'TRADER' SERVICE SHEET 267

AERODYNE 284

4-BAND BATTERY RECEIVER

TWO short-wave bands of 13-49 and 48-170 metres are covered by the Aerodyne 284 3-valve battery 4-band receiver. Its valve arrangement comprises a variable-mu pentode R.F. amplifier, a triode detector and a pentode output valve, and provision is made for the connection of an extension speaker.

CIRCUIT DESCRIPTION

Aerial input from **A1** on M.W. and L.W. via coupling coils **L1** (M.W.) and **L2** (L.W.) to capacity coupled band-pass filter. Primary coils **L3** (M.W.) and **L4** (L.W.) are tuned by **C17**; secondaries **L9** (M.W.), **L10** (L.W.) by **C20**; coupling by condensers **C3** and **C4**. On S.W. input is via **C2** and coupling coil **L5** (S.W.1), or **L6** (S.W.2) to single tuned circuits **L7, C20** (S.W.1) and **L8, C20** (S.W.2). From **A2** socket aerial input is fed to **A1** via series condenser **C1.**

First valve (**V1, Mullard metallised VP2**), is a variable-mu pentode operating as R.F. amplifier with gain control by potentiometer **R3** which varies G.B. applied.

Tuned-anode coupling by **L15, C23** (S.W.1), **L16, C23** (S.W.2), **L17, C23** (M.W.) and **L18, C23** (L.W.), between **V1** and triode detector valve (**V2, Mullard metallised PM2HL**) which operates on leaky grid system with **C8** and **R7.** Reaction is applied from anode by coils **L11** (S.W.1), **L12** (S.W.2), **L13** (M.W.) and **L14** (L.W.) and controlled by variable condenser **C21.** R.F. filtering in anode circuit by **R10, C10** and **L19.** Fixed tone correction by **C11.** Provision for connection of gramophone pick-up in grid circuit.

Parallel-fed auto-transformer coupling by **R9, C12** and **T1** between **V2** and pentode output valve (**V3, Mullard PM22A**). G.B. is obtained automatically from drop along potentiometer **R12, R13** in H.T. negative lead to chassis. Fixed tone correction by R.C. filter **C13, R11** in anode circuit. Provision for connection of low impedance external speaker across secondary of output transformer **T2.**

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 should be desired to remove the chassis from the cabinet, remove the detachable bottom (four round-head wood screws) and the four screws (with washers) holding the chassis to the bottom of the cabinet. Now remove the battery platform (pull out) and release the switch indicator control cord from the cleat holding it to the sub-baffle and unclip it from the indicator.

Next unhook and free from the drum on the tuning condenser the pointer drive cord, and free the scale lamp leads from the two staples holding them to the side of the cabinet. The chassis can now be withdrawn to the extent of the leads.

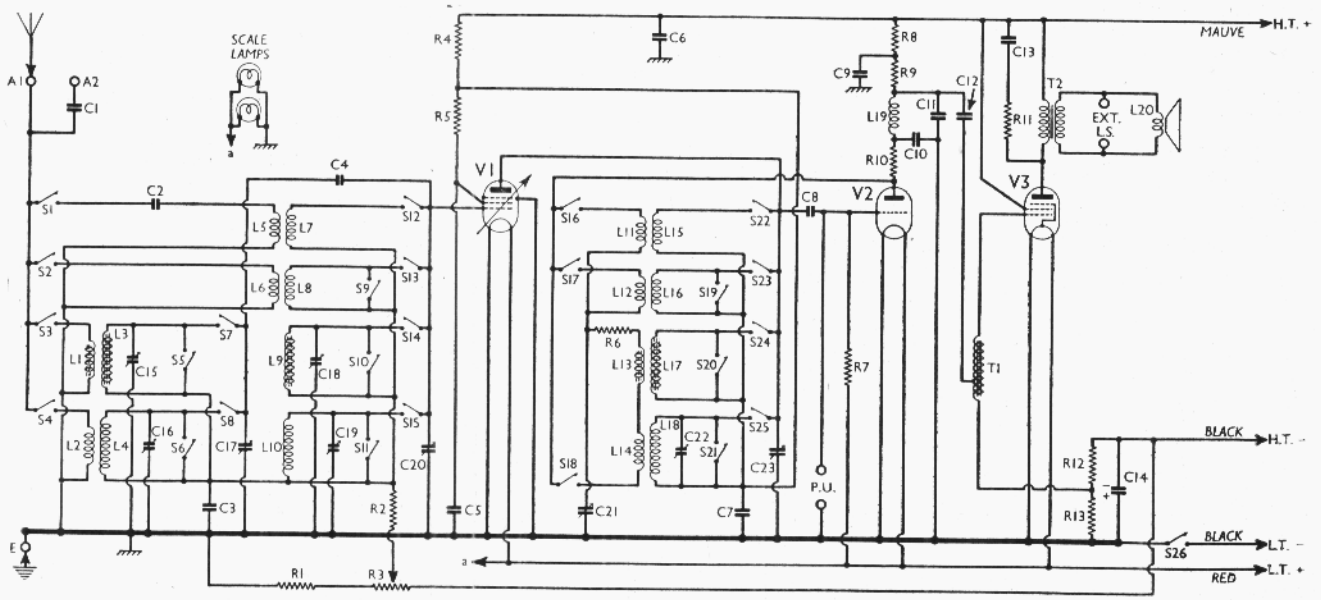
To free the chassis entirely, unsolder the leads to the scale lamps, speaker and extension speaker panel.

Removing Speaker.—To remove the speaker from the cabinet, slacken the three clamps (nuts and lock nuts) and remove the two round-head wood screws holding it to the sub-baffle. *When replacing,* see that the terminal panel points to the top right-hand corner of the cabinet.

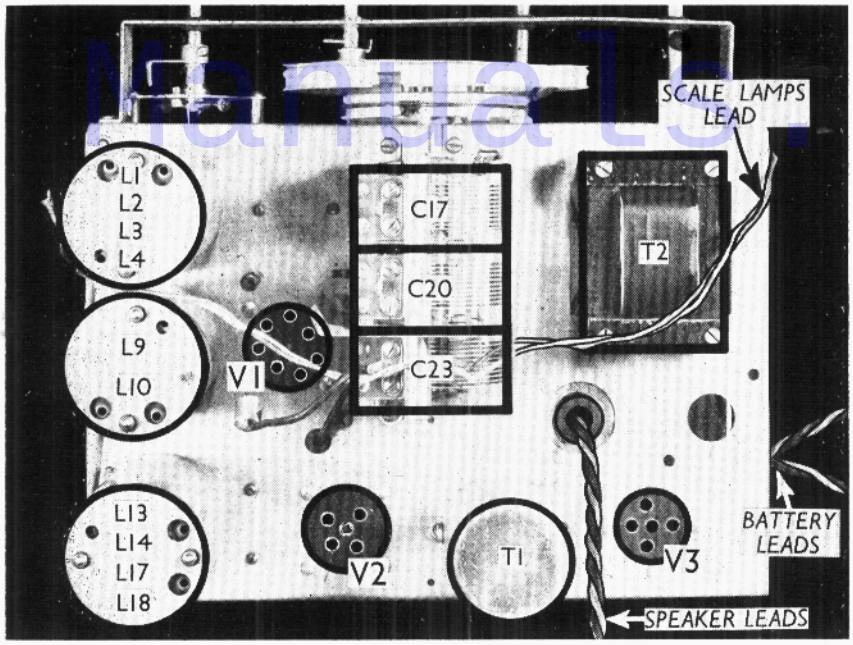
COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 fixed G.B. resistance ..	200
R2	V1 C.G. decoupling	30,000
R3	V1 gain control	10,000
R4	V1 anode and S.G. H.T. feed	2,000
R5	V1 S.G. H.T. feed	2,000
R6	M.W. and L.W. reaction damping	1,000
R7	V2 grid leak	2,000,000
R8	V2 anode decoupling	10,000
R9	V2 anode load	30,000
R10	V2 anode R.F. stopper ..	5,000
R11	Part of fixed T.C. filter ..	20,000
R12, R13	V3 automatic G.B. potential divider ..	1,000 380

	CONDENSERS	Values (μF)
C1	A2 aerial series condenser ..	0·001
C2	Aerial S.W. series condenser	0·00003
C3	Band-pass bottom coupling ..	0·05
C4	Band-pass top coupling ..	0·000003
C5	V1 S.G. decoupling	0·1
C6	H.T. circuit by-pass ..	1·0
C7	V1 anode decoupling ..	0·1
C8	V2 C.G. condenser	0·00003
C9	V2 anode decoupling ..	1·0
C10	V2 anode R.F. by-pass ..	0·0003
C11	Fixed tone corrector	0·001
C12	V2 to V3 A.F. coupling ..	0·1
C13	Part of fixed T.C. filter ..	0·01
C14*	Automatic G.B. decoupling ..	25·0
C15‡	Band-pass pri. M.W. trimmer	0·00003
C16‡	Band-pass pri. L.W. trimmer	0·00003
C17†	Band-pass primary tuning ..	0·00044
C18‡	Band-pass sec. M.W. trimmer	0·00003
C19‡	Band-pass sec. L.W. trimmer	0·00003
C20†	Band-pass sec. and S.W.1, S.W.2 aerial tuning ..	0·00044
C21†	Reaction control	0·00075
C22‡	V1 anode circ. L.W. trimmer	0·00003
C23†	V1 anode circuit tuning ..	0·00044



Circuit diagram of the Aerodyne 284 4-band battery receiver.



Plan view of the chassis. All the trimmers are beneath the chassis.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial M.W. coupling	0·3
L2	Aerial L.W. coupling	15·0
L3	Band-pass primary coils	1·3
L4		15·0
L5	Aerial S.W.1 coupling	0·3
L6	Aerial S.W.2 coupling	0·7
L7	Aerial S.W.1 tuning coil	0·05
L8	Aerial S.W.2 tuning coil	0·3
L9	Band-pass secondary coils	1·3
L10		15·0
L11	S.W.1 reaction coil	0·4
L12	S.W.2 reaction coil	0·7
L13	M.W. reaction coil	3·5
L14	L.W. reaction coil	
L15	V1 anode S.W.1 tuning coil	0·05
L16	V1 anode S.W.2 tuning coil	0·25
L17	V1 anode M.W. tuning coil	1·3
L18	V1 anode L.W. tuning coil	15·0
L19	V2 anode R.F. choke	35·0
L20	Speaker speech coil	2·25
T1	Intervalve transformer, total	5,000·0
T2	Output trans. Pri.	1,000·0
	Sec.	0·2
S1-S25	Waveband switches	—
S26	L.T. circuit switch	—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating with an H.T. battery reading 130 V, on load. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but the reaction control was at minimum. There was no signal input.

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 VP2	112	1·5	110	0·4
V2 PM2HL	62	1·0	—	—
V3 PM22A	111	5·4	117	1·0

GENERAL NOTES

Switches.—**S1-S25** are the waveband switches, in three rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams on page IV, where they are seen looking from the rear of the underside of the chassis.

The table (p. IV) gives the switch positions for the four control settings, starting from fully anti-clockwise. A dash indicates open, and **C** closed.

S26 is the Q.M.B. L.T. circuit switch, ganged with gain control **R3.**

Coils.—**L1-L4**; **L9, L10** and **L13, L14, L17, L18** are in three screened units on the chassis deck. The S.W. coils **L5, L7**; **L6, L8**; **L11, L15** and **L12, L16** are on four tubular formers beneath the chassis; and are unscreened. The choke **L19** is also beneath the chassis.

The auto-transformer **T1** is in a screened unit on the chassis deck.

Scale Lamps.—These are two Osram M.E.S. types, rated at 2.5 V, 0.2 A.

External Speaker.—Two sockets are provided on a panel at the right of the back of the cabinet for a low impedance (2-3 Ω) external speaker.

Condenser C4.—This is a small capacity coupling between the top of **C17** and the top of **C20** in our chassis. In the makers' diagram it is from the top of **L3** to the top of **L9,** and so is only in circuit on M.W.

The coupling is shown on our diagram as a single condenser, but it actually consists of a tinned copper wire, with a few turns at each end taken round the insulated leads from **C17** and **C20** respectively. It is marked in our under chassis view.

Condensers C6, C9.—These are two 1 μF paper types in a rectangular metal case beneath the chassis. The tag nearest the front of the chassis is common to both condensers. Of the others, that going to **R9** and **R8** belongs to **C9,** and that connected to **R8** and **R4** belongs to **C6.**

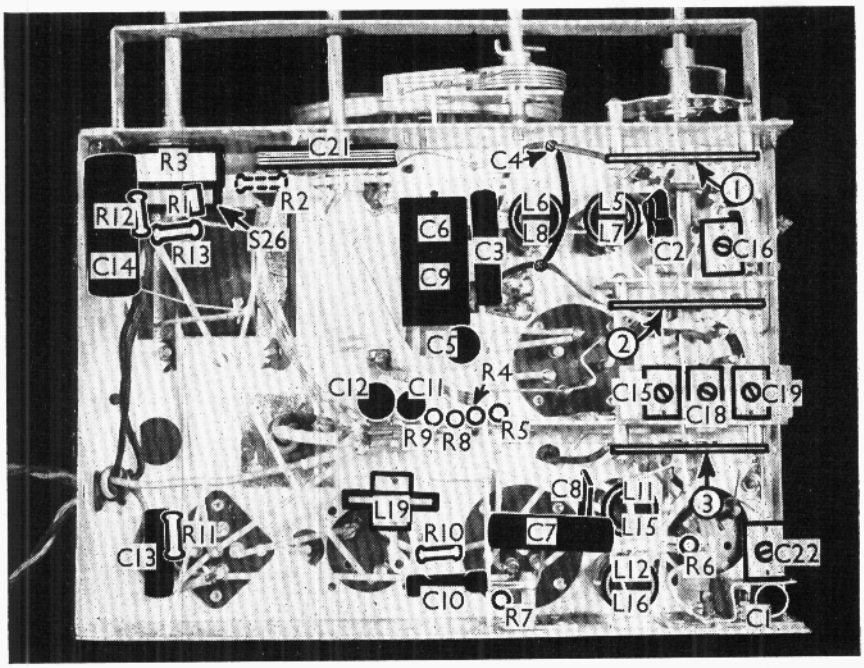
Batteries.—L.T., 2 V accumulator cell. H.T., 130 V dry H.T. battery. G.B. is automatic.

Battery Leads and Voltages.—Black lead, spade tag, L.T. negative; red lead, spade tag, L.T. positive 2 V; black lead and plug, H.T. negative; mauve lead, red plug, H.T. positive 130 V.

CIRCUIT ALIGNMENT

S.W.1. and **S.W.2.**—There are no trimmers for the S.W.1 and S.W.2 ranges, alignment being effected at the works by the disposition of the anode coil wiring at the lower ends of the wavelength scales, and by moving the top turn of **L15** and **L16** at the higher ends of the wavelength

Continued overleaf



Under-chassis view. The small condenser **C4** is explained under General Notes.

SPEEDY and EFFICIENT SERVICE—*Continued from page I.*

to familiarise him with the new season's work.

Part of the procedure for every repair includes re-aligning and repolishing, which is carried out before the foreman makes his final test, a team of three polishers being permanently employed. All coil winding is carried out on the premises.

The general lay-out is exceedingly good, giving the department a clean, orderly and efficient appearance. The polishers (with their own "In" and "Out" racks) and the in and out repair racks occupy one side of the department; the racks for those sets awaiting parts and those whose parts have just arrived completely fill a wall running along the back, whilst along the other side runs the service bench. The position of the test bench enables the foreman to keep a fatherly eye on all sections of the department.

Book-keeping systems enable the manager to state immediately the position of a job, to check up a price, to say if the set has been in previously, and to decide which sets are more prone to breakdown, this last intelligence being used when future buying is being planned.

In conclusion, the writer would like to express thanks to Mr. Cornell for his frankness and courtesy and to endorse his appreciation of the work put in by Mr. Mac Farlane, to whom a considerable amount of the organisation is due.

E.A.W.S.

MAINTENANCE PROBLEMS

Unusual Modulation Hum

THE receiver in for service was a Pye CR/AC and after two-and-a-half years' use it showed various resistance deviation faults, and in addition the spider was broken away from the speaker cone. These faults were rectified and when the receiver was put on test the performance was satisfactory, after making due allowance for a drop in the emission of the valves.

When the set was connected up for further tests on actual stations the following day it was noticed that bad modulation hum was present on strong signals. The fault at first appeared very puzzling, but a clue was given when it was noticed that the tuning indicator needle jumped up when the earth wire was connected, thus indicating a reduction of bias.

A quick measurement showed a 20,000 Ω leak between grid and cathode of the first valve. A further test showed that the leak was across aerial and earth. The aerial was of the basket type, and the day was wet.

A further glance at circuit diagram showed the aerial to be directly coupled to the grid of first valve via choke coils, thus offering a low impedance path to grid for any developed A.C. hum voltage. This part of the circuit is in a fairly strong hum field, and the voltage developed across the 20,000 Ω aerial leak was modulating signals. Although the particular type of circuit in question would be susceptible to a fault such as has been described, other aerial circuits of a different nature could not show the fault even when it was present, and on dry days the leak would not have been present in any case.

The aerial was dismantled and rewound with new wire and a condenser of small capacity placed in the aerial lead as a further precaution should the leak again show itself.—W. SMITH, HAVERFORDWEST.

Intermittent O.C. in Tracker

A COMPLAINT was received that an A.C. superhet receiver was giving intermittent signals, the trouble being experienced on the long waves only. It was also stated that the fault could be cleared by turning the wavechange switch.

On test this was confirmed, but no fault was evident in the switch or its associated wiring. It was suspected that moving the switch only caused vibration of the chassis and had no relation to the fault itself. Tapping the chassis confirmed this supposition, as the fault could also be cleared in this manner. Further tests revealed that the oscillator was inactive when the fault appeared.

The coils were found to be normal and the long wave tracking condenser came under suspicion. A new condenser placed across this component produced normal results, and the faulty part was removed. Tests on a capacity bridge showed an intermittent open circuit. The new condenser was fitted and the receiver became normal.—W. G. GOUGH, WORCESTER.

Faults in Oscillator Circuit

WE had in for repair recently an American A.C. superhet with the complaint that it would receive no stations. Valves were tested and found O.K., and H.T. supplies were O.K. except in the case of the oscillator, the anode voltage of which was lower by about 50 per cent. than was expected. Very little notice was taken of this, as some American sets work on low voltage at this point.

The wire on to the oscillator anode came from a coil, so the input voltage was checked and proved to be about 100 V. As no service sheets were available for the set it was presumed that a resistance was in series with the coil in the can.

It was decided, however, to examine the oscillator coils, and these were removed, after a decoupling condenser had been taken out to enable the coil can fixings to be reached. The medium wave winding for the oscillator was found to have the wire from one end twisted round a tag instead of soldered; a white powder had formed, making a high resistence joint. Cleaning and resoldering cured the trouble until the decoupling condenser was replaced, then the set failed again.

This time the decoupling condenser was found to be short-circuited, and it was replaced. The set then functioned properly, after being re-aligned.—W. BAMPKIN, NORTHAMPTON.

AERODYNE 284—*Continued*

scales. The top turns of **L7** and **L8** are also adjusted at the higher ends of the wavelength scales, using critical reaction.

Normally these adjustments will not be necessary.

M.W.—Switch set to M.W., feed a 250 m. signal into **A1** and **E** sockets, tune to 250 m. on scale, and adjust **C15** and **C18** for maximum output.

L.W.—Switch set to L.W., feed in a 1,200 m. signal, tune to 1,200 m. on scale, and adjust **C22**, then **C19** and **C16** for maximum output.

For optimum results on M.W. and L.W., the receiver should be maintained just short of oscillation.

Switch Table

Switch	L.W.	M.W.	S.W.2	S.W.1
S1	—	—	—	C
S2	—	—	C	—
S3	—	C	—	—
S4	C	—	—	—
S5	—	—	C	—
S6	—	C	—	—
S7	—	C	—	—
S8	C	—	—	—
S9	—	—	—	C
S10	—	—	C	—
S11	—	C	—	—
S12	—	—	—	C
S13	—	—	C	—
S14	—	C	—	—
S15	C	—	—	—
S16	—	—	—	C
S17	—	—	C	—
S18	C	C	—	—
S19	—	—	—	C
S20	—	—	C	—
S21	—	C	—	—
S22	—	—	—	C
S23	—	—	C	—
S24	—	C	—	—
S25	C	—	—	—

Switch Diagram

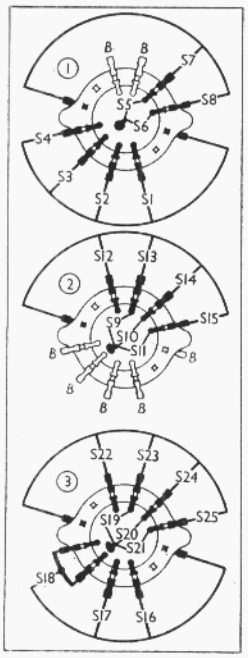


Diagram of the three switch units, as seen from the rear of the underside of the chassis. Tags marked **B** are blank.