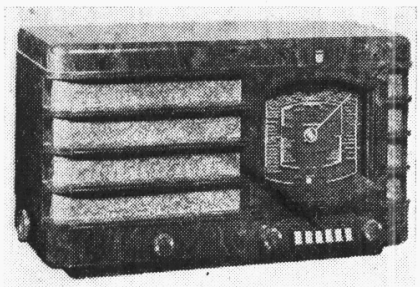
Supplement to The Wireless & Electrical Trader, May 27, 1939

"TRADER" SERVICE SHEET

406

PHILIPS 555A

597A, 555U AND 597U



The Philips 555A (or 555U) table press-button receiver. The 597A and 597U models are consoles.

THE Philips 555A is a 3-valve (plus rectifier) 3-band AC table superhet with mechanical direct action press-button tuning for six stations. The 555U is similar, but is fitted with a converter for use on DC mains.

The 597A and 597U are the console versions, which were issued prior to the table models.

Divergencies of the various models are given in cols. 3 and 4 overleaf.

The AC models are suitable for use on 100-260 V, 50-100 C/S mains; the DC models are for 200-250 V or 100-150 V mains, according to the type of converter fitted.

This *Service Sheet* was prepared on a 555A model.

Release dates: 555A, 555U, November, 1938; 597A, 597U, August, 1938.

CIRCUIT DESCRIPTION

Aerial input on MW and LW is via coupling coils **L2, L3** to mixed coupled band-pass filter. Primary coils **L4, L5** are tuned by **C28**; secondaries **L10, L11** by **C30**; coupling by coils **L6, L7** and condensers **C3, C4.** IF filtering by **L1, C26**; image suppression by **C1.** On SW, input is via coupling coil **L8** to single-tuned circuit **L9, C30.**

First valve (**V1, Mullard EK2**) is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L12** (SW), **L13** (MW) and **L14** (LW) are tuned by **C31**; parallel trimming by **C32** (MW) and **C33** (LW); series tracking by **C9** (MW) and **C8** (LW). Reaction by coils **L15** (SW), **L16** (MW) and **L17** (LW).

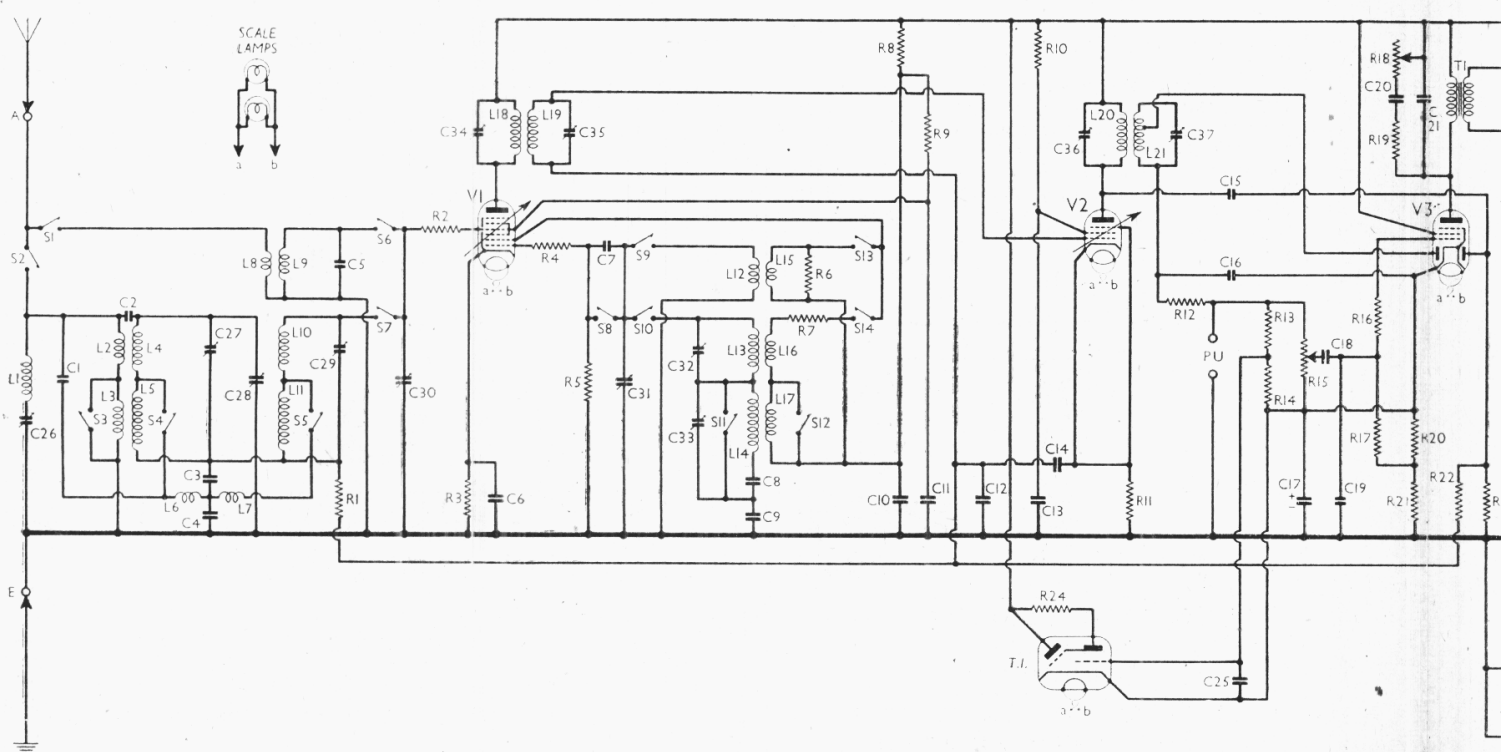
Second valve (**V2, Mullard EF9**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned secondary transformer couplings **C34, L18, L19, C35** and **C36, L20, L21, C37.**

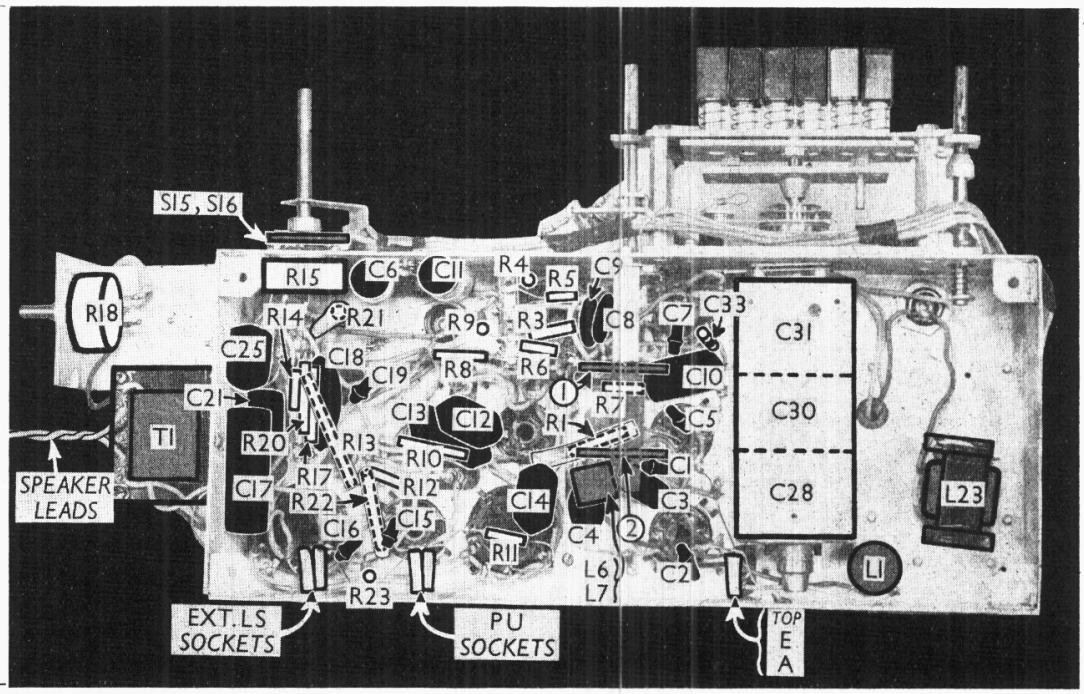
Intermediate frequency 128 KC/S.

Diode second detector is part of double diode pentode output valve (**V3, Mullard EBL1**). Audio frequency component in rectified output is developed across load resistances **R12** and the manual volume control **R15,** which forms part of the diode load, and passed via **C18** and stopper **R16** to CG of pentode section. IF filtering by **C16** and **C19.** Provision for connection of gramophone pick-up across **R15, C17.** Operating potential for cathode ray tuning indicator (**T.I., Mullard EM1**) is obtained from junction of resistances **R13, R14,** which form a potential divider across **R15.** Variable tone control in pentode anode circuit by **R18, C20, R19** and fixed tone correction by **C21,** also in anode circuit. Provision for connection of low impedance external speaker across secondary of output transformer **T1.**

Second diode of **V3,** fed from **V2** anode via **C15,** provides DC potential which is developed across load resistance **R23** and fed back through decoupling circuits as GB to FC (except on SW) and IF valves, giving automatic volume control. Delay voltage is obtained from drop along resistances **R20, R21** in **V3** cathode lead to chassis.

HT current is supplied by full-wave rectifying valve (**V4, Mullard AZ1**). Smoothing by iron-cored choke **L23** and large capacity wet electrolytic condensers **C22** and **C23.**





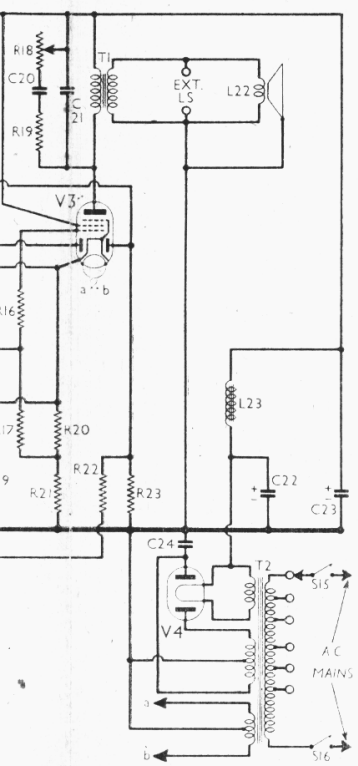
Under-chassis view. Diagrams of the two wave-change switch units are in col. 6 overleaf. **S15, S16** are ganged with the volume control **R15. C33** is a spiralled wire adjustable condenser.

DISMANTLING THE SET

Removing Chassis.—First remove the two right-hand control knobs from the front of the cabinet and the bakelite escutcheon which they hold in place. Then remove the remaining knob from the front of the cabinet and one from the side (grub screw inside cabinet). Remove the T.I. holder (knurled screw) and scale lamps from their brackets inside the cabinet; slacken the fixing screw in the spring-loaded pointer drum boss, hold the drum, slip the wire drive cord from the flat hook on the drum and allow the spring to turn the drum slowly until the tension is released; remove a second wire drive cord from the waveband indicator plate; unsolder the two leads from the connecting panel on the speaker and the two wires from the tag screwed to the screening on the base of the cabinet. Now remove the four bolts (with washers) holding the chassis to the bottom of the cabinet, when the chassis may be withdrawn from the cabinet.

When replacing, note that one flat washer and one spring washer are fitted on each of the two right-hand control spindles between the control knob and the bakelite escutcheon plate. The yellow rubber-covered lead from the front of the chassis should be connected to the tag screwed to the screening in the base of the cabinet and the speaker leads should be connected as follows, numbering from top to bottom: 1 and 2, joined together, yellow lead from **T1**; 3, red lead from **T1.**

Removing Speaker.—To remove the speaker from the cabinet, it is first necessary to remove the chassis; then slacken the square nuts and lock-nuts holding the three clamps to the speaker frame and the sub-baffle, when the speaker may be withdrawn if the clamps are swivelled round. *When replacing*, the small connecting panel should be on the right of the speaker, and the leads connected as detailed above.



Circuit diagram of the Philips 555A. The 597A console is almost identical (see col. 3 overleaf), while the "U" models are similar except for the addition of the DC to AC converter units (see col. 4 overleaf).

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 pentode CG decoupling	100,000
R2	V1 pentode CG stabiliser	50
R3	V1 fixed GB resistance	400
R4	V1 osc. CG stabiliser	40
R5	V1 osc. CG resistance	50,000
R6	Osc. circuit SW reaction damping	20,000
R7	Osc. circuit MW and LW reaction damping	4,000
R8	V1 osc. anode HT feed	32,000
R9	V1 SG HT feed resistance	160,000
R10	V2 SG HT feed resistance	80,000
R11	V2 fixed GB resistance	320
R12	Part V3 signal diode load	100,000
R13	T.I. CG feed potential divider resistances	5,000,000
R14	T.I. CG feed potential divider resistances	640,000
R15	Manual volume control; part of V3 signal diode load	500,000
R16	V3 pentode CG stopper	10,000
R17	V3 pentode CG resistance	1,000,000
R18	Variable tone control	50,000
R19	Part variable tone control	100
R20	V3 pentode GB and AVC delay resistances	160
R21	V3 pentode GB and AVC delay resistances	400
R22	AVC line decoupling	2,000,000
R23	V3 AVC diode load	500,000
R24	T.I. anode HT feed	2,000,000

	CONDENSERS	Values (μF)
C1	Image suppressor	0·00005
C2	Aerial MW and LW coupling	0·000016
C3	Band-pass coupling condensers	0·0125
C4	Band-pass coupling condensers	0·04
C5	Aerial circuit SW trimmer	0·00001
C6	V1 cathode by-pass	0·05
C7	V1 osc. CG condenser	0·00005
C8	Osc. circuit LW tracker	0·00068
C9	Osc. circuit MW tracker	0·001525
C10	V1 osc. anode decoupling	0·05
C11	V1 SG decoupling	0·05
C12	V2 CG decoupling	0·05
C13	V2 SG decoupling	0·05
C14	V2 cathode by-pass	0·05
C15	Coupling to V3 AVC diode	0·000004
C16	IF by-pass	0·00008
C17*	V3 cathode by-pass	25·0
C18	AF coupling to V3 pentode	0·01
C19	IF by-pass	0·00008
C20	Part of variable tone control	0·05
C21	Fixed tone corrector	0·002
C22*	HT smoothing condensers	32·0
C23*	HT smoothing condensers	32·0
C24	V4 anode RF by-pass	0·02
C25	T.I. CG decoupling	0·05
C26‡	Aerial IF filter tuning	0·0001
C27‡	Band-pass pri. MW trimmer	0·00003
C28†	Band-pass primary tuning	0·00049
C29‡	Band-pass sec. MW trimmer	0·00003

Continued overleaf

	CONDENSERS (*Continued*)	Values (μF)
C30†	Band-pass sec. and SW aerial tuning	0·00049
C31†	Oscillator circuit tuning	0·00049
C32‡	Osc. circuit MW trimmer	0·0001
C33‡	Osc. circuit LW trimmer	0·00003
C34‡	1st IF trans. pri. tuning	0·0001
C35‡	1st IF trans. sec. tuning	0·0001
C36‡	2nd IF trans. pri. tuning	0·0001
C37‡	2nd IF trans. sec. tuning	0·0001

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial IF filter coil	100·0
L2, L3	Aerial MW and LW coupling coils	30·0
		90·0
L4, L5	Band-pass primary coils	4·5
		40·0
L6, L7	Band-pass coupling coils	1·0
		1·0
L8	Aerial SW coupling coil	2·5
L9	Aerial SW tuning coil	0·15
L10, L11	Band-pass secondary coils	4·5
		40·0
L12	Osc. circuit SW tuning coil	0·15
L13	Osc. circuit MW tuning coil	11·0
L14	Osc. circuit LW tuning coil	40·0
L15	Oscillator SW reaction	1·0
L16	Oscillator MW reaction	4·0
L17	Oscillator LW reaction	7·5
L18, L19	1st IF trans. Pri.	130·0
	1st IF trans. Sec.	130·0
L20, L21	2nd IF trans. Pri.	130·0
	2nd IF trans. Sec., total	125·0
L22	Speaker speech coil	4·0
L23	HT smoothing choke	350·0
T1	Output trans. Pri.	690·0
	Output trans. Sec.	0·7
T2	Mains trans. Pri., total	48·5
	Mains trans. Heater sec.	0·15
	Mains trans. Rect. heat. sec.	0·2
	Mains trans. HT sec., total	375·0
S1-14	Waveband switches	—
S15, 16	Mains switches, ganged R15	—

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 2) are those measured in our receiver when it was operating on mains of 228 V, using the 220 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 EK2	280 Oscillator 160	1·4 2·6	50	0·9
V2 EF9	280	7·2	100	2·2
V3 EBL1	258	36·0	280	7·1
V4 AZ1	288†	—	—	—
T.I. EM1	25 Target 280	0·15 0·5	—	—

† Each anode, AC.

GENERAL NOTES

Switches.—**S1-S14** are the waveband switches, ganged in two rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams in col. 6, where they are drawn as seen looking from the rear of the underside of the chassis.

The table (col. 5) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C,** closed.

S15, S16 are the QMB mains switches, ganged with the volume control **R15,** and as indicated in the under-chassis view, they are at the front of the volume control.

Coils.—**L1** and **L6, L7** are in two units beneath the chassis, and are unscreened. **L2-L5 ; L8-L11 ; L12-L17 ;** and the IF transformers **L18, L19** and **L20, L21** are in five screened units on the chassis deck. Each unit contains one trimmer, additional trimmers, in the case of the IF units, being mounted nearby, on the chassis deck.

Scale Lamps.—These are two Philips MES types, with tubular bulbs. Their part number is Ph8045D.

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (5-7 O) external speaker.

Condenser C33.—This is a wire-wound adjustable type, situated beneath the chassis to the right of switch unit 1.

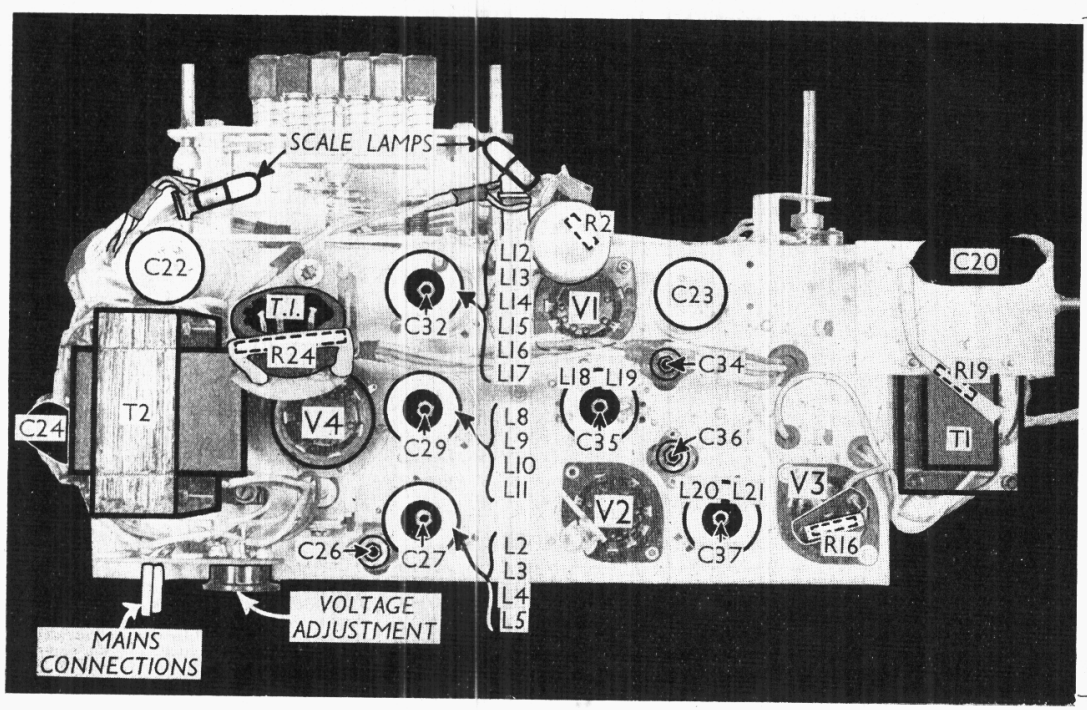
Trimmer Capacities.—Certain of the trimmers used are rated by the makers for capacity as 70+30 μμF. Presumably the first part represents the fixed minimum capacity, and the second the variable additional capacity. In our tables these trimmers are all indicated as having a capacity of 0·0001 μF.

Resistances R2, R16.—**R2** is inside the top cap connector of **V1,** while **R16** is on a paxolin strip attached to the top cap clip of **V3.**

Chassis Divergencies.—In the makers' diagram the connection from the top of **T1** primary, instead of going to the HT line as in our diagram, goes directly to the junction of **L23** and **C22** (**V4** heater). Also, **C14** is shown returned direct to chassis, instead of to the AVC line. Chassis bearing the stamp MO1 will be as our diagram ; if the stamping is MO, the above divergencies will be found. **C10** and **C13** may be 0·064 μF, not 0·05 μF.

597A MODIFICATIONS

In the console model 597A, the external speaker arrangements may be different. A 2-position switch may be provided to mute the internal speaker, and place an artificial load across the secondary of **T1.** In this case the load resistance is 10 O (two 20 O resistors in parallel), and the switch connects either **L22** or the load resistors across the secondary of **T1.**



Plan view of the chassis. **R2** and **R16** are associated with the top cap connectors of **V1** and **V3** respectively. **R24** is attached to the T.I. holder. Each coil unit has one trimmer at the top, while there are three others mounted on the chassis deck.

555U AND 597U MODIFICATIONS

In these models, the DC to AC converter type 7880C/7881C is employed. This is inserted between **S15, S16** and the primary of **T2.** In addition, across the input to the converter, two 0·02 μF condensers are connected in series, and the junction between them is taken to chassis. Between one of the mains switches and one side of the converter input there is a replaceable fuse.

C19 is 0·000064 μF in these models, not 0·00008 μF.

CIRCUIT ALIGNMENT

IF Stages.—Switch set to LW, and turn gang to minimum. Turn volume control to maximum. Connect signal generator to control grid (top cap) of **V1,** via a 0·032 μF condenser, and chassis. Connect a 50,000 O resistance across **C35** and an 80,000 O resistance across **C36.**

Feed in a 128 KC/S signal, and adjust **C37,** then **C34,** for maximum output. Transfer the 50,000 O resistance across **C34** and the 80,000 O resistance across **C37.** Adjust **C36,** then **C35,** for maximum output. Remove the damping resistances.

IF Filter.—Connect signal generator to **A** and **E** sockets, and feed in a 128 KC/S signal. Switch set to LW, tune to upper end of scale (2,000 m) and adjust **C26** for *minimum* output.

RF and Oscillator Stages.—Before alignment is commenced it is necessary to set the gang condenser to a certain capacity by depressing one of the buttons, and proceeding as follows.

Unsolder the leads to **C31** in the gang and connect a Mullard GM4140 capacity-resistance tester to **C31** by means of the shortest possible leads (about 3 in. long). Set the gang to minimum and depress the fourth button from the left. By means of the adjusting tool adjust **C31** accurately to 28·3 $\mu\mu$F, using the GM4140 set to this value. Disconnect the instrument, and re-solder the connections to **C31.** *Do not disturb the setting of the press-button until the whole of the alignment has been carried out.*

The signal generator must be connected to the **A** and **E** sockets via suitable dummy aerials for the various wavebands.

MW.—Switch set to MW and turn volume control to maximum. Turn gang to minimum, and depress the button just adjusted. Feed in a 1,400 KC/S (214·3 m) signal, and adjust **C32, C29** and **C27** for maximum output.

Set receiver for manual tuning by pulling out knob.

LW.—Switch set to LW and turn volume control to minimum. Connect an aperiodic amplifier (Philips GM2404) to anode of **V1.** Connect output meter to the output terminals of the aperiodic amplifier, and connect a 0·1 μF condenser between oscillator grid of **V1** and chassis.

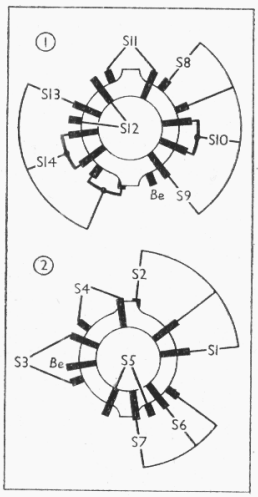
Feed in a 390 KC/S (769·2 m) signal to **A** and **E** sockets and tune it in on receiver to give maximum output from the amplifier. Disconnect amplifier and 0·1 μF condenser. Connect output meter to output of receiver. Turn volume control to maximum, and adjust **C33** for maximum output. Do not alter setting of gang condenser.

C33 is adjusted by unwinding turns of wire (to reduce capacity). If capacity is too low, wire cannot be added, and a new condenser must be fitted and its turns reduced until resonance occurs.

TABLE AND DIAGRAMS OF THE SWITCH UNIT

SWITCH	SW	MW	LW
S1	C	—	—
S2	—	C	C
S3	—	C	—
S4	—	C	—
S5	C	C	—
S6	C	—	—
S7	—	C	C
S8	—	C	C
S9	C	—	—
S10	—	C	C
S11	—	C	—
S12	—	C	—
S13	C	—	—
S14	—	C	C

Diagrams of the two wave-change switch units, as seen looking from the rear of the underside of the chassis.



PRESS-BUTTON UNIT

The mechanical press-button system used in this receiver was fully described and illustrated in the *A B C of Automatic Tuning,* on pages 4 and 5.

To select a station, first pull off the cap of the button which is to be used. This can be done easily after depressing the buttons on each side of it. Now tune the receiver manually (press-button out) to the station required.

Depress the button from which the cap has been removed. If the tuning appears to be correct, de-tune slightly by altering the adjusting screw of the button with the tool supplied. If, however, on depressing the button the tuning alters, unscrew the adjustment until the required station is again audible.

Move the scale pointer by means of the manual tuning knob to the extreme anti-clockwise position ("keyboard tuning"), and then adjust the screw of the button accurately to the desired station.

Service Hints Wanted

Service engineers are invited to submit hints regarding the maintenance of all kinds of domestic electrical, radio and television apparatus—based on their own personal experiences.

Payment will be made at usual lineage rates for all ideas and paragraphs used—about the 10th of the month following the month of publication. Material should be addressed to the Technical Editor, "The Wireless and Electrical Trader," Dorset House, Stamford Street, London, S.E.1.

Printed in Great Britain by Sanders Phillips & Co., Ltd., The Baynard Press, Chryssell Road, London, S.W.9.