Supplement to The Wireless & Electrical Trader, December 2, 1944

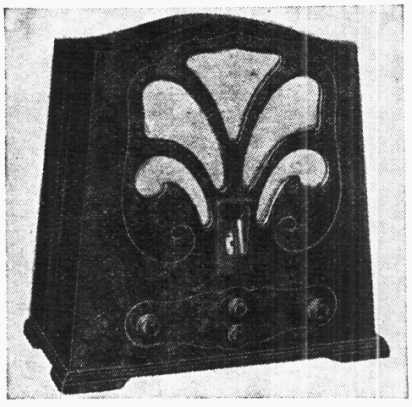
"TRADER" SERVICE SHEET

700

MARCONIPHONE 256, 258

HMV 470, 523 & 524 (Non AVC)

COLUMBIA 356 & 631



The Marconiphone 256 superhet.

SIX valves (plus rectifier), including a separate oscillator, are employed in the Marconiphone 256 receiver, a two-band superhet designed to operate from AC mains of 200-250 V, 50-100 c/s.

An identical chassis is employed in the Marconiphone 258 autoradiogram, the Columbia 356 table and 631 autoradiogram, and in the HMV 470 "Superhet Lowboy Seven" console, 523 radiogram and 524 (Non AVC) autoradiogram. The HMV 524 with AVC is *not* covered in this *Service Sheet*, which was prepared from a Marconiphone 256.

Release date (all models): 1932.

Original prices: Marconiphone 256, £25 4*s.*; 258, £57 15*s.*; *HMV* 470, £33 12*s.*; 523, £50 8*s.*; 524 (*Non AVC*), £57 15*s.*; *Columbia* 356, £25 4*s.*; 631, £54 12*s.*

CIRCUIT DESCRIPTION

Aerial input via series pre-set capacitor **C21** to inductively coupled band-pass filter. Primary coils **L1** (MW) and **L2** (LW) are tuned by **C22**; secondaries **L3, L4** are tuned by **C23.** Coupling is effected by mutual inductance between primary and secondary windings.

First valve **(V1, Marconi metallised VMS4)** is a variable-mu RF tetrode operating as signal frequency amplifier. Its gain is varied by the volume control **R6,** which forms with **R5** a potential divider across the HT circuit, by varying the applied GB potential. Fixed minimum GB is obtained from **R1** in **V1** cathode circuit.

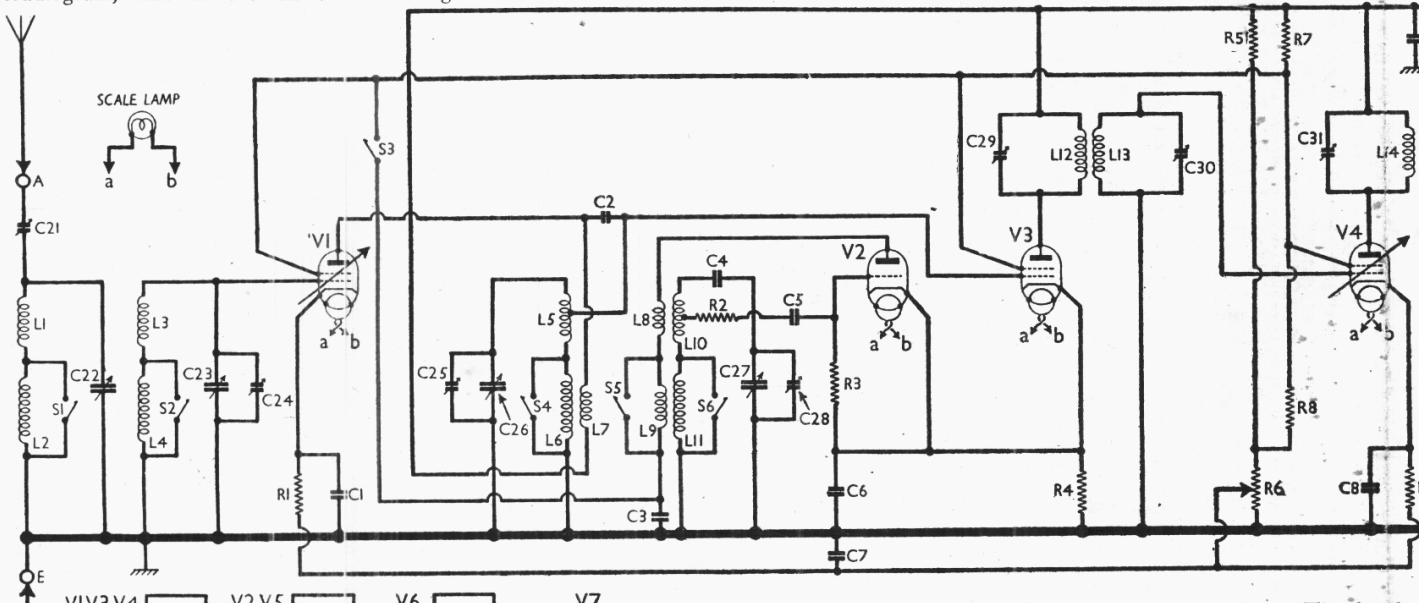
Choke-capacitance and inductive coupling via **C2** and **L7** between **V1** and first detector valve **(V3, Marconi metallised MS4),** an RF tetrode operating in conjunction with separate oscillator valve **(V2, Marconi metallised MH4).** Its control grid circuit is tuned by **L5, L6** and **C26.** The oscillator grid circuit coils **L10** (MW) and **L11** (LW) are tuned by **C27,** with parallel trimming by **C28** and series tracking by fixed capacitor **C4. V3** operates on the anode bend principle, and coupling between it and the oscillator circuit is inductive, via the grid circuit, **L5, L8, L10** being coupled, as are also **L6, L7, L9** and **L11.**

Fourth valve **(V4, Marconi metallised VMS4)** is a second variable-mu RF tetrode, this one operating as intermediate frequency amplifier, with tuned-primary, tuned-secondary transformer couplings **C29, L12, L13, C30** and **C31, L14, L15, C32.**

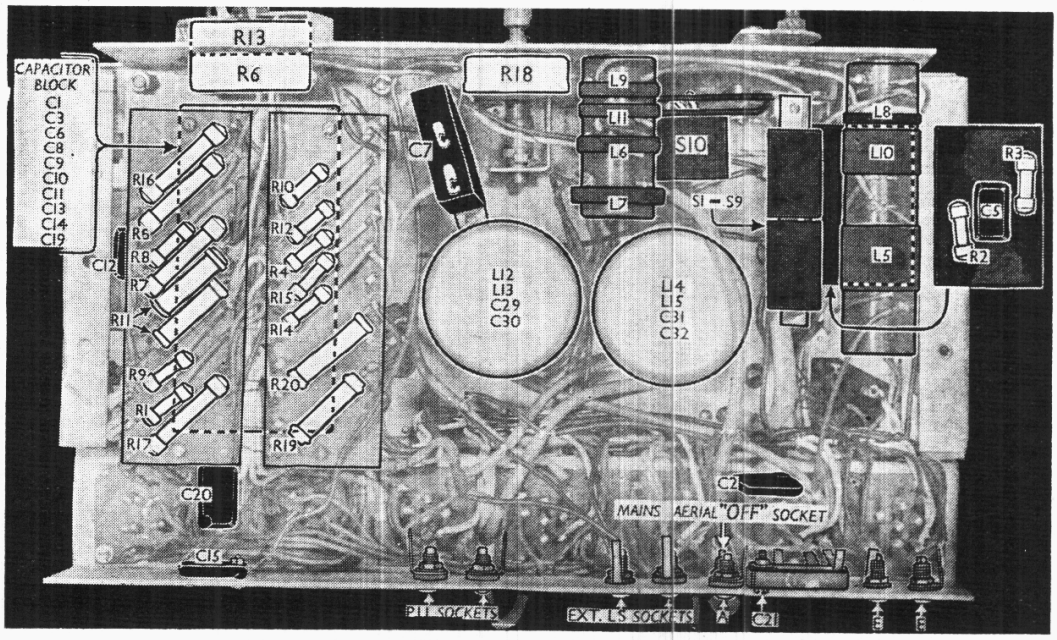
Intermediate frequency 125-128 kc/s.

Gain of **V4** is ganged with that of **V1,** its cathode lead being returned via the minimum GB resistor **R9** to the slider of **R6.** Screen feed voltage for **V1, V3** and **V4** is obtained from the potential divider **R7, R8** which is connected across **R5.**

The second detector is a triode valve **(V5, Marconi metallised MH4)** which



Circuit diagram of the Marconiphone 256 AC superhet. The band-p
L2, L4 are inductively coupled, as also are **V3** grid circuit coils **L5, L8-L11,** the oscillator itself being a separate valve **V2. R6** is the radio pick-up volume control. The numbers **1** to **6** on the speaker conne transformer panel, while those on the chassis are marked **24, 25** and **A,** ising coil on the speaker, but HT supply to the field is smoothed by **R** in several HMV and Columbia receivers



Under - chassis view. The **S1-S9** switch unit indicated on the right is shown in detail in a drawing in col. 3 overleaf. Another drawing, at the foot of cols. 1 and 2 overleaf shows in detail the panel of the capacitor block as seen in the direction of the arrow in this view. An additional 450Ω resistor may be found between **R19** and **R20** in some chassis.

operates on the anode bend principle. GB potential is obtained from the drop along **R14, R15,** and the control grid circuit is completed via **S7.** A tuning indicator link in the cathode circuit provides a convenient connection for a milliammeter during alignment operations.

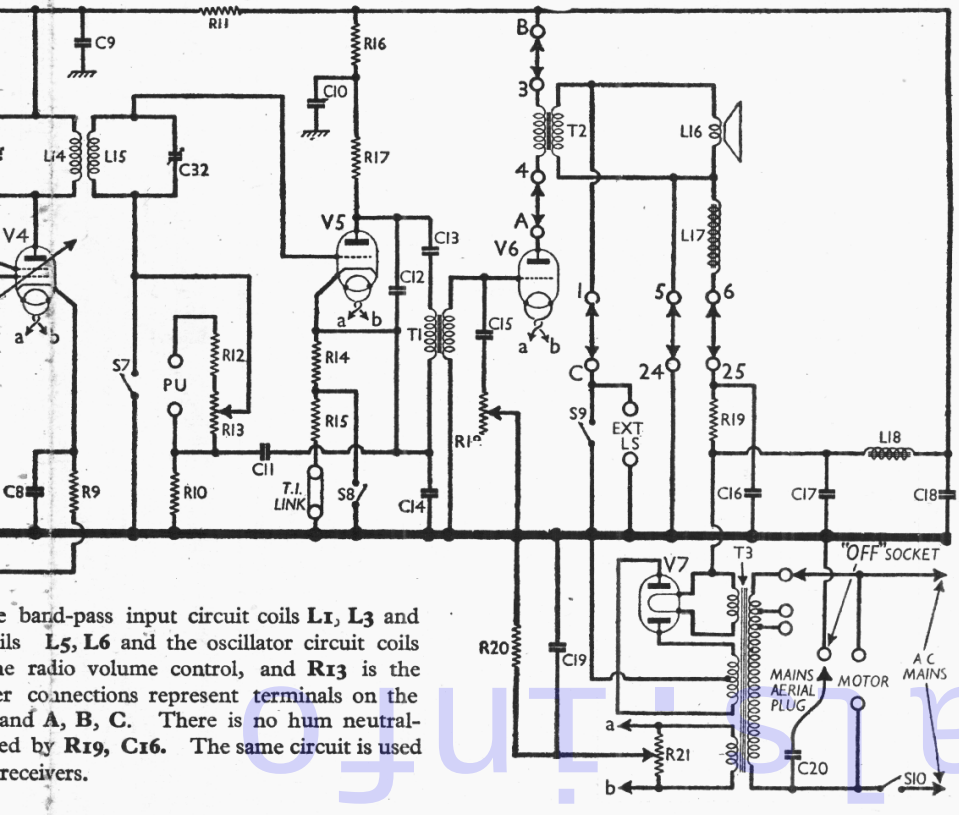
Provision is made for the connection of a gramophone pick-up in the control grid circuit, and a pick-up volume control **R13** is provided for it, maximum input to the valve being limited by **R12.** When the receiver is switched to radio, this input circuit is short-circuited by **S7;** when the receiver is switched to gram, **S7** opens, and **S8** then closes to short-circuit **R15** and correct the bias for amplifier operation. At the same time **S3** opens, disconnecting the HT supply to **V2** and thus muting radio signals. IF filtering by **C12** in triode anode circuit.

Parallel-fed AF transformer coupling by **R17, C13** and **T1** between **V5** and directly heated triode output valve **(V6, Marconi PX4).** Variable tone control by **C15** and variable resistor **R18** in control grid circuit. Provision is made for connecting a low impedance external speaker across the secondary winding of the speaker input transformer **T2.** Switch **S9,** which closes between the marked settings of the switch control, short-circuits this secondary winding during switching operations to mute the speaker.

HT current is supplied by full-wave rectifying valve **(V7, Marconi U12).** Smoothing by iron-cored choke **L18** and capacitors **C17, C18.** HT current to energise the speaker field **L17** is tapped off directly from the rectifier filament and smoothed by **R19, C16,** the resistor also providing ballast.

GB for **V6** is obtained from the drop obtained from its HT current flowing through **R20** via the heater secondary winding, while the potentiometer **R21** permits the electrically neutral point to be found to reduce hum.

Provision for mains aerial connection is made by a plug on a flying lead via the coupling capacitor **C20.** When out of use, the plug is inserted in an earthed socket provided for it, when **C20** acts as a mains RF by-pass.



e band-pass input circuit coils **L1, L3** and ils **L5, L6** and the oscillator circuit coils ne radio volume control, and **R13** is the er connections represent terminals on the and **A, B, C.** There is no hum neutralled by **R19, C16.** The same circuit is used receivers.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted in the makers' manual. They represent within ± 10 per cent. conditions to be expected

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VMS4	190	5·5	53	1·7
V2 MH4	50	20	—	—
V3 MS4	190	0·15	53	0·1
V4 VMS4	190	5·5	53	1·7
V5 MH4	195	0·9	—	—
V6 PX4	300	50·0	—	—
V7 U12	—	45·0†	—	—

† Each anode, DC.

in an average chassis when the voltage adjustment is properly set, the receiver is working on the MW band, with the volume control at maximum and with no signal input.

Voltages are those measured on the 1,200 V scale of an Avometer whose negative lead is connected to chassis. The total HT current is quoted at 90 mA, but 25 mA of this is used to energise the speaker field, which is shunt-fed across the rectifier output.

COMPONENTS AND VALUES

	RESISTORS	Values (ohms)
R1	V1 fixed GB resistor ...	320
R2	V2 grid stopper ...	5,000
R3	V2 CG resistor	25,000
R4	V3 GB resistor	2,000
R5	Part HT potential divider	100,000
R6	V1, V4 gain control ...	20,000
R7	V1, V3, V4 SG's HT feed potential divider ...	25,000 – 50,000
R8		
R9	V4 fixed GB resistor ...	320
R10	V5 CG decoupling ...	100,000
R11	V1–V4 HT feed resistor...	6,000*
R12	Pick-up limiter	200,000
R13	PU volume control ...	100,000
R14	V5 GB resistors ...	1,000 – 5,000
R15		
R16	V5 anode decoupling ...	25,000
R17	V5 anode load	50,000
R18	Variable tone control ...	600,000
R19	Speaker field ballast ...	3,000
R20	V6 GB resistor	800
R21	Heater circuit pot. ...	20

* Made up of two 3,000Ω resistors connected in series.

	CAPACITORS	Values (μF)
C1	V1 cathode by-pass ...	0·1
C2	V1–V3 RF coupling ...	0·00005
C3	SG and osc. HT decoupling	1·0
C4	Osc. circuit tracker ...	0·0017
C5	V2 CG capacitor ...	0·0003
C6	V2, V3 cathodes by-pass	0·5
C7	V1, V4 cathodes decoupling	1·0
C8	V4 cathode by-pass ...	0·1
C9	HT circuit decoupling ...	1·0
C10	V5 anode decoupling ...	1·0
C11	V5 CG decoupling ...	0·5
C12	IF by-pass	0·002
C13	AF coupling to T1 ...	0·1
C14	V5 cathode by-pass ...	0·5
C15	Part variable tone control	0·002
C16	HT smoothing capacitors	4·0
C17		4·0
C18		6·0
C19	V6 filament by-pass ...	4·0
C20	Mains aerial coupling ...	0·0003
C21‡	Aerial series trimmer ...	0·00007
C22†	Band-pass pri. tuning ...	0·00045
C23†	Band-pass sec. tuning ...	0·00045
C24‡	B-P sec. MW trimmer ...	—
C25‡	V3 CG MW trimmer ...	—
C26†	V3 CG circuit tuning ...	0·00045
C27†	Oscillator circuit tuning	0·00045
C28‡	Osc. circ. MW trimmer...	—
C29‡	1st IF trans. pri. tuning	0·00014
C30‡	1st IF trans. sec. tuning	0·00014
C31‡	2nd IF trans. pri. tuning	0·00014
C32‡	2nd IF trans. sec. tuning	0·00014

† Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Band-pass primary coils...	3·0
L2		20·0
L3	Band-pass secondary coils	3·0
L4		20·0
L5	V3 CG tuning coils ...	3·5
L6		20·0
L7	V1 anode choke	50·0
L8	Oscillator reaction coils ...	2·0
L9		4·0
L10	Osc. MW tuning coil ...	3·5
L11	Osc. LW tuning coil ...	11·0
L12	1st IF trans. Pri. ...	47·0
L13	Sec. ...	51·0
L14	2nd IF trans. Pri. ...	47·0
L15	Sec. ...	51·0
L16	Speaker speech coil ...	9·0
L17	Speaker field coil ...	10,600·0
L18	HT smoothing choke ...	750·0
T1	Intervalve trans. Pri. ...	1,700·0
	Sec. ...	6,000·0
T2	Speaker input trans. Pri. ...	150·0
	Sec. ...	2·0
T3	Mains trans. Pri., total ...	19·0
	Heater sec. ...	0·1
	Rect. heat. sec.	0·1
	HT sec. total	410·0
S1, S2 S4-S6	Waveband switches ...	—
S3, S7, S8	R/G change switches ...	—
S9	Wave change mute ...	—
S10	Mains switch	—

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs from the front of the set (recessed grub screws);

free the speaker cable from the cleat holding it to the sub-baffle;

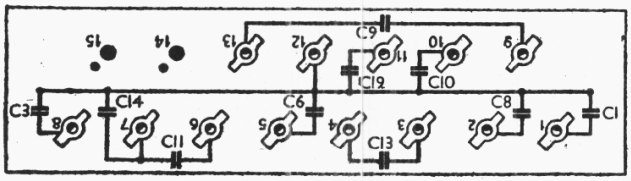
remove the four hexagon bolts holding the chassis to the bottom of the cabinet (and the two transit bolts if fitted).

The chassis may now be withdrawn to the extent of the speaker leads; or, if they are disconnected, at either end, from their terminals, the chassis will be freed entirely.

When replacing, the speaker leads should be connected between the terminals marked **24, 25** and **A, B, C** on the front edge of **C16** on the chassis, and those numbered **1** to **6** on the speaker panel as indicated in our circuit diagram and plan view. The original colour coding of the leads was as follows, using the numbers on the speaker panel: 1, green; 3, white; 4, yellow; 5, black; 6, red. No. 2 has no external connection, but it is connected internally to No. 5.

Removing Speaker.—Disconnect the leads from the speaker panel and remove the four hexagon nuts (with lock-washers) holding the speaker to the sub-baffle without disturbing the ornamental-headed bolts, which go through the front of the cabinet. If the bolts loosen, tighten up their second set of nuts (beneath the speaker) before replacing.

When replacing, the transformer should be on the right. The lead connections are as described previously.



The panel of the capacitor block, as seen from the end of the chassis when inverted.

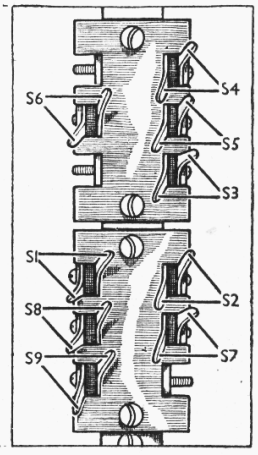
GENERAL NOTES

Switches.—S1-S6 are the waveband switches, **S7, S8** the radio/gram changeover switches, and **S9** the wavechange muting switch, ganged together in a barrel-operated spring-leaf unit mounted beneath the chassis.

The unit is indicated in our under chassis view, and the switch tags are identified in the sketch below, where the unit is redrawn as seen in our under-chassis view. The switch positions are given in the table below, starting from the fully anti-clockwise (off) position of the control. A dash indicates open, and **C,** closed.

S10 is the QMB mains switch, operated by a toggle linked with the main switch control spindle.

Sketch showing in detail the connecting tags of the **S1-S9** switch unit. It is drawn here exactly in the same position as it is seen in our under-chassis view overleaf. The switch table is below.



Switch	Gram	MW	LW
S1	—	C	—
S2	—	C	—
S3	—	C	C
S4	C	C	—
S5	—	C	—
S6	—	C	—
S7	—	C	C
S8	C	—	—
S9*	—	—	—

* Closed between settings only.

Coils.—The band-pass coils **L1, L3** and **L2, L4** are in two unscreened units mounted on the chassis deck. **V3** grid coils and the oscillator circuit coils are in two unscreened units, **L5, L8, L10** and **L6, L9, L11; V1** anode coil **L7** being added on the second (LW) unit. The IF transformers **L12, L13** and **L14, L15** are in two screened units beneath the chassis with their associated pre-set trimmers.

Scale Lamp.—This is an Osram MES type with a clear spherical bulb. It is rated at 6 V, and a suitable current rating would be 0.5 A. Its holder clips on the end member of the gang assembly, and may easily be withdrawn if the gang is first turned to minimum, but a little care must be exercised when replacing it so that the bulb misses the drum boss and the holder bracket does not foul the drum.

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (about 15 Ω) external speaker. A high impedance (about 4,000 Ω) speaker may be connected to terminals 3 and 4

on **T2** connecting panel if the leads are suitably isolated by capacitors.

Capacitor Block.—Ten fixed capacitors, **C1, C3, C6, C8, C9, C10, C11, C13, C14** and **C19** are contained in a single multiple unit beneath the chassis. The unit is indicated in our under-chassis view, where it is hidden by the resistor assembly which is mounted on it, but its connecting panel is shown in detail in the drawing in cols. 1 and 2, where it is drawn as seen from the left-hand end of the chassis, in the direction of the arrow, in our illustration.

The connecting tag numbers and internal connections are shown, but the tag numbers are inverted as they are seen in the actual chassis when that is inverted. All the capacitors are paper insulated, but when replacements are needed electrolytics, which may be mounted externally at any convenient place in the chassis, may be used for the large capacitance types.

Capacitor C16.—This is in a metal container mounted on the mains transformer and seen in our plan view of the chassis, where its connections are also indicated. Along its front edge are mounted the speaker connections, marked **24, 25, A, B** and **C** as read from left to right when viewed from the front, and **C16** is connected to **24** and **25** tags.

Capacitors C17, C18.—These are the HT smoothing capacitors, also paper insulated, in a single metal container mounted on the chassis deck. The respective tags are indicated in our plan view.

Chassis Divergence.—In some chassis an additional 450 Ω resistor may be found situated between **R19** and **R20** beneath the chassis. In such cases, it will be connected in series with the HT smoothing choke **L18,** between one end of the choke and the positive side of **C17.**

NEAR EQUIVALENT MODIFICATIONS

Marconiphone 258.—This is the auto-radiogram version of the 256 table receiver. Its chassis is identical with that of the 256 except that **R18** is fitted in the position we show for **R6, R13,** this pair being mounted on the front of the cabinet.

A larger speaker is fitted, which has a DC speech coil resistance of 11 Ω. The auto mechanism unit is type K, whose pick-up is type 14 with a DC resistance of 6,000 Ω. Owing to the presence of the motor the mains frequency range is restricted to 50-60 c/s.

HMV 470, 253, 254 (Non-AVC).—The 470 is a console receiver employing a chassis identical with that in the 256 except for the tuning drive, but its speaker is like that in the 258. The 253 is equivalent to the 258, but it has a model 24 induction motor unit instead of the auto-changer and has the 470 tuning drive. The 524 (without AVC) is actually a 523 with a model K auto-changer, but it has a different style of cabinet. The 524 *with* AVC is not covered by this *Service Sheet.* The mains frequency range of the 470 is the same as for the 256.

Columbia 356, 631.—Except for the cabinets and tuning drive arrangements, these are equivalent to the 256 and 258 respectively.

CIRCUIT ALIGNMENT

IF Stages.—Remove **V2** from its holder to stop the oscillator from working, turn the volume control to maximum, and switch the set to MW. Couple the signal generator output to the receiver via a coupling coil laid on the bench so that it is close to the **L5, L8, L10** unit.

The best indicator is an 0-5 mA meter, for the connection of which a pair of terminals is provided on the connecting panel on the mains transformer **T2.** If the shorting strap marked **T.I. Link** in our circuit diagram and plan view is removed, the milliameter indicates **V5** anode current. Alternatively, the normal output meter may be used, or an 0-25 mA meter may be connected to terminals **3** and **4** on the speaker input transformer.

Feed in a 125 kc/s (2,400 m) signal, keeping input low, and adjust **C31, C32, C29** and **C30** for maximum output, in that order. Now feed in a 128 kc/s (2,344 m) signal, and readjust **C29** for maximum output. Return to 125 kc/s and readjust **C30,** then **C31** and **C32,** but do not disturb **C29.**

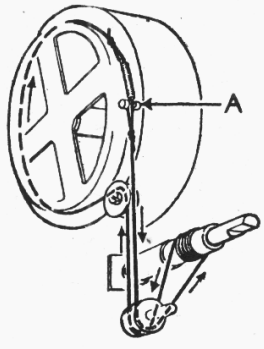
RF and Oscillator Stages.—Transfer signal generator leads to **A** and **E** sockets, via a suitable dummy aerial. The ends of the tuning scales should be about midway between the top and bottom of the pointer aperture when the gang is at minimum and maximum. It can be adjusted if the two fixing screws in the drum boss are slackened while in the minimum wave-band position.

MW.—Switch set to MW, set the MW pointer at about the centre of its rail, tune to 220 m on scale, feed in a 220 m (1,364 kc/s) signal, and adjust **C28** for maximum output. If two peaks can be found, select that involving the lesser trimmer capacitance. Now tune to 300 m on scale, feed in a 300 m (1,000 kc/s) signal, and adjust **C24** and **C25** for maximum output. Check calibration at several points on the MW scale and adjust the pointer for the best compromise. Signal input should be kept low to avoid overloading throughout, and should be reduced as circuits come into line.

LW.—There are no LW adjustments, and no trimming should be attempted on this band. **C21** should, however, be adjusted on MW when the set is installed.

CORD DRIVE REPLACEMENT

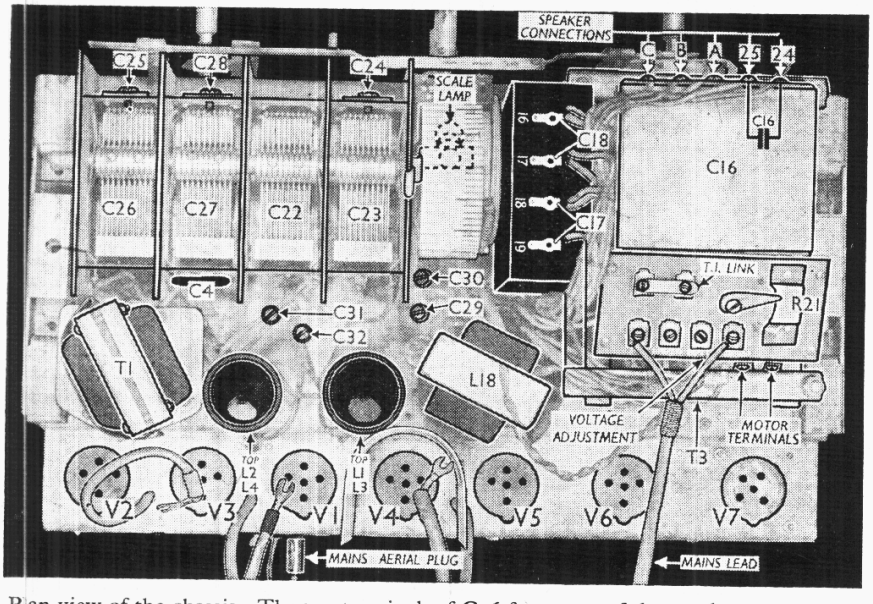
Approximately 27 inches of flax fishing line, with a breaking strain of about 40lb., is required for the cord. Double back 1in. at one end, and tie to form a loop. A length of stiff copper wire with a hooked end will be found useful in manipulating the cord.



Cord drive sketch. The drum is viewed from the front, but the chassis is omitted.

Remove **R18** temporarily, set the gang to minimum capacitance, turn the control spindle to its stop in an anti-clockwise direction, slip the loop over the small stud **A,** seen in the sketch, and wind the cord in the direction shown there. Make six turns round the spindle, but do not permit one turn to overlap another.

Pull the cord tight, and make a loop at the free end, linked in the spring, so that the overall length of cord causes the spring to open when hooked on to stud **A.** Finally, adjust drum position on spindle if necessary.



Plan view of the chassis. The two terminals of **C16** form part of the speaker connections. Other connections indicated are the **T.I. Link** and motor terminals.

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