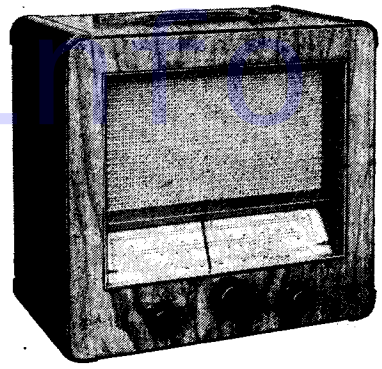
GORDON ELF 'CAMEO' MODEL ABX

Four valve, plus rectifier, three-band portable receiver with frame aerials for 100-250 volt, 30-100 cycle AC or DC supplies, price £9 19s. 6d.



CIRCUIT OUTLINE

THE input consists of either a tapped frame aerial on the medium and long bands or a coupled frame on the short band, controlled by switching in the normal manner. V1 is a frequency changer with conventional oscillator circuits. The input has AVC on the medium and long bands, but not on the short.

The hexode section of V1 is followed by an IF transformer, the secondary being taken to the AVC line so that control is applied to the V2, a low noise pentode.

A further transformer couples this valve to V3, the double diode triode. Here one diode is used for AVC and the other for signal demodulation. A resistance filter is used, the signal voltages being taken from the diode load through a coupling condenser to the volume control which operates on the triode portion.

Resistance capacity coupling is used between V3 and V4, the output pentode. This operates a permanent magnet speaker. Power supply is by means of a strapped rectifier with safety resistances and a smoothing choke and condensers.

CONSTRUCTIONAL FEATURES

AS this receiver is a portable type the arrangement of the components is naturally somewhat compact. The assembly around V3, the double diode triode, is mounted in a special little screening compartment on the top of the chassis. The components concerned are resistances R14, R15 and R19, and the condensers C16, C20 and C21.

There are two small technical points of interest. The coupling condenser between the triode and output valve is much larger than usual, being a .1 mfd., which is used in conjunction with a quarter megohm leak, giving a much larger time constant than general. It is also interesting to note use is made of an EF8 low noise pentode in the intermediate position.

The oscillator trimmers in the model examined were adjustable cores. The second IFT appeared to have trimmer condensers instead of permeability adjustment.

Wavechange Switches.

All the switching is carried out on a single multiple contact wafer. This carries four wipes, each controlling three contacts. The drawing shows how the wafer appears when looked at from the underside of the chassis with the click plate at the rear. On the first wipe one of the contacts is not used.

It will be noted that the frame coil is tapped and the function of the aerial switch is to short-circuit the long wave portion, the medium and long coils going direct to the input. The wipe W2 serves to remove the frame from the grid circuit and introduce the separate short wave aerial coil which is coupled to the main frame.

The oscillator wipes W3 and W4 call for no comment.

VALVE READINGS

V.	Type.	Electrode.	Volts.
1 ..	TH2320 (*Mazda*) ..	Anode ..	184
		Screen ..	85
		Osc. anode ..	67
2 ..	EF8 (*Mullard*) ..	Anode ..	195
		Screen ..	195
3 ..	EBC3 (*Mullard*) ..	Anode ..	81
4 ..	Pen 3520 (*Mazda*) ..	Anode ..	180
		Screen ..	195
5 ..	UR3C (*Mullard*) ..	Heater ..	217

Pilot lamps MES .. Osram 6.2 volts 300 ma.

Chassis Removal.

Chassis removal is very easy in this receiver as the chassis, tuning scale and frame aerials are bolted together as one unit. The control knobs are removed by releasing the grub screws and withdrawing them from the shafts.

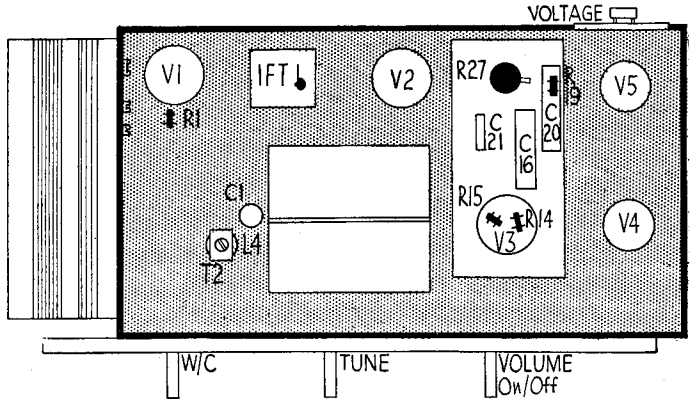
The chassis can then be removed from the cabinet by taking out three small wood-screws. These are passed through small brass angle brackets. Two are on the chassis and the third is on the top of the frame coil.

The speaker, smoothing system and tone control remain bolted to the inside of the cabinet. There is sufficient length of lead to enable any service operation to be carried out without disconnecting the cable.

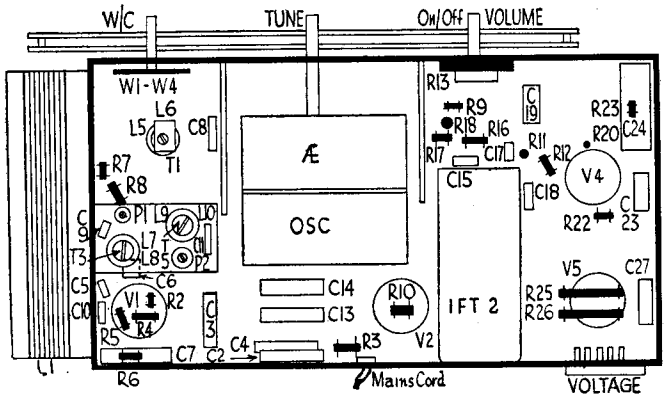
The multiple cable is colour coded and the connections are as follows. Looking at the connection strip at the top of the cabinet, the leads are connected, from left to right: unsmoothed HT, yellow; smoothed HT, green and white; output anode, maroon; and earth or negative, black.

The frame aerial is also connected by

(*Continued on page* 47)



Feature of the top of the ABX chassis (layout diagram, right) is a screened compartment near V3 containing a number of components.



Most of the trimmers are located under the chassis (layout on left). T5 and T3 are the adjustable cores of the oscillator coils.

10-MINUTE FAULT-FINDER — CAMEO ABX

Power Test.—As this set is a universal model, voltages will vary slightly with each power supply. The values below were taken with a 200-volt AC input.

The italic letters refer to test points shown on the circuit diagram. Voltages are measured to chassis. Point *A* is the yellow lead on the speaker strip and *B* the green-white.

Voltages : *A*, 217; *B*, 195.
Resistance : *A-B*, 282 ohms.
Total feed = 217 − 195 ÷ 282 = 77 ma.
The total loading is approximately 60 watts.

Output Stage, V4.

Inject 2 volts AF at V4 grid. If defective, check :—Voltages : *C*, 180; *D*, 195.
Resistances : *B-C*, 310; *F-E*, 250,000 ohms.

AF Stage, V3.

Inject .5 volt AF V3 grid. If defective, check :—Voltage : *G*, 81.
Resistances : *G-B*, 110,000; *H-E*, 500,000 ohms.

Demodulation.

Inject strong modulated 430 kc. signal V2 anode and trim L14. If defective, check :—
Resistances : L14, 5.8; *I-E*, 277,000 ohms.

IF Stage, V2.

Inject 430 kc. signal V2 grid and trim L13. If defective, check :—
Voltages : *J*, 195; *K*, 195.
Resistances : L13, 4.5; *L-E* 500,000 ohms.

Hexode Stage, V1.

Inject 430 kc. signal V1 anode and trim L12. If defective, check :—L12 7.
Inject 465 kc. signal V1 grid and trim L11. If defective, check :—
Voltages : *M*, 184; *N*, 85.
Resistances : *M-B* 5,000; *N-B* 20,000 ohms.

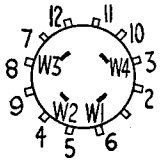
Oscillator Test.

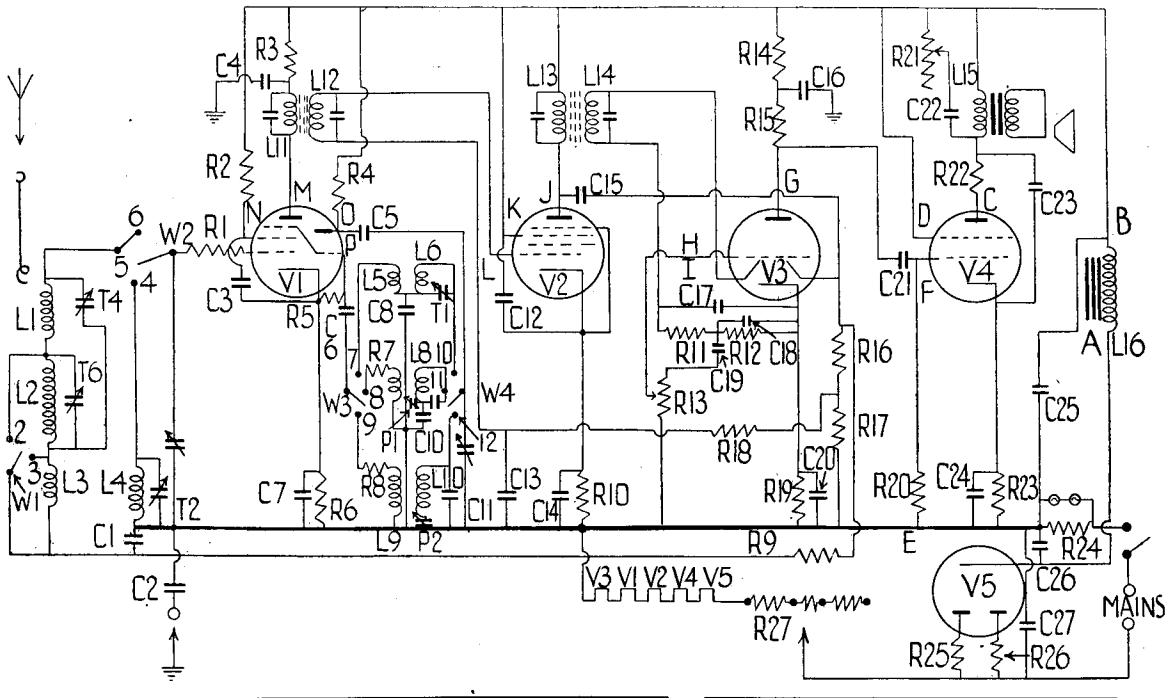
If no signals, check :—
Voltage : *O*, 67.
Resistances : *O-B*, 40,000; *P-E*, 25,000 ohms.

Signal Tests.

If still no signals, tune to local station and inject that frequency plus 430 kcs. at P.
If still no signals, test coil windings and switching.

Note that the aerial circuit switching differs from oscillator switching. L1 is the aerial MW coil and L4 the SW. Below, the switch bank (see also text).





CONDENSERS

		Mfds.
1	V1 AVC decouple	.1
2	Earth isolating	.1
3	V1 screen decouple	.1
4	V1 anode decouple	.1
5	Osc. anode coupling	.0001
6	Osc. grid	.0001
7	V1 cathode shunt	.1
8	SW fixed padder	.01
9	MW fixed trimmer	.00004
10	MW fixed padder	.0004
11	LW fixed trimmer	.00006
12	V2 screen decouple	.1
13	V2 AVC decouple	.1
14	V2 cathode shunt	.1
15	AVC coupling	.00005
16	V2 anode decouple	4
17	HF filter	.0001
18	HF filter	.0001
19	LF coupling	.01
20	V3 cathode shunt	50
21	LF coupling	.1
22	Tone control	.1
23	V4 anode shunt	.01
24	V4 cathode shunt	50
25	HT smoothing	32
26	HT smoothing	16
27	Mains filter	.1

RESISTANCES

		Ohms
1	V1 grid stopper	50
2	V1 screen feed	20,000
3	V1 anode decouple	5,000
4	Osc. anode load	40,000
5	Osc. grid leak	25,000
6	V1 cathode bias	200
7	MW het. volt control	1,000
8	LW het. volt control	4,000
9	V1 AVC decouple	100,000
10	V2 cathode bias	300
11	HF filter	20,000
12	Signal diode load	250,000
13	Volume control	500,000
14	V3 anode decouple	10,000
15	V3 anode load	100,000
16	AVC diode load (part)	1 megohm
17	AVC diode load (part)	250,000
18	V2 AVC decouple	250,000
19	V3 cathode bias	2,000
20	V4 grid leak	250,000
21	Tone control	100,000
22	V4 anode stabiliser	50
23	V4 cathode bias	160
24	Pilot lamp shunt	70
25	V5 anode safety resistance	50
26	V5 anode safety resistance	50
27	Mains resistance	750

WINDINGS

L.	Ohms	Range.	Where measured.
1	.6	MW	On green and red.
2	.5	LW	On red and black.
3	Very low	SW	Black and C1.
4	Very low	SW	On tags.
5	Very low	SW	W3 and C8.
6	Very low	SW	W4 and C1.
7	1,000	MW	W3 and chassis.
8	1	MW	W4 and C9.
9	4,000	LW	W3 and chassis.
10	2.3	LW	W4 and P2.
11	7	—	V1 anode and R3.
12	7	—	V2 grid and C13.
13	4.5	—	V2 anode and HT
14	5.8	—	V2 signal diode and C17.
15	260	—	On tags red and green.
16	282	—	On tags green and maroon.

Replacement Condensers.—Exact replacement electrolytics are available from A. H. Hunt, Ltd., makers of the units in the set. For C25 and C26 there is unit 4228, 13s. 6d., and for either C20 or C24, unit 2915, 1s. 9d.

McMichael Model 381

(*Continued from page* 38)

ders all the coils and switches entirely inaccessible without completely dismantling the assembly. This means that the ordinary routine resistance measurements cannot be taken by the service engineer.

In the usual windings table we have shown the resistances between the condenser gangs and chassis or some convenient junction point on the three wavebands. If the measured resistance value is incorrect it then indicates that there is a fault in the coil and switch assembly, and accordingly the tuning pack must be dismantled.

When this is done there will be no difficulty in identifying the coil connections as the respective coils are adjacent to the switch tags and are readily distinguished.

Wave-change Switches.

The complete switch assembly is mounted inside the tuning unit and is not accessible without dismantling the whole tuner unit. The wafers perform the usual functions of selecting the three wavebands and also the press-button pack. In addition they remove the bandpass input or aerial circuits on the short band, connecting the single coupled short wave coil to the grid circuit of V1.

The fidelity switch is a separate unit, and in the high fidelity position puts in the IFT primary tapping to increase the band width.

In the "bass" and "foreign" positions the volume control is shunted by a fixed condenser. In the "bass" position a bass lift filter is included in the feedback or tone modifying circuit.

Chassis Removal.

Remove the five knobs by releasing the grub screws and then release the four main chassis retaining bolts. This chassis is connected to a subsidiary chassis, which is held by four wood screws accessible from the inside of the cabinet.

The latter carries the speaker and press button tuning pack and is connected to the main one by two strips, each carrying six terminals. The top strip is connected to a multiple cable with the colours in the following order: Blue, white, green, yellow, red, brown.

Separate leads connect the second strip as follows, reading from the top downwards: Plain, black, black slip back, green slip back, blue, and red.

Alignment

IF Circuits. (Intermediate frequency 465 kcs.)

Connect an output meter to the extension speaker sockets and a signal generator to the grid of V1, shorting out the oscillator section. Tune the generator to 465 kc. and tune T1, T2, T3 and T4 for maximum, using a value below the AVC level.

Before tracking the signal circuits, check the alignment of the scale and pointer in the following manner. Slacken the glass scale and align the two red rings with the holes in the metal back plate. Turn the condenser to its mechanical maximum and see that the three pointers are in line with the marks at the extreme bottom of the wavelength scale.

Short Waves. (19-50 metres.)

Connect generator to the aerial and earth, unshort the oscillator section and tune set and generator to 15.3 mc. Adjust T5 for resonance and T6 for maximum.

The correct scale setting is with the pointer mid-way between the top of the scale and the 20 metre calibration.

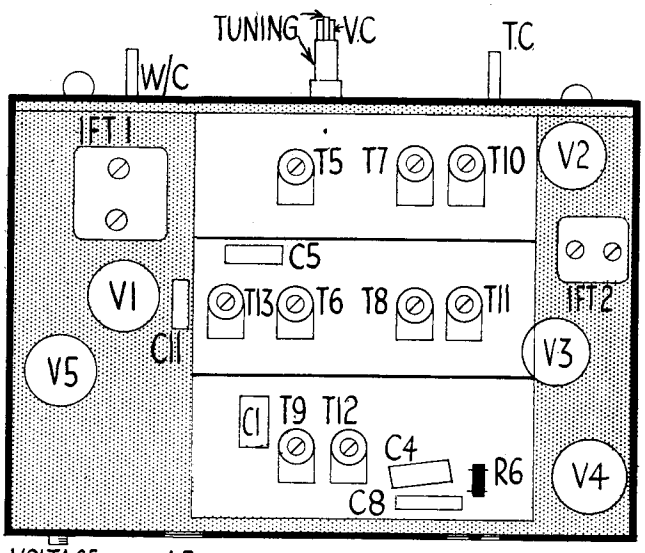
Medium Waves. (200-550 metres.)

Tune set and generator to 214 metres (indicated by a small dot on the tuning scale) and adjust T7 for resonance and T8 and T9 for maximum.

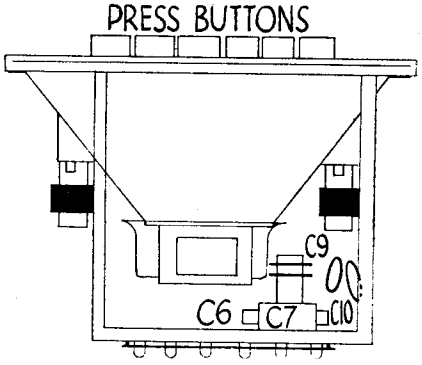
Long Waves (900-2,000 metres.)

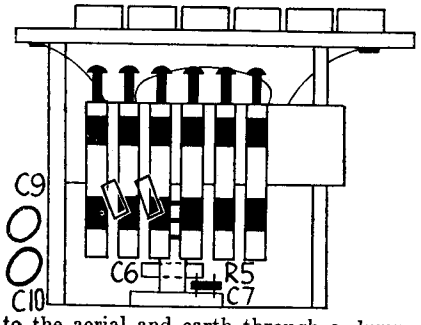
Tune set and generator to 1,125 metres (273 kc.) and adjust T10 for resonance and T11 and T12 for maximum.

The top of the main chassis carries the trimmers. Alignment notes are given on this page.



Below are two layout diagrams of the components associated with the push button coils on the speaker sub-assembly.





Push-Buttons

TO adjust a push-button, remove the strip from under the buttons by taking out the two screws. Then adjust the appropriate screw rod for the station required.

Aerial and oscillator coil cores are ganged and hence only the one adjustment has to be made for each button.

The lowest wave-range button is on the extreme right. All the buttons have wider ranges, however, and the arrangement is very flexible for station selection.

Check whether the correct station has been tuned in by switching over to manual.

When all the buttons seem out of adjustment or any work has been done on the push-button circuits, it is necessary, since aerial and oscillator circuits are ganged to realign them.

Inject a modulated signal of 214 metres to the aerial and earth through a dummy aerial and connect an output meter.

Reduce all the cores to minimum wavelength except the one on the extreme right.

Push in the button for the latter and adjust this core and T13 for maximum, using a low signal.

Then set up the other buttons as required without altering T13.

Cameo ABX

(*Continued from page* 50)

a multiple cable and the colours are as follows: Top connection, green; tapping point, red; lower end, black.

IF Circuits (Frequency 430 kcs.)

Connect an output meter to the set and a generator to the grid of V1.

Tune the set to 200 metres and inject a signal of 430 kcs., using a low value below the AVC level. Progressively adjust the permeability cores of the IF transformers. (Some sets appear to have a transformer with trimmer tuning in the second stage.)

Short Waves (15 to 60 metres.)

Tune set and oscillator to 19 metres and adjust T1 and T2 for maximum.

Medium Waves (200 to 550 metres).

Tune set and generator to 200 metres and adjust T3 and T4 for maximum.

Tune set and generator to 500 metres and adjust P1 for maximum.

The oscillator trimmers in the set examined comprised trimming cores in the centres of the medium and long wave oscillator coils and not trimmers as shown in the circuit.

Long Waves (850 to 2,200 metres).

Tune set and generator to 1,300 metres and adjust T5 and T6 for maximum.

Tune set and generator to 1,800 metres and adjust P2 for maximum.

GORDON ELF CAMEO A.B.X.

Four-valve, plus rectifier, three-band portable, for operation on A.C. or D.C. supplies, 100–250 volts.

Circuit.—Frame aerial windings, with a coupled winding on S.W., form the input to V1, the frequency-changer. The oscillator section has a tuned anode. I.F. transformers lead to V2, the amplifier, and V3, a double-diode triode for detection, A.V.C. and L.F. amplification. V4, the output valve, is followed by V5, a half-wave rectifier. The heaters are series connected.

Wavebands: 15–60, 200–500, 850–2,200 metres. Extra aerial and earth sockets are provided.

GANGING

I.F. CIRCUITS.—Adjust at 430 kcs.

S.W. BAND.—Adjust T1 and T2 at 19 metres. Padding is fixed.

M.W. BAND.—Adjust T3 and T4 at 200 metres. Adjust T5 at 500 metres.

L.W. BAND.—Adjust T6 and T7 at 1,300 metres.

Adjust T8 at 1,800 metres.

VALVE READINGS

Measured on 200 v. A.C. with Avo No. 7 meter.

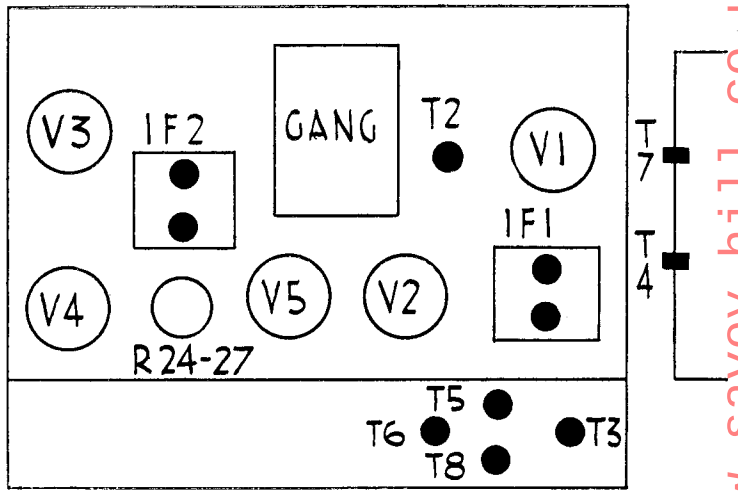
Valve.	*Type.*	*Electrode.*	*Volts.*	*Ma.*
1	TH233	Anode	180	3.9
		Screen	90	5.8
		Osc. anode	65	3.6
		Cathode	2.4	—
2	EF9	Anode	200	5.1
		Screen	70	1.4
		Cathode	1.7	—
3	EBC3	Anode	65	1
		Cathode	1.5	—
4	Pen 3A3	Anode	180	42
		Screen	200	10.5
		Cathode	13.5	—
5	URIC	—	—	—

RESISTANCES

R	*Ohms.*	*R*	*Ohms.*
1	20,000	15	100,000
2	5,000	16	2,000
3	200	17	.5 meg.
4	25,000	18	.5 meg.
5	40,000	19	.5 meg.
6	1,000	20	.25 meg.
7	4,000	21	.1 meg.
8	75,000	22	300
9	300	23	50
10	50,000	24	50
11	.5 meg.	25	500
12	1 meg.	26	125
13	.5 meg.	27	125
14	10,000	28	50

CONDENSERS

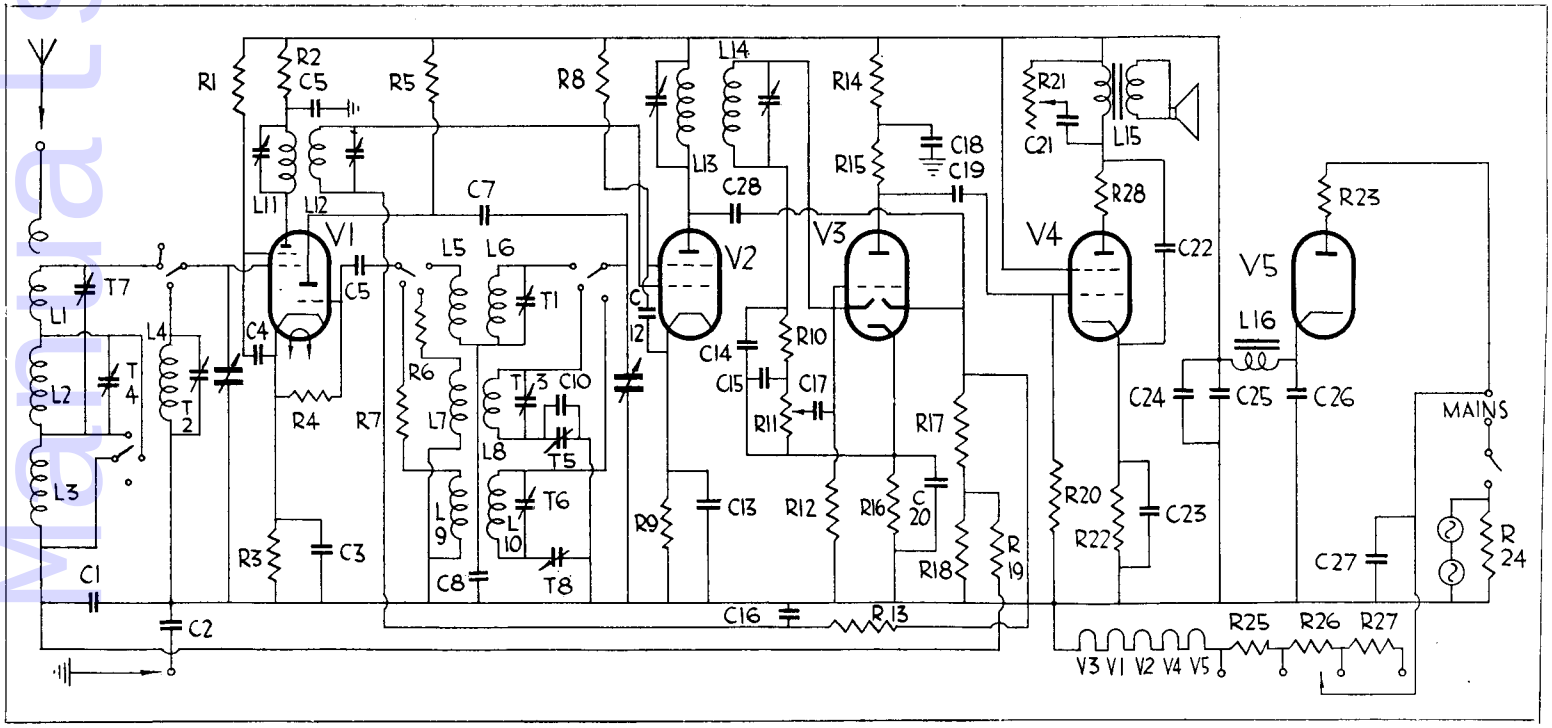
C	*Mfds.*	*C*	*Mfds.*
1	.05	15	.0001
2	.05	16	.05
3	.05	17	.006
4	.05	18	4
5	.05	19	.05
6	.0001	20	50
7	.0001	21	.05
8	.01	22	.01
T3	.00005	23	25
10	.0005	24	.05
T6	.00007	25	24
12	.02	26	16
13	.05	27	.05
14	.0001	28	.00005



The A.B.X. is a transportable with the aerial assembly on the right-hand side of the chassis.

WINDINGS

L	*Ohms.*	*L*	*Ohms*
1	.6	9+R7	4,000
2	.5	10	2.3
3	V. low	11	7
4	V. low	12	7
5	V. low	13	4.5
6	V. low	14	5.8
7+R6	1,000	15	260
8	1	16	350



Extra Speaker as L.F. Check

A CUSTOMER complained that for some time a Crossley 5-valve car radio had been very distorted, although volume had been almost normal.

Now the set, although less distorted, had lost all its power.

On test, the trouble proved to be in the L.F. section. All voltages and currents were normal, dispelling any chance of shorted condensers, O.C. bias resistances, etc. The only thing which seemed to be left was the speaker field coil, which was of the 6-volt type, but this proved to be up to standard.

I then decided to connect an external permanent magnet speaker, and was surprised to find the set worked perfectly. This led me to test the speech coil of the set speaker; this, I found, showed a "dead short."

On inspection, I discovered that a small piece of metal had entered and lodged in the air-gap. This had caused the distortion and had eventually cut through the insulation of the coil.—K. G. PILGRIM, Pilgrim's, Hove.