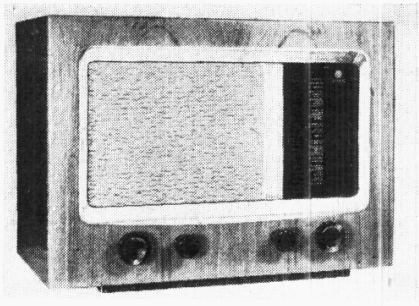
Supplement to The Wireless & Electrical Trader, November 29, 1947

"TRADER" SERVICE SHEET 839

PYE 47A

Covering the 47A, B47A and 45A Receivers



The Pye B47A in its walnut cabinet.

THE quick-release device for removing the chassis, as used on previous Pye receivers, is incorporated in the B47A, a 3-valve (plus rectifier) 3-band superhet designed to operate from A.C. or D.C. mains of 200-250 V. It is housed in a walnut cabinet, and a safety device disconnects the mains when the back cover is removed. The S.W. range is 16-52 m.

The Pye 47A is similar in every respect except the cabinet, which is a plastic moulding. In the 45A, which has a cabinet like the B47A, there are a few circuit differences which are explained as "Model 45A Modifications" overleaf.

Release date and original prices: B47A *and* 47A, *April*, 1947, £15 15*s*.; 45A, *June*, 1946, £15 15*s*., *plus purchase tax in each case.*

CIRCUIT DESCRIPTION

Aerial input is via isolating capacitor **C1** and coupling coils **L1** (S.W.) and **L2** (M.W. and L.W.) to single-tuned circuits **L3, C33** (S.W.), **L4, C33** (M.W.) and **L5 C33** (L.W.), which precede a triode-hexode valve **(V1, Mullard metallized CCH35)** operating as frequency changer with internal coupling.

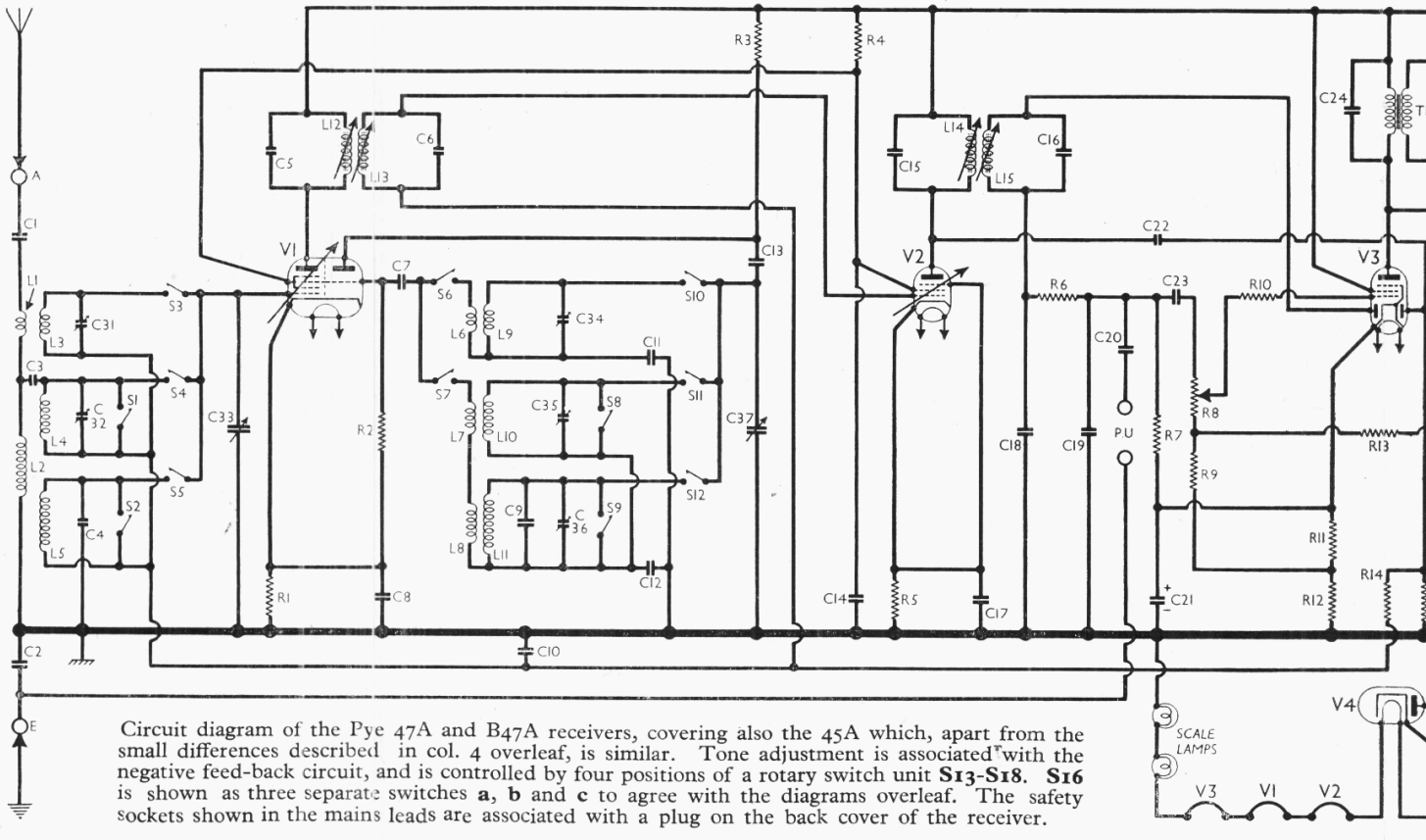
Triode oscillator anode coils **L9** (S.W.), **L10** (M.W.) and **L11** (L.W.) are tuned by **C37.** Parallel trimming by **C34** (S.W.), **C35** (M.W.) and **C9, C36** (L.W.). Series tracking by **C11** (S.W.) and **C12** (M.W. and L.W.). Inductive reaction coupling to control grid by coils **L6** (S.W.), **L7** (M.W.) and **L8** (L.W.), with additional capacitative coupling across the impedance of the trackers, which are common to grid and anode circuits.

Second valve **(V2, Mullard metallized EF39)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C5, L12, L13, C6** and **C15, L14, L15, C16,** in which the tuning capacitors are fixed and alignment is carried out by varying the positions of the iron-dust cores.

Intermediate frequency 465 kc/s.

Diode second detector is part of double diode pentode output valve **(V3, Mullard metallized CBL31).** Audio frequency component in rectified output is developed across load resistor **R7** and passed via A.F. coupling capacitor **C23,** manual volume control **R8** and grid stopper **R10** to control grid of pentode section. I.F. filtering by **C18, R6** and **C19** in diode circuit, and **R10** in pentode grid circuit. Provision for connection of a gramophone pick-up across **C23, R8,** via isolating capacitor **C20,** the "earthy" pick-up socket being wired directly to the receiver earth socket.

Second diode of **V3,** fed from **V2** anode via **C22,** provides D.C. potential which is developed across load resistor **R15** and fed back through a decoupling circuit as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage, to-



Circuit diagram of the Pye 47A and B47A receivers, covering also the 45A which, apart from the small differences described in col. 4 overleaf, is similar. Tone adjustment is associated with the negative feed-back circuit, and is controlled by four positions of a rotary switch unit **S13-S18. S16** is shown as three separate switches **a, b** and **c** to agree with the diagrams overleaf. The safety sockets shown in the mains leads are associated with a plug on the back cover of the receiver.

gether with G.B. for pentode section, is obtained from the drop across **R11, R12** in **V3** cathode lead to chassis. Fixed tone correction in pentode anode circuit by **C24,** and provision for the connection of a low impedance external speaker across the secondary winding of **T1** via sockets on the internal speaker plugs.

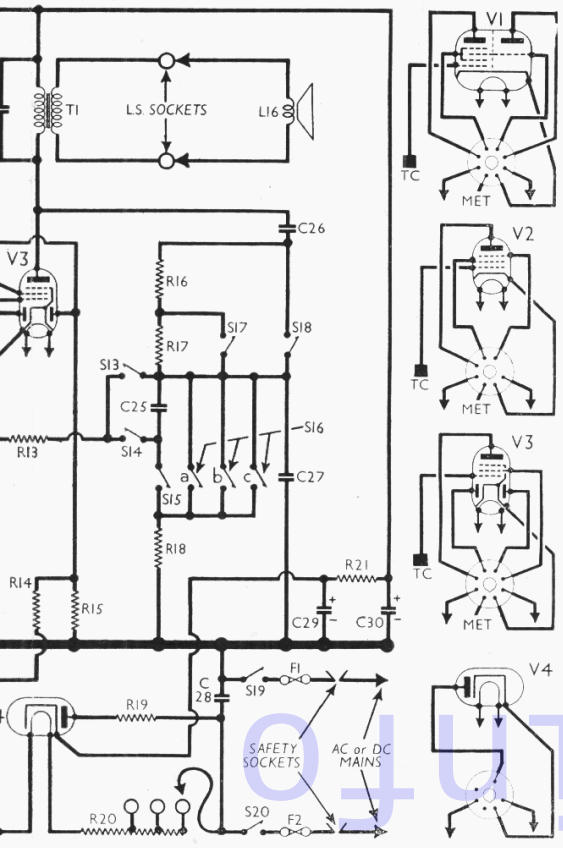
Voltage negative feed-back is provided from **V3** anode, via the potential divider network **C26, R16, R17, C25, R18, C27,** and limiting resistor **R13,** to the control grid circuit. Switches **S13-S18** permit the frequency response to be modified by manipulation of the circuit arrangement, giving a four-position tone control: Fidelity, Brilliant, Mellow 1 and Mellow 2.

In the Fidelity position **S14** and **S16** close, so that **C26, R16, R17,** and **R18, C27** in parallel, form the potential divider, and the voltage developed across **R18** is fed back via **C25** and **R13.**

In the Brilliant position, **S14** and **S16** are open, and **S13, S15** closed. **R13** is now directly connected to the potential divider and **C25** and **R18** are connected in series across **C27.**

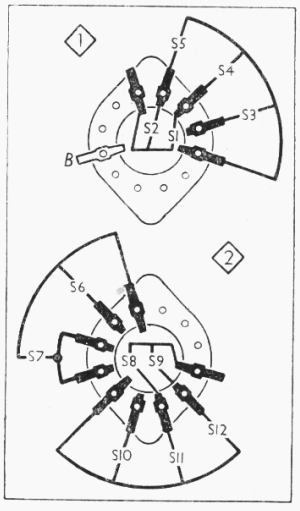
In the Mellow positions, **S14** and **S16** close again, and **S13, S15** open, as for Fidelity, but in position M1 **S17** closes, short-circuiting **R17,** and in position M2 **S18** closes, short-circuiting **R16** and **R17.**

S16 is shown in the circuit diagram as three separate switches **a, b** and **c** connected in parallel. Although it is contrary to our 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.



When the receiver is operated from A.C. mains, H.T. current is supplied by I.H.C. half-wave rectifying valve **(V4, Mullard CY31)** which, with D.C. mains, behaves as a low resistance. Smoothing by resistor **R21** and electrolytic capacitors **C29, C30.** Valve heaters, together with scale lamps and adjustable ballast resistor **R20,** are connected in series across mains input. Mains R.F. filtering by **C28,** and earth isolation by **C2.**

Waveband Switch Table and Diagrams



Diagrams of the two waveband switch units, drawn as seen from the rear of an inverted chassis. The associated table appears below.

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

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted by the manufacturers. With the receiver operating on A.C. mains of 230 V, they give the total H.T. current as 35 mA. Voltages were measured with a meter having an internal resistance of 1,000 ohms-per-volt.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 CCH35	160	1·5	67	2·2
	Oscillator 65	2·4		
V2 EF39	160	2·9	67	0·8
V3 CBL31	146	22·0	160	2·8
V4 CY31†	—	—	—	—

† Cathode to chassis, 260 V, D.C.

COMPONENTS AND VALUES

	RESISTORS	Values (ohms)	Locations
R1	V1 fixed G.B. ...	220	J5
R2	V1 osc. C.G. ...	47,000	J5
R3	Osc. H.T. feed ...	39,000	J6
R4	S.G.'s H.T. feed ...	33,000	I6
R5	V2 fixed G.B. ...	330	I7
R6	I.F. stopper ...	47,000	H7
R7	Sig. diode load ...	470,000	H7
R8	Volume control ...	1,000,000	G4
R9	F.-B. coupling ...	4,700	G6
R10	Grid stopper ...	47,000	D3
R11	V3 pent. G.B. and	330	G7
R12	A.V.C. delay ...	220	G7
R13	F.-B. coupling ...	15,000	G4
R14	A.V.C. decoupling	1,000,000	H6
R15	A.V.C. diode load ...	1,000,000	H7
R16	Tone control resistors ...	27,000	G4
R17		22,000	G4
R18		47,000	H4
R19	V4 surge limiter ...	82	F7
R20	Heater ballast ...	800*	F6
R21	H.T. smoothing ...	3,000	H5

*Tapped at 620Ω + 90Ω + 90Ω from V4 heater.

	CAPACITORS	Values (μF)	Locations
C1	Aerial isolator ...	0·0005	B1
C2	Earth isolator ...	0·01	J7
C3	"Top" coupling ...	0·000005	B1
C4	L.W. trimmer ...	0·00006	A2
C5	1st I.F. trans. tuning ...	0·00007	A3
C6		0·00007	B3
C7	V1 osc. C.G. ...	0·0001	J5
C8	Cathode by-pass ...	0·1	K5
C9	Osc. L.W. trim. ...	0·00033	I4
C10	A.V.C. decoupling	0·1	B2
C11	S.W. tracker ...	0·005	H5
C12	M.W., L.W. tracker	0·00057	H5
C13	V1 osc. anode ...	0·0001	J5
C14	S.G.'s decoupling ...	0·1	K5
C15	2nd I.F. trans. tuning ...	0·00014	C3
C16		0·00014	C3
C17	Cathode by-pass ...	0·1	I6
C18	I.F. by-passes ...	0·0001	H6
C19		0·0001	H7
C20	P.U. isolator ...	0·01	H7
C21*	Cathode by-pass ...	25·0	G5
C22	A.V.C. coupling ...	0·00001	H7
C23	A.F. coupling ...	0·01	H6
C24	Tone corrector ...	0·001	H7
C25	Parts of negative feed-back circuit	0·02	H4
C26		0·02	G5
C27		0·01	H4
C28	R.F. by-pass ...	0·1	H5
C29*	H.T. smoothing ...	16·0	D2
C30*		24·0	D2
C31‡	Aerial S.W. trim. ...	0·00005	B2
C32‡	Aerial M.W. trim. ...	0·00005	B2
C33†	Aerial tuning ...	0·000532	B2
C34‡	Osc. S.W. trim. ...	0·00005	I5
C35‡	Osc. M.W. trim. ...	0·00005	I5
C36‡	Osc. L.W. trim. ...	0·00005	I5
C37†	Oscillator tuning ...	0·000532	B2

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)	Location
L1	Aerial coupling coils	0·4	B1
L2		59·0	B1
L3	Aerial tuning coils	Very low	B1
L4		2·5	B1
L5		16·5	B1
L6	Osc. S.W. reaction	21·5	I5
L7	Osc. M.W. and L.W. reaction, total	2·25	I5
L8			I4
L9	Osc. tuning coils ...	Very low	I5
L10		3·5	I5
L11		4·5	I4
L12	1st I.F. Pri. ...	9·4	A3
L13	trans. Sec. ...	9·4	A3
L14	2nd I.F. Pri. ...	6·7	C3
L15	trans. Sec. ...	6·7	C3
L16	Speech coil ...	2·2	—
T1	Output trans. Pri. ...	500·0	F4
	Sec. ...	0·3	F4
S1-S12	Waveband switches	—	J4
S13-S18	Tone control Switches	—	H4
S19, S20	Mains Switches ...	—	H5
F1,F2	Mains fuses, 1·0 A	—	E3

Tone Control Switch Unit

Switch	F1D	BR1	M1	M2
S13	—	C	—	—
S14	C	—	C	C
S15	—	C	—	—
S16a	C	—	—	—
S16b	—	—	C	—
S16c	—	—	—	C
S17	—	—	C	—
S18	—	—	—	C

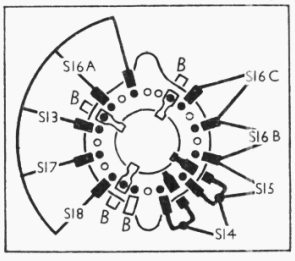


Diagram of the tone control switch unit **S13-S18** as seen from the rear of an inverted chassis with the mains switch removed. **S16a, b** and **c** are connected in parallel. The associated table is above the diagram.

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) after slackening their recessed grub screws.

Withdraw the two speaker lead plugs from their sockets at the rear of the chassis.

Remove the two fixing screws from the lower rear corners of the chassis.

Withdraw chassis about two inches, then lift the rear edge and slide it out. It should be noted that if it is desired to operate the chassis on the bench, the mains safety plug, which is secured to the receiver back by a paxolin and plywood carrier (two wood screws), must be in position in its sockets beneath the mains fuse panel.

Removing Speaker.—With the chassis removed, free the speaker leads from the soft metal clip on the side of the cabinet, and remove the four nuts (with spring washers) securing 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.

GENERAL NOTES

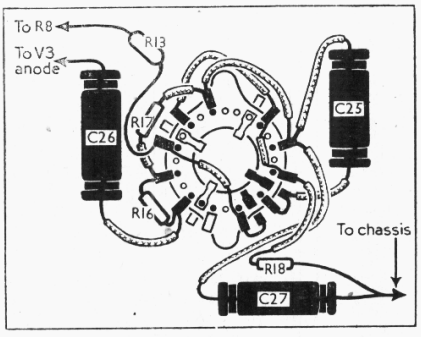
Switches.—S1-S12 are the waveband switches, ganged in two rotary units beneath the chassis. These are indicated in our under-chassis view by arrows and diamonds numbered **1, 2,** and shown in detail in the diagrams overleaf, where they are drawn as seen when viewed from the rear of the underside of the chassis. The table overleaf 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, S20,** which is ganged with it. This unit is indicated in our under-chassis view, and shown in detail in the diagram in col 1, where the associated table above it shows the switch positions for the four tone control settings, starting from the "OFF" position and turning the control clockwise. A dash indicates open, and **C,** closed.

In order to show clearly the action of **S16,** this has been divided into three parts, lettered **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.

Below, 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, C26, R18, C27** and **S19, S20** are unsoldered the whole unit may be removed complete for such purposes as replacement of a faulty component, or attention to **S19, S20.**

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 wave-



Sketch showing the tone control switch assembly, less the mains switch, wired ready for mounting into the chassis. After mounting it is a simple matter to connect the three free leads into circuit.

band switch units, their associated trimmers and trackers being grouped close to them.

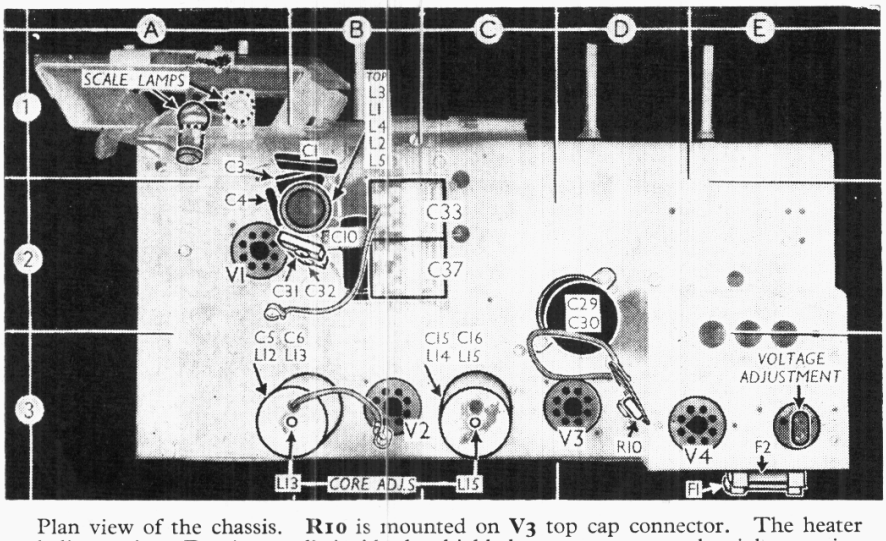
The IF transformers **L12, L13** and **L14, L15** are two screened units mounted on the chassis deck, their core adjustments projecting from either end. Their fixed tuning capacitors are contained within the units.

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.

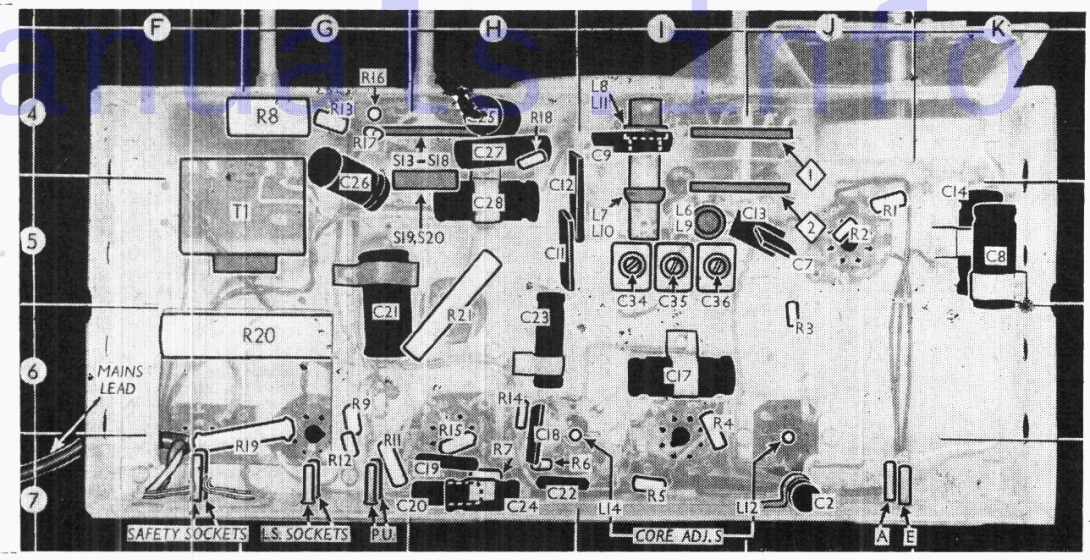
Capacitors C29, C30.—These are two electrolytics in a single tubular metal container mounted on the chassis deck, beneath which the three connecting tags emerge. The yellow tag is the positive of **C29** (16 μF) and the red tag is that of **C30** (24 μF). The black tag is the common negative connection. Although this negative tag is provided, the metal case is not isolated from the contents. The unit is rated at 350 V D.C. working.

Fuses.—F1 and **F2** are the mains circuit fuses, rated at 1 A each, 1¼in in length.

Scale Lamps.—These are two Osram M.E.S.-type lamps, with small clear spherical bulbs, rated at 4 V, 0.3 A. We show them as they were connected in our chassis, but in some cases they are inserted in the lead that connects the junction of **C28** and **S19** to chassis, so that H.T. current passes through them as well as heater current. In such cases **V3** heater is connected on one side directly



Plan view of the chassis. **R10** is mounted on **V3** top cap connector. The heater ballast resistor **R20** is actually inside the shielded compartment on the right carrying **V4, F1, F2,** etc., which thus forms a mains input unit.



Under - chassis view. The two waveband switch units (numbered **1** and **2** in diamonds) and the tone control switch unit **S13-S18** are indicated here and shown in detail in diagrams elsewhere. The plug shown in the safety sockets can be so used only after being removed from the back cover.

to chassis. The change-over was made at serial No. 197471 to the arrangement shown in our circuit diagram.

Model 45A Modifications

The Pye 45A was an earlier model than the 47A, but both receivers were based on similar lines, and this *Service Sheet* covers the 45A with the following modifications.

R21 is replaced by an iron-cored choke (D.C. resistance 490 Ω) mounted on the chassis deck beneath the speaker, and **C24** and **R19** are omitted. **R11** becomes 220 Ω, and **C29, C30** become 8 μF and 32 μF respectively, the unit being rated at 450 V D.C. working.

The tuning drive cord is specified as forty inches of first quality silk solid plaited line, parum waxed, size 3½. Otherwise, the instructions given for cord replacement elsewhere apply in full, including the sketch.

DRIVE CORD REPLACEMENT

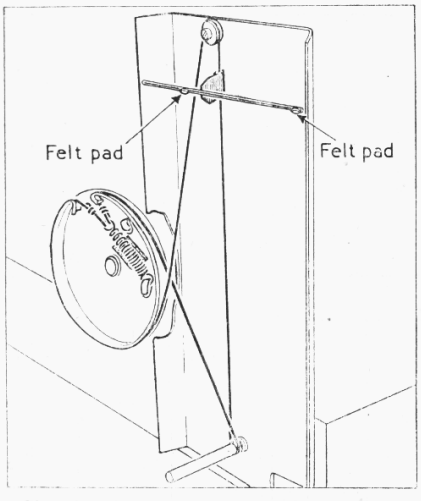
Four feet of Nylon braided glass yarn are required for the drive cord replacement, this length including an ample margin for tieing off.

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 in the edge of the drum at about 11 o'clock when viewed from the front, as shown in the sketch (next col.). Tie one end of the cord in a loop on to one end of the tension spring, using a knot that won't slip, and hook the spring on to the anchor tag provided for it in the drum; and take the cord through the gap.

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, 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.

Now tie off the end in another loop on to the same end of the tension spring as before, of such length as to open the coils about a quarter of an inch. 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,



Sketch showing the course of the tuning drive cord, drawn as seen from the front corner of the chassis when the gang is at maximum. The felt pads rub on unmarked portions of the scale panel.

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 makers give the overall length, with loops, as 35¼ inches. The measured length of our sample was 35¾ inches when stretched taut, and the pointer plate was almost exactly at the centre of it.

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 conector 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 tags of **C31** and **C32** 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 **L12, L13, L14** and **L15** (chassis locations A3, A3, C3, C3) for maximum output. Finally, remove the 500,000 Ω resistor and replace top cap.

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 **C35** (I5), then **C32** (B2), 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 **C36** (I5) 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 a 17.5 m (17.14 Mc/s) signal, and adjust **C34** (I5), then **C31** (B2), 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.

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

*