NUMBER 120 'TRADER' SERVICE SHEETS

PYE T10A

A.C. ALL-WAVE SUPERHET

COVERING two short-wave bands of 13-34 and 30-85 metres, in addition to the medium and long waves, the Pye T10A receiver is a 4-valve (plus rectifier) A.C. superhet with variable selectivity and a neon tuning indicator.

CIRCUIT DESCRIPTION

Aerial input via coupling coils **L4, L5** to single-tuned circuits **L6, L7, C35** (S.W.); via centre tap on primary band-pass coil **L2** (M.W.); and via coupling coil **L1** to primary band-pass coil **L3** (L.W.). Band-pass primaries **L2, L3** (M.W. and L.W.) tuned by **C30.** Inductive coupling to band-pass secondaries **L8, L9** (M.W. and L.W.), tuned by **C35.** Tuned circuits coupled to **V1** pentode C.G. by condenser **C2.** Neutralising condenser **C3** from oscillator grid circuit to pentode grid circuit. Switch **S5** connects aerial to earth on gram., and **S12** also closes. All coils are switched separately.

First valve (**V1, Ever Ready metallised A80A**) is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L10, L11** (S.W.), **L12** (M.W.) and **L13** (L.W.) tuned by **C36.** Tracking by **C7, C41** (M.W.) and **C8, C42** (L.W.). Oscillator anode reaction coils **L14, L15** (S.W.) and **L16** (M.W. and L.W.). All coils separately switched. **S18** closed on gram.

Second valve (**V2, Ever Ready metallised A50N**) is a variable-mu H.F. pentode operating as I.F. amplifier with tuned primary, tuned secondary transformer couplings **L17, L18** and **L19, L20.** Variable selectivity provided by mechanically variable coupling between primaries and secondaries of I.F. transformers. At maximum selectivity, **S25** closes, reducing high note response.

Intermediate frequency 465 KC/S.

Neon tuning indicator (**T.I.**) in anode feed circuit of **V2.**

Diode second detector forms part of double diode triode (**V3, Ever Ready metallised A23A**). Audio component in rectified output developed across **R14** and passed via coupling condenser **C15** and I.F. stopper **R16** to manual volume control **R17. R15,** and **S24** provide inter-station noise suppression. When sensitivity control is turned clockwise, **S24** opens, and gives maximum sensitivity. **R13, C13, C14** form I.F. filter network. Provision for pick-up across **R17** via **S23, C15** and **R16.**

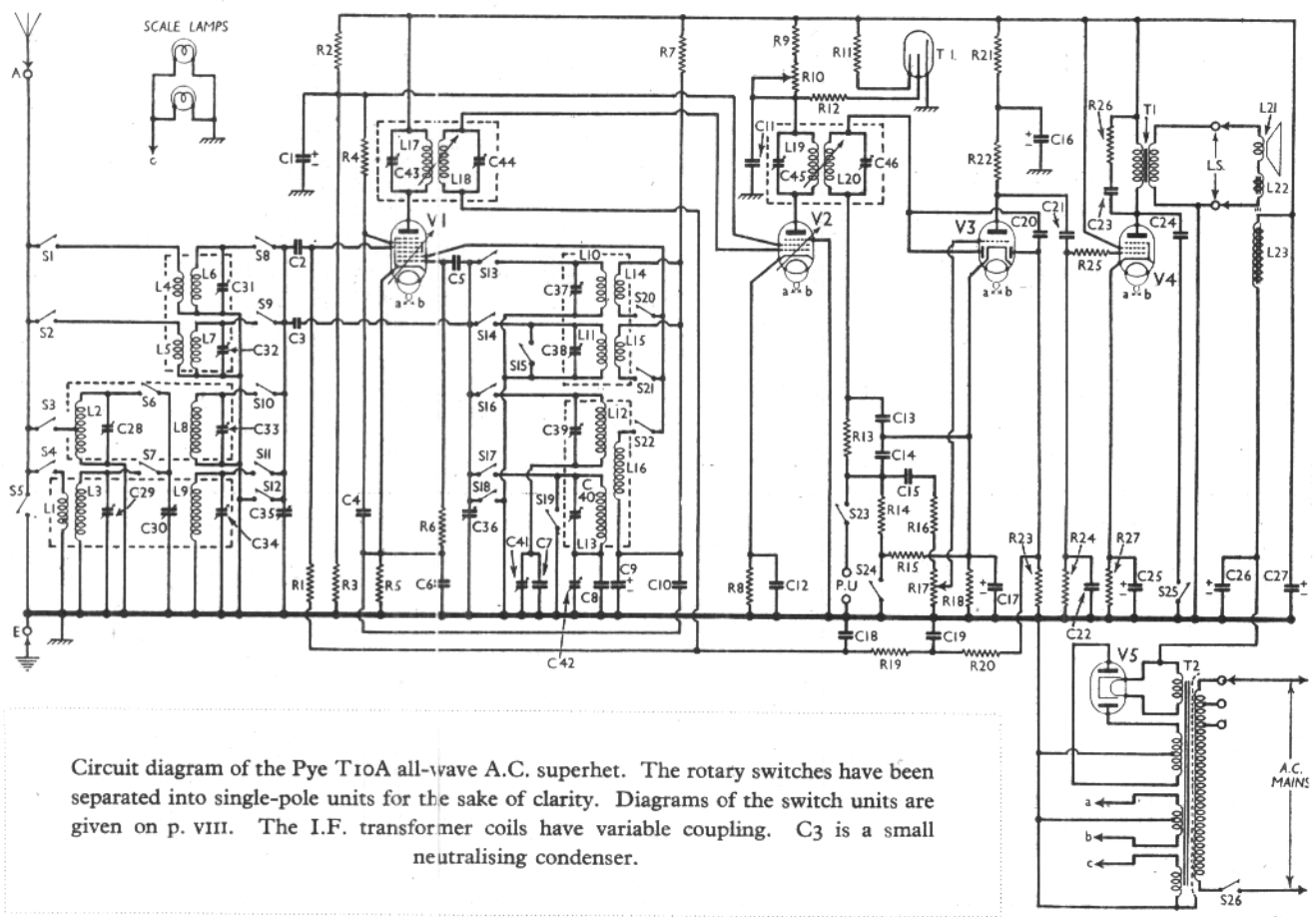
D.C. potential developed across **R23** is fed back via decoupling resistances **R19, R20** as G.B. to frequency changer and I.F. valves, giving A.V.C.

R.C. coupling by **R22, C21** and **R24** to output pentode (**V4, Ever Ready A70C**). **R26, C23** form impedance limiting network across the primary of output transformer **T1. C24** provides fixed tone control, switched in by **S25** on variable selectivity control. Provision for low resistance external speaker across secondary of **T1.**

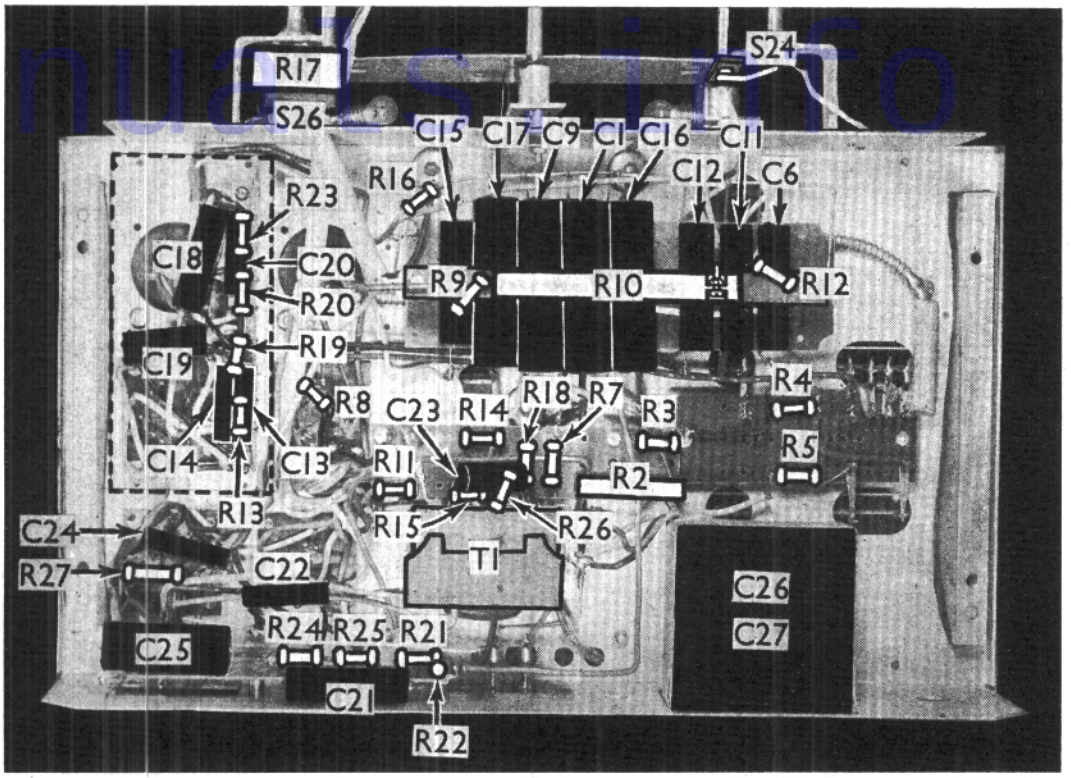
H.T. current supplied by I.H.C. full wave rectifying valve (**V5, Ever Ready A11B**). Smoothing by speaker field **L23** and dry electrolytics **C26, C27.** Scale lamps fed from separate 2 V secondary winding on mains transformer **T2.**

COMPONENTS AND VALUES

	Resistances	Values (ohms)
R1	V1 pentode C.G. resistance	510,000
R2	V1 and V2 S.G.'s H.T. potential divider	30,000
R3		50,000
R4	V1 S.G.'s H.T. feed	30,000
R5	V1 fixed G.B. resistance	150
R6	V1 oscillator C.G. resistance	26,000
R7	V1 osc. anode decoupling	40,000
R8	V2 fixed G.B. resistance	200
R9	Part V2 anode decoupling	10,000
R10	T.I. adjuster and part V2 anode decoupling	15,000
R11	Neon T.I. exciter resistance	2,000,000
R12	Neon T.I. feed resistance	50,000
R13	I.F. stopper	260,000
R14	V3 signal diode load	260,000
R15	Part inter-station noise suppression circuit	11,000
R16	I.F. stopper	220
R17	Manual volume control	500,000
R18	V3 G.B. resistance	1,000
R19	A.V.C. line decoupling	510,000
R20		510,000
R21	V3 triode anode decoupling	25,000
R22	V3 triode anode load	50,000
R23	V3 A.V.C. diode load	510,000
R24	V4 C.G. resistance	260,000
R25	V4 C.G. I.F. stopper	26,000
R26	Part V4 impedance-limiting network	10,000
R27	V4 G.B. resistance	150



Circuit diagram of the Pye T10A all-wave A.C. superhet. The rotary switches have been separated into single-pole units for the sake of clarity. Diagrams of the switch units are given on p. VIII. The I.F. transformer coils have variable coupling. C3 is a small neutralising condenser.



View of underside of main chassis. The screen over the components at the left has been removed, but its position is indicated by dotted lines. R10 is adjustable by means of a sliding clip. Note the noise suppression switch S24.

	Condensers	Values (μF)
C1*	V1 and V2 S.G.'s decoupling	2·0
C2	V1 pentode C.G. condenser	0·0001
C3	Neutralising condenser	Very low
C4	V1 S.G. by-pass	0·1
C5	V1 osc. C.G. condenser	0·0001
C6	V1 cathode by-pass	0·1
C7	Osc. M.W. tracker, fixed	0·0004
C8	Osc. L.W. tracker, fixed	0·0002
C9*	V1 osc. anode decoupling	2·0
C10		0·1
C11	V2 anode decoupling	0·1
C12	V2 cathode by-pass	0·1
C13	I.F. by-passes	0·0001
C14		0·0001
C15	L.F. coupling	0·05
C16*	V3 triode anode decoupling	2·0
C17*	V3 cathode by-pass	10·0
C18	A.V.C. line decoupling	0·025
C19		0·025
C20	Coupling to V3 A.V.C. diode	0·0001
C21	V3 to V4 L.F. coupling	0·05
C22	V4 C.G. I.F. by-pass	0·001
C23	Part V4 impedance-limiting network	0·01
C24	Tone control condenser	0·01
C25*	V4 cathode by-pass	50·0
C26*	H.T. smoothing	8·0
C27*		8·0
C28‡	Band-pass primary M.W. trimmer	—
C29‡	Band-pass primary L.W. trimmer	—
C30†	Band-pass primary tuning	—
C31‡	Aerial circuit S.W. trimmers	—
C32‡		—
C33‡	Band-pass secondary M.W. trimmer	—
C34‡	Band-pass secondary L.W. trimmer	—
C35†	Band-pass sec. and S.W. aerial tuning	—
C36†	Oscillator tuning	—
C37‡	Oscillator circuit S.W. trimmers	—
C38‡		—
C39‡	Oscillator M.W. trimmer	—
C40‡	Oscillator L.W. trimmer	—
C41‡	Oscillator M.W. tracker	—
C42‡	Oscillator L.W. tracker	—
C43‡	1st I.F. trans. pri. tuning	—
C44‡	1st I.F. trans. sec. tuning	—
C45‡	2nd I.F. trans. pri. tuning	—
C46‡	2nd I.F. trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

	Other Components	Approx. Values (ohms)
L1	Aerial coupling coil (L.W.)	161·0
L2	Band-pass M.W. primary coil	2·3
L3	Band-pass L.W. primary coil	17·0
L4	Aerial coupling coils (S.W.)	Very low
L5		Very low
L6	Aerial tuning coils (S.W.)	Very low
L7		Very low
L8	Band-pass M.W. secondary coil	2·3
L9	Band-pass L.W. secondary coil	17·0
L10	Oscillator tuning coils (S.W.)	Very low
L11		Very low
L12	Oscillator tuning coil (M.W.)	1·7
L13	Oscillator tuning coil (L.W.)	2·7
L14	Oscillator reaction coils (S.W.)	Very low
L15		Very low
L16	Oscillator reaction coil (M.W. and L.W.)	30·4
L17	1st I.F. transformer Pri.	6·0
L18	1st I.F. transformer Sec.	6·0
L19	2nd I.F. transformer Pri.	6·0
L20	2nd I.F. transformer Sec.	6·0
L21	Speaker speech coil	1·8
L22	Hum neutralising coil	0·2
L23	Speaker field coil	3,000·0
T1	Output trans. Pri.	700·0
	Output trans. Sec.	0·3
T2	Mains trans. Pri. total	44·0
	Mains trans. Heater sec.	0·04
	Mains trans. Rect. heat. sec.	0·2
	Mains trans. Lamp sec.	0·3
	Mains trans. H.T. sec. total	350·0
T.I.	Neon tuning indicator	—
S1-S22	Waveband and gram. switches	—
S23	Gram. pick-up switch	—
S24	Noise suppression switch	—
S25	Tone control switch	—
S26	Mains switch	—

DISMANTLING THE SET

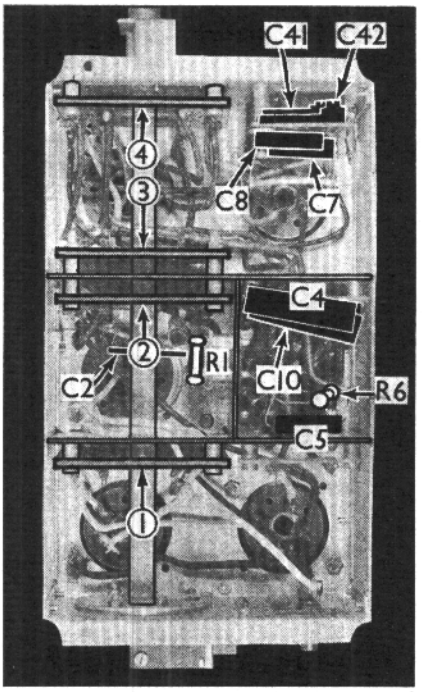
A detachable bottom is fitted to the cabinet and upon removal (four round-head wood screws and washers) gives access to most of the under-chassis components.

Removing Chassis.—First remove the mains lead and the back. Next remove the five control knobs (pull off) and the tuning indicator and its holder by unscrewing the knurled nut holding it to its bracket. Now free the speaker speech coil leads from the cleat on the mains transformer and remove the plugs from the back of the chassis. Then free the speaker field coil leads from the cleat on the side of the cabinet and remove the four chassis bolts (with washers). The chassis can now be withdrawn to the extent of the speaker field coil leads, which is sufficient for normal purposes, and can be put into operating condition by re-connecting the speaker speech coil leads.

To free the chassis entirely, disconnect the speaker field coil leads from the speaker (screw terminals).

Removing Speaker.—Remove the nuts, spring washers and washers from the four bolts holding it

(*Continued overleaf*)



View of underside of subsidiary chassis. The switch units are indicated by numbers in circles, and the arrows show the direction in which they are viewed in the diagram overleaf.

PYE T10A (continued)

to the sub-baffle. *When replacing*, see that the terminal panel for the field coil leads is at the bottom.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 225 V, using the 216-235 V tapping on the mains transformer. The volume control was at maximum and the sensitivity control was turned fully in the clockwise direction (minimum sensitivity). The receiver was tuned to the lowest wavelength on the medium band, but there was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, with chassis as negative.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 A80A*	255	0·9	50	1·7
V2 A50N	142‡	4·7	95	2·1
V3 A23A	90	2·1	—	—
V4 A70C	230	37·0	258	4·4
V5 A11B	362†	—	—	—

* Osc. anode (G2) 120 V, 3·0 mA.
† Each anode, A.C.
‡ This reading depends on the setting of the neon tuning adjuster.

GENERAL NOTES

Switches.—**S1-S23** are the waveband and gramophone switches. **S23** is attached to the end of the control shaft, at the rear of the subsidiary chassis, and closes in the "gram." position, but is open in all other positions.

S1-S22 are in four ganged rotary units beneath the subsidiary chassis. They are indicated by figures in circles in our under sub-chassis view, the arrows showing the direction in which the units are viewed when referring to the four diagrams of the units.

The diagrams show the individual switches in each unit, and it should be noted that as the shaft is rotated, a moving contact closes one switch in each unit in turn. There is never more than one switch in the closed position in each unit.

The table below gives the switches which are *closed* at each position of the control knob.

Control Position				
S.W.2	S.W.1	M.W.	L.W.	Gram.
S1	S2	S3	S4	S5
—	—	S6	S7	—
S8	S9	S10	S11	S12
S15	—	S19	—	—
S13	S14	S16	S17	S18
S20	S21	S22	S22	—
—	—	—	—	S23

Note that in the sixth line of the table, **S22** is shown closing on M.W. and L.W. This is due to the fact that two fixed contacts are joined together in this unit. Certain tags in some of the units are blank, and are marked "B" in the diagram. The whole section to the right of the **S8-S12** unit is not used for switching, though some of the tags are used as bearers.

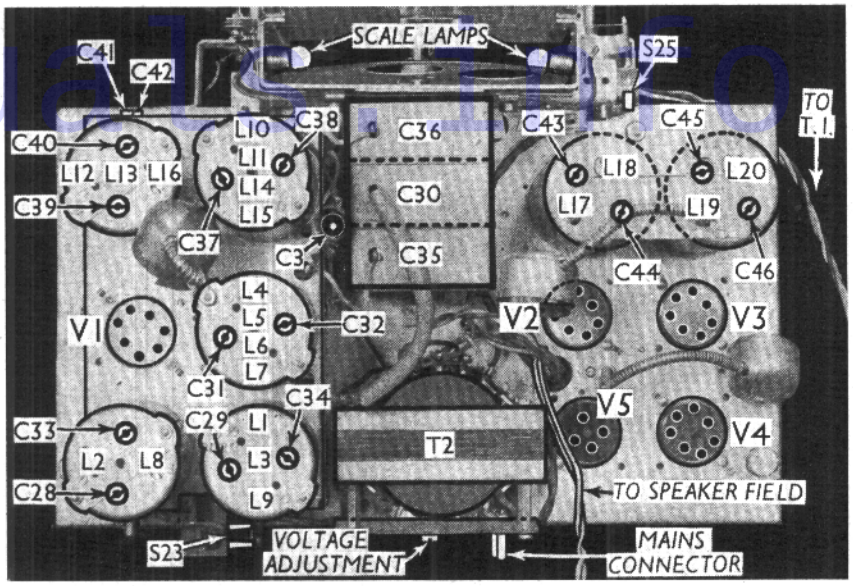
S24 is the sensitivity switch, operated by the "SC" control knob. It is *closed* when the knob is anti-clockwise. **S25** is at the front of the chassis behind the "VS" (selectivity) control, and is *closed* when the knob is fully anti-clockwise. **S26** is the Q.M.B. mains switch, ganged with the volume control **R17.**

Coils.—All the signal frequency and oscillator coils are on the deck of the subsidiary chassis, in five screened units, with their appropriate trimmers adjustable through holes in the tops of the cans.

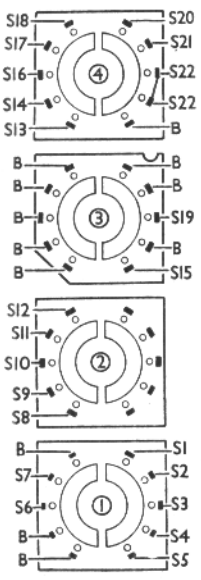
The I.F. transformers and their trimmers are in two screened units on the deck of the main chassis, and the coupling between the primaries and secondaries is varied by rods coupled to the "VS" control spindle.

Scale Lamps.—These are two Osram M.E.S. types rated at 4·0 V, 0·3 A, wired in parallel, and run from a 2 V winding on the mains transformer.

External Speaker.—There is provision for a low resistance (1·5-2·5 Ω) external speaker at the rear of the chassis, which may be used alone or in conjunction with the internal speaker.



Plan view of the chassis. C41 and C42 are the M.W. and L.W. trackers. Note the switches S23 and S25 at the rear and front of the chassis. C3 is the small neutralising condenser.



Diagrams of the switch units, numbered as in the lower illustration on p. VII, and viewed from the underside of the sub-chassis in the directions shown by the arrows in the illustration. Some tags are blank, while those to the right of unit 2 are not used as switches.

Tuning Indicator.—This is a G.E.C. "Tuneon" fitting in a small 4-pin holder. Looking at the underside of this with the large socket at the bottom, the red lead goes to the large socket, the black lead to the socket opposite, and the white lead to the socket on the left. The remaining socket is blank. If a new tube has to be fitted, it may be necessary to re-adjust **R10**, a wire-wound resistance with slider, beneath the main chassis. First move the slider to the end nearest **R9.** The glow should now be at a minimum. Leave the receiver running for 5 minutes, then move the slider slowly towards **R12.** The glow advances slowly at first, and then fairly suddenly. At this point, fix the slider in position by tightening the clamp screw.

Condensers C26, C27.—These are two 8 μF dry electrolytics in a single unit beneath the chassis having a common negative (black) lead. The yellow lead is the positive of **C26,** and the red the positive of **C27.**

Removing Subsidiary Chassis.—To reach the switches and several of the components, the small chassis must be removed. There are seven soldered connections below (tag to tag) which need not be coded, but the five connections above (plus two to **S23**) should be sketched out for ease in replacement. The sub-chassis is held to the main chassis deck by four self-tapping screws. The wire from the range indicator must be unhooked from the pulley on the range switch spindle before removing the sub-chassis entirely. An under-side view of the sub-chassis is given.

Condensers C41 and **C42.**—These variable trackers are adjustable through holes in the front of the sub-chassis.

Condenser C3.—This is a very small fixed neutralising condenser, seen in the plan chassis view.

CIRCUIT ALIGNMENT

Adjustment of Tuning Scale.—The scale should be adjusted (by loosening the two screws holding it) so that the horizontal line separating the upper and lower scales is truly horizontal. Rotate the tuning knob fully anti-clockwise, and see that the pointer lies accurately along this line. If not, adjust the pointer by loosening the centre fixing screw, and rotating.

Adjusting I.F. Circuits.—Remove the lead to the control grid (top cap) of **V1,** connect a 0·5 MΩ resistance from top cap to chassis, and apply a 465 KC/S signal via a ·002 μF condenser to the top cap, the other lead of oscillator going to chassis. Connect a 0·25 μF condenser from oscillator anode to chassis. (It may be necessary to wedge a fine wire from the condenser into the valve holder socket with pin 1 of **V1** to make connection to the oscillator anode). Connect an output meter across the primary of **T1.**

Turn the "VS" control fully anti-clockwise. Adjust **C46, C45, C44, C43** in that order, for maximum output.

Adjusting H.F. and Oscillator Circuits.

L.W.—Turn "VS" control fully anti-clockwise. Switch set to L.W., and turn pointer to 876 m. (The pointer should indicate about 200 m. on the M.W. scale). Apply an 876 m. signal to the A. and E. terminals. Adjust **C40, C34** and **C29** for maximum output in that order. Set the pointer to 1,950 m., apply a 1,950 m. signal, and adjust **C42** for maximum output.

M.W.—Keep "VS" control fully anti-clockwise. Switch set to M.W., and turn pointer to 198 m. Apply a 198 m. signal, and adjust **C39, C33** and **C28** for maximum output in that order. Set the pointer to 520 m., apply a 520 m. signal, and adjust **C41** for maximum output.

S.W.1.—Turn "VS" control fully *clockwise*. Switch receiver to S.W.1 (30-85 m.) and set pointer to 30 m. (10 MC/S). Apply a 30 m. signal, and adjust **C38** and **C32** for maximum output. Re-check these adjustments.

S.W.2.—Keep "VS" control fully *clockwise*. Switch receiver to S.W.2 (13-34 m.) and set pointer to 14·3 m. (21 MC/S). Apply a 14·3 m. signal, and adjust **C37** and **C31** for maximum output. Re-check these adjustments.

Note.—If more than one peak is obtained in adjusting the oscillator trimmers **C40, C39, C38** and **C37,** select the peak nearer to the minimum capacity of the trimmer. If the receiver tunes abnormally low at the higher wavelength end of the scale, the corresponding oscillator trimmer has probably been adjusted to the wrong peak. In this case, re-trim this particular waveband.

Since separate coils and trimmers are used for each waveband, it is only necessary to re-trim the circuits of the particular waveband which is out of gang.

All the above adjustments should be made with the volume control at maximum, the selectivity control in the position noted in the instructions, the sensitivity control turned clockwise, and an applied signal which is low enough to prevent masking by the A.V.C. action of the receiver.