coupling.

V1 triode oscillator anode coils **L9** (SW), **L10** (MW) and **L11** (LW) are tuned by **C32.** Parallel trimming by **C29** (SW), **C30** (MW) and **C8, C31** (LW); series tracking by **C9** (SW) and **C10** (MW and LW). Inductive reaction coupling from control grid by coils **L6** (SW), **L7** (MW) and **L8** (LW), with capacitative coupling across the common impedance of the trackers **C9** and **C10** in grid and anode circuits.

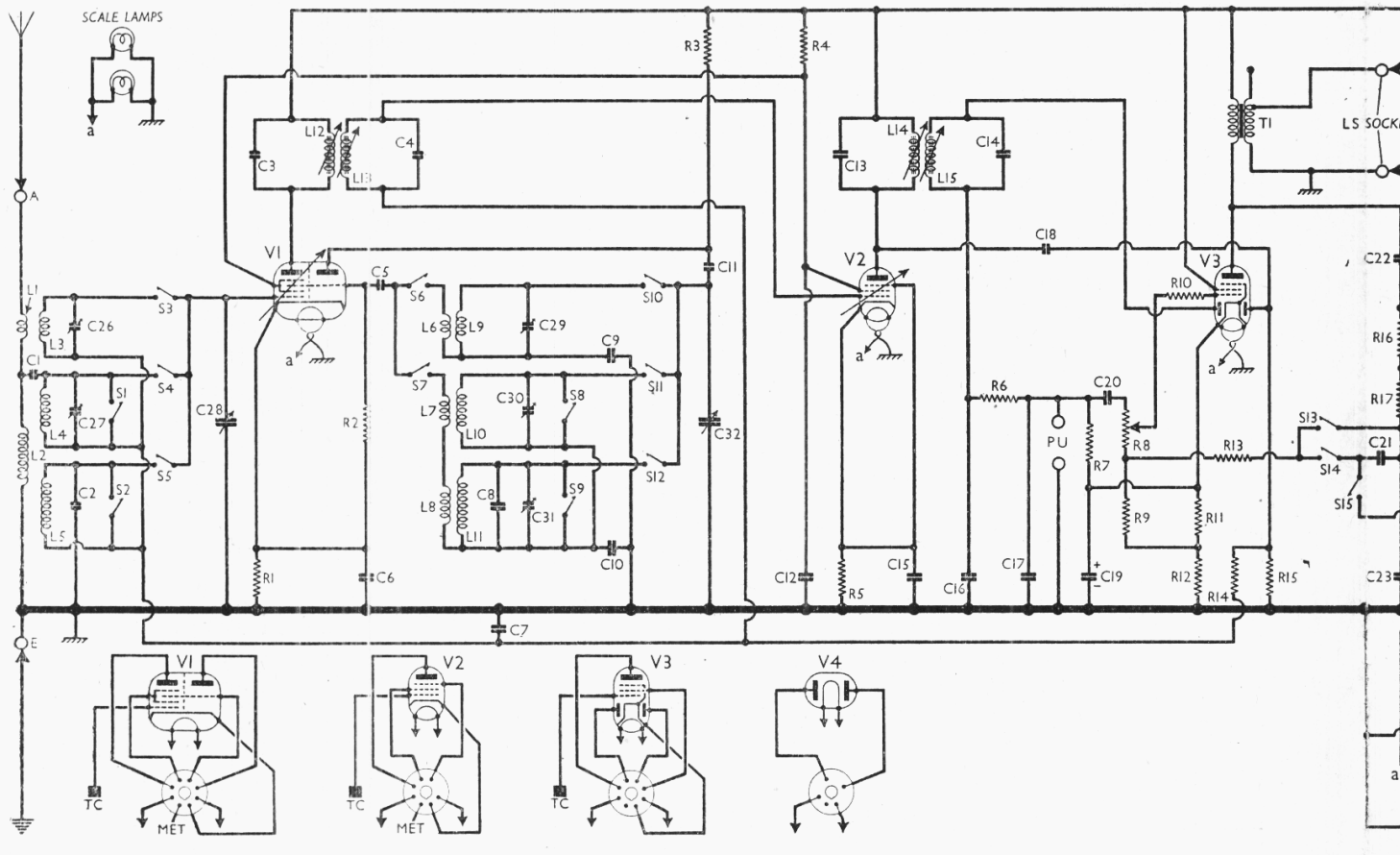
Second valve **(V2, Mullard metallised EF39)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary iron-cored transformer couplings **C3, L12, L13, C4** and **C13, L14, L15, C14,** in which the tuning capacitors are fixed and trimming is effected by adjusting the cores.

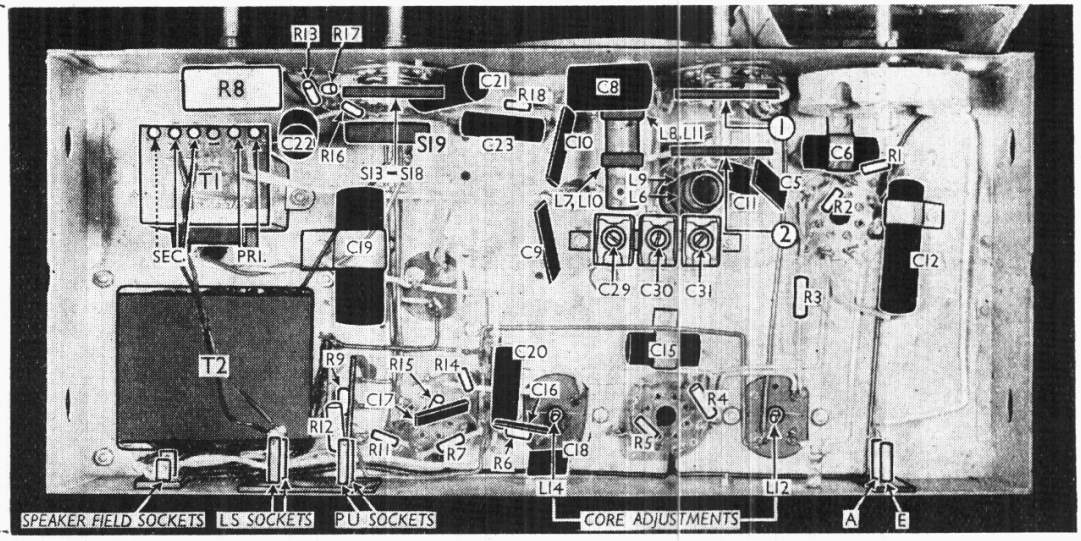
Intermediate frequency 465 kc/s.

Diode second detector is part of double diode output pentode valve **(V3, Mullard EBL1).** Audio frequency component in rectified output is developed across load resistor **R7** and passed via AF coupling capacitor **C20,** manual volume control **R8** and grid stopper **R10** to control grid of pentode section. IF filtering by **C16, R6** and **C17** in diode circuit, and **R10** in pentode control grid circuit. Provision for connection of gramophone pick-up into **C20, R8,** while plugs and sockets provide a convenient means for using internal or external speaker only, or both together.

Voltage-fed negative feed-back from the series network **C22, R16, R17, C23** and **R18,** which forms a potential divider across the output of **V3** pentode, to the control grid circuit via **R13.** Switches **S13-S18** permit the frequency response to be modified by manipulation of the circuit arrangement, giving a four-position tone control : Fidelity, Brilliant, Mellow 1 and Mellow 2.

In the Fidelity position **S14** and **S18** close, so that **C22, R16, R17** and **C23** form the potential divider, with **R18** in parallel with **C23,** and the voltage developed across these two is fed back via **C21** and **R13.**





Under-chassis view. The two waveband switch units (numbered **1** and **2**) and the tone control switch unit **S13–S18** are indicated here and shown in detail in diagrams overleaf. The connecting tags of the output transformer **T1** are identified, the unused secondary end tapping being indicated by a dotted arrow. The fourth tag from the left is blank.

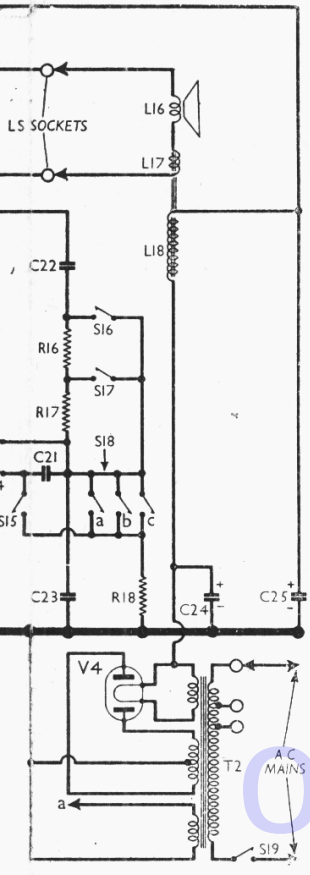
In the Brilliant position, **S14** and **S18** are open, and **S13** and **S15** closed. **R13** is now connected directly to the potential divider, and **R18** and **C21** are connected in series across **C23.**

In the two Mellow positions, **S14** and **S18** close again, and **S13, S15** open, as for Fidelity, but in position M1 **S17** closes, short-circuiting **R17;** and at M2 **S16** closes, short-circuiting both **R16** and **R17.**

S18 is shown in the diagram as three separate switches **a, b** and **c** connected in parallel. Although it is contrary to normal practice to show switches thus in the circuit diagram, it is necessary in this instance in order that the diagram shall agree with the practical switch data overleaf.

Second diode of **V3,** fed from **V2** anode via **C18,** provides DC potential which is developed across load resistor **R15** and fed back through decoupling circuit **R14, C7** as GB to FC and IF valves, giving automatic volume control. Delay voltage, together with GB for pentode section, is obtained from the drop along **R11, R12,** which form a potential divider in the cathode lead to chassis.

HT current is supplied by full-wave rectifying valve **(V4, Mullard AZ31).** Smoothing by speaker field **L18** and electrolytic capacitors **C24, C25.**



Circuit diagram of the Pye 15A AC superhet. Switches **S13–S18** associated with the negative feedback circuit provide a four-position tone control. **S18** is shown as three separate switches, **S18a, b** and **c** to agree with the practical diagrams of the unit overleaf. The speaker sockets are connected between one end of **T1** secondary and a tapping near the other end.

COMPONENTS AND VALUES

	CAPACITORS	Values (μF)
C1	Aerial "top" coupling ...	0·000005
C2	Aerial LW trimmer ...	0·00006
C3, C4	1st IF transformer tuning capacitors	0·00007
C5	V1 osc. CG capacitor ...	0·00005
C6	V1 cathode by-pass ...	0·1
C7	AVC line decoupling ...	0·1
C8	Osc. LW fixed trimmer ...	0·00033
C9	Osc. SW tracker	0·005
C10	Osc. MW and LW tracker	0·00057
C11	V1 osc. anode coupling ...	0·00005
C12	V1, V2 SG's decoupling ...	0·1
C13, C14	2nd IF transformer tuning capacitors	0·00014
C15	V2 cathode by-pass ...	0·1
C16, C17	IF by-pass capacitors ...	0·0001
C18	AVC diode coupling ...	0·00001
C19*	V3 cathode by-pass ...	25·0
C20	AF coupling to V3 pent.	0·01
C21, C22, C23	Parts of negative feedback circuit	0·02 / 0·02 / 0·01
C24*, C25*	HT smoothing capacitors	8·0 / 16·0
C26‡	Aerial circ. SW trimmer ...	0.00005
C27‡	Aerial circ. MW trimmer ...	0·00005
C28†	Aerial tuning capacitor ...	—
C29‡	Osc. circ. SW trimmer ...	0·00005
C30‡	Osc. circ. MW trimmer ...	0·00005
C31‡	Osc. circ. LW trimmer ...	0·00005
C32†	Oscillator circuit tuning ...	—

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)
R1	V1 fixed GB resistor ...	220
R2	V1 osc. CG resistor ...	47,000
R3	V1 osc. anode HT feed ...	47,000
R4	V1, V2 SG's HT feed ...	39,000
R5	V2 fixed GB resistor ...	330
R6	IF stopper	47,000
R7	V3 signal diode load ...	470,000
R8	Manual volume control ...	1,000,000
R9	Part feed-back coupling...	4,700
R10	V3 grid stopper	47,000
R11, R12	V3 pentode GB and AVC delay resistors	150 / 470
R13	Part feed-back coupling...	15,000
R14	AVC line decoupling ...	1,000,000
R15	V3 AVC diode load ...	1,000,000
R16, R17, R18	Tone control resistors ...	27,000 / 22,000 / 47,000

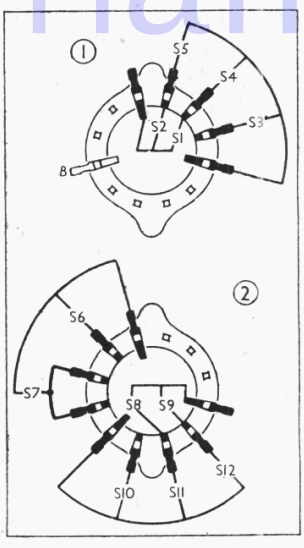
	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial SW coupling coil ...	0·4
L2	Aerial MW and LW coupling	59·0
L3	Aerial SW tuning coil ...	Very low
L4	Aerial MW tuning coil ...	2·7
L5	Aerial LW tuning coil ...	15·7
L6	Osc. SW reaction coil ...	21·5
L7, L8	Osc. MW reaction coil / Osc. LW reaction coil } total	2·4
L9	Osc. SW tuning coil ...	Very low
L10	Osc. MW tuning coil ...	4·0
L11	Osc. LW tuning coil ...	4·5
L12	1st IF trans. Pri. ...	9·4
L13	1st IF trans. Sec. ...	9·4
L14	2nd IF trans. Pri. ...	6·7
L15	2nd IF trans. Sec. ...	6·7
L16	Speaker speech coil ...	2·0
L17	Hum neutralising coil ...	0·1
L18	Speaker field coil ...	1,000·0
T1	Output trans. Pri.	500·0
	Output trans. Sec., total ...	0·35
T2	Mains trans. Pri., total ...	18·5
	Mains trans. Heater, sec. ...	0·1
	Mains trans. Rect. heat, sec.	0·1
	Mains trans. HT sec., total	398·0
S1–S12	Waveband switches ...	—
S13–S18	Tone control switches ...	—
S19	Mains switch	—

VALVE ANALYSIS

Valve voltages and currents in the table overleaf are those measured in our receiver when it was operating on mains of 230 V, using the 240 V tapping on the mains transformer.

The receiver was tuned to the lowest wavelength on the MW band, the volume

control was at maximum and the tone control was at "Fidelity," but there was no signal input. Voltages were measured



Diagrams of the waveband switch units, drawn as seen when viewed from the rear of the underside of the chassis.

on the model 7 Universal Avometer, chassis being the negative connection.

If, as in our case, **V2** becomes unstable while measurements are being made, it can be stabilised by connecting a 0.1 μF capacitor between top cap and chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 ECH35	275	2·9	100	2·9
	Oscillator			
	100	3·4		
V2 EF39	275	5·6	100	1·9
V3 EBL31	256	30·0	275	3·8
V4 AZ31	310†	—	—	—

† Each anode, AC.

DISMANTLING THE SET

The bottom of the cabinet is fitted with a detachable cardboard cover, upon removal of which (four round-head wood screws) access may be gained to most of the compartment beneath the chassis deck. Removal of the chassis, however, is only a few moments' work.

Removing Chassis.—Remove the four control knobs (pull off) from the front of the cabinet;

withdraw from their sockets at the rear of the chassis the two speaker speech coil plugs and the non-reversible two-pin speaker field coil plug;

remove the two fixing screws at the bottom corners at the rear of the chassis;

withdraw chassis about two inches, then tilt the back upwards and lift it out.

Removing Speaker.—With the chassis already removed, free the speaker leads from the soft metal clip on the side of the cabinet, and remove the nuts (with lock-washers) from the four bolts holding the speaker to the sub-baffle.

When replacing, the connecting panel should point towards the top right-hand corner of the cabinet, when viewed from the rear.

The connections, numbering the tags from left to right, are as follows: 1 and 5, field coil; 2, junction of **T1** secondary and speech coil; 3, junction of **T1** secondary and hum neutralising coil; 4, junction of hum neutralising coil and speech coil.

DRIVE CORD REPLACEMENT

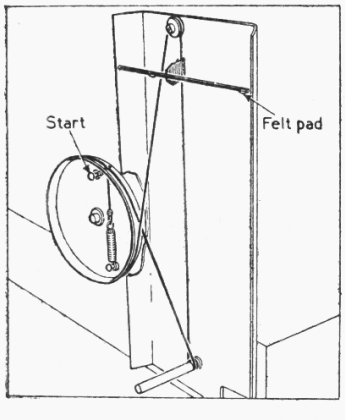
Forty inches of first quality silk solid plaited line parum waxed, size 3½, is required for the drive cord.

The scale glass must first be removed by removing the upper clamp (two set screws) and slackening the screws in the bottom one. The glass can then be lifted out, with its rubber packing pieces.

Turn the gang to maximum, with the gap or hole in the edge of the drum vertically above the gang spindle. Tie a loop in one end of the cord, making sure that it is tight and will not slip, pass it through the hole in the drum, and slip the loop over the nearest anchor peg.

Facing the front of the chassis, pass the free end of the cord through the slot in the scale back-plate, down *over* the control spindle, and round it twice, then up, on the *further* side of the first run, as shown in the sketch below, on to the right-hand side of the guide pulley at the top of the scale; over it, and down again through the slot in the scale back-plate, crossing in *front* of the first run of cord, nearer the operator; then continuing down, under the drum, round the groove on its edge and through the hole or gap at the top.

A second loop must now be tied for the extension coil spring, in such a position as to extend the spring about a quarter of

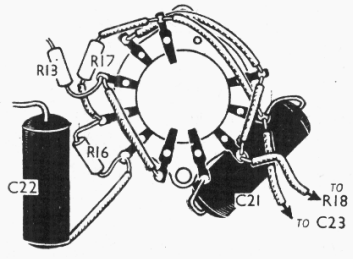


Sketch showing details of the cord drive for the scale pointer, including the direction of the cord round the spindle. It is drawn as seen from the front of the set with the scale removed.

an inch when hooked on to the second anchor. The pointer must be fixed to the vertical length of cord, close to the top and with the felt pads in the positions shown in the sketch, the cord being gripped in a fold in the pointer plate.

The scale glass may now be fitted, care being taken to set it up squarely, then the pointer may be adjusted as explained under "Circuit Alignment."

For guidance, the measured length of cord in our sample, with its loops already tied, was exactly 37in. overall when taut, and the centre of the pointer plate was 17in. from the starting end. Our drum was as shown in our sketch, but the makers' illustration shows a gap in the groove where we show a hole, and the second anchor is not so far displaced from the first as in our sample. Further, our anchors consisted of little round posts riveted to the drum plate, whereas the makers show them stamped out of the drum plate.



Sketch showing the tone control switch unit assembly as it appears when removed from the chassis. It is drawn as seen from the rear of an inverted chassis.

GENERAL NOTES

Switches.—S1-S12 are the waveband switches, ganged in two rotary units beneath the chassis. These are indicated in our under-chassis view by arrows and numbered circles (1 and 2), and shown in detail in the diagrams in col. 1, where they are drawn as seen when viewed from the rear of the underside of the chassis. The table below gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control. A dash indicates open, and **C**, closed.

S13-S18 are the tone control switches, ganged in a single five-position unit beneath the chassis. Four positions are used for tone control, and the fifth to operate the QMB mains switch **S19**, which is ganged with it. This unit is indicated in our under-chassis view, and shown in detail in the diagram in col. 5, where the associated table beneath it shows the switch positions for the four tone control settings, starting from the

Waveband Switch Table

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

"OFF" position and turning the control clockwise. A dash indicates open, and **C**, closed.

In order to show clearly the action of **S18**, this has been divided into three parts,

numbered **a, b, c,** as these are widely separated on the unit and connected in parallel. If all the parallel connections on the switch unit were shown as such they would confuse the diagram.

In col. 3, also, is a sketch of the unit showing the physical connections to it. All the components associated with it are mounted on its tags, and if the outer connections of **R13, C22, R18** and **C23** are unsoldered the whole unit may be removed complete for such purposes as replacement of a faulty component, or attention to **S19.**

Coils.—All the aerial circuit coils are mounted in a single unscreened unit on the chassis deck with their trimmers. The oscillator coils **L6-L11** are in two units beneath the chassis by the waveband switch units, their associated trimmers and trackers being grouped close to them.

The IF transformers **L12, L13** and **L14, L15** are two screened units mounted on the chassis deck, their core adjustments projecting from either end. Their fixed tuning capacitors are contained within the units.

External Speaker. — The secondary winding of the output transformer **T2** is brought out to a pair of sockets at the rear of the chassis, and from these the internal speaker or a low-impedance (2-4 Ω) external speaker may be operated. If both are required together, the external speaker plugs may be inserted in sockets in the tops of the internal speaker plugs.

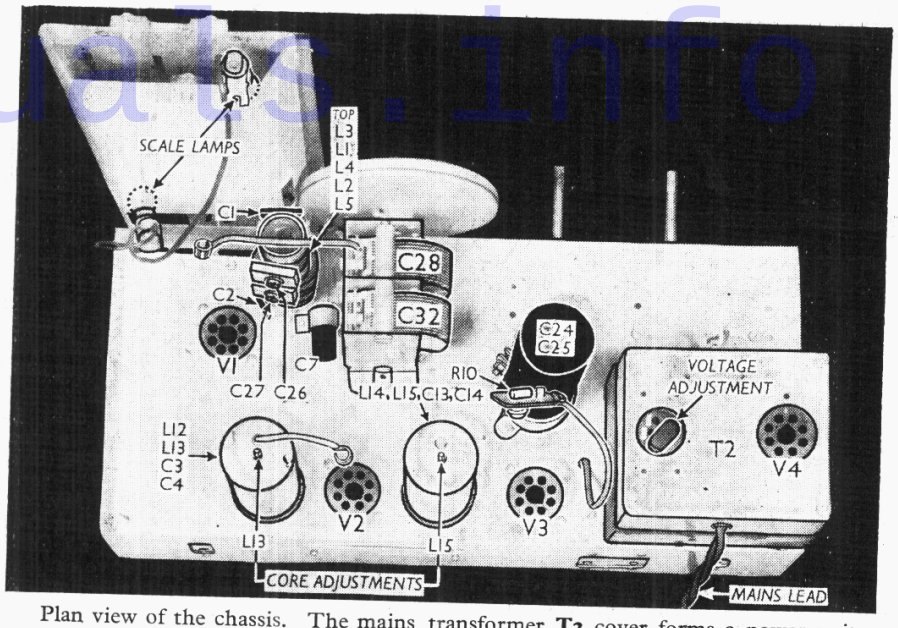
Scale Lamps.—These are two Ever Ready MES-type lamps, with clear spherical bulbs, rated at 6.5 V, 0.3 A. They are fitted at opposite ends of the scale.

Capacitors C24, C25.—These are two electrolytics in a single tubular metal container mounted on the chassis deck, beneath which the three connecting tags emerge. The red tag is the positive of **C24** (8 μF) and the yellow tag that of **C25** (16 μF). The black tag is the common negative connection. Although this negative tag is provided, the metal case is not isolated from the contents. The unit is rated as a surge-proof type, 450 V DC working.

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator leads, via a 0.1 μF capacitor, to control grid (top cap) of **V1** and chassis, removing the original top cap connector but connecting a 500,000 Ω resistor between the top cap of the valve and the AVC line. A convenient point on the AVC line is the bare wire connecting together the lower tags of **C26** and **C27** on the aerial coil unit.

Switch set to MW, turn the volume control to maximum, the tone control to "Fid" and tune to 570 m on scale. Feed in a 465 kc/s (645.16 m) signal, and adjust the cores of the two IF transformers. The primary adjustments are at the lower ends of the transformers, beneath the deck, and the secondary adjustments are at the upper ends. After adjusting these in turn for maximum output, remove the 500,000 Ω resistor and replace the top cap connector.



Plan view of the chassis. The mains transformer **T2** cover forms a power unit containing the mains lead entry and the rectifying valve **V4**. **R10** is mounted on the top cap connector of **V3**.

RF and Oscillator Stages.—With the gang at maximum, the pointer should be level with the black dots at the upper ends of the three scales. It may be adjusted by turning the drive drum on the gang spindle after loosening the fixing screw. Transfer signal generator leads to **A** and **E** sockets, via a suitable dummy aerial.

MW.—With set still switched to MW, tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust **C30,** then **C27,** for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and check calibration.

LW.—Switch set to LW, tune to 1,200 m on scale, feed in a 1,200 m (250 kc/s) signal, and adjust **C31** for maximum output. Tune to 1,800 m on scale, feed in an 1,800 m (166.7 kc/s) signal, and check calibration.

SW.—Switch set to SW, using 400 Ω dummy aerial, tune to 17.5 m on scale, feed in 17.5 m (17.14 Mc/s) signal, and adjust **C29,** then **C26,** for maximum output. Feed in a 43 m (6.98 Mc/s) signal, tune it in, and check calibration. If it is out, adjust the turns of **L9** to correct it; then adjust the turns of **L3** for maximum output. Then repeat the SW adjustments entirely.

Tone Control Switch Diagram and Table

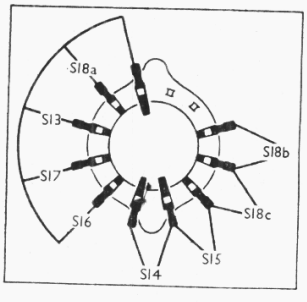


Diagram of the tone control switch unit **S13–S18**, drawn as seen from the rear beneath the chassis. **S18a, S18b** and **S18c** are all connected in parallel.

Switch	FID	BRI	M1	M2
S13	—	C	—	—
S14	C	—	C	C
S15	—	C	—	—
S16	—	—	—	C
S17	—	—	C	—
S18a	C	—	—	—
S18b	—	—	—	C
S18c	—	—	C	—

SERVICE SHEET CORRECTION

DEALERS are asked to note an unfortunate error in the valve base diagram for the Ever Ready C50N valve (V1) shown beside the circuit diagram of the Lissen 8130 in our *Service Sheet 722*, where the anode is shown connected to the top cap, and the control grid goes to pin 2 on the base. Actually these connections should be transposed, the control grid being the top cap connection.

Dealers are requested to mark their copies in order to avoid confusion at a later date.

Printed in Great Britain by The Cornwall Press Ltd., Paris Garden, London, S.E.1