'TRADER' SERVICE SHEET 229

AERODYNE 67

3-BAND BATTERY RECEIVER

A SHORT-WAVE range of 16·5-50 metres is covered by the Aerodyne 67 3-valve 3-band battery-operated receiver. It has a variable-mu pentode R.F. amplifier, a triode detector and a pentode output valve, and includes provision for a gramophone pick-up and an extension speaker. Two alternative aerial sockets are fitted, one bringing a Droitwich rejector into circuit.

CIRCUIT DESCRIPTION

Two alternating aerial input connections. **A1** includes Droitwich rejector **L1, C10** and **A2** connects direct to coupling coils **L6** (S.W.), **L2** (M.W.) and **L4** (L.W.). On M.W. and L.W. input is via capacity-coupled band-pass filter. Primaries **L3** (M.W.), **L5** (L.W.), are tuned by **C11**; secondaries **L8** (M.W.), **L9** (L.W.) are tuned by **C15**; common coupling condenser **C1.** On S.W. band input is via single-tuned circuit comprising **L7** and **C15.**

First valve (**V1, Mullard metallised VP2**) is a variable-mu pentode operating as R.F. amplifier with gain control by potentiometer **R2,** shunted across G.B. battery, which varies bias applied.

Tuned anode coupling by **L11, C20** (S.W.), **L13, C20** (M.W.) and **L14, C20** (L.W.) between **V1** and triode detector (**V2, Mullard metallised PM2HL**) which operates on grid leak system with **C6** and **R4.** Reaction is applied from anode by coils **L10** (S.W.) and **L12** (M.W. and L.W.) and controlled by variable condenser **C17.** Provision for connection of gramophone pick-up in grid circuit. R.F. filtering in anode circuit by chokes **L16** (S.W.) and **L15** (M.W. and L.W.) and condenser **C4** (M.W. and L.W. only).

Parallel fed auto-transformer coupling by **R5, C7** and **T1** via R.F. stopper **R7** between **V2** and pentode output valve (**V3, Mullard PM22A**). Fixed tone correction in anode circuit by R.C. filter **R8, C9.** Provision for connection of low-impedance external speaker across secondary of internal speaker transformer **T2.**

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Band-pass coupling	0·02
C2	V1 S.G. R.F. by pass	0·1
C3	V1 S.G. and anode decoupling	1·0
C4	V2 anode M.W. and L.W. R.F. by-pass	0·0003
C5	V1 anode R.F. by-pass	0·1
C6	V2 grid condenser	0·00004
C7	A.F. coupling to T1	0·1
C8	V2 anode decoupling	1·0
C9	Part of T.C. filter	0·01
C10‡	Droitwich rejector tuning	0·002
C11†	Band-pass primary tuning	0·00035
C12‡	Band-pass primary trimmer	—
C13‡	Band-pass sec. L.W. trimmer	0·000035
C14‡	Band-pass sec. M.W. trimmer	0·000035
C15†	Band-pass sec. and S.W. tuning	0·00035
C16‡	Aerial S.W. trimmer	—
C17†	Reaction control	0·0005
C18‡	V1 anode circuit L.W. trimmer	0·000035
C19‡	V1 anode circuit M.W. trimmer	0·000035
C20†	V1 anode circuit tuning	0·00035

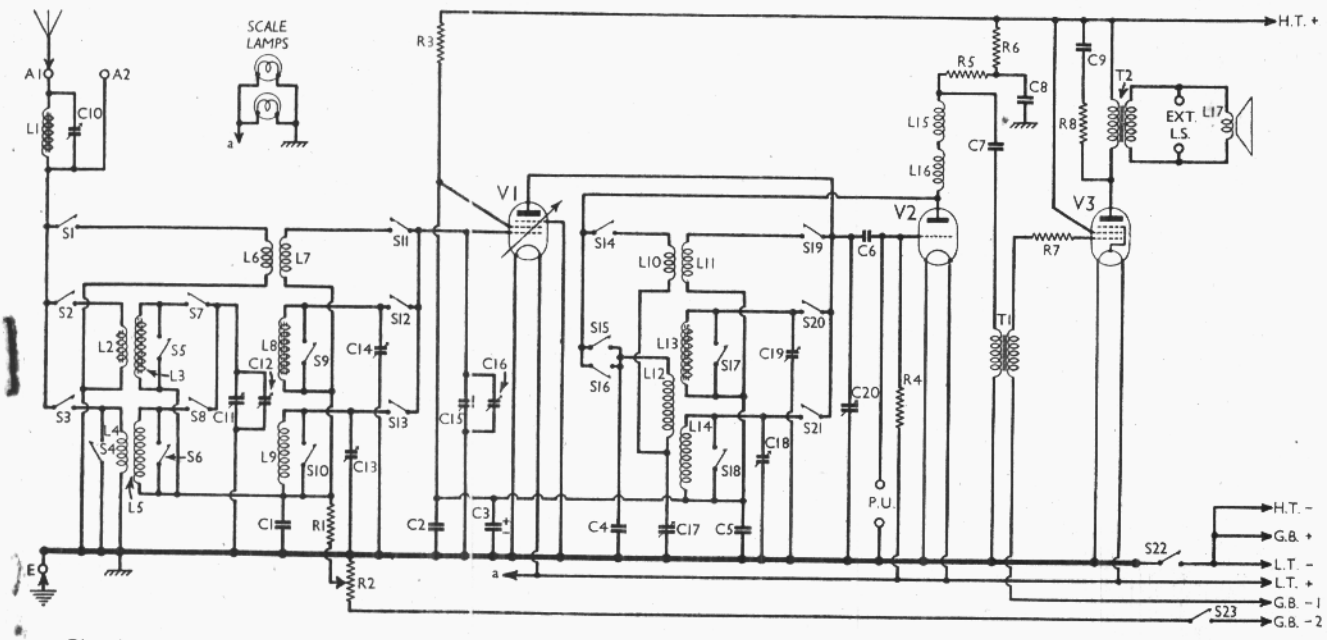
* Electrolytic. † Variable. ‡ Pre-set.

	RESISTANCES	Values (ohms)
R1	V1 C.G. decoupling	50,000
R2	V1 gain control	10,000
R3	V1 S.G. and anode H.T. feed	2,000
R4	V2 grid leak	2,000,000
R5	V2 anode load	40,000
R6	V2 anode decoupling	10,000
R7	V3 C.G. R.F. stopper	250,000
R8	Part of T.C. filter	20,000

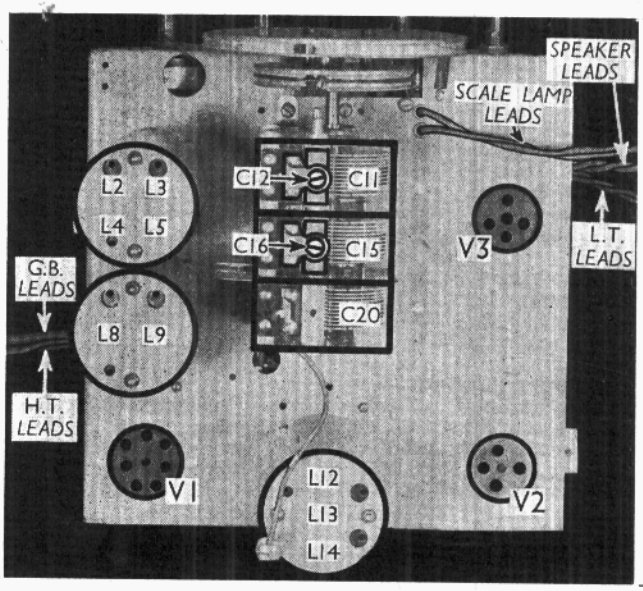
	OTHER COMPONENTS	Approx. Values (ohms)
L1	Droitwich rejector coil	1·5
L2	Aerial M.W. coupling coil	0·3
L3	M.W. band-pass primary	1·4
L4	Aerial L.W. coupling coil	16·0
L5	L.W. band-pass primary	17·0
L6	Aerial S.W. coupling coil	0·3
L7	Aerial S.W. tuning coil	0·05
L8	M.W. band-pass seconary	1·4
L9	L.W. band-pass secondary	18·0
L10	S.W. reaction coil	0·5
L11	V1 anode S.W. tuning coil	0·05
L12	M.W. and L.W. reaction coil	3·0
L13	V1 anode M.W. tuning coil	1·4
L14	V1 anode L.W. tuning coil	17·0
L15	V2 anode M.W. and L.W. R.F. choke	200·0
L16	V2 anode S.W. R.F. choke	8·0
L17	Speaker speech coil	2·2
T1	Intervalve trans. Pri. / Sec.	1,200·0 / 4,000·0
T2	Speaker input trans. Pri. / Sec.	700·0 / 0·25
S1-S21	Waveband switches	—
S22	H.T., L.T. and G.B. + circuit switch	—
S23	G.B. —circuit switch	—

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet,



Circuit diagram of the Aerodyne 67 3-band battery receiver. Note that the M.W. coils (except reaction) are iron-dust cored.



Plan view of the chassis. The S.W. coils are not included in the cans, but are beneath the chassis. The scale lamps are mounted on the scale assembly inside the cabinet.

first remove the four control knobs (recessed screws) and the three bolts (with washers) and the two round-head wood screws holding the chassis to the bottom of the cabinet.

Now unhook the switch indicator control cord from the indicator and free it from the cleat holding it to the front of the cabinet, and unhook the scale pointer drive cord from the drum on the tuning condenser. The chassis can now be withdrawn to the extent of the speaker and scale lamp leads, which should be sufficient for normal purposes.

To free the chassis entirely, unsolder the leads from the scale lamps and free them from the two staples holding them to the side of the cabinet, and unsolder the speaker leads.

When replacing, connect the speaker leads to the two outer tags on the transformer.

Removing Speaker.—To remove the speaker from the cabinet, slacken the three clamps (with nuts and lock nuts) holding it to the sub-baffle. *When replacing*, see that the transformer is pointing to the top right-hand corner of the cabinet.

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 120 V on load, and a 9 V G.B. battery. 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 1,200 V scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VP2	115	1·9	115	0·7
V2 PM2HL	60	0·7	—	—
V3 PM22A	118	3·1	120	0·6

GENERAL NOTES

Switches.—**S1-S21** are the wavechange switches, in three ganged rotary units beneath the chassis, indicated by numbers in circles in the under-chassis view. The arrows show the directions in which the units are viewed in the diagrams on page IV. The table (p. IV) gives the switch positions for the three control settings, starting from fully anti-clockwise, O indicating open, and **C** closed.

S22 and **S23** are the battery circuit switches, of the Q.M.B. type, in one unit ganged with the gain control, **R2.** The two tags on the right, looking from the rear of the chassis, belong to **S22,** while the two close together on the left belong to **S23.**

Coils.—**L1** is beneath the chassis; **L2-L5, L8, L9** and **L12-L14** are in three screened units on the chassis deck; while **L6, L7** and **L10, L11** are on two tubular units beneath the chassis. **L7** and **L11** are the thick wire windings, **L6** and **L10** each consisting of a few turns of fine wire interwound with **L7** and **L11** respectively. **L15** and **L16** are also beneath the chassis.

External Speaker.—Two sockets are provided on **T2** terminal panel for a low resistance (about 2O) external speaker.

Scale Lamps.—These are two Osram M.E.S. types, rated at 2·5 V, 0·2 A, and wired in parallel.

Chassis Divergencies. — In earlier versions of the chassis, slight differences in components and values may occur. Thus **R8** may not be used, while **C9** may be 0·005 μF, or 0·001 μF. **C3** may not occur in early models.

Batteries.—A 2 V L.T. cell, and separate 120 V H.T. and 9 V G.B. batteries are required.

Battery Leads and Voltages.—Black lead, spade tag, L.T. negative; red lead, spade tag, L.T. positive 2 V; black braided lead and plug, H.T. negative; red braided lead and plug, H.T. positive 120 V; red rubber lead and plug, G.B. positive; white rubber lead, yellow plug, G.B. negative 1, −4·5 V; black rubber lead, green plug, G.B. negative 2, −9 V. Where the volume cannot be reduced sufficiently by the gain control, G.B.-2 should be increased to 15 V.

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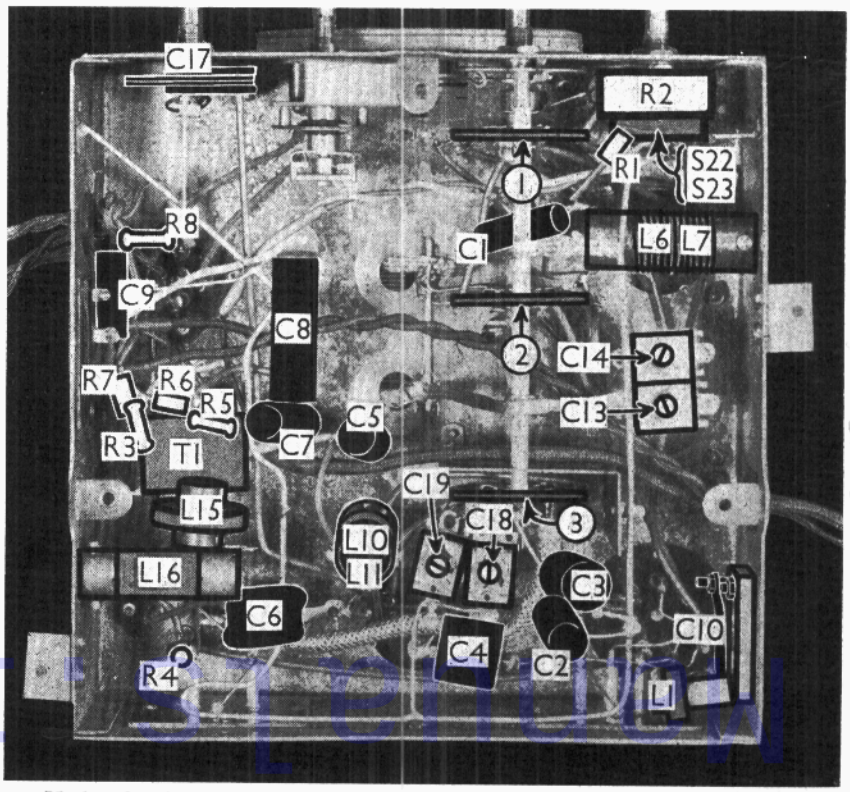


Under-chassis view. Note the three switch units, shown in detail on page IV.

MAINTENANCE PROBLEMS

Scale Lamps Cause Ripple

WE had in for service a Pye SP/AC, the trouble being a noisy background on long waves only, in the form of a perfect ripple, exactly like an electric motor running close at hand.

A great deal of time was spent on this repair and it was almost given up as a job for the works, when, upon giving the chassis a final check over I opened the switch contacts controlling the dial bulbs with a screwdriver. Of course the lights immediately went out, leaving the set still running, but without the ripple noise.

Upon removing the bulbs and cleaning both the centre contacts, and the contacting plate, the set functioned quite normally. I have never known a bad contact to give an A.C. ripple before; it has always been crackle or mush.—D. FISK, IPSWICH.

Weather Affects Set

A PHILIPS 588U receiver worked perfectly except that sometimes on being switched on a loud crackling noise would come on and keep up for about twenty minutes. The set would then settle down and work normally.

The set had twice been tested by the suppliers' service man and had been also returned to the makers for their examination. In each case a charge was made and once a new valve had been fitted.

I gave it all the usual tests but found no loose wires and no apparently faulty components, and for two weeks it was perfect. I had almost decided that it had healed itself in transit when one Sunday morning the noise started. I went over every inch of the wiring, testing for dry joints, faulty condensers, broken windings and anything that could possibly go wrong in it.

Eventually I found that trouble, mostly by good luck I admit. One of the tags on one of the coils had three wires soldered to it. An excessive amount of solder had been used and the surplus lump at the bottom was almost but not quite touching the chassis. But in damp weather, there was enough moisture in the air to condense and make a partial short circuit. When the set had been used for a short while the heat generated was sufficient to dry out the fault and the set worked O.K.

That sounds a bit silly but it does rain in Manchester, as you may have heard. Anyway, during the first two weeks I had the set the weather was dry and the day before the fault developed it rained.

However, I made a clean joint and returned the set, and it was still working all right two months later.—W. ROBERTS, MANCHESTER.

H.T. Shorted in Pye Baby Q

NO results at all were obtainable from a Pye Baby Q, and tests quickly showed that there was no H.T. at the anode of the third valve. Having removed the chassis, an apparent O/C was found at the low potential end of the 30,000 O coupling resistance. This was removed but was found to be O.K.

With a meter between earth and the anode of the third valve all components associated with this valve were disconnected in turn to see if there was a leak to earth. Nothing provided a clue till the screened lead going to the reaction winding was open circuited, when a reading of normal voltage was obtained.

Tracing this lead showed a small tag fixed low down on the coil former which had turned towards, and was touching, the chassis. An adjustment of this put matters right.

It was noticed that when the chassis was replaced the tuning pointer fouled and was inside the cabinet. Instead of taking out the chassis, we removed the moulded escutcheon and owing to the pointer being pliable, it was possible to draw it through the hole and set it straight. Pye's latest service notes give this warning.—F. SHUTER, EASTBOURNE.

Instability Due to Gang

INSTABILITY on the long waves only was found in a Pye TT, so all screening was carefully checked, resistances and condensers were checked for values and insulation, and even new valves were tried, but motor-boating would persist on Droitwich only.

It was then noticed that the rotors of the 3-gang condenser were not quite in the centre of the stators, so these were adjusted by moving the set screws provided for this purpose at each end of the casing. The set was then re-ganged and, to my surprise, all instability had vanished for good.

Since then this has been tried on several other sets of this model, with the same success.—DONALD W. YOUNG, CORSHAM.

Whistling in Pye MM

IN my experience a common fault in the Pye MM transportables is whistling at certain settings of the volume control. This is caused by the 10 μF electrolytic condenser which decouples the R.F. valve's bias supply losing its capacity.—DONALD W. YOUNG, CORSHAM.

Distortion on Loud Volume

SEVERE distortion was experienced in an H.M.V. 440 on loud passages or if the volume control was well advanced. At low volume no distortion was noticed.

I eventually discovered that the anode of the MPT4 output pentode was taking about 15 mA more than it ought, but tests on the G.B. circuit as regards insulation, resistance and capacity showed no fault.

Then I noticed that the condenser decoupling the MH4 (detector) anode supply was returned not to earth but to the G.B. line of the MPT4. This condenser had a small leak which was not noticeable even on a 0-1 milliammeter inserted in series with it the condenser.

On returning this condenser direct to earth quality was quite up to standard and the MPT4 anode consumption was correct within a few milliamps.—DONALD W. YOUNG, CORSHAM.

AERODYNE 67—*Continued*

CIRCUIT ALIGNMENT

S.W.—Feed in a 19 m. signal from the signal generator to the **A2** and **E** sockets. Tune it in on the receiver, and adjust **C16** for maximum output, rocking the gang for optimum results. Feed in a 50 m. signal and tune it in. If set needs re-alignment here and calibration is correct, adjust loose turn on **L7** so that the minimum amount of reaction is needed to cause the set to oscillate. If calibration is wrong at 50 m., adjust loose turn on **L11** first, then proceed as above with **L7.**

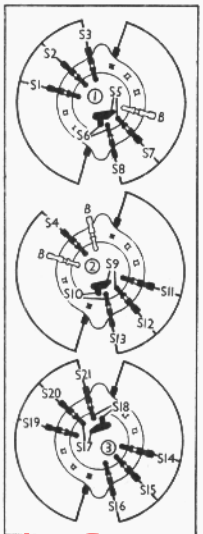
Switch	L.W.	M.W.	S.W.
S1	O	O	**C**
S2	O	**C**	O
S3	**C**	O	O
S4	O	**C**	O
S5	O	O	**C**
S6	O	**C**	O
S7	O	**C**	O
S8	**C**	O	O
S9	O	O	**C**
S10	O	**C**	O
S11	O	O	**C**
S12	O	**C**	O
S13	**C**	O	O
S14	O	O	**C**
S15	O	**C**	O
S16	**C**	O	O
S17	O	O	**C**
S18	O	**C**	O
S19	O	O	**C**
S20	O	**C**	O
S21	**C**	O	O

M.W.—Adjust **C19** for correct calibration at 250 m., then adjust **C14** and **C12.**

L.W.—Whilst rocking the gang slightly adjust **C18** for maximum signals at 1,300 m., then adjust **C13.**

C16 should not be touched after it has been adjusted for S.W.

Droitwich Rejector.—Feed in a 1,500 m. signal to **A1** and **E,** tune it in, and adjust **C10** (at side of chassis) for *minimum* output.



Aerodyne 67 switch diagrams, looking from the rear of the underside of the chassis. The three units are indicated in our under-chassis view. On the left is the table of switch positions.