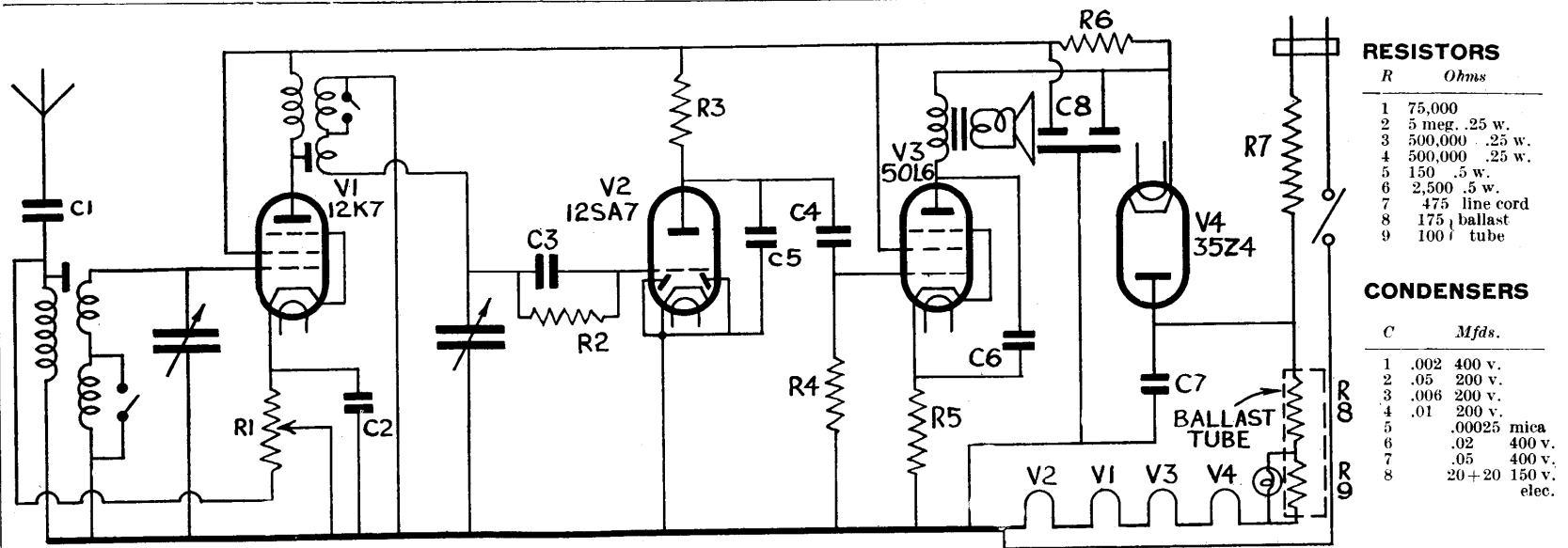


AMERICAN A.C. - D.C. MIDGETS

These two circuits are given as typical of American T.R.F. midget A.C.-D.C. receivers. Circuit A uses four .3-amp. valves, and circuit B uses four .15-amp. valves.

CIRCUIT A.

A SIMPLE transformer couples the aerial to a 6K7GT variable-mu pentode working as a radio-frequency amplifier. A similar tuned-grid transformer leads to a 6J7GT employed as an anode bend detector. Resistance-



CIRCUIT A (below).—This is a typical three-valve, plus rectifier, "straight" midget using .3 amp. valves and with an extension line cord to suit British mains voltages.

CIRCUIT B (above).—A representative three-valve, plus rectifier, "straight" midget using .15 amp. valves. This uses a ballast tube as well as line cords.

RESISTORS

R	Ohms
1	75,000
2	5 meg. .25 w.
3	500,000 .25 w.
4	500,000 .25 w.
5	150 .5 w.
6	2,500 .5 w.
7	475 line cord
8	175 ballast
9	100 tube

CONDENSERS

C	Mfds.
1	.002 400 v.
2	.05 200 v.
3	.006 200 v.
4	.01 200 v.
5	.00025 mica
6	.02 400 v.
7	.05 400 v.
8	20 + 20 150 v. elec.

capacity coupling leads to a 25L6GT output tetode.

Some models covered only 175-555 metres, others included the long-wave circuits shown in dot lines.

Volume is controlled by R1, which varies the bias on the 6K7GT, and also the amount of resistance across the aerial coil.

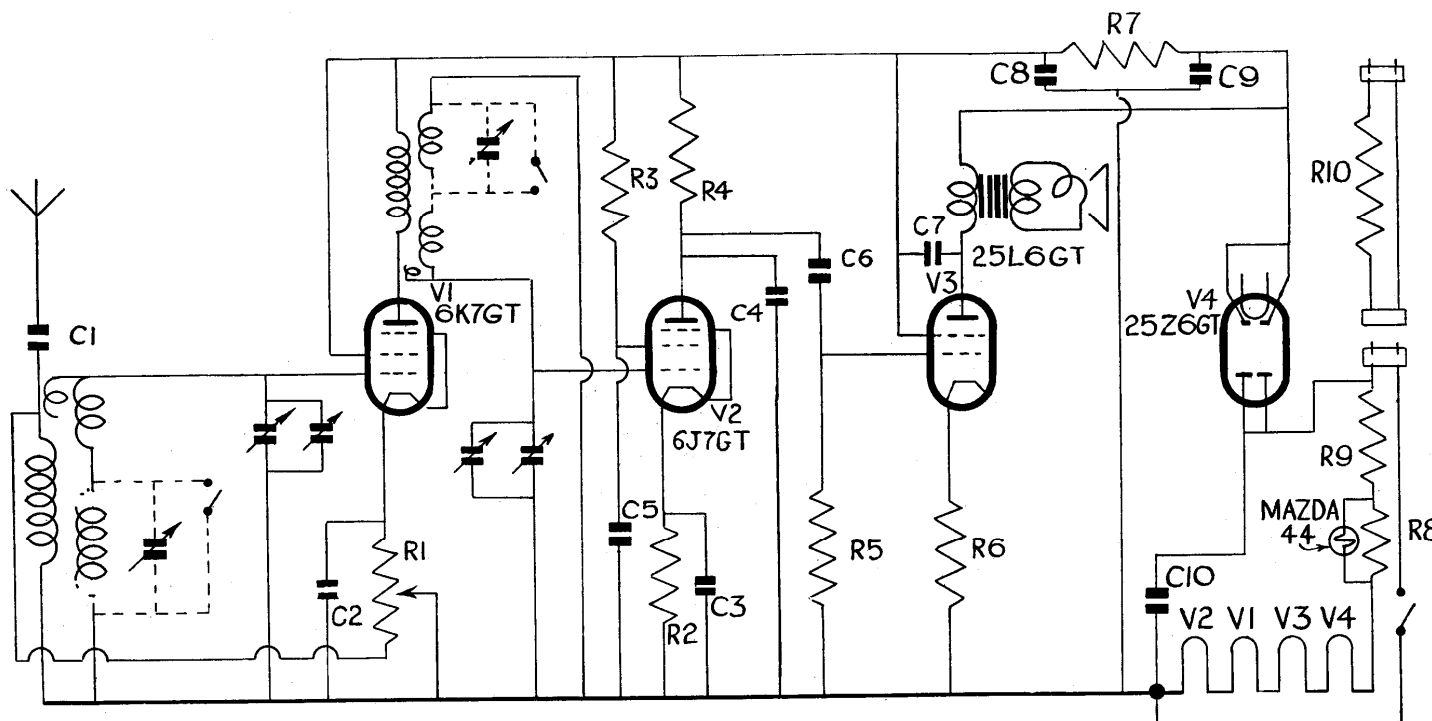
The rectifier is a 25Z6GT in the usual half-wave circuit. The H.T. to the rectifier is smoothed and decoupled by C8a 30 mfd. electrolytic. Other H.T. points are fed by R7 and decoupled by C7.

The original set was designed for 105-125-volt supplies. The heaters are series connected, the voltage being broken down by a 150-ohm resistance, plus a further 40-ohm section in parallel with a Mazda 44 (6.8 v. .25 amp.) pilot lamp. These resistances may be in the form of a line cord, a dropper resistance or a ballast (barretter) tube.

The American R.M.A. "standard" mains voltage is 117.5. On this voltage a set of this type should have a standard voltage dropper of 180 ohms (117.5-62.6 ÷ .3), excluding any pilot lamp arrangements. The latter are not critical and can usually be ignored, the lamp being shunted by a resistance of 40 ohms, or thereabouts.

The extra line cord (R10), for running the set on British supplies, may be either

Continued on opposite page



RESISTORS

R	Ohms
1	25,000
2	35,000
3	3 meg.
4	1 meg.
5	1 meg.
6	150
7	5,700
8	40*
9	150*
10	380

* See notes in text.

CONDENSERS

C	Mfds.
1	.001
2	.05
3	.1
4	.0001
5	.01
6	.01
7	.02
8	.16
9	.30
10	.05

an average value or a value chosen to suit the particular voltage in use. The resistance is ascertained as follows:—

Mains voltage—set voltage

Valve current.

For example, on 230-volt mains, the extra line cord should be:—

$$\frac{230-117.5}{.3} = 380 \text{ ohms, approx.}$$

Cords for 200 and 250 volts are usually rated at 280 and 450 ohms respectively.

For details of a five-valve .3 amp. set using a ballast tube plus line cord, see Belmont 650 in October SERVICE ENGINEER.

GANGING

With a T.R.F. set of this type, the trimmers should be set for accurate calibration at about 250 metres. A compromise adjustment for best average results over the whole band may be necessary.

CIRCUIT B.

AS in the previous circuit, the aerial is coupled by a simple transformer to the first valve, in this case a 12K7 variable-mu R.F. amplifier. Volume is

controlled by R1 which regulates the bias and the aerial shunt load.

Tuned grid coupling follows to a 12SA7 used as a leaky-grid detector (the diodes are not employed). The grip leak is of high value—5 megohms. Resistance-capacity coupling leads to a 50L6 output tetrode.

H.T. from a half-wave 35Z4 is fed to the output valve with a 20-mfd. section of C8 for smoothing and decoupling. H.T. for the rest of the set is reduced by R6 and decoupled by 20 mfd.

The valves are .15-amp. types, the voltages being 12.6, 12.6, 50 and 35 in the order given above. Although the circuit of this set was marked 235 v., the 275-ohm ballast tube and 475-ohm line cord are actually suitable for an “average” mains input of 225v. approximately.

Suitable line cords for accurate adjustment to other voltages would be: 200 v. 325 ohms, 230 v. 525 ohms, and 250 v. 650 ohms.

This particular model has no ganging adjustments; but where these are provided it is advisable to arrive at a compromise setting giving best average calibration and sensitivity.

TYPICAL MIDGET with '15 amp valves RCA 45X11, 45X12, 45X13

Four valve, plus rectifier, single waveband superhet (540-1600 kc), with self-contained frame aerial. Designed for operation from AC or DC mains, 105-125 volt (50-60 cycles in the case of AC), but may be fitted with line cord for operation from 200-250 volt mains.

The 45X11 has a mahogany coloured bakelite cabinet; 45X12 has an antique ivory bakelite cabinet, and 45X13 has a walnut wood cabinet. Made by the RCA Manufacturing Co., Inc., Camden, NJ, U.S.A.

THE frame aerial winding is also the tuning coil for the signal circuit of V1, the pentagrid converter valve. Aerial and earth terminals are provided and these are connected to a coupling winding with an isolating condenser, C1, in the earth lead.

The frame aerial winding is tuned by VC1 section of the gang condenser while

VC2 section tunes the grid coil, L2, of the oscillator section of V1. R1 and C2 are the grid leak and condenser. The reaction coil, L1, is in the cathode circuit.

An IF transformer, L3, L4, transfers the IF signal to the grid of the amplifier valve, V2. Standing bias for this valve is derived from R2, while the grid circuit of both V1 and V2 are returned to the AVC line.

A second IF transformer, L5, L6, couples V2 to the strapped diodes of V3, a double diode triode. The IF filter in the LF and AVC circuit comprises R3 and C3 while the load is the volume control R5. AVC is fed to V1 and V2 via the decoupling components, R4, C4.

The LF signal is fed via C6 to the grid of the triode section of V3, R6 being the grid leak. Resistance-capacity coupling is employed between V3 and V4, R7

VALVE READINGS

V	Type	Electrode	Volts
1	12SA7	Anode	90
2	12SK7	Screen grid	90
		Anode	90
		Screen grid	90
		Cathode	1.3*
3	12SQ7	Anode	61*
4	50L6-GT	Anode	84
		Screen	90
		Cathode	5.1*
5	35Z5-GT	Cathode	123
		Pilot lamp 7.5 volts .2 amp.	

* Actual volts. Make allowance for meter resistance.

being the coupling resistance, C7 the coupling condenser, and R8 the grid leak.

V4, the beam power output valve, is biased by R9 and a permanent degree of tone correction is effected by C8. The energised loudspeaker is coupled to V4 by the output transformer, L7, L8.

The HT and heater circuits are conventional, the heaters being all connected in series across the mains input. The pilot lamp is across a portion of the rectifier

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WINDINGS

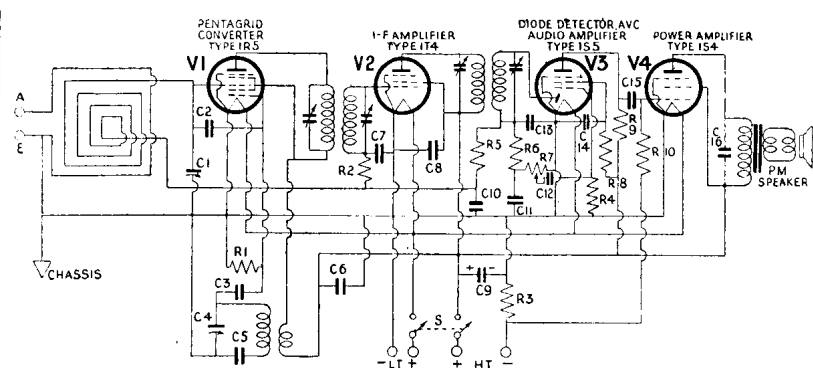
L	Ohms	L	Ohms
1	1	6	16
2	6.8	7	160
3	15	8	Very low
4	16	9	3.9
5	16	10	400

RESISTANCES

R	Ohms	R	Ohms
1	22,000	6	10 meg
2	120	7	220,000
3	47,000	8	470,000
4	2.2 meg	9	120
5	.5 meg		

CONDENSERS

C	Mfds	C	Mfds
1	.01	7	.01
2	.68 mmfd	8	.025
3	.00022	9	.12
4	.05	10	.20
5	.00022	11	.05
6	.005		



The extremely small American "personal" receivers usually have circuits similar to this one recommended by RCA.

PERSONAL RECEIVERS

QUITE a number of miniature receivers of American origin are finding their way into the country, with the American Forces, and a few notes on these sets may be of assistance to engineers asked to repair them.

The receivers are often housed in cases which resemble cameras or cigarette caskets, and being so easily transportable they are termed "personal" receivers. They employ miniature valves of which there are at present four types. The characteristics and base connections are given below.

HT is derived from a small battery having a voltage of 45 while LT is supplied by a 1.5-volt dry cell.

An internal aerial is provided so that no outside aerial is necessary for the

RESISTANCES

R	Ohms	R	Ohms
1	100,000	6	50,000
2	100,000	7	1 meg
3	500	8	3 meg
4	10 meg	9	1 meg
5	2 meg	10	2 meg

CONDENSERS

C	Mfds	C	Mfds
1	.00041	9	.8
2	* 5 mmfd	10	.05
3	50 mmfd	11	100 mmfd
4	.00041	12	.0025
5	420 mmfd	13	100 mmfd
6	.1	14	.1
7	.05	15	.0005
8	.1	16	.002

*Only necessary a frequencies higher than 5 mc.

reception of the more powerful stations, but by means of a coupling turn of wire and two terminals, an external aerial and earth may be used for weaker stations if desired.

Although some receivers of this type employ a TRF circuit, the superhet is most favoured and a circuit recommended by RCA is reproduced here. The circuit is quite straightforward and the values of the condensers and resistances are given in the accompanying tables. It will be seen that AVC operates from the LF load of the single diode in the 1S5 valve.

Resistance-capacity LF coupling is employed between V3 and V4, R9, C15 and R10 being the coupling components. V4 is biased by means of the resistance, R3, in the negative HT line.

The output transformer has a primary impedance of about 8,500 ohms and the total HT battery current is approximately 8.5 ma. The LT current is 250 ma. Any replacement resistance may be of the .5 watt type.

Typical working values of voltage and current are given in the valve characteristics tables on page viii

Continued from previous col.

valve, V5, heater. HT is smoothed by the field winding, L10, and condensers, C9, C10.

GANGING

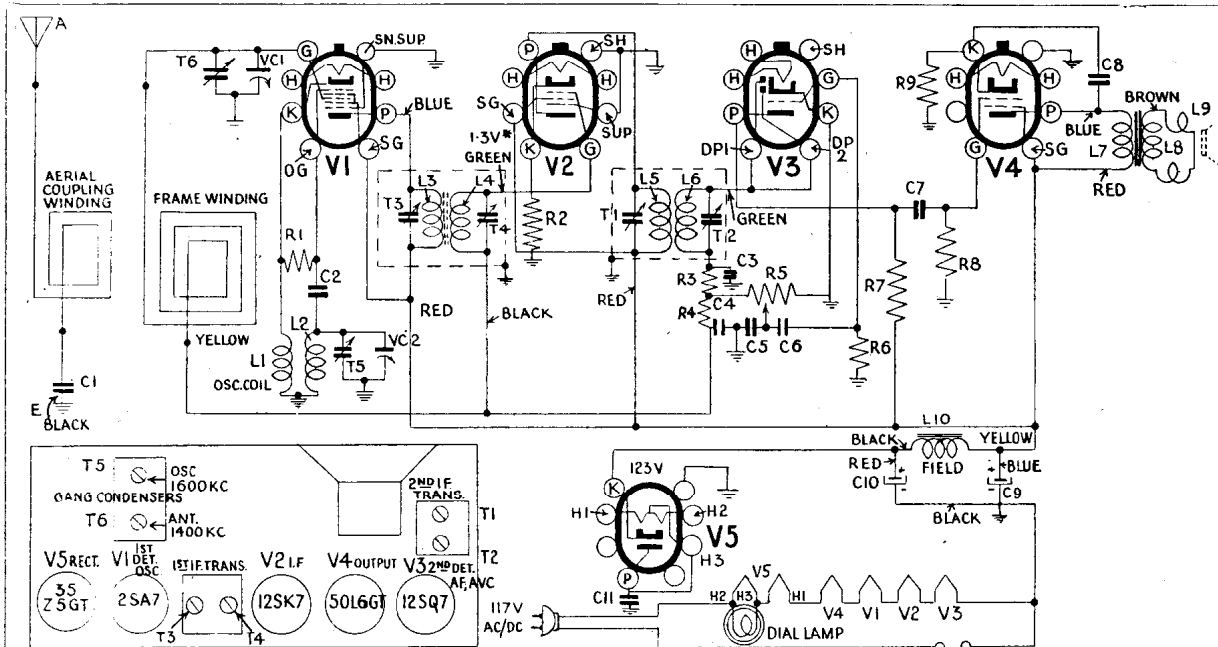
IF CIRCUITS.—Inject 455 kc signal into the grid of V2, using a .01 mfd. series condenser. Tune to a quiet point at 600 kc end of the dial.

Adjust T1 and T2 for maximum output. Transfer oscillator signal input to stator of VC1 and adjust T3, T4 for maximum.

HF CIRCUITS.—By means of a loop of wire comprising two turns of 18 in. in diameter radiate a 1,600 kc signal into the frame aerial.

Turn condenser gang to minimum capacity (fully clockwise) and adjust T5.

Inject and tune in a signal of 1,400 kc, and adjust T6 for maximum output.



Circuit and chassis layout diagrams for the RCA Midget. Most sets with '15 amp valves are of very similar design.

find

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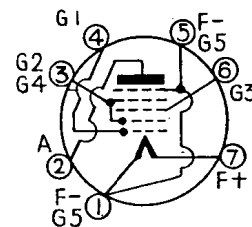
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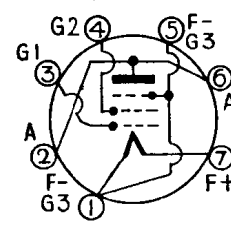
ADDRESS.....

AMERICAN MINIATURE ALL-DRY 1.4 VOLT VALVES



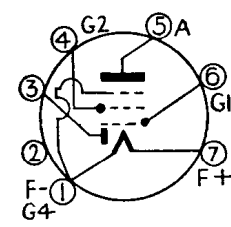
1 R 5
Pentagrid Converter.

Fil. Volts	—	1.4
Fil. Current	—	.05
Anode V. . .	45.0	90.0
Anode Mas.	.7	1.7
Screen V.	(G2, G4)	45.0 67.5
Screen Mas.	1.9	3.0



1 S 4
Output Pentode.

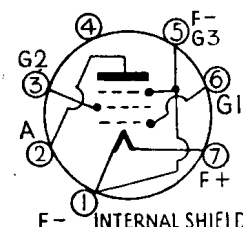
Fil. Volts	—	1.4
Fil. Current	—	.1
Anode V. . .	45.0	67.5
Anode Mas.	3.8	7.2
Screen V. (G2)	45.0	67.5
Screen Mas.	.8	1.5
Grid V. (G1)	—4.5	—7.0



1 S 5
Diode Pentode

Fil. Volts	—	1.4
Fil. Current	—	.05
Anode V. . .	45.0	90.0
Anode Mas.	*	3.0
Screen V. . .	45.0	90.0
Screen Mas.	*	.7

* Very low in R-C circuits.



1 T 4
RF Pentode.

Fil. Volts	—	1.4
Fil. Current	—	0.05
Anode V. . .	45.0	90.0
Anode Mas.	1.9	3.7
Screen V. (G2)	45.0	67.5
Screen Mas.	.7	1.25

ABOVE are the characteristics and base diagrams (looking from underside) of the four valves comprising the American miniature range of 1.4 volt filament valves for use in all-dry sets where the filament supply is drawn from a dry battery. The valves are particularly small and are employed in the personal type of receiver

which is often no larger than a cigarette casket or camera case. They fit into a 7-pin button base socket. Dimensions are 2½ in. overall length, and 1½ in. from top to pins. In the above tables of characteristics the first column gives typical working values and the figures in the second column are maximum values.