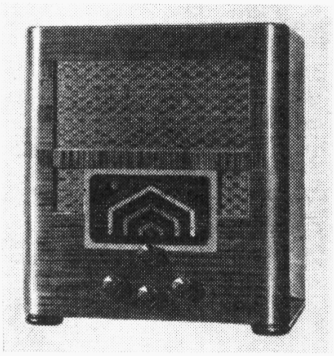
'TRADER' SERVICE SHEET

338

PYE QB3

BATTERY SUPERHET



A SHORT-WAVE range of 16-52 m is covered by the Pye QB3 4-valve battery 3-band superhet, a feature of which is the use of a double pentode QPP output valve. Provision is made for both a gramophone pick-up and an extension speaker, a plug and socket arrangement allowing the internal speaker to be cut out.

CIRCUIT DESCRIPTION

Aerial input via IF filter **L1**, **C24**, coupling coils **L3** (MW and LW) and **L2** (SW) to single tuned circuits comprising **L4** (SW), plus **L5** (MW), plus **L6** (LW), tuned by **C27**, which precede an octode valve (**V1, Mullard metallised FC2A** or **Ever Ready K80B**) operating as frequency changer with electron coupling. Oscillator grid coils **L7** (SW), **L8** (MW) and **L9** (LW) are tuned by **C28**; parallel trimming by **C29** (MW) and **C8** (LW); series tracking by **C6** (SW), **C7**, **C30** (MW) and **C31** (LW). Reaction by coils **L10** (SW) and **L11, L12** (MW and LW).

Second valve (**V2, Mullard metallised VP2** or **Ever Ready K50M**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary iron-cored transformer couplings **C32, L13, L14, C33** and **C34, L15, L16, L17, C35, C13.**

Intermediate frequency 465KC/S.

Diode second detector is part of double diode triode valve (**V3, Mullard metallised TDD2A** or **Ever Ready K23B**). Audio frequency component in rectified output is developed across load resistance **R9** and passed via AF coupling condenser **C15** and manual volume control **R10** to CG of triode section, which operates as AF amplifier. Provision for connection of gramophone pick-up across **C15, R10.** IF filtering by **C14, C18.**

Part of IF component in triode anode circuit is fed back via coupling coil **L16** to **L17** to introduce reaction which is controlled by pre-set condenser **C36.** Its effect is negligible except when **R10** is at maximum.

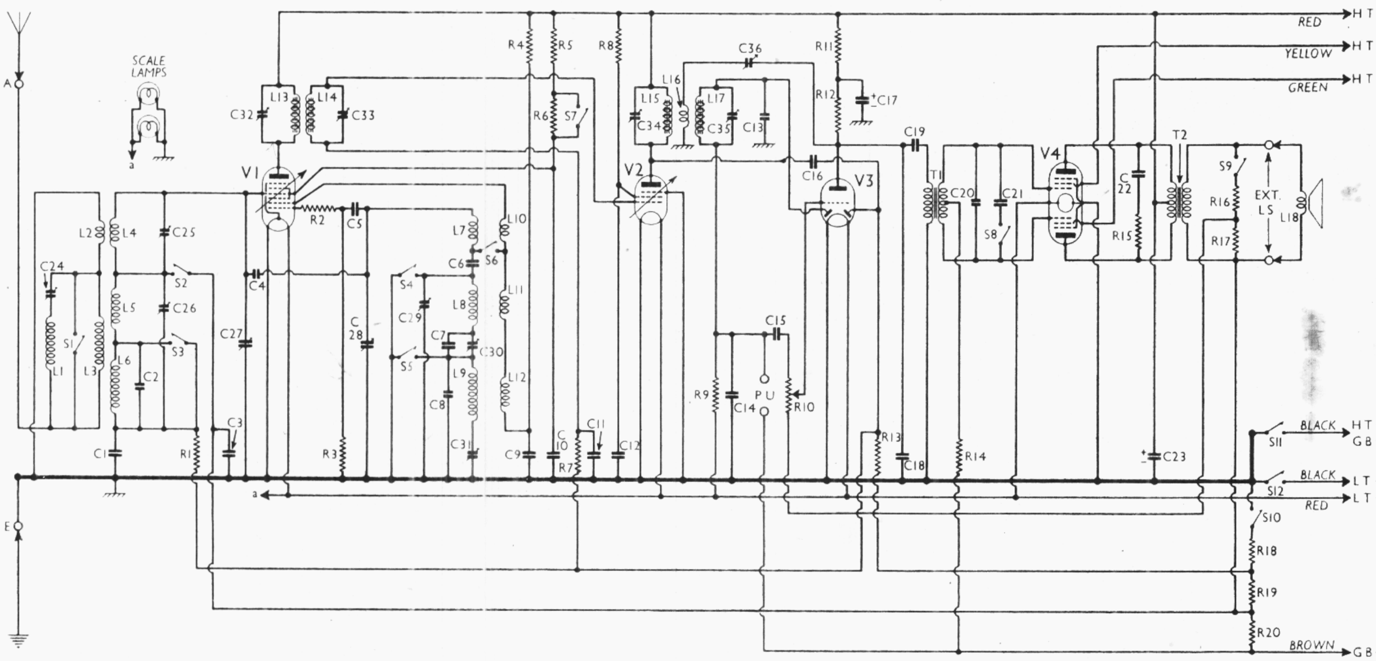
Second diode of **V3,** fed from **V2** anode via **C16,** provides DC potential which is developed across load resistance **R13** and fed back through decoupling circuits to FC (except on SW) and IF valves, giving automatic volume control.

Parallel-fed transformer coupling by **R12, C19** and **T1** between **V3** triode and quiescent push-pull output valve (**V4, Ever Ready K77A** or **Mullard QP22A**). Fixed tone correction by **C20** between control grids and **C22, R15** between anodes. Three position tone control by **C21, S8,** and **S9, R16, R17,** the latter introducing negative feed-back via **R10.** Provision for connection of low impedance external speaker across the secondary of the output transformer **T1** by means of socketed plugs which, when removed, disconnect the internal speaker speech coil, muting the internal speaker.

Fixed GB potentials for **V1** and **V2,** GB for **V3** triode and **V4,** and AVC delay potential are obtained from a potential divider formed by resistances **R18, R19, R20** connected across the GB section of the HT battery, that for **V3** triode being fed via **R17.**

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 pentode CG MW and LW decoupling	1,100,000
R2	V1 osc. CG stabiliser	50
R3	V1 osc. CG resistance	20,000
R4	V1 osc. anode HT feed	3,000
R5	V1 SG HT feed resistances	50,000
R6	V1 SG HT feed resistances	110,000
R7	V2 CG decoupling	1,100,000
R8	V2 SG HT feed	25,000



Circuit diagram of the Pye QB3 battery superhet. There are several unusual features, including IF reaction, and a tone control arrangement which introduces negative feed-back.

	RESISTANCES (Continued)	Values (ohms)
R9	V3 signal diode load	510,000
R10	Manual volume control ..	1,000,000
R11	V3 triode anode decoupling ..	20,000
R12	V3 triode anode load	30,000
R13	V3 AVC diode load	1,100,000
R14	V4 CG's decoupling	50,000
R15	Part of fixed tone corrector ..	20,000
R16	Negative feed-back potential	100
R17	divider resistances ..	50
R18	V1, V2 fixed GB, V3 triode	50
R19	and V4 GB, and AVC delay	50
R20	potential divider resistances	1,000

	CONDENSERS	Values (μF)
C1	V1 pentode CG MW and LW decoupling	0·05
C2	Aerial circuit LW trimmer ..	0·000005
C3	V1 pentode CG SW decoupling	0·1
C4	Small coupling	0·000003
C5	V1 osc. CG condenser ..	0·0001
C6	Osc. circuit SW tracker ..	0·005
C7	Osc. circuit MW fixed tracker	0·00055
C8	Osc. circuit LW trimmer ..	0·00001
C9	V1 osc. anode decoupling ..	0·1
C10	V1 SG decoupling	0·1
C11	V2 CG decoupling	0·05
C12	V2 SG decoupling	0·1
C13	2nd IF trans. sec. fixed trimmer	0·00002
C14	IF by-pass	0·0001
C15	AF coupling to V3 triode ..	0·01
C16	Coupling to V3 AVC diode ..	0·0001
C17*	V3 triode anode decoupling ..	2·0
C18	IF by-pass	0·0002
C19	AF coupling to T1	0·1
C20	Fixed tone corrector	0·00002
C21	Part of tone control circuit ..	0·0002
C22	Part of fixed tone corrector ..	0·01
C23*	HT circuit reservoir ..	8·0
C24‡	Aerial IF filter tuning ..	—
C25‡	Aerial circuit SW trimmer ..	—
C26‡	Aerial circuit MW trimmer	—
C27†	Aerial circuit tuning	—
C28†	Oscillator circuit tuning ..	—
C29‡	Osc. circuit MW trimmer ..	—
C30‡	Osc. circuit MW tracker ..	—
C31‡	Osc. circuit LW tracker ..	—
C32‡	1st IF trans. pri. tuning ..	—
C33‡	1st IF trans. sec. tuning ..	—
C34‡	2nd IF trans. pri. tuning ..	—
C35‡	2nd IF trans. sec. tuning ..	—
C36‡	Reaction control	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial IF filter coil	11·0*
L2	Aerial SW coupling coil ..	0·5
L3	Aerial MW and LW coupling	145·0
L4	Aerial SW tuning coil.. ..	0·05
L5	Aerial MW tuning coil ..	2·8
L6	Aerial LW tuning coil ..	12·0
L7	Osc. circuit SW tuning coil ..	Very low
L8	Osc. circuit MW tuning coil ..	1·8
L9	Osc. circuit LW tuning coil ..	5·0
L10	Oscillator SW reaction ..	34·5
L11	Oscillator MW reaction } total	
L12	Oscillator LW reaction } total	6·1
L13	1st IF trans. { Pri. ..	7·5
L14	1st IF trans. { Sec.. ..	7·5
L15	2nd IF trans. Pri. ..	4·8
L16	V3 triode anode reaction ..	30·0
L17	2nd IF trans. sec.	4·8
L18	Speaker speech coil	2·0
T1	Intervalve trans. { Pri. .. / Sec., total	1,000·0 / 7,500·0
T2	Output trans. { Pri., total / Sec. ..	850·0 / 0·3
S1-S7	Waveband switches	—
S8, S9	Tone control switches ..	—
S10	GB circuit switch } ganged R10	
S11	HT circuit switch } ganged R10	—
S12	LT circuit switch } ganged R10	

* May be 18 O.

DISMANTLING THE SET

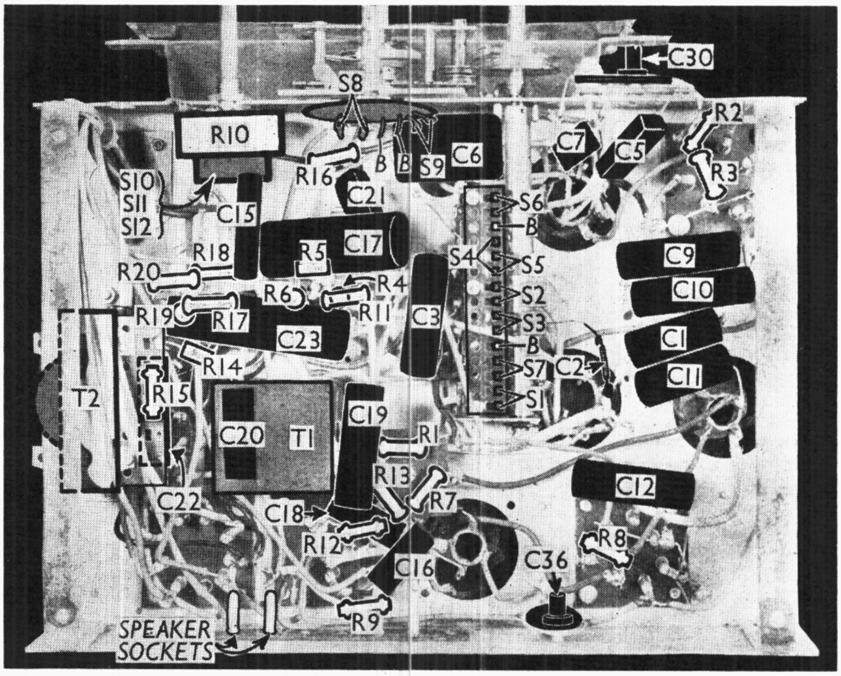
A detachable bottom is fitted to the cabinet and upon removal (four round-head wood screws) gives access to most of the components beneath the chassis.

Removing Chassis.—If it is necessary to remove the chassis from the cabinet, remove the four control knobs (pull off) and the four bolts (with washers) holding the chassis to the bottom of the cabinet.

Now free the battery and speaker leads from the cleat on the side of the cabinet, when the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To free the chassis entirely, unplug the speaker speech coil leads from the sockets at the back of the chassis.

Removing Speaker.—To remove the speaker from the cabinet, first withdraw the battery platform by lifting it up and then remove the four screws (with spring washers) holding the speaker to the sub-baffle. *When replacing*, see that the terminal panel is on the right.



Under-chassis view. All the switches are clearly indicated, the blank tags being marked. **C36** is the pre-set IF reaction control.

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 150 V overall, on load. 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. In our chassis **V4** was graded R for section A and S for section B.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 FC2A	140 / Oscillator 130	0·4 / 2·4	30	0·6
V2 VP2	140	2·0	110	0·6
V3 TDD2A	80	1·0	—	—
V4 K77A	138	1·5	†	0·2

† 120 V for section A ; 127 V for section B.

GENERAL NOTES

Switches.—**S1-S7** are the waveband switches ganged in a unit beneath the chassis. All the switches are indicated in our under-chassis view. Note that two tags are blank, while one is common to two switches.

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

SWITCH	SW	MW	LW
S1	C	—	—
S2	C	—	—
S3	—	C	—
S4	C	—	—
S5	C	C	—
S6	C	—	—
S7	C	—	—

S8 and **S9** are the two tone control switches, in a rotary unit at the front of the chassis. Their tags are indicated in our under-chassis view. Two tags on the unit are blank. In the fully anti-clockwise position **S8** is closed; in the centre position both are open; and in the clockwise position **S9** is closed.

S10-S12 are the battery circuit switches, in a QMB unit ganged with the volume control **R10.** These switches have one common contact, which is connected to chassis.

Coils.—**L1** is an unscreened coil on a bracket, with **C24,** mounted at the rear of the chassis deck. **L2-L6, L7-L12** and the IF transformers **L13, L14** ; **L15-L17,** are in four screened units on the chassis deck, with their associated trimmers.

External Speaker.—The internal speaker is fitted with socketed plugs, into which a low impedance (1·5-2·5 O) external speaker can be plugged.

Scale Lamps.—These are two Ever-Ready MES types, rated at 2·5 V, 0·1 A.

Condensers C2, C4.—These are two low capacity types, consisting of wires

Continued overleaf

PYE QB3—*Continued*

spiralled over short lengths of insulated wire.

Batteries.—LT, Pye/Ever Ready 2 V 30AH celluloid-cased free acid accumulator cell. HT and GB, Pye 147 V (total) dry battery, type K1 (or QB3/147).

Battery Leads and Voltages.—Black lead, spade tag, LT negative; red lead, spade tag, LT positive 2 V; black lead and plug, HT negative and GB positive, in +10·5 V socket; brown lead and plug, GB negative, in negative socket of battery; red lead and plug, HT+3, in +147 V socket; yellow and green leads and plugs, HT+1 and HT+2, voltage according to lettering of **V4.** On the moulded base are stamped letters A and B, while above these letters are other letters on the glass bulb. The letter above A indicates the voltage socket for the yellow lead and plug, and the letter above B that for the green lead and plug. The voltage letters are P to T, and their voltages are: P, 114 V; Q, 121·5 V; R, 129 V; S, 136·5 V; T, 144 V.

NOTE.—Judging from the makers' information, a 136·5 V battery with a GB section may have been fitted in some models, in which case the black lead goes to HT negative, the brown to GB—10·5, and the red to HT+136·5 V.

CIRCUIT ALIGNMENT

With gang at maximum, pointer should be opposite the scale setting mark at the top end of the MW scale. During alignment, volume control should be at maximum.

IF Stages.—Connect signal generator to control grid (top cap) of **V1,** via a 0·002 μF condenser, and chassis. Remove existing top cap connection, and connect a 0·5 MΩ resistance from top cap to chassis. Connect a 0·25 μF condenser from oscillator anode of **V1** to chassis.

Feed in a 465 KC/S signal, and adjust **C35, C34, C33** and **C32,** in that order, for maximum output. When adjusting a primary trimmer, connect a 50,000 Ω loading resistance across the secondary, and vice-versa.

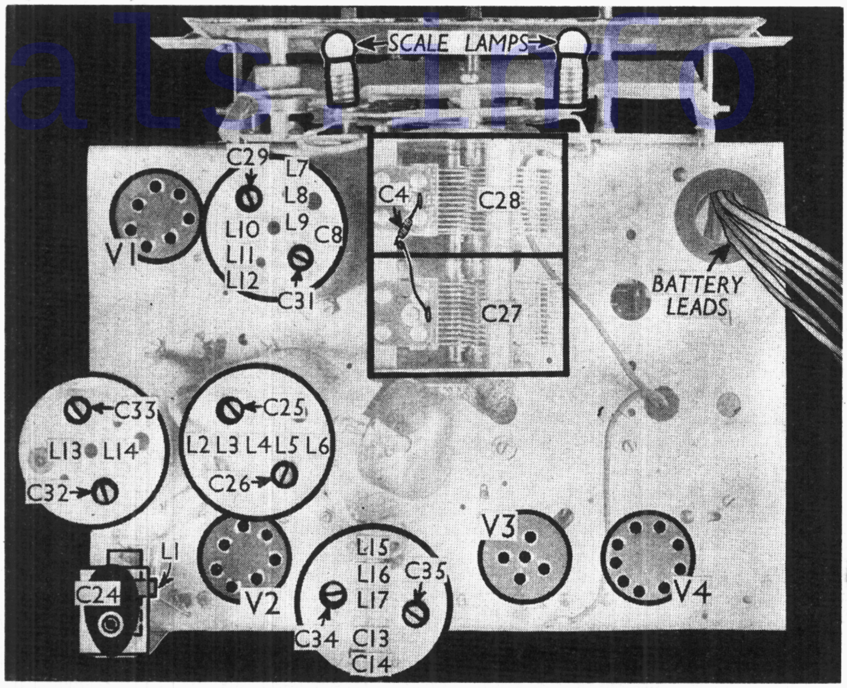
RF and Oscillator Stages.—Connect signal generator to **A** and **E** sockets. Switch set to SW, tune to 20 m on scale, feed in a 20 m (15 MC/S) signal, and adjust **C25** for maximum output.

Switch set to MW and tune to 210 m on scale. Feed in a 210 m (1,428 KC/S) signal, and adjust **C29** and **C26** for maximum output. Feed in a 520 m (577 KC/S) signal, tune it in, and adjust **C30,** while rocking the gang for optimum results. Re-check **C29** and **C26** at 210 m.

Switch set to LW, feed in an 1,800 m (166·5 KC/S) signal, tune it in, and adjust **C31** for maximum output, while rocking the gang for optimum results.

The reaction condenser **C36** can be used to increase sensitivity on all bands. Switch set to MW, tune to the top of the band, and adjust **C36** for maximum output without instability. After adjusting, it is necessary to re-adjust **C35** as explained under "IF stages."

To adjust the IF filter, feed a 465 KC/S signal into **A** and **E** sockets, and adjust **C24** for *minimum* output.



Plan view of the Pye QB3 chassis. **C4** is a twisted-wire condenser. **L1** and **C24** form the IF filter. The **L7** to **L12** unit also contains **C8,** while the **L15-L17** unit also contains **C13** and **C14.** All units in addition contain their associated trimmers.

MAINTENANCE PROBLEMS

Contributed by Service Engineers

Broken Aerial Causes Interference

I RECENTLY had an interesting spot of bother, a client complaining of interference, taking the form of clicks and a rumbling sort of crackle, in an Ekco AD38. On investigation at the customer's home it was found that the interference was not the usual type encountered and that, although it was not always present, it was not cut out by removing the aerial connection. The set was then tested at the shop and found to be perfect.

Meanwhile, we had received a request for service at the house next door, the complaint here being that the reception was entirely cut out by interference. Investigation showed that the trouble here was due to the aerial lead-in conductors inside the insulating braiding being broken and causing a rubbing contact. Curing this defect got rid of *both* of the cases of interference.—T. E. SMITH, LONDON.

Unusual Cause of Drift

THE customer, owning an HMV481, complained that the calibration would wander and stations would fade out completely while entirely different ones would take their place for a short period, after which the original station would re-appear. On testing the receiver on North Regional it did exactly as the customer said, and I thought this was going to be a very difficult fault.

On removing the back of the set prior to removing the chassis, the station tuned in on the receiver began to fade and another take its place in the now usual manner, and I noticed that there appeared to be no heater glow in the X41 frequency-changer.

As I looked at this valve wondering if one should be able to see the heater alight, the heater gradually began to light up and after a short period the station originally tuned in on the receiver re-appeared.

Here I thought was just a plain case of the heater of the X41 valve becoming o/c after fully heating up and I withdrew this valve prior to fitting a replacement. I then noticed that one heater pin was very blackened and coated with a thick layer of soot, pointing to a fault in the pin or its socket in the valveholder, so I proceeded to remove the chassis to examine this.

Sure enough, on looking at the suspected valveholder it was found that the socket for the heater pin that I had found thickly covered with soot was very slack. Upon re-tensioning this and testing the receiver it was found quite O.K.

What was apparently happening was that when the faulty valveholder began to arc over on the heater pin the valve would gradually cool down, the resulting oscillator drift causing another station to appear. When the arcing stopped, the valve warmed up and returned to normal.—P. GARDNER, TOTTENHAM.

Printed in Great Britain as a supplement to *The Wireless & Electrical Trader* by Sanders Phillips & Co., Ltd., The Baynard Press, Chryssell Road, London, S.W.9