

'TRADER' SERVICE SHEET

228

PYE QAC 3

3-BAND A.C. SUPERHET

THE Pye QAC3 is a 4-valve (plus rectifier) A.C. 3-band superhet covering a short-wave range of 15.5-52.5 metres, and having provision for a gramophone pick-up and an extension speaker, while the internal speaker can be cut out if desired. A feature of the set is the inclusion of a cathode-ray tuning indicator, and the special scale with luminous indications.

In its standard form the receiver is suitable for mains of 200-250 V, 40-100 C/S, and one of these was used for preparing this *Service Sheet*, but there are other models catering for 100 V and 25 C/S supplies.

CIRCUIT DESCRIPTION

Aerial input via **L3** (M.W. and L.W.) and **L2** (S.W.) to single-tuned circuits **L4**, **C33** (S.W.), **L5**, **C33** (M.W.) and **L6**, **C33** (L.W.). I.F. filter **L1**, **C30** is connected across **L3**.

First valve (**V1**, Ever Ready metallised **A36A**) is a triode-hexode operating as frequency changer with internal coupling. Oscillator grid coils **L7** (S.W.), **L8** (M.W.) and **L9** (L.W.) are tuned by **C34**; parallel trimming by **C35** (M.W.) and **C8** (L.W.); series tracking by **C7**, **C36** (M.W.), **C37** (L.W.) and **C9**. Anode reaction coils **L10** (S.W.) and **L11** (M.W. and L.W.).

Second valve (**V2**, Ever Ready metallised **A50P**) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C38**, **L12**, **L13**, **C39** and **C40**, **L14**, **L15**, **C41**.

Intermediate frequency 465 KC/S.

Diode second detector is part of double-

diode triode valve (**V3**, Ever Ready metallised **A23A**). Audio frequency component in rectified output is developed across load resistance **R12** and passed via A.F. coupling condenser **C16**, I.F. stopper **R13** and manual volume control **R14** to C.G. of triode section. Cathode ray tuning indicator (**T.I.**, Ever Ready **A39A**) is operated by potential tapped off potentiometer **R9**, **R10** which is connected across signal diode load resistance **R12**. Provision for connection of gramophone pick-up across **R14** via **S9**; **S7** closes on gram. to mute radio. **S3** closes across pick-up sockets on L.W. only.

Resistance-capacity coupling by **R17**, **C21** and **R19** between **V3** triode and pentode output valve (**V4**, Ever Ready **A70D**). Fixed tone correction in anode circuit by **C26**; four-position variable tone control by **S10**, **S11**, **S12** in connection with R.C. filter **R20**, **C23** and **C24**. Heterodyne filter **L16**, **C25** is connected in anode circuit. Provision for connection of low impedance external speaker across secondary of **T1** by means of the socketed plugs used for connection of internal speaker speech coil; these can be withdrawn, thus muting the internal speaker.

H.T. current is supplied by I.H.C. full-wave rectifying valve (**V5**, Ever Ready **A11D**). Smoothing by speaker field coil **L19** and dry electrolytic condensers **C28** and **C29**. R.F. filtering by **C5**.

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 under the receiver chassis.

Removing Chassis.—If it should be necessary to remove the chassis from the cabinet, remove the four control knobs (pull off) and unplug the speaker speech coil leads from the sockets at the back of the chassis and the power supply connector from the valve-holder on the chassis.

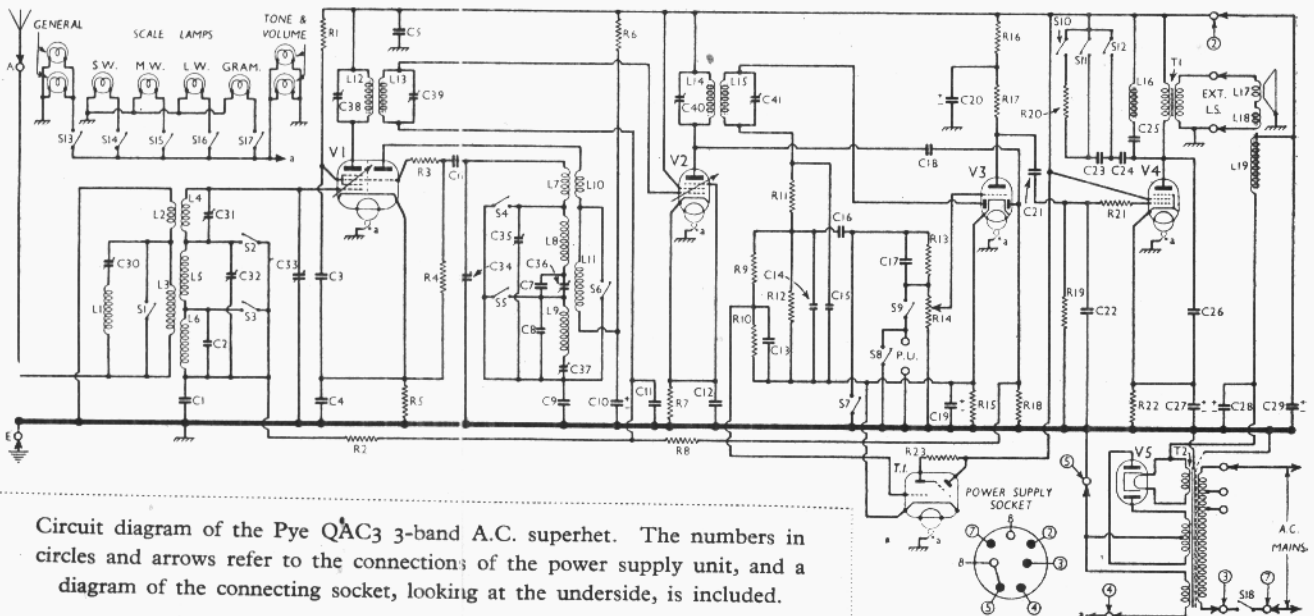
Now disconnect the leads from the mains transformer to the speaker terminal panel (screw terminals) and remove the electrolytic condenser block from the side of the cabinet (two round-head wood screws). Next remove the earthing lead from one of the mains transformer bolts.

Remove the three screws (with nuts, washers and spring washers) holding the mains transformer to the bottom of the cabinet and remove it from the cabinet. Remove the four bolts (with washers) holding the chassis to the bottom of the cabinet and loosen the two round-head wood screws (with washers) holding the scale assembly to the top of the cabinet. These screws need not be removed.

The chassis can now be withdrawn by tilting the back upwards.

When replacing, connect the leads to the speaker as follows, numbering the terminals from bottom to top:—1, black; 2, yellow. Do not forget to replace on the right-hand transformer fixing screw the cleat which holds the speaker speech coil and earthing leads.

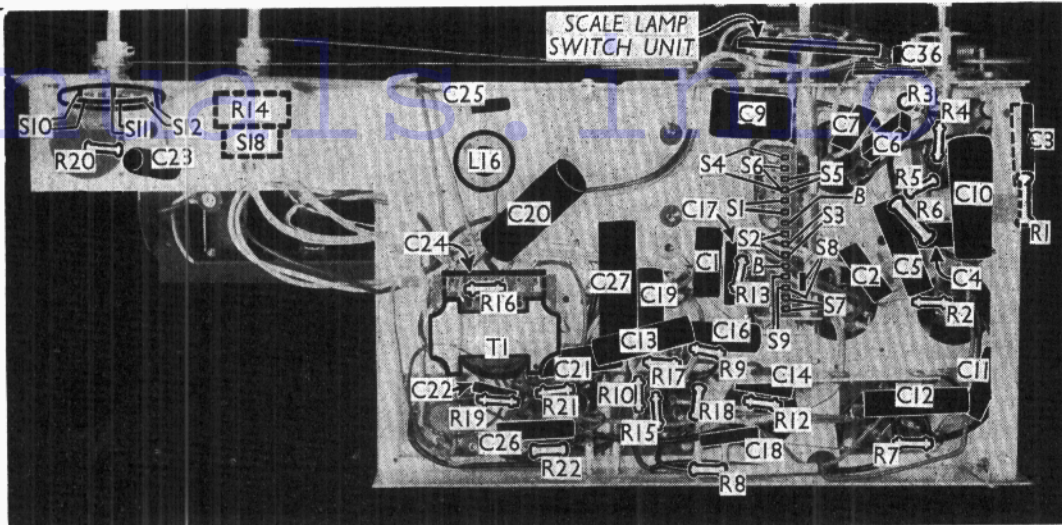
Removing Speaker.—To remove the speaker from the cabinet, disconnect the leads and remove the four screws holding it to the sub-baffle. *When replacing*, see



Circuit diagram of the Pye QAC3 3-band A.C. superhet. The numbers in circles and arrows refer to the connections of the power supply unit, and a diagram of the connecting socket, looking at the underside, is included.

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Under-chassis view. The wave-change and gramophone switches are identified, as are also the tone control switches on the left. A separate diagram of the scale lamp switch unit is on page VIII.



that the terminal panel is on the right and connect the leads from the mains transformer as above and the leads from the electrolytic block as follows:— 1, yellow; 2, brown; 3, black.

COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	V1 S.G. H.T. feed ..	80,000
R2	V1 hex. C.G. decoupling ..	110,000
R3	V1 osc. grid circuit stabiliser ..	50
R4	V1 osc. C.G. resistance ..	25,000
R5	V1 fixed G.B. resistance ..	200
R6	V1 osc. anode H.T. feed ..	80,000
R7	V2 fixed G.B. resistance ..	300
R8	A.V.C. line decoupling ..	1,100,000
R9	T.I. C.G. potentiometer ..	2,100,000
R10	I.F. stopper ..	510,000
R11	V3 signal diode load ..	110,000
R12	I.F. stopper ..	510,000
R13	Manual volume control ..	500,000
R14	V3 G.B. resistance ..	1,000
R15	V3 triode anode decoupling ..	25,000
R16	V3 triode anode load ..	110,000
R17	V3 A.V.C. diode load ..	1,100,000
R18	V4 C.G. resistance ..	260,000
R19	Part of variable T.C. filter ..	20,000
R20	V4 C.G. I.F. stopper ..	25,000
R21	V4 G.B. resistance ..	150
R22	T.I. anode H.T. feed ..	2,100,000

CONDENSERS		Values (µF)
C1	V1 hex. C.G. decoupling ..	0.005
C2	Aerial circuit L.W. trimmer ..	0.00001
C3	V1 S.G. decoupling ..	0.1
C4	V1 cathode by-pass ..	0.1
C5	H.T. positive R.F. by-pass ..	0.1
C6	V1 oscillator C.G. condenser ..	0.0001
C7	Osc. circuit M.W. fixed tracker ..	0.000055
C8	Osc. circuit L.W. fixed trimmer ..	0.00002
C9	Fixed tracker ..	0.005
C10*	V1 osc. anode decoupling ..	2.0
C11	V2 C.G. decoupling ..	0.05
C12	V2 cathode by-pass ..	0.1
C13	T.I. feed decoupling ..	0.1
C14	I.F. by-passes ..	0.00005
C15	A.F. coupling to V3 triode ..	0.01
C16	I.F. by-pass ..	0.0002
C17	Coupling to V3 A.V.C. diode ..	0.0001
C18*	V3 cathode by-pass ..	20.0
C19*	V3 triode anode decoupling ..	2.0
C20*	V3 triode to V4 A.F. coupling ..	0.025
C21	V4 C.G. I.F. by-pass ..	0.0005
C22	Parts of variable T.C. filter ..	0.025
C23	Part of heterodyne filter ..	0.002
C24	V4 anode fixed tone corrector ..	0.001
C25	V4 cathode by-pass ..	50.0
C26*	H.T. smoothing ..	8.0
C27*		16.0
C28*		
C29*		

CONDENSERS (Continued)		Values (µF)
C30†	Aerial circuit I.F. filter tuning ..	—
C31†	Aerial circuit S.W. trimmer ..	—
C32†	Aerial circuit M.W. trimmer ..	—
C33†	Aerial circuit tuning ..	—
C34†	Oscillator circuit tuning ..	—
C35†	Oscillator circuit M.W. trimmer ..	—
C36†	Oscillator circuit M.W. tracker ..	—
C37†	Oscillator circuit L.W. tracker ..	—
C38†	1st I.F. trans. pri. tuning ..	—
C39†	1st I.F. trans. sec. tuning ..	—
C40†	2nd I.F. trans. pri. tuning ..	—
C41†	2nd I.F. trans. sec. tuning ..	—

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial I.F. filter coil ..	11.0
L2	Aerial S.W. coupling ..	0.5
L3	Aerial M.W. and L.W. coupling ..	130.0
L4	Aerial S.W. tuning coil ..	Very low
L5	Aerial M.W. tuning coil ..	2.8
L6	Aerial L.W. tuning coil ..	11.2
L7	Oscillator S.W. tuning coil ..	Very low
L8	Oscillator M.W. tuning coil ..	1.8
L9	Oscillator L.W. tuning coil ..	4.5
L10	Oscillator anode S.W. reaction ..	33.0
L11	Oscillator anode M.W. and L.W. reaction ..	8.0
L12	1st I.F. trans. Pri. ..	5.0
L13	1st I.F. trans. Sec. ..	5.0
L14	2nd I.F. trans. Pri. ..	5.0
L15	2nd I.F. trans. Sec. ..	5.0
L16	Heterodyne filter choke ..	44.0
L17	Speaker speech coil ..	1.8
L18	Hum neutralising coil ..	0.25
L19	Speaker field coil ..	1,800.0
T1	Output transformer { Pri. total .. 700.0 Sec. .. 0.3	
T2	Mains trans. { Pri. heater .. 22.6 Rect. heat. sec. .. 0.2 H.T. sec. total .. 778.0	
T.I.	Cathode ray tuning indicator ..	—
S1-S6	Waveband switches ..	—
S7-S9	Radio-gram change switches ..	—
S10-12	Tone control switches ..	—
S13-17	Scale lamp switches ..	—
S18	Mains switch, ganged R14 ..	—

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 3) are those measured in our receiver when it was operating on mains of 235 V, using the 216-235 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 1,200 V scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 A36A	250	1.6	40	2.9
V2 A50P	250	10.1	250	3.6
V3 A23A	80	1.3	—	—
V4 A70D	210	42.0	250	6.9
V5 A11D	360	—	—	—

Oscillator anode 55 V, 2.5 mA. Each anode, A.C.

GENERAL NOTES

Switches.—S1-S9 are the waveband and gramophone switches, in a ganged unit beneath the chassis. All these switches are indicated in our under-chassis view. The table below gives the switch positions for the four control settings, starting from fully anti-clockwise. O indicates open, and C closed.

Switch	S.W.	M.W.	L.W.	Gram.
S1	O	O	O	O
S2	O	O	O	O
S3	O	O	O	O
S4	O	O	O	C
S5	O	O	O	C
S6	O	O	O	C
S7	O	O	C	O
S8	O	O	O	C
S9	O	O	O	C

Note that S8 consists of one fixed contact in the bank and a moving metal contact rivetted to the rotor spindle, and hence connecting to chassis.

S10-S12 are the tone control switches in a separate rotary unit, all the contacts being indicated in our under-chassis view. Five of the fixed contacts are blank, and three are used. In the fully anti-clockwise position S12 is closed, in the next position S11 is closed, in the third position S10 is closed, and in the fourth position all the switches are open.

S13-S17 are the scale lamp switches, in a rotary unit in front of the chassis, ganged with the wavechange and gram. unit. S13 controls the general lighting, and S14, S15, S16 and S17 the S.W., M.W., L.W. and gram. scale indicators respectively. A diagram of the switch

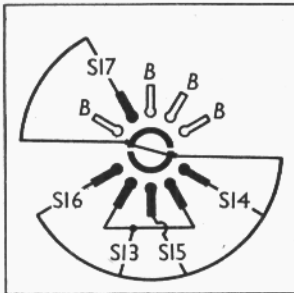
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PYE QAC3—Continued

unit is given below, indicating the switches as seen from the front of the chassis, when it is standing on its base. The table below gives the switch positions for the four control settings, starting from fully anti-clockwise. O indicates open, and C closed.

The tone and volume indicator lamps are always on when the set is operating.

Switch	S.W.	M.W.	L.W.	Gram.
SI3	C	C	C	O
SI4	C	O	O	O
SI5	O	C	O	O
SI6	O	O	C	O
SI7	O	O	O	C



The scale lamp switch unit, looking from the front of the chassis when it is standing on its base.

SI8 is the Q.M.B. mains switch, ganged with the volume control **R14**.

Scale Lamps.—There are eight of these in all, all Ever-Ready M.E.S. types, rated at 6.2 V, 0.3 A, and having small bulbs. All the lamps are sprayed green, except the two used for general illumination, which are clear. The lamps are controlled by five switches, dealt with above.

Coils.—**L1** is behind the **A, E** brackets

mounted on the chassis. **L2-L6, L7-L11**, and the I.F. units **L12, L13** and **L14, L15**, are in four screened units on the chassis deck. Apart from the associated trimmers (two in each unit), the **L7-L11** unit also contains **C8**, and the **L14, L15** unit contains **R11** and **C15**. The choke **L16** is beneath the chassis.

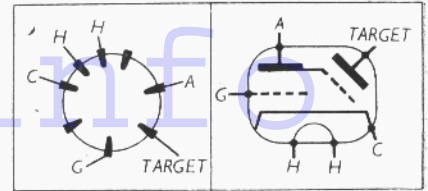
Condensers C28, C29.—These are two dry electrolytics in a single carton fixed to the right-hand side of the cabinet. There is a common negative (black) lead, the yellow lead is the positive of **C28** (8 μ F) and the red the positive of **C29** (16 μ F).

Power Unit.—The mains transformer and rectifier valve are in a unit fitted to the bottom of the cabinet. It is connected to the chassis by a 6-pin plug and socket. Actually a standard 7-pin valve plug and socket is used, with pin 1 removed and pin 6 blank. Sockets 1 and 6 on the holder are both blank, but 5 and 6 are joined by a wire. The numbering, looking at the underside of the socket, is indicated on the sketch of the socket inset in the circuit diagram. The coding of the wires to the plug is: Pin 2, yellow; pin 3, blue; pin 4, red; pin 5, black; pin 6, blank; pin 7, green.

Tuning Indicator.—The tuning indicator and its holder may be removed by undoing the two hexagonal-headed screws holding them in position. An 8 side-contact base is fitted, and the connections are given in the diagram on this page.

Chassis Divergencies.—**C2** in our chassis was not in the **L2-L6** coil unit as indicated by the makers, but was under this unit, beneath the chassis. **C26** was connected from anode of **V4** to chassis, not across the primary of **T1**.

External Speaker.—The internal speaker is connected to the sockets at the rear of the chassis by the usual socketed plugs, and a low resistance (1.5-2.5 Ω) external speaker can thus be used alone, or in parallel with the internal speaker.



Base connections and diagram of the cathode ray tuning indicator used.

CIRCUIT ALIGNMENT

When the gang is fully in mesh the cursor should be on the setting mark at the top end of the M.W. scale (beyond the 550 m. mark).

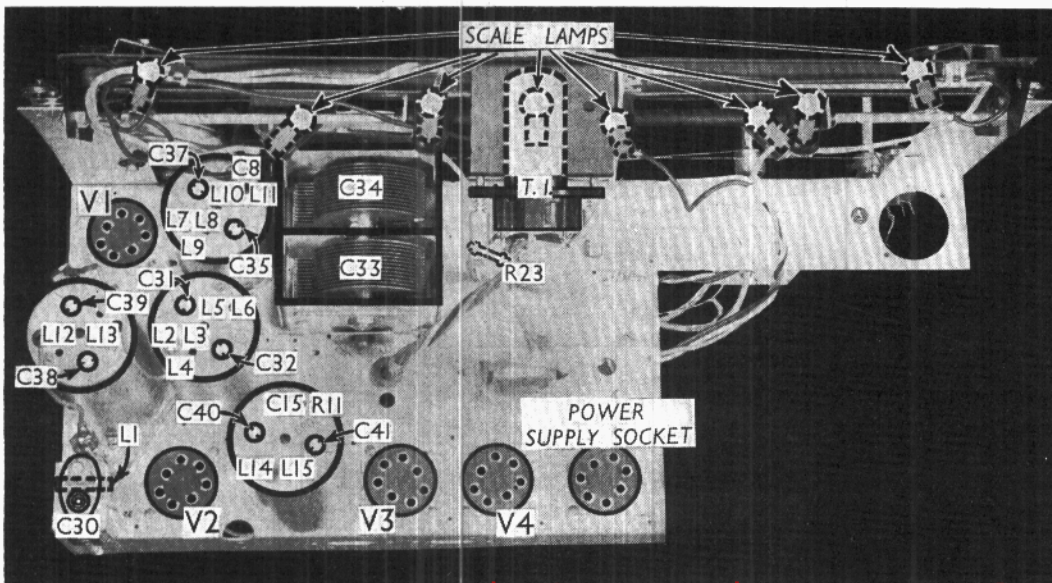
I.F. Stages.—Feed in a 465 KC/S signal to control grid (top cap) of **V1** via a 0.002 μ F condenser, and chassis, first removing the existing lead to the control grid, and connecting a 0.5 MO resistance between control grid and chassis. Also connect a 0.25 μ F condenser between oscillator anode of **V1** and chassis. Adjust **C41, C40, C39** and **C38** in that order for maximum output. Remove the swamp condenser and the 0.5 MO resistance, and replace top cap connection of **V1**.

R.F. and Oscillator Stages.—Switch set to S.W., tune to 15 MC/S on scale, feed a 15 MC/S (20 m.) signal into **A** and **E** sockets, and adjust **C31** for maximum output.

Switch set to M.W., tune to 210 m. on scale, feed in a 210 m. (1,428 KC/S) signal via a dummy aerial, and adjust **C35**, then **C32**, for maximum output. Tune to 520 m. on scale, feed in a 520 m. (577 KC/S) signal, and adjust **C36** (front of chassis) for maximum output, whilst rocking the gang for optimum results. Re-check at 210 m.

Switch set to L.W., tune to 1,800 m. on scale and feed in an 1,800 m. (166.5 KC/S) signal. Adjust **C37** for maximum output whilst rocking the gang.

I.F. Filter.—Feed in a 465 KC/S signal, and adjust **C30** for minimum output.



Plan view of the chassis. Note the eight scale lamps used for various indicating purposes. **C8** is inside the **L7-L11** coil unit, and **R11** and **C15** inside the **L14, L15** unit.