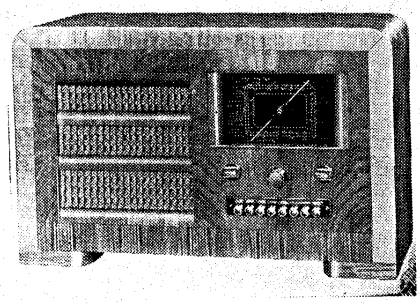
Supplement to The Wireless & Electrical Trader, November 19, 1938

"TRADER" SERVICE SHEET

366

DECCA PT/ML/B

(OR PT/B)



PRESS-BUTTON tuning of the trimmer type is included in the Decca PT/ML/B 5-valve battery 2-band superhet and caters for four medium and two long wave stations. Press-buttons are also incorporated for wave changing when manual tuning is being employed.

While the chassis of the receiver bears a plate carrying the model number PT/ML/B, the receiver itself is catalogued as PT/B.

Release date: July, 1938.

CIRCUIT DESCRIPTION

Coupling between the aerial and MW tuning coil **L4** is via coupling condenser **C2** and coupling coil **L2.** On LW, however, **C31** is connected by switching across **L4,** the two together operating as an aerial coupling to the LW tuning coil **L3** and as an aerial loading circuit. The aerial circuit is tuned by **C23** (manual) or one of the trimmer units **C32** to **C39,** selection being effected by switches mounted on the auto tuning unit and controlled by the press-buttons. **L1, C1** connected across aerial circuit is an IF filter.

The action of the switches can be followed from the circuit diagram when it is explained that the switches are numbered in the same sequence in the diagram as they appear in the accompanying illustration of the auto unit and are numbered in pairs as attached to each button, each switch bearing a lettered suffix to indicate its action.

S1a and **S1x** are associated with the MW manual button on the extreme left of the unit, while **S8a** and **S8x** are associated with the LW manual button, situated at the opposite end of the unit, so that **S1** and **S8** form the manual waveband switching.

Throughout the diagram the suffix "**a**" indicates that the switch with which it is associated closes when its button is depressed, while an "**x**" indicates that its switch opens when the button is depressed. When the button is released by the depression of another button, the position is reversed, so that the "**a**" switch opens and the "**x**" closes.

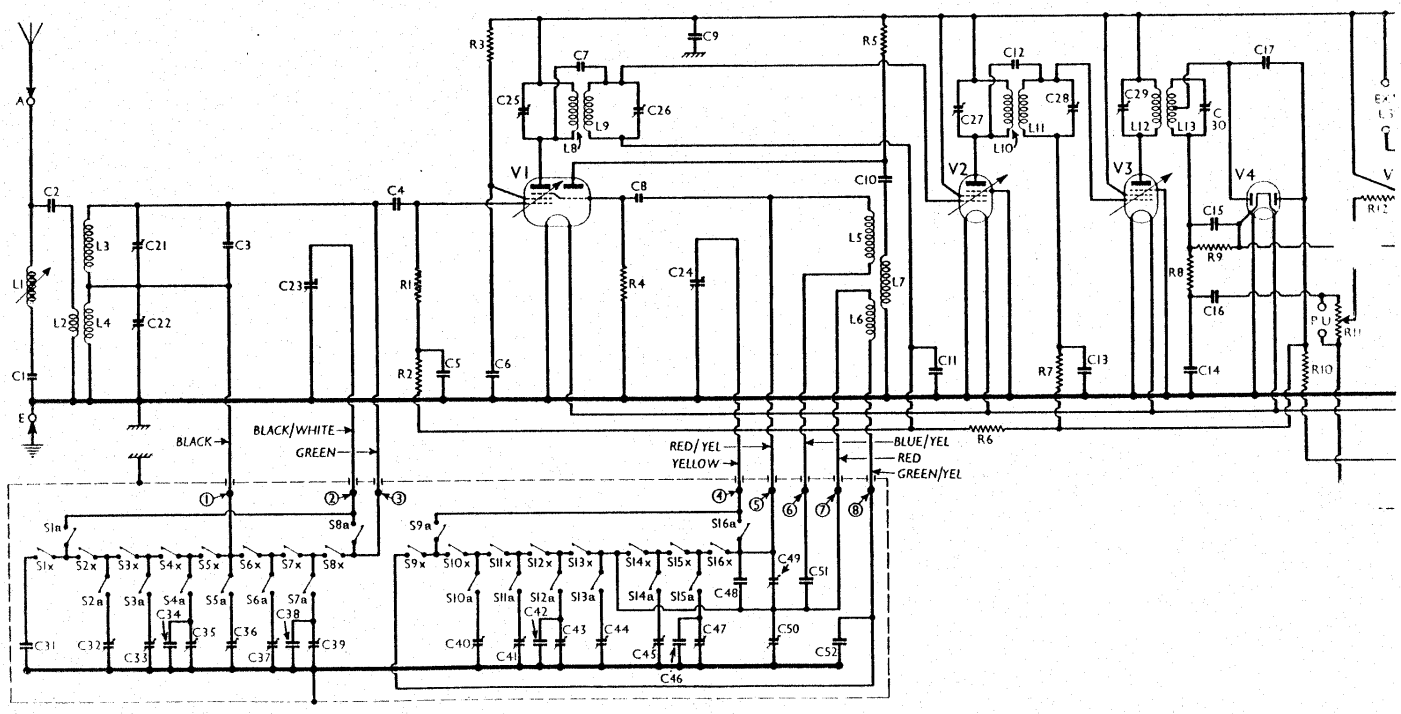
At any time, therefore, all "**x's**" but one are closed and all "**a's**" but one are open, from which it will be seen that, if the button controlling **S6, S7** or **S8** is depressed, all "**x's**" from **S1** to **S5** will be closed, connecting **C31** between the junction of **L3** and **L4,** and chassis. In this condition, the receiver will be operating on LW, **S6x, S7x** or **S8x** being open.

If a button controlling switch pairs **S1** to **S5** is depressed, the associated "**x**" will open, the "**a**" close, **S6x, S7x** and **S8x** will short-circuit **L3** and the receiver will operate on MW.

First valve (**V1, Mazda metallised TP23**) is a triode pentode operating as frequency changer with internal coupling. Triode oscillator grid coils **L6** (MW) and **L5** (LW) are tuned by **C24** (manual), or one of the trimmer units **C40** to **C47** via selector switches **S10a** to **S15a** (auto.) Parallel trimming by **C50** (MW) and **C48, C49** (LW); series tracking by **C52** (MW) and **C51** (LW). Reaction by coil **L7.**

It will be seen that, as in the aerial circuit, MW and LW oscillator circuits are connected in series and the "**x**" switches are connected between the two extreme ends of the coils. The junction of the two coils is connected to the junction of **S13x** and **S14x** and, as only one of the "**x**" series can be open at a time, one of the tuning coils is short-circuited so that waveband selection is automatically effected, whichever button is depressed.

Second valve (**V2, Tungsram metallised VP2B**) is a variable-mu RF pentode operating as intermediate frequency



amplifier with tuned-primary tuned-secondary transformer couplings **C25, L8, C7, L9, C26** and **C27, L10, C12, L11, C28**. The two small condensers **C7** and **C12** form small top couplings.

Third valve (**V3, Tungsram metallised VP2B**) is also a variable-mu RF pentode, providing further intermediate frequency amplification with output coupling transformer **C29, L12, L13, C30.**

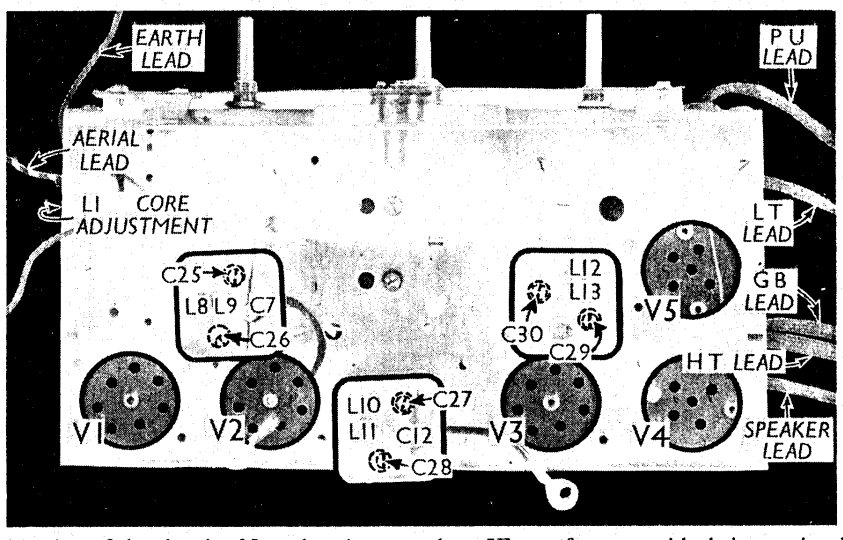
Intermediate frequency 465 KC/S.

Diode second detector is part of separate double diode valve (**V4, Mullard metallised 2D2**) employing an indirectly heated cathode. Audio frequency component in rectified output is developed across load resistance **R9** and passed via IF stopper **R8**, AF coupling condenser **C16**, manual volume control **R11** and grid stopper **R12** to CG of pentode output valve (**V5, Mullard PM22D**). Provision for connection of gramophone pick-up across **R11**. Fixed tone correction by **C18** and variable tone control by **C19, R13**, both in anode circuit. Provision for connection of high impedance external speaker across primary of **T1.**

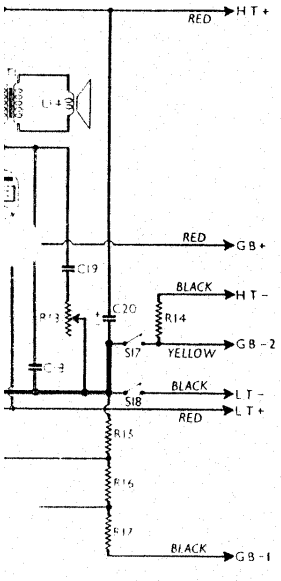
Second diode of **V4**, fed from tap on **L13** via **C17**, provides DC potential which is developed across load resistance **R10** and fed back through decoupling circuits as GB to FC and both IF valves, giving AVC.

The grid bias battery is virtually divided into two sections, the yellow GB −2 lead, which is connected to chassis in the receiver, being plugged into the 6 V GB socket of the battery. That section of the battery which lies between −6 V and −9 V is used to provide a voltage across the potentiometer formed of resistances **R15, R16** and **R17** from which are obtained minimum GB potential for **V1, V2** and **V3** and GB potential for **V5.** The other section of the battery, that between −6V and GB+ sockets, biases **V4** cathode positively with respect to chassis to provide the major portion of the AVC delay voltage, to which of course must be added the minimum GB on **V1, V2** and **V3.**

The resistance **R14** in the negative HT lead to chassis is inserted to limit the HT current in case of accidents.



Plan view of the chassis. Note that there are three IF transformers, with their associated trimmers.



Circuit diagram of the Decca PT/ML/B 2-band battery press-button superhet. The auto-unit is shown in a dotted enclosure at the bottom left-hand corner of the diagram. Note that in the main part of the diagram the MW coils are placed below the LW ones, a reversal of the usual practice. Thus **L4** and **L6** are the MW coils. The battery connections are explained under General Notes.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Aerial IF filter tuning ..	0·00006§
C2	Aerial coupling condenser ..	0·0004
C3	Aerial circuit LW fixed trimmer	0·00003
C4	V1 pentode CG condenser ..	0·0001
C5	V1 pentode CG decoupling ..	0·02
C6	V1 SG decoupling	0·1
C7	1st IF trans. top coupling ..	0·000025
C8	V1 osc. CG condenser. . ..	0·00006§
C9	HT circuit RF by-pass ..	0·1
C10	V1 osc. anode coupling ..	0·0002
C11	V2 CG decoupling	0·02
C12	2nd IF trans. top coupling ..	0·000025
C13	V3 CG decoupling	0·02
C14	IF by-pass condensers	0·0001
C15		0·0001
C16	AF coupling to V5	0·02
C17	Coupling to V4 AVC diode ..	0·0001
C18	Fixed tone corrector	0·006
C19	Part of variable tone control	0·01
C20*	HT reservoir condenser ..	4·0
C21‡	Aerial circuit LW trimmer ..	—
C22‡	Aerial circuit MW trimmer ..	—
C23†	Aerial circuit manual tuning..	—
C24†	Oscillator circuit manual tuning	—
C25‡	1st IF trans. pri. tuning ..	—
C26‡	1st IF trans. sec. tuning ..	—
C27‡	2nd IF trans. pri. tuning ..	—
C28‡	2nd IF trans. sec. tuning ..	—
C29‡	3rd IF trans. pri. tuning ..	—
C30‡	3rd IF trans. sec. tuning ..	—
	AUTO-TUNING UNIT	
C31	Aerial LW coupling condenser	0·00125
C32‡	Aerial circuit automatic tuning trimmers ..	—
C33‡		—
C34		0·000175
C35‡		—
C36‡		—
C37‡		—
C38		0·0002
C39‡		—
C40‡		—
C41‡		—
C42		0·000175
C43‡	Oscillator circuit automatic tuning trimmers ..	—
C44‡		—
C45‡		—
C46		0·0002
C47‡		—
C48	Oscillator circuit LW trimmers	0·000175
C49‡		—
C50‡	Osc. circuit MW trimmer ..	—
C51	Osc. circuit LW tracker ..	0·00101
C52	Osc. circuit MW tracker ..	0·000541

*Electrolytic. †Variable. ‡Pre-set. §Made up of two in parallel.

	RESISTANCES	Values (ohms)
R1	V1 pentode CG resistance ..	500,000
R2	V1 pentode CG decoupling ..	500,000
R3	V1 SG HT feed	100,000
R4	V1 osc. CG resistance ..	50,000
R5	V1 osc. anode HT feed ..	30,000
R6	AVC line decoupling	500,000
R7	V3 CG decoupling	500,000
R8	IF stopper	70,000
R9	V4 signal diode load	300,000
R10	V4 AVC diode load	500,000
R11	Manual volume control ..	500,000
R12	V5 grid stopper	15,000
R13	Variable tone control	50,000
R14	HT current limiter	150
R15	GB battery potential divider	300
R16		150
R17		150

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial IF filter coil	9·0
L2	Aerial coupling coil	14·0
L3	Aerial LW tuning coil ..	12·0
L4	Aerial MW tuning coil ..	2·7
L5	Osc. circuit LW tuning coil ..	3·5
L6	Osc. circuit MW tuning coil ..	1·6
L7	Oscillator reaction coil ..	6·5
L8	1st IF trans. Pri.	6·0
L9	1st IF trans. Sec.	6·0
L10	2nd IF trans. Pri.	6·0
L11	2nd IF trans. Sec.	6·0
L12	3rd IF trans. Pri.	6·0
L13	3rd IF trans. Sec., total ..	6·0
L14	Speaker speech coil	1·7
T1	Speaker input trans. Pri...	650·0
	Sec...	0·15
S1a, x	Aerial circuit manual wave-band switches	—
S8a, x		
S2a to S7a	Aerial circuit auto selector switches	—
S2x to S7x		
S9a, x	Oscillator circuit manual wave-band switches	—
S16a, x		
S10a to S15a	Oscillator circuit auto selector switches	—
S10x to S15x		
S17	HT and GB circuits switch .. ganged R11	—
S18	LT circuit switch	—

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DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and upon removal (six countersunk-head wood screws) gives access to the trimmers for the pre-set stations and to certain others.

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the three knobs (recessed grub screws) and the two bolts (with claw and spring washers) holding the chassis to the bottom of the cabinet.

Now remove the aerial, earth and pick-up terminal strip from the back of the cabinet (three round-head wood screws) and free the aerial lead from the cleat on the side of the cabinet (round-head wood screw).

The chassis can now be withdrawn to the extent of the speaker leads which is sufficient for normal purposes. *When replacing,* make sure that the chassis is correctly positioned in the cabinet as otherwise the buttons may jam on the escutcheon.

Removing Auto Unit.—Before access can be gained to the components beneath the chassis, it is necessary to remove the press-button unit. This can be done by unsoldering the blue/yellow, green/yellow, red, black/white, green, yellow and red/yellow leads from the unit and the black lead from **C21** in the main chassis. Then remove the four self-tapping screws holding the press-button unit to the main chassis.

When replacing, consult the illustrations of the chassis and the press-button unit for the connections for the leads which have been removed. The leads on the chassis are colour-coded and numbered, while the connecting points on the press-button unit are numbered.

Removing Speaker.—The speaker can be removed from the cabinet by removing the nuts and lock washers from the four screws holding it to the sub-baffle. *When replacing,* see that the transformer is at the top.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating with an HT battery reading 120 V. The receiver was tuned to the lowest wavelength on the medium 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 TP23 ..	118	1·1	54	0·6
	Oscillator			
	50	1·6		
V2 VP2B	118	0·7	118	0·3
V3 VP2B	118	0·9	118	0·3
V4 2D2	—	—	—	—
V5 PM22D	116	3·5	118	0·6

GENERAL NOTES

Switches.—**S1a** to **S16x** are all push-button switches contained in a 2-bank push-button unit with eight plungers. Each plunger controls four switches, two on the upper and two on the lower paxolin terminal strip. **S1x** to **S16x** are of the " series " type, incorporating " L " shaped moving contacts, while **S1a** to **S16a** are of the ordinary type, consisting of two straight contacts which are shorted when the plunger is depressed. Push-button switch units of this type were described in articles 8 and 9 of the series " Automatic Tuning " (April 30 and May 7, 1938).

Of the four switches controlled by each plunger, two are of the " L " type, and two of the ordinary type. Thus the left-hand plunger (in our view of the auto-unit), controls **S1x, S1a, S9x** and **S9a.** The second from the left controls **S2x, S2a, S10x** and **S10a,** and so on.

When all the buttons are *out,* **S1x** to **S16x** are *closed* and **S1a-S16a** are *open.*

When any button is depressed, only its four associated switches are affected: the two " L " types *open,* while the two ordinary types *close.*

Thus when the left-hand button is depressed, **S1x** and **S9x** *open,* and **S1a** and **S9a** *close.* All the other switches remain unaltered.

The tags of all the switches are shown in our view of the auto-unit. The tags of the " L " contacts have no external connection to them; in addition, two tags (second from the right, top and bottom bank) are blank, and do not form part of the circuit.

The functions of the various switches are given in the table " Other Components."

S17, S18 are the QMB battery circuit switches, in the main chassis, ganged with the volume control **R11.**

Coils.—**L1**; **L3**; **L2, L4** and **L5-L7** are in four unscreened units beneath the main chassis. The IF transformers **L8, L9**; **L10, L11** and **L12, L13** are in three screened units on the chassis deck, with their associated Tempa trimmers.

V2, V3 Valveholders.—Note that the tag of socket 6 on each of these holders is used as a bearer. Pin 6 on the Tungsram VP2B is blank.

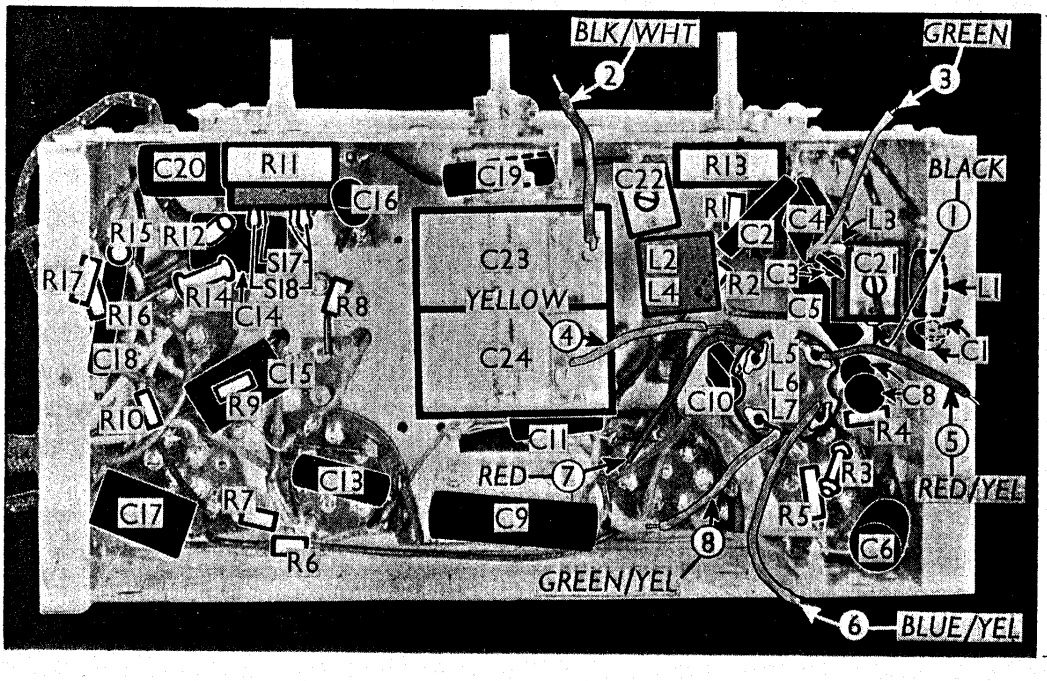
Condensers C1, C8.—Note that these each consist of two disc-type condensers in parallel.

Resistance R8.—This has a value of 70,000 O in our chassis, but is shown as 700,000 O in the makers' diagram.

Batteries.—LT, 2 V accumulator cell; HT, 120 V dry HT battery (no tappings needed); GB, 9 V tapped GB battery.

Battery Leads and Voltages.—Black lead, spade tag, LT negative; red lead, spade tag, LT positive 2 V; black lead and plug, HT negative; red lead and plug, HT positive 120 V.

The GB leads are a little confusing, since part of the battery is used to provide a positive bias relative to chassis. The



Under-chassis view, with the press-button unit removed. The inter-connecting leads are colour-coded and numbered to agree with the circuit diagram. **C1** and **C8** each consist of two small condensers in parallel.

red lead and plug, marked Grid +, goes into the positive socket of the GB battery. The yellow lead and plug, marked Grid — 2, goes into the negative 6 V socket of the battery, which is thus connected to chassis. The black lead and plug, marked Grid — 1 goes into the negative 9 V socket of the battery, thus applying a negative voltage of 3 V, with respect to chassis.

Auto-Tuning Unit.—This is shown, with all the components included in it, at the bottom left-hand corner of the circuit diagram, and in a separate chassis illustration. All the interconnecting leads (of which there are eight) are indicated and colour-coded on the circuit diagram and on the under-chassis view. Their connection points on the auto-tuning unit are also indicated and numbered on the illustration of this unit. In addition, although there is no wire connecting them the auto-unit and the main chassis are connected electrically by the bolts holding them together.

The auto-unit contains the switches **S1a** to **S16x** (see under switches), the fourteen Tempa trimmers, external parallel fixed trimmers across certain of the Tempa types (**C34, C38, C42, C46** and **C48**), the LW coupling condenser **C31** and the fixed trackers **C51** and **C52.**

Of the Tempa trimmers, **C49** and **C50** are LW and MW trimmers (the former having **C48** across it). The remaining twelve are for the six pre-set stations.

The circuit may seem a little confusing in that **C31** and **C48** to **C52** are shown in the auto-unit, but as they are actually in this part of the receiver it was thought best to place them similarly in the circuit diagram. By tracing this out, it will be seen that they are actually in their usual positions relative to the tuning coils and the gang condenser. Note, however, that the LW coils are *above* the MW coils, a reversal of the usual practice. Thus **L3** and **L5** are LW coils, and **L4** and **L6** MW coils.

CIRCUIT ALIGNMENT

IF Stages.—According to the makers, the IF trimmers are adjusted at the factory for the correct response curve with an oscilloscope, and should not be touched unless they have been tampered with, or a new transformer has been fitted. The IF is 465 KC/S and alignment follows the usual practice.

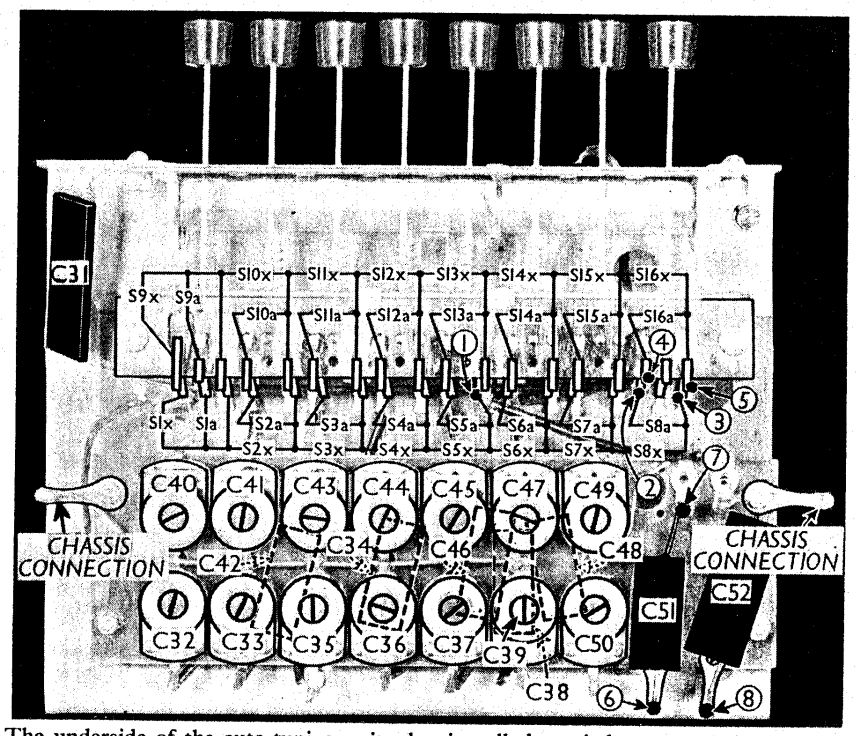
IF Filter.—To adjust this, feed a 465 KC/S signal into the **A** and **E** sockets, tune to bottom of LW band, and adjust core of **L1** for *minimum* output.

RF and Oscillator Stages.—Set pointer so that it is vertical when gang is at maximum.

MW.—Press MW manual button, connect signal generator to **A** and **E** sockets and feed in a 200 m (1,500 KC/S) signal. Tune to 200 m on scale, and adjust **C22** (under main chassis) and **C50** (on auto unit) for maximum output.

LW.—Press LW manual button, feed in a 1,200 m (250 KC/S) signal, tune to 1,200 m on scale and adjust **C21** (under main chassis) and **C49** (on auto unit) for maximum output.

Adjustment of the trimmers for the pre-set stations is best carried out on the signals from the stations themselves.



The underside of the auto-tuning unit, showing all the switch tags, and the points to which the leads from the main chassis are connected.

HINTS FROM SERVICE ENGINEERS

Unusual Leakage Trouble

I HAVE just encountered a very strange trouble in an Ekco AC86 receiver.

The set was completely dead, but when the grid cap of the FC4 frequency changer was removed the set worked practically at normal strength.

After several tests I found the insulating material on the grid tuning condenser had developed a leakage giving a resistance as low as 10,000 O, due to some impurity on the surface.

When a new piece of material was fitted the set behaved perfectly.—E. DAVIES, SALFORD.

Faults Affecting Battery Life

FOR our district we hold the sole agency for a well-known brand of HT battery. In order to stimulate sales and ensure satisfaction between the customers, the manufacturers and ourselves, we adopt the following procedure in respect of all batteries returned and claimed to be faulty.

We check the anode consumption of the respective receivers, and from our observation fully 80 per cent. of the assumed faulty batteries were traced to be due either to wrong battery connections or faults in the receivers themselves. We are quoting some of the most common faults we have encountered: externally reversed LT or GB leads; faulty grid bias batteries; wrong HT tappings.

When replacing the combined HT and GB type of battery with separate HT and GB types, it is usually necessary to add a GB lead, and here we have found many cases of reversed GB, which, besides imposing a serious drain on the HT battery, is liable to lower the emission of the output valve.

With regard to faults inside receivers, we find that wrong types of replacement valves have been the cause of excessive HT consumption, although reception in most instances appeared satisfactory. Broken grid leads; O/C grid resistors; broken down or O/C secondaries of AF transformers; and faulty resistance-capacity coupling condensers have also caused trouble. In some instances we have noted a discharge of about two milliamperes, although the receiver was switched off, and this has usually been due to a leaky by-pass condenser. The electrolytic types are very troublesome in this respect.

We have been handsomely compensated for the time and trouble expended in making these tests, for, besides increasing battery sales, it has also resulted in additional service work, while at the same time retaining the customers' goodwill—which is so essential to success.—R. H. GILL, GUERNSEY.

Marconi 262 and 272 Hint

IN a recent issue P. G., of London, mentions instability in a Marconi 262 and 272 caused by the MPT4 valve. This is due to feedback to the oscillator tuning condenser, which is very close to the MPT4. It can be cured, without fitting a new valve, by fitting a screen between the valve and condenser.—P. HENDERSON, STOCKTON-ON-TEES.