TM 11-6625-683-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL

DS, GS, AND DEPOT MAINTENANCE MANUAL

SIGNAL GENERATOR

AN/URM-127

HEADQUARTERS, DEPARTMENT OF THE ARMY

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TECHNICAL MANUAL
No. 11-6625-683-15

DEPARTMENT OF THE ARMY
HEADQUARTERS
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Operator, Organizational, Direct Support, General Support, and Depot Maintenance Manual

SIGNAL GENERATOR AN/URM-127

A-1. Index of Publications

Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment. Department of the Army Pamphlet No. 310-4 is a current index of technical manuals, technical bulletins, supply manuals (types 7, 8, and 9), supply bulletins, lubrication orders, and modification work orders available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc) and the latest changes to and revisions of each equipment publication.

A-2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).

c. Reporting of Equipment Manual Improvements. The direct reporting of errors, omissions, and recommendations for improving this equipment manual by the individual user is authorized and encouraged. DA Form 2028 will be used for reporting these improvements. This form may be completed by using pencil, pen, or typewriter. DA Form 2028 will be completed by the individual using the manual and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MR-NMP-AD, Fort Monmouth, New Jersey 07703.

SECTION I
DESCRIPTION

1-1. IDENTIFICATION. (See figure 1-1.)

a. This publication contains operating instructions for Signal Generator, Part No. SG334 (Government Type AN/URM-127) (FSN 6625-785-5965) manufactured by Burton Manufacturing Co., Van Nuys, California.

b. A serial number is contained on the generator identification plate to complete identification for each unit.

1-2. PURPOSE AND LEADING PARTICULARS OF EQUIPMENT.

a. The signal generator provides electrical output signals at the selected frequency for use in calibrating various electronic devices. The output signal is a sine-wave of adjustable amplitude, with a decimal multiplier/divider selector switch.

b. The leading particulars of the signal generator are contained in figure 1-2.

1-3. LIST OF ACCESSORIES.

a. A list of major components is contained in figure 1-3.

b. Figure 1-3 also includes use data for all major components.

1-4. AUXILIARY EQUIPMENT. (See figure 1-4.)

1-5. THEORY OF OPERATION.

a. The signal generator is a solid state unit with RC bridge oscillator circuit of the double feedback Wien bridge type (see figure 1-5), an output voltmeter, a power supply and an output attenuator. These circuits and the front panel controls associated with them are shown in the block diagram, figure 1-6.

b. The RC bridge oscillator consists of an RC bridge, a two-stage amplifier, and two emitter followers in push-pull combination. The output of this circuit is a sine-wave signal which is 1) returned to the RC bridge as feedback, and 2) applied to the output attenuator.

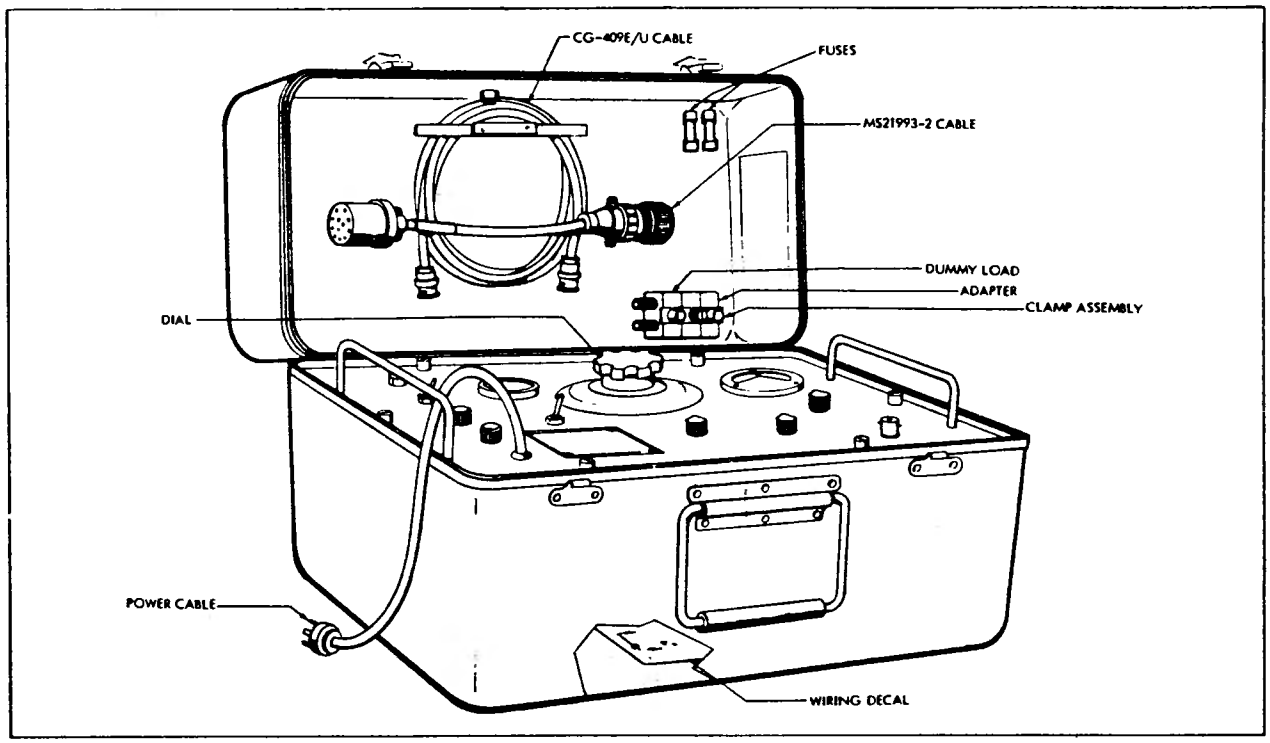

Figure 1-1. Signal Generator, Part No. SG334

Use	Provide electrical signals at various frequencies
Freq. Accuracy	±2% overall
Number of Bands	4
Band 1 (X1)	20 to 200 cps
Band 2 (X10)	200 to 2000 cps
Band 3 (X100)	2000 to 20,000 cps
Band 4 (X1000)	20,000 to 200,000 cps
Band Overlap	5%
Power Output	200 milliwatts at 500 ohms load
Signal Amplitude	0 to 10 VAC (RMS) (7 increments)
Output Load	1000 ohms (for calibrated output voltage)
Output Waveform	Sine wave (1% max distortion)
Calibration Monitor	Reed type, 60 cps and 400 cps, ±1%
Amplitude Monitor	Voltmeter (Panel Mounted)
Hum Level	80 db less than fundamental output voltage
Input Power	115 VAC, ±10% 50/70 or 380/420 cps, 1ø
Power Consumption	6.5 VA, 0.055 AMP
Ambient Conditions	
Temperature	-40 to +50°C (-40 to +122°F)
Altitude	0 to 50,000 ft non operating 0 - 10,000 ft operating
Envelope Dimensions	13 in. w x 8-3/4 in. h x 7-1/4 in. lg
Weight	13.3 lbs
Specification	MIL-G-27724A (USAF)

Figure 1-2. Leading Particulars

c. The RC bridge consists of an RC frequency-selective network and a resistive voltage divider network. The RC frequency-selective network supplies positive feedback to the amplifier and determines the frequency of oscillation. The resistive voltage divider network supplies negative feedback to the amplifier.

d. The current sensitive resistor (R4) balances automatically the division ratio of the resistive voltage divider network, thereby controlling the amount of negative feedback. This system maintains the RC oscillator output at a constant level.

e. The attenuator is an "L" type attenuator which provides continuous control of the oscillator output voltage while maintaining constant output impedance.

f. Oscillator Circuit. The RC bridge in the oscillator circuit consists of an RC frequency-selective network and a resistive voltage divider network. The frequency-selective network is similar to one leg of a Wien bridge; the resistive voltage divider, the other leg.

g. As in any oscillator, an in-phase feedback voltage (from the oscillator circuit output) is necessary to maintain oscillation. The proper phase relationship at the desired frequency is maintained by the RC components in the bridge.

h. The frequency-selective network consists of a series branch, C1 and R1, and a parallel branch, C2 and R2, as shown in figure 1-5. For the frequency at which X_C = R in the series and parallel branches,

DESCRIPTION	PART NO.	MFR	GOVT TYPE	USE
Fuse (2)	F02A250V1/4A	---	MIL-F-15160/02	Prevent circuit overload
Wiring Decal	4344120	81920	---	Circuit tracing
Electrical Cable	4344107	81920	CG-409E/U	Connect signal generator output to system
Electrical Cable	4344121	81920	MS21993-2	Connect signal generator to alternate power source
Clamp Assembly	4344025	81920	---	Hold dummy load and adapter in case
Dummy Load	4344114	81920	DA-35/U	1000 ohms resistive load for testing unit
Adapter Connector	4344115	89120	UG-514/U	Adapt unit output to other system

Figure 1-3. Accessories Included

DESCRIPTION	GOVT TYPE	USE
Oscilloscope	AN/USM-141	Calibration of signal generator
Voltmeter (±2%, vacuum tube)	MIL-V-55104	Alternate for oscilloscope

Figure 1-4. Auxiliary Equipment

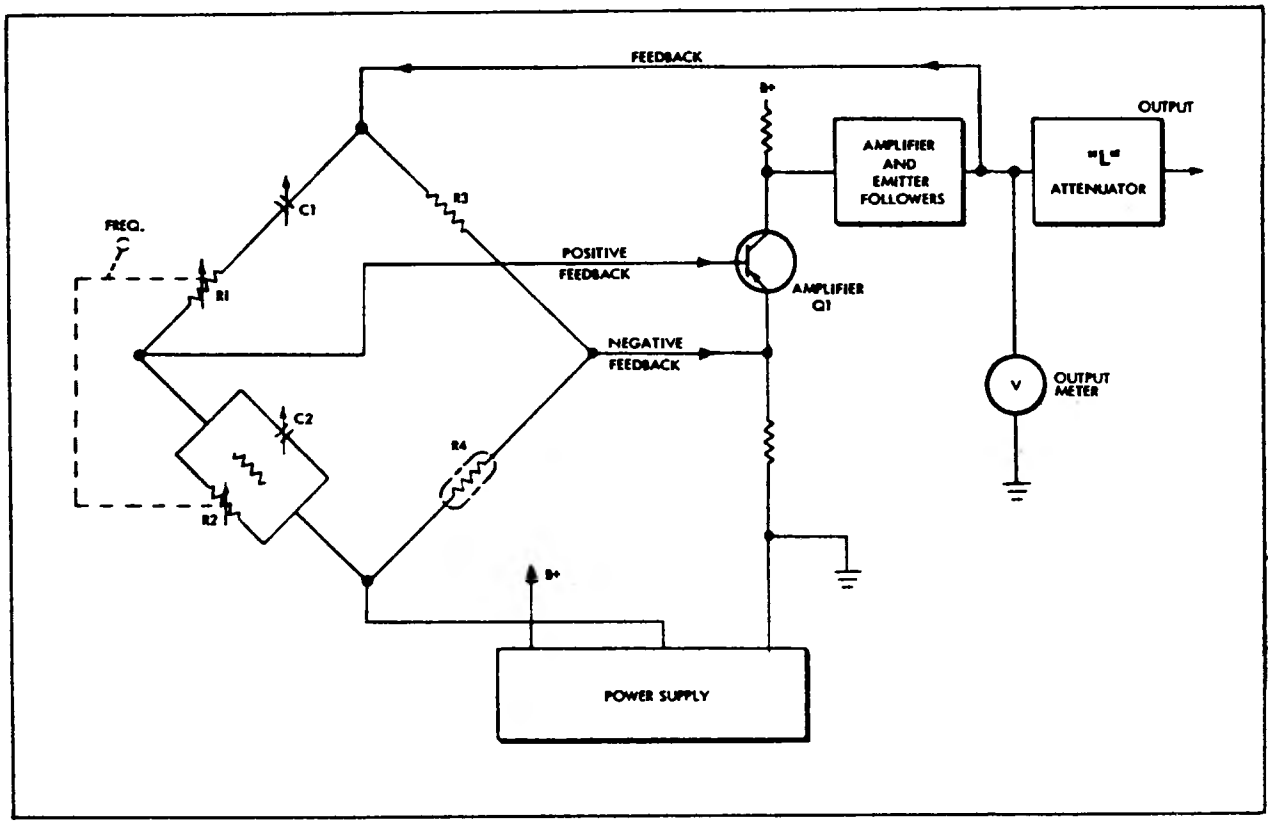

Figure 1-5. Wien Bridge Circuit

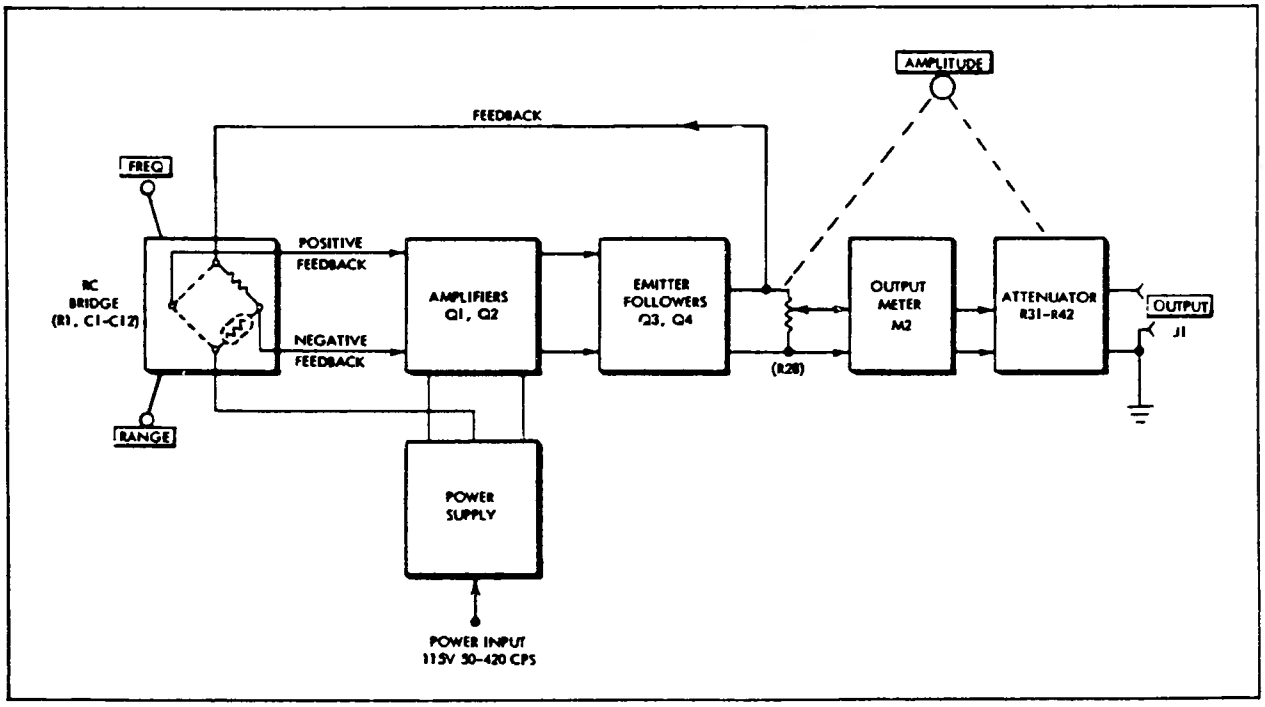

Figure 1-6. Signal Generator Block Diagram

the positive feedback voltage to the amplifier is maximum and is in phase with the oscillator circuit output voltage (figure 1-7). Only that frequency at which $X_C = R$ will be amplified; at frequencies where X_C does not equal R, the positive feedback voltage is not of the right phase and is insufficient to sustain oscillation. Figure 1-7 shows the positive feedback curve and phase relationship for frequencies above and below the frequency where $X_C = R$.

i. The resistive voltage divider network consists of R3 and R4 which provide negative feedback voltage to maintain the oscillator circuit output at a constant level. The negative feedback developed is in part due to the resistance of R4 which is controlled by the amount of current passing through it. If the oscillator circuit output changes, the value of current flowing through R4 changes, changing its resistance and accordingly changing the negative feedback. Increasing the negative feedback results in a decrease in the net input to the amplifier and thus the output signal decreases. The oscillator output is maintained at approximately 33 volts peak-to-peak.

j. Two amplifiers, Q1 and Q2, amplify the signal and apply it to complementary emitter followers Q3 and Q4. The emitter followers are forward biased by CR1 and CR2 and under a no-signal condition are conducting slightly to minimize crossover distortion. The oscillator circuit output is coupled to the "L" type attenuator.

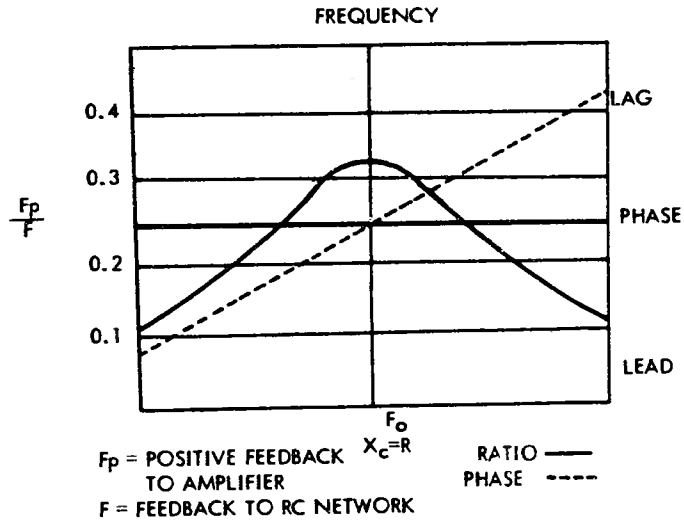

Figure 1-7. RC Network Characteristics

SECTION II
PREPARATION FOR USE

2-1. SCOPE.

a. This section describes the initial preparation required prior to operating the signal generator.

b. No special selection of site is required, other than availability to 115 VAC, 50/60 cps, 1 ø or 115 VAC, 400 cps, 1 ø power for operation of the unit.

2-2. PREPARATION FOR USE.

a. Inspection of Components. Open the top cover of the signal generator and check that all components are intact as shown in figure 1-1. Check that correct fuses are in both .25 AMP fuseholders.

b. Connection to Power Supply. Check that power source is as described in paragraph 2-1b and observe whether power source outlet is three-prong or two-prong type. If power outlet is two-prong type, insert generator power plug in outlet receptacle while holding grounding pin aside. See figure 2-1 for panel markings and locations.

(1) Turn generator POWER switch to OFF, and turn FREQ METER switch to OFF.

(2) Connect Power Cable to power source receptacle.

(3) Turn POWER switch ON and observe that POWER lamp illuminates.

c. Initial Calibration. Install Cable Part No. CG409E/U on OUTPUT receptacle and install Part No. DA35/U Dummy Load on cable terminal receptacle. Connect dummy load to test equipment specified in figure 1-4.

NOTE

Dummy Load Part No. DA35/U contains a 1000 ohm resistor for proper output voltage calibration. Adapter Connector Part No. UG514/U is used for direct coupling to equipment being tested which has 1000 ohm input impedance.

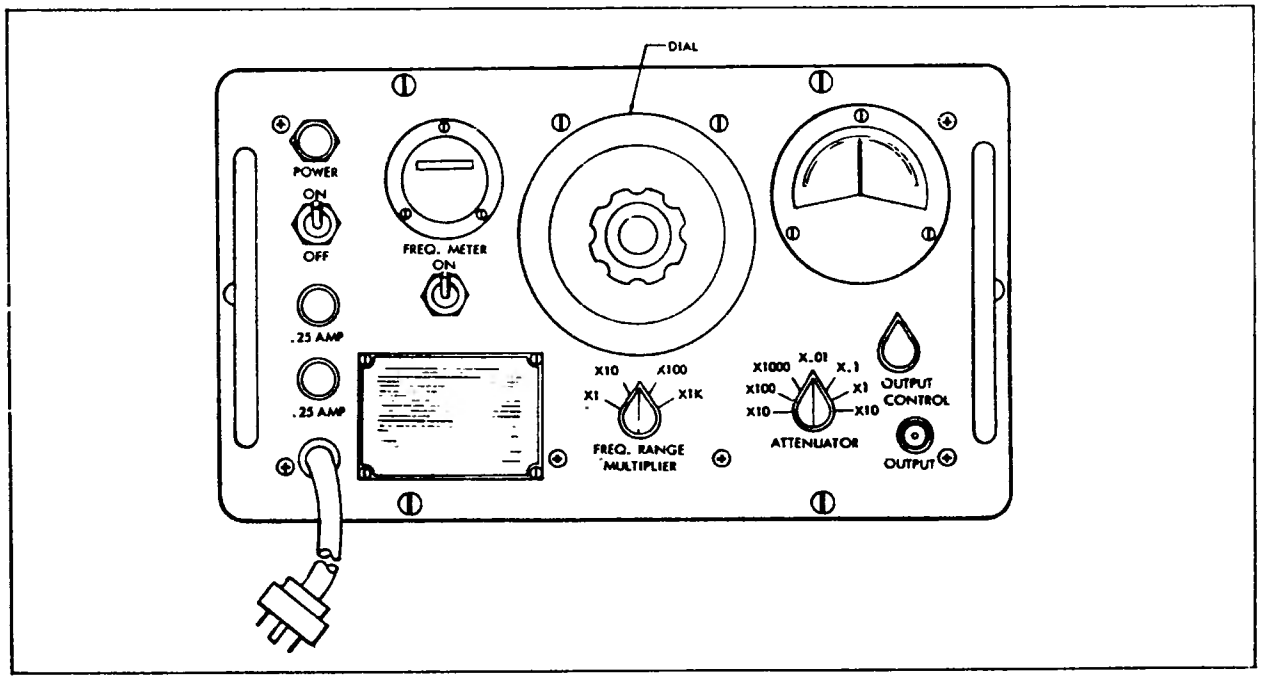

Figure 2-1. Panel Identification

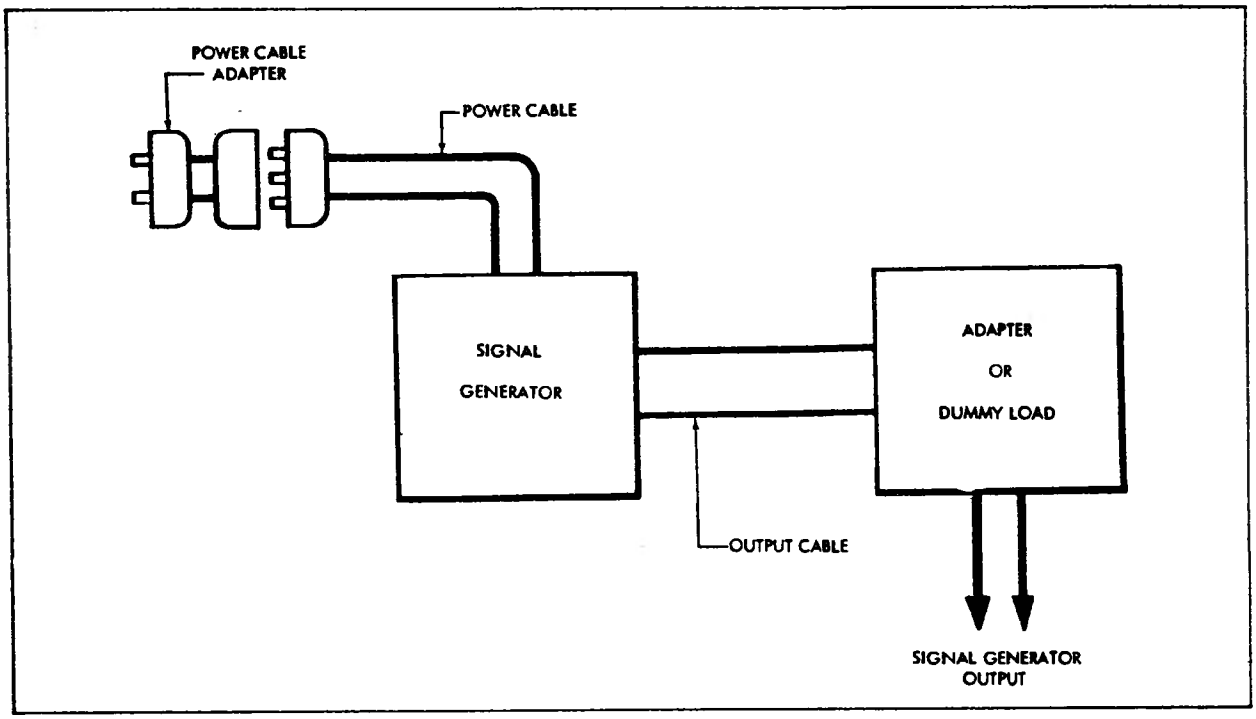

Figure 2-2. Cabling Diagram

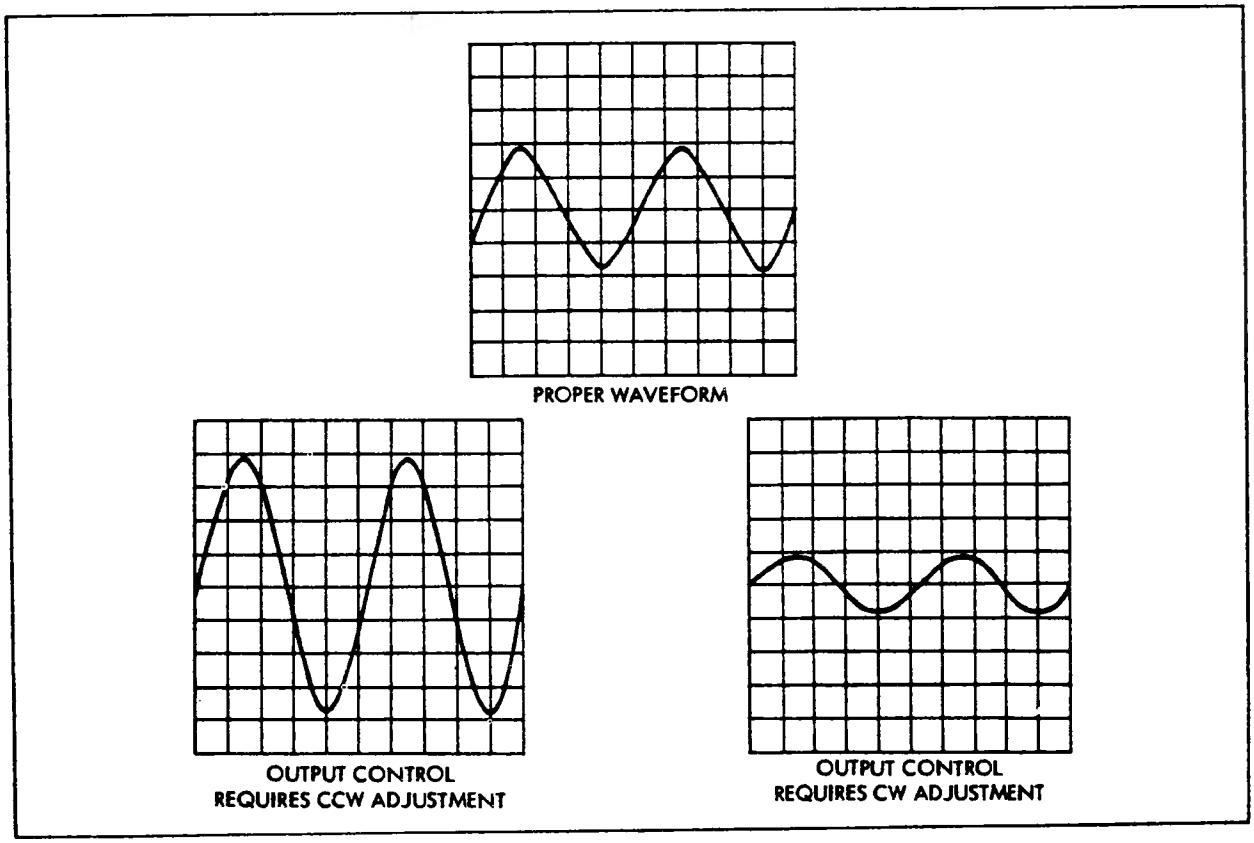

Figure 2-3. Waveforms

(1) Turn FREQ METER switch ON, turn FREQ RANGE MULTIPLIER switch to "X10" and adjust vernier dial to "40" for 400 cps output or turn FREQ RANGE MULTIPLIER switch to "X1" and adjust vernier dial to "60" for 60 cps output. Check that the applicable "60" or "400" reed vibrates. Check against frequency meter, Government Type AN/USM-26.

(2) Turn OUTPUT CONTROL dial full clockwise. Panel voltmeter should read approximately "1.15". Check with electronic voltmeter, Government Type ME-20A/U.

(3) Place ATTENUATOR switch to each position and observe the output voltmeter voltage readout. Voltage should be approximately the same in each position.

2-3. CABLING ARRANGEMENT (See fig. 2-2)

2-4. OSCILLOSCOPE READINGS. When an oscilloscope, Government Type AN/USM-141, is attached through Cable, Part No. CG405E/U and Dummy Load, Part No. DA35/U the waveform will be as shown in figure 10-5A with OUTPUT CONTROL set properly. Adjust OUTPUT CONTROL to obtain proper waveform amplitude of 10 volts. Check dummy load with electronic multimeter, Government Type TS-505/U.

2-5. PREPARATION FOR RESHIPMENT.

a. Reinstall all accessories in signal generator as shown in figure 1-1 and close cover.

NOTE

To avoid damage to front panel assure that power cable is plugged into adapter cable MS21993-2.

b. Pack in adequate shipping container per Specification PP-B-636 with sufficient overpacking.

SECTION III
OPERATION

3-1. SCOPE.

a. This section describes normal operation of the signal generator.

b. References to controls or monitors which are capitalized will be identical to panel markings as shown in figure 2-1.

3-2. CONTROLS. (See figure 3-1.)

CONTROL	FIG. REFERENCE	MARKING	USE
Switch	2-1	POWER ON-OFF	Shuts off power input to signal generator
Fuses	2-1	0.25 AMP	Prevents circuit overloading
Switch	2-1	FREQ METER ON-OFF	Connects reed type frequency meter into circuitry
Switch	2-1	FREQ RANGE MULTIPLIER	Changes signal frequency to selected band
Dial	2-1	FREQ RANGE DIAL	Vernier adjustment of output frequency
Switch	2-1	ATTENUATOR	Changes output voltage scale by multiples of 10
Dial	2-1	OUTPUT CONTROL	Increases output voltage by clockwise adjustment

Figure 3-1. Controls for Signal Generator

3-3. MONITORS. (See figure 3-2.)

MONITOR	FIG. REFERENCE	MARKING	USE
Lamp	2-1	POWER ON-OFF	Illuminates when power is ON to signal generator
Reed	2-1	FREQ METER	Vibrates at frequencies of 60 cps or 400 cps
Voltmeter	2-1	---	Indicates output voltage in same increments as ATTENUATOR

Figure 3-2. Panel Monitors

3-4. PRELIMINARY ADJUSTMENTS. (See figure 2-1.)

a. Primary adjustments are contained in Section II. Additional adjustments are as follows:

b. Frequency range settings are made with the FREQ RANGE MULTIPLIER switch as follows:

Frequency Range	Switch Position	Adjustment Within Range
20-200 cps	X1	Dial markings on large dial over switch
200-2000 cps	X10	Dial markings on large dial over switch
2000-20,000 cps	X100	Dial markings on large dial over switch
20,000-200,000 cps	X1K	Dial markings on large dial over switch

EXAMPLE: Switch position X1 with Dial positioned at "40" sets the output frequency at 40 cps

Switch position X10 with Dial positioned at "40" sets the output frequency at 400 cps

c. Output signal amplitude (VAC) is selected by the ATTENUATOR switch as follows:

Volts Output	Switch Position	Panel Voltmeter Reading (Adjust with Output Control Dial)
10 uV	uV X10	1.0
100 uV	uV X100	1.0
1000 uV	uV X1000	1.0
0.01 V	V X.01	1.0
0.10 V	V X.1	1.0
1.0 V	V X1	1.0
10.0 V	V X10	1.0

3-5. WARM-UP. Warm-up requirement is one minute maximum at room temperature, 10 minutes maximum at -40°.

3-6. OPERATION. (See figure 2-1.)

a. Complete procedures described in Section II.

b. Refer to figure 1-2 for equipment capability and to figure 2-1 for panel markings.

c. Place FREQ RANGE MULTIPLIER to needed band per paragraph 3-4b.

d. Set ATTENUATOR switch to voltage output required per paragraph 3-4c.

NOTE

If 1000 ohm load is required in application, install Dummy Load, Part No. DA35/U on OUTPUT Cable, Part No. CG409E/U. Otherwise use Adapter Connector, Part No. UG514/U.

e. Place POWER ON-OFF switch to ON and observe that lamp illuminates.

f. Output signal will commence immediately.

3-7. STOPPING OPERATION.

a. Turn POWER ON-OFF switch OFF and observe that lamp goes out.

b. Disconnect all cables and store in cover of signal generator.

c. Disconnect dummy load and store in cover of signal generator.

d. Plug end of power cable into the Adapter Cable, Part No. MS21993-2.

e. Close cover of unit and secure.

SECTION IV
EMERGENCY OPERATION

4-1. SCOPE.

a. This section comprises emergency operating procedures for the signal generator.

b. Emergency procedures are necessarily limited due to the design of the equipment and to limitations of field repair capabilities.

4-2. ABNORMAL OPERATION. Not applicable.

4-3. EMERGENCY OPERATION.

a. Emergency operation of the signal generator is normally limited to the following:

(1) Replacement of fuses (see figure 1-1) in event of power overload.

(2) Repair of cables (see figure 2-2) to establish circuit continuity.

(3) When operating technicians have sufficient familiarity with the equipment to follow the wiring diagram (see figure 1-1) the six thumb screws on the front panel may be removed and the chassis lifted from the case. Make visual inspection of circuit board components for loose connections or defective components. Make correct connections or replace components with like components (equal value and accuracy) when repair can be effected by soldering.

CAUTION

Solder per Specification MIL-S-6872 using solder (Federal Specification QQ-S-571, SN50 or 60). Do not use acid flux.

(4) Determination of repair per preceding step is at the discretion of the using agency.

b. The signal generator may be operated on input power frequencies as low as 40 cycles for periods of not more than 15 minutes; it may also be operated on power input frequencies up to 2000 cps for periods not in excess of 2 hours.

SECTION 5

PREVENTIVE MAINTENANCE INSTRUCTIONS

5-1. Scope of Maintenance

The maintenance duties assigned to the operator and organizational repairman of the equipment are listed below together with a reference to the paragraphs covering the specific maintenance functions.

a. Daily preventive maintenance checks and services (para 5-4).

b. Weekly preventive maintenance checks and services (para 5-5).

c. Monthly preventive maintenance checks and services (para 5-6).

d. Quarterly preventive maintenance checks and services (para 5-7).

e. Cleaning (para 5-8).

f. Touchup painting (para 5-9).

5-2. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 5-8 and 5-9 cover routine systematic care and cleaning essential to proper upkeep and operation of the AN/URM-127.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services charts (para 5-4 through 5-7) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat-serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the charts indicate what to check, how to check, and the normal conditions; the References column lists the illustrations, paragraphs, or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by performing the corrective action indicated, higher category maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

5-3. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the equipment are required daily, weekly, monthly, and quarterly.

a. Paragraph 5-4 specifies the checks and services that must be accomplished daily (or at least once each week if the equipment is maintained in standby condition).

b. Paragraphs 5-5, 5-6, and 5-7 specify additional checks and services that must be performed on a weekly, monthly, and quarterly basis, respectively.

5-4. Operator's Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Completeness.....	See that the equipment is complete (appx II).	None.
2	Exterior surfaces.....	Clean the exterior surfaces, including the panel (para 7-8). Check the meter face for scratches.	None.
3	Connectors.....	Check tightness of all connectors...	None.
4	Controls and indicators....	While making the operating checks (item 5), observe that the mechanical action of each switch and control is smooth and free of external or internal binding, and that there is no excessive looseness.	None.
5	Operation.....	During operation, be alert for any unusual performance or condition.	None.

5-5. Organizational Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Cables.....	Inspect cords, cables, and wires for chafed, cracked, or frayed insulation. Replace connectors that are broken, arced, stripped, or worn excessively.	None.
2	Handles and latches.....	Inspect handles and latches for looseness. Replace or tighten as necessary.	None.
3	Metal surfaces.....	Inspect exposed metal surfaces for rust and corrosion. Touchup paint as required (para 5-9).	None.

5-6. Organizational Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Jacks and plugs.....	Inspect jacks and plugs for snug fit and good contact.	None.

5-6. Organizational Monthly Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item to be inspected	Procedure	References
2	Transformer terminals.....	Inspect the terminals on the power transformer. All nuts must be tight. There should be no evidence of dirt or corrosion.	None.
3	Circuit boards.....	Inspect circuit boards for loose connections and cracks.	None.
4	Resistors and capacitors....	Inspect resistors and capacitors for cracks, blistering, or other detrimental defects.	None.

5-7. Organizational Quarterly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Publications.....	See that all publications are complete, serviceable, and current.	DA Pam 310-4.
2	Modifications.....	Check DA Pam 310-4 to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	TM 38-750.

5-7. Organizational Quarterly Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item to be inspected	Procedure	References
3	Spare parts.....	Check all spare parts (operator and organizational) for general condition and method of storage. There should be no evidence of overstock, and all shortages must be on valid requisitions.	Appx II.

5-8. Cleaning

Inspect the exterior of the AN/URM-127. The exterior surfaces must be free of dust, grease, and fungus.

a. Remove dust and loose dirt with a clean, soft cloth.

Warning: Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. DO NOT use near a flame. Avoid contact with the skin; wash off any that spills on your hands.

b. Remove grease, fungus, and ground-in dirt from the case and cover of the test set. Use a cloth dampened (not wet) with Cleaning Compound (FSN 7930-395-9542).

c. Remove dust or dirt from plugs and jacks with a brush.

d. Clean the front panel and control knobs with a soft, clean cloth. If dirt is difficult to remove, dampen the cloth with water; use mild soap if necessary.

5-9. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TB SIG 364.

SECTION VI
ORGANIZATIONAL MAINTENANCE

6-1. SCOPE.

a. This section provides minimum performance standards and simple organizational repair methods.

b. Due to the simplicity of design, organizational repair and field repair are almost identical in scope. For this reason, organizational repair technicians are referred to Section VI for trouble shooting and subsequent repair techniques.

c. Refer to figure 2-1 for panel markings.

6-2. PRELIMINARY INSPECTION.

a. Inspect all cables and connectors for continuity, corrosion, defective insulation and similar defects which can be visually observed.

b. Inspect all fuses and panel instrument for physical damage.

c. If the signal generator has been stored in excess of two years, perform the following pre-test procedure to assure proper operation of the power supply filter capacitor.

(1) Operate the signal generator for 30 minutes at 57.5 VAC, 60-400 cps, 1 phase input.

(2) Adjust the input to the required value using a variable transformer between the power supply and the power cable. Check voltage prior to connecting to the signal generator.

(3) Remove the variable transformer from the power cable and connect the power cable to the electrical power source.

d. With the power switch "ON", check that the POWER lamp illuminates.

e. Connect Dummy Load, Part No. DA35/U to Cable, Part No. CG405E/U and connect cable to OUTPUT connector. Adjust OUTPUT control to obtain a "10" reading on the panel voltmeter.

f. Turn FREQ METER switch ON, turn FREQ RANGE MULTIPLIER switch to "X10" and adjust vernier dial to "40" for 400 cps output or turn FREQ RANGE MULTIPLIER switch to "X1" and adjust vernier dial to "60" for 60 cps output. Check that the applicable "60" or "400" reed vibrates.

6-3. MINIMUM PERFORMANCE STANDARDS.

a. Distortion. With output frequency stepped at 20, 200, 2000 and 20,000 cps and alternate resistive loads of 500 ohms and 1000 ohms, check that distortion is less than 2% at either 10 v output or 1 v output.

b. Output Voltage Variation. With a 115 VAC, 60 cps, 1 phase input and a 5 millivolt output into a 1000 ohm load, check voltage variation between 20, 200, 2000, 20,000 and 200,000 cps signals. Variation shall not exceed 2 decibels.

c. Output Gain Control. With input at 115 VAC, 60 cps, 1 phase, set ATTENUATOR to "10 V" position, and OUTPUT CONTROL to full counterclockwise position. Within the output frequencies of 20-200, 200-2000, 2000-20,000 and 20,000-200,000 the output reading shall not exceed 300 millivolts. With OUTPUT CONTROL fully clockwise, the output should exceed 10.5 volts.

d. Attenuator and Output Accuracy. With the output set at 10 volts at the ATTENUATOR "X10" position and the output frequency stepped at 110, 1100, 11,000 and 110,000 cps check that the output voltage is 9.5 to 10.5. Set the attenuator and check voltages as follow:

Attenuator Position	Output Voltage Reading
X1	0.95 to 1.05 V
X.1	95 to 105 mV
X.01	9.5 to 10.5 mV
X.1000 uv	950 tp 1050 uv
X.100 uv	95 to 105 uv
X.10 uv	7.0 to 12.0 uv

6-4. TROUBLE SHOOTING.

a. Trouble shooting procedures are contained in Section VI.

b. Prior to attempting repair, ascertain that repair is within the capability of organizational equipment.

6-5. REPAIR

a. Repair methods within the scope of this section are restricted to fuse replacement, bulb replacement and simple cable repair.

b. Refer to Section IX for more complete repair instructions.

SECTION VII
THEORY OF OPERATION

7-1. THEORY OF OPERATION.

a. The signal generator is a solid state unit with RC bridge oscillator circuit of the double feedback Wien bridge type (fig. 1-5) an output voltmeter, a power supply and an output attenuator. These circuits and the front panel controls associated with them are shown in the block diagram, figure 1-6.

b. The RC bridge oscillator consists of an RC bridge, a two-stage amplifier, and two emitter followers in push-pull combination. The output of this circuit is a sine-wave signal which is 1) returned to the RC bridge as feedback, and 2) applied to the output attenuator.

c. The RC bridge consists of an RC frequency-selective network and a resistive voltage divider network. The RC frequency-selective network supplies positive feedback to the amplifier and determines the frequency of oscillation. The resistive voltage divider network supplies negative feedback to the amplifier.

d. The current sensitive resistor (R4) balances automatically the division ratio of the resistive voltage divider network, thereby controlling the amount of negative feedback. This system maintains the RC oscillator output at a constant level.

e. The attenuator is an "L" type attenuator which provides continuous control of the oscillator output voltage while maintaining constant output impedance.

f. Oscillator Circuit. The RC bridge in the oscillator circuit consists of an RC frequency-selective network and a resistive voltage divider network. The frequency-selective network is similar to one leg of a Wien bridge; the resistive voltage divider, the other leg.

g. As in any oscillator, an in-phase feedback voltage (from the oscillator circuit output) is necessary to maintain oscillation. The proper phase relationship at the desired frequency is maintained by the RC components in the bridge.

h. The frequency-selective network consists of a series branch, C1 and R1, and a parallel branch, C2 and R2, as shown in figure 1-5. For the frequency at which $X_C = R$ in the series and parallel branches, the positive feedback voltage to the amplifier is maximum and is in phase with the oscillator circuit output voltage (figure 1-7). Only that frequency at which $X_C = R$ will be amplified; at frequencies where X_C does not equal R, the positive feedback voltage is not of the right phase and is insufficient to sustain oscillation. Figure 1-7 shows the positive feedback curve and phase relationship for frequencies above and below the frequency where $X_C = R$.

i. The resistive voltage divider network consists of R3 and R4 which provide negative feedback voltage to maintain the oscillator circuit output at a constant level. The negative feedback developed is in part due to the resistance of R4 which is controlled by the amount of current passing through it. If the oscillator circuit output changes, the value of current flowing through R4 changes, changing its resistance and accordingly changing the negative feedback. Increasing the negative feedback results in a decrease in the net input to the amplifier and thus the output signal decreases. The oscillator output is maintained at approximately 33 volts peak-to-peak.

j. Two amplifiers, Q1 and Q2, amplify the signal and apply it to complementary emitter followers Q3 and Q4. The emitter followers are forward biased by CR1 and CR2 and under a no-signal condition are conducting slightly to minimize crossover distortion. The oscillator circuit output is coupled to the "L" type attenuator.

7-2. CONTROLS (See figure 3-1)

7-3. MONITORS (See figure 3-2).

SECTION VIII

TEST EQUIPMENT AND SPECIAL TOOLS

8-1. SPECIAL TOOLS. Not required.

8-2. TEST EQUIPMENT. (See figure 8-1.)

DESCRIPTION	GOVT TYPE	ALTERNANT	USE
Oscilloscope	AN/USM-141	ME-30/U	Calibration of signal generator
Voltmeter (±2%, vacuum tube)	ME-30/U	AN/USM-141	Alternate for oscilloscope
Frequency Meter	AN/USM-26	AN/USM-207	Read output frequencies
Multimeter, Meter	ME-26/U		Resistance and current readings
Voltmeter, Electronic	ME-20A/U		Output voltage readings
Signal Amplifier and Control Panel	AM348[a]		100:1 amplification of weak signal ranges

[a] Burton Part Number.

Figure 8-1. Test Equipment.

SECTION IX
FIELD MAINTENANCE

9-1. SCOPE.

a. This section describes performance standards and repair methods for obtaining proper performance.

b. Repair methods presume that technicians performing repair have been trained in maintenance practices, alinement and adjustment procedures on similar types of equipment.

9-2. TEST EQUIPMENT.

a. Test Equipment is listed in Section VIII.

b. Equivalent equipment may be used provided that range and accuracies are similar. Unless otherwise specified all references to control panels refer to AM348 Amplifier and Control Panel.

9-3. MINIMUM PERFORMANCE STANDARDS.

a. Figure 9-1 contains the standard factory calibration and test sheet used for initial standards.

b. Abbreviations are explained at the bottom of the figure.

c. Test sequences 1 and 8, figure 9-1 should be performed monthly using an oscilloscope to check wave form, excepting that the 100uV and 10uV portions at 110,000 cps may be deleted if a 100:1 output signal amplifier is not available. The signal is too weak for normal amplifiers. If Amplifier Part No. AM348 is available, these tests can be satisfactorily performed.

9-4. TROUBLE ANALYSIS. (See figure 9-2).

a. Figure 9-2 explains the type of operation which may be expected from most component failures.

b. Wave forms referenced within figure 9-2 will be found in figure 10-1.

9-5 DISASSEMBLY TO MAJOR COMPONENTS.

a. No special disassembly instructions are required for disassembly.

b. No special tools are required for disassembly.

9-6 ELECTRICAL VALUES

a. Electrical values at test points are as follow:

TEST POINT	VALUE
E3 to E12	47 VDC
E5 to E4	102 AC
E7 to E8	20,000 ohms ± 2 percent
E7 to E6	20,000 ohms ± 2 percent
E1 - E2	33V Peak to Peak
E3 - E4	51 VAC
E5 - E3	
C21 - Neg	60 V

b. The figure is also the complete circuit diagram for the signal generator.

9-7. TEST POINTS. (See figure 10-2)

a. Only one major test point is contained on the signal generator. This test point is the output connection (OUTPUT).

b. Twelve secondary test points are found on the generator circuit boards, identified as E1 through d E12. The wiring diagram (figure 10-2) shows these test points and proper test values. In addition, the identification is etched into the circuit board.

9-8. REPLACEMENT OF POTENTIOMETER ASSEMBLY (R1a and R1b).

a. The replacement of potentiometer assembly (R1a and R1b) in the URM/127, as in the case of all matched bridge circuits, requires the replacement of balancing resistors R1d and R1f, to achieve correct oscillation and performance of circuit.

b. The following steps depict the method of replacing the potentiometer and selection of appropriate balancing resistors R1d and R1f.

(1) Disconnect signal generator from power source.

(2) Replace defective potentiometer assembly R1a and R1b.

(3) Before connecting potentiometer assembly into circuit, measure and record the actual resistance values of R1a and R1b.

(4) Disconnect, remove and discard resistors R1f and R1d from printed circuit board.

(5) To select the resistor value required to replace R1d, use the measured value of R1a (step 3 above), refer to the resistance value chart,

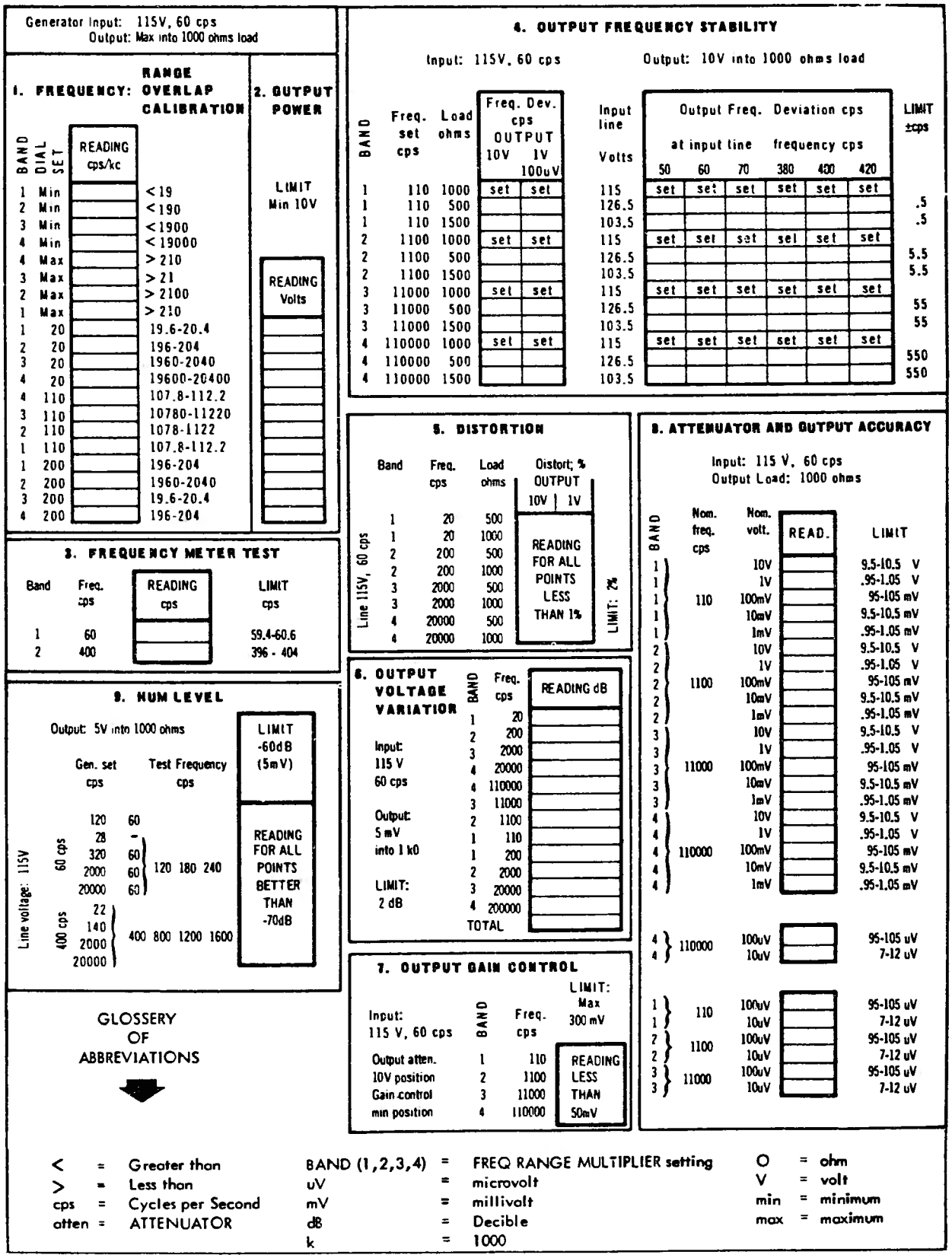

Figure 9-1. Performance Test Requirements

REFERENCE DESIGNATOR & FAILURE	WAVE FORM FIGURE REFERENCE	TROUBLE INDICATION	TEST SETTING
R8 Open		Voltage output decreases at 200 kc output and waveform is slightly distorted.	Input: 110-120 VAC - 60 cps Output frequency set for 10,000 cps Output attenuator set at X10 Output control turned fully clockwise Output voltmeter should read between 11 and 12 volts with a dummy load connected to the output
R9 Open		Output signal will appear for approximately 1 second when main frequency dial is turned rapdily ccw, otherwise no output signal is shown.	
R10 Open	7-5G	Output signal is clipped at one end.	
R11 Open		Output signal is clipped at low temperature (below 20° F). No difference at normal temperature.	
R13 Open C16 Open		Possible parasitic oscillations on slope of output signal.	
R16 Open	7-5H	Output voltage decreases to approximately 6v or output signal clipped and distorted.	
R21, R24 Open or CR7, Q6 Shorted	7-5I	Low and distorted output signal. Voltage at test points E3 and E12 = 30v.	
R22, R23, CR7 Open or Q5, Q7 Shorted	7-5J	Voltage at test points E3 and E12 = 60v. Scope connected across E3 and E12.	
R25 Open		No output signal. Voltage at test points E3 and E12 is 12v.	
R26 Open		No output signal and no dc voltage.	
R27 Open		No pilot light.	
R28 Open		No output voltage, or output voltage will not adjust to zero.	
R29 Open R30 Open		Output signal normal. No output meter indication.	
R31 thru R42 Open		Output voltage in one or more attenuator switch positions incorrect.	
CR1 or CR2 Open		No output signal. Voltage at test points E3 and E12 is 20v. Q3 will get hot.	
CR1 or CR2 Shorted		Slight increase in distortion.	
Shorted or Open CR3, CR4, CR5, CR6		Indication on output meter is approximately half voltage	
CR8 Shorted		Low output signal or motorboating (oscillating) signal. Voltage at test points E3 and E12 approximately 12 vdc.	
F1 or F2 Blown		No pilot light and no output voltage.	
R1A, R1B, R1C, R1D, R1E, R1F Open		No output signal.	
R4, R5 Open		No output signal.	

Figure 9-2. Trouble Shooting (Sheet 1 of 2)

REFERENCE DESIGNATOR & FAILURE	WAVE FORM FIGURE REFERENCE	TROUBLE INDICATION	TEST SETTING
R6 Open		No output signal.	Input: 110-120 VAC - 60 cps Output frequency set for 10,000 cps Output attenuator set at X10 Output control turned fully clockwise Output voltmeter should read between 11 and 12 volts with a dummy load connected to the output
R12 Open		No output signal.	
L1 Open		No output signal.	
R14 Open		No output signal.	
R18 Open		No output signal.	
R19 Open		No output signal.	
R20 Open		No output signal.	
R28 Open		No output signal.	
Q1 Shorted		No output signal.	
C15 Shorted		No output signal.	
C17 Shorted		No output signal.	
C18 Shorted		No output signal.	
C19 Shorted		No output signal.	
R2 or R3 Open	7-5F	Square wave output signal.	
Glass Cracked R4 or R5	7-5D	Output signal clipped and output voltage over 12v.	
R7 Open R15 Open R17 Open		Turn AC power switch on. Output signal will appear for approximately 0.2 second on the oscilloscope connected across the output.	
CR9 or CR10 Open	7-5K	Increased ripple on output signal.	
Q2 Shorted	7-5G	Output signal clipped.	
Q3 Shorted		Output signal motorboating. Low DC voltage (approximately 20v) across E3 and E12.	
Q4 Shorted		Low DC voltage (approximately 20v across E3 and E12).	
Shorted or Open C1 thru C13		Either no output signal or signal distorted on respective range. Incorrect frequency.	
C15 Open C17 Open	7-5E	Low output voltage (approximatsly 8v) and output signal clipped.	
C18 Open	7-5C	Output meter motorboating.	
C20 Shorted	7-5L	Low DC voltage (approximately 25v) across E3 and E12. Output signal distorted.	
C21 Shorted		F1 and F2 blown.	
C21 Open	7-5B	Output signal clipped with oscillations.	
C22 Shorted		DC voltage of (approximately 20v) appears across the output connector, when generator is set for 10v output signal.	

Figure 9-2. Trouble Shooting (Sheet 2 of 2)

figure 9-3). and read the corresponding total required value of R1c and R1d.

Example: The corresponding total required value for a potentiometer reading 19960 ohms, would be 1858 ohms.

(6) Measure the actual value of R1c (in circuit) and subtract value from required R1c + R1d value read on Resistance Value Chart (step 5 above), to determine correct value of R1d. The difference will be the replacement value of resistor R1d.

(7) Select the closest value available for R1d, and replace same in circuit.

(8) Repeat steps 5, 6, and 7 for resistor R1f.

(9) Connect potentiometer assembly R1a and R1b in circuit, and readjust signal generator in accordance with procedures outlined in steps

(10) The following is an example of a typical resistor selection:

Measured value of "R1a" . . . . . 19870 ohms
Measured value of "R1c" . . . . . 1788 ohms

The closest value of "R1a"
from Fig. 9-3... . . . . 19880 ohms
Corresponding value of "R1c + R1d"
from Fig. 9-3.... . . . . 1851 ohms

The difference (R1d):
(R1c + R1d)-R1c = 1851-1788=63 ohms
The closest standard value for "R1d" . . 68 ohms

POTENTIOMETER	RESISTANCE
R1a or R1b	R1c+R1d or R1e+R1f
OHMS	OHMS
19600	1825
19640	1828
19680	1832
19720	1836
19760	1840
19800	1843
19840	1847
19880	1851
19920	1855
19960	1858
20000	1862
20040	1866
20080	1869
20120	1873
20160	1877
20200	1881
20240	1884
20280	1888
20320	1892
20360	1896
20400	1899

Figure 9-3. Resistance Values

9-9. D.C. POWER SUPPLY ADJUSTMENT.

a. Check if the fuses (.25 AMP) are in the fuse holders of the generator.

b. Connect d.c. voltmeter to points E3(Plus) and E12(Minus).

c. Connect a.c. voltmeter to power cable.

d. Connect the generator power cord to the output of a variable transformer.

e. Turn on the generator power switch.

f. Increase slowly AC voltage and read both DC and AC voltmeters on control panel.

g. When AC voltmeter reads 115V, adjust potentiometer R21 on printed circuit board until DC voltmeter reads 47V.

h. Change AC input from 115V to 126.5V and down to 103.5V. The reading on DC voltmeter should remain constant within approximately 1 volt.

9-10. OUTPUT VOLTAGE ADJUSTMENT.

a. Connect generator output to oscilloscope and AC voltmeter.

b. Set oscilloscope on 10V/CM division and AC voltmeter on 30 V range.

c. Set generator "FREQUENCY RANGE MULTIPLIER" on X100 position.

d. Set generator "OUTPUT CONTROL" to maximum C.W. position.

e. Set generator "ATTENUATOR" to X10 position.

f. Adjust R2 to read 11.5V on AC voltmeter.

g. Check the wave shape on the oscilloscope. The wave should be sinusoidal without any visible clipping or other distortion.

h. Adjust R29 to read 11.5V on generator panel output meter.

9-11. FREQUENCY ADJUSTMENT.

a. Preliminary and 2000-20000 CPS Range Adjustment.

(1) Connect frequency counter to the generator output.

(2) Turn the main frequency adjust potentiometer shaft to maximum CCW position without dial.

(3) Adjust trimmer C11 until the output frequency is 21400 to 21500 CPS.

(4) Turn slowly potentiometer shaft CW until the frequency is as close as possible to 20000 CPS.

(5) Mount the frequency dial on the potentiometer shaft in the position which reads 200 on the dial.

(6) Turn frequency dial to 20 and read the output frequency which should be well within 1960 to 2040 CPS.

(7) Turn frequency dial to 110 and read the output frequency which should be well within 10780 to 11220 CPS.

(8) Check similarly position 40(3920-4080 CPS limits) and position 60(5880-6120 CPS limits).

(9) Check maximum CW frequency dial position. The frequency should be less than 1900 CPS.

NOTE

If after adjusting the error of the frequency dial exceeds ±2%, it might be necessary to shift the frequency range by changing slightly the dial position versus the potentiometer shaft.

b. 20000-200000 Range Adjustment.

(1) Set "FREQUENCY RANGE MULTIPLIER" to X1000 position.

(2) Check trimmer C14. It should be in half-open position.

(3) Set frequency dial to 20.

(4) Adjust trimmers C5 and C13 to get output frequency as close as possible to 20,000 CPS.

(5) If the output voltage indicated by the panel meter (output control potentiometer should be still in maximum CW position) is lower than 11.5V, increase capacitance of C5 and decrease capacitance of C13 until output frequency is 20,000 CPS again. Above manipulation should be repeated until the proper frequency and output voltage is achieved.

(6) Set frequency dial to 200. Check the frequency on the counter. If the frequency is not 200,000 CPS, adjust trimmer C14 until counter reads as closely as possible to 200,000 CPS.

(7) Set frequency dial back to 20 and read the counter. If there is any significant difference, re-adjust slightly C5 or C13 and repeat adjustment described in step 6.

c. 200-2000 CPS Range Adjustment.

(1) Set "FREQUENCY RANGE MULTIPLIER" to X10 position.

(2) Set frequency dial to 200 and read the output frequency, it should be between 1960 and 2040 CPS.

(3) Set frequency dial to 20 and read the counter. The frequency should be between 196 and 204 CPS.

(4) Set frequency dial on 110 and check the output. It should be within 1078 and 1122 CPS.

(5) If necessary test another listed value for C9 to balance frequency error on both ends of the range.

(6) Replace C9 capacitor on the printed circuit board if required.

d. 20-200 CPS Range Adjustment.

(1) Set "FREQUENCY RANGE MULTIPLIER" to X1 position.

(2) Set frequency dial to 200 and read the output frequency, it should be between 196 and 204 CPS.

(3) Set frequency dial to 20 and read the counter. The frequency should be between 19.6 and 20.4 CPS.

(4) Set frequency dial on 110 and check the output frequency. It should be within 107.8 and 112.2 CPS.

(5) If necessary, test another listed value for C7 to balance frequency error on both ends of the range.

(6) Replace C7 capacitor on the printed circuit board if required.

9-12 WAVE SHAPE. Check the wave shape on the oscilloscope for at least one point for all positions of "FREQUENCY RANGE MULTIPLIER". The wave should be sinusoidal and should not have any visible distortions.

9-13 FREQUENCY METER TEST.

a. Turn on the frequency meter switch on the panel.

b. Adjust the output frequency to 60 CPS until generator frequency meter responds as indicated by the counter.

c. The output frequency should be within 59.4 and 60.6 CPS.

d. Adjust the output frequency to 400 CPS until generator frequency meter responds.

e. The output frequency as indicated by the counter should be within 396 and 404 CPS.

9-14 ATTENUATOR TEST.

a. Connect the generator output to AM348 amplifier and vtvm through a 1000 ohm dummy load.

b. Turn the "ATTENUATOR" switch on the control panel to "X10" position.

c. Set multimeter to 10V position.

d. Set the generator frequency to 110KC.

e. Adjust the generator output to 10V. Multimeter should indicate 10V within ± 5%.

f. Set the attenuator to "X1" and correct if necessary the "OUTPUT CONTROL" to obtain 1V reading on the generator output meter.

Set multimeter switch to 1V position. The reading should indicate 1V ± 5%.

Repeat steps f and g correspondingly for attenuator settings of: X. 1, x.01 and X1000. The output voltage should stay within ± 5%.

i. Leave generator set for 110 KC and 1MV output (position x 1000).

j. Set multimeter to .1V position.

k. Turn the "METER" switch on control panel to X100(110KC).

l. The generator frequency may be adjusted slightly to obtain maximum reading on the multimeter. Adjust "CALIBRATE" potentiometer on control panel until multimeter indicates exactly .1V.

NOTE

The above procedure calibrates the "110KC" amplifier to an exact one-hundred amplification.

m. Change ATTENUATOR switch to X10 uV and multimeter to .01V. Multimeter should indicate .01V ± 5%.

n. Change ATTENUATOR switch to X10 uV and multimeter to .003V. Multimeter reading should be within .7 and 1.2 MV.

NOTE

Steps 9-14 i thru n must be performed with AM348 amplifier.

SECTION X

DIAGRAMS

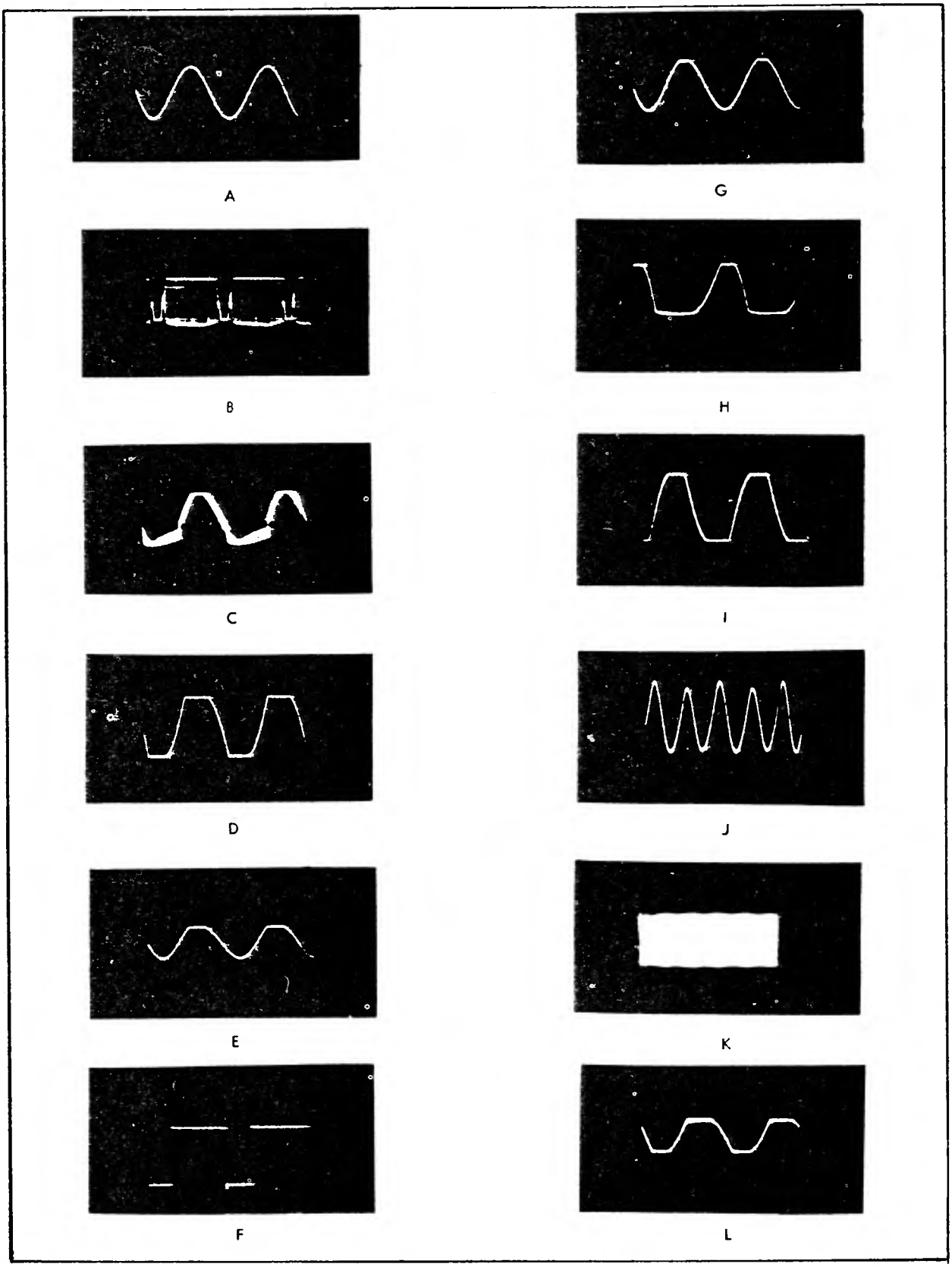

Figure 10-1. Wave Forms

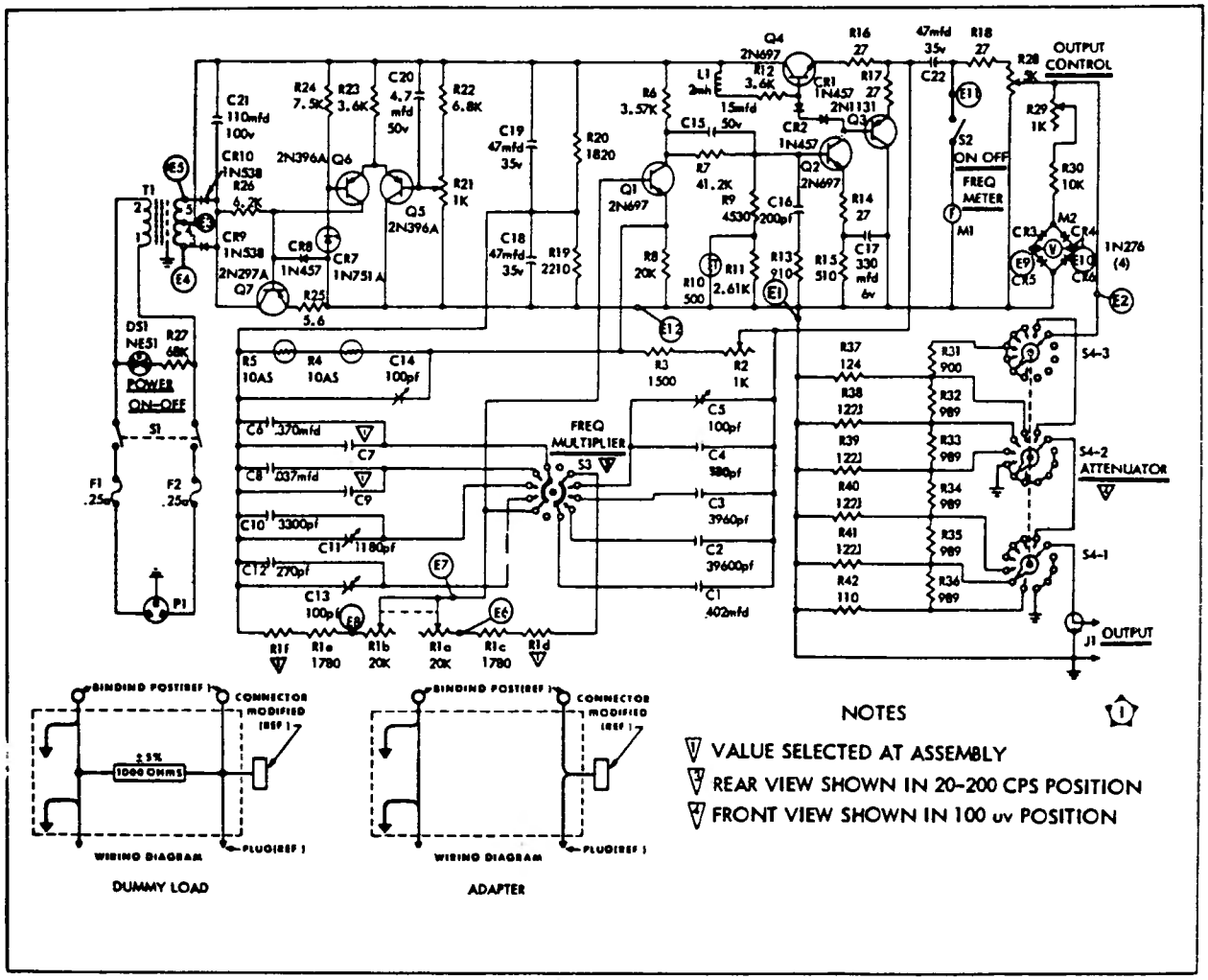

Figure 10-1. Wiring Diagram

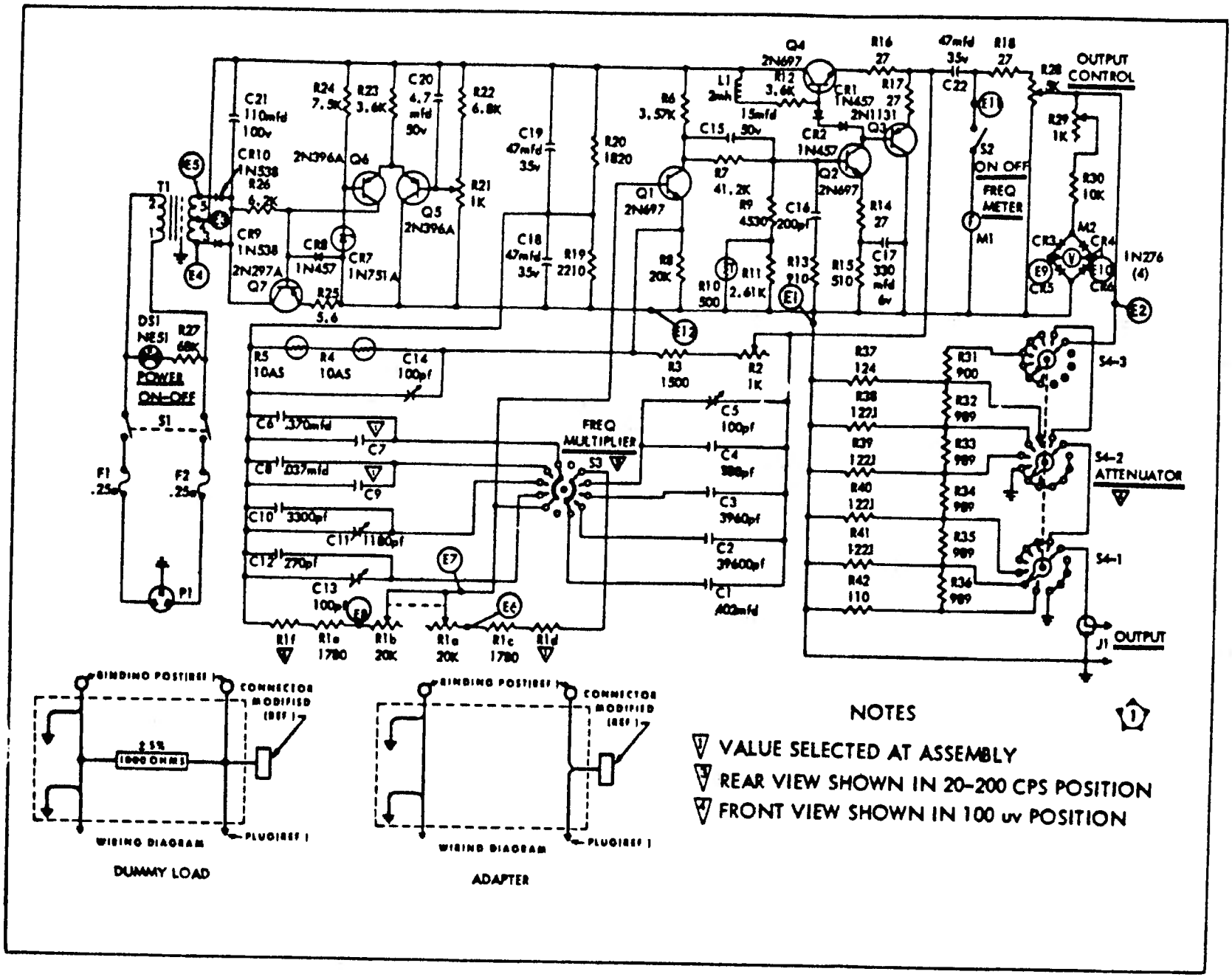

Figure 10-1. Wiring Diagram

APPENDIX I

REFERENCES

Following is a list of references that are available to the operator and organizational, DS, GS, and depot maintenance repairman of Signal Generator AN/URM-127.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TB SIG 364	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 38-750	Army Equipment Record Procedures.

APPENDIX II

BASIC ISSUE ITEMS

Section I. INTRODUCTION

A2-1. General

This appendix lists items for Signal Generator AN/URM-127, the component items comprising it, and the items which accompany it, or are required for installation, operation, or operator's maintenance.

A2-2. Explanation of Columns

An explanation of the columns in section II is given below.

a. Source, Maintenance, and Recoverability Codes, Column 1. Not used.

b. Federal Stock Number, Column 2. The Federal stock number for the item is indicated in this column.

c. Description, Column 3. The Federal item name, a five-digit manufacturer's code, and part number are included in this column.

d. Unit of Issue, Column 4. The unit used as a basis of issue (e.g. ea, pr, ft, yd, etc) is noted in this column.

e. Quantity Incorporated in Unit Pack, Column 5. Not used.

f. Quantity Incorporated in Unit, Column 6. The total quantity of the item used in the equipment is given in this column.

g. Quantity Authorized, Column 7. The total quantity of an item required to be on hand and necessary for the operation and maintenance of the equipment is given in this column.

h. Illustration, Column 8.

(1) Figure number, column 8a. Not used.

(2) Item or symbol number, column 8b. The callout number used to reference the item in the illustration appears in this column.

A2-3. Federal Supply Codes

This paragraph lists the Federal supply code with the associated manufacturer's name.

Code	Manufacturer
58854	Sylvania Electric Products Inc
81349	Military Specifications
81920	Burton Mfg Co

SECTION II. BASIC ISSUE ITEMS LIST

(1) SOURCE CD (a)	MAINT.CD (b)	REC. CODE (c)	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UNIT PACK	(6) QTY INC IN UNIT	(7) QTY AUTH	(8) ILLUSTRATIONS (A) FIGURE NUMBER	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
			6625-783-5965							GENERATOR, SIGNAL AN/URM-127						
			ORD THRU AGC							TECHNICAL MANUAL TM 11-6625-683-15	ea			1		
										NOTE: For technical manuals the quantity indicates the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply centers through AG channels.						
										GENERATOR, SIGNAL SG-377/URM-127	ea		1	1		
			5935-549-1159							ADAPTER, CONNECTOR UG-514/U	ea		1	1		
			5995-681-8401							CABLE ASSEMBLY CG-409E/U	ea		1	1		
										CABLE ASSEMBLY: 81349; MS21993-2	ea		1	1		
			5985-224-5419							DUMMY LOAD, ELECTRICAL DA-35/U	ea		1	1		
			7510-802-9469							ENVELOPE, TRANSPARENT: 81920; 2000-181	ea		1	1		
			5920-043-2641							FUSE, CARTRIDGE: 81349; F02A250V1/4A	ea		2	5		F1, F2
			6240-782-5605							LAMP, INCANDESCENT: 58854; 10AS	ea		2	1		
			6240-223-9100							LAMP, NEON: 81349; NE-51	ea		1	1		DS1
										The following items, and their quantities, are mounted in or on equipment listed for storage purposes						
										GENERATOR, SIGNAL SG-377/URM-127						
			5935-549-1159							ADAPTER, CONNECTOR: 1						
			5995-681-8401							CABLE ASSEMBLY: 1						
										CABLE ASSEMBLY: 1						

(1) SOURCE CD (a)	(1) MAINT. CD (b)	(1) REC. CODE (c)	BASIC ISSUE ITEMS LIST (2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UNIT PACK	(6) QTY INC IN UNIT	(7) QTY AUTH	(8) ILLUSTRATIONS (A) FIGURE NUMBER	(B) ITEM OR SYMBOL NUMBER
										AN/URM-127						
			5985-224-5419							DUMMY LOAD, ELECTRICAL: 1						
			5920-043-2614							FUSE, CARTRIDGE: 2						

APPENDIX III

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

A3-1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature for Signal Generator AN/URM-127. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

A3-2. Explanation of Format for Maintenance Allocation Chart

a. Group Number. Group numbers correspond to the reference designation prefix assigned in accordance with ASA Y32.16, Electrical and Electronics Reference Designations. They indicate the relation of listed items to the next higher assembly.

b. Component Assembly Nomenclature. This column lists the item names of component units, assemblies, subassemblies, and modules on which maintenance is authorized.

c. Maintenance Function. This column indicates the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform that function at higher categories. The codes used represent the various maintenance categories as follows:

Code	Maintenance Category
C	Operator/Crew
O	Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

d. Tools and Equipment. The numbers appearing in this column refer to specific tools and equipment which are identified by these numbers in section III.

e. Remarks. Self explanatory.

A3-3. Explanation of Format for Tool and Test Equipment Requirements

The columns in the tool and test equipment requirements chart are as follows:

a. Tools and Equipment. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool for the maintenance function.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.

c. Nomenclature. This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

d. Federal Stock Number. This column lists the Federal stock number.

e. Tool Number. Not used.

SECTION II. MAINTENANCE ALLOCATION CHART

MAINTENANCE ALLOCATION CHART

GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	GENERATOR, SIGNAL AN/URM-127	O	O H	O						O H		D	7 7 1 thru 6 1 thru 6	Visual only
	GENERATOR, SIGNAL SG-377/URM-127	O	O H	O						O H		D		
	CORD									H				

TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
		AN/URM-127 (continued)		
1	H,D	ANALYZER, SPECTRUM TS-723/U	6625-668-9418	
2	H,D	FREQUENCY METER AN/USM-207	6625-911-6368	
3	H,D	MULTIMETER TS-352/U	6625-242-5023	
4	H,D	TEST SET, TRANSISTOR TS-1836/U	6625-893-2628	
5	H,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G	5180-605-0079	
6	H,D	VOLTMETER, ELECTRONIC ME-30/U	6625-669-0742	
7	O	TOOLS AND TEST EQUIPMENT AVAILABLE TO THE ORGANIZATIONAL REPAIRMAN BECAUSE OF HIS ASSIGNED MISSION		