NUMBER 140 **'TRADER' SERVICE SHEETS**

PYE T61

BATTERY SUPERHET

A FRAME aerial is fitted in the Pye T61 transportable battery superhet. It is a 5-valve type with a variable-mu pentode signal frequency amplifier, a triode-pentode frequency changer, a variable-mu pentode I.F. amplifier, a double diode triode, and a double pentode O.P.P. output valve.

On the left-hand side of the cabinet there are sockets for an external aerial and earth.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L2, L3, C19** to variable-mu pentode signal frequency amplifier (**V1, Mazda metallised VP210**). Provision for external aerial coupling by winding **L1.**

Choke-fed tuned-grid coupling by **L4, C3, L5, L6, C22** to triode-pentode valve (**V2, Mazda metallised TP22**) operating as frequency changer with cathode injection.

Triode section of valve forms separate oscillator with anode coils **L10, L11** tuned by **C25**; tracking by shaped plates; grid coil **L8**; coupling coils **L7, L9** in common filament circuit.

Single variable-mu H.F. pentode intermediate frequency amplifier (**V3, Mazda metallised VP210**) operating with tuned-primary tuned-secondary transformer couplings **C26, L12, L13, C27** and **C28, L14, L15, C29.**

Intermediate frequency 127 KC/S.

Diode second detector forms part of double diode triode valve (**V4, Mazda metallised L21DD**). Audio frequency component in rectified output is developed across load resistance **R11** and passed via coupling condenser **C13** and manual volume control **R12** to C.G. of triode section, which operates as L.F. amplifier. I.F. filtering by choke **L17** and by-pass condensers **C11, C12.**

Second diode of **V4,** fed from **V3** anode via **C14,** provides D.C. potential which is developed across load resistances **R14, R15** and fed back through decoupling circuits as G.B. to R.F., F.C., and I.F. valves, giving automatic volume control.

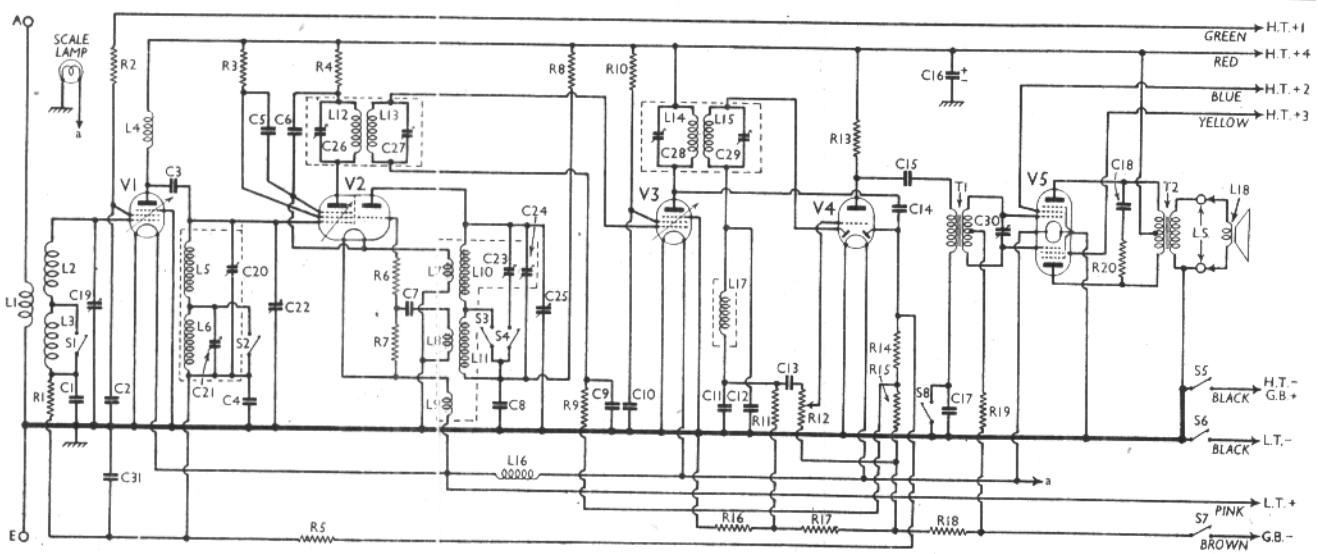
Delay voltage is obtained from **V4** G.B. potential divider, **R16, R17, R18,** which also serves as G.B. battery load and provides a small negative bias for the signal diode, thus giving a certain degree of inter-station noise suppression.

Parallel-fed transformer coupling by **R13, C15** and **T1** between **V4** triode and output stage which comprises double pentode valve (**V5, Mazda QP240**) operating on quiescent push-pull system. Fixed tone correction by anode circuits impedance limiting filter **R20, C18**; variable tone control by variable condenser **C30** in grid circuits; 2-point bass response control by switch **S8** and condenser **C17.**

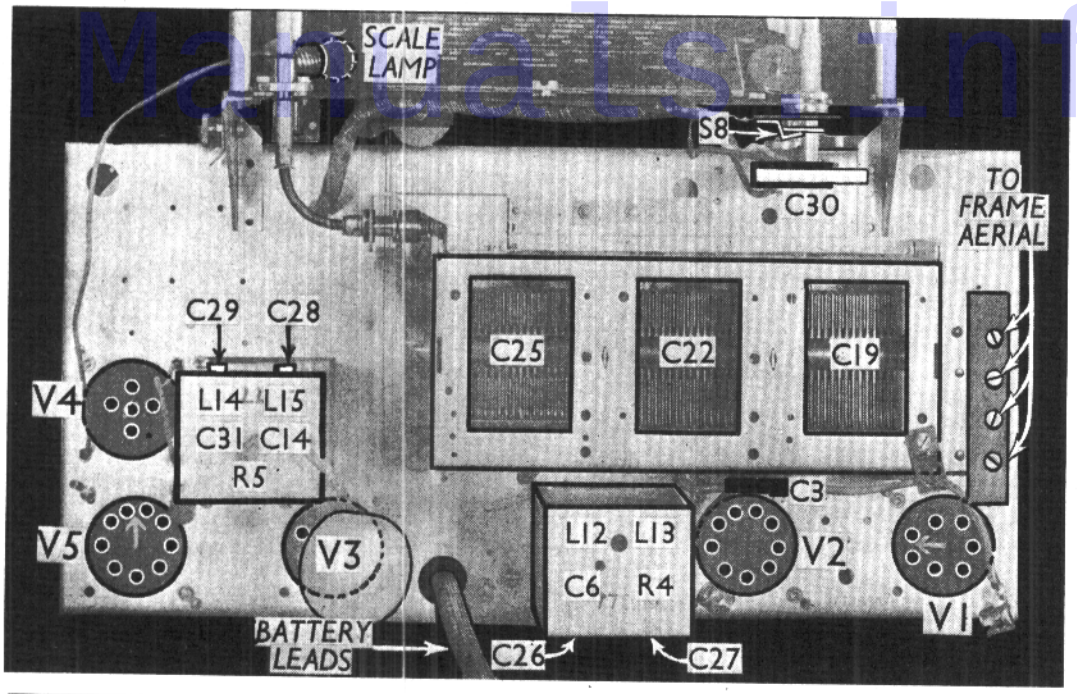
COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 C.G. decoupling	260,000
R2	V1 S.G. H.T. feed	2,000
R3	V2 pentode S.G. H.T. feed	160,000
R4	V2 pentode anode decoupling	2,000
R5	V1, V2 A.V.C. line decoupling	1,100,000
R6	V2 osc. harmonic suppressor	2,500
R7	V2 osc. C.G. resistance	100,000
R8	V2 osc. anode decoupling	50,000
R9	V3 C.G. decoupling	1,100,000
R10	V3 S.G. H.T. feed	160,000
R11	V4 signal diode load	510,000
R12	Manual volume control	500,000
R13	V4 triode anode load	30,000
R14	V4 A.V.C. diode load	1,100,000
R15		510,000
R16	G.B. potential divider	100
R17		300
R18		630
R19	V5 C.G. circuits stabiliser	160,000
R20	Part V5 imp. limiting filter	16,000

	CONDENSERS	Values (μF)
C1	V1 C.G. decoupling	0·1
C2	V1 S.G. by-pass	0·1
C3	H.F. coupling to L5, L6	0·000025
C4	V2 pentode C.G. decoupling	0·1
C5	V2 pentode S.G. by-pass	0·1
C6	V2 pent. anode decoupling	0·1
C7	V2 osc. C.G. condenser	0·0002
C8	V2 osc. anode decoupling	0·1
C9	V3 C.G. decoupling	0·1
C10	V3 S.G. by-pass	0·1
C11	I.F. by-passes	0·00005
C12		0·00005
C13	L.F. coupling to V4 triode	0·01
C14	Coupling to V4 A.V.C. diode	0·0002
C15	L.F. coupling to T1	0·1
C16*	H.T. supply reservoir	8·0
C17	Bass attenuator	0·01
C18	Part V5 imp. limiting filter	0·0025



Circuit diagram of the Pye T61 battery superhet. L2 and L3 are the frame aerial windings, L1 being a coupling coil for an external aerial.



Plan chassis view. S8 is the bass response attenuator switch operated by a push-pull action of the high-note tone control spindle. The colour coding for the frame aerial terminals is given under Dismantling the Set.

CONDENSERS (*Continued*)		Values (μF)
C19†	Frame aerial tuning	—
C20‡	F.C. C.G. circuit M.W. trimmer	—
C21‡	F.C. C.G. circuit L.W. trimmer	—
C22†	F.C. C.G. circuit tuning	—
C23‡	Oscillator L.W. trimmer	—
C24‡	Oscillator M.W. trimmer	—
C25†	Oscillator tuning	—
C26‡	1st I.F. trans. pri. tuning	—
C27‡	1st I.F. trans. sec. tuning	—
C28‡	2nd I.F. trans. pri. tuning	—
C29‡	2nd I.F. trans. sec. tuning	—
C30†	Variable tone control	0·00075
C31	V1, V2, A.V.C. line decoupling	0·05

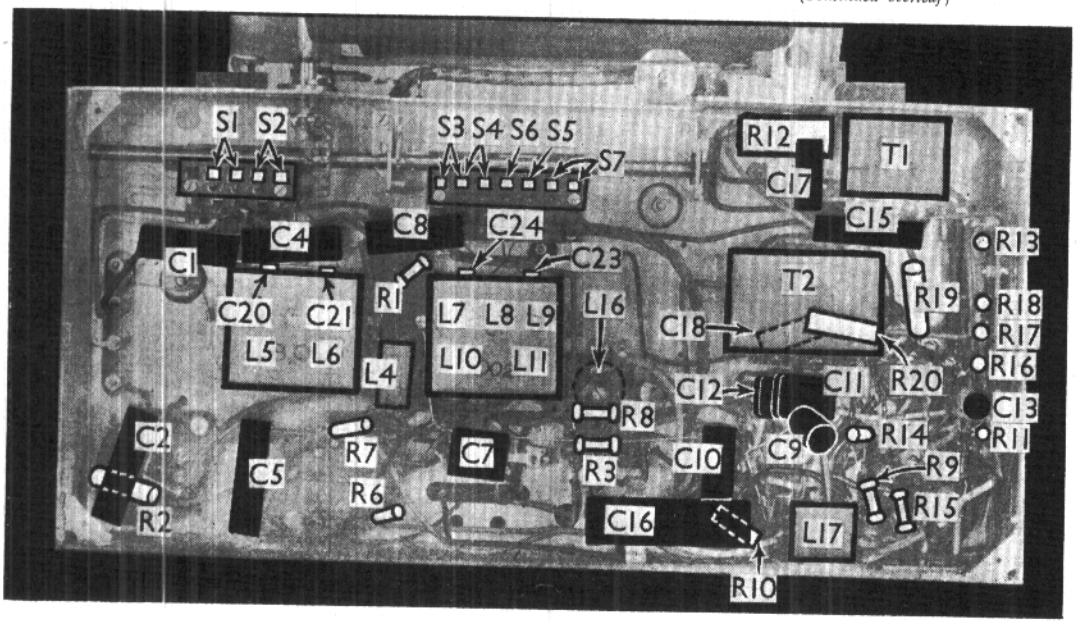
* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	External aerial coupling	0·14
L2	Frame aerial windings	1·9
L3	Frame aerial windings	19·8
L4	V1 anode H.F. choke	500·0
L5	F.C. C.G. tuning coils	1·5
L6	F.C. C.G. tuning coils	16·0
L7	Osc. coupling coil	0·3
L8	Osc. C.G. coil	0·5
L9	Osc. coupling coil	0·3
L10	Oscillator tuning coils	1·2
L11	Oscillator tuning coils	4·8
L12	1st I.F. trans. Pri.	42·0
L13	1st I.F. trans. Sec.	42·0

OTHER COMPONENTS (*Continued*)		Approx. Values (ohms)
L14	2nd I.F. trans. Pri.	110·0
L15	2nd I.F. trans. Sec.	110·0
L16	Filament circuit choke	0·06
L17	I.F. choke	700·0
L18	Speaker speech coil	1·2
T1	Intervalve trans Pri.	1,000·0
	Intervalve trans Sec. total.	8,500·0
T2	Output trans. Pri. total	850·0
	Output trans. Sec.	0·3
S1-S4	Waveband switches	—
S5	H.T. circuit switch	—
S6	L.T. circuit switch	—
S7	G.B. circuit switch	—
S8	Bass control switch	—

(*Continued overleaf*)

Under-chassis view. The ganged wave-change and battery switches are clearly shown, S5 and S6 consisting of single contacts with a common earthed shorting strip.



PYE T16 (Continued)

DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and upon removal (six countersunk-head screws) gives access to most of the under-chassis components.

Removing Chassis.—If it should be necessary to remove the chassis from the cabinet, first remove the back and the batteries, and the four control knobs (pull off). Now free the speaker leads from the two cleats on the side of the cabinet and disconnect the frame leads from the panel on the chassis (screw terminals). The chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

When replacing, connect the frame leads as follow, numbering the terminals from back to front of the chassis :—1, red ; 2, white ; 3, black ; 4, green. The terminals are colour coded in accordance with the leads.

To free the chassis entirely, disconnect the speaker leads from the sockets at the back of the chassis.

Removing Speaker.—To remove the speaker, remove the four screws (with lock washers and washers) holding it to the sub-baffle. *When replacing*, see that the terminal panel is at the bottom.

Removing Frame Aerial.—If it is desired to remove the frame aerial from the cabinet, this can be done by first removing the battery shelf (two screws with nuts, lock nuts and washers). Now remove the three large and one small round-head wood screws holding the frame to the front of the cabinet.

VALVE ANALYSIS

Valve voltages and currents in the table below are those given by the manufacturers. They are for a receiver with a new H.T. battery and no signal input, and voltages were measured on a meter having a resistance of 1,000 Ω per volt, with chassis as negative.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 VP210..	130	0·6	90	0·2
V2 TP22*..	128	0·6	84	0·3
V3 VP210..	130	0·6	82	0·2
V4 L21DD	103	0·7	—	—
V5 QP240..	130	2·0	†	0·4

* Osc. anode 76 V, 1.0 mA.
† As Blue and Yellow battery plug tappings.

GENERAL NOTES

Switches.—**S1-S7** are the waveband and battery switches in two ganged assemblies underneath the chassis. Our under-chassis illustration clearly shows the arrangement of the contacts, and the table (col. 2) gives their positions for the various settings of the control knob, O indicating open and C closed.

Switch	Off	M.W.	L.W.
S1	O	C	O
S2	O	C	O
S3	O	C	O
S4	O	O	C
S5	O	C	C
S6	O	C	C
S7	O	C	C

S8 is the bass control switch working in conjunction with attenuator condenser **C17.** It is operated by a push-pull action of the high-note tone control spindle, being open when the knob is out, and closed when the knob is in.

Coils.—**L1, L2** and **L3** are the frame aerial windings on a skeletonised former mounted inside the cabinet. **L1** is a single turn of wire for coupling an external aerial and earth system.

L5, L6 and **L7-L11** are iron-cored coils in two screened units mounted underneath the chassis. The **L5, L6** unit contains M.W. and L.W. signal frequency trimmers **C20, C21,** and the **L7-L11** units contains M.W. and L.W. oscillator trimmers **C24** and **C23.**

L12, L13 and **L14, L15** are the I.F. transformers in two screened units on the chassis deck. The first transformer contains its trimmers **C26, C27,** and also condenser **C6** and resistance **R4,** while the second transformer, apart from trimmers **C28, C29,** contains condensers **C14** and **C31,** and resistance **R5.**

L4 is an unscreened H.F. choke, **L16** a filament circuit choke, and **L17** a screened iron-cored I.F. choke, all mounted underneath the chassis.

Condensers.—**C16** is a 150 V 8μF dry electrolytic condenser of the tubular type mounted in a clip underneath the chassis.

C30 is a solid dielectric variable condenser operating as high-note tone control.

Scale Lamp.—This is an Osram M.E.S. type rated at 2.5 V 0.2 A and supported on an easily removable bracket.

External Speaker.—A low-impedance (2-4 Ω) external speaker may be connected to the L.S. sockets, with or without the internal speaker in circuit.

Battery Leads and Voltages.—Black lead, spade tag, L.T. negative ; Pink lead, spade tag, L.T. positive 2 V ; Black lead and plug, H.T. negative (and G.B. positive) ; Green lead and plug, H.T. positive 88.5 V ; Red lead and plug H.T. positive 136.5 V ; Brown lead and plug, G.B. negative 10.5 V. The blue and yellow leads and plugs are connected respectively to the auxiliary grids of the A and B sections of the double pentode valve **V5,** and the voltages applied depend on the letters P, Q, R, S, or T marked on the valve above the letters A and B. Where the letter is P the voltage should be 103.5 positive ; Q, 111 ; R, 118.5 ; S, 126 ; T, 133.5.

H.T.-G.B. Battery and L.T. Cell.—The combined H.T. and G.B. battery recommended is a 136.5+10.5 V Pye-Ever Ready type, listed as No. T61/147. The 2 V 40 AH celluloid cased accumulator is also a Pye-Ever Ready type.

CIRCUIT ALIGNMENT

Calibration.—To adjust calibration rotate tuning knob until pointer is at higher wavelength end of scales. With disc drive against stop, release set screw clamping drum to condenser spindle and set rotor vanes fully in mesh with stator. Tighten set screw. Pointer should now be located at end of horizontal lines, but if not, the scale end-clasps should be released, and the scale plate moved slightly. If further correction is needed the three screws at the end of the drive drum should be released, and the indicating pointer and its tracer moved while the gang vanes are kept fully in mesh.

I.F. Transformers.—All adjustments should be made with the volume control at max. and the red, white and black frame aerial terminals on the chassis short-circuited. The modulated signal should be kept low to ensure that A.V.C. system is inoperative. Remove **V2** C.G. connection (top cap) and connect 0.5 MΩ resistance between cap and chassis. By-pass oscillator anode to chassis with 0.25 μF condenser to stop oscillation. Feed in 127 KC/S signal between chassis and **V2** top cap via 0.002 μF condenser and adjust I.F. trimmers **C29, C28, C27, C26** in that order for maximum output. A loading resistance of 65,000 Ω must be employed in view of the band-pass characteristics of the transformers. When tuning the primary of either transformer, the resistance is connected across the secondary, and when the secondary is tuned the load is applied to the primary.

Signal Frequency and Oscillator Circuits.—After the I.F. alignment has been carried out the by-pass condenser in the oscillator circuit should be removed together with the F.C. resistance (replace top cap) and the frame aerial terminals shorting wire. All signal frequency and oscillator adjustments are made with the gang condenser vanes fully out of mesh, and with the volume control at maximum, the input signal being kept as low as possible. Connect 0.5 MΩ resistance across terminals normally holding red and black frame aerial leads, and, with wave-change switch set at M.W., feed in a 196 m. (1,530 KC/S) signal via a 0.002 μF condenser to the same two terminals. Adjust M.W. oscillator trimmer **C24** for maximum output, bearing in mind that if more than one peak is obtained that nearer to minimum capacity is correct. Next adjust H.F. M.W. trimmer **C20.** Check calibration at top of scale ; if low, it is fairly certain that **C24** is tuned to incorrect peak.

Set wavechange switch to L.W. and feed in 775 m. (387 KC/S) signal (with gang at minimum capacity as before). Adjust L.W. oscillator trimmer **C23,** and then H.F. trimmer **C21,** both for maximum output. Finally, feed in 846 m. (354 KC/S) signal and re-adjust **C23,** observing in this instance that the correct peak is the one nearer to maximum capacity. Do not re-adjust **C21.**