V2 1 3 4 R52H

WARD "AIRLINE"

Four-valve, including rectifier, midget portable superhet for 100 to 250-volt A.C./D.C. operation. Unusual features are the use of permeability tuning and a combined output valve and rectifier. An imported American receiver by Montgomery Ward.

Circuit.—The self-contained aerial is a metal plate forming the back of the set and insulated from the chassis. No external aerial is required for local stations, but provision is made for one by a washer clip condenser on the plate aerial.

The set incorporates a little used feature—permeability tuning. There are no tuning condensers and both aerial and oscillator coils are tuned by moveable iron-dust cores, ganged together and operated by a spindle which also operates the dial slide. Two capacity trimmers are provided for accurate ganging.

Another feature is that the chassis is isolated from the mains via R1 and C4. The chassis should not be earthed, but if a person does touch it, the current is not large enough to give a shock.

The latest type RCA bantam metal valves are used, having no top caps. The 70L7GT is an interesting type consisting, in effect, of a 35ZL6 output valve and 35Z4 rectifier in the same envelope.

V1 is the frequency-changer. The oscillator section is interesting in that cathode injection is used in association with a tuned grid. The oscillator anode is simply connected internally to the screening grid.

V2 is a straightforward I.F. amplifier. V3 is a combined double-diode triode with a very simple demodulation and A.V.C. arrangement utilising both diodes. The demodulated signal is taken from R4, the volume control, and AVC bias from the diode end of R3.

The triode section of V3 biases itself across R6, and the amplified signal, developed by R8, is passed by C11, to the top of R9, the grid leak of V4.

R10, biasing the "beam" pentode section of V4 is not decoupled, and so a degree of negative-feedback is introduced. The speaker is a 4-in. P.M. type, and shrillness is prevented by C13.

H.T. from the mains flows from anode to cathode of the rectifier section of V4, through R5 to the "beam" pentode, and through R5 and R11 to the rest of the set. C14 and C12 are smoothing electrolytics of large capacity, and although there is no choke, the hum is low.

All the heaters are series connected. The current is .15 amp., and the valves take 12.6 volts, except the 70L6GT, which takes 70 volts. For British mains, of course, a line cord is generally necessary.

GANGING

I.F. Circuits.—Inject 465 kc. to V1 signal grid and adjust the four I.F. trimmers for maximum on an output meter. Keep the signal low to prevent A.V.C. operating.

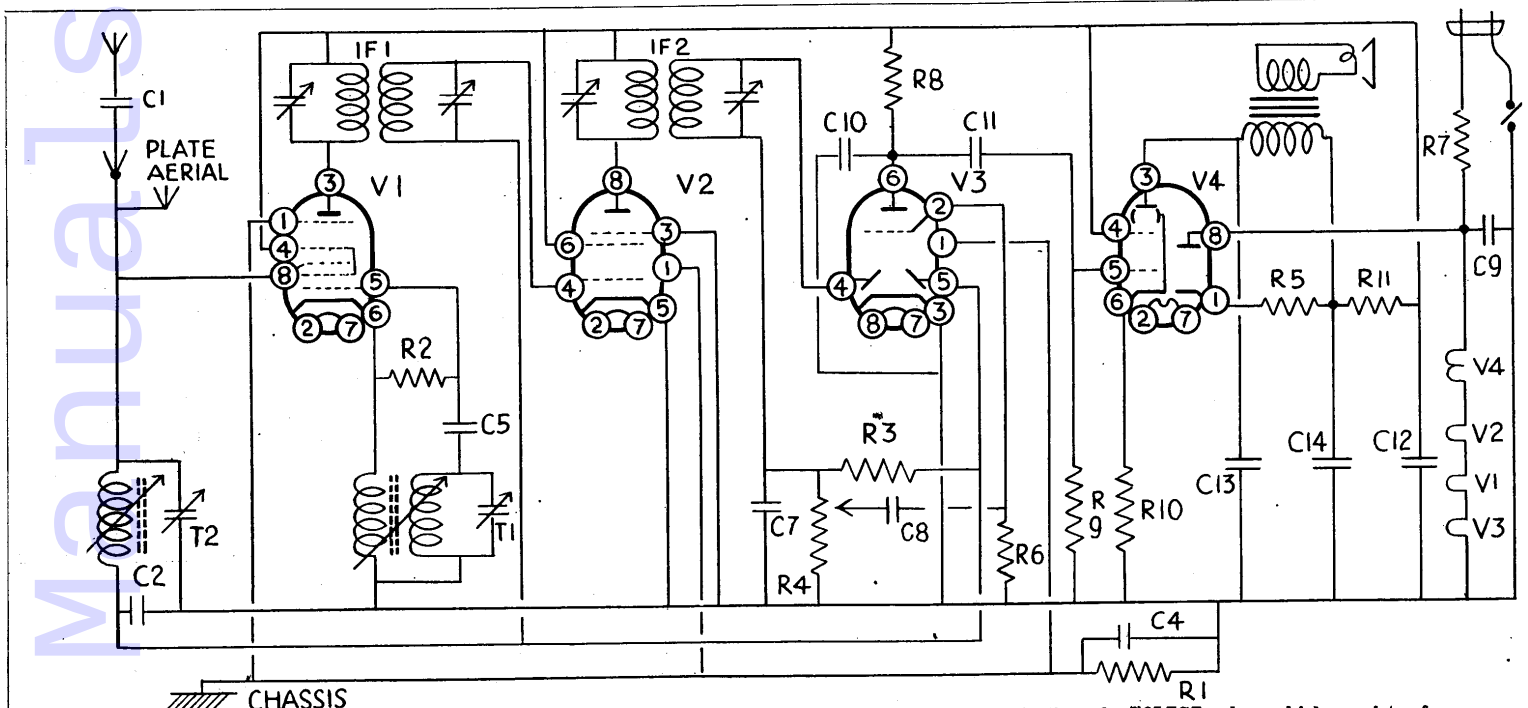
R.F. Adjustments.—The set covers only one band of 540–1,720 kc. (555–174 metres). There is no padding adjustment but only two parallel capacity trimmers.

A modulated signal of about 200 metres should be injected by means of pick-up from a loose wire placed near the plate aerial, and T1 and T2 should be adjusted for maximum.

A compromise setting may be necessary to obtain best average gain over the band.

CONDENSERS

C	Mfds.	C	Mfds.
1 ..	.00001	9 ..	.05
2 ..	.05	10 ..	.0005
4 ..	.15	11 ..	.01
5 ..	.00005	12 ..	20
7 ..	.00025	13 ..	.01
8 ..	.002	14 ..	40



Interesting features of this midget American set are the use of permeability tuning and the utilisation of a 70L7G7 valve, which consists of an output tetrode and a half-wave rectifier in the same bulb. R1 and C4 are simply interposed between H.T. negative and chassis.

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VALVE READINGS

V	Type	Electrode	Volts.
1	12SA7	Anode	90
		Screen	90
		Osc. grid *	—11
2	12SK7	Anode	90
		Screen	90
3	12SQ7	Anode	56
4	70L7GT	Anode	110
		Screen	90
		Cathode	5.5
		Rect. cathode	110

* *Measured with RF choke in lead* (1,000 *ohms per volt meter*).

RESISTANCES

R	Ohms.	R	Ohms.
1 ..	150,000	7 ..	65
2 ..	20,000	8 ..	75,000
3 ..	3 meg.	9 ..	250,000
4 ..	.5 meg.	10 ..	150
5 ..	30	11 ..	1,000
6 ..	5 meg.		

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in parallel, as in Fig. 9. The voltage across the pair is fluctuating D.C.—that is D.C. with an A.C. component (see Fig. 4).

By connecting the coupling condenser, C, and grid leak, R, across the pair we leave things unchanged from the D.C. point of view, but get an A.C. current through these two components. The voltage across R will be less than that across V1 by the drop across the reactance of the condenser.

It follows that to pass the maximum possible signal to V2, the resistance R must be high compared with the reactance of C. It also follows that as the reactance of a condenser increases with a reduction of frequency, the arrangement will discriminate against the low frequencies.

This explains why, generally speaking, an increase of C makes for increase of bass and why, in the case of weak, shrill signals, the L.F. coupling capacity should be held suspect.

No advantage is gained in increasing the capacity beyond the figure that gives adequate bass transference. In fact, if the capacity is too large it will tend to hold successive charges too long for the high-frequencies to be properly transferred.

Typical values of C and R are .01 mfd. and .5 megohm, and at 32 c.p.s. about 30 per cent of the voltage is developed across C, leaving 70 per cent applied to V2.

It will have been noted that in considering the condenser as a coupling it has been most convenient to view it as a reactance, that is, a conductor of A.C. Next month, in examining its utilisation for decoupling and smoothing, we shall see that the reservoir or spring conception is sometimes more appropriate.