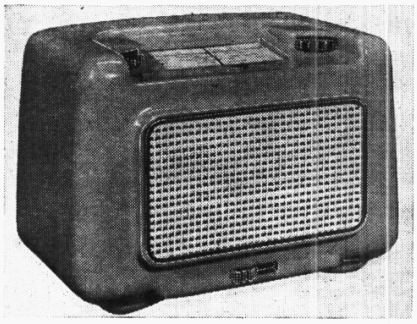
"TRADER" SERVICE SHEET

948

MULLARD MUS271



PERMEABILITY tuning, with 2-band coverage by a single tuning coil in both aerial and oscillator circuits is an unconventional feature in the Mullard MUS271, a three-valve (plus rectifier) 2-band superhet designed for A.C. or D.C. mains of 100-250V. A special circuit is used to provide delayed A.G.C. from a single diode.

Release date and original price: November, 1949; £10 10s, plus purchase tax.

CIRCUIT DESCRIPTION

Aerial is "bottom" coupled via the potential divider **C2, C4** to single-coil permeability-tuned circuit. On M.W. **L2** is tuned by **C7, C8, C26,** switches **S1** and **S2** being open; on L.W., **L2** is tuned by **C6, C26,** with **S3** open. **S1** closes on L.W. to modify the coupling, and this, together with the step-down coupling effect of **C7, C8,** tends to level the gain over the M.W. and L.W. bands. I.F. rejection by **L1, C1.**

First valve **(V1, Mullard UCH42)** is a triode hexode operating as frequency changer with internal coupling. Triode oscillator grid circuit is permeability tuned on M.W. by **L4, C14, C28,** with reaction coupling from anode by the upper part of **L5,** via **S5.** On L.W., **S4** closes, connecting **L3, C12** and **C27** in parallel with **L4,** while **S5** opens and **S6** closes to modify the reaction coupling. **L3** ensures good tracking.

Second valve **(V2, Mullard UAF42)** is a variable-mu diode pentode, whose pentode section operates as intermediate frequency amplifier with tuned transformer input and tuned anode output couplings **C9, L6 L7, C10** and **L8, C16.**

Intermediate frequency 470 kc/s.

Parallel-fed diode second detector of **V2** is coupled via **C17** from **V2** pentode anode. Audio frequency component in rectified output is developed across manual volume control **R11** and passed via **C20** to pentode output valve **(V3, Mullard UL41).**

D.C. potential developed across **R8, R11** is fed back as G.B. to F.C. and I.F. valves, giving automatic gain control. Fixed G.B. for all three valves is obtained from the drop along **R15,** through which the total H.T. current flows, but A.G.C. delay is derived from a special circuit in which **V2** pentode suppressor operates as a diode. It functions in the following manner:

Neglecting **R7,** a potential divider comprising **R5, R6, R9, R8** and **R11** shunts the H.T. circuit, and the junction of **R6** and **R9** is positive with respect to chassis, and therefore to **V2** cathode, so that **V2** suppressor conducts in the absence of a signal, effectively holding junction **R6, R9** to chassis. Upon the arrival of a signal, diode current moves the junction **R8, R9** negatively in proportion to signal strength, and the junction **R6, R9** tries to follow it.

When this potential is large enough to neutralize the positive potential of the potential divider, **V2** suppressor ceases to conduct, opening like an electronic switch and freeing junction **R6, R9** from chassis, so that it may follow the increasing negative potential across **R8, R11.** As **R10** is six to seven times the value of **R7,** the A.G.C. line is effectively isolated from **R15** and it follows the changing potential of the diode circuit.

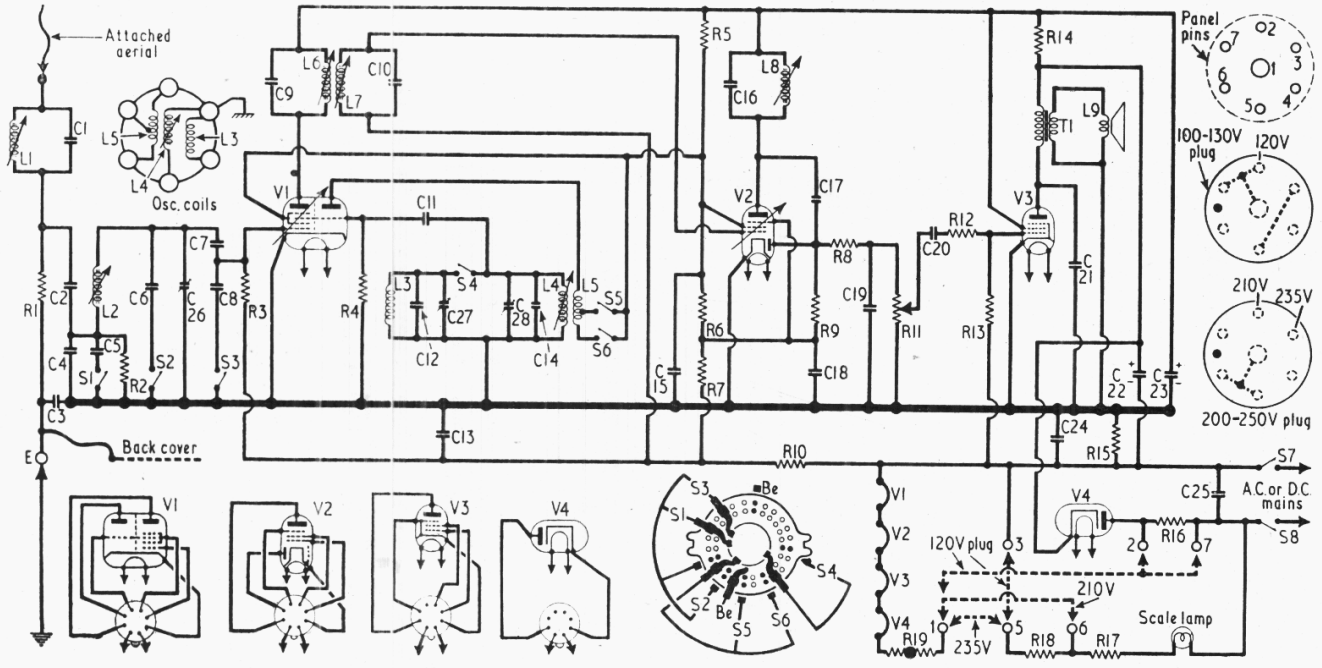
H.T. current is supplied by half-wave rectifying valve **(V4, Mullard UY41)** which rectifies A.C. mains, and smoothed by **R14, R15** and **C22, C23.** Valve heaters, ballast resistors **R17, R18,** thermistor **R19** and scale lamp are connected in series across the mains input. What happens when the voltage adjustment plugs are inserted in various positions is indicated by the three sets of dotted connecting lines.

COMPONENTS AND VALUES

	RESISTORS	Values	Locations
R1	Aerial shunt ...	1MΩ	A1
R2	Aerial coupling ...	4·7kΩ	E5
R3	V1 hex. C.G. ...	820kΩ	D5
R4	V1 osc. C.G. ...	47kΩ	E5
R5	H.T. feed decoup.	10kΩ	D4
R6	A.G.C. delay resistors	10MΩ	D4
R7		820kΩ	D4
R8	I.F. stopper ...	220kΩ	D4
R9	Part A.G.C. delay	3·9MΩ	D4
R10	G.B. decoupling...	5·6MΩ	D4
R11	Volume control ...	1MΩ	D3
R12	V3 grid stopper...	0·1MΩ	D4
R13	V3 C.G. resistor...	1MΩ	D4
R14	H.T. smoothing...	2·2kΩ	F5
R15	V3 G.B. ...	150Ω	F4
R16	V4 surge limiter	290Ω	A2
R17	Heater ballast resistors	729Ω	A2
R18		240Ω	A2
R19	Temcophil (cold)	10kΩ	F5

	CAPACITORS	Values	Locations
C1	I.F. rejector tune	330pF	A1
C2	Aerial isolator ...	1,000pF	E4
C3	Earth isolator ...	0·01μF	A1
C4	Aerial coupling ...	390pF	E4
C5	Aerial coupling ...	5,600pF	E5
C6	Aerial L.W. tune	1,760pF	E5
C7	V1 hex. C.G. ...	220pF	D5
C8	Aerial M.W. tune	150pF	E5
C9	1st I.F. trans.	115pF	C2
C10	tuning	115pF	C2
C11	V1 osc. C.G. ...	220pF	D5
C12	Osc. L.W. trim ...	520pF	B2
C13	A.G.C. decoup. ...	0·1μF	D5
C14	Osc. M.W. trim.	56μF	E5
C15	H.T. feed decoup.	0·047μF	D5
C16	2nd I.F. tune ...	150pF	C2
C17	Diode coupling ...	10pF	C2
C18	I.F. by-passes ...	1,000pF	D5
C19		220pF	D3
C20	A.F. coupling ...	0·015μF	D4
C21	Tone corrector ...	1,000pF	D4
C22*	H.T. smoothing ...	47μF	F4
C23*		47μF	F4
C24	V3 G.B. by-pass ...	0·15μF	F4
C25	Mains R.F. by-pass	0·01μF	A1
C26‡	Aerial M.W. trim.	30pF	B2
C27‡	Osc. L.W. trim. ...	125pF	B2
C28‡	Osc. M.W. trim. ...	30pF	B2

* Electrolytic. ‡ Pre-set.



Circuit diagram of the Mullard MUS271, with the waveband switch unit, voltage adjustment plugs and oscillator coil diagrams inset.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	I.F. rejector coil	5·3	A1
L2	Aerial tuning ...	20·0	C1
L3	Oscillator tuning	9·0	B1
L4	Oscillator tuning	11·2	B1
L5	React. coil (total)	4·3	B1
L6	1st I.F. trans. Pri. ...	6·8	C2
L7	1st I.F. trans. Sec. ...	6·8	C2
L8	2nd I.F. coil ...	9·7	C2
L9	Speech coil ...	3·5	—
T1	Output trans. Pri.	430·0	B1
	Output trans. Sec.	0.55	B1
S1-S6	W/band switches	—	E5
S7, S8	Mains sw.'s: g'd R11	—	D3

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted by the manufacturers, whose receiver was operating from 240 V A.C. Voltages were measured with a 20,000 ohms-per-volt meter whose negative lead was connected to chassis.

Valve		Anode		Screen	
		V	mA	V	mA
V1	UCH42	144	2·9	76	2·1
		Oscillator			
		76	2·8		
V2	UAF42	144	5·9	76	1·9
V3	UL41	174	37·0	144	6·1
V4	UY41	—	58·0	—	—

DISMANTLING THE SET

Removing Chassis.—Remove the fibreboard back and bottom cover (six screws with washers); unsolder the earth and attached aerial leads; remove scale lamp complete with scale illumination assembly (one screw and washer); remove one chassis fixing bolt (with washer) from each corner of the chassis, which may now be withdrawn complete with speaker. *When replacing*, if the control knobs need adjusting on their spindles, this should be done after the chassis has been replaced, but before the back cover is screwed into position.

GENERAL NOTES

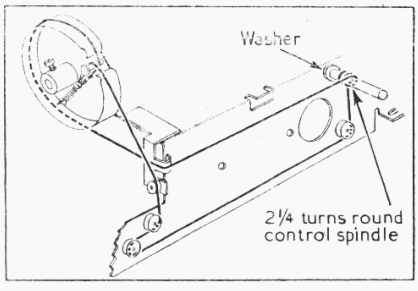
Switches.—**S1-S6** are the waveband switches, ganged in a single rotary unit mounted at the base of the chassis and operated by a lever at the front of the receiver. The unit is indicated in our front view of the chassis, and shown in detail in the diagram inset beneath the circuit diagram overleaf. Here it is viewed as seen from the top of the page in our front view of the chassis: that is, as seen when facing the rear of the chassis and looking over the top of it. In the M.W. position (control knob to left) **S3** and **S5** close; in the L.W. position, **S1, S2, S4** and **S6** close, and **S3, S5** open.

Coils.—All the R.F. and oscillator permeability tuning coils are mounted in a single assembly, seen in our rear view of the chassis. No adjustment should normally be necessary to this unit, which is carefully calibrated at the works, but if anything should become damaged, such as a core or a coil, it is advisable to replace the complete assembly with a new one.

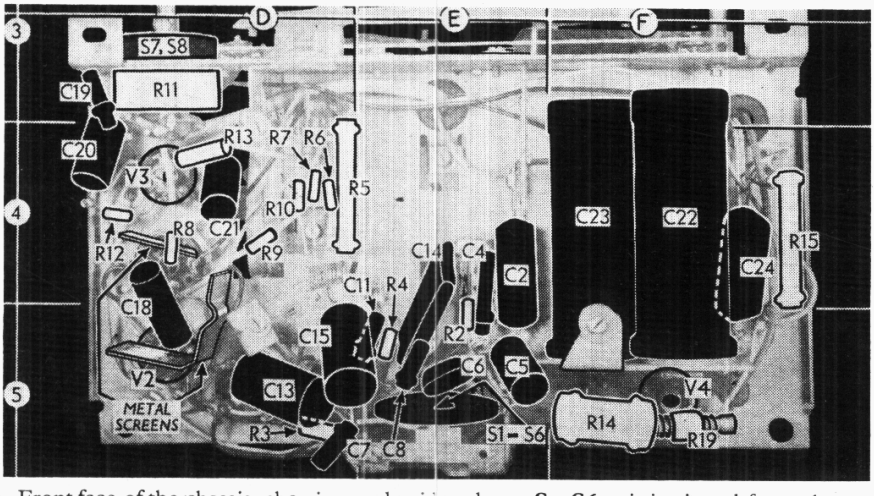
To remove the assembly, remove the speaker, unsolder the eight connecting leads, remove the cursor drive cord and unscrew the three fixing bolts (with lock-washers).

When replacing the assembly, the slot in the cursor drive drum should be in the position shown in our sketch (above) when the cores are fully in the tuning coils. The drive cord replacement is explained elsewhere on this page. Six of the connecting leads go to a circular group of tags beneath the oscillator coil unit, whose internal connections are identified in the diagram inset in the top left-hand corner of the circuit diagram overleaf. The remaining two go to the two tags at the base of **L2**.

Scale Lamp.—This is a Philips type 8097D lamp, with an M.E.S. base and a clear tubular bulb. It is rated at 20 V, 0.1 A.

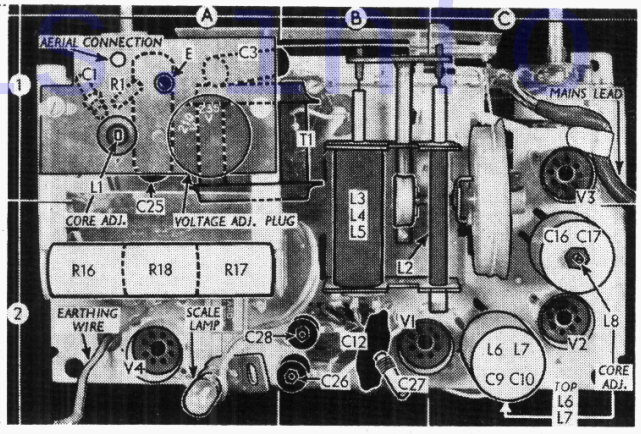


Sketch of the tuning drive system.



Front face of the chassis, showing underside valves. **S1-S6** unit is viewed from above.

Rear view of the chassis, with the 210/235V mains plug in position, set for 235V. The earthing wire indicated at the lower left corner goes to the screening foil on the back cover.



External Speaker.—No provision is made for this, but the impedance is quoted as 5·7 Ω.

R19. — This is a Philips "Temcophil" thermistor, included in the heater chain to prevent a current surge when switching on. Its resistance when cold is not less than 2,000 Ω (ours was about 12,000 Ω), but at working temperature this drops to 165 Ω.

Mains Voltage Adjustment.—Two special plugs are provided with the receiver for voltage adjustment, one centred on 120 V mains, and a two-position plug centred on 210 V and 235 V mains. Dotted lines in the circuit diagram show the connections effected by these plugs, and diagrams of the plugs, and of the pins on to which they plug, are inset on the right of the circuit diagram. The locating spot which we show at 9 o'clock will be found on the front face of the plug, where it will, of course, appear at 3 o'clock.

They are all drawn as seen from the rear. When correctly placed, the voltage marking on the plug is at 12 o'clock. The pin numbers in the top diagram agree with those in the circuit diagram. The spare plug is held by a small collar to the back cover of the receiver.

Drive Cord Replacement.—The sketch in col. 2 is self explanatory. The length of cord required is about 18 inches. The cursor must be slipped on to the cord before fitting.

CIRCUIT ALIGNMENT

I.F. Stages.—Switch set to M.W., fully open the tuner unit (pointer at low wavelength ends of tuning scales) and turn volume control to maximum. Connect signal generator via an 0.047μF capacitor in the "live" lead either to the control grid (pin 6) of **V1**, or to the junction of **C26** and **C7** (location reference of connection B2). Feed in a 470 kc/s (638.3 m) signal, and adjust the cores of **L8, L7** and **L6** (C2) for maximum output.

When adjusting the primary of the transformer, a 100 pF damping capacitor should be connected across the secondary; and conversely, when adjusting the secondary, the capacitor must be shunted across the primary. For **L8** the capacitor should be placed across **L7**.

I.F. Rejector.—With set still switched to M.W., transfer signal generator "live" lead to the attached aerial connection (A1) via a suitable dummy aerial, feed in a 470 kc/s signal and adjust the core of **L1** for minimum output.

R.F. and Oscillator Stages.—With the tuner unit fully open the cursor should be coincident with the mark at the low wavelength end of the tuning scales. It may be adjusted by sliding the cursor carriage along the drive cord. The manufacturers warn against adjustment of the tuner unit cores, which have been sealed before leaving the factory.

The local oscillator frequency is higher than the signal frequency on both bands. After adjusting the trimmer capacitors, seal them again with hot wax.

M.W.—With the set still switched to M.W., tune to 272.7 m (mark on scale), feed in a 272.7 (1,100 kc/s) signal and adjust **C28** (B2) and **C26** (B2) for maximum output.

L.W.—Switch set to L.W., tune to 1,429 m (mark on scale), feed in a 1,429 m (210 kc/s) signal, and adjust **C27** (B2) for maximum output. Adjustment of **C27** may be made only by unwinding turns from it until the peak is reached, when the end should be secured with wax; turns must not be added. If more turns are required, the capacitor must be replaced.

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