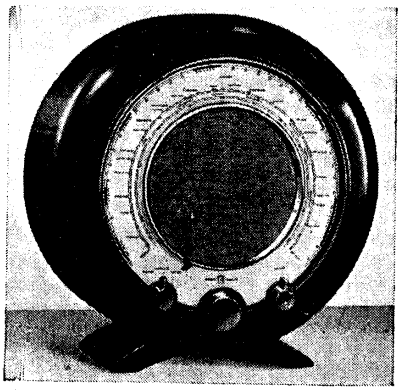
Supplement to The Wireless & Electrical Trader, May 4, 1946

"TRADER" SERVICE SHEET

768

EKCO A22

3-BAND A.C. SUPERHET



The Ekco A22 post-war superhet. The cabinet shown is finished in black and chromium, but a walnut finish is available also.

OF entirely new circular chassis construction, the Ekco A22 is a 3-valve (plus rectifier), 3-band superhet designed to operate from A.C. mains of 200-250 V, 40-80 c/s. The S.W. range is 16-50 m.

The chassis comprises a vertical circular member and a small horizontal compartment. Our chassis illustrations show front and rear elevation and the underside of the chassis.

The circular plastic cabinet is available in walnut or black and chromium finish. There is provision for connecting an external speaker, but none for a gramophone pick-up. Modifications in early models are described overleaf.

Release date: November, 1945.

Original price: £14 14s., plus £3 3s 3d purchase tax, in walnut or black and chromium finish.

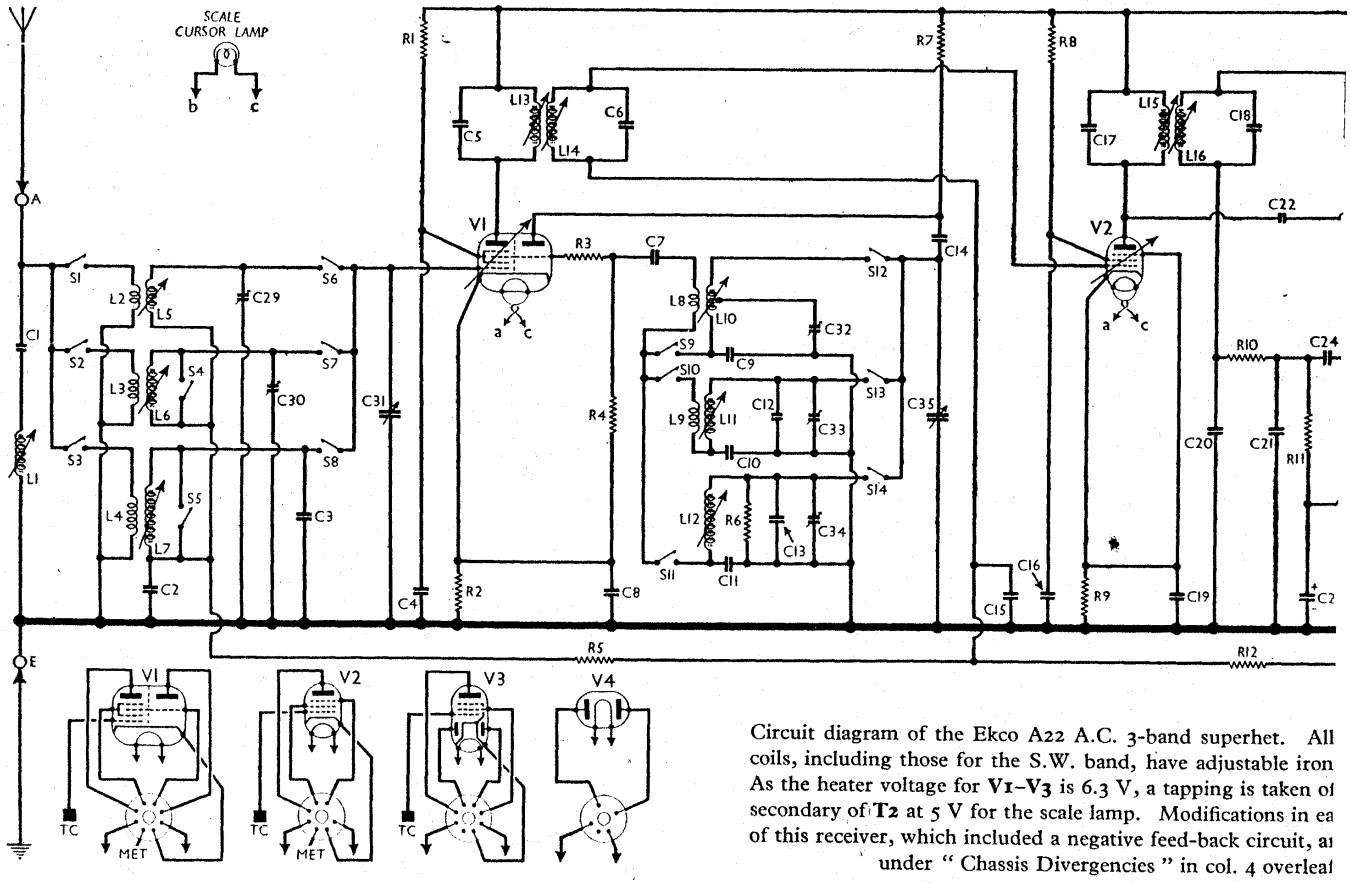
CIRCUIT DESCRIPTION

Aerial input via coupling coils **L2** (S.W.), **L3** (M.W.), and **L4** (L.W.) to single-tuned circuits **L5, C31** (S.W.), **L6, C31** (M.W.) and **L7, C31** (L.W.). I.F. filtering by **L1, C1** across the aerial circuit.

First valve **(V1, Mullard metallised ECH35)** is a triode-hexode operating as frequency changer with internal coupling. Triode oscillator anode coils **L10** (S.W.), **L11** (M.W.) and **L12** (L.W.) are tuned by **C35.** Parallel trimming by **C32** (S.W.), tapped down the tuning coil, **C12, C33** (M.W.) and **C13, C34** (L.W.); series tracking by fixed capacitors **C9** (S.W.), **C10** (M.W.) and **C11** (L.W.), adjustments being effected by variable iron-dust cores on all three wavebands, as is the case also in the aerial circuit.

Reaction coupling to grid circuit via the common impedance of the trackers on all three wavebands with additional inductive coupling on S.W. and M.W. by coils **L8** and **L9** respectively.

Second valve **(V2, Mullard metallised EF39)** is a variable-mu **R.F.** pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C5, L13, L14, C6** and **C17, L15, L16, C18,** in which the



Circuit diagram of the Ekco A22 A.C. 3-band superhet. All coils, including those for the S.W. band, have adjustable iron As the heater voltage for **V1–V3** is 6.3 V, a tapping is taken of secondary of **T2** at 5 V for the scale lamp. Modifications in ea of this receiver, which included a negative feed-back circuit, ar under " Chassis Divergencies " in col. 4 overleaf

tuning capacitors are fixed and adjustments are again carried out by varying the positions of the iron-dust cores.

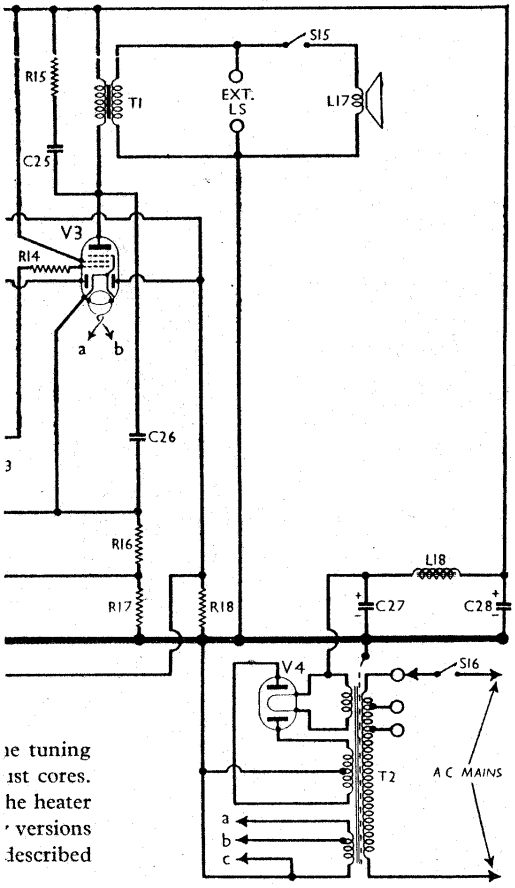
Intermediate frequency 465 k/cs.

Diode second detector is part of double-diode output pentode valve **(V3, Mullard EBL31).** Audio frequency component in rectified output is developed across load resistor **R11** and passed via A.F. coupling capacitor **C24,** manual volume control **R13** and grid stopper **R14** to control grid of pentode section.

I.F. filtering by **C20, R10** and **C21** in diode circuit. Fixed tone correction by **C26** and **R15, C25** in pentode anode circuit. Provision for connection of low impedance external speaker across secondary winding of output transformer **T1.**

Second diode of **V3,** fed from **V2** anode via **C22,** provides D.C. potential which is developed across load resistor **R18** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage, together with G.B. for pentode section, is obtained from the drop along resistors **R16, R17** in cathode lead to chassis.

H.T. current is supplied by full-wave rectifying valve **(V4, Mullard AZ31).** Smoothing by iron-cored choke **L18** and electrolytic capacitors **C27, C28.** Valve heaters of **V1-V3** are supplied from the ends **a, c** of the heater secondary winding on the mains transformer **T2** at 6.3 V R.M.S., but the scale lamp is supplied from **c** and a tapping **b** at about 5 V R.M.S.



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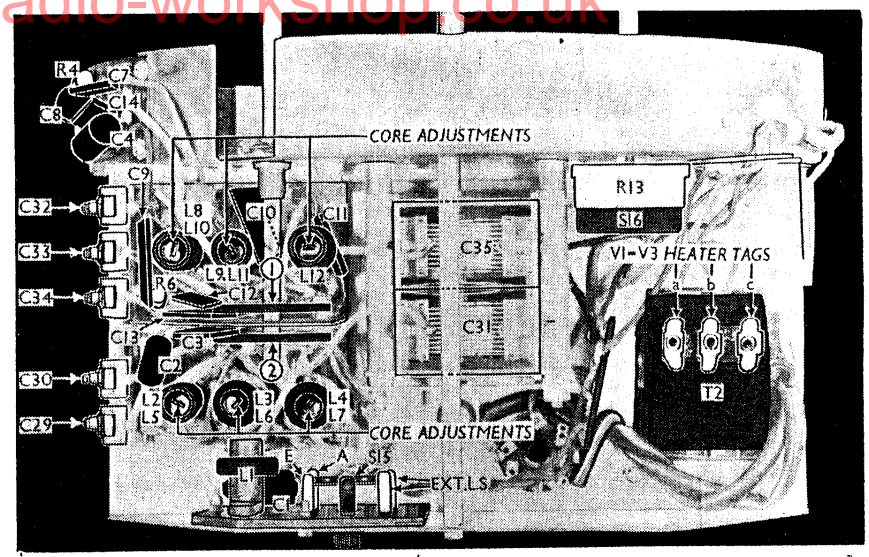


Under-chassis view. The R.F. and oscillator tuning assembly is seen on the left of the tuning gang, the trimmers conveniently facing outwards. Arrows show the directions in which the waveband switch units (1 and 2) are viewed in the diagrams in col. 2 overleaf.

COMPONENTS AND VALUES

	CAPACITORS	Values (μF)
C1	Aerial I.F. filter tuning...	0·00005
C2	V1 hex C.G. decoupling...	0·1
C3	Aerial circ. L.W. trimmer	0·0001
C4	V1 S.G. decoupling ...	0·05
C5	1st I.F. transformer tuning	0·0001
C6	capacitors	0·0001
C7	V1 osc. C.G. capacitor ...	0·0001
C8	V1 cathode by-pass ...	0·1
C9	Osc. circ. S.W. tracker ...	0·00617
C10	Osc. circ. M.W. tracker ...	0·000485
C11	Osc. circ. L.W. tracker ...	0·000172
C12	Osc. M.W. fixed trimmer	0·000025
C13	Osc. L.W. fixed trimmer...	0·00011
C14	V1 osc. anode coupling ...	0·00005
C15	A.V.C. line decoupling ...	0·05
C16	V2 S.G. decoupling ...	0·05
C17	2nd I.F. transformer	0·0001
C18	tuning capacitors ...	0·0001
C19	V2 cathode by-pass ...	0·1
C20	I.F. by-pass capacitors ...	0·0001
C21		0·0001
C22	V3 A.V.C. diode coupling	0·00005
C23*	V3 cathode by-pass ...	25·0
C24	A.F. coupling to V3 pent.	0·05
C25	Fixed tone correctors ...	0·04
C26		0·0025
C27*	H.T. smoothing capacitors	8·0
C28*		16·0
C29‡	Aerial circ. S.W. trimmer	—
C30‡	Aerial circ. M.W. trimmer	—
C31†	Aerial circuit tuning ...	—
C32‡	Osc. circ. S.W. trimmer...	—
C33‡	Osc. circ. M.W. trimmer...	—
C34‡	Osc. circ. L.W. trimmer...	—
C35†	Oscillator circuit tuning...	—

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)
R1	V1 S.G. H.T. feed ...	47,000
R2	V1 fixed G.B. resistor ...	150
R3	V1 osc. C.G. stabiliser ...	47
R4	V1 osc. C.G. resistor ...	47,000
R5	A.V.C. line decoupling ...	220,000
R6	Osc. circ. L.W. damping...	15,000
R7	V1 osc. anode H.T. feed...	47,000
R8	V2 S.G. H.T. feed ...	68,000
R9	V2 fixed G.B. resistor ...	150
R10	I.F. stopper	47,000
R11	V3 signal diode load ...	330,000
R12	A.V.C. line decoupling ...	1,000,000
R13	Manual volume control ...	1,000,000
R14	V3 pent. grid stopper ...	4,700
R15	Part of tone corrector ...	5,600
R16	V3 pent. G.B. and A.V.C.	150
R17	delay resistors	220
R18	V3 A.V.C. diode load ...	680,000

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial I.F. filter tuning ...	20·0
L2	Aerial coupling coils ...	0·2
L3		44·0
L4		30·0
L5	Aerial S.W. tuning coil ...	0·1
L6	Aerial M.W. tuning coil ...	3·0
L7	Aerial L.W. tuning coil ...	30·0
L8	Osc. S.W. reaction coil ...	10·5
L9	Osc. M.W. reaction coil ...	0·5
L10	Osc. S.W. tuning coil, total	0·2
L11	Osc. M.W. tuning coil ...	3·2
L12	Osc. L.W. tuning coil ...	6·0
L13	1st I.F. trans. Pri. ...	10·0
L14	Sec. ...	10·0
L15	2nd I.F. trans. Pri. ...	10·0
L16	Sec. ...	10·0
L17	Speaker speech coil ...	2·6
L18	H.T. smoothing choke ...	310·0
T1	Output trans. Pri. ...	450·0
	Sec. ...	0·17
T2	Mains trans. Pri., total ...	50·0
	Heater sec. ...	0·15
	Recr. heat. sec.	0·15
	H.T. sec., total...	1,150·0
S1-S14	Waveband switches ...	—
S15	Int. speaker switch ...	—
S16	Mains switch, ganged R11	—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted in the makers' manual. They represent conditions to be expected in an average receiver when the mains voltage adjustment is appropriately set.

When readings were taken the receiver was tuned to the highest wavelength on the M.W. band, and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 1,200 V scale of a Universal Avometer, chassis being the negative connection in all cases.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 ECH35	240	2·0	80	3·4
	Oscillators			
	85	3·3		
V2 EF39	240	7·6	65	2·3
V3 EBL31	225	32·0	240	3·7
V4 AZ31	270†	—	—	—

† Each anode, A.C.

DISMANTLING THE SET

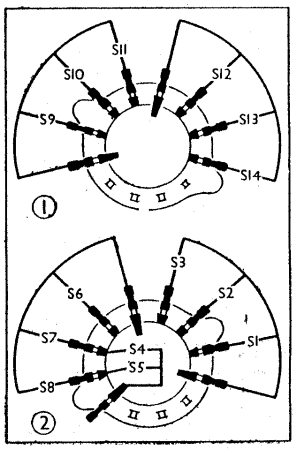
Removing Chassis.—Remove the three control knobs (large recessed grub screws);

laying the receiver face-down on a baize pad or soft duster, with the control spindles overhanging the bench, remove the back cover (five cheese-head screws) and slide it down the mains lead;

remove from the four lugs round the periphery of the chassis the four set screws holding it to the front of the cabinet, when the chassis, complete with speaker, may be lifted out.

When replacing, insertion of the four fixing screws is facilitated by the use of beeswax or Plasticine to hold the screws to the end of the screwdriver.

Removing Scale Disc.—To obtain access to the front compartment of the vertical chassis section, insert a long screwdriver into the slot across the flat rim of the periphery of this section, opposite the 41 m band mark on the scale, and slacken the largest fixing screw at the centre of the section, in front of the speaker, when the scale disc can be withdrawn.



Diagrams of the waveband switch units. Arrows in the under-chassis view overleaf show the directions in which they are viewed.

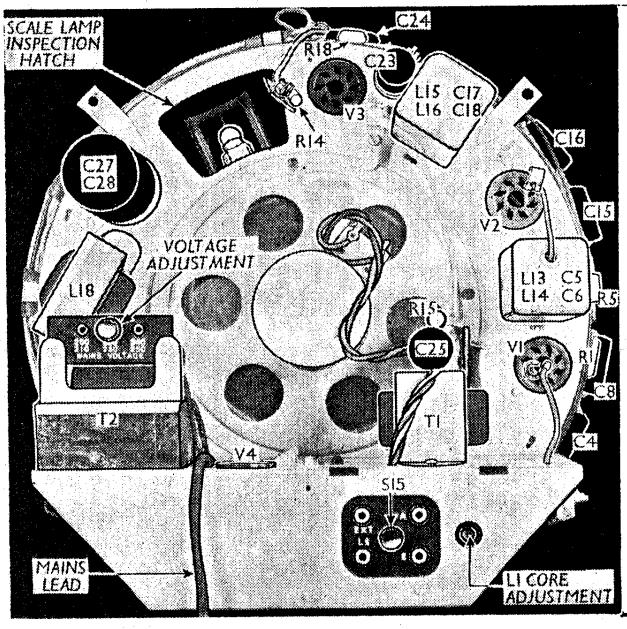
This operation is simplified if the scale lamp inspection cover is first removed (three small cheese-head screws) permitting a clear view of the screw-head. The bottom edge of the scale disc should just overhang the edge of the bench.

When replacing, the flat on the central stem locates the scale accurately, so that calibration is not upset, but it is advisable to swing the scale either way slightly, to assist correct location on the flat as the screw is tightened.

Removing Speaker.—Turn the gang to minimum to protect the vanes form risk of damage, and slacken the nuts on the three clamps holding the speaker to the vertical chassis member.

If the clamps are swivelled, the speaker may now be lifted out, but as the leads are not very long it is advisable to unsolder them.

When replacing, the connecting panel should go at the top. Note that the fixing clamps have on their bases locating pegs which rest in holes drilled in the vertical member.



Rear view of the chassis, showing all the valve positions, **V4** being on the horizontal deck. The cover has been removed from the scale lamp inspection hatch, and the lamp and cursor are seen through the aperture

GENERAL NOTES

Switches.—S1-S14 are the waveband switches, ganged in two rotary units within the tuning assembly beneath the chassis, the aerial **(S1-S8)** and oscillator **(S9-S14)** units being separated into their appropriate compartments by a metal screen. The units are indicated in our under-chassis view, and shown in detail in the diagrams in col. 2, where they are drawn as seen when viewed in opposite directions, as indicated by arrows in the chassis illustration.

The table below gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C**, closed.

S15 is the thumb-screw operated internal speaker switch, situated on the connecting panel at the rear of the chassis. It closes when screwed in (clockwise).

S16 is the Q.M.B. mains switch, ganged with the volume control **R13.**

Coils.—The aerial circuit coils **L2, L5; L3, L6; L4, L7;** and the oscillator coils **L8, L10; L9, L11; L12,** are in six unscreened tubular units in the tuning assembly beneath the chassis, the aerial and oscillator compartments being separated by a metal screen. All six units have adjustable iron-dust cores. The aerial I.F. filter coil **L1,** also iron-cored, is mounted on the rear chassis member, in the aerial compartment.

Scale Cursor Lamp.—This is a lamp with a spherical bulb and an M.E.S. base, rated at 6.3 V, 0.3 A. It is energised from the heater secondary of **T2,** being tapped off at **b** and **c** at about 5 V R.M.S.

The lamp is mounted in a small box carried on the end of the cursor arm, and throws a shadow which forms the cursor line through the translucent scale. It is connected by a pair of flexible leads which make a complete turn round the central stem on which the cursor drive pulley is mounted.

Access to the lamp is obtained easily from the rear of the receiver by removing

Switch Table

Switch	S.W.	M.W.	L.W.
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	C	—	—
S5	C	C	—
S6	C	—	—
S7	—	C	—
S8	—	—	C
S9	C	—	—
S10	—	C	—
S11	—	—	C
S12	C	—	—
S13	—	C	—
S14	—	—	C

the cover (three cheese-head set screws) from the scale lamp inspection hatch, indicated in our rear view of the chassis, and turning the cursor to the appropriate position.

External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a low impedance (about 3 Ω) external speaker. With these sockets is switch **S15,** which can be used if desired to mute the internal speaker.

Capacitors C27, C28.—These are two dry electrolytics in a single tubular metal container mounted on the vertical chassis member, rated at 500 V D.C. working. The red spotted tag is the positive of **C27** (8 μF), and the yellow spotted tag is that of **C28** (16 μF). The case forms the common negative connection.

Chassis Divergencies.—In the first few models produced, negative feed-back was used in the output stage, involving two additional resistors and one capacitor.

The lead connecting the speech coil circuit in our diagrams to chassis then went to the junction of **R16** and **R17** instead of to chassis, and a 22,000 Ω and a 33,000 Ω resistor went in series across **T1** secondary, the 33,000 Ω resistor being at the earthy end with a 0.1 μF capacitor shunted across it to modify the response. Feed-back was introduced into **V3** pentode control grid circuit by connecting the earthy end of **R13** (shown connected in our diagram to the junction of **R16** and **R17)** to the junction of the two additional resistors. The three additional components were mounted on a small connecting panel just beside **T2** in the under-chassis compartment.

In some chassis, also, a 33,000 Ω damping resistor may be shunted across the M.W. oscillator coil **L11,** in the manner in which **R6** is shunted across **L12.** This may be further extended in a few cases to adding a damping resistor across **L10.**

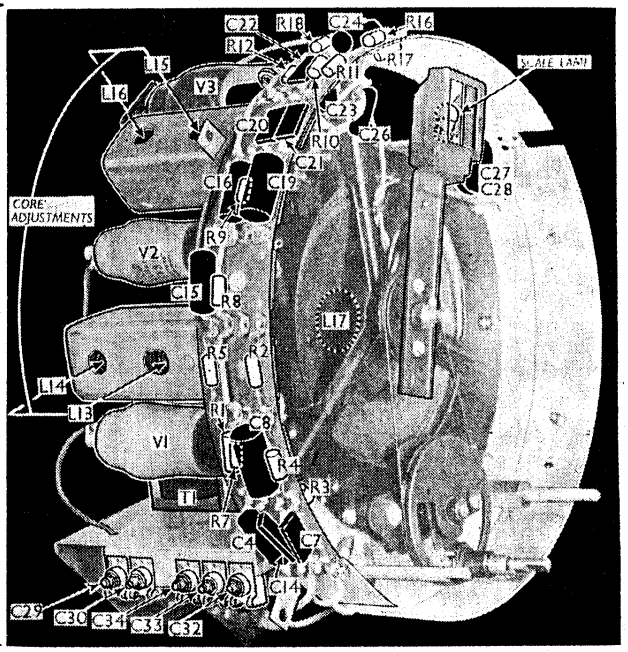
CIRCUIT ALIGNMENT

I.F. Stages.—Switch set to M.W. and tune to 550 m on scale. Turn the volume control to maximum and keep the input low to avoid A.V.C. action. Connect signal generator leads to control grid (top cap) of **V1** and chassis, via a 0.1 μF capacitor, feed in a 465 kc/s (645.16 m) signal, and adjust the cores of **L16, L15, L14** and **L13,** in that order, for maximum output.

I.F. Filter.—Transfer signal generator leads via a M.W. dummy aerial to **A** and **E** sockets, feed in a strong 465 kc/s signal and adjust the core of **L1** for minimum output.

R.F. and Oscillator Stages.—With the gang at maximum, the cursor shadow should cover the red spot just beyond the "L" at the high wavelength end of the L.W. scale. If it does not, the cursor arm may be adjusted within the limits of the slotted screw-holes in its carrier arm if the two screws holding it to the smaller (central) drive wheel are slackened. To do this, the scale disc much first be removed, as described under "Dismantling the Set." The signal generator leads remain connected to **A** and **E** sockets, via a suitable dummy aerial.

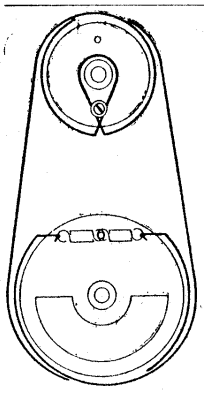
S.W.—Switch set to S.W., tune to 16 m on scale (middle of 16 m band area), feed in a 16 m (18.75 Mc/s) signal, and adjust **C32** for maximum output. Tune to 40 m on scale, feed in a 40 m (7.5 Mc/s) signal, and adjust the core of **L10** for maximum output. Tune to 18 m on scale, feed in an 18 m (16.67 Mc/s) signal, and adjust **C29** for maximum output. Tune to 48 m on scale, feed in a 48 m (6.25 Mc/s) signal, and adjust the core of **L5** for maximum output.



Three-quarter front view of the chassis, with the scale disc removed, showing the speaker cone. Most of the components are fitted to a flexible band which is bolted round the rim of the chassis. The valves are shown in position, and the I.F. core adjustments are indicated.

M.W.—Switch set to M.W., tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust **C33** for maximum output. Tune to 400 m on scale, feed in a 400 m (750 kc/s) signal, and adjust the core of **L11** for maximum output. Tune to 220 m on scale, feed in a 220 m (1,364 kc/s) signal, and adjust **C30** for maximum output. Tune to 520 m on scale, feed in a 520 m (576.9 kc/s) signal, and adjust the core of **L6** for maximum output.

L.W.—Switch set to L.W., tune to 1,000 m on scale, feed in a 1,000 m (300 kc/s) signal, and adjust **C34** for maximum output. Tune to 1,500 m on scale, feed in a 1,500 m (200 kc/s) signal, and adjust the core of **L12** for maximum output. Tune to 2,000 m on scale, feed in a 2,000 m (150 kc/s) signal, and adjust the core of **L7** for maximum output.



Reverse, or "inside" view of the cursor drive wheels, seen as they lie on the bench, showing the course taken by the drive cord, whose replacement is described in the next column.

DRIVE CORD REPLACEMENT

Turn the gang to minimum, and remove the collar (set screw) and cupped washer holding the upper wheel in place on the central stem; then dismount the cursor arm (one screw, one nut, with washers) from the upper wheel, and withdraw the wheel.

Slacken the two grub screws holding the lower wheel boss to the gang spindle, and remove the two set screws, behind the wheel, holding the friction drive bracket to its mounting (the screwdriver is applied *through* the drive wheel). The lower wheel may now be withdrawn, complete with tuning spindle and friction drive. Lay both wheels face-down on the bench, the spindle on the lower wheel overhanging the edge of the bench.

Removing the two tension springs from their anchor, knot one end of the new cord to one spring, then knot the other end to the second spring, so that the overall length, including the two springs relaxed, is 30⅜in, then cut off the surplus cord.

Fold the new cord exactly in half, and thread the centre loop so formed through the lower hole in the rim of the smaller wheel. Open the loop, slip it over the centre boss, pull it taut, and secure it under the clamping screw between the hole and boss.

The cord must now be run round the two drive wheels, which still lie face-down on the bench, in the manner shown in the diagram in col. 5, terminating with the springs at the anchor pin in the larger wheel. Then, holding the wheels to keep the cord taut, lift them and slip them on to their spindles, upper side first, and allow springs to take up slack. Finally, tighten up the fixing screws.

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