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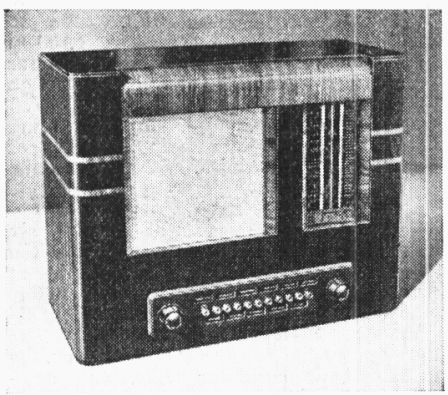
Supplement to The Wireless & Electrical Trader, June 8, 1940

"TRADER" SERVICE SHEET

470

PYE PP/B

BATTERY TRANSPORTABLE



THE Pye PP/B receiver is a 4-valve 2-band battery transportable superhet, with self-contained frame aerial. Eleven press-buttons are provided, six for pre-set stations, two for wavechanging, two for tone control and one for "off" switching.

There is provision for use of an external speaker, and for an external aerial and earth, if required.

Release date: April, 1939.

CIRCUIT DESCRIPTION

Our usual system has been used for numbering the switches associated with press-button unit, so that the switches are numbered in groups and lettered to indicate their action. A switch bearing the suffix **a** or **b** *closes* when its button is pressed, while one bearing an **x**, **y** or **z** opens. When the button is released, the position is reversed. Each button controls two groups of switches, one in the aerial circuit, and one in the oscillator circuit.

Aerial input on MW is from frame aerial winding **L2** which is tuned manually by **C28.** On LW, **L2** operates as the frame, but a loading coil **L1** is connected in series with it and the whole is tuned manually by **C28.**

For automatic operation, **L2** is tuned by pre-set condensers **C30, C31, C32** or **C33** (MW), or **L1, L2** are tuned by **C34** or **C35** (LW).

When any MW button is pressed, **L1** is short-circuited by one of the **a** switches. When the LW manual button is pressed, **S2b** connects a pre-set LW trimmer **C29** in circuit.

First valve **(V1, Mullard metallised FC2A)** is an octode operating as frequency changer with electron coupling. For manual operation, oscillator anode coils **L4** (MW) and **L5** (LW) are tuned by **C38;** parallel trimming by **C9, C39** (MW) and **C8** (LW); series tracking by **C6, C37, C7** (MW) and **C36, C6, C37, C7** (LW). Reaction coupling is developed across **C6, C37** and **C7** on both bands, but is augmented on MW by the reaction coil **L3.**

For automatic operation, one of the coils **L6** to **L11** is connected in the oscillator anode circuit via **S9x** and **S10x,** and tuned by **C11.** Their common busbar is returned to chassis via the reaction coupling condenser **C7,** which is in the oscillator grid circuit.

Second valve **(V2, Mullard metallised VP2B)** is a variable-mu RF hexode operating as pentode intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C3, L12, L13, C4** and **C14, L14, L15, C15.** The tuning condensers are fixed, and tuning is carried out by adjusting the positions of the iron coil-cores.

Intermediate frequency 467 KC/S.

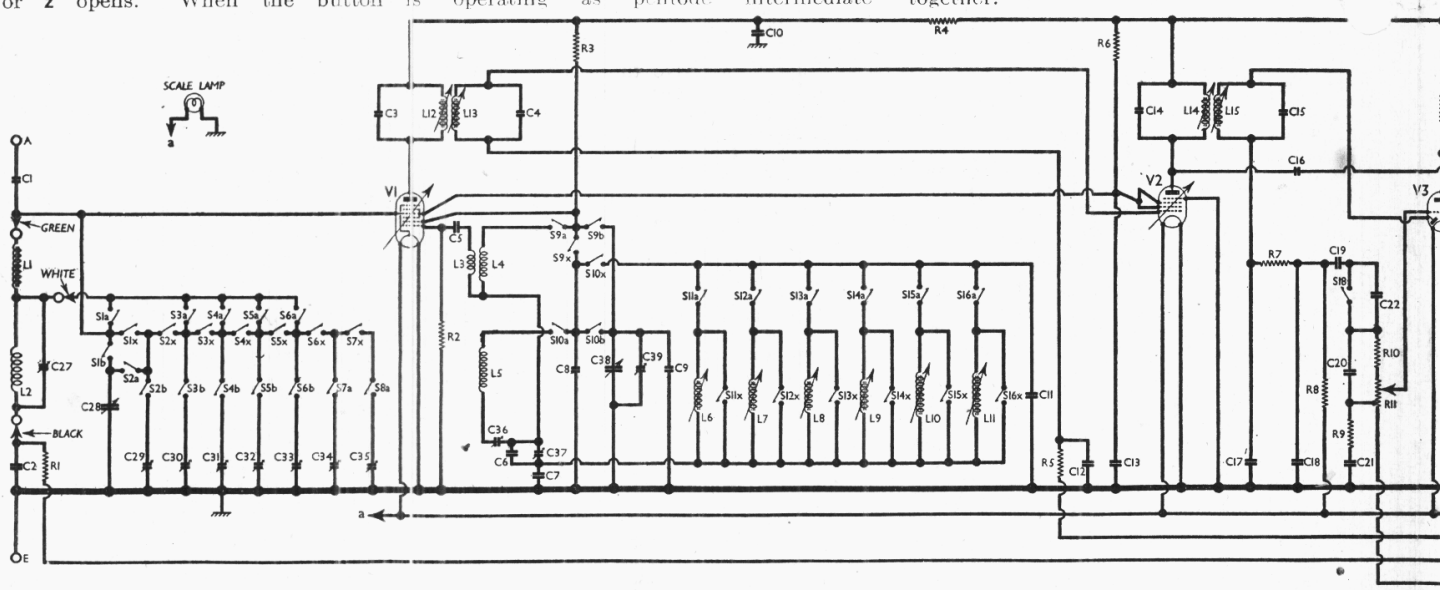
Diode second detector is part of double diode triode valve **(V3, Mullard metallised TDD2A).** Audio frequency component in rectified output is developed across load resistance **R8** and passed via AF coupling condenser **C19,** switch **S18,** output limiting resistance **R10** and manual volume control **R11** to CG of triode section, which operates as AF amplifier.

IF filtering by **C17, R7** and **C18.** Tone compensation by **C20, R9** and **C21** according to position of **R11** slider. Bass attenuation by **C22** when **S18** is open.

Second diode of **V3,** fed from **V2** anode via **C16,** provides DC potentials which are developed across load resistances **R13** and **R14** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control.

Parallel-fed transformer coupling by **R12, C23** and **T1** between **V3** triode and quiescent push-pull output valve **(V4, Mullard QP22B).**

Fixed tone correction by **C25, R16** between anodes. High-note attenuation by **C24** when **S19** is closed. Provision for connection of low impedance external speaker in internal speaker sockets if the internal speaker is not required; or with the internal speaker by means of socketed plugs fitted to the latter if both speakers are required to operate together.



Circuit diagram of the Pye PP/B receiver. Note that **L2** is the MW frame winding and **L1** is the LW loading coil, which is connected i switches, except **S18** and **S19,** are in a single press-button unit.

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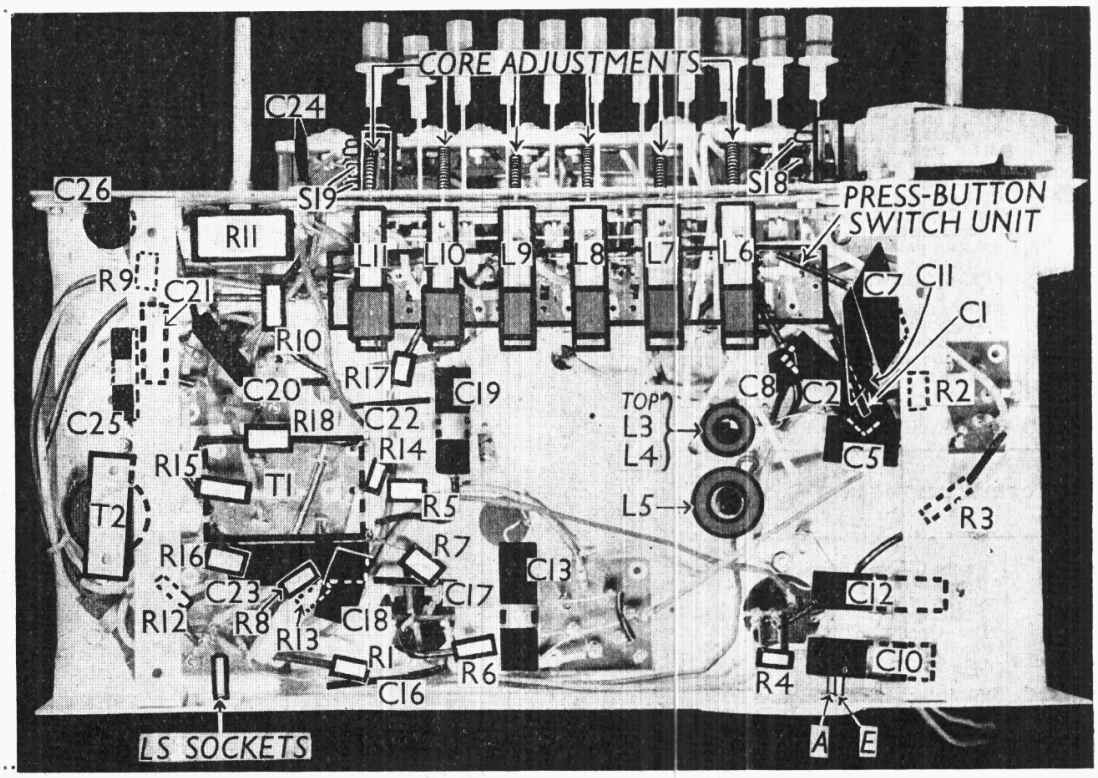
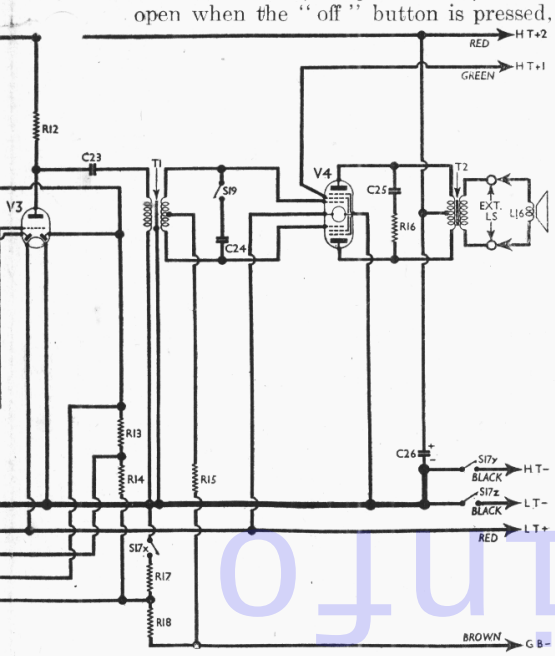


Under-chassis view. The press-button unit is indicated here, and shown in diagrammatic form overleaf. The six pre-tuned oscillator coils are indicated, with their core adjusting screws, in a row above the switch unit. Note the extra switches **SI8** and **SI9.**

Fixed GB potential for **V1** and **V2,** GB for **V3** triode, and AVC delay voltage are obtained from a potential divider comprising **R17, R18** which are connected across the GB section of the HT battery and discharge it at approximately the same rate as the HT section is discharged. GB for **V4** is taken directly from the negative GB tapping.

Switches **S17x, S17y** and **S17z,** which open when the "off" button is pressed, open all the battery circuits when the receiver is switched off.



ed in series with **L2** for LW operation. All the

DISMANTLING THE SET

The cabinet is fitted with a detachable bottom on which is mounted the turntable. If the detachable bottom is removed access may be gained to most of the components beneath the chassis.

Removing Chassis.—Remove the two rotary control knobs (pull-off);
remove the battery shelf (lift out); disconnect the three frame leads from the terminals on the frame struts, and remove the top-cap from **V1;** or alternatively remove the frame assembly complete (four round-head wood screws) with leads attached;
remove the long wood screw (with metal washer and rubber grommet) holding the top of the scale to the cabinet;
withdraw the speaker plugs from the sockets at the rear of the chassis;
free the battery leads from the cleat holding them to the accumulator shelf;
remove the four countersunk head screws (with ridged washers) holding the chassis to the cabinet.
When replacing, if the frame aerial leads have been disconnected, they should be reconnected as follows, viewing the frame assembly from inside the cabinet:
green lead to left-hand terminal screw;
white lead to upper tag of **C27** (on right);
black lead to lower tag of **C27** (on right);
green lead attached to frame aerial assembly and with top cap connector, to top cap of **V1.**

Removing Speaker. — Withdraw the speaker plugs from the sockets at the rear of the chassis;
remove the four cheese-head set screws (with washers) holding the speaker to the sub-baffle.
When replacing, the speech coil tags should point towards the bottom right-hand corner of the cabinet.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Ext. aerial series condenser	0·000005
C2	V1 pentode CG decoupling	0·1
C3	1st IF transformer fixed tuning condenser	0·00007
C4		0·00007
C5	V1 osc. CG condenser ...	0·0002
C6	Osc. circuit MW fixed tracker	0·0009
C7	Oscillator reaction coupling	0·001
C8	Osc. LW and auto trimmer	0·00003
C9	Osc. circ. MW fixed trimmer	0·00003
C10	V1 anode RF by-pass ...	0·1
C11	Osc. circuit auto tuning ...	0·00063
C12	V2 CG decoupling	0·1
C13	V1, V2 SG's decoupling ...	0·1
C14	2nd IF transformer fixed tuning condensers	0·00006
C15		0·00008
C16	Coupling to V3 AVC diode	0·00002
C17	IF by-pass condensers ...	0·0001
C18		0·0001
C19	AF coupling to V3 triode ...	0·05
C20	Parts of tone compensating circuit	0·0002
C21		0·01
C22	Bass attenuator	0·0005
C23	AF coupling to T1	0·1
C24	High-note attenuator ...	0·0001
C25	Part of fixed tone corrector	0·001
C26*	HT reservoir condenser ...	8·0
C27‡	Frame aerial MW trimmer	—
C28†	Frame aerial manual tuning	—
C29‡	Aerial LW trimmer... ...	—
C30‡	Aerial circuit MW tuning condensers	—
C31‡		—
C32‡		—
C33‡		—
C34‡	Aerial circuit LW tuning condensers	—
C35‡		—
C36‡	Osc. circuit LW tracker ...	—
C37‡	Osc. circuit MW tracker ...	—
C38†	Osc. circuit manual tuning	—
C39‡	Osc. circuit MW trimmer ...	—

* Electrolytic. † Variable. ‡ Pre-set.

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	RESISTANCES	Values (ohms)
R1	V1 pentode CG decoupling	1,100,000
R2	V1 osc. CG resistance ...	110,000
R3	V1 osc. anode HT feed ...	22,000
R4	V1 anodes HT feed	1,000
R5	V2 CG decoupling	1,100,000
R6	V1, V2 SG's HT feed ...	47,000
R7	IF stopper	110,000
R8	V3 signal diode load ...	470,000
R9	Part of tone compensator...	25,000
R10	Volume control limiter ...	500,000
R11	Manual volume control ...	1,000,000*
R12	V3 triode anode load ...	68,000
R13	V3 AVC diode load	470,000
R14	resistances	470,000
R15	V4 CG's decoupling... ...	50,000
R16	Part of fixed tone corrector	25,000
R17	V1, V2 fixed GB; V3 triode,	100
R18	V4 GB; AVC delay resistances	820

* Tapped at 400,000 Ω from lower end.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Frame LW loading coil ...	6·0
L2	Frame aerial winding ...	1·0
L3	Oscillator MW reaction coil	0·5
L4	Osc. circuit MW tuning coil	2·0
L5	Osc. circuit LW tuning coil	4·5
L6		0·5
L7	Oscillator circuit MW	0·5
L8	auto tuning coils	2·0
L9		2·0
L10	Oscillator circuit LW	4·3
L11	auto tuning coils	4·3
L12	1st IF trans. Pri.	10·5
L13	1st IF trans. Sec.	10·5
L14	2nd IF trans. Pri.	10·5
L15	2nd IF trans. Sec.	10·5
L16	Speaker speech coil ...	2·4
T1	Intervalve trans. Pri.	950·0
	Intervalve trans. Sec., total ...	8,400·0
T2	Output trans. Pri., total ...	950·0
	Output trans. Sec.	0·2
S1a, b, x	Aerial circuit waveband	—
S2a, b, x	switches	—
S3a, b, x	Aerial circuit auto selector	—
to S8a	switches	—
S9a, b, x	Oscillator circuit wave-	—
S10a, b, x	band switches	—
S11a, x to	Oscillator circuit auto	—
S16a, x	selector switches ...	—
S17x	GB circuit switch... ...	—
S17y	HT circuit switch... ...	—
S17z	LT circuit switch	—
S18	Bass control switch ...	—
S19	"Top" control switch ...	—

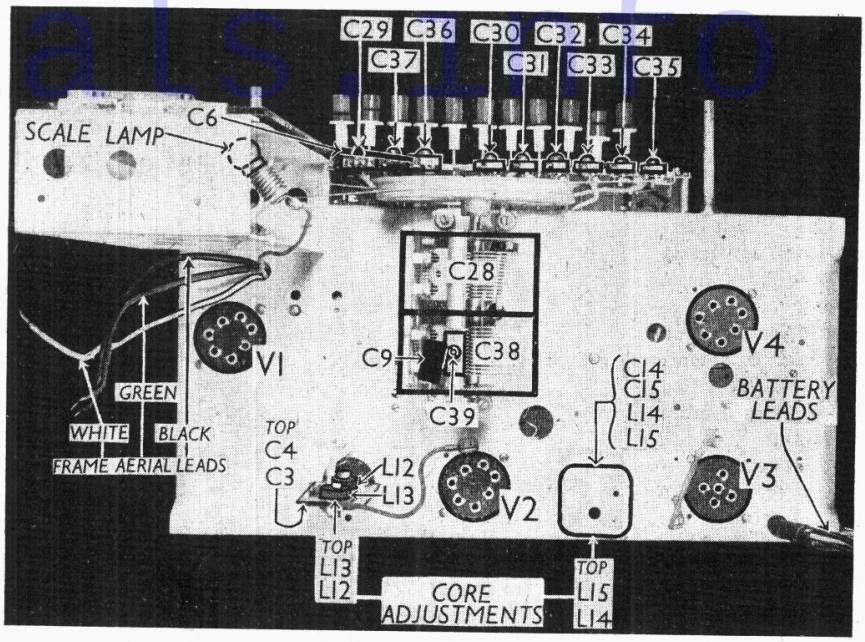
VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating with a new HT battery reading 142 V on load. The receiver was tuned to the lowest wave-length on the MW band and the volume control was at maximum, but there was no signal input, as **L2** was short-circuited.

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 FC2A	128	0·5	49	0·9
	Oscillator 77	1·7		
V2 VP2B	131	1·5	49	0·5
V3 TDD2A	68	0·8	—	—
V4 QP22B	130†	2·1	105	0·8

† Each anode.



Plan view of the chassis. Note the nine pre-set condensers in a row at the top, six of which are for the pre-set aerial circuits.

If as in our case **V2** should become unstable when its anode and screen currents are being measured, it can be stabilised by connecting a 0.1μF condenser from top cap to chassis.

GENERAL NOTES

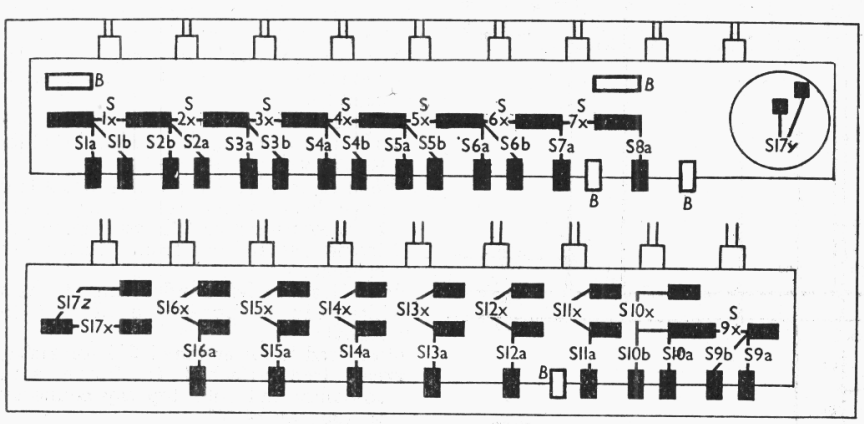
Switches.—S1a, b, x to **S16a, x** are the waveband and auto-tuning press-button switches, which, together with the battery switches **S17x, y, z,** are contained in a single two-sided press-button unit at the front of the underside of the chassis, having nine buttons. Two other buttons, one at each extremity of the unit, control **S18** and **S19,** the tone control switches. These two switches are indicated in the under-chassis view, while the main press-button unit is shown in complete detail in two diagrams below. The lower diagram shows the unit as seen from the underside of the chassis, and the upper one shows the reverse side.

The buttons, from left to right looking at the front of the cabinet, are: Less Top; Off; two LW stations; four MW stations; LW manual; MW manual; Less Bass.

The switch groups are numbered with suffixes, **a, b, x, y** or **z,** and when **a** button is pressed, all its **a** and **b** switches close, and its **x, y** and **z** switches open, and vice-versa. The same applies to the three battery circuit switches. See also the beginning of Circuit Description.

The tone control switches are not automatically released when another button is pressed, so that both may be in the "depressed" position if desired. To release, their buttons must be pressed towards the top of the cabinet.

Coils.—L1 is the iron-cored frame aerial LW loading coil, mounted on the paxolin cross supports for **L2,** the MW frame winding. The assembly also carries the trimmer **C27. L3, L4; L5**



Diagrams of the press-button unit. *Above,* the side facing the chassis deck; *below,* the side seen from beneath the chassis.

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and the six oscillator circuit auto tuning coils **L6-L11** are in eight unscreened tubular units beneath the chassis. **L6-L11** have iron cores adjustable by means of screws projecting through the front chassis member.

The first IF transformer **L12, L13,** is on the chassis deck, and is unscreened. The second, **L14, L15,** is in the usual screening can on the chassis deck. Each unit has its two fixed trimmers associated with it, and the core adjustments of the coils are indicated in our plan chassis view.

Scale Lamp.—This is an Ever Ready MES type, rated at 2·5V, 0·2A.

External Speaker.—A low impedance (2-4 O) external speaker can be plugged into the socketed plugs of the internal speaker, or can be used alone by first unplugging the internal speaker leads from the chassis.

Pre-Set Condensers.—All these, with the exception of **C27** (on the frame assembly) are indicated in our plan chassis view.

Batteries.—LT, Pye type LT3 2V40AH celluloid cased accumulator cell. HT and GB, Pye type K2 136·5V dry battery, tapped at each 1·5V from negative end up to 12V, then at numerous intermediate voltages.

Battery Leads and Voltages.—Black lead, spade tag, LT negative; red lead, spade tag, LT positive 2V; black lead and plug, HT negative, in 9V positive socket of battery; green lead and plug, HT +1, voltage according to grading letter on **V4** (A, 120V; B, 112·5V; C, 105V); red lead and plug, HT +2, 136·5V; brown lead and plug, GB−, in negative socket of battery.

Chassis Divergencies.—Certain resistors have slightly different values from those quoted by the makers. **R2** and **R7** may be 100,000 O each; **R9** and **R16** may be 27,000 O each; **R15** may be 47,000 O. The resistance of **L1** is given as 13·8 O by the makers; it was 6·0 O in our receiver.

Early models may be fitted with certain Hivac valves, as follows: **V2,** Hivac VP2B; **V3,** Hivac DDT215D; **V4,** Hivac QP240.

CIRCUIT ALIGNMENT

In all cases, the signal from the generator is fed into the set by coupling to the frame aerials. A single turn of wire round the cabinet, or even some distance away, should provide adequate coupling.

IF Stages.—Press MW button, and tune to higher wavelength end of scale. Feed in a 467 KC/S signal, and adjust cores of **L12, L13, L14** and **L15** for maximum output. Repeat these adjustments carefully.

RF and Oscillator Stages.—With gang at maximum, pointer should be at the tops of the clear glass strips on which the scales are printed.

MW.—Press MW button, tune to 210m on scale, feed in a 210m (1,426 KC/S) signal, and adjust **C39,** then **C27** (on frame assembly) for maximum output. Feed in a 520m (576 KC/S) signal, tune it in, and adjust **C37** for maximum output while rocking the gang for optimum results. Repeat the MW adjustments.

LW.—Press LW button, tune to 1,800 m on scale, feed in an 1,800 m (166·7 KC/S) signal, and adjust **C36** for maximum output. Tune to 1,300 m on scale, feed in a 1,300 m (230 KC/S) signal, and adjust **C29** for maximum output, rocking the gang slightly if necessary. Repeat the LW adjustments.

AUTO-TUNING ADJUSTMENT

The wavelength ranges of the six auto-tuning buttons, starting with the third button from the left, looking at the front of the cabinet are: 1,150-2,000 m; 1,150-2,000 m; 245-540 m; 245-540 m; 200-400 m; 200-400 m. The ranges can be changed, if necessary, by fitting new oscillator coils, and associated aerial trimmers.

Station setting is achieved by depressing the appropriate button and adjusting the associated aerial trimmer **(C30-C35),** and the core of the corresponding oscillator coil **(L6-L11).**

THE FERRET FAULT FINDER

ALTHOUGH the idea of a signal tracer, with visual indication, for fault finding in a receiver is not new, instruments of this description have hitherto been rather elaborate in specification, and consequently relatively high in price.

The Ferret Fault Finder, made by the Franklin Electric Co., Ltd., is an instrument of this nature stripped of all non-essentials, and made to retail at 10 guineas.

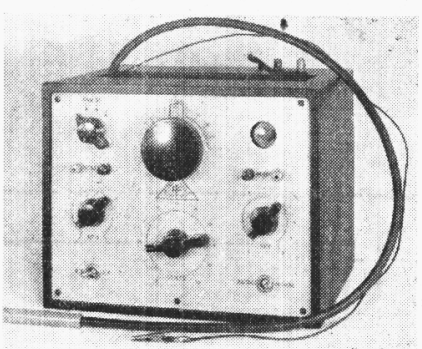
In essence the instrument is a DC valve voltmeter preceded (for RF tests) by a tuned RF amplifier covering from 140 to 3200m. (2142 to 94 KC/S) in four switched bands. In use the RF voltage in any part of a receiver can be introduced into the tester via a test prod, amplified, rectified, and indicated on the valve voltmeter, which is provided with a standard visual tuning indicator.

Visual or Audio Indication

The instrument, by suitable switching, will also indicate AF signals, while it can be switched to give an audio indication in headphones in place of the visual indication if desired.

The test-prod, when used for RF pick-up, has a small series condenser introduced in it, so that its effect on the circuit being examined is very small. For audio pick-up, this series condenser is cut out by screwing up the point of the prod.

In order to control the input to the amplifier valve, a variable attenuator is fitted, which prevents overloading the amplifier, and also serves to give an indication as to the degree of amplification taking place between two points. The attenuator is not calibrated, though its scale is divided.



For actual voltage measurements two sockets are provided for the input. There are two variable controls, marked "set" and "volts." The "volts" control is placed at zero, and the "set" control (with no input volts) is adjusted to the point where the tuning indicator is at a critical position, just about to open up to a wide beam. The voltage to be measured, which in this case must be DC, is applied to the input sockets, and the "volts" control is adjusted until the indicator is again in the critical position. The reading on the "volts" scale is then noted, and from a graph provided the actual voltage is read off. The "volts" scale is not directly calibrated, but is divided from 0 to 100. The range is from 0 to 85V, and reasonably accurate readings from about 1V upwards are obtainable.

The tuned amplifier is provided with four individually drawn calibration curves, and the accuracy, at several spot points tested, was within about 2 per cent.

With a little practice in correctly interpreting results, the instrument can be used for speedy signal tracing (and hence fault localising). For this purpose one usually does not need quantitatively accurate results, but merely an indication of whether RF (or AF) is present or not, whether amplification is occurring between two key points or not, and a rough indication of its degree. Since the instrument can be used without any unsoldering of the receiver wiring, and without affecting its circuits, information can be obtained with the utmost speed, and under working conditions (or fault conditions) of the receiver.

Shielded Test Prod

Although the test prod lead is shielded inside its rubber covering, the prod itself is inclined to pick up stray voltages (particularly when switched to AF, or when the attenuator is at its zero position), which give slight indication on the valve voltmeter. This, however, does not give trouble when its cause is understood.

The instrument is housed in a wooden cabinet finished in black leather cloth. It has an enamelled metal control panel, carrying all the controls and switches. The cursor of the tuner might with advantage be set closer to the scale to avoid parallax errors. A hot enamel smell, experienced when first using the instrument, which caused temporary uneasiness, proved to be due to the fact that the whole of the inside appears to be sprayed with black enamel.

Three valves (including rectifier) in addition to the tuning indicator are employed, and the instrument is, of course, AC operated.

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