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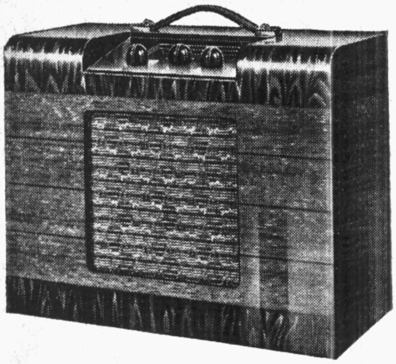
"TRADER" SERVICE SHEET

496

PYE QU
AC/DC PORTABLE



The Pye QU AC/DC superhet portable. The carrying case is in two-tone walnut.

THE Pye QU is a 3-valve (plus rectifier) 2-band superhet portable, designed to operate from 200-250 V AC or DC mains, the mains frequency range being 25-100 C/S in the case of AC mains.

A MW frame aerial only is employed, a loading coil being used for LW reception. The receiver is divided up into two chassis : the main receiver chassis and a separate power unit. The points of intersection between the two are shown in the circuit diagram. Provision is made for connection of an external aerial and an earth via **C1** and **C3**.

Certain divergencies occur between our chassis and an earlier edition, which used a different set of valves. This is referred to under "General Notes."

Release date: January, 1940.

CIRCUIT DESCRIPTION

Tuned frame aerial input on MW by frame winding **L2** and the tuning condenser **C27**. For LW operation, an iron-dust cored loading coil **L1** is inserted in the high potential end of the circuit. On MW,**L1** is short-circuited by the switch **S1**; when **S1** opens, **S2** closes and connects the LW aerial circuit trimmer **C25** across the circuit, in parallel with the MW trimmer **C26**. It should be noted that, to avoid a complicated diagram, the LW coil in our circuit diagram is *above* the MW coil; in the oscillator circuit, the MW coils are the upper ones as usual.

Provision for connection of external aerial, via the small series condenser **C1**, and an earth via the mains isolating condenser **C3**.

First valve **(V1, Mullard metallised CCH35)** is a triode heptode operating as frequency changer with internal coupling. Triode oscillator anode coils **L5** (MW) and **L6** (LW) are tuned by **C30**. Parallel trimming by **C29** (MW) and **C28** (LW) via **S4**, which closes on LW. Reaction coupling by grid coils **L3** (MW) and **L4** (LW). **L3** and **L4** are separate windings, but are wound continuously, and no switching is employed.

Second valve **(V2, Mullard EF39)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary iron-dust cored transformer couplings **C4, L7, L8, C5** and **C11, L9, L10, C12.**

The tuning condensers are fixed, and alignment is carried out by adjusting the positions of the threaded coil cores.

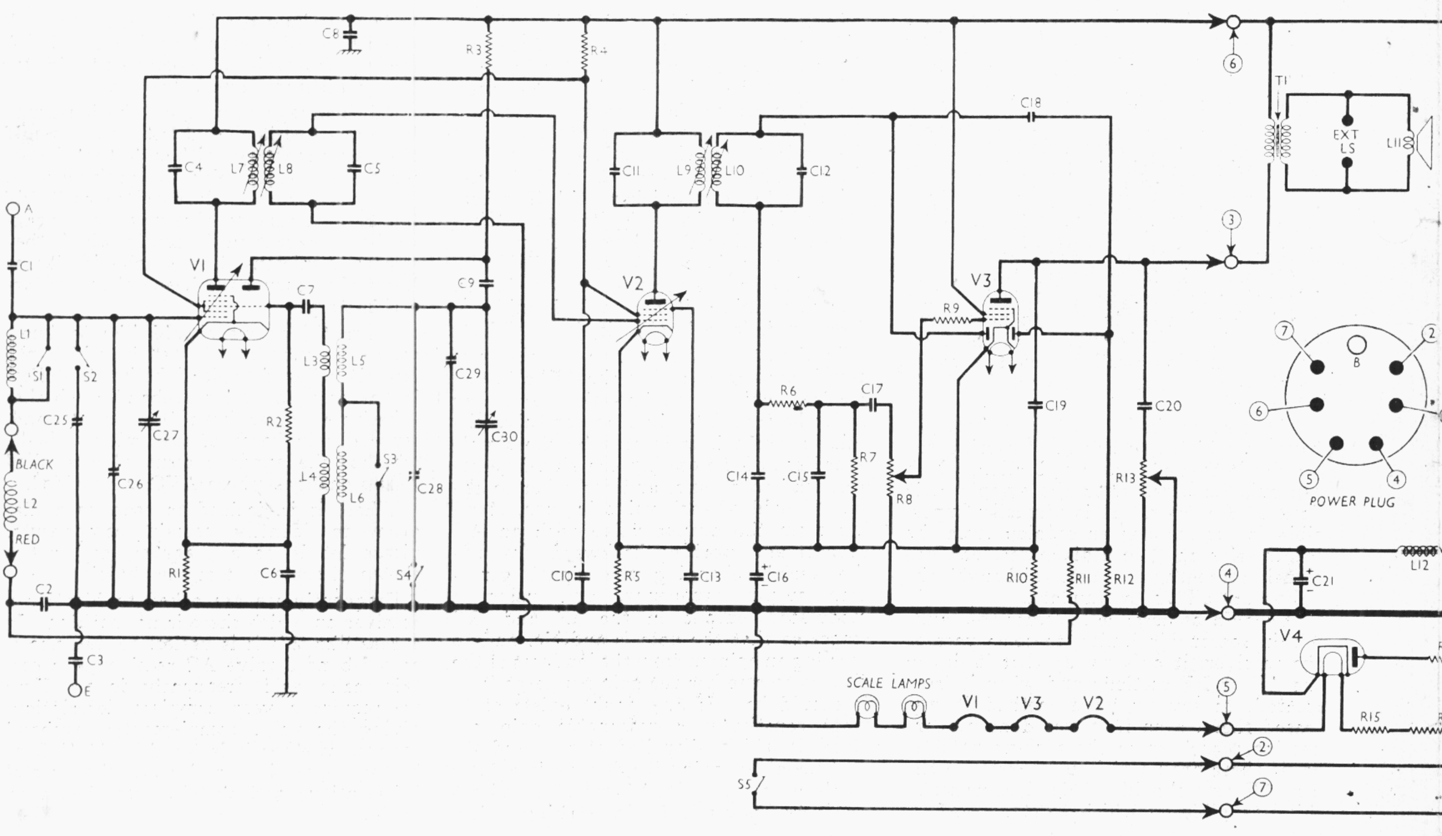
Intermediate frequency 467 KC/S.

Diode second detector is part of double diode output pentode valve **(V3, Mullard CBL31).** Audio frequency component in rectified output is developed across resistance **R7** and passed via AF coupling condenser **C17,** manual volume control **R8** and grid stopper **R9** to CG of pentode section. IF filtering by **C14, R6** and **C15.**

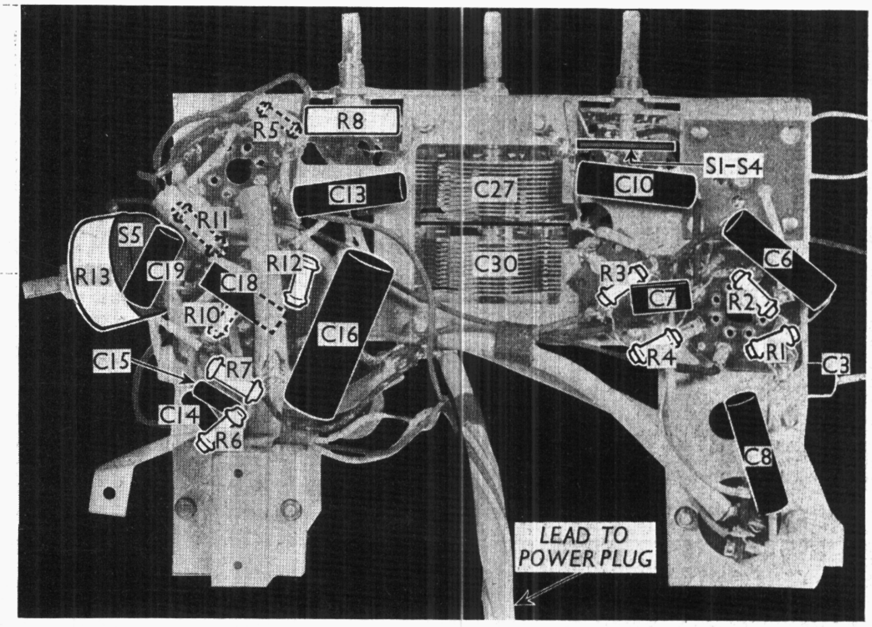
Fixed tone correction by **C19** in pentode anode circuit. Variable tone control by **C20, R13,** also in pentode anode circuit.

No sockets are provided for connection of an external speaker, but one could be connected by soldering its leads to the internal speaker speech coil connections on the panel on the power unit chassis deck.

Second diode of **V3**, fed from **L10** via **C18,** provides DC potential which is de-



Under-chassis view. The waveband switch unit **S1-S4** is indicated, and the arrow shows the direction in which it is viewed in the diagram, showing the unit in detail, in col. 2 overleaf. Several resistances are shown dotted, to indicate that they are covered with insulated sleeving.



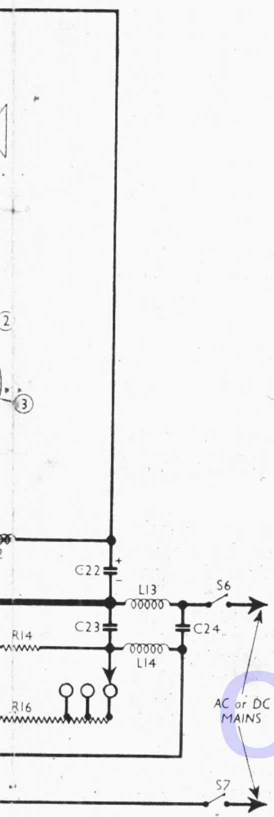
veloped across load resistance **R12** and fed back through a decoupling circuit to FC and IF valves, giving automatic volume control.

Delay voltage, together with GB for pentode section, is obtained from drop along resistance **R10** in cathode lead to chassis.

When the receiver is used with AC mains, HT current is supplied by IHC half-wave rectifying valve **(V4, Mullard CY31)** which, with DC mains, behaves as a low resistance. Smoothing is effected by an iron-cored choke **L12** and dry electrolytic condensers **C21** and **C22.**

The valve heaters, together with scale lamps and ballast resistances **R15** and **R16,** are connected in series across mains input, while a filter circuit comprising two RF chokes **L13, L14** and two condensers **C23, C24** suppresses mains-borne interference.

The two switches **S6, S7** form the electrical circuit of a mains safety device to which the mains lead is connected. The switches automatically open when a plunger, which is attached to the back of the receiver, is withdrawn, so that the mains are disconnected as soon as the back is removed. Fortunately, for service purposes, the plunger is of about the same diameter as an ordinary lead pencil, which can, therefore, be used to connect the mains when the chassis has been removed from the cabinet.



Circuit diagram of the Pye QU AC/DC superhet portable receiver. The IF transformers have adjustable iron-dust cores, whose positions are indicated in our plan view. The power unit (seen on the right of the diagram), forms a separate chassis, shown overleaf. Inset is a diagram of the connecting plug, which is attached to the chassis, showing the free ends of the pins. The numbers in circles in the circuit diagram correspond with those of the plug.

DISMANTLING THE SET

Removing Main Chassis.—Remove the three control knobs (recessed grub screws, covered by soft wax) from the front of the control panel, and a fourth from the tone control at the side of the cabinet;

disconnect the two frame aerial leads from the terminals on the frame aerial connecting panel at the top of the chassis, just below the scale backing plate;

unsolder the two leads from the **A** and **E** panel on the side of the cabinet;

remove the fixing nut from the tone control, and push the control inwards;

withdraw the connecting plug from the socket on the power unit;

remove the two round-head wood screws holding the chassis brackets to the sub-baffle, and two further wood screws holding the chassis to the top of the cabinet.

When replacing, use the two long wood screws to hold the chassis to the top of the cabinet, and the two short ones to hold the brackets to the sub-baffle.

Connect the green aerial lead to the bottom tag on the **A** and **E** panel, and the black lead from **C3** to the middle tag;

connect the black frame aerial lead to the left-hand terminal, and the red one to the right-hand terminal, on the frame aerial connecting panel on the chassis.

Do not forget finally to re-wax the heads of the grub screws in the control knobs.

Removing Power Unit.—Remove the countersunk-head wood screw holding the top of the electrolytic condenser block to the sub-baffle;

withdraw the connecting plug from the socket on the deck of the unit;

unsolder the speaker speech coil leads from the connecting panel near the power socket;

remove one round-head wood screw from each of the two square paxolin safety discs on the bottom of the cabinet and swivel the discs round, exposing the two cheese fixing screws (with flat metal washers) and remove the screws.

When replacing, note that a thick packing washer is fitted between the fixing bracket at the top of the electrolytic block and the sub-baffle.

Do not forget to replace the safety discs over the heads of the fixing screws.

Removing Speaker.—Before the speaker can be removed, the main chassis and the power unit must be removed, to give access to the four round-head fixing screws (with two brass washers each) holding the speaker to the sub-baffle.

When replacing, the speech coil leads should be at the bottom.

VALVE ANALYSIS

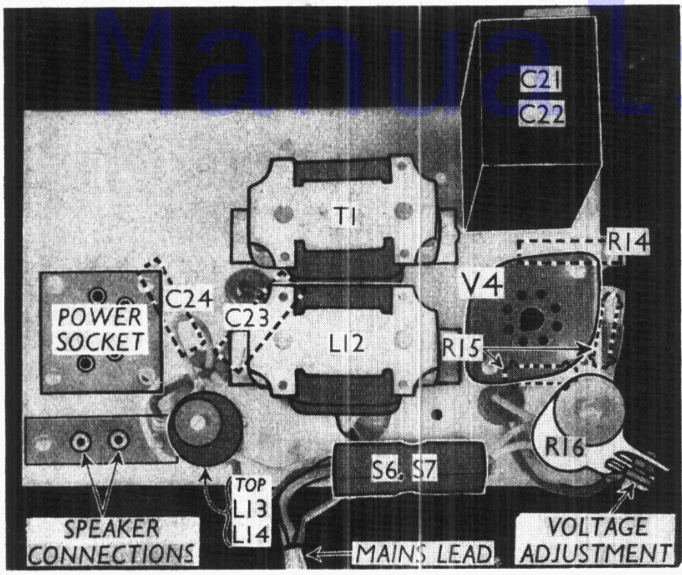
Valve voltages and currents given in the table below are those measured in our receiver when it was operating on AC mains of 235 V, using the 235 V tapping on the mains resistance.

The receiver was tuned to the lowest wavelength on the medium band, and the frame aerial terminals were short-circuited so that there should be no signal input. The volume control was at maximum.

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 CCH35	242 Oscillator 90	2·8 2·3	95	4·0
V2 EF39	242	7·0	95	2·2
V3 CBL31	230	37·5	242	6·0
V4 CY31	266†	—	—	—

† Cathode to chassis, DC.



Plan view of the power unit. The dotted outlines indicate the positions of several components fitted beneath the chassis. **S6, S7** form the electrical component of a mains cut-out safety device; the switches open when the back of the cabinet is removed. An external speaker may be connected to the speaker connections.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 fixed GB resistance ...	200
R2	V1 osc. CG resistance ...	50,000
R3	V1 osc. anode HT feed ...	50,000
R4	V1, V2 SG's HT feed ...	20,000
R5	V2 fixed GB resistance ...	200
R6	IF stopper	110,000
R7	V3 signal diode load ...	510,000
R8	Manual volume control ...	1,000,000
R9	V3 pentode grid stopper ...	50,000
R10	V3 GB; AVC delay ...	250
R11	AVC line decoupling ...	1,000,000
R12	V3 AVC diode load ...	1,000,000
R13	Variable tone control ...	20,000
R14	V4 anode surge limiter ...	100
R15	Heater circuit ballast resistances	50*
R16		780†

* Made up of two 100 O 1 watt resistances in parallel.
† Tapped at 580 O + 100 O + 100 O from R15 end.

	CONDENSERS	Values (μF)
C1	Ext. aerial series	0·000005
C2	AVC line decoupling ...	0·1
C3	Earth isolating condenser	0·05
C4	1st IF transformer tuning condensers	0·00008§
C5		0·00007
C6	V1 cathode by-pass ...	0·1
C7	V1 osc. CG condenser ...	0·00015
C8	HT circuit RF by-pass ...	0·1
C9	V1 osc. anode coupling ...	0·0001
C10	V1, V2 SG's decoupling ...	0·1
C11	2nd IF transformer tuning condensers	0·00009
C12		0·00009
C13	V2 cathode by-pass ...	0·1
C14	IF by-pass condensers ...	0·0001
C15		0·0001
C16*	V3 cathode by-pass ...	25·0
C17	AF coupling to V3 pentode	0·005
C18	Coupling to V3 AVC diode	0·00002
C19	Fixed tone corrector ...	0·003
C20	Part of variable tone control	0·025
C21*	HT smoothing condensers	24·0‖
C22*		16·0¶
C23	Mains RF filter condensers	0·1
C24		0·1
C25‡	Aerial LW trimmer ...	—
C26‡	Aerial MW trimmer ...	—
C27†	Aerial circuit tuning ...	—
C28‡	Osc. circuit LW trimmer ...	—
C29‡	Osc. circuit MW trimmer	—
C30†	Oscillator circuit tuning ...	—

* Electrolytic.
† Variable.
‡ Pre-set.
§ 0·00007 μF and 0·00001 μF in parallel.
‖ 16 μF and 8 μF in parallel.
¶ 12 μF and 4 μF in parallel.

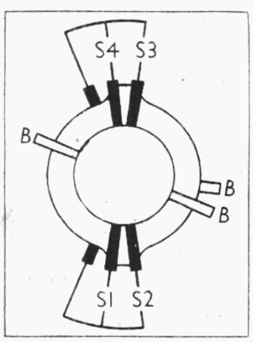
	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial LW loading coil ...	5·6
L2	Frame aerial winding (MW)	1·0
L3	Oscillator circuit reaction coils, total	
L4		3·4
L5	Osc. circ. MW tuning coil	2·5
L6	Osc. circ. LW tuning coil	0·5
L7	1st IF trans. Pri. ...	8·5
L8	1st IF trans. Sec. ...	8·5
L9	2nd IF trans. Pri. ...	8·5
L10	2nd IF trans. Sec. ...	8·5
L11	Speaker speech coil ...	2·4
L12	HT smoothing choke ...	400·0
L13	Mains RF filter chokes ...	1·8
L14		1·8
T1	Output trans. Pri. ...	345·0
	Output trans. Sec. ...	0·3
S1-S4	Waveband switches ...	—
S5	Mains switch, ganged R13	—
S6, S7	Mains safety switches ...	—

GENERAL NOTES

Switches.—S1-S4 are the waveband switches, ganged in a rotary unit mounted at the front of the chassis, and indicated in our under-chassis view. The diagram below shows the individual switches, and is drawn as seen looking from the rear of the underside of the chassis. On MW (knob anti-clockwise) **S1** and **S3** are closed; on LW (knob clockwise), **S2** and **S4** are closed.

S5 is the QMB mains switch, ganged with the tone control **R13.** These are normally mounted on a paxolin panel at the left-hand side of the cabinet, but are shown at the left of our under-chassis view.

Diagram of the switch unit, viewed from the rear of the underside of the chassis.



S6, S7 are two mains safety switches, mounted at the rear of the power unit. Normally they are closed by an ebonite plug attached to the back of the cabinet. When the back is removed, thus withdrawing the plug, **S6** and **S7** open, and completely disconnect the mains supply.

Coils.—L1 is the iron-cored aerial LW loading coil, mounted at the top of a vertical tubular former on the chassis deck. **L2** is the MW frame aerial winding, mounted inside the cabinet at the left, looking from the back. On LW, **L2** still acts as the frame aerial, but it is loaded by **L1.** The connections of **L2** are indicated in our plan view of the main chassis.

L3-L6 are the oscillator coils, on a single small tubular former on the chassis deck, beneath the bank of trimmer condensers. The position of the unit is indicated in our plan view of the main chassis.

L7, L8 and **L9, L10** are the IF transformers, in two screened units on the chassis deck. These units contain their fixed trimmer condensers, and the positions of the iron-core adjustments are indicated in our plan chassis view.

L12 is the iron-cored smoothing choke, and **L13, L14** the mains filter chokes, mounted on the power unit.

Scale Lamps.—These are two Mazda MES types, rated at 6.2 V, 0.3 A.

External Speaker.—A low impedance (2-4 O) external speaker can be connected across the speaker connections on the chassis of the power unit. In models where the internal speaker is fitted with socketed plugs, the external speaker can be plugged into these.

Valves.—The valves used in our model were Mullard E types with octal bases. Early models may use the corresponding side-contact types of valves, except **V4,** which has a 7-pin base. This will not affect the circuit or valve voltages and currents, except that **V4** in early models has two anodes, with separate 100 O resistors for each, and two cathodes, connected together.

Power Unit Connections.—The main chassis is connected to the power unit by a 6-pin plug and socket. A view of the plug, looking at the free ends of the pins, is inset in the circuit diagram, and the pins are numbered from 2 to 7 to agree with the numbered arrows and circles in the diagram. The colour-coding of the connections to the plugs is: 2, yellow; 3, black rubber (screened); 4, screening; 5, green; 6, red; 7, blue rubber.

Trimmers.—All four pre-set trimmers are mounted on a strip supported above the chassis deck. They are indicated in our plan chassis view.

Condensers C21, C22.—In our chassis, each of these consists of two dry electrolytics in parallel, in a cardboard carton containing four condensers in all. The black lead is the common negative; the red and green leads are the positives of **C21** (16 + 8 μF); and the yellow and blue leads are the positives of **C22** (12 + 4 μF). In early models **C21** may be a single 16 μF condenser, and **C22** a single 8 μF condenser.

Condenser C4.—In our chassis this consists of a 0.00007 and a 0.00001 μF condenser in parallel.

Condenser C1.—This is mounted inside the cabinet on the external **A** and **E** panel.

Resistance R15.—This consists of two 100 O resistors in parallel. It is not indicated in the makers' diagram.

Condenser C16.—This is a 25 μF electrolytic unit in our chassis, but is shown as 20 μF in the makers' information.

IF Fixed Trimmers.—According to the makers, the values of these are: **C4** and **C5,** 0.00007 μF each; **C11,** 0.00006 μF; **C12,** 0.00008 μF. The values in our chassis were: **C4,** 0.00008 μF (two in parallel); **C5,** 0.00007 μF; **C11, C12,** 0.00009 μF each.

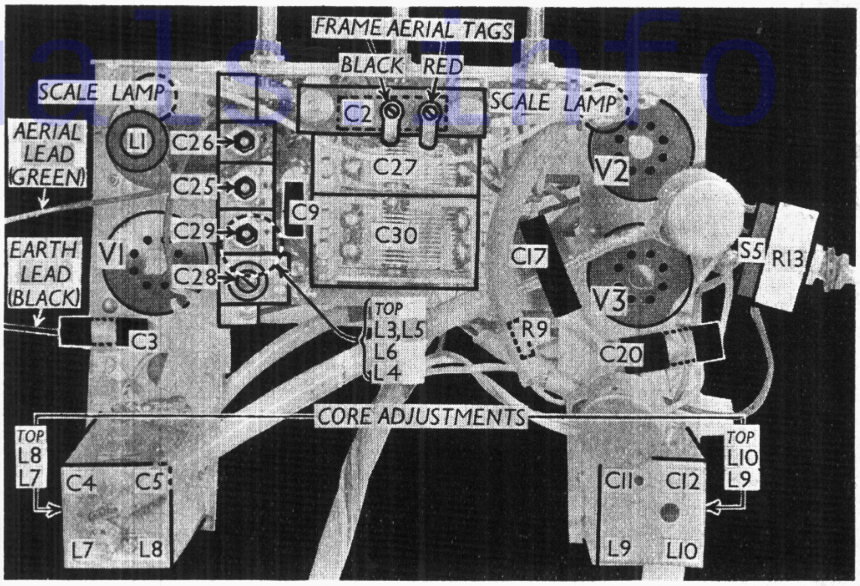
CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator leads via a 0.01 μF non-inductive condenser to control grid (top cap) of **V1** and AVC line, leaving existing top cap connector in place, and turn volume control to maximum. Feed in a 467 KC/S signal, and adjust the cores of **L10, L9, L8** and **L7** for maximum output. Re-check these settings.

RF and Oscillator Stages.—With the gang at maximum, the pointer should be horizontal. If it is not, it can be adjusted by pushing its clip, which is a sliding fit, round the control spindle. Connect signal generator to **A** and **E** sockets, keeping volume control at maximum.

MW.—Switch set to MW, tune to 210 m on scale, feed in a 210 m (1,430 KC/S) signal, and adjust **C29,** then **C26,** for maximum output. Check calibration at 520 m (577 KC/S), readjusting **C29** and **C26** if necessary.

LW.—Switch set to LW, tune to 1,300 m on scale, feed in a 1,300 m (230 KC/S) signal, and adjust **C28,** then **C25,** for maximum output. Check calibration at 1,800 m (166 KC/S), readjusting **C28** and **C25** if necessary.



Plan view of the chassis. All the trimmers are mounted on a metal strip above the oscillator coil unit **L3, L5, L6, L4,** which is indicated by a dotted outline through the trimmer assembly. The core adjustments of the IF transformers are indicated to left and right of the chassis.

THOSE TECHNICAL QUERIES

THE *Trader* laboratory staff are anxious to help dealers and their service engineers as far as is possible with their technical enquiries, especially in these difficult days, when so many men employed on service work generally have had only a limited amount of experience at the job, and it is to be regretted that it has become necessary to discontinue the telephone enquiry service for technical queries, but the publishing trade has its difficulties, too.

Although it takes longer to write a letter than to 'phone, a great deal of time can be saved both in corresponding and in searching at this end, if all the relative information available at the workbench is passed on in the letter to the laboratory.

The only method we of the laboratory have by which to work in answering the queries is that of logical deduction, which can only be based upon the symptomatic data of the fault. It is virtually impossible for us to form an opinion from the information that, in a given receiver, the signal strength is poor, although the valves are all up to standard.

It should be possible to locate the fault, within reasonable limits, to some part of the receiver, if only to say that it lies in the AF or RF section; and when it is so located, to say by what method it was traced there, even if it was done by connecting a pick-up to the pick-up sockets, or, if there are no pick-up sockets, to the first AF control grid. This gives us something tangible on which to start work.

Perhaps a few hints might be helpful. The first thing to do is to make sure that the trouble does not lie actually in a valve, that the valves are the correct ones, that they are in the correct sockets, and that those with top cap connectors have the correct top cap leads connected to them. The valves can be tested in a valve tester or, quicker still if others are available, by substitution. Then measure all the HT voltages and currents and compare them with any available information on the receiver or one like it. The next thing, if the fault is still not discovered, is to localise it, if possible.

In almost every case, if a signal generator is available—and it should be to any service engineer to-day—the fault can easily be traced to the stage or valve circuit in which it is located by the simple expedient of connecting one signal generator lead to chassis, and the other to the control grid of each valve in turn, starting from the output valve with an AF output, and working backwards towards the aerial, changing the signal generator output frequency, and using a modulated output in the IF and RF stages so that the note is audible, and so forming an opinion from the loudness of the note as to whether the gain per stage is as it should be. If any doubt exists as to what constitutes a reasonable gain per stage, it will be dispelled at once and for all time after trying it out experimentally on three or four mixed types of broadcast receivers known to be in working order. It is sometimes possible to trace the fault down to a component by this method, following the train of components in the circuit diagram from valve to valve.

At this stage of progress the fault may have revealed itself; no letter to us would then be necessary, although that is not what we have in mind in speaking thus. If a query is now addressed to us it will not be necessary to give us valve voltage readings, except in a case in which they appear suspicious, but we should like to know that they have been taken and are satisfactory.

Other things we should like to know are: The part of the set in which the fault is believed to lie; whether the effect is the same on all wavebands; whether substitute valves have been tried; and, especially in cases of intermittent fault, whether the anode current of controlled valves changes where AVC is provided.

Where it is decided to send us a diagram to identify certain components, please let it be a diagram, and *not* a sketch of some part of the chassis.

Frequently we are asked to identify a receiver on which there is no marking. In a case like this it is useless to describe it as a 3-band 5-valve AC receiver of a certain make, as is frequently done. Here we require a very complete description, giving the valve complement, waveband ranges, whether it is for AC, AC/DC or battery operation, and any other useful information; and sketches are then very useful.

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