'TRADER' SERVICE SHEET 212

PILOT U355, CU355 AND RU355

A SHORT-WAVE range of 16-52 metres is covered by the Pilot U355 3-band A.C. superhet, in which there is fitted a 4-valve (plus rectifier) chassis with sockets for an extension speaker and a jack for a gramophone pick-up. The chassis is suitable for mains of 200-250 V, 50-60 C/S, and is housed in a horizontal cabinet with the speaker on the left.

A similar chassis is also fitted in the CU355 console receiver and the RU355 radio-gramophone, but this *Service Sheet* was prepared on a U355 table model.

CIRCUIT DESCRIPTION

Aerial input via coupling coils **L2** (S.W.), **L4** (M.W.) and **L6** (L.W.), to single tuned circuits **L3, C30** (S.W.), **L5, C30** (M.W.) and **L7, C30** (L.W.), which precede variable-mu heptode frequency changer valve (**V1, Pilot 6A7**). 261 m. filter **L1, C26** in aerial circuit on L.W. only.

Oscillator grid coils **L8** (S.W.), **L10** (M.W.) and **L12** (L.W.) are tuned by **C31**; parallel trimming by **C32** (S.W.), **C33** (M.W.) and **C35, C6** (L.W.); series tracking by **C5** (S.W.), **C34** (M.W.) and **C36** (L.W.); anode reaction coils **L9** (S.W.), **L11** (M.W.) and **L13** (L.W.).

Single variable-mu pentode intermediate frequency amplifier (**V2, Pilot 6D6**) operates with tuned-primary tuned-secondary transformer couplings **C37, L14, L15, C38** and **C39, L16, L17, C40.**

Intermediate frequency 456 KC/S.

Diode second detector is part of double diode triode valve (**V3, Pilot 75**). Audio-frequency component in rectified output is developed across load resistance **R12** and passed via coupling condenser **C14** and manual volume control **R11** to C.G of triode section, which operates as A.F. amplifier. Provision for connection of gramophone pick-up across volume control by jack.

D.C. potential developed across **V3** diode load resistance is fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop along **V3** cathode resistance **R15.** Tone correction in anode circuit of **V3** by **C17.**

Resistance capacity coupling by **R14, C19** and **R17** between **V3** triode and pentode output valve (**V4, Pilot 42**). Variable tone control across **T1** primary by **R16, C18**; fixed tone correction in anode circuit by condenser **C23.** Provision for connection of high impedance external speaker across primary of internal speaker transformer **T1.** Isolation from H.T. supply by coupling condensers **C20, C21.**

H.T. current is supplied by full-wave rectifying valve (**V5, Pilot 80-S**). Smoothing by speaker field coil **L20** and dry electrolytic condensers **C24** and **C25.**

DISMANTLING THE SET

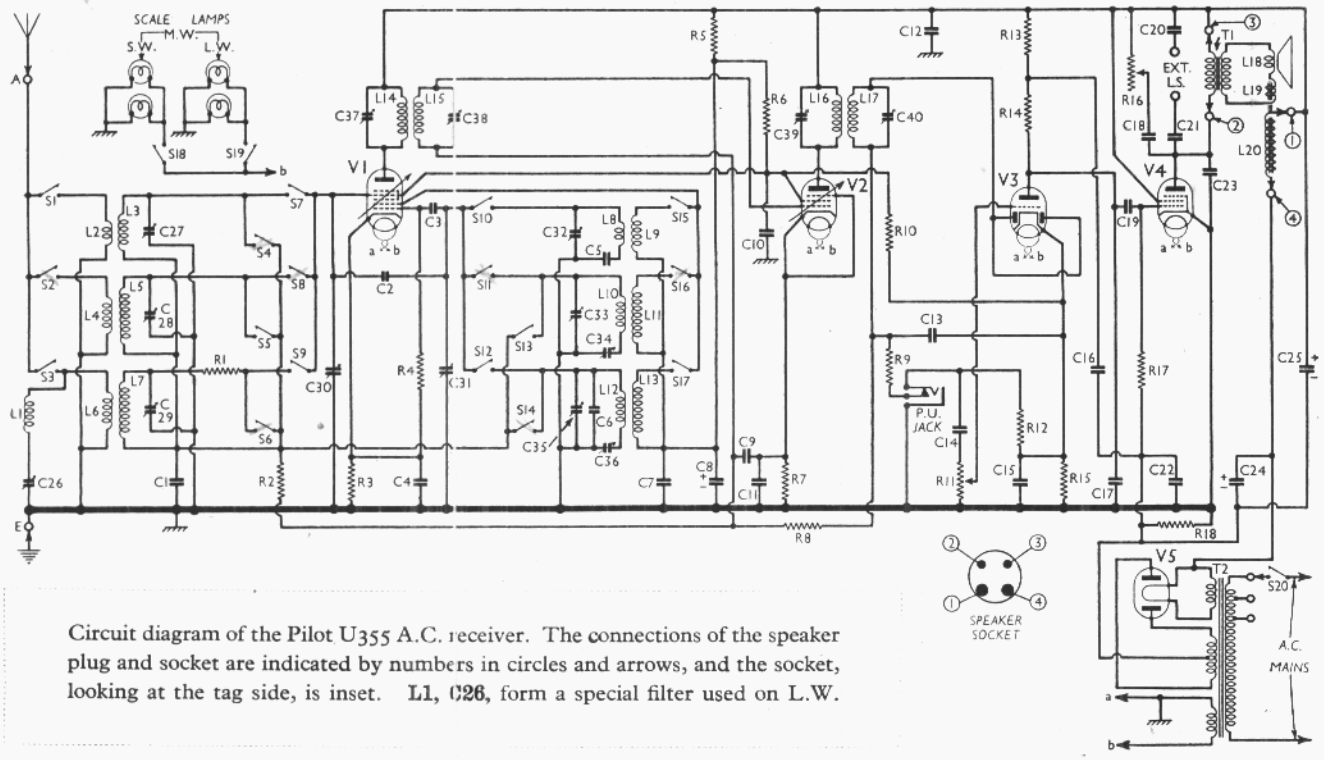
Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the three small control knobs (pull off) and the large tuning knob (recessed grub screw), and the felt washers from the spindles. Next remove the four bolts (with washers and spring washers) holding the chassis to the bottom 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, withdraw the speaker plug from the socket at the back of the chassis.

Removing Speaker.—To remove the speaker from the cabinet, remove the nuts and fibre washers from the four bolts holding it to the sub-baffle and *when replacing*, see that the transformer is on the right.

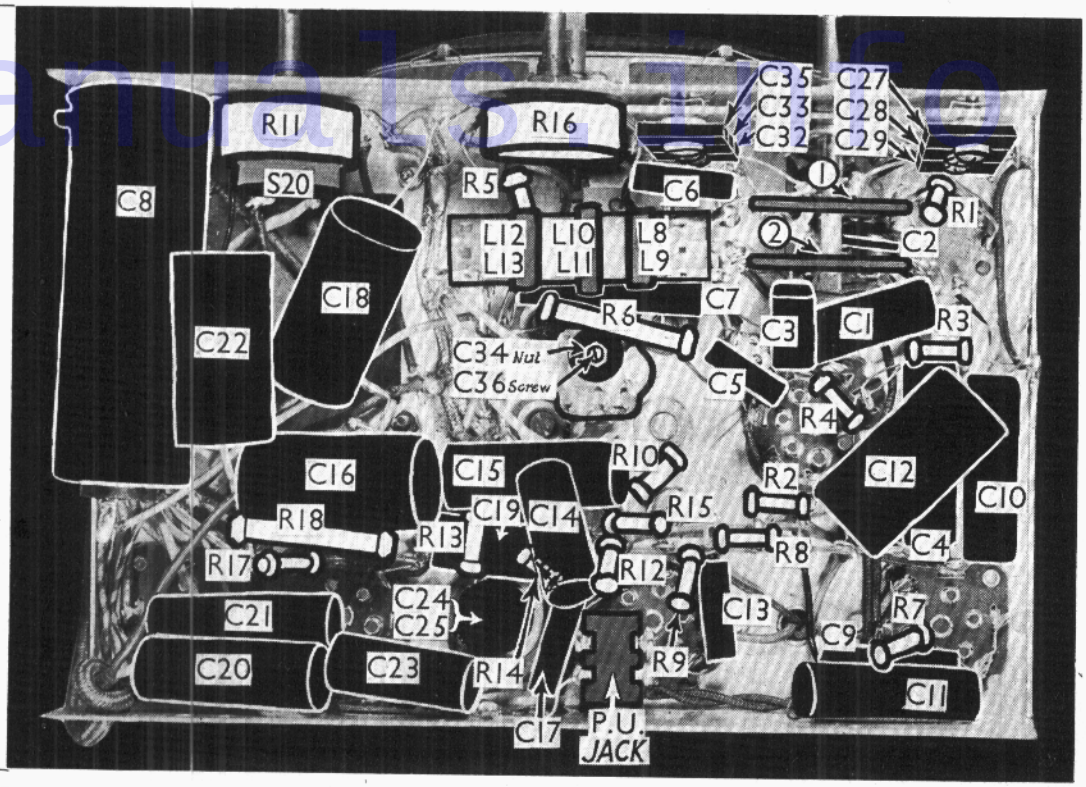
COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	Aerial circuit L.W. stabiliser	50
R2	V1 C.G. decoupling	1,000,000
R3	V1 fixed G.B. resistance	400
R4	V1 osc. C.G. resistance	50,000
R5	V1 osc. anode decoupling	3,000
R6	V1, V2 S.G. decoupling	15,000
R7	V2 fixed G.B. resistance	400
R8	A.V.C line decoupling	1,000,000
R9	I.F. stopper	50,000



Circuit diagram of the Pilot U355 A.C. receiver. The connections of the speaker plug and socket are indicated by numbers in circles and arrows, and the socket, looking at the tag side, is inset. **L1, C26,** form a special filter used on L.W.

Under - chassis view. The switch units are indicated, and are shown in detail on page VIII. Most of the trimmers are in two groups of three at the front of the chassis. The trackers **C34** and **C36** are in a dual unit, adjusted by a nut and screw.



RESISTANCES (*Continued*)		Values (ohms)
R10	Part of V1, V2 S.G. feed and V3 G.B. pot.	30,000
R11	Manual vol. control	750,000
R12	V3 diode load resistance	300,000
R13	V3 anode decoupling	50,000
R14	V3 anode load	250,000
R15	Part of V3 G.B. potentiometer	420
R16	Manual tone control	1,000,000
R17	V4 C.G. resistance	500,000
R18	V4 G.B. resistance	250

CONDENSERS		Values (μF)
C1	V1 C.G. decoupling	0·05
C2	Small coupling	Very low
C3	V1 osc. C.G. condenser	0·00005
C4	V1 cathode by-pass	0·1
C5	Osc. S.W. fixed tracker	0·006
C6	Osc. L.W. fixed trimmer	0·000025
C7	V1 osc. anode decoupling	0·05
C8*		10·0
C9	V2 C.G. decoupling	0·05
C10	V1, V2 S.G. decoupling	0·05
C11	V2 cathode by-pass	0·1
C12	H.T. line by-pass	0·1
C13	I.F. by-pass	0·00025
C14	Coupling to V3 triode	0·01
C15	V3 cathode by-pass	0·25
C16	V3 triode anode decoupling	0·1
C17	V3 triode anode tone corrector	0·00025
C18	Part of tone control filter	0·05
C19	V4 C.G. coupling	0·01
C20	Ext. L.S. coupling	0·05
C21		0·05
C22	V4 C.G. decoupling	0·5
C23	V4 anode tone corrector	0·005
C24*	H.T. smoothing	8·0
C25*		8·0
C26‡	Aerial 261 m. filter tuning	—
C27‡	Aerial circuit S.W. trimmer	—
C28‡	Aerial circuit M.W. trimmer	—
C29‡	Aerial circuit L.W. trimmer	—
C30†	Aerial circuit tuning condenser	0·000405
C31†	Osc. circuit tuning condenser	0·000405
C32‡	Osc. circuit S.W. trimmer	—
C33‡	Osc. circuit M.W. trimmer	—
C34‡	Osc. circuit M.W. tracker	0·0006
C35‡	Osc. circuit L.W. trimmer	—
C36‡	Osc. circuit L.W. tracker	0·00015
C37‡	1st I.F. trans. pri. tuning	—
C38‡	1st I.F. trans. sec. tuning	—
C39‡	2nd I.F. trans. pri. tuning	—
C40‡	2nd I.F. trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial circuit 261 m. filter coil	1·4
L2	Aerial circuit S.W. coupling	1·4
L3	Aerial circuit S.W. tuning	Very Low
L4	Aerial circuit M.W. coupling	25·0
L5	Aerial circuit M.W. tuning	3·4
L6	Aerial circuit L.W. coupling	120·0
L7	Aerial circuit L.W. tuning	70·0
L8	Osc. circuit S.W. tuning	0·5
L9	Osc. circuit S.W. reaction	0·55
L10	Osc. circuit M.W. tuning	6·0
L11	Osc. circuit M.W. reaction	2·0
L12	Osc. circuit L.W. tuning	14·5
L13	Osc. circuit L.W. reaction	5·5
L14	1st I.F. trans. Pri.	6·75
L15	1st I.F. trans. Sec.	6·75
L16	2nd I.F. trans. Pri.	11·0
L17	2nd I.F. trans. Sec.	11·0
L18	Speaker speech coil	1·6
L19	Hum neutralising coil	0·2
L20	Speaker field coil	1,300·0
T1	Speaker input trans. Pri.	700·0
	Speaker input trans. Sec.	0·2
T2	Mains transformer Pri. total	36·0
	Mains transformer Heat. sec.	0·1
	Mains transformer Rect. fil. sec.	0·05
	Mains transformer H.T. sec. total	450·0
S1-17	Waveband switches	—
S18-19	Scale lamp switches	—
S20	Mains switch, ganged R11	—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 230 V, using the 220 V tapping on the mains transformer. The set was tuned to the lowest wavelength on the medium band and the volume control was at maximum. There was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, with chassis as negative.

If **V2** should become unstable when measurements are being made of its anode or screen current, it can be stabilised by connecting a non-inductive condenser of about 0·1 μF from the control grid (top cap) to chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 6A7*	255	1·8	90	3·1
V2 6D6	255	6·5	90	1·5
V3 75	90	0·4	—	—
V4 42	230	34·0	255	5·6
V5 80-S	310†	—	—	—

* Oscillator anode (G2) 200 V, 7.5 mA.
† Each anode, A.C.

GENERAL NOTES

Switches.—**S1-S17** and **S18, S19** are the waveband and scale lamp switches, in two rotary units beneath the chassis. They are indicated in our under-chassis view, and shown in detail in the diagrams on page VIII, where they are seen looking from the front of the underside of the chassis.

The table (p. VIII) gives the switch positions for the three control settings, starting from fully anti-clockwise. O indicates open, and C, closed.

S20 is the Q.M.B. mains switch, ganged with the volume control, **R11**. There is also a pick-up jack switch at the rear of the chassis, and shown in the circuit in diagrammatic form. When a pick-up is inserted, the bottom of **R9** is disconnected from the top of **C14,** thus muting radio.

Coils.—**L1** is mounted on a bracket attached to the gang condenser, with **C26. L2-L7, L14, L15** and **L16, L17** are in three screened units on the chassis deck. The oscillator unit, **L8-L13,** is unscreened, and is on a tubular former beneath the chassis.

Scale Lamps.—These are four miniature bayonet cap types, rated at 6-8 V. They are switched in or out of circuit by **S18** and **S19** in the main switch assembly.

Continued overleaf

PILOT U355—*Continued*

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (10,000 Ω) external speaker. The sockets are fed from the anode circuit of **V4** via two fixed condensers **C20, C21.**

Condensers C24, C25.—These are two 8μF dry electrolytics in a single tubular metal container mounted on the chassis deck. The case is isolated, but a common negative tag is provided. The tag connected to **V5** filament is the positive of **C24** and the other tag the positive of **C25.**

Condenser C2.—This is a very small fixed condenser, formed of two tags riveted to a fibre strip, and connected across two tags on one of the switch units.

Trackers C34, C36.—These form a dual unit, beneath the chassis, roughly in its centre. The nut adjusts **C34,** and the screw, **C36.**

Speaker Connections.—A 4-pin plug and socket is used for connecting the speaker to the chassis. The plugs and sockets are indicated by numbered arrows and circles in the circuit diagram, at the bottom of which a diagram of the socket, looking at the connecting tag side, is given.

Chassis Divergencies. — The special filter, **L1, C26,** is not shown in the makers' diagram, but has been fitted on all recent chassis. It is in circuit on L.W. only, and is tuned to 261 m. to reject London National which sometimes produces a whistle on Luxembourg.

The decoupling circuit **R13, C16** is in our chassis, but not in the makers' diagram, while the connections of **R16** are altered so that the slider goes to **C18,** and not to the H.T. line as in the makers' diagram. **C8** is 10 μF in our chassis, not 4 μF.

In the RU355 radiogram, the pick-up jack is replaced by a change-over switch mounted on the motor board.

CIRCUIT ALIGNMENT

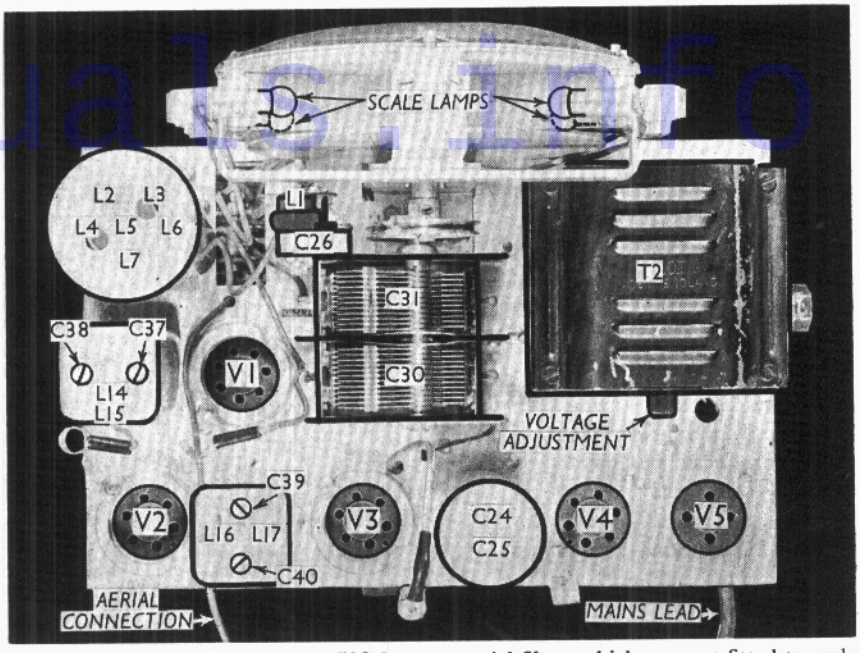
I.F. Stages.—Switch set to M.W., and turn gang to maximum. Connect signal generator to control grid (top cap) of **V2** through a 0·1 μF condenser, and to chassis. Feed in a 456 KC/S signal, and adjust **C39** and **C40** for maximum output. Transfer signal generator to top cap of **V1,** and similarly adjust **C37** and **C38.** Repeat the adjustment of all trimmers with the signal generator connected to **V1** top cap.

R.F. and Oscillator Stages.—Connect signal generator to **A** and **E** through a 0·0002 μF condenser. Switch set to M.W., and tune to 200 m. on scale. Feed in a 200 m. signal, and adjust **C33,** then **C28,** for maximum output. Feed in a 500 m. signal, tune it in on receiver, then adjust **C34** (nut) for maximum output, rocking the gang for optimum results. Repeat the 200 m. adjustments.

Switch set to S.W., tune to 16·6 m. on scale, feed in a 16.6 m. (18 MC/S) signal and adjust **C32** and **C27** for maximum output. Fixed tracking is used on this band, so there is no adjustment at the top of the band.

Switch set to L.W., tune to 800 m. on scale, feed in an 800 m. signal, and adjust **C35** and **C29** for maximum output. Feed in an 1,875 m. signal, tune it in, and adjust **C36** (screw) for maximum output, rocking the gang for optimum results. Repeat the 800 m. adjustments.

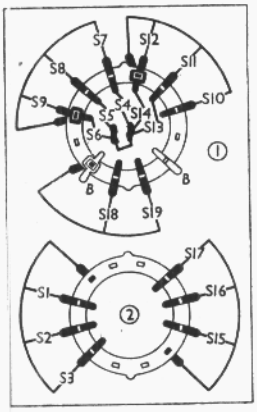
261 m. Filter.—This is used to eliminate a whistle on Luxembourg, due to London National, which is sometimes encountered. It is best to adjust **C26** when listening to the actual whistle, if this is present.



Plan view of the chassis. **L1** and **C26** form a special filter, which was not fitted to early chassis.

SWITCH TABLE AND DIAGRAM

Switch	L.W.	M.W.	S.W.
S1	O	O	C
S2	O	C	O
S3	C	O	O
S4	C	C	O
S5	C	O	C
S6	O	C	O
S7	O	O	C
S8	O	C	O
S9	C	O	O
S10	O	O	C
S11	O	C	O
S12	C	O	O
S13	O	O	C
S14	O	C	C
S15	O	O	C
S16	O	C	O
S17	C	O	O
S18	O	C	C
S19	C	C	O



The two switch units, as seen from the front of the underside of the chassis.

MAINTENANCE PROBLEMS

Set "Struck By Lightning"

CALLING in for some new components a home constructor remarked that his set had been struck by lightning.

The receiver proved to be a 3-valve type with two A.F. valves, used with a D.C. power pack, and had every sign of being struck, as the aerial coil was a charred mass! According to the blueprint, the aerial had been directly connected to a tapping on the aerial coil.

A resistance test was made between aerial and earth, and though reading O.K. at first, when the lead-in was moved in one particular direction, a short circuit resulted. Examination revealed that both aerial and earth lead were taken through the same hole in the window-sill, and the insulation had broken down.

The cause of the burn-out was then obvious. The positive pole of the mains was earthed, and as no isolating condenser was fitted in the aerial lead, the mains were short-circuited *via* the aerial coil. To crown everything, the eliminator was connected to the power circuit, the fuses of which were examined and found to be—bell-wire!—J. B., BASINGSTOKE.

High Background in Ekco B74

AFTER being used a year or two many Ekco B74 receivers develop a bad background hiss on all powerful stations.

A check up on all components in the F.C. and I.F. stages failed to reveal any defect, but it was found that a 0·25 μF condenser connected directly across screening grids of the F.C. and I.F. valves increased the volume and reduced this carrier hiss to a barely audible level.—F. R. ELLORY, PAR, CORNWALL.

Printed in Great Britain as a supplement to *The Wireless Trader* for the proprietors and publishers, *The Trader Publishing Co., Ltd.*, Dorset House, Stamford Street, London, S.E.1, by Sanders Phillips & Co., Ltd., The Baynard Press, Chryssell Road, London, S.W.9. Every Saturday.