Supplement to The Wireless & Electrical Trader, April 2, 1949

"TRADER" SERVICE SHEET

902

PYE 19A

A.C. Superhet with Three Band-spread Ranges

THREE S.W. band-spread circuits to cover the 16 m, 31 m and 49 m bands are provided in the Pye 19A, in addition to the M.W. and L.W. bands. The circuit includes the "Tonemaster" feed-back tone control feature, and the chassis is equipped with the usual Pye quick-release facility.

The receiver is a 3-valve (plus rectifier) superhet, designed to operate from A.C. mains of 200-250 V. Provision is made for an external speaker, but not for a gramophone pick-up. The tuning ranges are: 1,000-2,000 m (L.W.), 185-575 m (M.W.), 5.9-6.4 Mc/s (49 m band), 9.3-10 Mc/s (31 m band) and 17.3-18.4 Mc/s (16 m band).

A novel feature is the employment of adjustable aluminium tuning plugs for the cores of the S.W. coils in the oscillator circuit.

Release date and original price: November 1948; £17 17*s plus purchase tax.*

CIRCUIT DESCRIPTION

Aerial input is inductively coupled by **L1** to single-tuned circuits **L5, C33** (M.W.) and **L6, C33** (L.W.), and capacitatively coupled by **C1** to fixed tuned circuits **L2, C3** (16 m), **L3, C3** (31 m), **L4, C3** (49 m) for S.W. band-spread operation, when the variable capacitor **C33** is disconnected.

First valve **(V1, Mullard metallized ECH35)** is a triode hexode operating as frequency changer with internal coupling. For M.W. and L.W. operation, triode oscillator anode coils **L11** (M.W.) and **L12** (L.W.) are tuned by **C36,** with parallel trimming by **C34** (M.W.), **C9, C35** (L.W.), and series tracking by **C12.** Mixed reaction coupling is provided by **L7** and the common impedance of **C12** in grid and anode circuits.

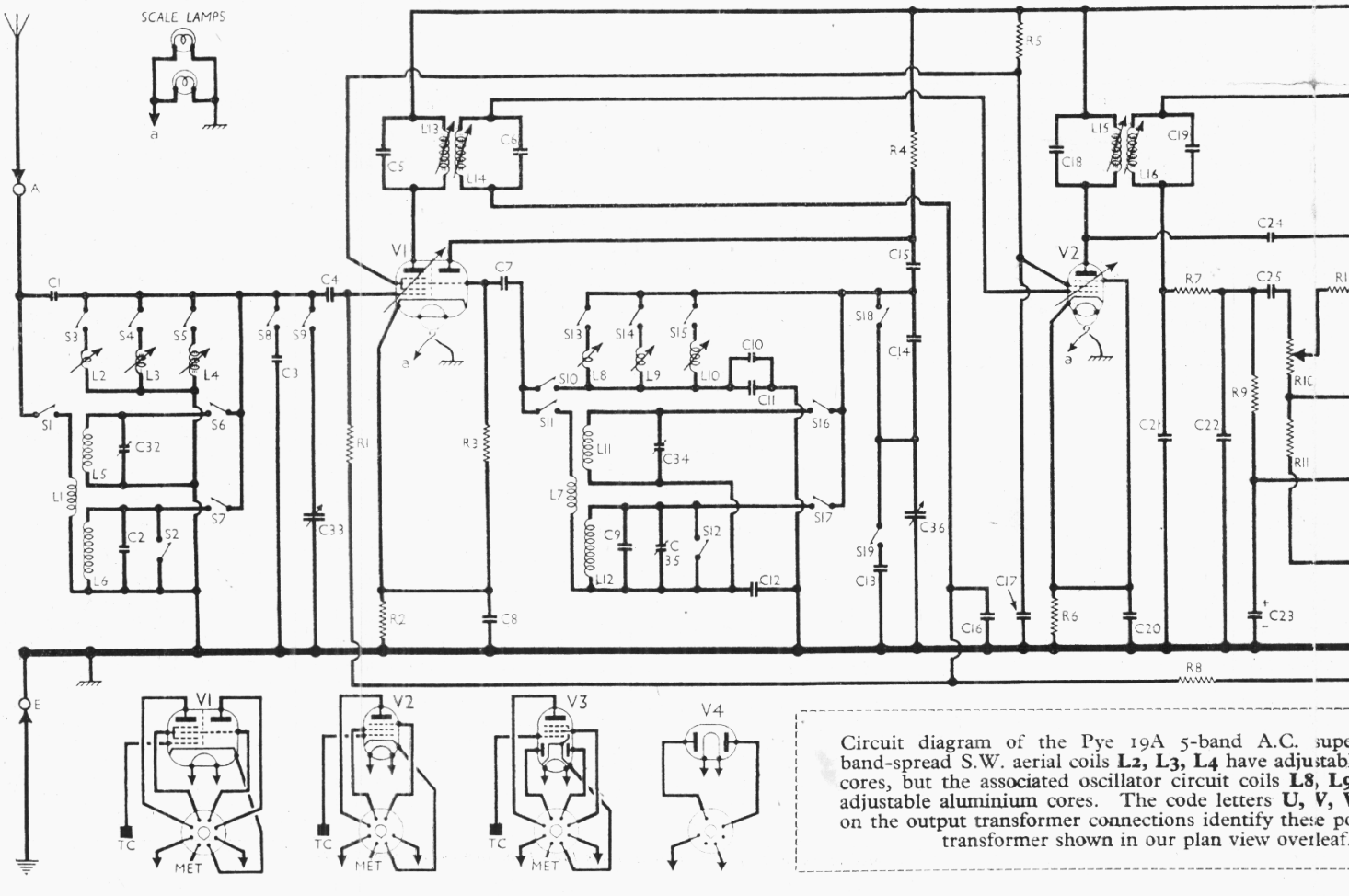
For S.W. operation, a Colpitts oscillator circuit is used, comprising one of the oscillator coils **L8** (16 m), **L9** (31 m) or **L10** (49 m), selected by switches **S13-S15,** together with a combination of series and parallel capacitors associated with the variable capacitor **C36** to give band-spread tuning.

Second valve **(V2, Mullard metallized EF39)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-transformer couplings **C5, L13, L14, C6** and **C18, L15, L16, C19,** in which the tuning capacitors are fixed and alignment adjustments are effected 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 EBL31).** Audio frequency component in rectified output is developed across load resistor **R9** and fed, via A.F. coupling capacitor **C25** and manual volume control **R10,** to control grid of pentode section. I.F. filtering by **C21, R7, C22** in diode circuit, and **R12** in pentode C.G. circuit.

Second diode of **V3,** fed from **V2** anode via **C24,** provides D.C. potential, which is developed across **R15** and fed back



Circuit diagram of the Pye 19A 5-band A.C. supe
band-spread S.W. aerial coils **L2, L3, L4** have adjustab
cores, but the associated oscillator circuit coils **L8, L9**
adjustable aluminium cores. The code letters **U, V,**
on the output transformer connections identify these po
transformer shown in our plan view overleaf

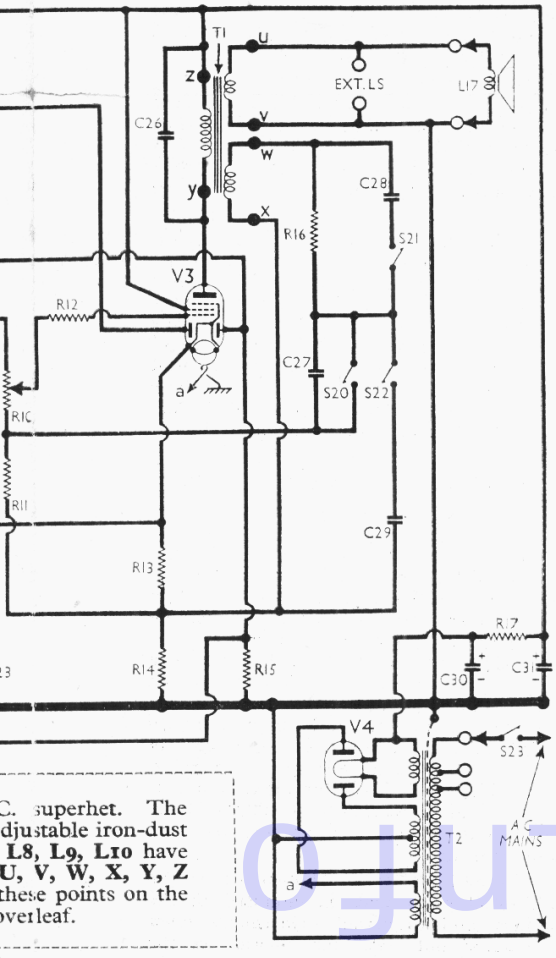
COMPONENTS AND VALUES

	CAPACITORS	Values (μF)	Locations
C1	Aerial S.W. coup.	0·000005	H3
C2	Aerial L.W. trim.	0·00005	A1
C3	Aerial S.W. tuning	0·00002	J3
C4	V1 hex. C.G.	0·00022	B2
C5	1st I.F. transformer	0·0001	B2
C6	tuning	0·0001	B2
C7	V1 osc. C.G.	0·0001	K4
C8	V1 cath. by-pass	0·01	K4
C9	Osc. L.W. trim.	0·00033	G4
C10	Osc. S.W. reaction	0·00003	J4
C11	coupling	0·00012	J4
C12	Osc. M.W., L.W. tracker	0·00057	G3
C13	Osc. S.W. band-spread	0·00025	H3
C14	spread capacitors	0·00018	H4
C15	Osc. anode coup.	0·0001	J4
C16	A.G.C. decoupling	0·05	B2
C17	S.G's decoupling	0·1	K4
C18	2nd I.F. trans. tun.	0·0001	C2
C19		0·0001	C2
C20	V2 cath. by-pass	0·1	H5
C21	I.F. by-passes	0·0001	H6
C22		0·0001	G6
C23*	V3 cath. by-pass	25·0	F4
C24	A.G.C. coupling	0·00001	H5
C25	A.F. coupling	0·01	G6
C26	Tone corrector	0·001	G5
C27	Parts of tone control circuit	0·1	G3
C28		0·1	G3
C29		0·1	G3
C30*	H.T. smoothing	32·0	C2
C31*		32·0	C2
C32‡	Aerial M.W. trim.	0·00005	A1
C33†	Aerial tuning	0·000532	B1
C34‡	Osc. M.W. trim.	0·00005	H4
C35‡	Osc. L.W. trim.	0·00005	G4
C36†	Oscillator tuning	0·000532	B1

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)	Locations
R1	V1 hex. C.G.	330,000	B2
R2	V1 fixed G.B.	220	K4
R3	V1 osc. C.G.	47,000	K4
R4	Osc. anode load	33,000	J5
R5	S.G.'s H.T. feed	39,000	J5
R6	V2 fixed G.B.	330	H6
R7	I.F. stopper	47,000	H6
R8	A.G.C. decoupling	1,000,000	G5
R9	Sig. diode load	470,000	G6
R10	Volume control	1,000,000	E3
R11	F-B. coupling	2,200	F5
R12	V3 grid stopper	47,000	C2
R13	V3 G.B., A.G.C. decay resistors	220	F6
R14		470	F6
R15	A.G.C. diode load	1,000,000	G6
R16	Part tone control	2,200	G3
R17	H.T. smoothing	2,500	G5

	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L1	Aerial M.W., L.W. coupling coil	55·0	A1
L2	Aerial 16m coil	0·1	B1
L3	Aerial 31m coil	0·4	B1
L4	Aerial 49m coil	0·6	B1
L5	Aerial M.W. coil	2·5	A1
L6	Aerial L.W. coil	14·5	A1
L7	Osc. react. coil	2·0	H4
L8	Osc. 16m coil	0·2	J4
L9	Osc. 31m coil	0·3	J4
L10	Osc. 49m coil	0·6	H4
L11	Osc. M.W. coil	2·8	H4
L12	Osc. L.W. coil	4·5	H4
L13	1st I.F. trans. Pri.	10·0	B2
L14	1st I.F. trans. Sec.	10·0	B2
L15	2nd I.F. trans. Pri.	10·0	C2
L16	2nd I.F. trans. Sec.	10·0	C2
L17	Speech coil	2·8	—
T1	Output trans. Pri.	415·0	C1
	Output trans. Sec. U.V.	0·5	
	Output trans. Sec. W.X.	88·0	
T2	Mains trans. Pri. total	19·5	D2
	Mains trans. Heat. sec.	Very low	
	Mains trans. Rect. heat. sec.	Very low	
	Mains trans. H.T. sec., total	390·0	
S1-S19	Waveband switches	—	J3
S20-S22	Tone control switches	—	F3
S23	Mains sw., g'd R10	—	F4



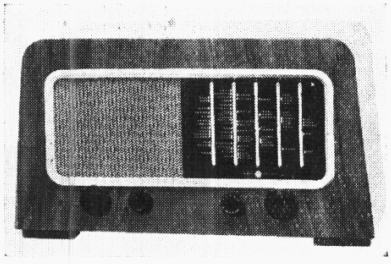
C. superhet. The djustable iron-dust L8, L9, L10 have U, V, W, X, Y, Z these points on the overleaf.

Circuit Description—*continued*

through a decoupling circuit **R8, C16** as G.B. to F.C. and I.F. valves, giving automatic gain control. Delay voltage, together with G.B. for pentode section, is obtained from the drop across **R13, R14** in **V3** cathode lead to chassis.

Provision is made for the connection of a low impedance external speaker across **T1** secondary winding, and the A.F. voltage developed across a third winding on **T1** is applied, via a feed-back network comprising **R11, R16, C27, C28, C29** and the four-position switch **S20-S22,** to **V3** C.G. circuit for tone control purposes.

H.T. current is supplied by full-wave rectifying valve **(V4, Mullard AZ31).** Smoothing by resistor **R17** and electrolytic capacitors **C30, C31.**



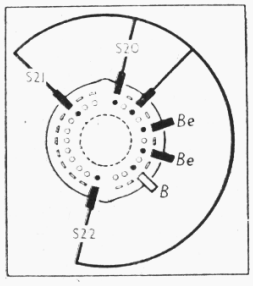


Diagram of the tone control switch unit, as seen from the rear of an inverted chassis. Below is the associated table.

Switch	Fld.	Bri.	M1	M2
S20	—	C	—	—
S21	—	—	—	C
S22	C	C	—	—

DISMANTLING THE SET

Removing Chassis.—Pull off the four control knobs, withdraw the two speaker plugs from their sockets, and remove the two cheese-head screws located at the rear bottom corners of the chassis; the chassis may now be slid out, while lifting the rear edge slightly to enable

[*Continued col. 1, overleaf*]

VALVE ANALYSIS

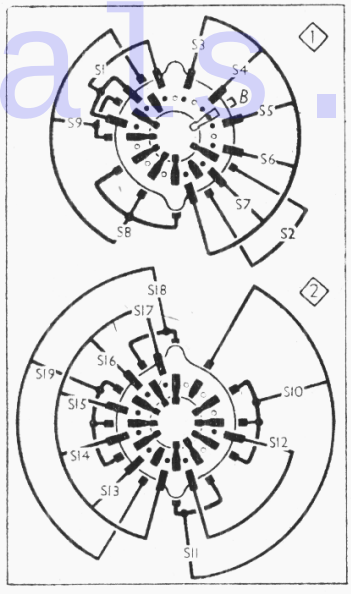
Valve voltages and currents given in the table below are those measured in our receiver when it was operating from mains of 230 V, using the 216-235 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the M.W. band, and the volume control was at maximum, but there was no signal input. In the sixth column, cathode voltages are quoted.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)	Cathode Voltage (V)
V1 ECH35	250	1·5	93	3·0	1·75‡
	Oscillator 114	3·8			
V2 EF39	250	4·8	93	1·4	1·9‡
V3 EBL31	237	27·0	250	3·2	20*
V4 AZ31	323†	—	—	—	357

* 100V meter range.
† Each anode, A.C. ‡ 10V meter range.

Voltages were measured on the 400 V scale of a model 7 Avometer, except where otherwise indicated, chassis being the negative connection.

Switch	L.W.	M.W.	49m	31m	16m
S1	C	C	—	—	—
S2	—	C	—	—	—
S3	—	—	—	—	C
S4	—	—	—	C	—
S5	—	—	C	—	—
S6	—	C	—	—	—
S7	C	—	—	—	—
S8	—	—	C	C	C
S9	C	C	—	—	—
S10	C	C	C	C	C
S11	C	C	—	—	—
S12	—	C	—	—	—
S13	—	—	—	—	C
S14	—	—	—	C	—
S15	—	—	C	—	—
S16	—	C	—	—	—
S17	C	—	—	—	—
S18	C	C	—	—	—
S19	—	—	C	C	C



Diagrams of the waveband switch units as seen from the rear. On the left in the adjoining column is the associated table.

Dismantling the Set—*continued*

the scale assembly to clear the top of the cabinet.

Removing Speaker.—Remove chassis as previously described, free the speaker leads from the soft-metal cleat on the side of the cabinet, and remove the four nuts (with lock washers) securing the speaker to the sub-baffle.

When replacing, the speech coil connecting tags should be at the top.

GENERAL NOTES

Switches.—S1-S19 are the waveband switches, ganged in two rotary units beneath the chassis. These are indicated in our under-chassis illustration by the numbers **1** and **2** in diamonds, with arrows to show the direction in which they are viewed in the diagrams in col. 2, where they are seen in detail.

The table above gives the switch positions for the five control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C**, closed.

S20-S22 are the tone control switches, ganged in a single 5-position rotary unit beneath the chassis. The unit is indicated in our under-chassis view, and shown in detail in the diagram in col. 6 overleaf, where it is drawn as seen from the rear of an inverted chassis, neglecting the presence of the mains circuit switch **S23**, which is mounted on the same assembly and is operated by the same control spindle.

The table below it gives the switch positions for the four control settings, starting from the fully anti-clockwise (OFF) position of the control knob. A dash indicates open, and **C**, closed. The abbreviations, which are given as they are marked on the control knob, mean high fidelity (Fid.), brilliant (Bri.), and two mellow positions (M1, M2).

S23 is the Q.M.B. mains switch ganged with the tone control switches. It is operated only in the fully anti-clockwise position of the control knob.

Coils.—The band-spread S.W. aerial coils **L2, L3, L4** have adjustable iron-dust cores, but the associated oscillator circuit coils **L8, L9, L10** have adjustable aluminium cores. Screwing the core into the coil in the aerial circuit will have the effect of increasing the inductance, whereas the same action in the oscillator circuit will result in reduced inductance.

The M.W. and L.W. aerial coils **L1, L5, L6** are in an air-cored unit on the chassis deck. The associated oscillator coils **L7, L11, L12** are in another air-cored unit beneath the chassis.

Transformer T1.—The output transformer **T1,** which is mounted on the chassis deck, has its six connections brought out to tags mounted in a row on a panel. These tags are identified by letters **U, V, W, X, Y, Z** in our plan view of the chassis, and the respective connections are lettered similarly in our circuit diagram overleaf. It is essential that the primary and feed-back windings are connected in the same relative order as shown in our diagram, as otherwise the "sense" of the feed-back voltage will be reversed.

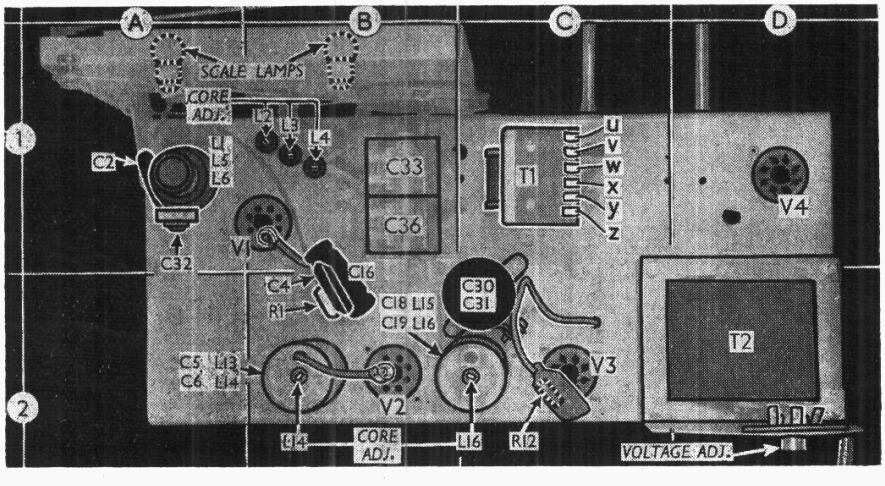
Scale Lamps.—These are two Mazda lamps, with large frosted spherical bulbs and M.E.S. bases, rated at 6.5 V, 0.3 A.

External Speaker.—Two pairs of speaker sockets, connected in parallel, are fitted on a panel at the rear of the chassis. One pair is for the connection of the internal speaker, and the other is for the connection of a low impedance (2-4 Ω) external speaker. The internal speaker may be muted by the withdrawal of one of its plugs, provided that an external speaker is already connected.

Critical Capacitor Ratings.—C5, C6; C11, C13, C14; and **C18, C19** are quoted as requiring a ±2 per cent tolerance; **C9** is quoted at ±5 per cent, and **C12** is quoted at ±1 per cent. The remainder vary between ±10 per cent and ±25 per cent.

Chassis Divergencies.—In some chassis, **C2** may be 0.00006 μF, but in our tables we quote the manufacturers' specified value of 0.00005 μF. In approximately 4,000 chassis bearing serial numbers from 0667301 onwards, the D.C. resistance of the I.F. transformer windings is different from that quoted in our tables. In these chassis, **L13** and **L14** are about 9.4 Ω each, and **L15, L16** are about 6.7 Ω each.

Resistor R17.—This is a wire-wound enamelled unit rated at 2,500 Ω, 8 W.

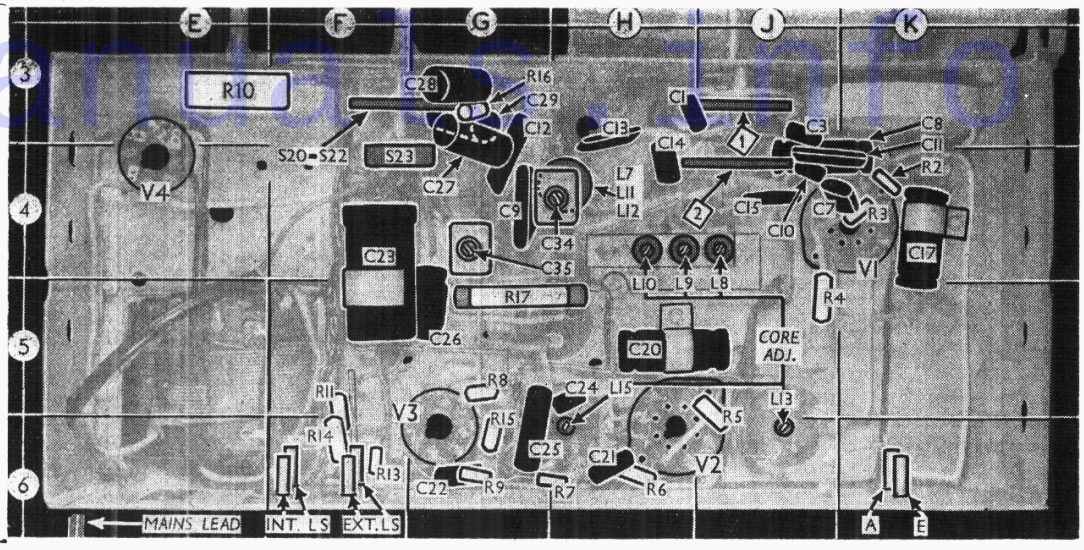


Plan view of the chassis, with the connecting tags of the output transformer coded with letters to agree with those in the circuit diagram overleaf. **R12** is mounted on the top cap connector of **V3**.

CIRCUIT ALIGNMENT

I.F. Stages.—Connect signal generator, via an 0.1 μF capacitor in the "live" lead, to control grid (top cap) of **V1** and the **E** socket, after removing the original top cap connector and connecting a 500,000 Ω resistor between the top cap of the valve and the A.G.C. line. Switch set to M.W., turn gang and volume control to maximum, feed in a 465 kc/s (645.16 m) signal, and adjust the cores of **L16, L15, L14** and **L13** (location references C2, H6, B2, J6) for maximum output. Finally, remove the 500,000 Ω resistor and replace the original top cap connector on **V1.**

R.F. and Oscillator Stages.—Since the calibrated glass scale is mounted in the cabinet, and alignment adjustments must be carried out with the chassis on the



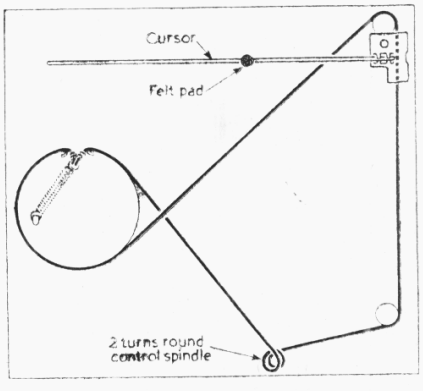
Under-chassis view. Diagrams of the two wave-band switch units (indicated here by the numbers 1 and 2 in diamonds) are shown in detail in col. 2. A diagram of the tone control switch unit **S20-S22** appears in col. 6 overleaf.

bench, a substitute scale having 100 divisions is printed on the rear of the scale backing plate. Readings on this scale are taken against the upper edge of the top tongue of the three-tongued drive cord clamp on the cursor carriage.

Thus, with the gang at maximum capacitance, the reading on the substitute scale should be 95 degrees, and if any error is found the cursor carriage may be slid up or down the drive cord to correct it. When the chassis is inserted in the cabinet, the dots above the high wavelength ends of the five scales should coincide with the position of the cursor when the gang is at maximum capacitance. Transfer the "live" signal generator lead to the **A** socket, via a suitable dummy aerial.

M.W.—With set still switched to M.W., tune to 10 degrees on scale, feed in a 200 m (1,500 kc/s) signal, and adjust **C34** (H4) and **C32** (A1) for maximum output. Tune to 81 degrees on scale, feed in a 500 m (600 kc/s) signal, and check that it is receivable at this setting of the cursor carriage.

L.W.—Switch set to L.W., tune to 34 degrees on scale, feed in a 1,200 m (250 kc/s) signal, and adjust **C35** (G4) for maximum output. Tune to 78 degrees on scale, feed in a 1,800 m (166.7 kc/s) signal, and check that it is receivable at this setting of the cursor carriage.



Sketch of the drive cord system, drawn as though seen from the front, looking through the scale backing plate.

S.W.—In the following operations the receiver must remain tuned to 52 degrees on scale, and it is desirable, in the interests of accuracy, that the signal generator should incorporate some form of crystal reference circuit. The receiver calibration should be checked, after alignment, against S.W. broadcast stations of known wavelength.

49 m.—Switch set to 49 m, feed in a 49.1 m (6.1 Mc/s) signal, and adjust the cores of **L10** (H4) and **L4** (B1) for maximum output.

31 m.—Switch set to 31 m, feed in a 31.25 m (9.6 Mc/s) signal, and adjust the cores of **L9** (H4) and **L3** (B1) for maximum output.

16 m.—Switch set to 16 m, feed in a 16.85 m (17.8 Mc/s) signal, and adjust the cores of **L8** (J4) and **L2** (B1) for maximum output.

DRIVE CORD REPLACEMENT

Although the drive cord is obscured by the scale backing-plate when viewed from the front, this is the easiest position in which to fit it, so it is drawn as though viewed from the front in our sketch of the drive system in the adjoining column.

Three feet of Nylon braided glass yarn is required for a new cord, this length leaving ample for tying off. Tie a non-slipping loop at one end of the cord, slip it on the loop at one end of the tension spring, and hook the other end of the spring to the anchor tag in the gang drum.

With the gang at maximum, take the cord, in a clockwise direction in our sketch, down to the control spindle, make two turns round it and continue the course indicated in our sketch, pulling on the cord against the gang stop to keep the cord in position.

Tie off with another non-slipping loop so that the tension spring is well extended, and seal the knots with some kind of acetate cement. The makers give the length of the made-up cord as 28¾ inches between the centres of the loops, but the length of our specimen was 29¼ inches, measured as the overall length when held taut between two pins driven into the bench.

Finally, slip the cursor carriage on to the edge of the scale backing plate, engaging the cord in the cord-grip tongues, and adjust the cursor with reference to the dummy scale printed on the back of the scale backing plate as explained under "Circuit Alignment".

Service Short-cuts

REES MACE "GNOME"

This is an all-dry portable model using capacitance coupling between the frequency-changer valve (1C1) and the I.F. amplifier (1F3). The coupling capacitor is 1,000 pF ceramic type, soldered directly to the grid socket of the I.F. valve and enclosed in a tube of insulating material. In one case we found that the capacitor had developed a leak of about 80,000 Ω, and out of four of these receivers we serviced, three of them had this fault.—**E. C. S.**, Darlington.

MURPHY B101

I have traced crackling in these receivers to leakage between the contacts of the rear wafer on the switch unit. This is due to a breakdown of the insulation of the wafer, and H.T. current leak across it. Where such trouble is suspected, it can easily be confirmed by examining the chassis in a dark room, when small sparks will be observed jumping across the unit.

The obvious solution is to replace the switch wafer, but in a number of cases I have removed the four battery leads from the wafer and connected them instead to a separate switch unit which I have mounted in a corner at the rear of the chassis.—**R. C. B.**, Ambleside.

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