

RCA

Type WV-37A

Radio Battery TESTER

Operating Instructions



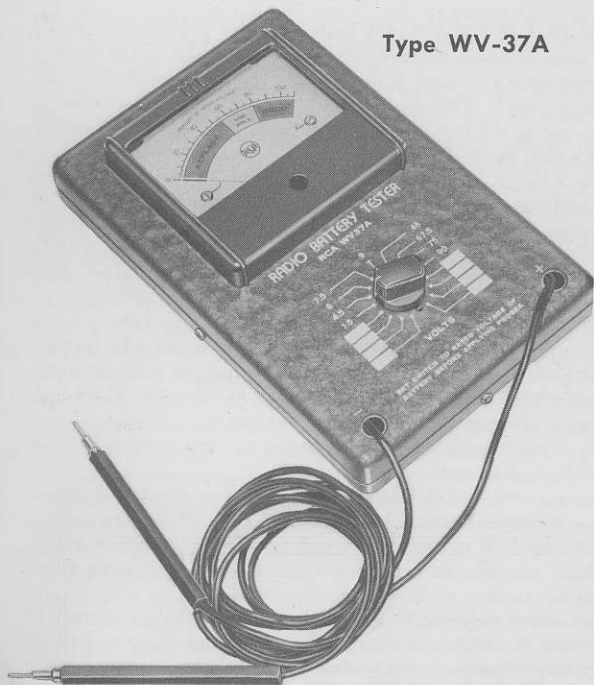
RADIO CORPORATION of AMERICA

TEST AND MEASURING EQUIPMENT

HARRISON, N. J.

RCA Radio Battery Tester

Type WV-37A



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Type WV-37A

The RCA WV-37A Radio Battery Tester is designed to test RCA portable-radio batteries and equivalent types under receiver load conditions without requiring that the batteries be installed in the receiver. This feature makes possible a more accurate indication of the battery's true condition for radio use than can be provided by conventional voltmeter measurements alone.

The WV-37A indicates directly by means of two meter scales the condition of the battery under test and the advisability of replacing it. The top scale, marked in per cent, indicates the existing percentage of the battery's original rated voltage. The lower scale, divided into three sections of different colors, indicates the battery's condition as "Good", "Useable", or "Replace".

The selector switch on the front panel has nine factory-wired test positions and eight additional blank positions. The factory-wired positions accommodate popular types of portable-radio batteries having rated voltages from 1.5 to 90 volts. The blank positions are provided to enable the user to set up load and voltage conditions of his own choosing to test nearly any other type of dry battery.

The selector switch has two functions; to select the proper values of series resistors so the proper ratio of battery voltage may be applied to the meter, and to select the correct values of shunt resistors to provide current drains duplicating those drawn by average portable-radio receivers.

The meter movement is of rugged construction designed to withstand the rigors of shop and counter handling as well as temporary electrical overloads. One milliampere dc flowing through the meter will cause deflection to the 100% mark on the top scale.

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Two test prods, one colored red for the “+” terminal and the other black for the “—” terminal, are supplied with leads which are permanently attached to the tester. The unit may be used flat on its four mounting feet or mounted vertically by means of the mounting hole in the rear of the case.

The WV-37A is useful on the sales counter for checking the condition of used batteries or insuring that counter stock is in good condition. The tester is also useful on the service bench because the built-in load circuits make possible more accurate measurements of battery condition than can be provided by the conventional service voltmeter alone. In the stock room, the WV-37A is valuable in keeping a running check on the condition of battery stock.

Operation

Use of the Factory-Wired Positions

To insure an accurate meter reading with any of the factory-wired positions, use the WV-37A only for the RCA or equivalent types of batteries listed on page 8. A battery designed for current drains different from the batteries listed may be damaged if its maximum allowable current drain is less than the current drain produced by the WV-37A. A battery designed for a current drain higher than that produced by the WV-37A may give an inaccurate indication of the condition of the battery.

When testing portable-radio batteries, observe the following precautions.

1. The battery type should be checked against the list on page 8. If the type is not listed, make sure that it is equivalent to a listed battery type before testing it on the WV-37A.
2. The battery should *not* be in operation when tested. If it is to be tested installed in equipment, make sure that the power

switch is shut off or that the connectors are removed from the battery.

3. The selector switch of the WV-37A should be set to the rated value of the battery voltage *before measurements are made. Failure to do this may result in damage to the battery or the tester.*

After performing the three precautionary operations listed above, test by touching the negative lead of the tester to the battery connection marked “—” or “Negative”, and the positive lead of the tester to the battery terminal marked “+” or “Positive”. The meter scales will then show the battery condition.

Important

Because batteries are often made with different chemical compositions and different internal constructions, the output voltage of a fresh battery may vary slightly above or below its rated value. Any such slight variation in output voltage should therefore not be taken as a positive indication that the battery is above or below standard. With a little experience, the operator will learn to identify the effect produced by batteries of different composition and be able to distinguish between the normal, slight voltage differences and the greater voltage differences which indicate that a battery is unacceptable. In general, any battery which produces a reading in the green section of the lower scale can be considered as satisfactory for use in a portable radio receiver.

Use of the Blank Positions

The blank positions are provided to permit the user to set up voltage and load conditions of his own choosing for testing battery types not provided for by the factory-wired positions.

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These positions allow the WV-37A to be easily adapted to the testing of batteries used in such other equipment as hearing aids, communications equipment, remote control devices, telephones, radiation counters, bias packs, standby and emergency equipment, lighting devices, and protective equipment.

The adaptation may be accomplished by adding only two resistors to a vacant set of switch contacts inside the instrument case. One resistor is required to provide a current drain on the battery duplicating that drawn by an average portable-radio receiver. The second resistor is required to apply the proper ratio of battery voltage to the meter. An equivalent circuit diagram for a single switch position of the WV-37A is shown in Figure 1. The complete schematic diagram is shown in Figure 2.

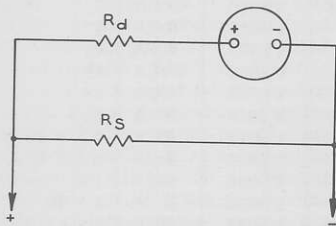


Figure 1. Equivalent circuit diagram for one switch position of WV-37A

To prepare a blank position for use with a battery not covered by one of the prefixed positions, use the following procedure. In the formulas, B = rated voltage of the battery in volts and I_t = total rated load current of battery in milliamperes.

1. Determine the current drawn from the battery in the equipment in which it is used, or consult manufacturers' data for typical load currents.

(Continued on page 12)

Test Chart

for

Portable-Radio Batteries

(B = Burgess, E = Eveready, P = Philco, Z = Zenith)

Battery		Tester	Battery		Tester
Type No.	Brand	Selector Setting	Type No.	Brand	Selector Setting
A30	B	45	P363	P	7.5 9 90
B5	B	7.5	P364	P	1.5 90
B30	B	45	T5Z50	B	6 7.5 75
C5	B	7.5	T6Z60	B	7.5 9 90
D3	B	4.5	VS003	RCA	7.5
D100	B	4.5	VS004	RCA	1.5
F3	B	4.5	VS005	RCA	1.5
F4B60	B	6 90	VS008	RCA	1.5
F4P1	B	6	VS009	RCA	6
F5M45	B	6 7.5 67.5	VS010	RCA	6
F6A60	B	7.5 9 90	VS011	RCA	6
F6A60P	B	9 90	VS013	RCA	45
G3	B	4.5	VS014	RCA	45
G5	B	7.5	VS015	RCA	45
G4B50	B	6 75	VS016	RCA	67.5
G5A42	B	7.5 63	VS019	RCA	7.5 9 90
G6B60	B	9 90	VS020	RCA	6 7.5 67.5
G6M60	B	7.5 9 90	VS036	RCA	1.5
M30	B	45	VS037	RCA	1.5 90
N60	B	90	VS038	RCA	7.5 63
P4F4R	P	6	VS041	RCA	1.5 7.5 67.5
P41A4G	P	1.5 61.5	VS043	RCA	1.5 90
P41A4FL	P	1.5 63	VS046	RCA	6 75
P60A4L	P	1.5 90	VS047	RCA	9 90
P87	P	7.5 63	VS048	RCA	6 90
P94	P	1.5	VS050	RCA	6 7.5 75
P100	P	4.5	VS052	RCA	1.5 61.5
P210	P	45	VS053	RCA	1.5 63
P361	P	7.5 9 90	VS054	RCA	1.5 90

Battery		Tester	Battery		Tester
Type No.	Brand	Selector Setting	Type No.	Brand	Selector Setting
VS055	RCA	45	4TZ60	B	1.5 90
VS057	RCA	7.5 9 90	5DA60	B	1.5 90
VS057W	RCA	7.5 9 90	6F	B	1.5
VS058	RCA	9 90	6FA60	B	1.5 90
VS064	RCA	1.5 90	6TA60	B	1.5 90
VS065	RCA	7.5	8FL	B	1.5
VS067	RCA	4.5	21R	B	1.5
VS068	RCA	6	455	E	45
VS069	RCA	1.5	467	E	67.5
VS072	RCA	4.5	482	E	45
VS090	RCA	90	490	E	90
VS129	RCA	7.5	687	E	7.5
VS216	RCA	67.5	717	E	7.5
VS236	RCA	1.5	718	E	6
XX30	B	45	720	E	1.5
XX45	B	67.5	724	E	6
Z4	B	6	726	E	4.5
Z30	B	45	736	E	4.5
Z45	Z	67.5	738	E	45
Z530	Z	45	742	E	1.5
Z659	Z	6 90	743	E	1.5
Z675	Z	6 75	744	E	6
Z909	Z	9 90	745	E	1.5
Z979	Z	7.5 9 90	746	E	4.5
Z985	Z	9 90	747	E	6
2D	B	1.5	752	E	9 90
2F4	B	6	753	E	7.5 9 90
2F4A60	B	6 90	754	E	7.5 9 90
2F4L	B	6	755	E	6 7.5 75
2R	B	1.5	756	E	7.5 9 90
4F	B	1.5	756W	E	7.5 9 90
4FL	B	1.5	762	E	45
4GA41	B	1.5 61.5	950	E	1.5
4GA42	B	1.5 63	964	E	1.5

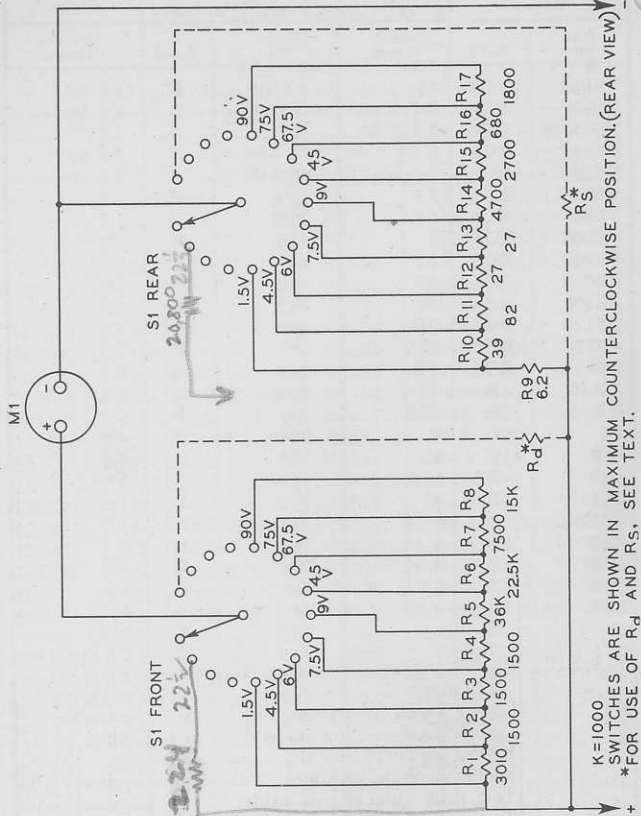


Figure 2. Schematic diagram of WV-37A

Replacement Parts List

If it becomes necessary to replace any of the parts in the WV-37A, only RCA replacement parts or their equivalents should be used. Parts should be ordered, by stock number and full description, from a local RCA tube and parts distributor.

Symbol No.	Description	Stock No.
M1	Meter.....	97766
	Resistors	
R1	Carbon film: 3010 ohms, $\pm 1\%$, $\frac{1}{2}$ watt.....	97757
R2, R3, R4	Carbon film: 1500 ohms, $\pm 1\%$, $\frac{1}{2}$ watt.....	97758
R5	Carbon film: 36,000 ohms, $\pm 1\%$, $\frac{1}{2}$ watt.....	97759
R6	Carbon film: 22,500 ohms, $\pm 1\%$, $\frac{1}{2}$ watt.....	55866
R7	Carbon film: 7500 ohms, $\pm 1\%$, $\frac{1}{2}$ watt.....	97760
R8	Carbon film: 15,000 ohms, $\pm 1\%$, $\frac{1}{2}$ watt.....	97761
R9	Wire wound: 6.2 ohms, $\pm 5\%$, $\frac{1}{2}$ watt.....	97762
R10	Wire wound: 39 ohms, $\pm 10\%$, 1 watt.....	54481
R11	Wire wound: 82 ohms, $\pm 10\%$, 1 watt.....	97763
R12, 13	Wire wound: 27 ohms, $\pm 10\%$, 1 watt.....	97764
R14	Wire wound: 4700 ohms, $\pm 10\%$, 1 watt.....	96423
R15	Wire wound: 2700 ohms, $\pm 10\%$, 1 watt.....	97765
R16	Wire wound: 680 ohms, $\pm 10\%$, 1 watt.....	77193
R17	Wire wound: 1800 ohms, $\pm 10\%$, 1 watt.....	71512
	* * * * *	
S1A, S1B	Switch, rotary: 2 sections, 17 positions, 17 circuits.....	97756
	Cover, black phenolic: for front of meter, with glass window and adjustment knob....	97767
	Knob, for switch.....	59543
	Knob, meter adjustment: with retaining ring	97768
	Test prod: black, less cable.....	97769
	Test prod: red, less cable.....	97770

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2. Compute the value in ohms of the series dropping resistor, R_d , as follows:

$$R_d = (B \times 1000) - 1500$$

3. Compute the value in ohms of the shunt resistor, R_s , as follows:

$$R_s = \frac{B \times 1000}{I_t - 1}$$

4. Compute the watt's rating, P , of the shunt resistor as follows:

$$P = \frac{B (I_t - 1)}{1000}$$

The value P is the exact amount of power to be dissipated in resistor R_s . It is wise, however, to use a resistor which has a dissipation rating of approximately twice the calculated dissipation to prevent overheating.

The resistors used in the factory-set positions on the WV-37A are arranged in series, and additional values are added or subtracted when the selector is switched from one position to another. It is recommended, however, that any new resistances be wired into the switch so that they are independent of the existing networks. Such an arrangement will prevent possible damage to the network from overheating and rearrangement of the prefixed resistors. The values of the series dropping resistors should be within $\pm 1\%$ of the calculated value. The values of the shunt resistors, however, may be within $\pm 10\%$, which often makes possible the use of standard RTMA values. To prevent errors, the resistance of the chosen resistor should be measured to insure that its actual value is within $\pm 10\%$ of the calculated value. If it is desired to set up the WV-37A for a no-load test, then it is necessary to add only the series dropping resistor, R_d .

Example

Suppose it is desired to set up a position for testing an industrial-type battery, similar to the 6-volt RCA VS040A, which is used in lanterns. The current drain in this application is commonly about 200 milliamperes. (1 milliampere = 0.001 ampere) First calculate the value of R_d as follows:

$$R_d = (1000 \times 6) - 1500$$

$$R_d = 6000 - 1500$$

$$R_d = 4500 \text{ ohms (select a value within } \pm 1\%)$$

The value of R_s is calculated as follows:

$$R_s = \frac{6 \times 1000}{200 - 1}$$

$$R_s = \frac{6000}{199}$$

$$R_s = 30.14 \text{ ohms}$$

A resistor which has a measured value of 27.9 to 33.1 ohms should be satisfactory. The watt's rating should be calculated as follows:

$$P = \frac{6(200 - 1)}{1000}$$

$$P = \frac{1194}{1000}$$

$$P = 1.194 \text{ watts}$$

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To insure an adequate margin of dissipation as described above, a two-watt rating is recommended. The dotted lines on the schematic diagram, Figure 2, show an extra position set up for testing.

The type of battery which can be tested is limited by (a) its voltage and (b) its correct current load. Any battery which has a voltage rating higher than 250 volts or which must be tested at a load current greater than 0.5 ampere should not be tested with the WV-37A because battery ratings which exceed these limits may cause breakdown of the selector switch. If it is necessary to test batteries which exceed these ratings, external resistors should be used. These may be connected directly at the battery terminals.

If an additional fixed position is set up, it may be marked on the front panel by removing with an eraser or sandpaper the lacquer covering the extra position on the selector switch, lettering the blank space with ink, and recoating with a transparent material.

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