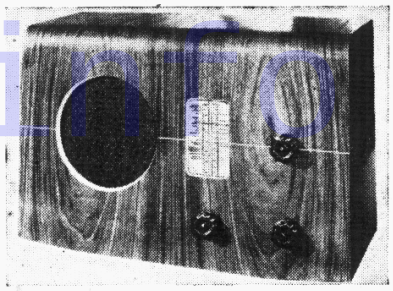
"TRADER" SERVICE SHEET

702

MURPHY AD32

AC/DC SUPERHET



THE first Murphy receiver designed to operate from AC or DC mains, the AD32, is a 3-valve (plus rectifier) 2-band superhet. The mains voltage range is 200-250 V, in six steps, 25-100 c/s in the case of AC.

Several unconventional features are embodied, including a special noise suppressor and a split HT reservoir capacitance.

Release date and original price: February, 1937; £8 5s.

CIRCUIT DESCRIPTION

Aerial input is via coupling coils **L1, L2** to inductively coupled band-pass circuit. Primary coils **L3, L4** are tuned by **C21**; secondaries **L6, L7** by **C23.** Coupling is principally by mutual inductance, but some capacitative coupling occurs via **C1.** Image suppression by **L5.**

First valve **(V1, Mazda metallised TP2620)** is a triode-pentode operating as frequency changer with cathode coupling. Triode oscillator anode coils **L10** (MW) and **L11** (LW) are tuned by **C26.** Parallel trimming by **C27** (MW) and **C25** (LW). Tracking by specially shaped vanes of **C26** (MW) and series capacitor **C6** (LW). **C7** has some influence on tracking on both bands, but is mainly an HT isolator. Reaction by cathode coils **L8, L9.**

Second valve **(V2, Mazda metallised VP1322)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C28, L12, L13, C29** and **C30, L14, L15, C31.**

Intermediate frequency 119 kc/s.

Diode second detector is part of double diode beam tetrode output valve **(V3, Mazda PenDD4021).** Audio frequency component in rectified output is developed across the manual volume control **R12,** which also operates as load resistor, and passed via AF coupling capacitor **C15** and filter resistors **R14, R13** to CG of tetrode section. IF filtering by **C13, R10, C14** in diode circuit, and **R14, R13** and the valve and lead capacitance in **V3** CG circuit.

Second diode of **V3,** fed from **V2** anode via **C16,** provides DC potentials which are developed along load resistors **R20, R21** and fed back through decoupling circuits to FC and IF valves, giving automatic volume control. Delay voltage, together with GB for tetrode section, is obtained from drop along resistors **R17, R18** in cathode lead to chassis.

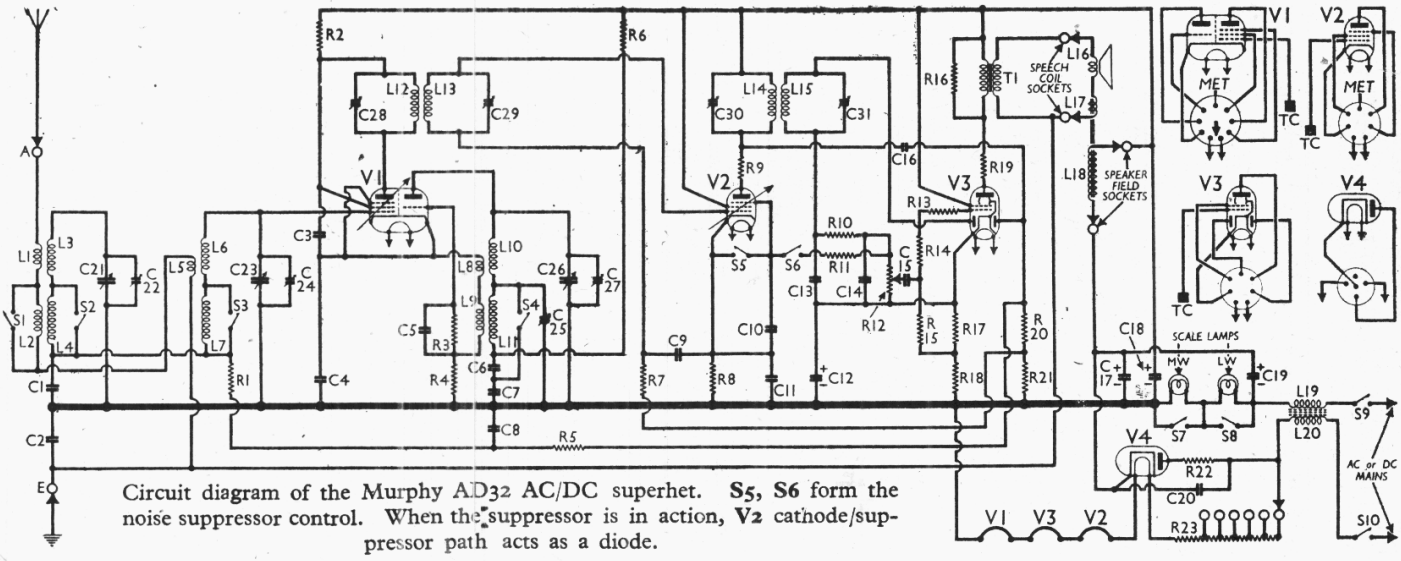
When the noise suppressor is switched into circuit, **S6** closes and **S5** opens. With no signal, the DC potential of **V3** cathode is applied to **V2** suppressor grid, making it positive with respect to its cathode so that it acts as a diode anode, with **R11, R12** as its load. **V3** signal diode is thus biased negatively, and the receiver is thus muted until a signal strong enough to exceed the bias arrives at the detector. When this occurs, **V2** suppressor is no longer positive with respect to its cathode, and diode current ceases, so that the muting bias is removed and the unpleasant "threshold" detector effect is avoided. As the suppressor is driven further negative with still stronger signals, additional AVC control is attained. When the suppressor switch is off, **V2** behaves normally, the suppressor being returned to cathode via **S5.**

When the receiver is operating from AC mains, HT current is supplied by half-wave rectifying valve **(V4, Mazda U4020).** Smoothing is effected by speaker field **L18** and electrolytic capacitors **C17, C18, C19.** Valve heaters, together with adjustable ballast resistor **R23,** are connected in series across mains input. Scale lamps are connected in series with the chassis mains lead, so that they are energised by HT and heater currents. The reservoir capacitance **C17, C19** is split so that ripple current on AC mains also helps to energise the lamps, giving equal illumination on AC or DC mains. Filter chokes **L19, L20** suppress mains borne interference.

COMPONENTS AND VALUES

	CAPACITORS	Values (μF)
C1	Band-pass coupling ...	0·1
C2	Earth socket isolator ...	0·01
C3	V1 HT decoupling ...	0·01
C4	V1 cathode circuit shunt	0·00035
C5	V1 osc. CG capacitor ...	0·0005
C6	Osc. circ. LW tracker ...	0·00125
C7	Osc. circ. MW tracker ...	0·05
C8	AVC line decoupling ...	0·01
C9	V2 CG decoupling ...	0·01
C10	V2 suppressor decoupling	0·05
C11	V2 cathode by-pass ...	0·05
C12*	V3 cathode by-pass ...	25·0
C13	IF by-pass capacitors ...	0·0001
C14		0·0002
C15	AF coupling to V3 pent.	0·0015
C16	Coupling to V3 AVC diode	0·00005
C17*	HT smoothing capacitors	6·0
C18*		16·0
C19*		8·0
C20	Rectifier RF by-pass ...	0·04
C21†	Band-pass pri. tuning ...	0·0005
C22‡	B-P pri. MW trimmer ...	—
C23†	Band-pass sec. tuning ...	0·0005
C24‡	B-P sec. MW trimmer ...	—
C25‡	Osc. circ. LW trimmer...	—
C26†	Oscillator circuit tuning	0·0004
C27‡	Osc. circ. MW trimmer...	—
C28‡	1st IF trans. pri. tuning	—
C29‡	1st IF trans. sec. tuning	—
C30‡	2nd IF trans. pri. tuning	—
C31‡	2nd IF trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Murphy AD32 AC/DC superhet. **S5, S6** form the noise suppressor control. When the suppressor is in action, **V2** cathode/suppressor path acts as a diode.

	RESISTORS	Values (ohms)
R1	V1 pent. CG decoupling	5,000
R2	V1 pent. HT feed ...	5,000
R3	V1 osc. CG resistor ...	50,000
R4	V1 fixed GB resistor ...	500
R5	AVC line decoupling ...	2,000,000
R6	V1 osc. anode HT feed...	50,000
R7	V2 CG decoupling ...	1,000,000
R8	V2 fixed GB resistor ...	200
R9	V2 anode stopper ...	100
R10	IF stopper	100,000
R11	V2 suppressor coupling	1,000,000
R12	Manual volume control...	500,000
R13	V3 tet. grid stopper ...	5,000
R14	IF stopper	50,000
R15	V3 CG resistor	1,000,000
R16	Fixed tone corrector ...	50,000
R17	V3 GB and AVC delay resistors	110
R18		250
R19	V3 tet. anode stopper ...	50
R20	V3 AVC diode load resistors	800,000
R21		600,000
R22	Surge limiter	50
R23	Heater circuit ballast ...	630†

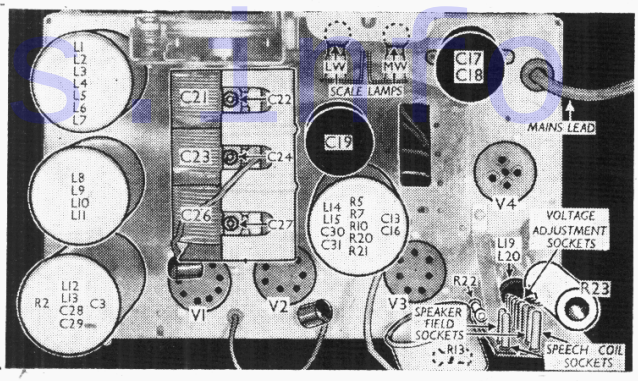
† Tapped at 380Ω + 50Ω + 50Ω + 50Ω + 50Ω + 50Ω from V4 heater.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial coupling coils ...	1·2
L2		9·0
L3	Band-pass primary coils	4·0
L4		12·0
L5	Image suppressor coil ...	0·1
L6	Band-pass secondary coils	4·0
L7		12·0
L8	Oscillator reaction coils, total	2·5
L9		
L10	Osc. circ. MW tuning coil	3·5
L11	Osc. circ. LW tuning coil	8·0
L12	1st IF trans. Pri. ...	40·0
L13	Sec. ...	40·0
L14	2nd IF trans. Pri. ...	40·0
L15	Sec. ...	40·0
L16	Speaker speech coil ...	2·0
L17	Hum neutralising coil ...	0·1
L18	Speaker field coil ...	920·0
~~L19~~	Mains RF filter chokes ...	3·5
L20		3·5
T1	Output trans. Pri. ...	185·0
	Sec.	0·15
S1-S4	Waveband switches ...	—
S5, S6	Noise sup. switches ...	—
S7, S8	Scale lamp switches ...	—
S9, S10	Mains switches, ganged R12	—

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (concentric domed nuts) from the front of the cabinet;
withdraw from the voltage adjustment panel the two speech coil and two field coil plugs (or unsolder the leads);
remove rubber stoppers covering boltheads beneath the chassis, and remove the three chassis fixing bolts (¼in. Whitworth spanner or screwdriver).
When replacing, the speech coil leads go to the top pair of sockets, and the field coil leads to the pair just below them.
Do not omit to replace the rubber stoppers.

Removing Speaker.—Remove the three bolts holding the mounting bracket to the vertical wooden partition.
The connecting tags, numbered from left to right, are: 1 and 2, **L18**; 3 and 4, **L17**; 4 and 5, **L16**.



Plan view of the chassis. The heater ballast resistor **R23**, mains voltage adjustment sockets, speaker sockets, **R22** and **L19, L20** are all mounted on a vertical panel at the rear.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in a receiver operating on 230 V AC mains, tuned to 200 m, with the volume control at maximum, using a Model 7 Avometer with chassis as negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TP2620	153	2·6	153	1·1
	Oscillator 93	1·4		
V2 VP1322	184	7·7	185	2·1
V3 Pen DD4021	178	33·0	185	7·0
V4 U4020†	—	—	—	—

† Cathode to chassis, 239V, DC.

GENERAL NOTES

Switches.—**S1-S4** are the waveband switches, and **S7, S8** the scale lamp switches, ganged in a barrel operated unit beneath the chassis. **S1-S4** and **S8** close on MW and open on LW; **S7** opens on MW and closes on LW.

S5, S6 are the noise suppressor switches, forming one-half of a double-pole double-throw toggle switch on the rear chassis member, the other half of which is not used. When **S6** is closed (knob down) the suppressor is in circuit and **S5** is open; in the reverse position **S5** closes and **S6** opens, and the suppressor is out of circuit.

S9, S10 are the QMB double-pole mains switches, ganged with the manual volume control **R12**.

Scale Lamps.—There are two MES type lamps, with clear spherical bulbs, rated at 6.5 V, 0.3 A.

External Speaker.—No intentional provision is made for this, but a low impedance (about 4 Ω) speaker could be connected to the sockets on the mains voltage adjustment panel (or to the internal speech coil connections if sockets are not fitted).

Capacitors C17, C18, C19.—**C17, C18** are two dry electrolytics in a single tubular metal container, which forms the negative connection, mounted on the chassis deck. The red lead is the positive of **C17** (6 μF), and the yellow that of **C18** (16 μF). **C19** is wet electrolytic, in a separate unit mounted on the chassis deck. Ours was rated at 8 μF, 440 V working. The case formed the negative connection, but it was insulated from chassis by washers.

Chassis Divergencies.—The anode stopper **R19** will not be found in later chassis, and the grid stopper **R13** (fitted in V3 top cap connector) may not be present in very early chassis. The speaker connections may be soldered to the voltage adjustment panel instead of being connected by plugs.

CIRCUIT ALIGNMENT

IF Stages.—Switch set to LW, tune to 2,000 m on scale, turn the volume control to maximum, switch the noise suppressor out of circuit (knob up), connect signal generator via a dummy aerial to control grid (top cap) of **V2** and chassis, feed in a 119 kc/s (2,521 m) signal, and adjust **C30** and **C31** for maximum output. Keep input low to avoid AVC action. Repeat these adjustments. Transfer grid signal generator lead to **V1** top cap and adjust **C28** and **C29** for maximum output. Repeat these adjustments.

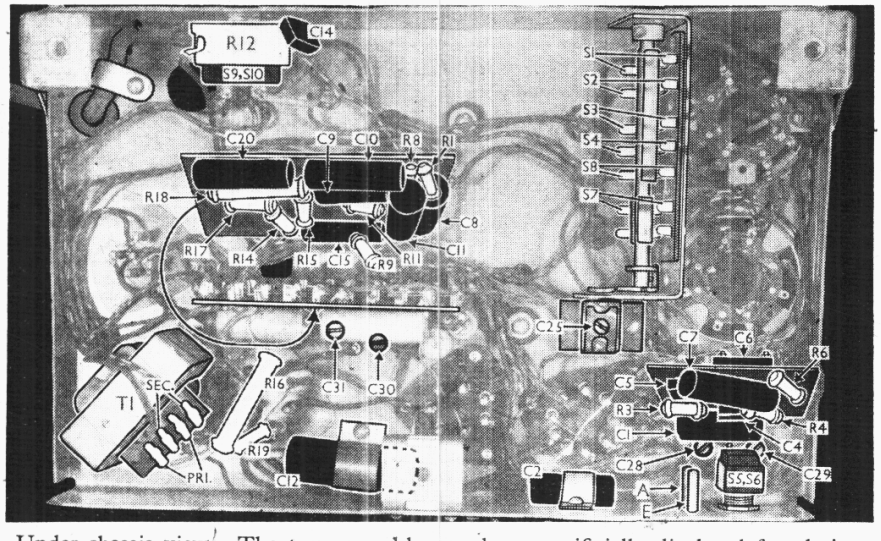
Swing the signal generator frequency 15 kc/s either side of 119 kc/s (104 kc/s to 134 kc/s) and check that output falls away evenly on each side and peaks at 119 kc/s. If it does not, repeat the trimming procedure until it does. If it peaks at an incorrect frequency, **C31** requires readjustment.

RF and Oscillator Stages.—Transfer signal generator leads, via the dummy aerial, to **A** and **E** sockets. With the gang at minimum and maximum, the pointer should cover the horizontal lines at top and bottom of the scale.

MW.—Switch set to MW, tune to 220 m on scale, feed in a 220 m (1,364 kc/s) signal, and adjust **C27**, then **C22** and **C24** for maximum output. Repeat these adjustments. Tracking is fixed.

LW.—Switch set to LW, tune to 1,500 metres on scale, feed in a 1,500 m (200 kc/s) signal, and adjust **C25** for maximum output.

Image Suppressor.—Feed in a strong 333 m (901 kc/s) signal, switch set to MW, tune in the image at about 453 m on scale, and adjust **L5** (screw at top of **L1-L7** assembly) through hole in top of can for minimum output, using the speaker as an indicator. In some localities this may not be the best point at which to make the adjustment, in which case **L5** should be adjusted while receiving the affected programme until the image of the local transmission is at minimum.



Under-chassis view. The two assembly panels are artificially displaced for clarity.

Printed in Great Britain by The Cornwall Press Ltd., Paris Garden, London, S.E.1