TM 11-6625-351-35

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

FIELD AND DEPOT MAINTENANCE MANUAL

RADIO INTERFERENCE MEASURING SET AN/URM-85

This copy is a reprint which includes current pages from Changes 2 through 4

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RADIO INTERFERENCE MEASURING SET AN/URM-85

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CHAPTER 1

THEORY

Section I. SYSTEM BLOCK DIAGRAM

1. Scope

a. This manual covers field and depot maintenance for Radio Interference Measuring Set AN/URM-85. It includes instructions appropriate to third, fourth, and fifth echelons for troubleshooting, testing, and repairing the equipment, and for replacing maintenance parts. It also lists tools, materials, and test equipment for fourth, and fifth echelon maintenance. There are no maintenance functions allocated to third echelon. Detailed functions of the equipment are covered in the theory sections.

b. The complete technical manual for this equipment includes TM 11-6625-351-12, TM 11-6625-351-20P, and TM 11-6625-351-35P.

c. Forward comments concerning this manual to the Commanding Officer, U.S. Army Signal Materiel Support Agency, ATTN: SIGMS-PA2d, Fort Monmouth, N.J.

Note: For applicable forms and records, see paragraph 2, TM 11-6625-351-12.

d. Refer to DA Pamphlet 310-4 to determine what Changes to or revisions of this publication are current.

2. General Application

Radio Interference Measuring Set AN/URM-85 is a portable test set which is used in four different applications.

a. One application is the measurement of the field intensity of radiated continuous wave (cw), amplitude modulation (am.) or frequency modulation (fm) signals. These measurements are usually expressed in microvolt per meter (uv/m). The figure is obtained by dividing the potential difference between the receiving antenna system and ground by the distance, in meters, between those two points. A more practicable method to determine field strength consists of measuring the voltage induced across an antenna by a passive wave and applying the following formula:

Formula $$\underline{FS} = \frac{\underline{E_a}}{\underline{h_c}}$$

Where: $\underline{FS}$ = field strength in microvolt per meter,
$\underline{E_a}$ = voltage induced across the antenna in microvolt,
$\underline{h_c}$ = effective height of antenna in meters.

Both the panel-mounted meter and the remote multimeter of the test set have scales which are calibrated in microvolt (uv) (10 uv full scale) and in decibles (db) (20-db full scale). A measurement is meaningful only after the meter has been calibrated by applying the output of the self-contained impurse generator to the system.

(1) The test set indicates the voltage E_a that is present at the SIGNAL INPUT connector of the main unit.

(2) The effective height h_c of the antenna which is used for the measurement is provided by reference to graphs, supplied in the calibration book accompanying each serial numbered model of the equipment. Typical graphs showing the antenna factor versus frequency appear in TM 11-6625-351-12.

b. A second application of this test set is the use of the instrument as a tunable two-terminal radiofrequency (rf) voltmeter. In this application, the output signal from such rf signal sources as a radio receiver, a tuned rf amplifier, a local oscillator, or a signal generator, is conductively coupled to the SIGNAL INPUT connector of the main unit, without the use of an antenna. The input impedance of the test set is 50 ohms in all positions of the SIGNAL ATTENUATOR DB control, except in the 0 SUBST. ONLY position.

c. A third application of this test set is

the measurement of broadband radio interference (noise). Broadband interference is produced by switching transients in electronic and electrical equipment, such as that caused by the throwing of switches, vibrating electrical contacts of relays, rotation of commutators, electrical arcing or sparking, and other sudden changes in electric or magnetic potentials. This type of interference normally consists of short-duration pulses that have either a comparatively regular or a random repetition rate and amplitude. For measuring purposes, broadband interference is expressed in terms of *microvolt per unit of bandwidth,* such as microvolt per kilocycle (uv/kc) of bandwidth or microvolt per megacycle (uv/mc) of bandwidth. In these measurements, the peak value of the interfering signal is used.

(1) Assume that a signal of 1 uv/mc of bandwidth is applied to the input of a radio receiver with an equivalent noise bandwidth of 1 mc.

(2) The definition of a 1 uv/mc of bandwidth signal is as follows: it is the peak value of that broadband signal which produces a specific output from this receiver. If a cw signal of 1 microvolt is then applied to the input of this receiver, the output will be equivalent to that produced by the broadband signal.

d. A fourth application of this test set is the measurement of the field intensity of broadband r a d i o interference (noise). These measurements, expressed in microvolt per megacycle per meter (uv/mc/m), are used when the test set is located in the *far field* of a radiating antenna. In this application, the peak amplitude of the noise signal under measurement is indicated on the meter. An antenna factor, which accounts for the effective height of the antenna (a above), and a correction factor for losses in the rf cable must be added to the meter indication. Typical graphs of antenna factors are provided in TM 11-6625-351-12. One graph is applicable when the vertical or loop antenna is used with tuning unit 1 (150 kc to 30 mc frequency range); a second graph is applicable when the appropriate dipole antenna is used with tuning unit 2, 3, or 4 (20- to 1,000-mc frequency range).

3. Shunt Method of Calibration Using Internal Signal Source

a. General. The signal path for calibrating the test set by the shunt method of calibration is shown in figure 1. Basically, a self-contained inpulse generator is used as a calibrating signal to produce a full-scale meter indication. The setting of six-step signal attenuator AT702 control determines the amount of rf and intermediate frequency (if.) attenuation inserted into the signal path. After the meter is calibrated for a full-scale meter indication, the im-p u 1 s e generator is deenergized. The magnitude of the rf signal under measurement (fig. 2) is then directly read from the meter scale.. taking into account the setting of the six-step signal attenuator control. The following subparagraphs, based on placing the main unit calibration switch in the SHUNT CAL position, give a brief functional description of the calibrating signal path.

b. Impulse Generator Circuit. With IMPULSE GENERATOR DB ABOVE lUV/MC ON-OFF switch S705 in the ON position, the signal path is produced as follows:

(1) *R e p e t i t i o n rate generator and driver V703.* Repetition rate generator V703A is a resistance-capacitance type oscillator which produces a fixed output of approximately 70 cycles per second (cps). This output, increased in amplitude by impulse generator driver stage V703B, is fed to impulse generator G701.

(2) *Impulse generator G701.* The impulse generator produces abroad-band signal by the transient discharge of a direct-current (de) voltage on a short length of coaxial line, working into a 50-ohm impedance load. A mercury switch, operated by impulse generator driver stage V703B, opens and closes the coaxial line pulse-forming circuit.

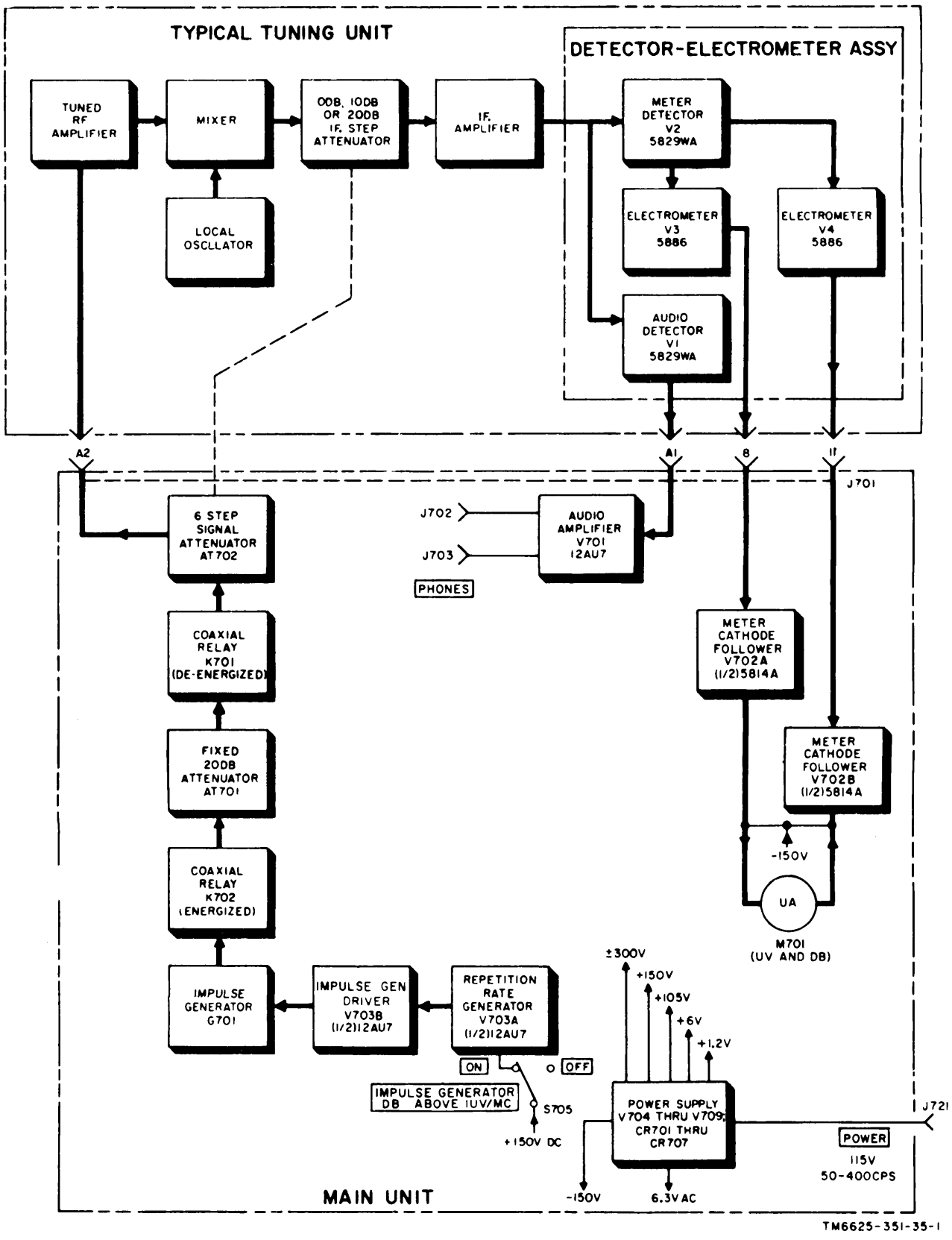

Figure 1. Shunt method of calibration, using internal signal source.