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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR,

ORGANIZATIONAL AND

FIELD MAINTENANCE MANUAL

ELECTRONIC VOLTMETER AN/URM-145

This copy is a reprint which includes current pages from Changes 1 through 3.

HEADQUARTERS, DEPARTMENT OF THE ARMY

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M O D E L 91CA

R F V O L T M E T E R

Do not use on Ser. Nos. below 2661

TECHNICAL MANUAL

NO. 11-6625-524-14

HEADQUARTERS,
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ELECTRONIC VOLTMETER AN/URM-l45

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SECTION I

MODEL 91 CA

SPECIFICATIONS

1.1	Measurement Range:		300 microvolt to 3 volts
1.2	Full Scale Ranges:		.001, .003, .01, .03, .1, .3, 1, 3 volts.
1.3	Frequency Range:		10 KC to 600 MC
1.4	Accuracy:	.003 range and above	5% of full scale to 200 MC 10% of full scale above 200 MC
		.001 range only	10% of full scale to 200 MC 15% of full scale above 200 MC
1.5	Input Impedance:		91-3B RF Probe See curve for shunt resistance data on high impedance probe. Shunt capacitance varies inversely with input voltage from 2 to 5 μμf. 91-8B 50 Ω BNC Adapter Max. VSWR 1.2 up to 600 MC. 91-13A Probe Tip For direct measurements up to 250 MC.
1.6	Tube Complement:		1 each: BEC 525001, 12AT7, 6AU6, OA2, and 6X4.
1.7	Power Requirements:		105-125 volts, 55-65 ∿ 30 watts.
1.8	Dimensions		7-1/9 W, x 9-1/2 D, x 11 H excluding handle
1.9	Weight		12 pounds

SECTION II

GENERAL DESCRIPTION

The 91CA RF Voltmeter is a sensitive instrument for the measurement of voltages of 300 microvolt to 3 volts spanning a wide frequency range of 10 kilocycles to 600 megacycles. In addition to conveniently measuring voltage levels in a diversity of rf circuits, the instrument has application for many associated tests. Such measurements include: the frequency response of both active and passive networks, i.e., amplifiers and filters; VSWR and return loss on transmission lines and attendant systems; attenuation and insertion loss of rf attenuators; and high frequency parameters of transistors. With true rms response below 0.03 volt (up to 3 volts with the 91-7B, 100:1 divider), wide band noise can be measured, and using suitable null networks measurement of the harmonic distortion of RF waveforms can be performed without the attendant errors of average type meters.

The instrument is also useful as an rf null detector for bridge measurements and analogous techniques when a sensitivity in the order of 200 microvolt will suffice.

Supplied with each instrument is a general purpose probe, 50 ohm adapter, and probe tip. The adapter is fitted with a BNC coaxial connector and provides a 50 ohm termination with a low VSWR up to at least 600 megacycles. The probe tip and companion ground clip are useful for direct measurement to approximately 100 megacycles. Above 100 megacycles, the probe may be used directly without the tip or" ground clip, but the connecting leads must be extremely short to avoid resonant effects. In the special case where it is possible to connect the probe directly to the voltage source, the specified tolerance is maintained to at least 600 megacycles. The impracticability of such a connection, however, precludes our assuring the accuracy of the 91CA RF Voltmeter above 250 megacycles without the use of the 91-8B BNC 50 ohm adapter.

The 91-3B probe with its full-wave crystal detecting circuit produces a true rms response without turnover, or harmonic errors for all voltage levels below 0.03 volt, gradually changing to peak-to-peak reading (calibrated in rms) at approximately 1.0 volt. The probe has a shunt capacitance of approximately 2.5 µµf at levels of 0.3 volt or higher, increasing slightly at levels of 0.1 volt or less. The shunt resistance component shown in Figure 1 is a variable factor, depending on the voltage and frequency.

Figure 1 also shows the input resistance of the 91-7B, 100:1 voltage divider. When the frequency and the voltage to be measured permit, consideration should be given to the use of the 91-7B. In addition to extending the voltage range of the instrument to 300 volts, the benefit is threefold: the input resistance is increased above that available with vacuum tube diode probes, and the diode overload protection as well as the range of true rms response is increased by a factor of 100. The 100:1 divider may be used at frequencies up to 250 megacycles with negligible loading for most rf circuitry.