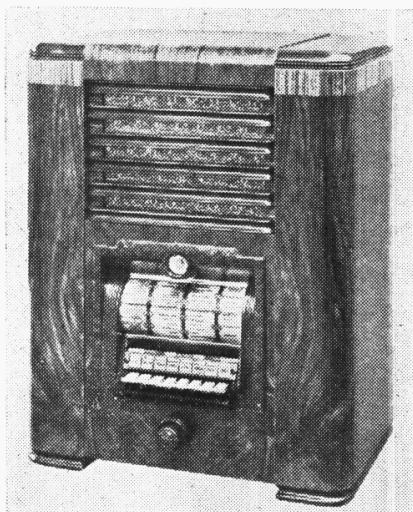


"TRADER" SERVICE SHEET
400

PILOT T63

AC SUPERHET



THE Pilot T63 is an AC all-wave superhet, with a short-wave range of 16-58 m. It is suitable for 200-250 V, 50 C/S mains.

A feature of the set is that waveband and off switching, and tone control, is accomplished by eight piano keys, of which four are used for tone control, three

for wavechange purposes, and one for "off" switching.

A tuning indicator is fitted, and there is provision for an external speaker (with internal speaker muting) and a pick-up (with radio muting). Apart from the piano keys, the only other control is a dual one, for tuning and volume control.

Release date : February, 1939.

CIRCUIT DESCRIPTION

Aerial input is via coupling coils **L1** (SW), **L2** (MW) and **L3** (LW) to single-tuned circuits **L4**, **C28** (SW), **L5**, **C28** (MW) and **L6**, **C28** (LW) which precede triode hexode valve (**V1**, **Osram X65**) operating as frequency changer with internal coupling.

Triode oscillator grid coils **L7** (SW), **L8** (MW) and **L9** (LW) are tuned by **C29**; parallel trimming by **C31** (SW), **C32** (MW) and **C33** (LW), series tracking by **C7** (SW), **C34** (MW) and **C30** (LW). Reaction by coils **L10** (SW), **L11** (MW) and **L12** (LW).

Second valve (**V2**, **Brimar 6U7G**) is a variable- μ RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformers **C3**, **L13**, **L14**, **C4** and **C35**, **L15**, **L16**, **C36**; tuning is effected by adjusting the iron cores **L13**, **L14** in the case of the

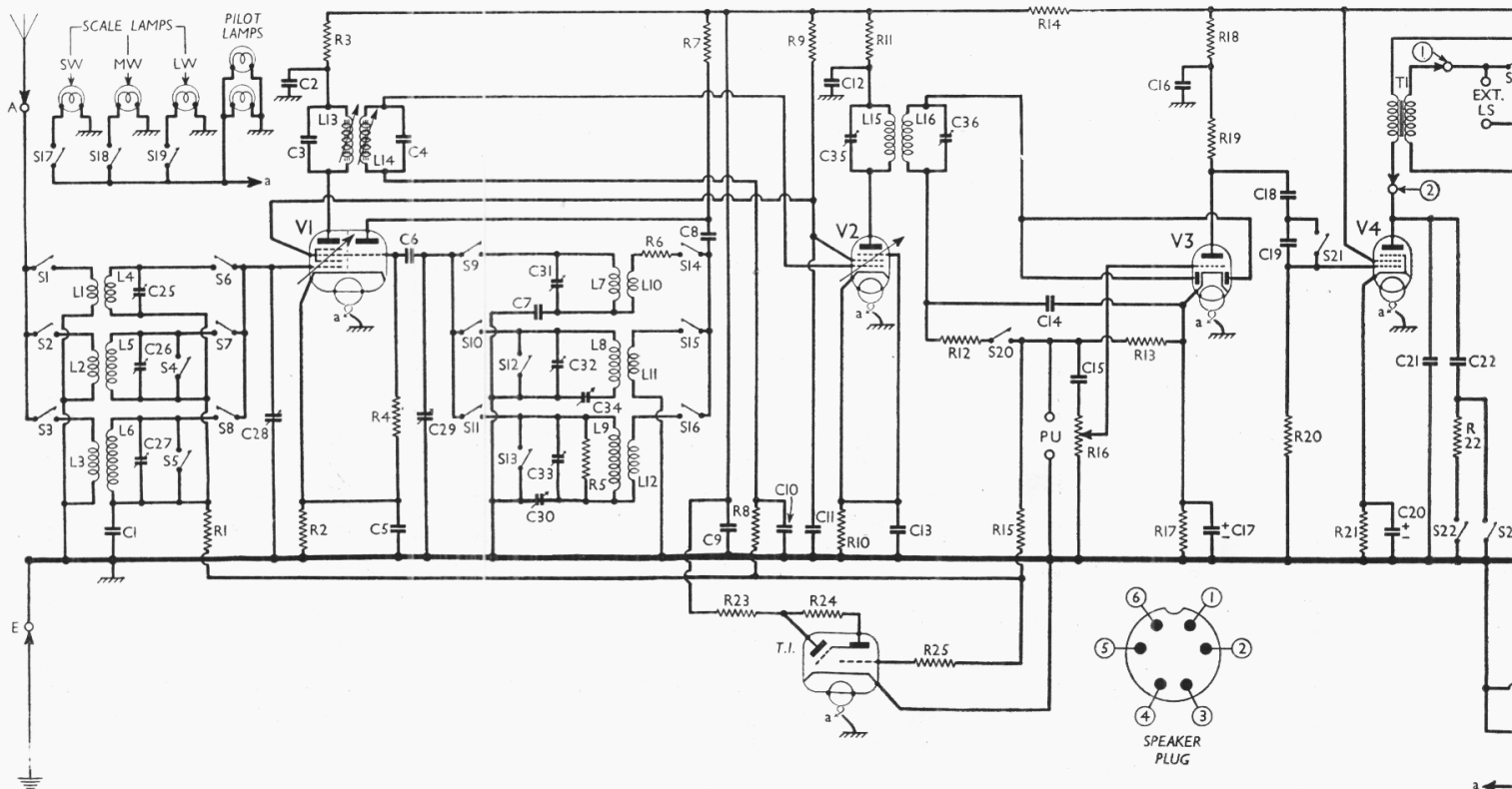
first transformer and the trimmers **C35**, **C36** in the case of the second.

Intermediate frequency 451 KC/S.

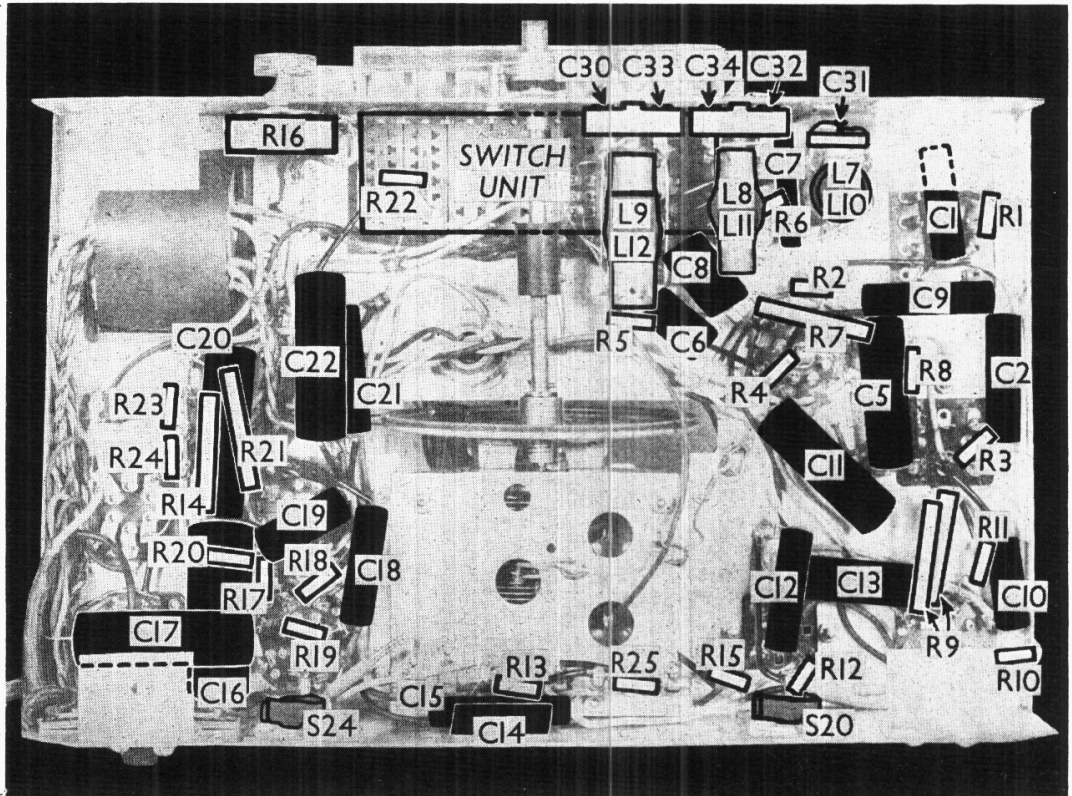
Diode second detector is part of double diode triode valve (**V3**, **Brimar 6Q7G**), with both diodes strapped to operate as single diode. Audio frequency component in rectified output is developed across load resistances **R12** and **R13**, that across **R13** being passed via AF coupling condenser **C15** and manual volume control **R16** to CG of triode section, which operates as AF amplifier. IF filtering by **C14**. Provision for connection of gramophone pick-up by jack-switch across **C15**, **R16**. The switch **S20**, which forms the junction between **R12** and **R13** on radio, and is part of the gramophone jack-switch, opens when the pick-up plug is inserted and turned a few degrees anti-clockwise, to mute radio.

DC potential developed across **R13** is fed back via **R15** and further decoupling circuits as GB to FC and IF valves, giving automatic volume control. AVC line potential is also employed to operate the cathode-ray tuning indicator (**T.I.**, **Tungsram 6U5**).

Resistance-capacity coupling by **R19**, **C18**, **S21** and **R20** between **V3** triode and pentode output valve (**V4**, **Brimar**



Under-chassis view. The key switch unit, as seen in this view, is shown in detail at the bottom of the diagram in col. 6 overleaf. S20 and S24 are radio and internal speaker muting switches, operated by the pick-up and external speaker plugs respectively.



6F6G). Fixed tone correction by C21 anode circuit.

Tone control is effected by switches operated by four keys similar to those used for waveband switching. Numbering from left to right as seen looking at the

front of the cabinet, the first key, when pressed, closes S23; the second closes S22, the fourth opens S21 so that C19 is in series with C18. When the third key is pressed, any of the other three which is depressed is released.

Provision for connection of low impedance external speaker by a jack-switch, similar to that used for pick-up connection, across the speech coil L17. When the external speaker plug is inserted and turned anti-clockwise, S24 opens to mute the internal speaker.

HT current is supplied by IHC full-wave rectifying valve (V5, Brimar 5Z4G). Smoothing by speaker field L19 and electrolytic condensers C23, C24. The mains switch S25 is operated by the eighth key on the extreme right.

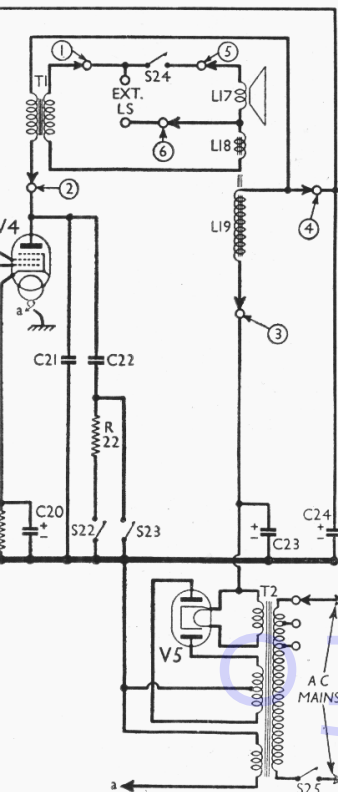
COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	V1 hexode CG decoupling	100,000
R2	V1 fixed GB resistance	250
R3	V1 hexode anode HT feed	1,000
R4	V1 osc. CG resistance	100,000
R5	Osc. circuit LW damping	33,000
R6	Osc. SW reaction damping	60
R7	V1 osc. anode HT feed	30,000
R8	V2 CG decoupling	100,000
R9	V1, V2 SG's HT feed	20,000*
R10	V2 fixed GB resistance	390
R11	V2 anode HT feed	1,000
R12	V3 signal diode load resistances	470,000
R13	V1, V2 and T.I. HT feed	1,000
R14	AVC line decoupling	1,000,000
R15	Manual volume control	1,000,000
R17	V3 GB resistance	4,000
R18	V3 triode anode decoupling	100,000
R19	V3 triode anode load	250,000
R20	V4 CG resistance	470,000
R21	V4 GB resistance	440
R22	Part of tone control	10,000
R23	T.I. anode HT feed resistances	22,000
R24	T.I. CG decoupling	1,000,000
R25	T.I. CG decoupling	1,000,000

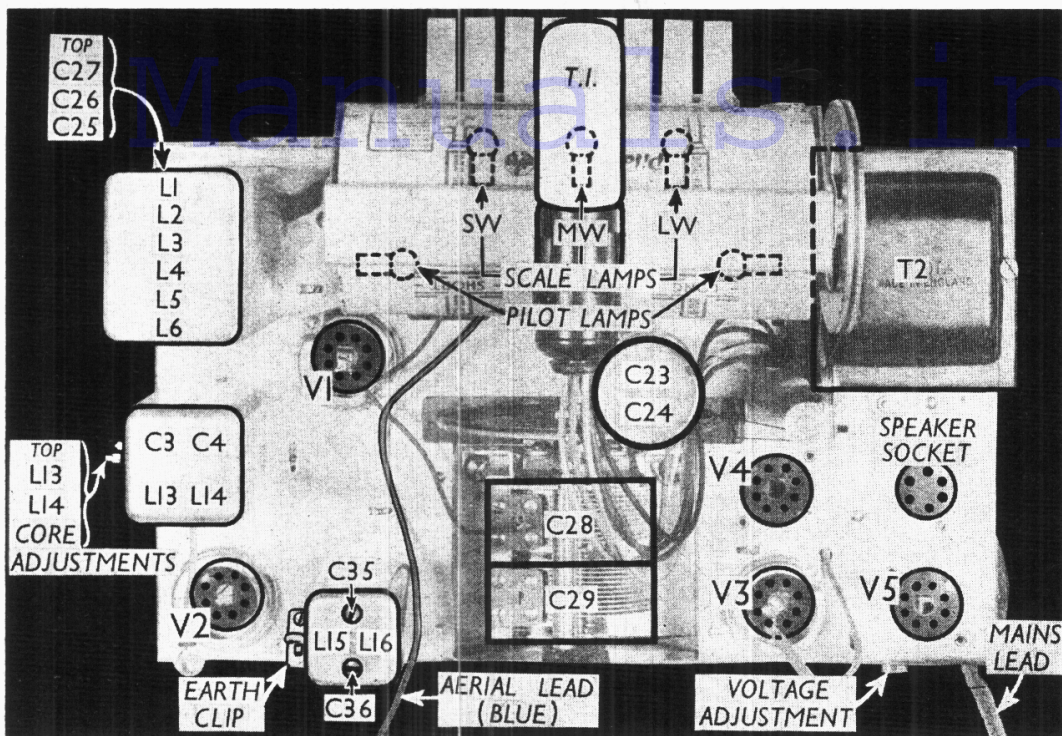
* Two 40,000 Ohm in parallel.

CONDENSERS		Values (μF)
C1	V1 hexode CG decoupling	0.01
C2	V1 hexode anode decoupling	0.01
C3	1st IF transformer fixed tuning condensers	0.000111
C4	V1 cathode by-pass	0.1
C5	V1 osc. CG condenser	0.0001
C6	V1 osc. CG condenser	0.0001
C7	Osc. circuit SW tracker	0.00325
C8	V1 osc. anode coupling	0.002
C9	HT circuit RF by-pass	0.01
C10	V2 CG decoupling	0.01
C11	V1, V2 SG's decoupling	0.1
C12	V2 anode decoupling	0.01
C13	V2 cathode by-pass	0.1
C14	IF by-pass	0.00025
C15	AF coupling to V3 triode	0.01
C16	V3 triode anode decoupling	0.1
C17*	V3 cathode by-pass	10.0
C18	V3 triode to V4 AF coupling	0.01
C19	condensers	0.001
C20*	V4 cathode by-pass	10.0
C21	Fixed tone corrector	0.003
C22	Part of tone control	0.03
C23*	HT smoothing condensers	8.0
C24*	HT smoothing condensers	16.0
C25‡	Aerial circuit SW trimmer	0.00003
C26‡	Aerial circuit MW trimmer	0.00003
C27‡	Aerial circuit LW trimmer	0.00003
C28†	Aerial circuit tuning	0.000456
C29†	Oscillator circuit tuning	0.000456
C30‡	Osc. circuit LW tracker	0.00016
C31‡	Osc. circuit SW trimmer	0.00003
C32‡	Osc. circuit MW trimmer	0.000025
C33‡	Osc. circuit LW trimmer	0.00008
C34‡	Osc. circuit MW tracker	0.00045
C35‡	2nd IF trans. pri. tuning	—
C36‡	2nd IF trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Pilot T63. Connections of the speaker plug (inset below) are shown in the circuit by arrows and numbers in circles. All the switches, except S20 and S24 are operated by "piano" keys. The first IF transformer has adjustable iron cores, while the second has normal trimmers.



Plan view of the chassis. The key switch unit, as seen from the front of the top of the chassis, is shown in detail in the upper of the two diagrams in col. 6. Note that the trimmers C25-C27 are reached through holes in the front of the L1-L6 unit.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial SW coupling coil ..	1·2
L2	Aerial MW coupling coil ..	19·0
L3	Aerial LW coupling coil ..	120·0
L4	Aerial SW tuning coil ..	0·05
L5	Aerial MW tuning coil ..	2·8
L6	Aerial LW tuning coil ..	17·0
L7	Osc. circuit SW tuning coil ..	0·05
L8	Osc. circuit MW tuning coil ..	5·6
L9	Osc. circuit LW tuning coil ..	9·5
L10	Oscillator SW reaction ..	0·13
L11	Oscillator MW reaction ..	0·8
L12	Oscillator LW reaction ..	0·3
L13	1st IF trans. { Pri. ..	4·75
L14	{ Sec. ..	4·75
L15	2nd IF trans. { Pri. ..	11·0
L16	{ Sec. ..	11·0
L17	Speaker speech coil ..	2·0
L18	Hum neutralising coil ..	0·15
L19	Speaker field coil ..	1,400·0
T1	Speaker input trans. { Pri. ..	800·0
	{ Sec. ..	0·5
	{ total ..	25·0
T2	Mains trans. { Heater sec. ..	0·1
	{ Rect. heat. sec. ..	0·1
	{ HT sec., total ..	320·0
S1-16	Waveband switches ..	—
S17-19	Scale lamps switches ..	—
S20	Radio muting switch ..	—
S21-23	Tone control switches ..	—
S24	Speaker switch ..	—
S25	Mains switch ..	—

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, it is necessary first to remove the bakelite escutcheon surrounding the scale aperture (four round-head wood screws) as otherwise the keys foul the scale lamp shield. Then pull out the two concentric control knobs (with felt backing washer) and the four bolts (with washers and spring washers) holding the chassis to the bottom of the cabinet. The chassis may now be withdrawn from the cabinet upon removal of the speaker plug from the socket on the chassis deck.

Removing Speaker.—Slacken the four nuts holding the clamps to the rim of the speaker and remove the plug from the socket on the chassis deck, when the speaker may be withdrawn from the cabinet.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 230 V, using the 225 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 X65 ..	238 73 73	1·6 Oscillator 4·5	95	5·5
V2 6U7G ..	236	7·5	95	2·2
V3 6Q7G ..	73	0·4	—	—
V4 6F6G ..	241	36·0	270	6·4
V5 5Z4G ..	342†	—	—	—
T.1.6U5 ...	15 190	0·2 Target 2·0	—	—

† Each anode, AC.

GENERAL NOTES

Switches.—Most of the switches are of a type similar to those in press-button units, but their plungers are operated by keys. **S1-S16** are the waveband switches, and **S17-S19** the scale lamp switches, and these are all associated with the three waveband keys. Their

tags are indicated in the diagrams in column 6, and the switch positions when any one of the three waveband keys is operated are given in the table in column 5. A dash indicates open, and C, closed.

S21-S23 are tone control switches, in the same assembly, and are operated by the keys marked "bass," "mellow" and "speech." The key marked "treble" has no switch associated with it, but on being depressed it releases any of the other tone control keys which may be depressed. **S21** opens when the "speech" key is depressed; **S22** closes when the "mellow" key is depressed; and **S23** closes when the "bass" key is depressed.

S20 is the radio muting switch, of the rotary type, associated with the pick-up sockets at the rear of the chassis. **S20** is normally closed, but when the 2-pin pick-up plug is inserted and rotated anti-clockwise, it opens **S20** and so mutes radio by breaking the input to the signal diode of **V3**. When the pick-up plug is rotated clockwise, however, **S20** closes for radio operation.

S24 is a similar switch associated with the external speaker sockets, also at the rear of the chassis. When an external speaker is plugged in, and the 2-pin plug is rotated anti-clockwise, **S24** opens and mutes the internal speaker by disconnecting its speech coil circuit. In the clockwise position, however, **S24** is closed, and both speakers are in operation.

S25 is the QMB mains switch, mounted at the back of the key switch assembly.

It is open when the "off" key is pressed, and closes when this key is released by pressing any of the waveband keys.

Coils.—L1-L6, and the IF transformers L13, L14 and L15, L16, are in three screened units on the chassis deck. Note that the trimmers C25-C27 are reached through three holes in the front of the L1-L6 can. The core adjustments of the first IF transformer are at the side of its can, and are indicated in the plan chassis view.

L7, L10; L8, L11 and L9, L12 are in three unscreened tubular units beneath the chassis.

Scale and Pilot Lamps.—There are three scale lamps, switched by S17-S19, and two pilot lamps which light whenever the set is "on." They are all Ever Ready miniature bayonet cap types, rated at 7.3 V, 0.25 A.

External Speaker.—Provision is made at the rear of the chassis for a low impedance (4 O) external speaker. A special 2-pin plug is supplied, which, on partial rotation, operates S24 and mutes the internal speaker if desired. See also "Switches."

Condensers C23, C24.—These are two 475PV electrolytics in a single tubular metal case, mounted on the chassis deck. The case is isolated, and the black lead is the common negative. The red lead is the positive of C24 (16μF) and the green lead the positive of C23 (8μF).

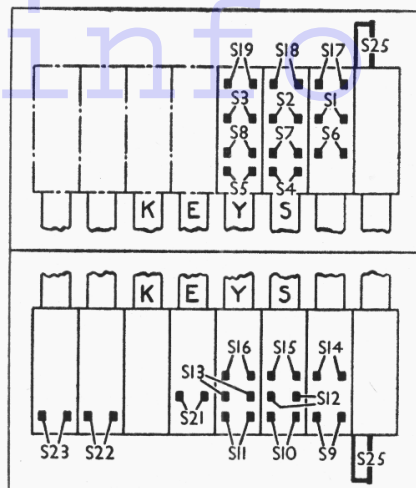
NOTE.—In the makers' diagram, the 8 and 16μF condensers are reversed.

Speaker Plug and Socket.—The speaker is connected to the receiver by means of a 6-pin plug and socket, a diagram of the plug, looking at the free ends of its pins, being given beneath the circuit diagram. The plug and socket connections, numbered to agree with this diagram, are indicated by circles and arrows in the circuit.

The colour coding of the connections to the pins of the plug is as follows: 1, yellow; 2, green; 3, black; 4, two red; 5, white; 6, blue.

TABLE AND DIAGRAMS OF THE SWITCH UNIT

Switch	SW	MW	LW
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	C	C	—
S5	C	—	—
S6	C	—	—
S7	—	C	—
S8	—	—	C
S9	C	—	—
S10	—	C	—
S11	—	—	C
S12	C	C	—
S13	C	—	—
S14	C	—	—
S15	—	C	—
S16	—	—	C
S17	C	—	—
S18	—	C	—
S19	—	—	C



Diagrams of the key switch unit. Above, as seen from the front of the top of the chassis; below, as seen from the rear of the underside of the chassis.

Pre-Set Condensers.—Apart from the trimmers associated with the L1-L6 unit, and the second IF transformer, which are above the chassis deck, there are five pre-set condensers beneath the chassis, which are adjustable through holes in the front member of the chassis.

Resistance R9.—This consists of two 40,000 O resistors in parallel in our chassis.

Resistance R8.—This was 1,000 O in our chassis, which is presumably a mistake. The value should be 100,000 O.

CIRCUIT ALIGNMENT

IF Stages.—Switch set to MW, and turn gang condenser to maximum. Connect signal generator via a 0.1 μF condenser to control grid (top cap) of V2, and chassis.

Feed in a 451 KC/S signal, and adjust C35, then C36, for maximum output. Transfer signal generator to control grid (top cap) of V1, and adjust the core of L13, then L14, for maximum output. Re-check all settings with the signal generator connected to V1.

RF and Oscillator Stages.—With gang condenser at maximum, pointer should cover the horizontal lines at the high wavelength ends of the three scales. Connect signal generator to A lead and E clip via a 0.002 μF condenser.

MW.—Press MW key, and tune to 200 m on scale. Feed in a 200 m (1,500 KC/S) signal, and adjust C32, then C26, for maximum output. Feed in a 500 m (600 KC/S) signal, tune it in, and adjust C34 for maximum output, while rocking the gang for optimum results. Repeat the 200 m adjustments.

LW.—Press LW key, and tune to 1,100 m on scale. Feed in a 1,100 m (272.5 KC/S) signal, and adjust C33, then C27, for maximum output. Feed in a 1,900 m (158 KC/S) signal, tune it in, and adjust C30 for maximum output, while rocking the gang for optimum results. Repeat the 1,100 m adjustments.

SW.—Switch set to SW, and tune to 18 MC/S mark on scale. Feed in an 18 MC/S (16.67 m) signal, and adjust C31, then C25, for maximum output. Repeat these adjustments very accurately. There is no variable SW tracker to be adjusted.

S A T O R

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