MBER NINETY-FOUR 'TRADER' SERVICE SHEETS

ACE MODEL S6

5-VALVE (Plus Rectifier) A.C. SET

A SPECIAL muting valve is used in the Ace Radio S6 5-valve (plus rectifier) superhet for A.C. mains of 200-250 V. The set has alternative aerial sockets, and provision is made for both a gramophone pick-up and an extension speaker.

CIRCUIT DESCRIPTION

Two alternative aerial connections (**A1** via fixed series condenser **C1**) to inductively coupled band-pass input filter. Primary **L1, L2** tuned by **C20**; secondary **L5, L6** tuned by **C22**; coupling coils **L3, L4.**

First valve (**V1, Tungsram metallised V04**) is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L7, L8** tuned by **C24**; anode reaction coils **L9, L10**; tracking by means of shaped condenser vanes and **C26, C32** (L.W.).

Second valve, a variable-mu H.F. pentode (**V2, Tungsram metallised HP4106**) operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **L11, L12** and **L13, L14**. Moving-iron meter visual tuning indicator **T.I.** in anode H.T. feed circuit.

Intermediate frequency 125 KC S.

Diode second detector forms part of double diode triode valve (**V4, Tungsram metallised DDT4**). Second diode, fed from **V2** anode via condenser **C14** provides direct current potential which is developed across load resistance **R15** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves. Delay voltage is obtained from **V4** cathode resistance **R11.**

Audio-frequency component in output from signal diode is developed across manual volume control **R7,** and passed via coupling condenser **C11** to grid of **V4** triode section which operates as L.F. amplifier. Provision for connection of gramophone pick-up by switch **S7.** On gram., **S8** breaks H.T. line to **V1** and **V2** anodes and thus prevents radio break-through.

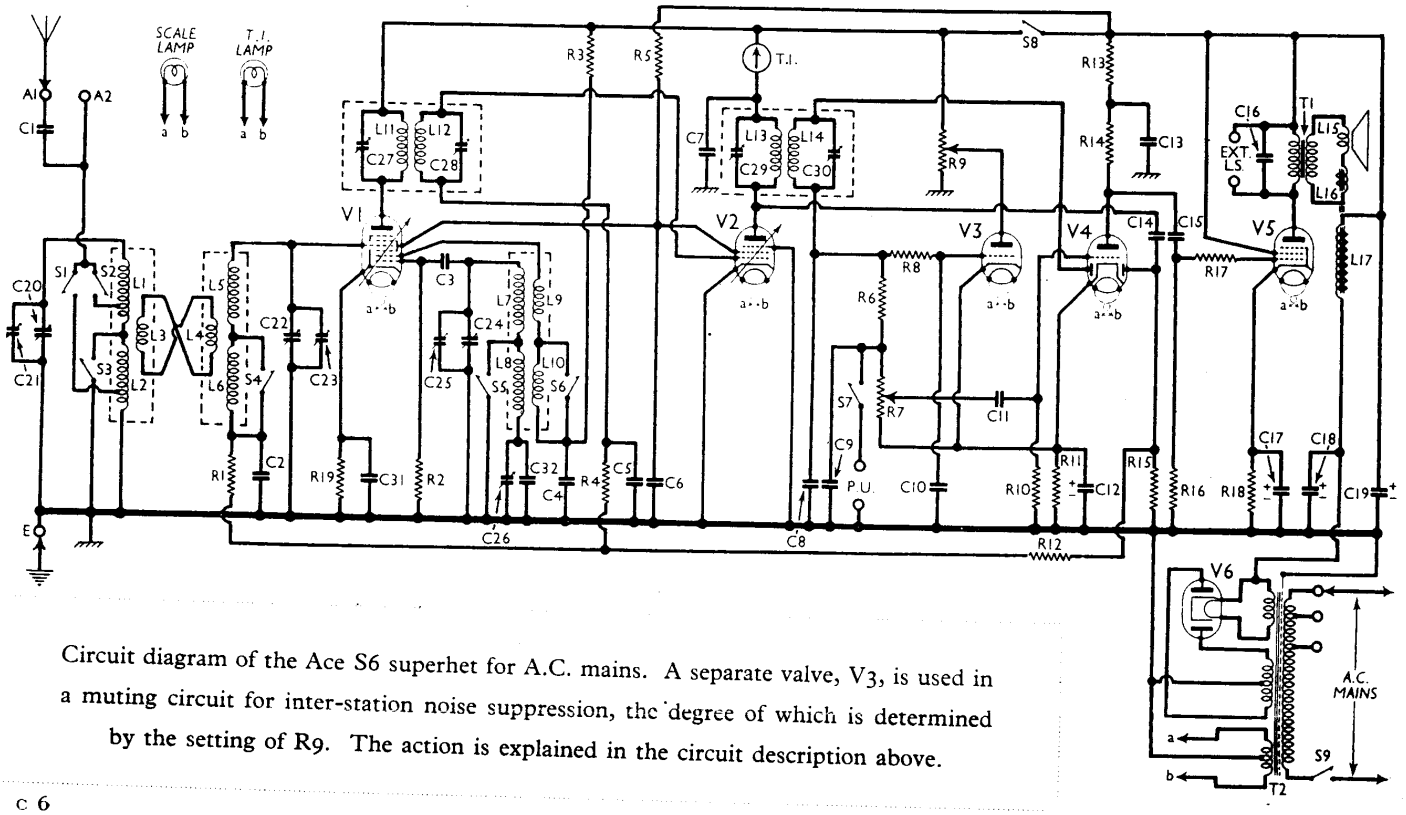
V3 is a triode (**Tungsram metallised HL4**) operating as muting valve to give inter-station noise suppression. When a station is tuned in the D.C. potential developed across **R6** and **R7** by reason of the carrier wave is applied through **R8** as negative G.B. to **V3,** with the result that the anode current of the valve is reduced to a negligible value. Immediately the receiver is off tune, the bias is removed from **V3** grid and the anode current increases. The **V4** G.B. resistance **R11** is common also to **V3** cathode, so that any increase of anode current in **V3** will increase the voltage drop along **R11** and thus the G.B. applied to **V4** triode grid. Resistance values are so chosen that the bias applied when the receiver is off tune is excessive, with the result that the L.F. valve is paralysed and gives no amplification. Thus, between stations, the L.F. end of the receiver is "dead." Control of the muting valve is exercised by means of a variable potentiometer **R9,** which supplies the anode current.

Resistance-capacity coupling by **R14, C15** and **R16** to output pentode (**V5, Tungsram APP4120**). Tone correction by fixed condenser **C16** in anode circuit. Provision for connection of high impedance external speaker across primary of internal speaker transformer **T1.**

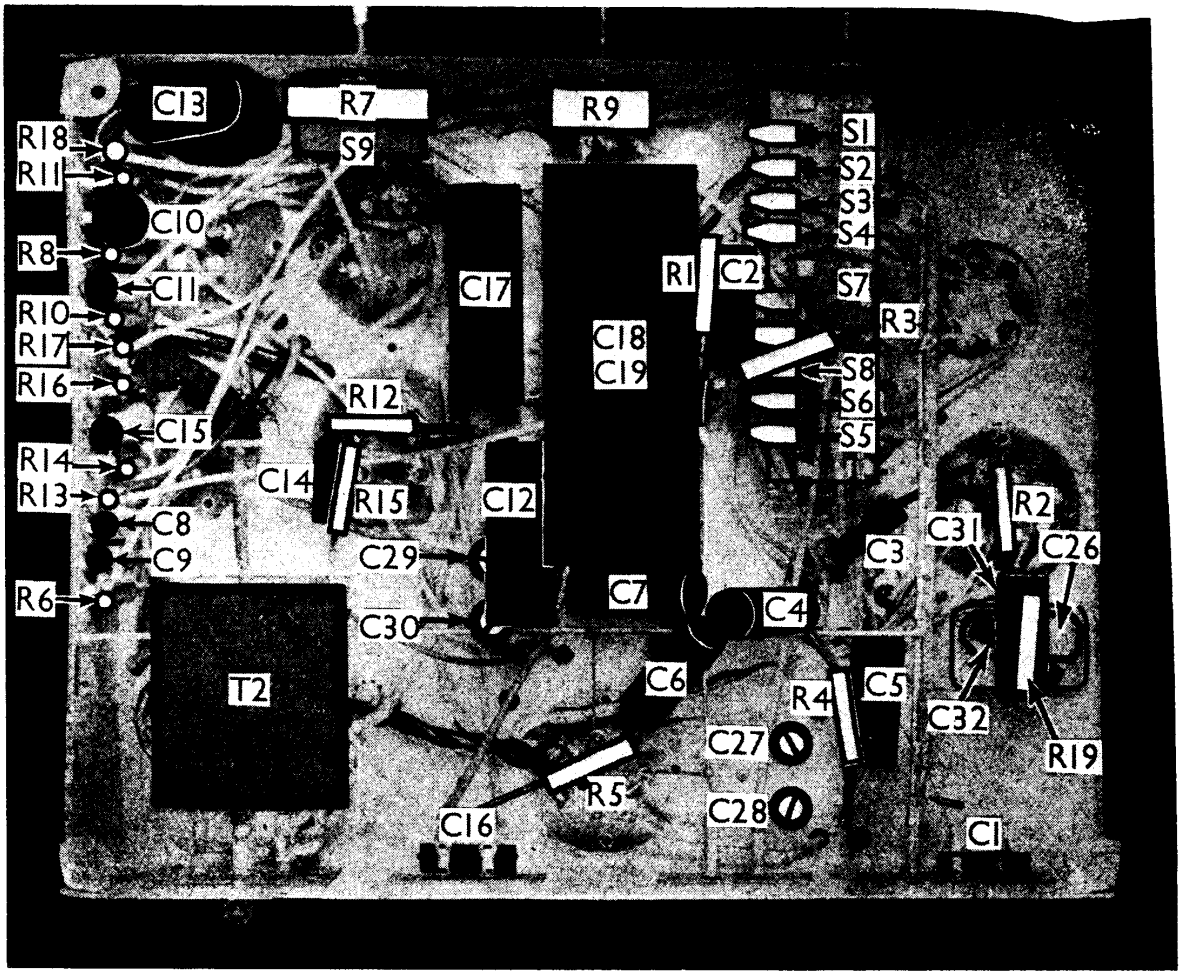
H.T. current is supplied by I.H.C. full-wave rectifying valve (**V6, Tungsram APV4200**). Smoothing by speaker field coil **L17** and dry electrolytic condensers **C18, C19.**

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the back (four screws), the four control knobs (recessed grub screws), the four chassis fixing bolts (with washers), the two small countersunk-head wood screws holding the tuning dial to the cabinet front and the tuning indicator from the front of the cabinet (two screws). By lifting the chassis up slightly, it can now be removed from the cabinet to the



Circuit diagram of the Ace S6 superhet for A.C. mains. A separate valve, V3, is used in a muting circuit for inter-station noise suppression, the degree of which is determined by the setting of R9. The action is explained in the circuit description above.



Under - chassis view. The switch unit between S4 and S7 is blank. C26 (adjustable through a hole in the chassis deck) is in parallel with the fixed condenser C32. C27 C28, C29 and C30 are the I.F. transformer trimmers.

extent of the speaker leads. These are not very long, but should be enough to allow of normal repairs being carried out.

To free the chassis entirely, unsolder the leads from the speaker. *When replacing*, connect as follow, numbering the tags from bottom to top:—1, red; 2, yellow; 3 and 4 joined together, black.

Removing Speaker.—To remove the speaker from the cabinet, remove the four round-head wood screws holding it to the sub-baffle. *When replacing*, see that the transformer is pointing to the bottom right-hand corner of the cabinet.

COMPONENTS AND VALUES

	Resistances	Values (ohms)
R1	V1 pent. cont. grid decoupling	1,000,000
R2	V1 osc. grid resistance ..	50,000
R3	V1 osc. anode decoupling ..	25,000
R4	V2 cont. grid decoupling ..	1,000,000
R5	V1 and V2 S.G.'s H.T. feed	25,000
R6	I.F. stopper	100,000
R7	V4 signal diode load; vol. control	250,000
R8	V3 grid resistance	1,000,000
R9	V3 anode resistance; muting control	50,000
R10	V4 triode grid resistance ..	250,000
R11	V4 cathode resistance.. ..	10,000
R12	A.V.C. line decoupling ..	1,000,000
R13	V4 anode decoupling ..	100,000
R14	V4 anode load	50,000
R15	V4 A.V.C. diode load ..	500,000
R16	V5 grid resistance	250,000
R17	V5 grid I.F. stopper	50,000
R18	V5 G.B. resistance	400
R19*	V1 fixed G.B. resistance ..	300

* May not appear in some chassis.

	Condensers	Values (μF)
C1	Aerial series condensers ..	0·0003
C2	V1 pent. cont. grid decoupling	0·1
C3	V1 osc. grid condenser ..	0·0001
C4	V1 osc. anode decoupling ..	0·1
C5	V2 cont. grid decoupling ..	0·1
C6	V1 and V2 S.G.'s by-pass ..	0·1
C7§	V2 anode decoupling	0·1
C8	I.F. by-passes ..	0·0003
C9		0·0001
C10	V3 grid by-pass	0·1
C11	L.F. coupling to V4 triode ..	0·01
C12*	V4 cathode by-pass	8·0
C13	V4 triode anode decoupling ..	1·0
C14	Coupling to V4 A.V.C. diode..	0·0001
C15	L.F. coupling to V5	0·01
C16	Tone corrector	0·01
C17*	V5 cathode by-pass ..	25·0
C18*	H.T. smoothing ..	8·0
C19*		8·0
C20†	Band-pass primary tuning ..	—
C21‡	Band-pass primary trimmer ..	—
C22†	Band-pass secondary tuning ..	—
C23‡	Band-pass secondary trimmer	—
C24†	Oscillator tuning	—
C25‡	Oscillator main trimmer ..	—
C26‡	Oscillator L.W. tracker ..	—
C27‡	1st I.F. trans pri. tuning ..	—
C28‡	1st I.F. trans sec. tuning ..	—
C29‡	2nd I.F. trans. pri. tuning ..	—
C30‡	2nd I.F. trans. sec. tuning ..	—
C31§	V1 cathode by-pass	0·1
C32	Oscillator L.W. tracker, fixed	0·0003

* Electrolytic † Variable ‡ Pre-set
§ May not appear in some chassis.

	Other Components	Approx. Values (ohms)
L1	Band-pass primary coils	8·0
L2		27·0
L3	Band-pass coupling coils	0·2
L4		0·2
L5	Band-pass secondary coils	8·0
L6		27·0
L7	Oscillator tuning coils	7·0
L8		15·5
L9	Oscillator reaction coils	8·0
L10		4·5
L11	1st I.F. trans Pri.	85·0
L12	Sec.	85·0
L13	2nd I.F. trans. Pri.	85·0
L14	Sec.	85·0
L15	Speaker speech coil ..	2·3
L16	Hum neutralising coil.. ..	0·1
L17	Speaker field coil	2,500·0
T1	Speaker input trans. Pri. ..	220·0
	Sec. ..	0·25
T2	Mains trans. Pri. total ..	27·5
	Heat. sec. ..	0·1
	Rect. heat. sec	0·1
	H.T. sec. tot.	550·0
S1-S6	Waveband switches	—
S7	Gram. pick-up switch ..	—
S8	Radio muting switch (gram.)	—
S9	Mains switch, ganged R7 ..	—
T.I.	Tuning indicator	4,700·0

VALVE ANALYSIS

Valve voltages and currents given in the table below were measured with the receiver operating on mains of 230 V, using the 220-230 V tapping. The volume control was at maximum, the muting control was set to give *minimum* muting and the receiver was tuned to the lowest wavelength on the medium band, but there was no signal input.

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

(*Continued overleaf*)

ACE S6 — *Continued*

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 VO4*	220	0·3	70	4·0
V2 HP4106	100	6·0	70	2·2
V3 HL4 ..	220	3·0	—	—
V4 DDT4	120	Very low	—	—
V5 APP4120	215	29·0	220	4·5
V6 APV4200	340†	—	—	—

* Osc. anode (G2) 130 V, 4.1 mA.

† Each anode, A.C.

GENERAL NOTES

Switches.—**S1-S8** are ganged in a single unit beneath the chassis, and are indicated in our under-chassis view. One of the switches in the unit, between **S4** and **S7,** is not used. The table below gives the switch positions for the various control settings, O indicating open, and C, closed.

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

S9, the Q.M.B. mains switch, is ganged with the volume control **R7.**

Coils.—These are in five screened units on the chassis deck. The coils in each unit are indicated in our plan chassis view. The I.F. units also contain the I.F. trimmers, but these are not reached through holes in the screens, as is usual. Actually the trimmers are situated at the base of each unit, and are adjusted from beneath the chassis through holes in the chassis deck. Their positions are shown in the under-chassis view.

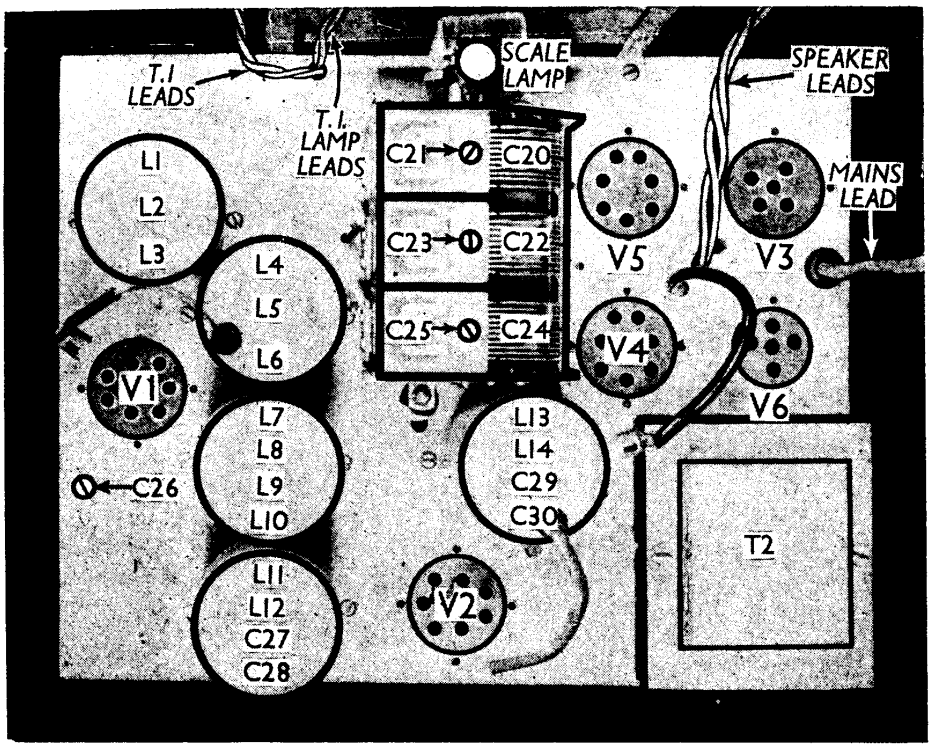
Scale and T.I. Lamps.—These are both M.E.S. types marked "8V" (no current rating is shown).

Tuning Indicator Circuit.—This is not shown in the makers' circuit diagram, while **C7** is also omitted in the makers' diagram. The indicator is of the moving-iron type, with a resistance of about 4,700 O. Of the leads from the chassis to the tuning indicator, the two yellow ones go to the lamp-holder, and the red and black ones to the positive and negative tags on the indicator casing.

External Speaker.—Two sockets are provided at the rear of the chassis for a high resistance external speaker.

Condenser C12.—This is an 8 μF 120 V D.C. working tubular dry electrolytic in our chassis, and not a 1 μF type as indicated by the makers.

Condenser C1.—This has a value of 0.0003 μF in our chassis, not 0.0001 μF.



Plan view of the chassis. C26 is the variable part of the oscillator L.W. tracker. Note that the I.F. cans are not provided with holes through which the trimmers can be adjusted, since the latter are mounted at the base of each unit, and are adjusted from beneath the chassis.

Condensers C18, C19.—These are two 8 μF dry electrolytics, in a single unit with a common negative (black) lead. The red lead to one of the external L.S. sockets is the positive of **C19,** the other red lead being the positive of **C18.**

Condenser C31, Resistance R19.—These automatic G.B. components are not shown in the makers' diagram, the cathode of **V1** being taken direct to chassis.

Condensers C26 and C32.—The trimmer **C26** in our chassis is in parallel with **C32,** a fixed 0.0003 μF tubular condenser. **C26** is operated through a hole in the chassis deck.

HINTS AND PROBLEMS

(*Continued from p. IV*)

A Troublesome Short Circuit

A six-valve portable battery superhet was received for service with the complaint that although the quality of reproduction was good, the volume had fallen to about half strength.

Upon switching on and testing receiver, results were found to be fairly good, but not up to standard on long waves, and definitely on the weak side on medium waves. It was noticed that rotating the knob of the trimmer condenser—which was connected in parallel with the main condenser for tuning the frame aerial—seemed to have little, if any, effect upon the results. However, before removing chassis it was decided to test batteries and valves, which proved to be O.K.

As this receiver is arranged for gramophone pick-up, one was connected, with the result that the output valves, the penultimate stage and the loud-speaker could be eliminated from suspicion.

The next thing to do was to remove chassis and examine that trimmer condenser; this was done, and the condenser and its connections tested and passed O.K. The I.F. transformers were checked over and also various other components. The frame aerial connections were intact, but it was decided to remove the M.W. aerial for inspection, and the cause of the trouble was soon apparent. The wooden frame supporting the windings was fixed to the cabinet by four brackets, which, in turn, were screwed to the frame, and the screws holding the brackets to the frame were passed through the surface over which the turns of wire were wound. One of the screw heads, of the countersunk type, was standing above the surface of the frame and in contact with two turns of the enamelled copper wire, thereby shorting-out one turn of the frame aerial and consequently making all the difference between poor and good volume.

When working on the M.W. band the L.W. frame winding was short-circuited by the wave-change switch, but when working on the L.W. band the two windings were in series, and apparently the short-circuiting of the one turn of wire on the M.W. frame affected the L.W. results as well, for when the shorted turn was insulated, results on both wave-bands were much improved—M. F.