RESISTANCES

R.	Purpose.	Ohms.
1	Part of smoothing and bias ptr.	1,260
2	Top part of screen ptr. to V2 screen	40,000
3	Lower part of screen ptr. to V1 screen	64,000
5	Middle part of screen ptr. to V1 and V2	25,000
6	Decoupling anode V3	.1 meg.
7	Part of bias ptr. to V4 ...	.4 meg.
8	Decoupling bias to V1	2 meg.
9	Part of bias ptr. to V4 ...	.64 meg.
10	V2 cathode bias	640
11	V3 cathode bias	16,000
12	V3 anode coupling	.32 meg.
13	V4 grid leak	2 meg.
14	V4 grid circuit	.32 meg.
15	Part of bias ptr.	440
16	In parallel with R15 and R18 ...	160
17	Across semi-aperiodic transformer, sec.	64,000
18	Part of bias ptr.	260
19	H.F. stopper grid V4	.64 meg.

CONDENSERS

C.	Purpose.	Mfd.
1	H.T. smoothing (electrolytic) ...	16
2	H.T. smoothing (electrolytic) ...	16
3	H.T. smoothing	1
4	Decoupling V2 screen	.25
5	Decoupling V1 screen	.1
6	Decoupling anode V3	.25
7	Decoupling bias V1	.1
8	Decoupling grid V4	.25
9	V2 cathode	.1
10	V3 cathode	.5
11	Between earth terminal and chassis	Mmfd. 100
12	Aerial series condenser	20
13	Tuning condenser	430
14	Between V1 grid and earth ...	25
15	Tuning condenser	430
16	Trimmer of H.F. transformer ...	27
17	Fixed tuning for semi-aperiodic coupling on M.W.	640
18	V3 anode by-pass	250
19	L.F. coupling V3, V4	2,000
20	H.F. bypass grid V4 ...	50
21	Tone compensation, anode V4 ...	5,000
22	Trimmer (pad. on L.W.) ...	27

PHILIPS 834A MAINS FIVE (Cont.)

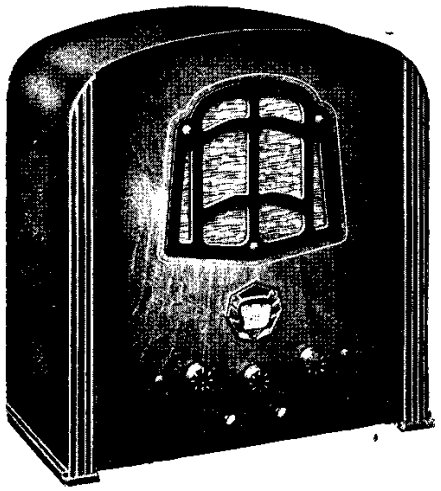
former and the condenser, C1. Note that this fuse resembles a resistance so closely that it may be mistaken for one.

Replacing Chassis.—Lay the rubber buffers over the holes in the bottom of the cabinet, and lay the chassis on them.

Insert the broad, tinned earthing connection between one of the rear buffers and the chassis and replace the screw with its rubber washer on the outside. Before tightening the screw turn the earthing connection so that it is making contact with the foil screen on the base of the cabinet.

Replace the remaining screws and the knobs, and resolder the L.S. leads and speaker earth connection to C1.

G.E.C. BATTERY M.C.3



Detector and two L.F. stages are employed in the M.C.3 by the General Electric Co., Ltd. On the right is the under view of the chassis, and below is the straightforward circuit.

Circuit.—The detector valve, HL2 (V1), is preceded by an aerial transformer with tuned secondary. Leaky grid detection is employed and reaction is applied to the tuned circuit by a differential reaction condenser across the reaction winding.

The anode of the valve is resistance-capacity coupled to the next valve and the H.T. supply is decoupled.

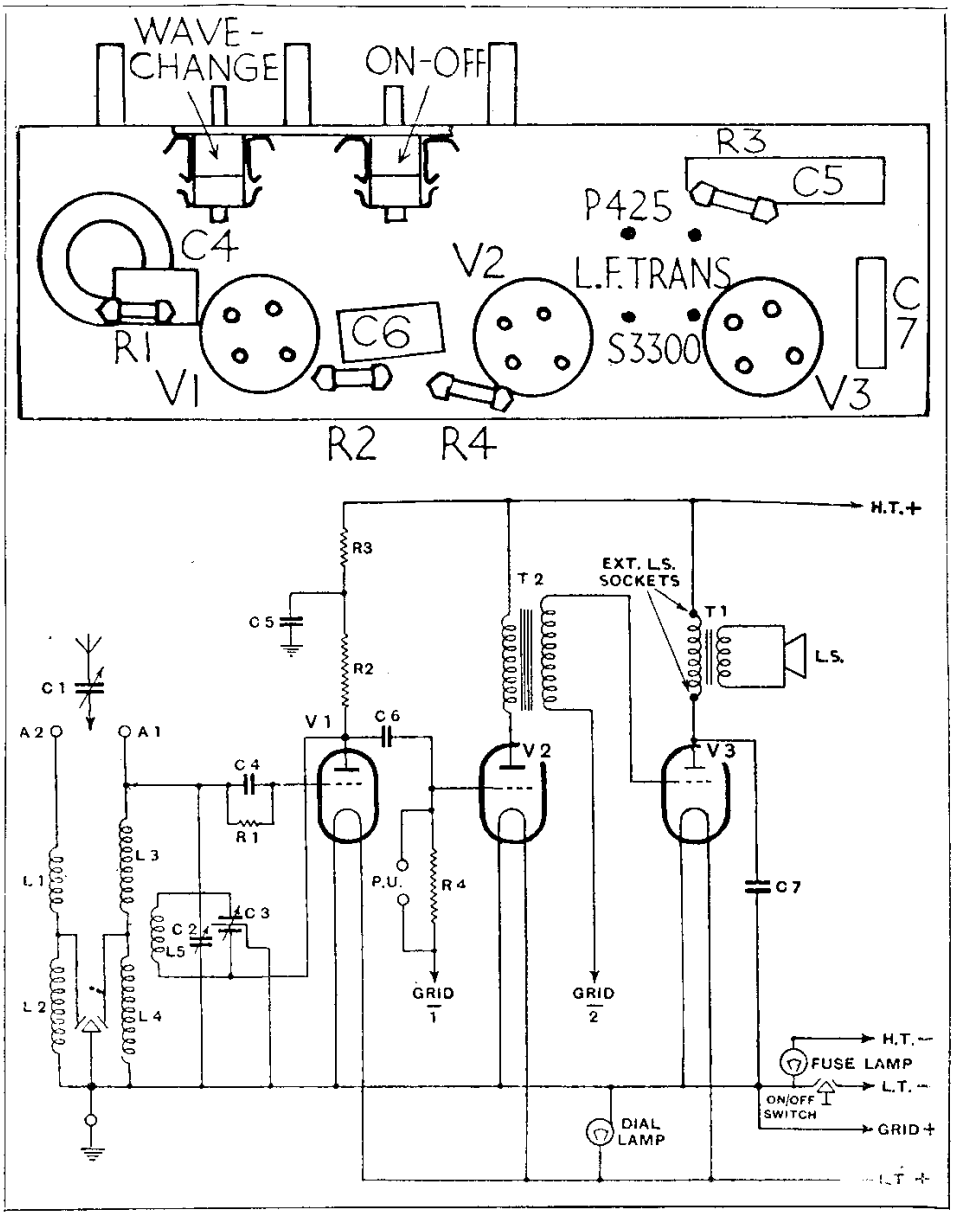
The L.F. valve HL2 (V2) has the pick-up connections between the grid and the low A.C. potential end (G.B.) of the grid leak.

Straight transformer coupling is used to the output valve.

This, a P2 (V3) triode, is conventionally used both in its grid and output circuits, but a condenser C7 is connected between the anode and earth to act as a tone compensator.

Special Notes.—In some chassis the H.T. lead is connected to the chassis through

(Continued on next page.)



CONDENSERS

C.	Purpose.	Mfd.
1	Aerial selectivity control ...	.0001 max.
2	Tuning condenser	.00035 "
3	Differential reaction condenser	.0005 "
4	V1 grid	.0002
5	V1 anode decoupling	.25
6	Coupling V1 to V2	.003
7	Tone compensator anode V3 ...	.02

RESISTANCES

R.	Purpose.	Ohms.
1	V1 grid leak	2 meg.
2	V1 coupling resistance ...	200,000
3	V1 decoupling resistance ...	50,000
4	V2 grid leak	1 meg.
—	Primary of output transformer	400
—	L.F. transformer primary* ...	440 or 425
—	L.F. transformer secondary* ...	4,440 or 3,300

* Two types have been used with the corresponding values bracketed.

G.E.C. M.C.3 BATTERY SET (Contd.)

the fuse, and on the L.T. switch only one pole is used for breaking the L.T. lead.

In other cases the switch is used to break both the H.T. and L.T. leads.

Quick Tests.—In this set these are best performed by judging the intensity of the various "plops" caused by making contact with the meter leads in testing the valves.

Removing Chassis.—Take out two screws holding flange at back of chassis. Remove the screw next to the reaction condenser (behind L.F. transformer) and slacken screw holding clamp at other end of chassis, and turn clamp to the outside.

Pull out L.S. plugs, pull switch knobs to the "out" position and unscrew them (this is advisable as the ebonite blocks inside may turn and strain the contact springs).

Pull off the remaining knobs, and lift the chassis out.

General Notes.—The design and connections are exceedingly simple. Components inside are suspended in the wiring, and are easily replaced if any should become defective.

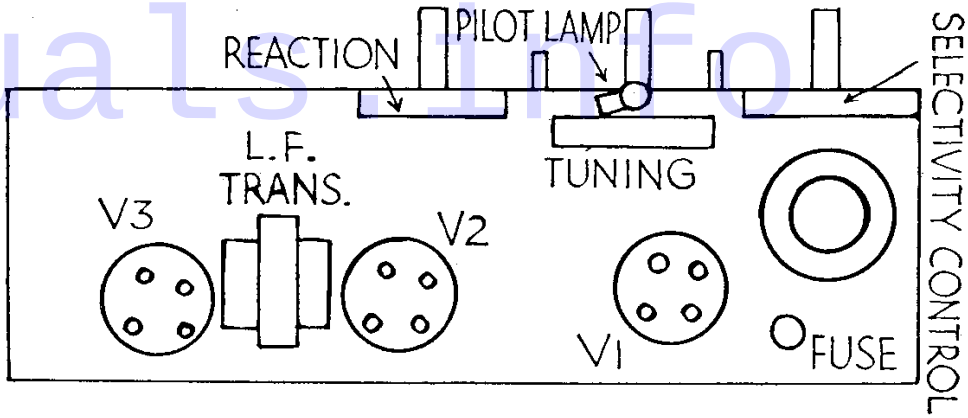
Note that the variable aerial series condenser is insulated from the chassis, and that the wave-change switch has, in addition to the earth contact through the spindle, a pigtail connection soldered under the locking nut behind.

If dirt gets into the contacts between the spindles and springs of the condensers, the latter can be bent back slightly to allow them to be cleaned.

Replacing Chassis.—See that switches are making contact. Lay chassis into cabinet. Replace front nut and clamp, two screws on flange at back of chassis and L.S. plugs.

Screw on the switch knobs and press the control knobs on to their spindles.

It is advisable to switch "off" before connecting the batteries.



How the components and valves are situated on the top of the chassis of the M.C.3 made by the General Electric Co., Ltd.

VALVE READINGS

Operating battery voltages: L.T.2v.; H.T., 120v.; G.B.1—1.5v.; G.B.2—9v.
No signal and reaction turned off.

Valve.	Type.	Electrode.	Volts.	M.A.
1	H.L.2	anode* ...	—	.25 to .5
2	H.L.2	anode ...	107	1.5—2
3	P.2	anode ...	107	7—9

*As there are resistances totalling 250,000 in the anode lead totally deceptive readings are obtained. The current is the important factor in this case.

Meters and Oscillators for the Service Engineer

(*Continued from page 33.*)

the valve, and consequently the connection of an A.C. meter across the primary of the output transformer is much preferable. The connections of this winding are the most accessible points in the vast majority of receivers.

When used in conjunction with a modulated oscillator the output meter is a sure gauge of the ganging and amplification of a receiver. In addition, if it is suspected that any valve in a set is a little below standard, a reliable visual indication is given by watching the increase in output caused by substituting a valve known to have full emission.

Using as Output Meters

Here are the connections which should be used in order to employ popular A.C. meters as output meters:—

Avometer (Universal), on 120 or 1,200 volt A.C. range, direct connection.

Ferranti (A.C.-D.C. test set), on 150 volt A.C. range, with adaptor.

Philco (test set), on "output," 20 or 200 volt, A.C. ranges, direct connection.

Standard Telephones, direct to appropriate matching tapping.

Muirhead, direct to appropriate matching tapping.

The last three meters are assembled together with oscillators.

Connected in the above methods, the meters can be used in parallel with the speaker, but in the case of the Muirhead and Standard instruments the speaker speech coil need not be in circuit as the output can be matched.

Matching Resistances

As a rule the optimum tappings are: Triodes, from 3,000 to 5,000 ohms; pentodes, from 7,000 to 10,000 ohms. In practice, optimum matching only matters to the extent that it gives a greater deflection and consequently allows smaller variations to be noticed.

Any A.C. meter that has ranges suitable for the output valve can be used as output meters if a .5 mfd. condenser is connected in series to prevent the flow of D.C. current.

Several firms have produced compact modulated oscillators at reasonable prices. Here are brief specifications of well-tried models:—

Ekco.—Self-contained with L.T. accumulator and H.T. battery. Drum dial with calibration curves for M.W., L.W. and I.F. Ranges are operated by switch, and tuning is on the fundamental. Control of output volume is provided by 1, 10+ and 100+ tappings. An insulated screwdriver for trimming is supplied with the instrument, in addition to the other accessories. Price £16.

Muirhead.—Type 5A. External 2-volt and 100-volt batteries. Large chromium 4½-in. dial, with hair-line indicator. Comparative scale calibration. Ranges, M.W., L.W. and I.F., controlled by switch with tuning in fundamentals. Has provision for external modulation by P.U. or microphone. Variable output control. Available alone at £9 15s., or with set-testing outfit, including output meter.

Philco.—Contained in "Set Tester," small pointer with scale calibrated in frequencies, two ranges with tuning in fundamentals and harmonics. Variable output control. Price 12 gns.

Standard Telephones. — Combination modulated oscillator and output meter. High and low impedance, output terminals with variable output control. Calibrated in frequencies with fundamentals on I.F. band and harmonics on L.W. and M.W. bands. Indicator is hair-line on rotating window. The output meter has an impedance matching transformer with calibration in decibels above and below a base of 50 milliwatts. Price 12 gns.

Oscillator Precautions

In using modulated oscillators there are one or two precautions that must be taken if accurate ganging is to be obtained.

The output should not be so great that the H.F. valves are overloaded. This shows itself as double hump tuning, and particular care should be taken when adjusting the first and last trimmers that the peak is the real maximum for tuning and not one side of the double hump.

In buying a modulated oscillator, the principle criteria are: Ease with which the scale can be read, particularly on the I.F. range; constancy of the output and calibration; the purpose for which the apparatus is to be used (outside engineer, bench engineer or laboratory).

It is advisable to check the calibration occasionally against the fixed wavelengths of several known stations.

WATCH FOR THESE REVIEWS

Forthcoming issues of the SERVICE ENGINEER will contain reviews of the following receivers:—

Bush Radio—S. A.C. 4.
Decca-Brunswick—Six-valve superhet.
Marconiphone—Six-valve portable.
McMichael—Twin Supervox.
Murphy—A4.
Portadyne—PB5.
Pye—P/A.C.
Ultra—A.C. Tiger.

The next article of W. MacLanachan's series on service will deal with testing mains apparatus.

Suggestions as to receivers which could be analysed in SERVICE ENGINEER will be welcomed.

Letters should be sent to the BROADCASTER AND WIRELESS RETAILER, 29, Bedford Street, Strand, London, W.C.2. 'Phone number, Temple Bar 2468.