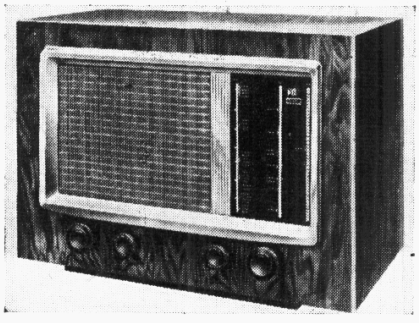
Supplement to The Wireless & Electrical Trader, June 1, 1946

"TRADER" SERVICE SHEET 772

PYE 65A

BATTERY SUPERHET



THE battery-operated version of the Pye post-war range is the Pye 65A, a 4-valve, 3-band superhet with a Q.P.P. output stage. The S.W. range is 16-52m.

The same quick-release features that characterized the A.C. model, in which the chassis is held by two screws and two pegs, are included in it, as is also the identity plate showing the model number and valve positions.

A four-position "Tonemaster" tone control is included with the battery switch control. Grid bias is automatic, and there is provision for a gramophone pick-up and an external speaker.

Release date and original price: April, 1946, £15 15s, plus purchase tax £3 7s 9d, complete with batteries.

CIRCUIT DESCRIPTION

Two aerial sockets are provided, **A1** and **A2.** Input from **A1** is via coupling coils **L1** (S.W.) and **L2** (M.W. and L.W.) to single-tuned circuits **L3, C27** (S.W.), **L4, C27** (M.W.) and **L5, C27** (L.W.), which precede a triode-pentode valve **(V1, Mazda metallised TP25)** operating as frequency changer with internal coupling. "Top" aerial coupling by **C1** on M.W. Socket **A2** is provided for the reception of very strong signals, and it feeds the signal to socket **A1** via the very small capacitance of **C2,** which consists only of a small piece of insulated wire wrapped round **A1.**

V1 triode oscillator anode coils **L9** (S.W.), **L10** (M.W.) and **L11** (L.W.) are tuned by **C31.** Parallel trimming by **C28** (S.W.),**C29** (M.W.) and **C8, C30** (L.W.); series tracking by **C9** (S.W.) and **C10** (M.W. and L.W.). Inductive reaction coupling from control grid by coils **L6** (S.W.), **L7** (M.W.) and **L8** (L.W.), with capacitative coupling across the common impedance of the trackers **C9** and **C10** in grid and anode circuits.

Second valve **(V2, Mazda metallised VP23)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary iron-cored transformer couplings **C5, L12, L13, C6** and **C13, L14, L15, C14.**

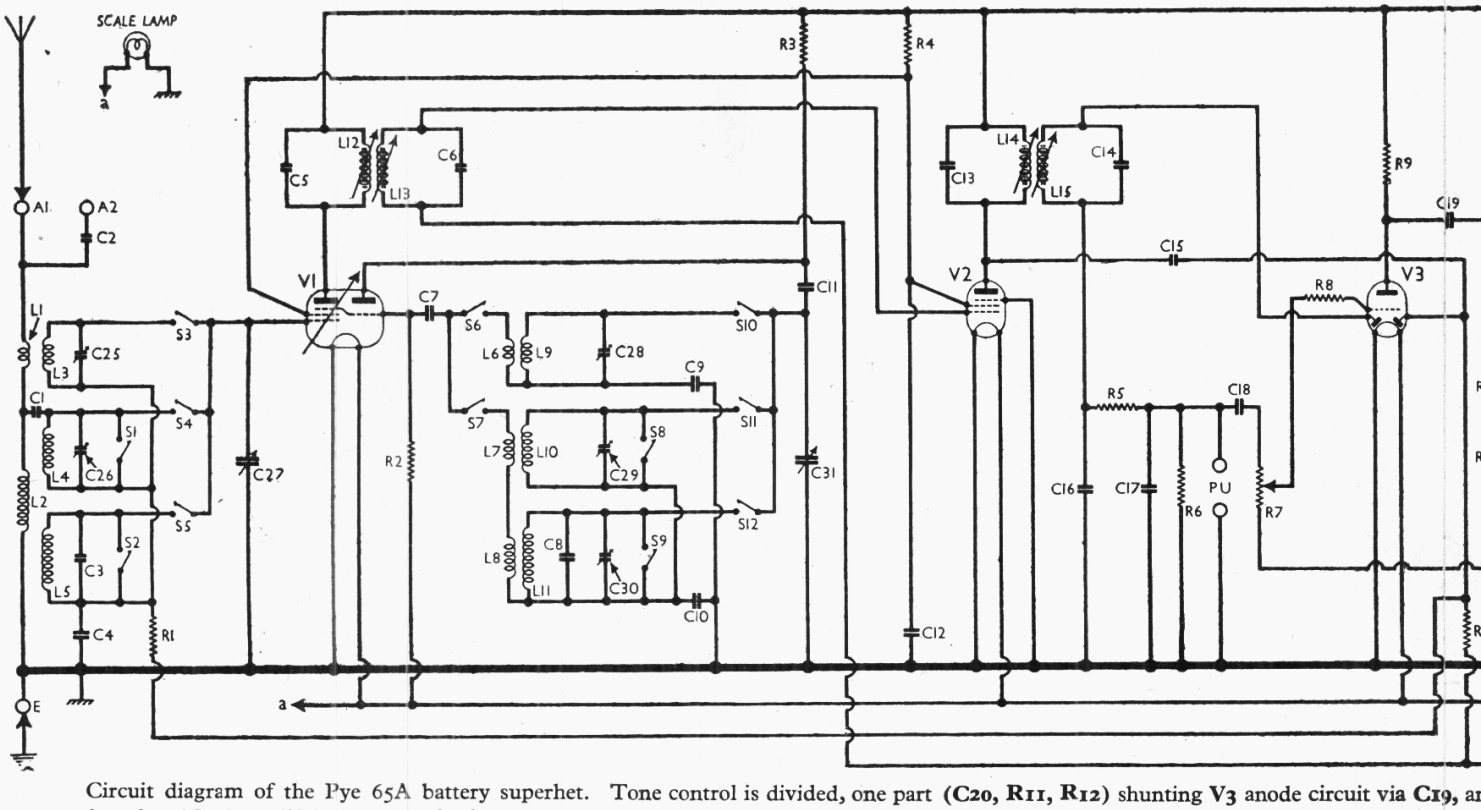
Intermediate frequency 465 kc/s.

Diode second detector is part of a double diode triode valve **(V3, Mazda metallised HL23DD).** Audio frequency component in rectified output is developed across load resistor **R6** and passed via A.F. coupling capacitor **C18,** manual volume control **R7** and grid stopper **R8** to control grid of triode section, which operates as audio frequency amplifier.

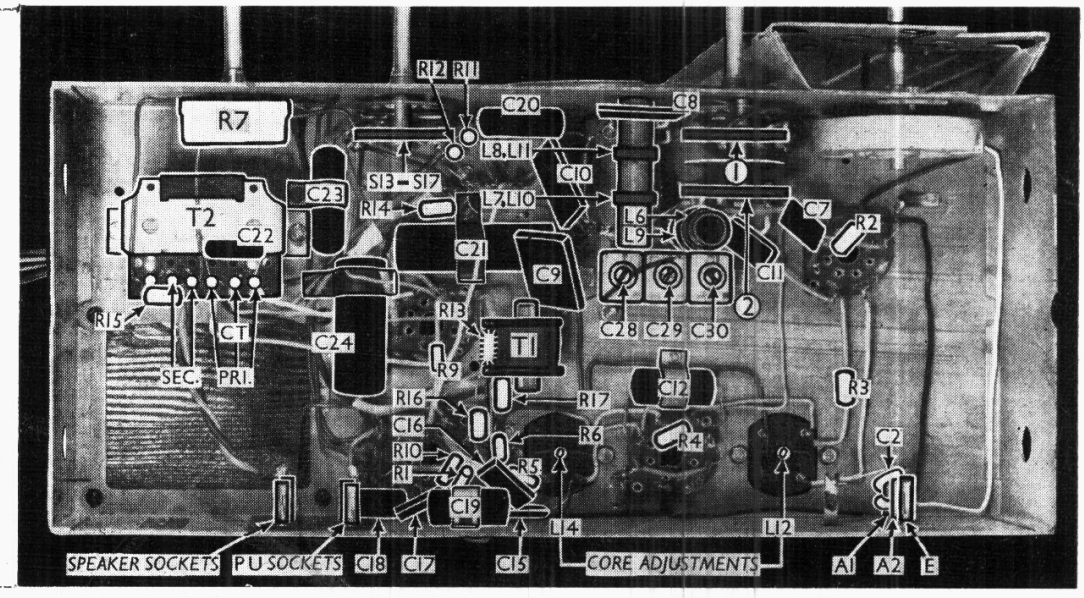
I.F. filtering by **C16, R5** and **C17** in the diode circuit, and by **R8** and the valve capacitance in the control grid circuit. Provision for the connection of a gramophone pick-up into the volume control via **C18.**

Second diode of **V3,** fed from **V2** anode via small coupling capacitor **C15,** provides D.C. potential, which is developed across load resistor **R10** and fed back through decoupling circuit as grid bias to F.C. valve only, giving automatic volume control.

Parallel-fed transformer coupling by **R9, C19** and **T1** between **V3** triode and double-



Circuit diagram of the Pye 65A battery superhet. Tone control is divided, one part **(C20, R11, R12)** shunting **V3** anode circuit via **C19,** ar the other **(C23)** modifying the feed-back response. The associated switches, **S13, S14** and **S15** are all ganged on the tone control switch un



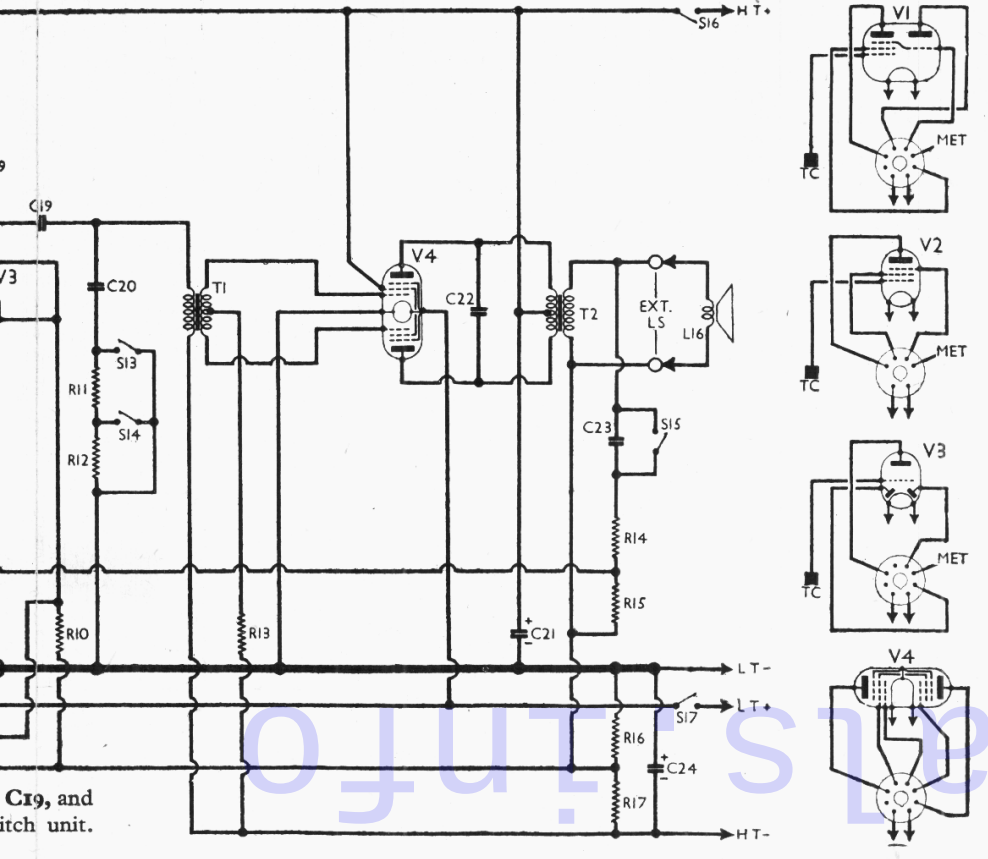
Under-chassis view. The waveband switch units (**1** and **2** in circles) and the tone control and battery switch unit (**S13–S17**) are indicated here, and shown in detail in the diagrams in cols. 2 and 3 overleaf. The connecting tags of **T2** are dentified. **R13** is actually mounted on **T1**, and is shown dotted through the wrapping that encloses it.

pentode quiescent push-pull output valve **(V4, Mazda QP25).** Fixed tone correction in anode circuit by **C22.** Provision for the connection of a low-impedance external speaker across the secondary winding of the output transformer **T2,** with facilities for muting the internal speaker.

Output voltages at **T2** secondary are stepped down by the potential divider, comprising resistors **R14, R15** and fed back in negative phase to **V3** triode control grid circuit, **C23** being included in the series for tone control purposes. This, in association with the series **C20, R11, R12** in **V3** triode anode circuit and a switch unit comprising switches **S13, S14** and **S15,** forms a four-position tone control.

In the first position of the control, marked "FID," all the switches are open; in the position marked "BRI," **S15** closes; in the two mellow positions **S15** opens, and **S14** ("M1") or **S13** ("M2") closes, giving progressively greater "top" cut.

Grid bias potentials for **V2, V3** triode, **V4** and A.V.C. delay are obtained from the drop along resistors **R16, R17** in the negative H.T. battery lead to chassis. The A.V.C. delay potential is automatically applied via the A.V.C. line as a fixed grid bias voltage to **V1.** The same voltage is applied to **V2,** but in that case it is applied directly to the control grid circuit from the potential divider, as **V2** is not controlled from the A.V.C. line.



C19, and itch unit.

COMPONENTS AND VALUES

	CAPACITORS	Values (μF)
C1	Aerial "Top" coupling ...	0·000005
C2	A2 series coupling ...	Very low
C3	Aerial L.W. trimmer ...	0·00006
C4	V1 pent. C.G. decoupling	0·1
C5, C6	1st I.F. transformer tuning capacitors	0·00007, 0·00007
C7	V1 osc. C.G. capacitor ...	0·0001
C8	Osc. L.W. fixed trimmer...	0·00033
C9	Osc. S.W. tracker ...	0·005
C10	Osc. M.W. and L.W. tracker	0·00057
C11	V1 osc. anode coupling ...	0·0001
C12	V1, V2 S.G. decoupling ...	0·1
C13, C14	2nd I.F. transformer tuning capacitors	0·00014, 0·00014
C15	Coupling to A.V.C. diode	0·00001
C16, C17	I.F. by-pass capacitors ...	0·0001, 0·0001
C18	A.F. coupling to V3 triode	0·01
C19	A.F. coupling to T1 ...	0·1
C20	Tone control capacitor ...	0·05
C21*	H.T. reservoir capacitor ...	8·0
C22	Fixed tone corrector ...	0·001
C23	Feed-back coupling ...	0·1
C24*	G.B. circuit shunt ...	50·0
C25‡	Aerial S.W. trimmer ...	0·00005
C26‡	Aerial M.W. trimmer ...	0·00005
C27†	Aerial circuit tuning ...	—
C28‡	Osc. circ. S.W. trimmer	0·00005
C29‡	Osc. circ. M.W. trimmer	0·00005
C30‡	Osc. circ. L.W. trimmer...	0·00005
C31†	Oscillator circuit tuning...	—

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)
R1	V1 pent. C.G. decoupling ...	1,000,000
R2	V1 osc. C.G. resistor ...	47,000
R3	V1 osc. anode H.T. feed ...	33,000
R4	V1, V2, S.G.'s H.T. feed	47,000
R5	I.F. stopper	47,000
R6	V3 signal diode load ...	470,000
R7	Manual volume control ...	1,000,000
R8	V3 triode grid stopper ...	10,000
R9	V3 triode anode load ...	47,000
R10	V3 A.V.C. diode load ...	1,000,000
R11	Tone control resistors ...	10,000
R12		47,000
R13	V4 C.G.'s decoupling ...	100,000
R14	Feed-back resistors ...	15,000
R15		2,200
R16	G.B. resistors	150
R17		680

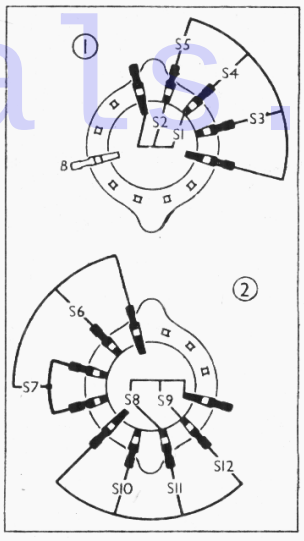
	OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial S.W. coupling coil ...		0·4
L2	Aerial M.W. and L.W. coupling		59·0
L3	Aerial S.W. tuning coil ...		Very low
L4	Aerial M.W. tuning coil ...		2·7
L5	Aerial L.W. tuning coil ...		15·7
L6	Osc. S.W. reaction coil ...		0·5
L7	Osc. M.W. reaction coil } total		2·4
L8	Osc. L.W. reaction coil }		
L9	Osc. S.W. tuning coil ...		Very low
L10	Osc. M.W. tuning coil ...		4·0
L11	Osc. L.W. tuning coil ...		4·5
L12	1st I.F. trans.	Pri. ...	9·4
L13		Sec. ...	9·4
L14	2nd I.F. trans.	Pri. ...	6·7
L15		Sec. ...	6·7
L16	Speaker speech coil ...		2·0
T1	Intervalve trans.	Pri. ...	680·0
		Sec., total	8,500·0
T2	Output trans.	Pri., total	860·0
		Sec. ...	0·2
S1-S12	Waveband switches ...		—
S13-S15	Tone control switches ...		—
S16	H.T. circuit switch		—
S17	L.T. circuit switch ...		—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted by the makers, who give total H.T. current as 10 mA, and L.T. current as 0.6A. The voltages are actual values, no allowance having been made for a drop due to a meter.

Value	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TP25	110	0·6	51	0·9
	Oscillator			
	46	2·0		
V2 VP23	110	0·9	51	0·2
V3 HL23DD	80	0·6	—	—
V4 QP25	109*	2·0*	110	1·1

* Each anode.



Diagrams of the waveband switch units, drawn as seen from the rear of the underside of the 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 above, where they are drawn as seen when viewed from the rear of an inverted 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-S15 are the tone control switches, which form part of a five-position rotary unit fitted beneath the chassis on the front member. On the reverse side of the unit are the battery circuit switches **S16, S17.**

Starting from the fully anti-clockwise (Off) position of the control, all switches are open. In the next position clockwise (FID), **S16** and **S17** close only; then in position "BRI," **S15, S16** and **S17** are closed; in position "M1," **S14, S16** and **S17** are closed; and in the final position

Waveband Switch Table

Switch	S.W.	M.W.	L.W.
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

"M2," **S13, S16** and **S17** are closed. A diagram of the switch unit, as seen from the rear of an inverted chassis, appears in the next column.

Coils.—All the aerial circuit coils **L1-L5** 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 I.F. 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 Lamp.—This is an M.E.S. type lamp, with a clear spherical bulb, rated at 2.5 V 0.15 A.

Resistor R13.—This is a small resistor fitted directly on the intervalve transformer **T1,** where it lies across the windings. It cannot be seen actually, as the transparent tape round the windings also covers the resistor, and for this reason its position is indicated in our under-chassis view by a dotted outline.

Capacitor C2.—This consists of a piece of insulated flexible wire connected to aerial socket **A2** and wrapped round **A1.**

Batteries, Leads and Voltages.—The batteries supplied with the receiver are

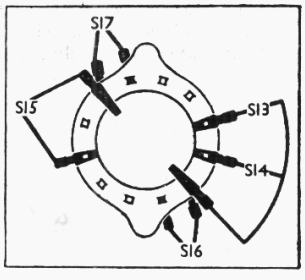


Diagram of the tone control and battery switch unit, **S13–S17,** as seen from the rear of an inverted chassis.

an Oldham "Plus 50" glass-cased 2V accumulator cell, carrying a special Pye label, and a Pye type K103A 120V H.T. battery.

There are two pairs of leads only. The black lead with the spade tag is the negative L.T. lead, and the red lead with a spade tag the positive L.T. (2V) lead. The negative H.T. lead (black with black plug) and the positive H.T. lead (red with red plug) go into the extreme tappings in the 120V H.T. battery. Grid bias is automatic.

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;
remove the H.T. battery shelf (lift out);
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.

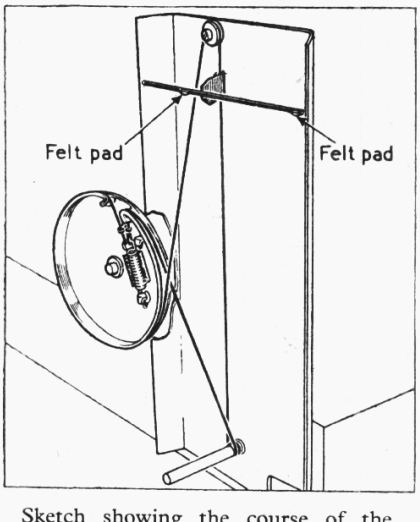
DRIVE CORD REPLACEMENT

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

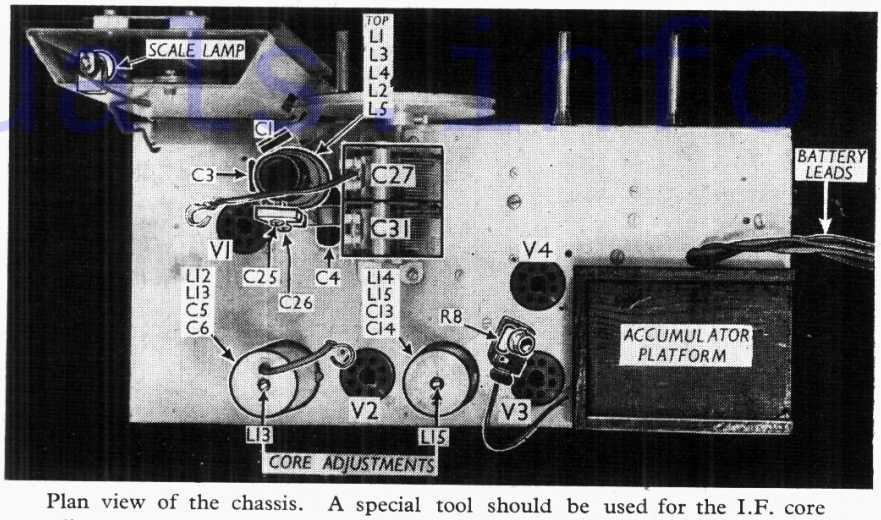
The scale glass must first be removed by removing the upper clamp (two set screws) and slackening the screws in the bottom one. The glass can then be lifted out, with its rubber packing pieces.

It is convenient to fit the pointer to the cord before fitting the cord to the set, rather than to fix it with the cord in position. To do this, tie a loop at one end of the cord, and hook it over a pin driven into the bench. Use a knot that will not slip and permit the loop to close.

With the pin on the left, stretch the cord out straight and fix the right-hand end to some convenient anchorage, slip the folded end of the pointer-plate under the cord, with the pointer bar in a horizontal position at the *top* of the plate, the felt pad at the end of the pointer bar pointing towards the operator. Now slide the pointer along the cord until the left-hand edge of the plate is exactly 17 inches from the outer end of the loop in the cord, and fix the plate in that position by clamping the fold in the plate tightly on to the cord with pliers.



Sketch showing the course of the scale pointer drive cord, as seen from the front when the scale is removed. Note the direction of the turns round the control spindle.



Plan view of the chassis. A special tool should be used for the I.F. core adjustments, the secondaries of which are indicated here. The primary adjustments are beneath the chassis.

Lay the chassis on its back, face its underside, and lay the pointer and cord in the trough formed by the scale backing plate, with the looped end of the cord towards the control spindle.. Turn the gang to maximum. Slip the loop on to one end of the coil spring, and pass it down on the *left-hand* side of the control spindle and round it nearly twice, as shown in the sketch below, then up, through the slot in the scale backing-plate, on to the groove in the drive drum and through the slot in its rim. Then hook the far end of the coil spring to the further (lower) anchor on the face of the drum.

Take the free end of the cord, and pass it upwards on the right-hand side of the pulley at the top of the scale backing-plate, round the pulley, down through the slot in the backing-plate, under the drive drum and round it, and through the slot in its rim. A second loop must now be tied to hook this end of the cord to the coil spring (it goes on to the same end as did the first loop). The loop must be tied so that the spring is extended about a quarter of an inch when the tension on the cord has been eased by running it back and forth three or four times.

When completed, the cord should follow the course indicated in the sketch, the vertical run being nearest to the backing-plate, and the felt pads on the pointer being in the positions indicated. The drive drum is shown in the position of maximum capacitance of the gang, with the rim opening directly over the gang-spindle. The second anchor shown on the drum face is not used.

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 36⅜ inches overall when taut.

CIRCUIT ALIGNMENT

I.F. 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 A.V.C. line. A convenient point on the A.V.C. line is the bare wire connecting together the lower tags of **C25** and **C26** on the aerial coil unit.

Switch set to M.W., 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 I.F. 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.

R.F. 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 two fixing screws. Transfer signal generator leads to **A1** and **E** sockets, via a suitable dummy aerial. This may consist of a 0.0002 μF capacitor for M.W. and L.W. adjustments, and a 400 Ω resistor for S.W. adjustments, connected in series with the lead to **A1.**

M.W.—With set still switched to M.W., tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust **C29,** then **C26,** for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and check calibration.

L.W.—Switch set to L.W., tune to 1,200 m on scale, feed in a 1,200 m (250 kc/s) signal, and adjust **C30** for maximum output. Tune to 1,800 m on scale, feed in an 1,800 m (166.7 kc/s) signal, and check calibration.

S.W.—Switch set to S.W., using 400 Ω dummy aerial, tune to 17.5 m on scale, feed in 17.5 m (17.14 Mc/s) signal, and adjust **C28,** then **C25,** 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 S.W. adjustments entirely.

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