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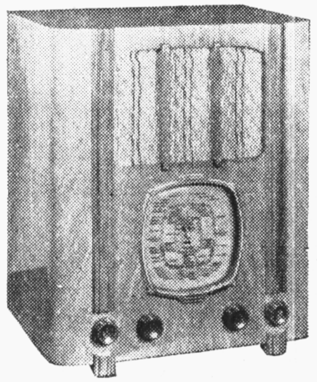
"TRADER" SERVICE SHEET

481

EVER READY 5347

3-BAND AC SUPERHET



THE Ever Ready model 5347 is a 3-valve (plus valve rectifier) 3-band AC superhet, with provision for a gramophone pick-up (with switching) and for an external speaker. The SW range is 16.3-52 m, and the receiver is suitable for use on 200-250 V, 40-100 C/S mains.

Release date: January, 1940.

CIRCUIT DESCRIPTION

Aerial input on MW and LW via coupling coils **L1** (MW) and **L2** (LW) to inductively coupled band-pass filter. Primary coils **L3** (MW) and **L4** (LW) are tuned by **C28**; secondaries **L7** (MW) and **L8** (LW) by **C32**. Mutual coupling by juxtaposition of appropriate coils.

On SW, input is via coupling coil **L5** to single-tuned circuit **L6, C32.**

First valve **(V1, Mullard ECH3)** is a triode-heptode operating as frequency changer with internal coupling. Triode oscillator grid coils **L9** (SW), **L10** (MW) and **L11** (LW) are tuned by **C33.** Parallel trimming by **C36** (SW), **C37** (MW) and **C38** (LW); series tracking by **C7** (SW), **C8, C34** (MW) and **C35** (LW). Reaction coupling from anode by coils **L12** (SW), **L13** (MW) and **L14** (LW).

Second valve **(V2, Mullard EF9)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C39, L15, L16, C40** and **C41, L17, L18, C42.**

Intermediate frequency, 452 KC/S.

Diode second detector is part of double diode output pentode valve **(V3, Mullard EBL1).** Audio-frequency component in rectified output is developed across load resistance **R14** and passed via IF filter circuit **C14, R15, C16,** AF coupling condenser **C18** and manual volume control **R16** to control grid of pentode section.

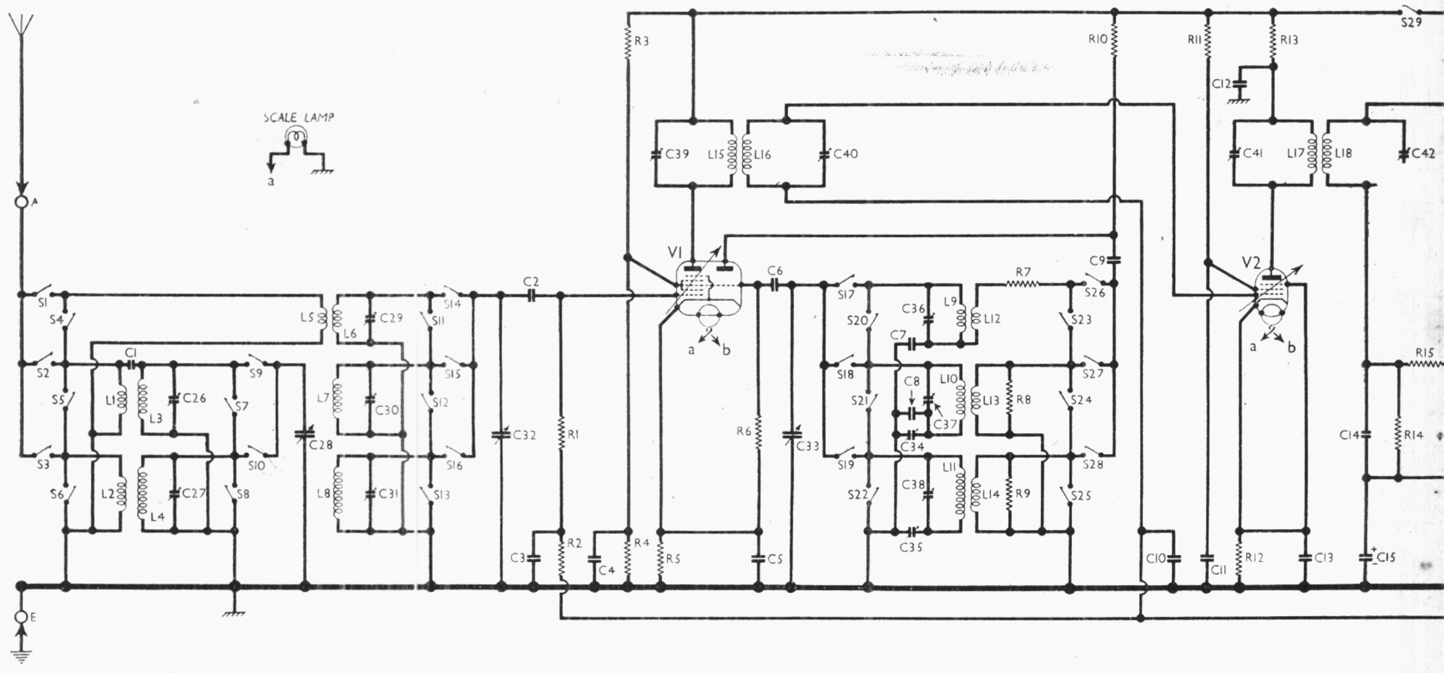
Provision for connection of gramophone pick-up across **C18, R16** via switch **S30,** which closes when the waveband control is turned to the gram position. Radio signals are muted during gramophone operation by **S29,** which opens as **S30** closes and cuts off the HT supply to **V1** and **V2.**

Fixed tone correction by **C19** in **V3** pentode anode circuit. Variable tone control by **C20, R21** which are connected in series across **C19** and operate on radio or gramophone operation, as does also the volume control **R16.** Provision for connection of high impedance external speaker by sockets in the anode circuit of **V3** pentode.

Second diode of **V3,** fed from **L18** via **C17,** provides DC potential which is developed across load resistance **R20** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control. Delay voltage, together with GB for pentode section, is obtained from drop across resistances **R17** and **R18,** which form a potential divider in the cathode lead to chassis.

HT current is supplied by full-wave rectifying valve **(V4, Mullard AZ1).** Smoothing is effected by iron-cored choke **L20** in conjunction with electrolytic condensers **C21** and **C22.**

Mains input circuit RF filtering by **C25.** RF filtering in rectifier circuit by by-pass condensers **C23** and **C24.** Surge limiting by **R22** and **R23.**

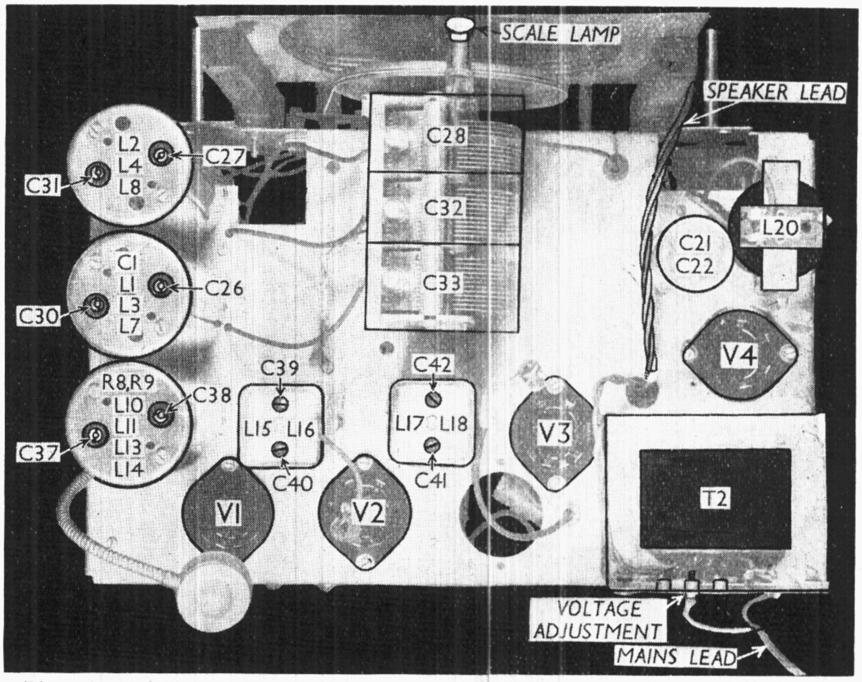


Circuit diagram of the Ever Ready 5347 3-band AC superhet. **S30** and **S29** perform the pick-up switching operations. **Note** limiting resistors and by-pass condensers in the feed circuit to **V4** anodes. The end turn of **L9** is adjustable for SW trac

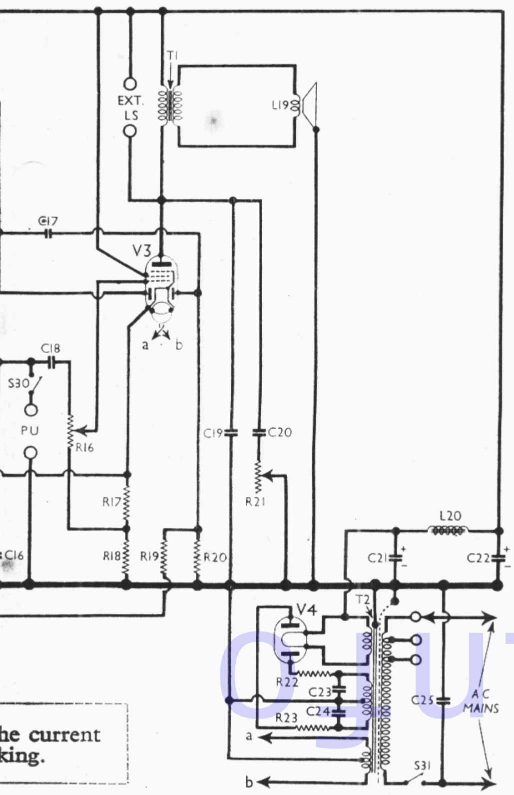
COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Aerial MW "top" coupling	0·000005
C2	V1 heptode CG condenser	0·0005
C3	V1 heptode CG decoupling	0·05
C4	V1 SG decoupling ...	0·1
C5	V1 cathode by-pass ...	0·1
C6	V1 osc. CG condenser ...	0·0001
C7	Osc. circuit SW tracker...	0·0057
C8	Osc. circ. MW fixed tracker	0·0003
C9	V1 osc. anode coupling ...	0·0003
C10	V2 CG decoupling ...	0·1
C11	V2 SG decoupling ...	0·1
C12	V2 anode decoupling ...	0·1
C13	V2 cathode by-pass ...	0·1
C14	IF by-pass	0·00005
C15*	V3 cathode by-pass ...	25·0
C16	IF by-pass	0·00005
C17	Coupling to V3 AVC diode	0·00001
C18	AF coupling to V3 pentode	0·05
C19	Fixed tone corrector ...	0·005
C20	Part of variable tone control	0·04
C21*	HT smoothing condensers	16·0
C22*	HT smoothing condensers	24·0
C23	V4 anode RF by-pass condensers	0·005
C24	V4 anode RF by-pass condensers	0·005
C25	Mains RF by-pass ...	0·01
C26‡	Band-pass pri. MW trimmer	0·0001
C27‡	Band-pass pri. LW trimmer	0·0001
C28†	Band-pass pri. tuning ...	—
C29‡	Aerial circuit SW trimmer	0·00002
C30‡	Band-pass sec. MW trimmer	0·0001
C31‡	Band-pass sec. LW trimmer	0·0001
C32†	Band-pass sec. and SW aerial tuning	—
C33†	Osc. circuit tuning ...	—
C34‡	Osc. circuit MW tracker...	0·0003
C35‡	Osc. circuit LW tracker ...	0·0003
C36‡	Osc. circuit SW trimmer...	0·00002
C37‡	Osc. circuit MW trimmer	0·0001
C38‡	Osc. circuit LW trimmer...	0·0001
C39‡	1st IF trans. pri. tuning...	0·0001
C40‡	1st IF trans. sec. tuning...	0·0001
C41‡	2nd IF trans. pri. tuning...	0·0001
C42‡	2nd IF trans. sec. tuning...	0·0001

* Electrolytic. † Variable. ‡ Pre-set.



Plan view of the chassis. **L20** is the HT smoothing choke. Note the various trimmers in the five coil units.



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	RESISTANCES	Values (ohms)
R1	V1 heptode CG resistance	1,000,000
R2	V1 heptode CG decoupling	250,000
R3	V1 SG HT potential divider resistances	25,000
R4	V1 SG HT potential divider resistances	30,000
R5	V1 fixed GB resistance ...	200
R6	V1 osc. CG resistance ...	47,000
R7	Osc. SW reaction damping	150
R8	Osc. MW reaction damping	1,500
R9	Osc. LW reaction damping	5,100
R10	V1 osc. anode HT feed ...	30,000
R11	V2 SG HT feed	80,000
R12	V2 fixed GB resistance ...	250
R13	V2 anode HT feed ...	2,100
R14	V3 signal diode load ...	600,000
R15	IF stopper	100,000
R16	Manual volume control ...	500,000
R17	V3 pentode GB and AVC delay resistances ...	150
R18	V3 pentode GB and AVC delay resistances ...	100
R19	AVC line decoupling ...	250,000
R20	V3 AVC diode load ...	1,100,000
R21	Variable tone control ...	50,000
R22	V4 anodes current limiting resistances	75
R23	V4 anodes current limiting resistances	75

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial MW coupling coil	17·0
L2	Aerial LW coupling coil	140·0
L3	Band-pass primary coils	2·5
L4	Band-pass primary coils	45·0
L5	Aerial SW coupling coil	2·2
L6	Aerial SW tuning coil...	Very low
L7	Band-pass secondary coils	2·5
L8	Band-pass secondary coils	48·0
L9	Osc. circuit SW tuning coil	Very low
L10	Osc. circuit MW tuning coil	2·7
L11	Osc. circuit LW tuning coil	4·5
L12	Oscillator SW reaction	0·2
L13	Oscillator MW reaction	3·0
L14	Oscillator LW reaction	10·0
L15	1st IF trans. Pri. ...	26·0
L16	1st IF trans. Sec. ...	26·0
L17	2nd IF trans. Pri. ...	26·0
L18	2nd IF trans. Sec. ...	26·0
L19	Speaker speech coil ...	2·0
L20	HT smoothing choke ...	260·0

	OTHER COMPONENTS (*Continued*)	Approx. Values (ohms)
T1	Speaker input trans. Pri. ...	500·0
	Speaker input trans. Sec. ...	0·4
T2	Mains trans. Pri., total ...	20·0
	Mains trans. Heater sec....	0·1
	Mains trans. Rect. heat. sec.	0·1
	Mains trans. HT sec., total	260·0
S1-S28	Waveban switches ...	—
S29, S30	Radio/gram change switches	—
S31	Mains switch, ganged R16	—

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (pull-off). These knobs are fitted with spring fixing clips, which frequently stick tight. If difficulty is experienced in removing a knob, twist a thick piece of string round its neck and pull the string steadily.

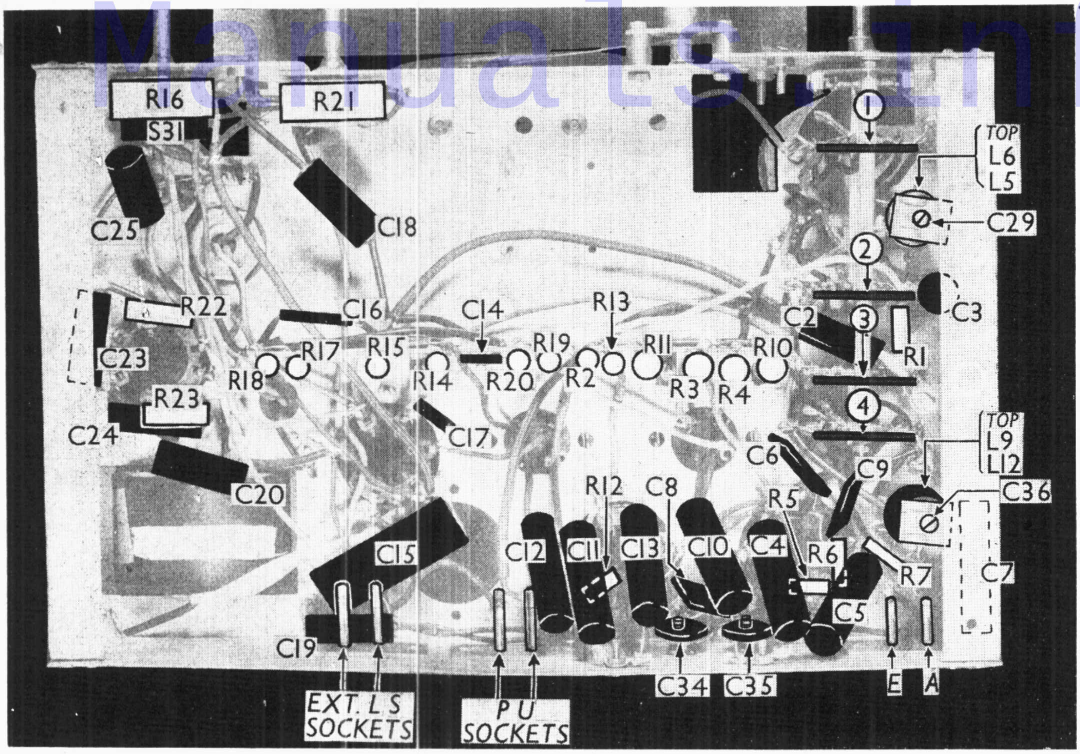
Free the speaker leads from the cleat on the sub-baffle; remove the four bolts (with metal washers) holding the chassis to the bottom of the cabinet, when the chassis may be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To free chassis entirely, unsolder the two leads from the speaker transformer and a third (earthing) lead from under the lower right-hand speaker fixing nut.

When replacing, connect the red speaker lead to the top tag on the speaker transformer, and the blue lead to the bottom tag.

Fit the black (earthing) lead tag under the lower right-hand speaker fixing nut.

Removing Speaker.—Disconnect the three leads as indicated above; remove the remaining three fixing nuts (with washers) holding the speaker to the sub-baffle.



Under-chassis view. Diagrams of the four switch units, viewed in the direction of the arrows, are below. The trackers **C34** and **C35** are adjustable through holes in the rear chassis member. The trimmers **C29** and **C36** are mounted on the SW coil units.

When replacing, the transformer should be on the right and the leads should be connected as outlined previously.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 235 V, using the 216-235 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium wave band, and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 ECH3	250	2.2	106	2.1
	Oscillator 95	4.8		
V2 EF9	226	8.3	75	2.3
V3 EBL1	230	34.0	250	4.6
V4 AZ1	267†	—	—	—

† Each anode, AC.

GENERAL NOTES

Switches.—S1-S28 are the waveband switches, and **S29, S30** the radio/gram switches, ganged in four rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams in col. 3, where they are drawn as seen looking from the front of the underside of the chassis.

The table (col. 2) gives the switch positions for the four control settings, starting from fully anti-clockwise. A dash indicates open, and **C**, closed.

S31 is the QMB mains switch, ganged with the volume control **R16**.

Coils.—L1, L3, L7; L2, L4, L8; L10, L11, L13, L14 and the IF transformers **L15, L16** and **L17, L18** are in five screened units on the chassis deck. Each unit contains two trimmers, and in addition the first unit contains **C1** and the third unit contains **R8, R9.**

L5, L6 and **L9, L12** are in two tubular unscreened units beneath the chassis, near the switch unit. The thick wire windings are **L6** and **L9** respectively. Each unit has a trimmer mounted above it.

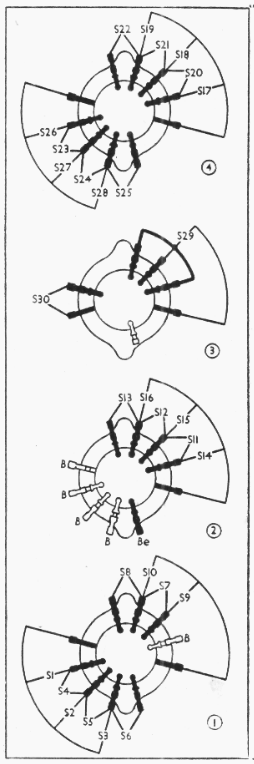
L20 is the iron-cored smoothing choke, mounted on the chassis deck.

Switch Table

Switch	LW	MW	SW	Gram
S1	—	—	C	—
S2	—	C	—	—
S3	C	—	—	—
S4	—	—	—	C
S5	—	—	C	C
S6	—	C	C	—
S7	—	—	C	C
S8	—	C	C	—
S9	—	C	—	—
S10	C	—	—	—
S11	—	—	—	C
S12	—	—	C	C
S13	—	C	C	—
S14	—	—	C	—
S15	—	C	—	—
S16	C	—	—	—
S17	—	—	C	—
S18	—	C	—	—
S19	C	—	—	—
S20	—	—	—	C
S21	—	—	C	C
S22	—	C	C	—
S23	—	—	—	C
S24	—	—	C	C
S25	—	C	C	—
S26	—	—	C	—
S27	—	C	—	—
S28	C	—	—	—
S29	C	C	C	—
S30	—	—	—	C

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (not less than 10,000 O) external speaker.

Scale Lamp.—This was an Ever Ready MES type, rated at 5.5 V, 0.3 A in our chassis. The makers specify a voltage of



Diagrams of the four switch units, drawn as seen looking from the front of the underside of the chassis.

4.5 V. The lamp is connected across one half of the heater secondary of **T2**.

Condensers C21, C22.—These are two 350 V peak working dry electrolytics in a single tubular metal can, mounted on the chassis deck. The connections emerge from beneath the chassis, the black lead being the common negative. The red lead is the positive of **C21** (16 μF) while the yellow lead is the positive of **C22** (24 μF).

Trimmers. — Apart from the ten trimmers (two in each of the five screened coil units) there are two more beneath the chassis (one at the top of each SW coil unit), and two trackers mounted on the rear chassis member, and adjustable from the back of the chassis.

Chassis Divergencies.—Slight divergencies in certain resistors were noted in our chassis, compared with the makers' values. **R1** was 1,000,000 O (not 1,100,000 O); **R2** and **R19** were both 250,000 O (not 260,000 O); **R6** was 47,000 O (not 51,000 O); **R14** was 600,000 O (not 510,000 O); **R15** was 100,000 O (not 110,000 O). In some chassis there may be a 0.0003 μF RF bypass condenser in parallel with **C15**. The makers also show **C25** connected to the side of **S31** opposite to that indicated in our diagram.

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator, via a 0.1 μF condenser, to control grid (top cap) of **V1**, and to chassis. Short circuit **C33** and switch set to MW. Feed in a 452 KC/S signal, and adjust **C42, C41, C40** and **C39** in turn for maximum output. Check these settings, then remove the short circuit from **C33**.

RF and Oscillator Stages.—With gang at maximum, pointer should be horizontal. Connect signal generator via a suitable dummy aerial to the **A** and **E** sockets.

LW.—Switch set to LW, and adjust **C35** to about two-thirds its maximum setting. Tune to 1,000 m on scale, feed in a 1,000 m (300 KC/S) signal, and adjust **C38**, then **C31** and **C27**, for maximum output. Feed in a 1,700 m (176.3 KC/S) signal, tune it in, and adjust **C35** for maximum output, while rocking the gang for optimum results. Repeat the 1,000 m adjustments.

MW.—Switch set to MW, and adjust **C34** to about three-quarters its maximum setting. Tune to 214 m on scale, feed in a 214 m (1,400 KC/S) signal, and adjust **C37**, then **C30** and **C26**, for maximum output. Feed in a 500 m (600 KC/S) signal, tune it in, and adjust **C34** for maximum output, while rocking the gang for optimum results. Repeat the 214 m adjustments.

SW.—Switch set to SW, and tune to 15 MC/S on scale. Feed in a 15 MC/S (20 m) signal, unscrew **C36** fully, then screw it up to the first peak encountered, and adjust accurately for maximum output. Then adjust **C29** for maximum output. Feed in a 6 MC/S (50 m) signal and tune it in, then adjust the top turn of **L9** for maximum output, while rocking the gang slightly for optimum results. Repeat the 15 MC/S adjustments.

MECHANICAL FAULTS IN LOUD SPEAKERS

ALTHOUGH the modern loud speaker is of fairly robust construction and rarely gives rise to faults in use, older types may suffer from various troubles.

Faults may be divided broadly into two classes, mechanical and electrical. Among mechanical faults may be included foreign noises, such as buzzes and rattles, and distorted reproduction. Electrical faults may occur in the speech coil, the field coil (in the case of an energised type) and the input transformer (which is usually considered to be part of the loud speaker).

It is with mechanical faults only that these notes are concerned.

The tracing of faults in a loud speaker is usually fairly simple. Mechanical faults which take the form of a buzz may be due to the speech coil being out of centre, a damaged or broken centring device, a split or tear in the diaphragm, a broken joint between the diaphragm and speech coil, loose turns of wire on the speech coil, loose mounting bolts or clips holding the loud speaker to the sub-baffle, vibrating speech coil leads, and so on.

To trace such faults it is best first of all to operate the set with the loud speaker *in situ* in an endeavour to locate the source of the buzz or rattle. By lightly touching various parts of the loud speaker when it is operating one can often stop or modify the fault, and in this way the source can generally be located.

If a casual test such as this does not reveal the cause of the trouble, and the engineer is certain that it is due to the loud speaker itself, and not to some loose part of the cabinet or chassis, the loud speaker must be removed, without disconnecting it from the set, for a more thorough test.

At this point an audio-frequency oscillator is useful for testing. By feeding its output into the pick-up sockets of the set, or to the grid circuit of the output or first AF valve, a steady input of any desired strength may be fed to the loud speaker. Further, the frequency may be varied up or down the scale, which is a help in cases where the buzz is produced only on a very narrow range of frequencies.

The repair of mechanical faults is often quite an easy matter but in certain cases, such as a fractured centring "spider," it will probably be necessary to return the loud speaker to the manufacturers, or to obtain and fit a new coil and diaphragm assembly.

Slits or tears in the diaphragm may be repaired by glueing patches of paper on either side of the faulty area; transparent adhesive tape is a good material to use for this. It is important that the edges of the tear or slit should be well coated with seccotine or similar adhesive before fitting the patches, and that the latter should be securely stuck over their whole area. Sometimes a centring device which has cracked can be repaired with strips of thin card or bakelised paper to save renewal of the whole assembly.

If the speech coil is breaking away from the diaphragm, it is often possible to repair it by running seccotine or cellulose adhesive in a fairly liberal quantity into the angle between the coil former and the diaphragm and allowing it to set hard before use. Loose turns of wire on the speech coil can often be fixed by painting over with cellulose adhesive, thinned, if necessary, with a little amyl acetate.

If the fault is due to the speech coil being out of centre in the loud speaker gap, the first thing to check is that the coil former has not warped, for if it has, re-centring may be impossible. Sometimes it is possible to squeeze a warped coil back to its cylindrical form, but this is a delicate operation, and in any case may not be a permanent cure. Replacement is really the only safe course.

To re-centre a coil, the screw or screws holding the centring device to the speaker frame or magnet must be slackened off, and the position taken up by the coil noted. If it is only slightly off centre, all well and good; but if it is seriously out of centre the fixings of the frame holding the diaphragm should be examined to see whether it is possible to shift the whole diaphragm assembly slightly to bring the coil nearer the centre of the gap.

Some manufacturers supply gauges for fitting between the coil former and the magnet to hold it in the correct position while tightening the centring device, but even so this operation must be done very carefully to avoid strain, otherwise the coil may spring out of centre when the gauge is removed.

Another tip is to feed 50 C/S current at about 2 V from half the 4 V centre-tapped secondary of an old mains transformer into the speech coil, which causes it to vibrate fairly vigorously. It is then easy to hear whether the coil remains centred when the screws of the centring device are tightened. The note produced should be very deep and clear—any harshness or high-pitched quality means that the coil is touching the magnet somewhere. It should not be allowed to continue vibrating while touching for any length of time, otherwise the coil winding may be badly rubbed.

Distorted reproduction is often due to dirt or rust in the magnet gap, or to the coil touching the magnet very slightly. The remedy is obvious, but the cleaning out of the gap will involve removing the coil and diaphragm assembly first. When this is done the gap can be cleaned with ordinary insulation tape drawn over a thin piece of wood. By applying pressure, ferrous metallic particles are embedded in the tape, and can be removed despite the attraction of the magnet.

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