TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND

GENERAL SUPPORT MAINTENANCE MANUAL

INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

# TEST SET, RADIO FREQUENCY POWER AN/URM-182

**(NSN 6625-00-148-9371)**

HEADQUARTERS, DEPARTMENT OF THE ARMY

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HEADQUARTERS
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**General Support Maintenance Manual**

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# TEST SET, RADIO FREQUENCY POWER AN/URM-182

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**Current as of 9 May 1975**

## LIST OF ILLUSTRATIONS



## LIST OF TABLES

# CHAPTER 1

# INTRODUCTION

## Section I. GENERAL

### 1-1. Scope

*a.* This technical manual is provided to help you operate and maintain Test Set, Radio Frequency Power AN/URM-182 (test set) (fig. 1-1). The manual describes the test set, lists its capabilities and limitations, provides information regarding installation, operation, maintenance, and repair, and helps you isolate and correct troubles.

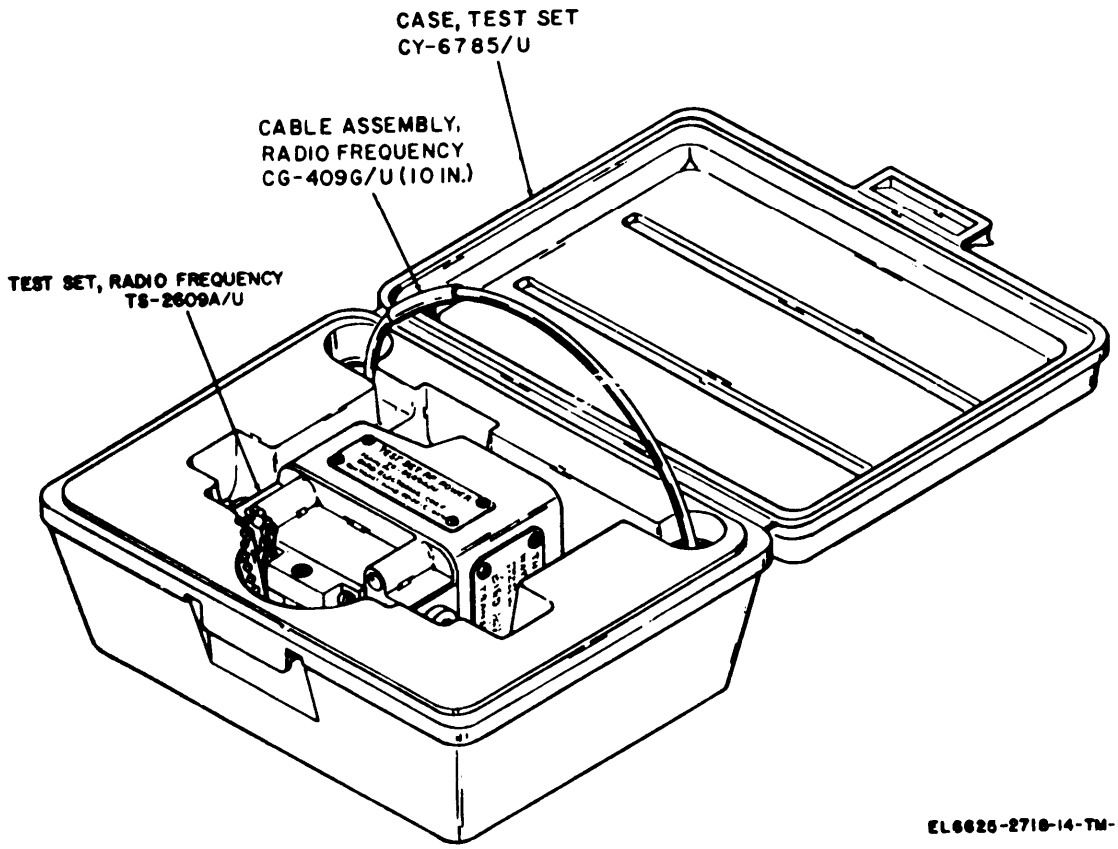


*Figure 1-1. Test Set, Radio Frequency Power AN/URM-182.*

*b.* This manual contains instructions which cover operator maintenance, organizational maintenance, and direct support and general support maintenance (appendix B). Appendix C contains a maintenance allocation chart (MAC) which prescribes the maintenance functions that are allocated to each category of maintenance. You must check the MAC before performing maintenance functions to insure that the tasks are in line with the capabilities at your category of maintenance. Refer troubles that are relegated to higher categories of maintenance levels to the required category.

### 1-2. Indexes of Publications

*a. DA Pam 310-4.* 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.

*b. DA Pam 310-7.* Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

### 1-3. Forms and Records

*a. Reports of Maintenance and Unsatisfactory Equipment.* Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

*b. Report of Packaging and Handling Deficiencies.* Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DSAR 4145.8.

*c. Discrepancy in Shipment Report (DISREP) (SF 361).* Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33A/AFM 75-18/MCO P4610.19B, and DSAR 4500.15.

### 1-4. Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to: Commander, US Army Electronics Command, ATTN: AMSEL-MA-Q, Fort Monmouth, NJ 07703.

### 1-5. Equipment Serviceability Criteria

This equipment is not covered by an ESC.

### 1-6. Destruction of Army Materiel to Prevent Enemy Use

Refer to TM 750-244-2 for instructions regarding the destruction of this equipment if necessary to prevent enemy use.

### 1-7. Administrative Storage

Before placing this unit in storage, you must refer to TM 740-90-1, Administrative Storage, for the required storage instructions.

## Section II. DESCRIPTION AND DATA

### 1-8. Purpose and Use

*a.* Test Set, Radio Frequency Power AN/URM-182 consists of Test Set, Radio Frequency TS-2609A/U; Cable Assembly, Radio Frequency CG-409G/U; and Case, Test Set CY-6785/U, as shown in figure 1-1.

*b.* Test Set, Radio Frequency TS-2609A/U is a directional wattmeter which measures and monitors radio frequency (rf) power and load match on 50-ohm impedance coaxial lines. It is normally connected between a transmitter and an antenna. The TS-2609A/U measures either forward or reflected power of rf transmission in ranges of 0 to 10 or 0 to 100 watts. The range is selected by use of a selector switch on the front panel. The TS-2609A/U has a rated frequency range of 30 to 76 megahertz (MHz). It is designed primarily for rugged field use on mobile, airborne, or pack-carried transmitters and transceivers.

### 1-9. Description

*a.* Test Set, Radio Frequency TS-2609A/U is a portable device encased in a two-section aluminum housing provided with a screw-type clamping device. The two sections of the case are secured together with sealed screws. The upper section houses the meter and switch. The lower section is the line section which mounts the sensing elements and the sensing circuit components. The sealed meter has two scales, one for each power range. The unit has quick-change type BNC female connectors at each end to provide interconnection with related components.

*b.* Cable Assembly, Radio Frequency CG-409G/U (10 in.) is a 10-inch long cable fitted with a quick change male BNC connector at each end. This cable normally provides the interconnection between the transmitter and the test set.

*c.* Case, Test Set CY-6785/U is a molded plastic case designed to house and protect the test set during transit. It contains a fitted plastic insert into which the test set seats to prevent it from shifting in the case during transit. The insert contains two holes for insertion of the ends of the cable to secure it during movement.

### 1-10. Differences Between Models

This manual covers only model AN/URM-182. No known differences exist in models manufactured under this number.

### 1-11. Tabulated Data

| | |
|---|---|
| Measuring medium | Rf transmission in W-ohm coaxial systems |
| Rf power ranges (forward and reflected): | |
| Low range | 0 to 10 watts |
| High range | 0 to 100 watts |
| Frequency range | 30 to 76 MHz |
| Swr standing wave ratio (voltage) | 1.1:1 maximum |
| Accuracy: | |
| At 77° F | ±5 percent of full scale |
| From –40° F to +125° F (100 watts) | ±10 percent of full scale |
| From –40° F to +140° F (10 watts) | ±15 percent of full scale |
| Insertion loss | 0.2 dB maximum |
| Dimensions and weight (AN/URM-182): | |
| Dimensions | 7½ in. l x 6 in. w x 3 1/8 in. h |

Weight . . . . . .34 oz
Dimensions and weight (TS-2609A/U only):
Dimensions . . . . . ..4-5/8 in. h x 2-1/8 in. w x 3¾ in. d
Weight . . . . . .22 oz
Line connectors . . . . . 2 female BNC
Finish:
Case, Test Set CY-6785/U . . . . . Olive drab
Test Set, Radio Frequency TS-2609A/U . . . . . Olive drab

**1-12. Items Comprising an Operable Equipment**

Test Set, Radio Frequency TS-2609A/U and Cable Assembly, Radio Frequency CG-409G/U (10 in.) comprise an operable equipment.

# CHAPTER 2

# INSTALLATION AND OPERATING INSTRUCTIONS

## Section I. SERVICE UPON RECEIPT AND INSTALLATION

### 2-1. Site and Shelter Requirements

The test set is a small, portable device which is normally connected and attached directly to a radio frequency transmitter during use. It is powered by transmitter output and needs no other source of power. When not in use, it is normally kept in its carrying case and stored in an electronics repair shop. As a result, siting and shelter of the unit present no problems.

### 2-2. Unpacking

The test set is packed with conventional packing precautions to minimize the danger of damage during shipment. When you unpack the test set, take care not to pierce the container with any sharp instruments.

### 2-3. Checking Unpacked Equipment

*a.* Inspect the equipment for damage incurred during shipment. If you notice any damage, report the damage on DD Form 6 (para 1-3).

*b.* Check the equipment against the list of items comprising an operable equipment (para 1-12) and against the packing slip to see if the shipment is complete. Report all discrepancies found in accordance with the instructions given in TM 38-750. You may place the equipment in service even though a minor assembly or part that does not affect proper functioning is missing.

*c.* Check to see whether the equipment has been modified. (Equipment which has been modified will have the MWO number near the nomenclature plate.) Check also to see whether all currently applicable MWO's have been applied. (Current MWO's applicable to the equipment are listed in Da Pam 310-7.)

### 2-4. Installation

The test set is shipped assembled and requires no special maintenance, special tools, or procedures for installation. It requires neither external sources of power nor special mountings. Interconnections are made with other equipment as part of the operating procedure. No installation adjustments are required.

## Section II. CONTROLS AND INSTRUMENTS

### 2-5. Damage from Improper Settings

The test set is designed to check the output of rf transmitters, and it provides two forward and two reflected output ranges. The selector switch is normally detented in either the 100 FWD or 100 RFL position. Before selecting either of the related 10 watt ranges, check the wattage output on the meter of the test set. If the meter indicates less than 10 watts on the 0 to 100 scale, the selector switch can safely be turned to the 10 watt range. If the meter indication is greater than 10 watts, do not turn the selector switch to the 10 watt range or it may cause damage due to overload.

**WARNING**

You must reenergize the transmitter under test before connecting or disconnecting the test set.

### 2-8. Operator's Controls

Test set controls are listed and their functions are described in table 2-1. The controls are illustrated in figure 2-1.

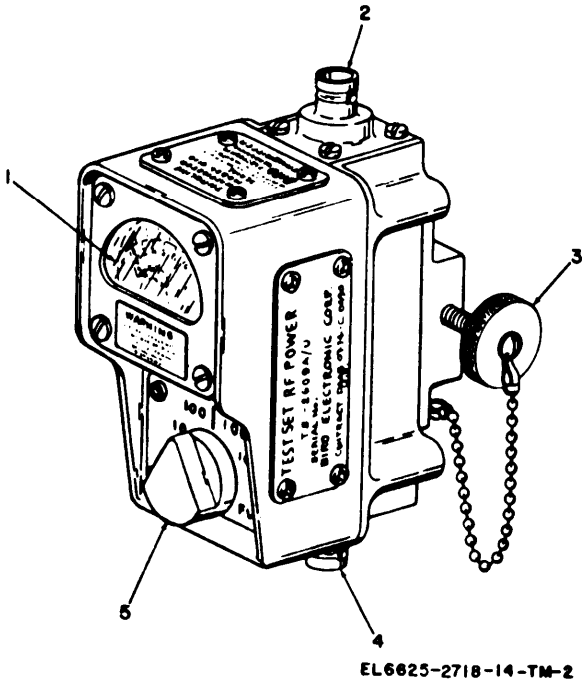


*Figure 2-1. Operator's controls.*

*Table 2-1. Operator's Controls*

| *Fig. 2-1 Item No.* | *Control indicator, or connector* | *Function* |
|---|---|---|
| 1 | Meter | Indicates power measured by the test set. The dual scale indications are 0 to 100 watts and 0 to 10 watts. The upper scale corresponds to the 100 watt selector switch setting. The lower scale corresponds to the 10 watt selector switch setting. |
| 2 | Transmitter connector (female BNC). | Provides a connection through which transmitter power is applied to the test set. The connector mates with connectors supplied on Cable Assembly CG-409G/U. |
| 3 | Clamping screw | Provides a method of attaching and removing test set from mounting on related equipment. |
| 4 | Antenna cable connector (female BNC). | Provides a connection through which transmitter output is applied to the antenna. |
| 5 | Selector switch | Determines the power level and direction indicated by the meter. When the switch pointer is set to the left, toward RFL, the meter will indicate reflected power. When the switch pointer is set to the right, toward FWD, the meter will indicate forward power. When the switch pointer is in the 100 position, the meter will indicate in the 0 to 100-watt range. When the switch pointer is moved to and held in the 10 position, the meter will indicate in the 0 to 10 watt range. When released, the switch will automatically return to the 0 to 100-watt range. |

## Section III. OPERATION UNDER USUAL CONDITIONS

### 2-7. Installation of Test Set on Rf Transmitter

**WARNING**

The transmitter must be deenergized before connecting the TS-2609A/U to transmitter output.

Remove the TS-2609A/U and Cable Assembly, Radio Frequency CG-409G/U from Case, Test Set CY-6785/U and install them as follows:

*a.* Reenergize the transmitter.

**NOTE**

If an antenna is not available during performance of the test, use a dummy load (Dummy Load, Electrical DA-75/U, or equivalent) in its place.

**CAUTION**

Although the TS-2609A/U is ruggedly constructed, unnecessarily rough handling, dropping, or severe impact can damage the delicate mechanism of the meter. Be careful when handling the TS-2609A/U. Do not use the TS-2609A/U to test equipment which has a power output higher than 100 watts. Use it only to test rf power in the 30 to 76 MHz frequency range.

*b.* Position the TS-2069A/U so that the groove in the clamping block engages the rack handle attached to the transmitter front panel as shown in figure 2-2. Choose the rack handle, left or right, that permits the Cable Assembly, RF CG-409G/U to interconnect the antenna rf output jack on the transmitter and the transmitter connector on the test set. Tighten the thumbscrew on the clamping block to secure the TS-2609A/U to the rack handle.

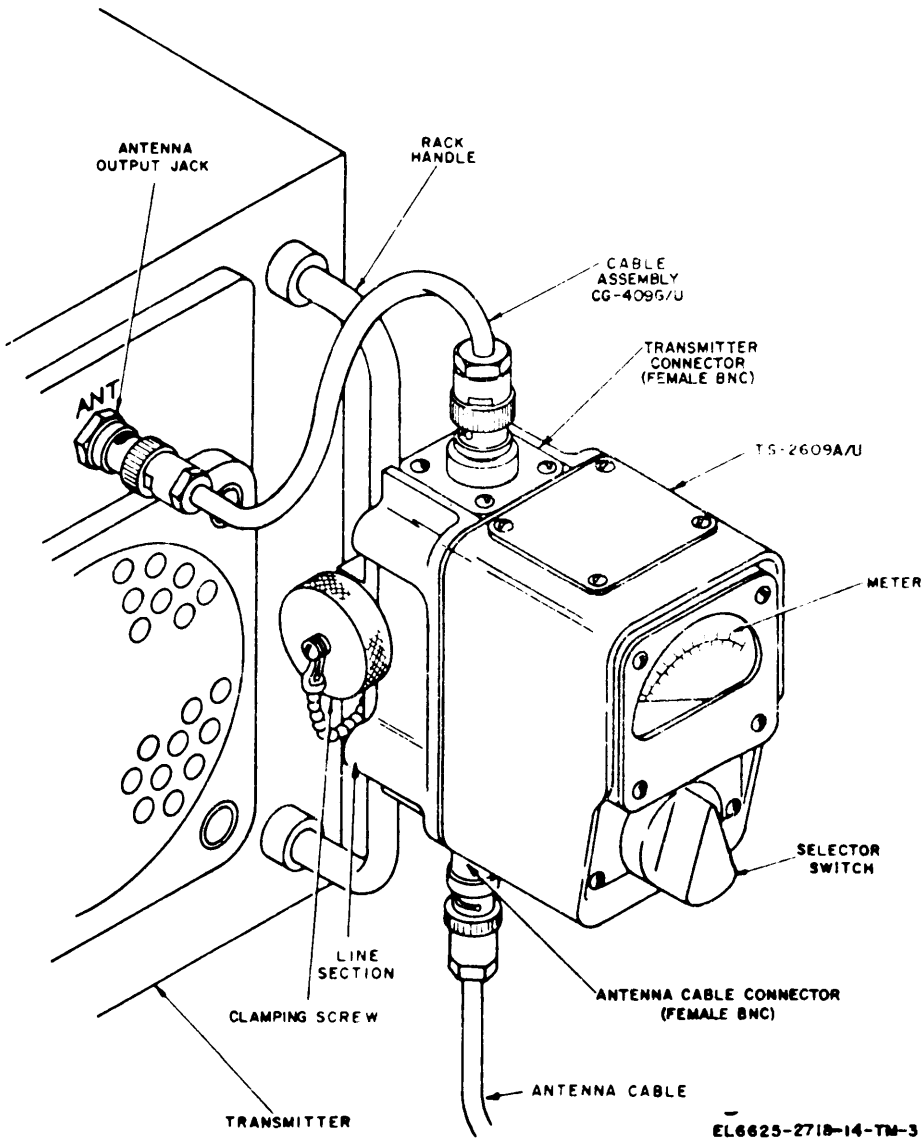


*Figure 2-2. Test Set, Radio Frequency TS-2609A/U mounted on typical transmitter.*

*c.* Disconnect the antenna cable from the transmitter antenna (ANT) output jack (female BNC type). Use Cable CG-409G/U to interconnect the ANT output jack and the transmitter connector.

*d.* Connect the antenna cable that was disconnected from the transmitter to the antenna cable connector (female BNC type) at the bottom of the TS-2609A/U.

*e.* Energize the transmitter.

**2-8. Types of Operation**

*a.* The TS-2609A/U provides different types of information about the signal being transmitted. The same installation setup is used for each type of operation.

*b.* The following are the most usual types of operation for the TS-2609A/U:

(1) Determining load power (para 2-9).

(2) Measuring and monitoring transmitter power (para 2-10).

(3) Measuring and monitoring reflected power (para 2-11).

(4) Determining standing wave ratio (swr) (para 2-12).

**2-9. Determining Load Power.**

**WARNING**

The transmitter must be deenergized before the TS-2609A/U is connected.

When the TS-2609A/U is connected to the transmitter (para 2-7), the load power can be determined as follows:

*a.* Position the selector switch (5, fig. 2-1) in the 100 FWD position and check the indication on the meter 0 to 100 scale. If the transmitter rf output is less than 100 watts, as indicated by the meter, set and hold the selector switch in the 10 FWD position to take the reading. The meter indication is the forward power output of the transmitter. When released, the selector switch automatically returns to the 100 FWD position.

*b.* Position the selector switch in the 100 RFL position and check the indication on the meter 0 to 100 scale. If the meter indicates less than 10 watts reflected power, rotate and hold the selector switch in the 10 RFL position to take the reading. The meter indication is the reflected power. When released, the switch automatically returns to the 100 RFL position.

*c.* To determine the power dissipated in the load, subtract the reflected power from the forward power reading as follows:

Watts (load) = Watts (forward) – Watts (reflected).

Example: 8 watts (load) = 10 watts (forward) — 2 watts (reflected).

*d.* The reflected power varies, depending on the load. Where appreciable power is reflected, as with a mismatched antenna, the subtraction of reflected power is necessary to obtain radiated or dissipated power readings; however, this step may be unnecessary when the load is closely matched to the transmitter because the reflected power becomes negligible.

**NOTE**

If the forward and reflected power readings are alike, there is an opening in the transmission line beyond the TS-2609A/U.

**2-10. Measuring and Monitoring Transmitter Power**

With the selector switch in the 100 FWD position, the TS-2609A/U will continuously indicate transmitter output. This mode of operation can be used to detect intermittent transmitter troubles which will be indicated by inconsistent meter indications.

**NOTE**

If an antenna is not available, use Dummy Load, Electrical DA-75/U for the load.

**2-11. Measuring and Monitoring Reflected Power**

With the selector switch in the 100 RFL position, the TS-2609A/U will continuously indicate the power reflected from the load. Intermittent line or antenna faults are indicated by inconsistent meter indications.

**2-12. Determining Voltage Standing Wave Ratio**

*a.* The TS-2609A/U is designed to provide forward and reflected power readings in watts. To convert these power readings to standing wave ratio (voltage swr) readings, use the graphs provided in figures 2-3 and 2-4.

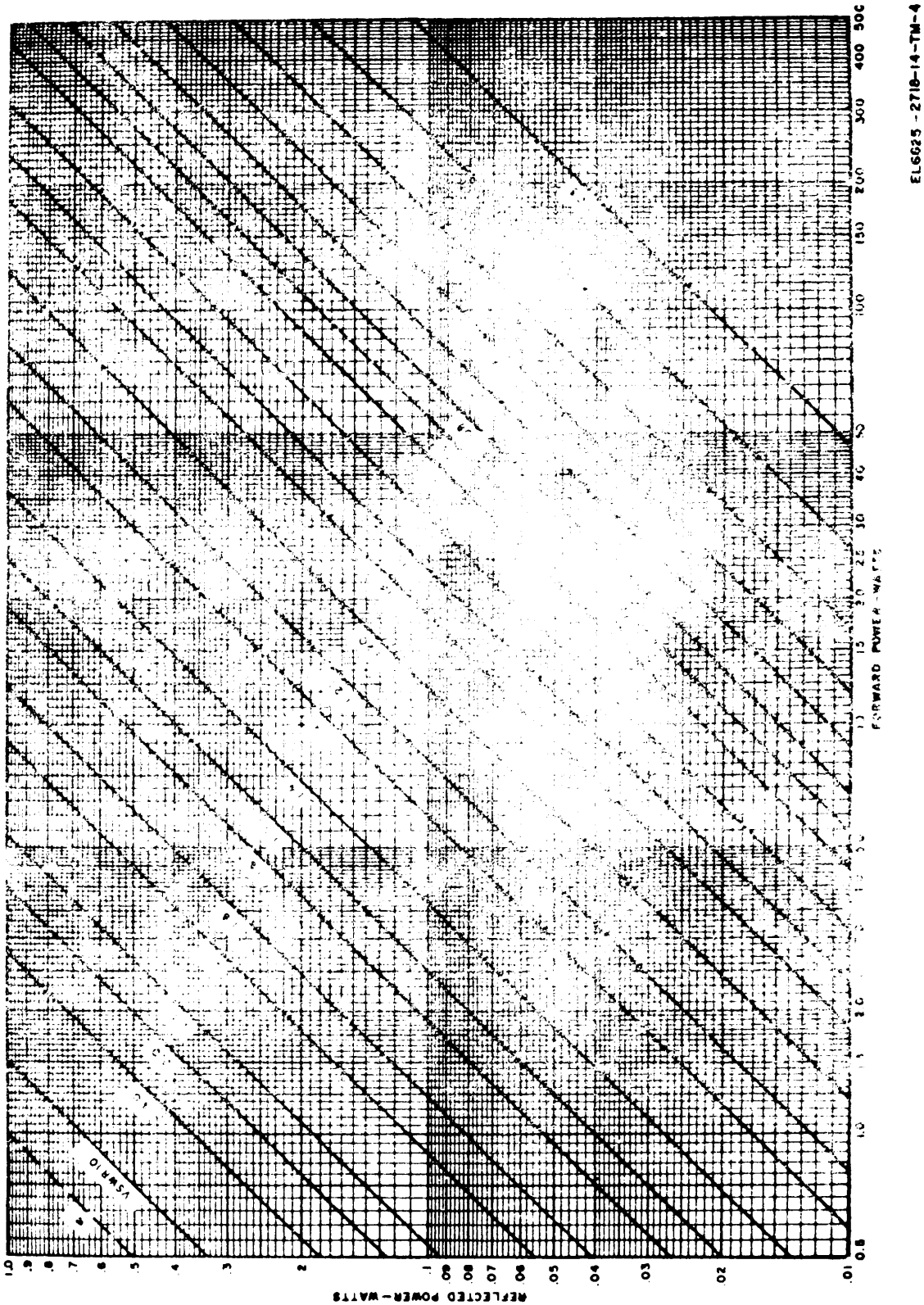


*Figure 2-3 Power values versus swr (reflected power 0.01 to 1.0 watts)*

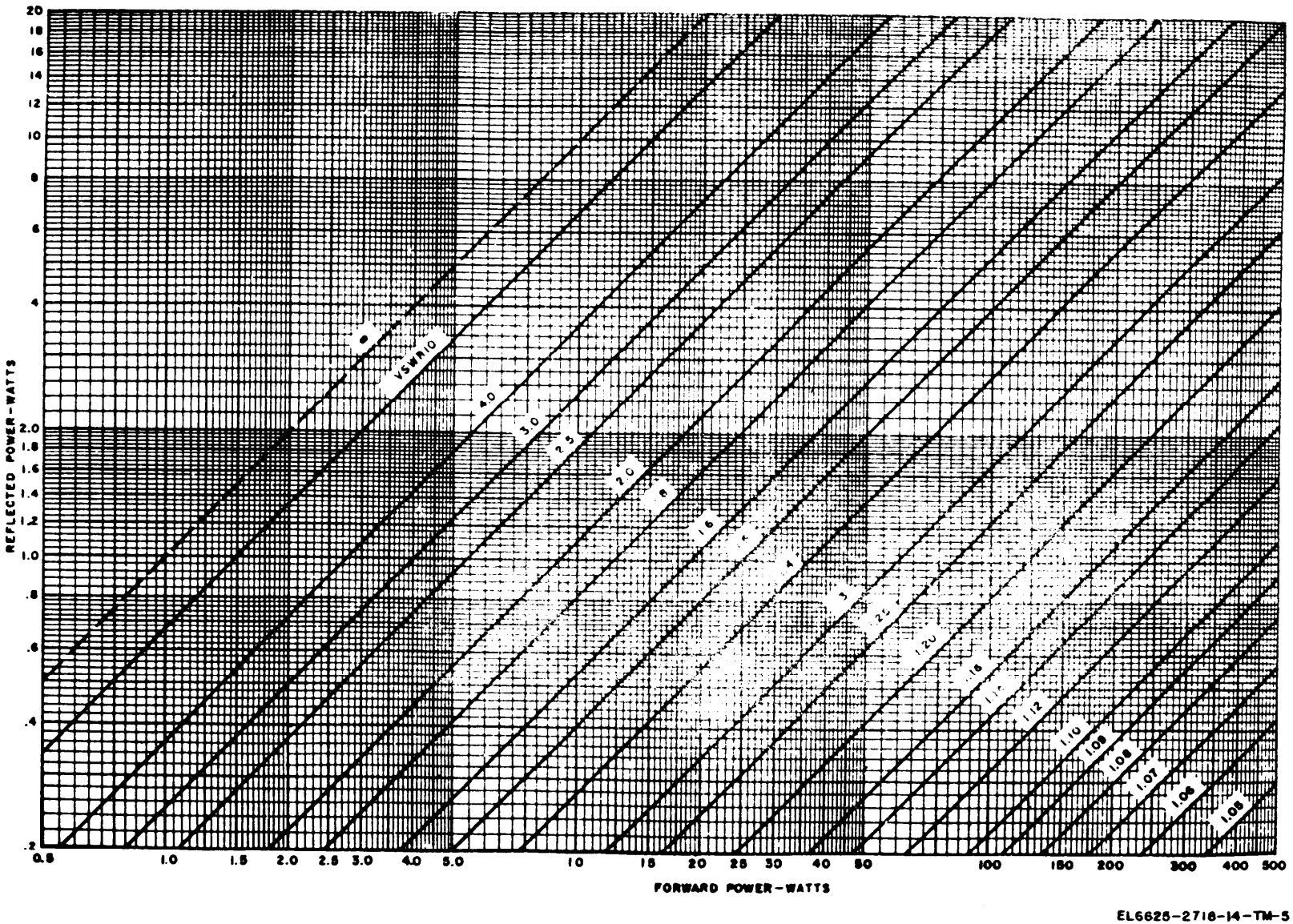


*Figure 2-4. Power values versus swr (reflected power 0.2 to 20 watts).*

*b.* Determine the forward and reflected power in watts by following the instructions given in paragraph 2-9.

*c.* Refer to the appropriate graph (fig. 2-3 or 2-4) to convert these readings to swr. The graphs convert directly to swr values with no intermediate computations required.

Example: Forward power reading is 35 watts (horizontal on figure 2-3 chart). Reflected power reading is 0.08 watt (vertical on chart). Chart shows swr to be 1.10.

**2-13. Removal of Test Set from Transmitter**

After completion of testing or monitoring the transmitter, remove the test set as follows:

**WARNING**

Always deenergize the transmitter before disconnecting the test set.

*a.* Deenergize the transmitter.

*b.* Disconnect the CG-409G/U from the ANT jack of the transmitter and from the transmitter connector of test set.

*c.* Disconnect the antenna cable from the antenna cable connector at the bottom of the teat set.

*d.* Loosen the clamping screw and remove the test set from the rack handle of the transmitter.

*e.* Connect the antenna cable to the ANT jack on the transmitter. The transmitter can now be energized when desired.

*f.* Pack the test set and the cable assembly into the case as shown in figure 1-1.

## Section IV. OPERATION UNDER UNUSUAL CONDITIONS

**2-14. Operation at High or Low Temperatures**

Although the TS.2609A/U is temperature-compensated to minimize the effects of temperature extremes, it will provide the greatest accuracy at normal room temperatures. When possible, avoid or minimize extreme temperature conditions during operation.

**2-15. Operation Under Tropical Conditions**

*a.* Keep moisture wiped from the exterior of the TS-2609A/U to prevent its entry into the unit.

*b.* Do not open the TS-2609A/U unnecessarily; the entry of moisture could corrode or otherwise damage the operating components.

**2-16. Operation in Desert Climate**

*a.* Keep sand and dust wiped from the exterior of TS-2609A/U.

*b.* Do not open the TS-2609A/U case unnecessarily; the entry of sand or foreign material could damage the operating components.

**2-16. Operation in Desert Climates**

*a.* Keep sand and dust wiped from the exterior of TS-2069A/U.

*b.* Do not open the TS-2609A/U case unnecessarily; the entry of sand or foreign material could damage the operating components.

# CHAPTER 3

# OPERATOR/CREW MAINTENANCE INSTRUCTIONS

## Section I. TOOLS AND EQUIPMENT

### 3-1. Repair Parts

Repair parts prescribed for use by the operator for the test set are listed in appendix B.

### 3-2. Additional Tools and Equipment

You will need no additional tools or equipment for operator/crew maintenance of this test set.

## Section II. LUBRICATION INSTRUCTIONS

### 3-3. Lubrication

No lubrication is required for the test set.

## Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

### 3-4. General

To insure that the test set is always ready for operation, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services to be performed are listed and described in table 3-1. The item numbers indicate the sequence of items to be inspected and the minimum inspection required. Defects discovered during operation of the unit will be noted for future correction to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment. Record all deficiencies together with the corrective action as prescribed in TM 38-1750.

*Table 3-1. Operator/Crew Preventive Maintenance Checks and Services*

D-Daily
Time required: 0.8

| *Sequence No. D* | *ITEM TO BE INSPECTED PROCEDURE* | *Work Time (M/H)* |
|---|---|---|
| 1 | COMPLETENESS<br>Check that all items issued with the test eat are present. Refer to paragraph 1-12. | 0.1 |
| 2 | CLEANLINESS<br>Refer to paragraph 3-6. | 0.1 |
| 3 | CASE<br>Check for punctures, cracked hinges, broken insert, and defective latch. Report defects to higher catagory maintenance. | 0.1 |
| 4 | CABLE AND CONNECTORS<br>Check cable l saembly for cracks, breaks, and damaged connector. Report defective cable to higher category maintenance. | 0.1 |
| 5 | KNOB AND SELECTOR SWITCH<br>Check that selector switch is present and secure. Turn the selector switch through its full range. It must detent firmly in either 100 position. When turned to either 10 position, it must return to associated 100 position when released. Report defective selector switch to higher category maintenance. | 0.1 |
| 6 | CLAMPING BLOCK<br>Check for proper mounting of the TS-2609A/U. Check for damaged thumbscrew or broken chain Report damaged or missing part to higher category maintenance. | 0.1 |
| 7 | OPERATION<br>Turn transmitter on. With selector switch in 100 FWD position, check meter indication. It must indicate transmitter output. If output is less than 10 watts, turn selector switch to 10 FWD position. Meter should read power output as indicated on lower meter scale. Check for indication of reflected readings by turning selector switch to RFL position as described l bove. Refer to higher category maintenance if TS-2609A/U fails to respond properly. | 0.2 |

### 3-5. Cleaning

Inspect the exterior of the TS-2609A/U. The exterior surfaces should be free of dust, dirt, grease, and fungus.

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

**WARNING**

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used, DO NOT use near an open flame. Trichloroethane is not flammable, but exposure of fumes to flames converts fumes to highly toxic, dangerous gases.

*b.* Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with trichloroethane.

*c.* Remove dust or dirt from the jacks with a cotton swab stick lightly dampened with trichloroethane.

**CAUTION**

Do not press on the meter face (glass) when cleaning; the meter may become damaged.

*d.* Use a soft, clean cloth to clean the front panel, meter, and knob, If dirt is difficult to remove, dampen the cloth with water; mild soap may be used for more effective cleaning.

*e.* Wipe Case, Test Set CY-6785/U with a clean, dry cloth. Remove greasy or dummy deposits with a cloth dampened lightly with trichloroethane.

## Section IV. TROUBLESHOOTING

### 3-4. General

*a.* This section provides a chart listing the most frequent malfunctions, their probable causes, and the corrective actions required. Symptoms indicated in this chart include those which you may have observed during preventive maintenance checks as well as those you encountered during normal operation of the test set.

*b.* Any malfunction that is beyond the scope of the operator to correct shall be referred to higher category maintenance.

### 3-7. Troubleshooting Chart

The troubleshooting chart for the test set is provided in table 3-2.

*Table* 3-2. *Operator/Crew Troubleshooting*

| *Malfunction* | *Probable cause* | *Corrective action* |
|---|---|---|
| 1. No meter indication. | *a.* No rf power applied to the TS-2609A/U. | *a.* Check transmitter and cables. |
| | *b.* Selector switch in wrong position. | *b.* Change selector switch position. |
| 2. Intermittent or inconsistent meter readings, | *a.* Faulty antenna or load. | *a.* Repair or replace antenna or load. |
| | *b.* Faulty transmitter or transmission lines. | *b.* Repair or replace transmitter or transmission lines. |
| | *c.* Faulty Cable Assembly CG-409G/U. | *c.* Replace defective cable. |
| 3. High swr or high percent of reflected power. | *a.* Defective antenna or dummy load. | *a.* Repair or replace antenna or load. |
| | *b.* Shorted or open transmission line. | *b.* Repair or replace transmission lines. |
| | *c.* Foreign material in TS-2609A/U or CG-409G/U connectors. | *c.* Clean connectors (para 3-5). |

# CHAPTER 4

# ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

## Section I. TOOLS AND EQUIPMENT

### 4-1. Special Tools and Test Equipment

You will require no special tools or special test equipment for organizational maintenance of the radio frequency power test set.

### 4-2. Repair Parts

Repair parts available for use at organizational maintenance are listed in Appendix B.

## Section II. REPAINTING AND REFINISHING INSTRUCTIONS

### 4-3. General

Case, Test Set CY-6785/U is a molded plastic container which is the same color throughout the full thickness of the part. For this reason, no repainting of the part is required. Touchup painting should be done only on those areas of the test set whose original surfaces had been painted.

4-4. Repainting Instructions

a. Touch up the painted surfaces of the test set using Olive Drab enamel per FED-STD-595, Paint Number X24087, Type 1. Take care to prevent covering screw heads, nameplates, and connectors.

b. Refer to TB 746-10. Field Instructions for Painting and Preserving Electronic Command Equipment.

4-5. Refinishing Exterior Surfaces

You may remove gouges or scratches in the plastic case with fine sandpaper. Sand only enough to remove rough edges. Do not disrupt the surrounding finish any more than necessary. Do not attempt to fill in scratches or gouges with paint.

## Section III. LUBRICATION INSTRUCTIONS

### 4-6. Lubrication

No lubrication is required for Test Set, Radio Frequency Power AN/URM-182.

## Section IV. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

### 4-7. General

To ensure that the test set is always ready for operation, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services are listed and described in tables 3-1, 4-1 and 4-2. The item numbers indicate the sequence of items to be inspected and the minimum inspection required. Record all deficiencies together with the corrective action as prescribed in TM 38-750.

### 4-8. Preventive Maintenance Checks and Services

The preventive maintenance checks and services applicable to organizational maintenance are listed in tables 4-1 and 4-2.

*Table 4-1 Organizational Monthly Preventive Maintenance Checks and Services*

M–Monthly
Total man-hours required: 1.0

| *Sequence Number* | *ITEM TO BE INSPECTED PROCEDURE* | *Work time (M/H)* |
|---|---|---|
| | SECTION I – Carrying Case | |
| | Man-hours required: 0.2 | |
| 1 | CASE BODY<br>Inspect for punctures, severe gouges, broken insert. | 0.1 |
| 2 | HINGE AND CATCH<br>Inspect for cracking at hinge and for faulty catch engagement. | 0.1 |
| | SECTION II – Controls and Indicators | |
| | Man-hours required: 0.3 | |
| 3 | METER<br>Check for frce movement, legible dial markings and secure mounting. Tighten mounting screws. | 0.1 |
| 4 | SELECTOR SWITCH KNOB<br>Check for secure mounting. Replace cracked knob. Replace missing setscrew or tighten loose set screw. | 0.1 |
| 5 | SELECTOR SWITCH<br>Check that switch operates freely through its full range and that it detents firmly in both 100 positions Make sure that when it is operated to 10 and released, it will return to its associated 100 position. | 0.1 |
| | SECTlON III – Connecting and Mounting Parts | |
| | Man-hours required: 0.3 | |
| 6 | CABLE<br>Check the cable for pliability, proper insulation, and secure connectors. Check that the cable connectors engage the test set connectors firmly and securely, | 0.1 |
| 7 | LINE CONNECTORS<br>Inspect for secure mounting, proper engagement by cable connectors, and clean contact points. | 0.1 |
| 8 | CLAMPING SCREW<br>Inspect for secure clamp mounting, and for presence of clamping screw and chain. | 0.1 |
| | SECTION IV – Operation | |
| | Man-hours required: 0.2 | |
| 9 | OPERATION<br>**WARNING**<br>Transmitter must be deenergized before TS-2609A/U is connected.<br>Turn transmitter on. With selector switch in 100 FWD position, check the meter indication. It should indicate transmitter output. If output is less than 10 watts, turn selector switch to 10 FWD position Meter should indicate power output as read on lower meter scale, Turn switch to RFL position and check for an indication of reflected power. Refer to troubleshooting chart if TS-2609A/U fails to function properly. | 0.2 |

*Table 4-2 Organizational Quarterly Preventive Maintenance Checks and Services*

Q–Quarterly
Total time required: 0.3

| *Sequence number* | *ITEM TO BE INSPECTED PROCEDURE* | *Work Time (M/H)* |
|---|---|---|
| 1 | PUBLICATIONS<br>Check DA Pam 310-4 to see that all publications are complete, serviceable, and current. | 0.1 |
| 2 | MODIF1CATIONS<br>Check DA Pam 310-7 to determine if new applicable MWO's must be applied immediately. All NORMAL MWO's must be scheduled. | 0.1 |
| 3 | SPARE PARTS<br>Check all spare parts for general condition and method of storage. There should be no evidence of overstock, and all shortages must be on valid requisitions. | 0.1 |

## Section V. TROUBLESHOOTING

### 4-9. General

This section provides information necessary to help organizational maintenance personnel identify, localize, and repair troubles which are within their allocated scope.

### 4-10. Troubleshooting Chart

Refer to table 4-3 for the organizational maintenance troubleshooting chart. You must report to higher category maintenance any malfunction that is beyond the scope of organizational maintenance personnel. Also refer to table 3-2, Operator/Crew Troubleshooting.

*Table 4-3 Organizational Maintenance Troubleshooting*

| *Malfunction* | *Probable cause* | *Corrective action* |
|---|---|---|
| 1. Case cover fails to latch. | *a.* Broken hinge. | *a.* Replace case. |
| | *b.* Defective latch. | *b.* Replace case. |
| 2. Knob slips on selector switch shaft. | *a.* Knob cracked. | *a.* Replace knob (para 4-12). |
| | *b.* Setscrew loose. | *b.* Tighten setscrew. |
| | *c.* Threads in knob stripped. | *c.* Replace knob. |
| 3. Cable fails to engage test set connector or engages with difficulty. | *a.* Defective cable connector. | *a.* Replace cable. |
| | *b.* Dirt in cable connector or test set connector. | *b.* Clean connectors. |
| | *c.* Test set connectors defective. | *c.* Replace test set connectors (para 4-14). |
| 4. Erratic, inconsistent meter readings. | *a.* Faulty cable or connector. | *a.* Replace cable or connector (para 4-14). |
| | *b.* Defective transmitter or antenna. | *b.* Repair or replace transmitter or antenna. |
| 5. Clamping screw fails to mount test set. | *a.* Clamping screw threads defective. | *a.* Replace clamping screw (para 4-13). |
| | *b.* Mounting block threads defective. | *b.* Insert screw from opposite side of block. |

## Section VI. MAINTENANCE OF TEST SET, RADIO FREQUENCY POWER, AN URM-182

### 4-11. General

This section describes maintenance procedures that are the responsibility of organizational maintenance.

### 4-12. Knob Replacement

(fig. B-1)

*a.* If the knob is loose on the shaft of the selector switch (19), tighten the knob setscrew (7).

*b.* To replace knob (6), loosen the setscrew (7) and pull the knob from the switch shaft. Back off the setscrew in the new knob and slide the knob onto the shaft. Tighten the setscrew snugly to secure the knob. After tightening, make sure the knob aligns with the switch plate indications. Reposition the knob on the shaft if it is misaligned.

*c.* After tightening or installing the knob, operate the selector switch through its full operating range and recheck that the knob pointer aligns with the switch plate markings for all operating positions.

### 4-13. Clamping Screw Replacement

(fig. B-1)

*a.* Remove the screw (9) to disconnect the chain (11) from the clamping screw (10). Remove the screw (14) to disconnect the opposite end of the chain. Unscrew the clamping screw from the mounting block of the test set.

*b.* Turn the replacement clamping screw into the mounting block. Note that it can be inserted from either side of the block. Secure the chain to the clamping screw and to the mounting block with screws.

### 4-14. Connector Replacement

(fig. B-1)

*a.* Remove the four screws (12) that secure the transmitter connector (13) to the top of the test set case. Pull straight out to remove the connector. Remove the four screws and remove the antenna cable connector from the bottom of the case in the same manner.

**NOTE**

The connectors mounted on the top and bottom of the test set case are identical and may be interchanged.

b. To install, position each connector on the test set case so that it is fully seated; secure each with four screws.

# CHAPTER 5

# FUNCTIONING OF EQUIPMENT

## 5-1. Rf Power in Transmission Lines

*a.* When rf power is transmitted through a transmission line to a load, this power or energy is termed as a forward traveling wave. If the load on this transmission line is of the correct ohmic value (matched), all the power that traveled to the load is consumed by the load. If the ohmic value of the load is of some other value (mismatched) than the correct value, the load does not consume all the initial power. This unused power reflects and travels back along the transmission line, and is termed a reflected traveling wave. The TS-2609A/U enables maintenance personnel to effectively troubleshoot a radio set by providing readings that depict the amount of forward and reflected rf power in a transmission line.

*b.* The TS-2609A/U contains a short transmission line (uniform airtype line section) that acts as a very accurate 50-ohm load from which correct measurements of the forward and reflected power are taken. This line section contains two separate sensing units (fig. 5-l). One unit senses the amount of forward power, and the other unit senses the amount of reflected power.

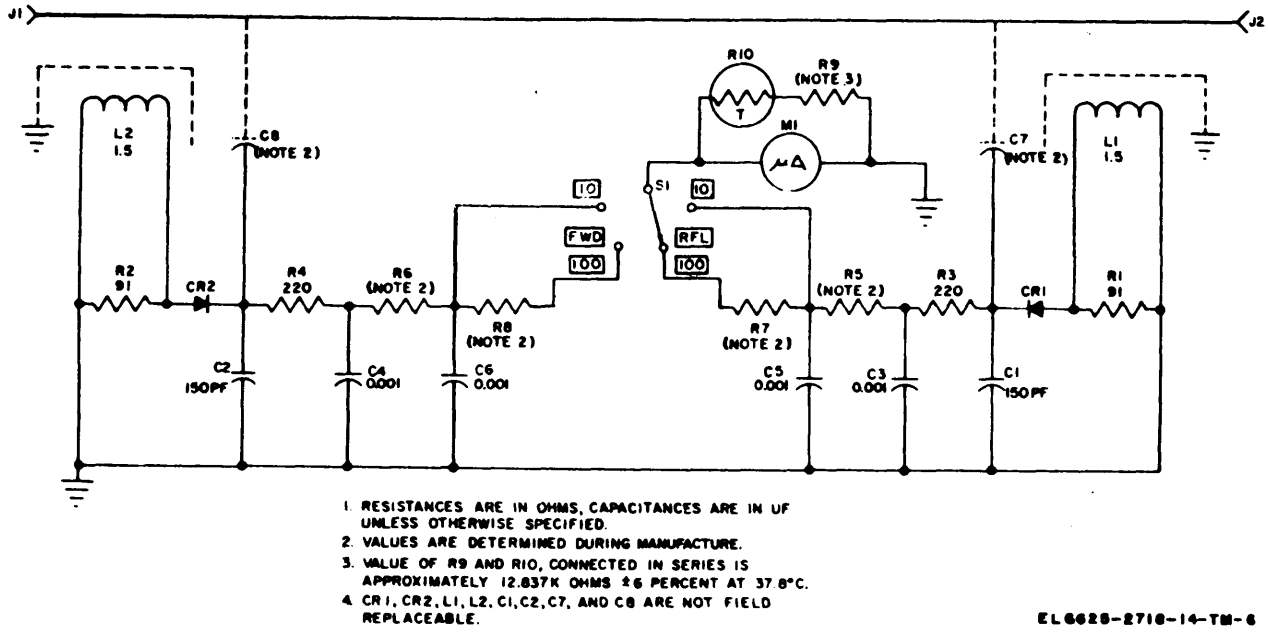


*Figure 5-1. Test Set, Radio Frequency TS-2609A/U, schematic diagram.*

## 5-2. Functioning of TS-2609A/U

*a.* In the traveling wave concept, the forward and reflected waves traveling on a transmission line produce voltage and current maximum and minimum points along the transmission line (standing waves). These standing waves do not affect the readings of the TS-2609A/U since the TS-2609A/U reads only forward and reflected traveling waves.

*b.* After the forward and reflected power levels have been read in watts and recorded, they can be used to determine the ratio between forward and reflected powers. This ratio of forward power divided by reflected power provides the voltage standing wave ratio (swr) which is an indication of the efficiency of the load or antenna (matched load or mismatched load). Graphs have been provided (fig. 2-3 and 2-4) to eliminate the need for computation to obtain the swr. A low swr indicates an efficient load or antenna, whereas a high swr reveals either a defective antenna or an open transmission line.

*c.* When the TS-2609A/U is connected into the system, transmitter output is directed through the line section to the antenna (or dummy load). The line section is a short, uniform section that provides unimpaired impedance of the rf coaxial line into which it is inserted, The rf waves traveling through the line section produce energy in the coupling circuits of both sensing units by inductance and capacitance. Inductor L2 and capacitor C8 sense forward power, while inductor L1 and capacitor C7 sense reflected power. Whether the meter is being used to sense the forward or the reflected power is determined by the position of selector switch S1.

*d.* The output of the coupling circuit is applied to a resistive and capacitive network which has been carefully balanced to its associated coupler. Each sensing unit will provide a current output that will cause meter M1 to deflect in proportion to the rf power applied to the line section, provided the frequency of transmission is within the rated range of the TS-2609A/U.

*c.* Each sensing unit has two forward and two reflected power ranges. One forward range will deflect the meter 100 watts when 100 watts is applied to the transmitter end of the line section. The other forward range will deflect the meter 10 watts full scale when 10 watts is applied to the transmitter end of the line section, When selector switch S1 is placed in the 10 RFL position, output from the 10-watt reflected reading sensing circuit is applied to the meter. In the 100 RFL position, the selector switch connects the meter to the 100-watt output of the reverse reading sensing unit.

*f.* To compensate for changes in surrounding temperature, a temperature-correction circuit is provided. This circuit consists of thermistor R10 and fixed resistor R9 connected in series and placed across the meter. The fixed resistor is matched to the thermistor to provide the temperature correction required.

*g.* Resistors R1 and R2 limit the loading effect of inductors L1 and L2 respectively on the transmission line, provide broadband, impedance circuits, and develop the voltages coupled to rf rectifiers- CR1 and CR2 for measuring reflected and forward traveling signal power levels. The rectified signals are filtered by C2, C4, C6, R4, and R6 for forward traveling signal power measurements below the 10-watt level, and Cl, C3, C5, R3, and R5 filter the rectified signals for reflected traveling signals power below 10 watts when the selector switch is set to the 10 RFL position. When the selector switch is set to the 100 FWD position, multiplier resistor R8 is added to the forward traveling power filter circuit and, when the selector switch is set at 100 RFL, multiplier resistor R7 is added to the reflected traveling power filter circuit.

# CHAPTER 6

# DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

## 6-1. Troubleshooting

Troubleshooting is performed on the AN/URM-182 at direct support maintenance category to determine that the proper continuity exists through the rf cable, its connectors, and the line section assembly. This chapter provides instructions for checking and repairing the rf cable assembly.

## 6-2. Test Equipment and Tools

Test equipment and tools necessary for troubleshooting at direct support maintenance level are listed in table 6-1.

*Table 6-1. Direct Support Maintenance Test Equipment and Tools*

| *Nomenclature* | *National stock number* | *Publication* |
|---|---|---|
| Multimeter TS-352B/U | 6625-00.242-5023 | TM 11-6625-366-15 |
| Tool Kit, Electronic Equipment TK-100/G | 5180-00-605-0079 | |
| Cable. Rf RG-58C/U | 6145-00-542-0092 | |

## 6-3. Checking TS-2609A/U for Continuity

*a.* If the TS-2609A/U fails to provide proper transmitter output readings, disconnect it from the associated equipment and remove cable assembly CG-409G/U.

*b.* With Multimeter TS-352B/U adjusted to read resistance, check for continuity between the female BNC connectors at the top and bottom of the TS-2609A/U.

*c.* If continuity does not exist, remove the four screws (12, fig. C-1 ) that hold each female BNC connectors (13) to the line section (17) of the TS-2609A/U. Remove the connectors.

*d.* Check for continuity through the TS-2609A/U. If continuity does not exist, refer the test set to general support maintenance.

*e.* Check for continuity through cable assembly CG-409G/U. Continuity must exist between the external shells of the male BNC connectors and must also exist between the internal pins of the connectors. If continuity does not exist, repair the cable per paragraph 6-4.

## 6-4. Repairing Cable Assembly CG-409G/U

*a.* Loosen the cable socket screws that hold the rf cable to male BNC-type connector plugs; pull the rf cable from the connectors.

*b.* Remove the collars, seals, and cable socket screws from the end of the rf cable.

*c.* Discard and replace seals and any other defective parts.

*d.* Cut a new rf cable from cable RG-58C/U to the length shown in figure 6-1. Trim the exterior insulation to the length shown.

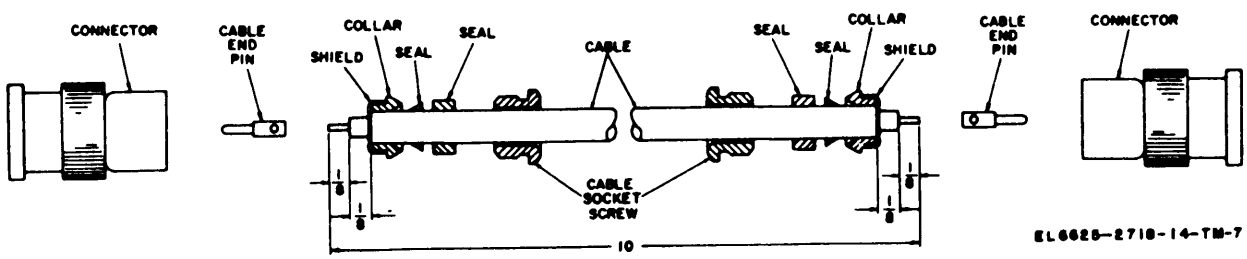


*Figure 6-1. Cable Assembly, Radio Frequency CG-409G/U (10 in.) showing parts locations.*

*e.* Install the cable socket screws, seals, and collars on the ends of the new piece of rf cable. Roll the shield of the rf cable over the collars as shown in figure 6-1, Trim the shield as necessary to maintain the required dimensions. Trim the inside insulation to the dimensions shown.

*f.* Solder new cable end pins on the ends of the internal wire of the rf cable. Insert the ends of the rf cable and assembled parts into the male BNC. type connector plug and tighten the cable socket screws into the connector.

# CHAPTER 7

# GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

## Section I. TOOLS AND EQUIPMENT

### 7-1. Tools

Tools required to perform general support maintenance for Test Set, Radio Frequency TS-2609A/U are contained in Tool Kit, Electronic Equipment TK-100/G.

### 7-2. Test Equipment

Test equipment necessary for troubleshooting and maintenance at general support maintenance is listed in table 7-1

*Table 7-1. Test Equipment Required for General Support Maintenance*

| *Nomenclature* | *National stock No.* | *Technical manual* |
|---|---|---|
| Multimeter TS-352B/U | 6625-00-242-5023 | TM 11-6625-366-15 |
| Receiver-Transmitter, Radio RT-524/VRC. | 5820-00-892-0622 | TM 11-5820-401-10 |
| Handset H-189/GR (or H-138/U). | 5965-00-069-8886 | TM 11-5965-280-15 |
| | 5965-00-892-0972 | TM 11-5965-257-15 |
| Dummy Load, Electrical DA-75/U. | 5985-00-280-3480 | |
| Cable Assembly, Radio Frequency CG-1773A/U. | 5995-00-823-2986 | |
| Adapter UG-201A/U | 5935-00-201-3090 | |

## Section II. TROUBLESHOOTING

### 7-3. Troubleshooting Meter

(fig. B-1)

If the TS-2609A/U fails to operate properly, check the meter as follows:

**CAUTION**

When removing or replacing the meter, be careful to prevent breaking the wires that interconnect components of the line section assembly and components of the case.

*a.* Remove the meter from TS-2609A/U (para 7-6a) and substitute a replacement meter. Do not use an ihduction-type soldering iron on solder connections.

*b.* If the substitute meter (meter must be identical) functions properly, replace the original meter (para 7-6b ) with the substitute meter, or with an identical meter from stock.

### 7-4. Troubleshooting Selector Switch

(fig. B-1)

If one or more of the contacts of the selector switch are faulty, good continuity will not exist through the switch. Troubleshoot the selector switch as follows:

*a.* Operate the switch to its four positions. The switch must restore itself to the 100 position from either 10 position. Make sure the switch operates smoothly and easily.

**CAUTION**

Be careful to prevent breaking the wires that interconnect the components of the line section assembly and those of the case.

*b.* To check the electrical characteristics of the selector switch, remove the four machine screws (16) that hold the line section assembly (17) to the case (32) of the TS-2609A/U. Separate the line section assembly from the case without disconnecting the electrical leads.

*c.* Unsolder one lead from the meter to prevent the TS-352B/U multimeter battery from being placed across the meter or being applied to the meter while multimeter measurements are being taken of the switch contacts.

*d.* Put the TS-352B/U range switch in the RX1 position and the FUNCTION switch on OHMS. Measure the resistance across the switch contacts. A good switch contact should give a zero

multimeter reading across the contacts. Broken or bent contacts give an indication of an open circuit,

*e.* Remove and replace a faulty switch (para 7-7).

*f.* Reconnect the meter lead that was removed (c above).

## 7-5. Troubleshooting Line Section Assembly

If both the meter and the selector switch operate properly as indicated in paragraphs 7-3 and 7-4, check the line section assembly as follows:

*a.* Connect the TS-2609A/U in a test circuit, as shown in figure 7-1, and energize the RT-634/VRC (transmitter).

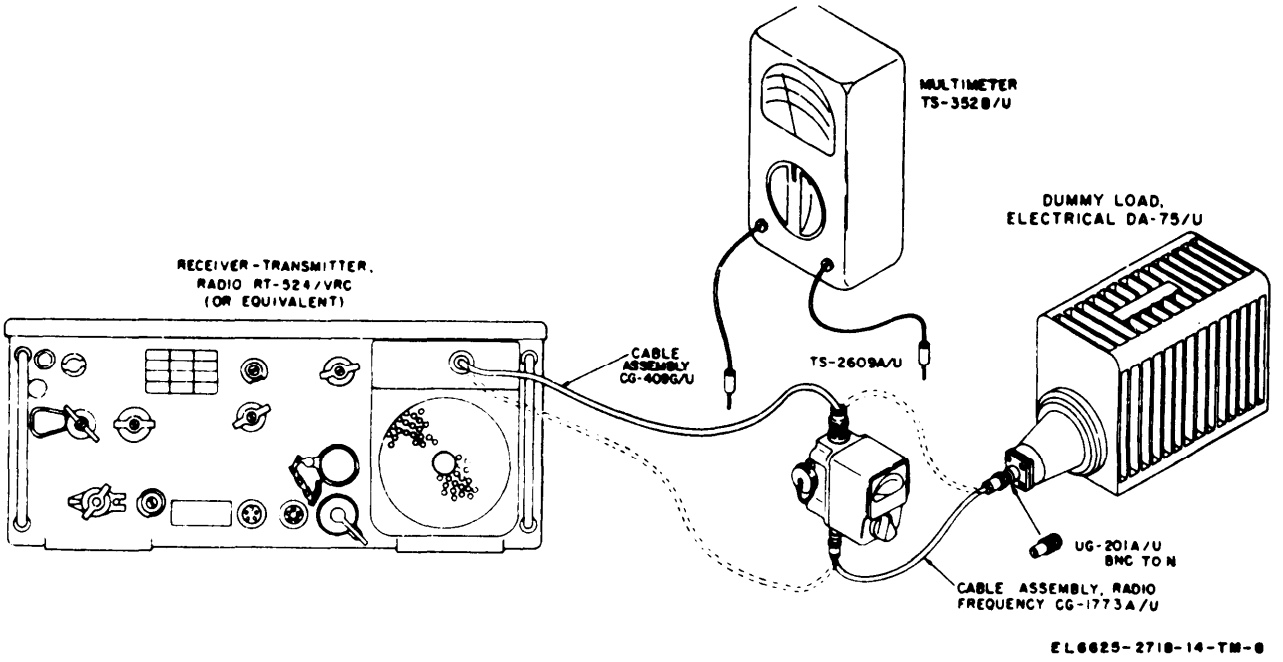


*Figure 7-1. Test set hookup for comparing forward and reflected power indications.*

*b.* With the TS-2609A/U selector switch at 100 FWD, operate the transmitter on high power to provide an rf power output at 30 M Hz. Record the reading on the TS-2609A/U. Reenergize the transmitter, remove the TS-2609A/U from the circuit, and substitute a known good TS-2609A/U into the circuit. Energize the transmitter and compare the reading on the substitute TS-2609A/U with that recorded on the TS-2609A/U being checked. The two readings must coincide within 5 percent.

*c.* Repeat the above test, using frequencies of 50 MHz and 75 MHz.

*d.* Set the transmitter output to low power (the maximum power must not exceed 10 watts) at 30 MHz. Insert the TS-2609A/U under test in the circuit as shown in figure 7-1. Operate the selector switch of the TS-2609A/U to 10 FWD. With the transmitter energized, record the reading on the TS-2609A/U. Remove the TS-2609A/U from the circuit and substitute the known good TS-2609A/U; set its selector switch to 10 FWD. Energize the transmitter and record the reading. Compare the two readings taken. They should coincide within 5 percent.

*e.* Repeat the above test, using frequencies of 50 MHz and 75 MHz.

*f.* To troubleshoot the line section assembly for reflected traveling wave performance, connect the TS2609A/U in the circuit of figure 7-1 as depicted by the dotted lines. This condition will permit the transmitter to simulate reception of reflected traveling waves.

*g.* With the selector switch in the 100 RFL position, set the transmitter for high-power output at 30 MHz and energize the transmitter. Record the reading on the TS-2609A/U. Reenergize the transmitter, remove the TS-2609A/U under test, and substitute the known good TS-2609A/U with its selector switch set to 100 RFL position. Energize the transmitter and compare the reading on the substitute TS-2609A/U with that recorded on the TS-2609A/U

being checked. The two readings must coincide within 5 percent.

*h.* Repeat the procedure given in g above, using frequencies of 50 MHz and 75 MHz.

*i.* Set the transmitter output to low power (the maximum power must not exceed 10 watts) at 30 MHz. Insert the TS-2609A/U under test in the circuit as shown by the dotted lines in figure 7-1. operate the selector switch of the TS-2609A/U to the 10 RFL position. Energize the transmitter and record the reading on the TS-2609A/U. Remove the TS-2609A/U from the circuit and substitute the known good TS-2609A/U; set its selector switch to 10 RFL. Energize the transmitter and record the reading on the substitute TS-2609A/U. Compare the two readings taken. They should coincide within 5 percent.

*j.* Repeat the above test; use frequencies of 50 MHz and 75 MHz. If the TS-2609A/U fails to operate within the prescribed tolerances, the line section is faulty and must be replaced (para 7-8).

## Section III. MAINTENANCE OF TEST SET, RADIO FREQUENCY TS-2609A/U

### 7-6. Meter Removal and Replacement

(fig. B-1)

*a. Removal.*

(1) Remove the four machine screws (16) that secure the line section assembly (17) to the case (32 ). Carefully separate the line section from the case; be careful not to break interconnecting leads.

(2) Unsolder the leads from the meter (27).

(3) Remove the four machine screws (24) that hold the meter plate (28) to the case (32); remove the meter plate.

(4) Apply thumb pressure on the back of the meter (27) and push the meter out through the front of the TS-2609A/U case. Remove the meter gasket (29).

**NOTE**

The meter gasket (29) may hold the meter to the case. Some pressure may be required to dislodge the meter.

(5) Unsolder the thermistor (26) from the meter terminals. Use a pair of long-nosed pliers or similar tool as a heat sink between the solder joint and the thermistor to prevent overheating the thermistor.

*b. Replacement.*

**CAUTION**

Do not use an induction-type soldering iron which may have voltage present at the tip. This action could overload the meter and severely damage it.

(1) Solder the thermistor (26) to the terminals of the meter (27).

(2) Position the meter gasket (29) on the meter and position the assembled gasket and meter on the TS-2609A/U case (32); install the meter plate (28) and secure with four machine screws (24).

(3) Solder the electrical leads to the terminals of the meter. Refer to the wiring diagram in figure 7-2 for proper connection information.

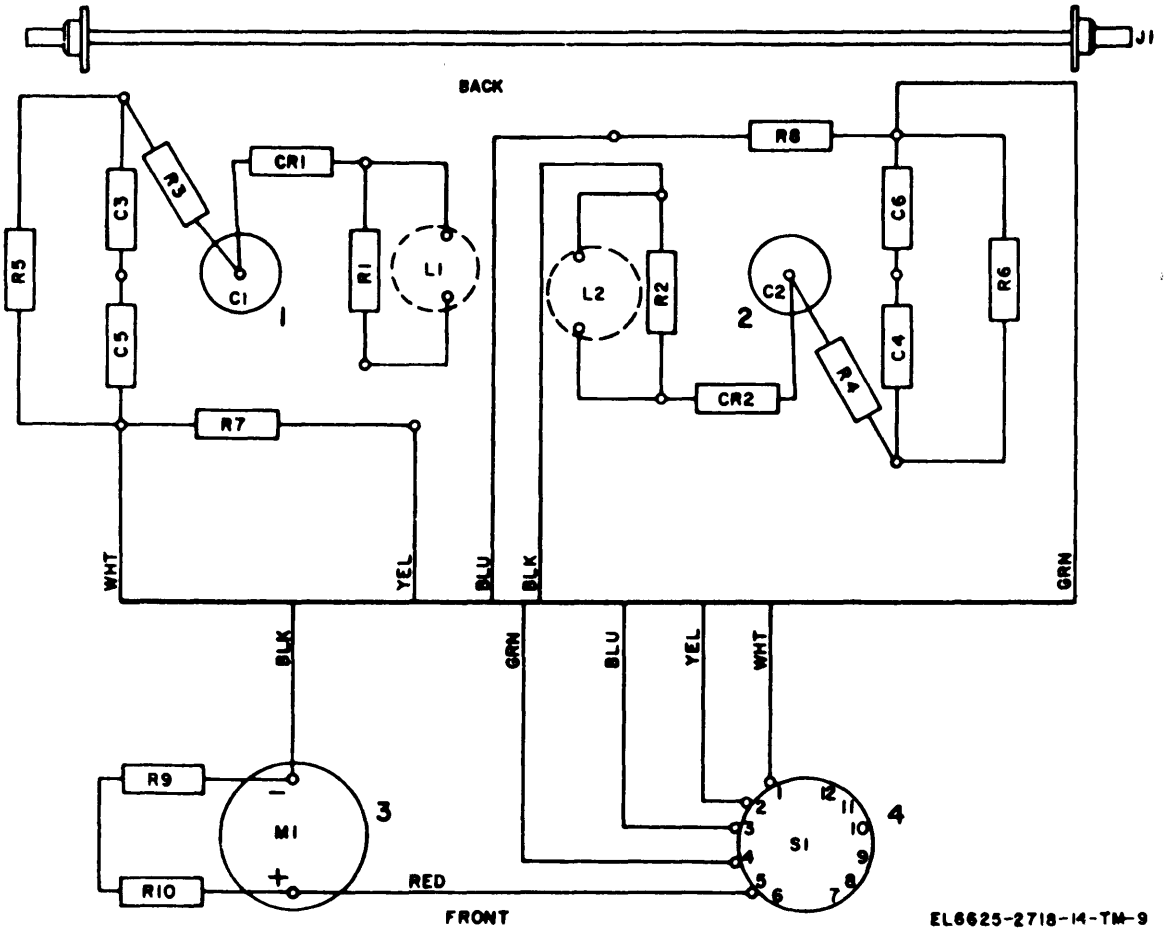


*Figure 7-2. Test Set, Radio Frequency TS-2609A/U, wiring diagram.*

(4) Position the line section assembly (17) on the case (32); make sure the gasket (18) is properly aligned. See that the leads that interconnect electronic components of the parts are not pinched between the parts as they are assembled, Secure the parts together with four machine screws (16).

**7-7. Selector Switch Removal and Replacement** (fig. B-1)

*a. Removal.*

(1) Remove the four machine screws (16) that secure the line section assembly (17) to the case (32) of the TS-2069A/U. Carefully separate the line section from the case; be careful not to break the interconnecting leads.

(2) Using a socket head screw key, loosen the setscrew (7) and remove the selector switch knob (6) from the shaft of the selector switch (19). Remove the plain hexagonal nut (20) and lockwasher (21) that hold the selector switch to the meter case; remove the selector switch from the case.

**CAUTION**

Do not use an induction-type soldering iron or gun which has a voltage present at the tip. This action could overload the meter or other electronic components.

(3) Unsolder the electrical leads from the terminals of the selector switch. Tag leads for ease of identification.

*b. Replacement.*

(1) Solder the electrical leads to the terminals of the selector switch (9). Refer to the wiring diagram (fig. 7-2) for proper lead connection.

(2) Position the selector switch (19) on the case (32) so that the key on the selector switch engages the locating hole inside the case.

(3) Secure the selector switch to the case with a lockwasher (21) and a plain hexagonal nut (20).

(4) Position knob (6) on the shaft of the

selector switch; secure by tightening the setscrew (7).

(5) Position the line section assembly (17) and gasket (18) on the case (32); secure with four machine screws (16).

**7-8. Removal and Replacement of Line Section Assembly**

(fig. B-1)

*a. Removal.*

(1) Remove the four machine screws (12) that hold each of the female BNC connectors (13) to the line section assembly; remove the connectors.

(2) Remove the four machine screws (14) that secure the clamping block (15) to the back of the line section assembly; remove the clamping block.

(3) Remove the four machine screws (16) that secure the line section assembly (17) to the case (32); carefully separate the line section assembly and case.

(4) Unsolder the electrical leads that connect to the line section assembly. Remove the line section assembly and gasket (18).

*b. Replacement.*

**CAUTION**

Be sure to use a soldering iron which does not have voltage present at the soldering tip. Inductive-type soldering irons or guns frequently have a voltage high enough to damage the meter or diodes of the TS-2609A/U..

(1) Pull the electrical leads from components of the case (32) through the opening in the center of the gasket (18). Solder the electrical leads to the line section assembly by the use of a noninductive-type soldering iron. Refer to figure 7-2 for wiring information.

(2) Position the line section assembly (17) on the test set case; be careful not to pinch the interconnecting wires between the castings. Secure the line section assembly and gasket (18) to the case with four machine screws (16).

(3) Position the clamping block (15) on the back of the line section assembly; secure with four machine screws (14). One of the screws also secures the chain (11) of the thumbscrew (10).

(4) Position the female BNC-type connectors (13) on the top and bottom of the line section assembly; secure each with four machine screws (12).

## Section IV. GENERAL SUPPORT TESTING PROCEDURES

**7-9. General Procedures.**

*a.* Testing procedures are prepared for use by Signal Field Maintenance Shops and Signal Service Organizations responsible for general support maintenance of electronic equipment to determine the acceptability of repaired electronic equipment. These procedures set forth specific requirements that repaired electronic equipment must meet before you return it to the using organization. A summary of the performance standards is given in paragraph 7-15.

*b.* Comply with the instructions preceding each chart before proceeding to the chart. Perform each test in sequence. Do not vary the sequence. For each step, you must perform all the actions required in the Test equipment control settings and Equipment under test control settings columns; then perform each specific test procedure and verify it against its performance standard.

**7-10. Test Equipment, Tools, and Materials**

Test equipment, tools, materials, and other equipment required to perform the testing procedures are given in this section as follows:

*a. Test Equipment.* Test equipment required is listed in table 7-2.

*Table 7-2. Test Equipment Required for General Support Testing*

| *Nomenclature* | *National stock No.* | *Technical manual* |
|---|---|---|
| Wattmeter AN/URM-120 | 6625-00-873-8430 | TM 11-6625-446-15 |
| Receiver-Transmitter, Radio RT-524/VRC. | 5820-00-892-0622 | TM 11-5820-399-35 |
| Handset H-189/GR (or H-138/U). | 5965-00-069-8886 | TM 11-5965-280-15 |
| | 5965-00-892-0972 | TM 11-5965-257-15 |
| Dummy Load, Electrical DA-75/U. | 5985-00-280-3480 | |
| Cable Assembly, RF CG-1773A/U. | 5995-00-823-2986 | |
| Adapter UG-201A/U | 5935-00-201-3090 | |
| Adapter, Connector UG606/U. | 5935-00-295-6295 | |

*b. Tools.* Tool Kit, Electronic Equipment TK-100/G is required for general support testing.

### 7-11. Test Facilities

*a.* A source of power is required to energize the transmitter used while conducting these tests.

*b.* The surrounding temperature of the test facility must be between 700 and 88°F (21° and 31°C).

### 7-12. Physical Tests and Inspection

*a. Test Equipment and Materials.* None.

*b. Test Connections and Conditions.* None.

*c. Procedure.*

| Step No. | Control settings | | Test procedures | Performance standard |
|---|---|---|---|---|
| | Test equipment | Equipment under test | | |
| 1 | N/A | Controls may be in any position. | *a.* Inspect all mechanical assemblies for loose or missing screws. | *a.* Screws are tight; none is missing. |
| | | | *b.* Inspect selector switch knob for looseness and damage. | *b.* No looseness or damage evident. |
| | | | *c.* Inspect connectors and cable for damage and loose mounting screws. | *c.* Connectors and cable are securely mounted and in good condition. |
| | | | *d.* Inspect thumbscrew and attaching chain for damage and insecure mounting. | *d.* Thumbscrew threads are in good condition and screw can be inserted from either left or right. Chain is intact. |
| 2 | N/A | Controls may be in any position. | *a.* Turn selector switch knob from 100 FWD to 100 RFL and return several times. | *a.* Selector switch operates freely without binding and detents firmly in either position. |
| | | | *b.* Turn selector switch knob from 100 FWD to 10 FWD and release. Repeat several times. | *b.* Selector switch knob returns to 100 FWD position when released. |
| | | | *c.* Turn selector switch knob from 100 RFL to 10 RFL and release. Repeat several times. | *c.* Selector switch knob returns to 100 RFL position when released. |
| 3 | N/A | Controls may be in any position. | Connect and disconnect male BNC connectors on cable of TS-2609A/U and female BNC connectors on the unit. | Connectors engage and disengage without difficulty. |

### 7-13. Forward Power Accuracy Test

*a. Test Equipment and Materials.*

(1) Wattmeter AN/URM-120.

(2) Receiver-Transmitter, Radio RT. 524/VRC.

(3) Handset H-189/GR (or H-138/U).

(4) Cable Assembly, Radio Frequency CG-1773A/U.

*b. Test Connections and Conditions.* Connect equipment as shown in figure 7-3.

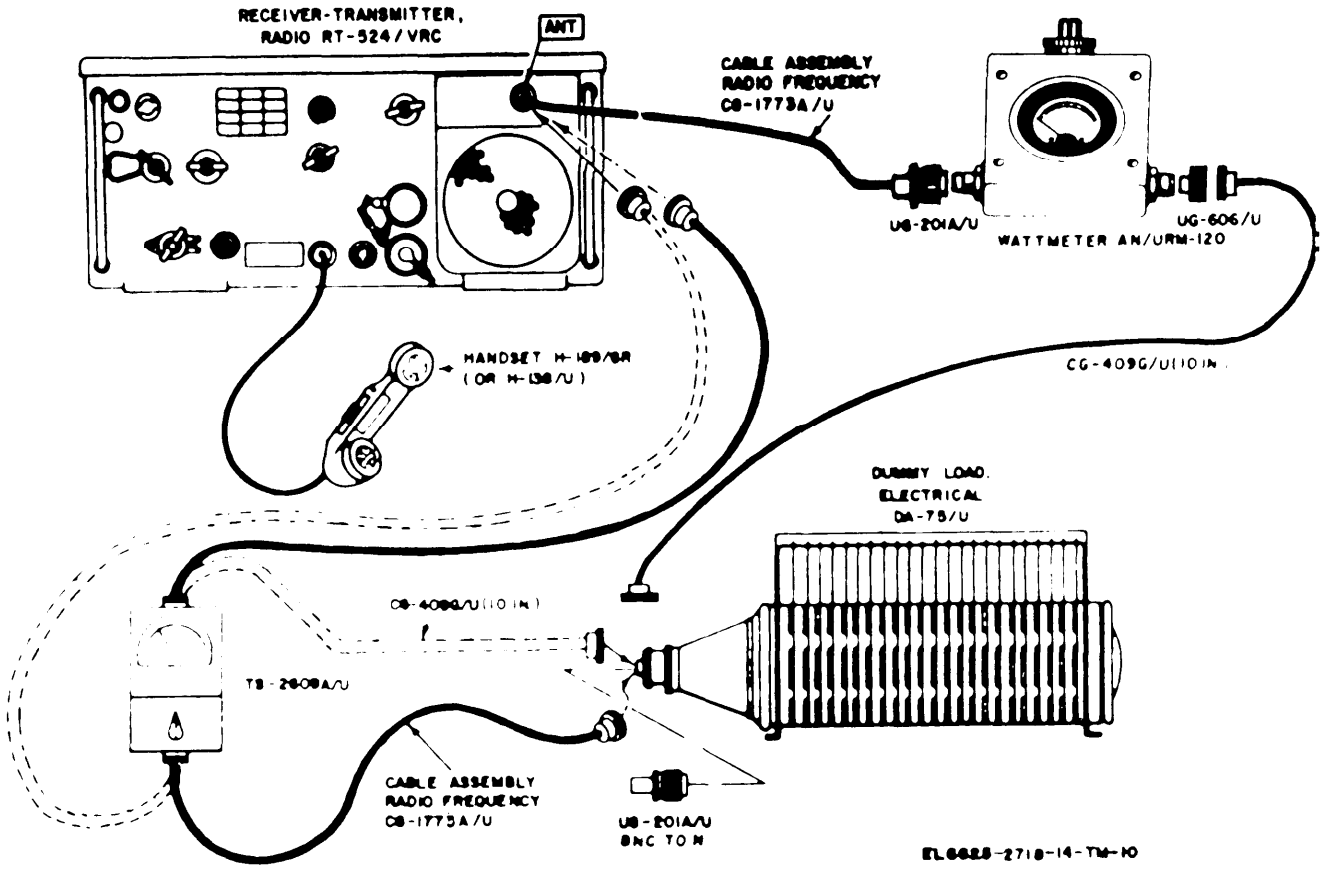


*Figure 7-3. TS-2609/AU, forward and reflected power test.*

c. *Procedure.*

| Step No | Control settings: Test equipment | Control settings: Equipment under test | Test procedures | Performance standard |
|---|---|---|---|---|
| 1 | RT-524/VRC<br>MC-TUNE switch: 30 MHz<br>KC-TUNE switch: 00<br>POWER switch: OFF | TS-2609A/U<br>Selector switch knob: on center line. | *a.* Turn transmitter POWER switch to HIGH. Key the transmitter with the handset. Record the meter reading indicated on the AN/URM-120 meter. | *a.* None. |
| | | | *b.* Disconnect the cable to the AN/URM-120 from the transmitter and attach the TS-2609A/U using Cable Assembly CG-409G/U. Key the transmitter and feed the signal through the TS-2609A/U to the DA-75/U. Set the TS-2609A/U knob to 100 FWD. Record the reading on the TS-2609A/U. | *b.* The reading should be within ± 5 percent of the wattage reading recorded in *a* above. |
| | | | *c.* Repeat the procedure given in *a* and *b* above, for transmitter frequencies of 50 MHz and 70 MHz. | *c.* The readings on the TS-2609A/U should be within ± 5 percent of those recorded when the AN/URM-120 was used. |

| Step No. | Control settings: Test equipment | Control settings: Equipment under test | Test procedures | Performance standard |
|---|---|---|---|---|
| 2 | Same as step 1 above. | Same as step 1 above | *a.* Turn transmitter POWER switch to LOW. Key the transmitter with the handset. Record the meter reading indicated on the AN/URM-120. | *a.* None. |
| | | | *b.* Disconnect the cable to the AN/URM-120 from the transmitter and attach the TS-2609A/U. Key the transmitter and feed the signal through the TS-2609A/U to the DA-75/U. Set the TS-2609A/U selector switch to 10 FWD. Record the reading on the TS-2609A/U. | *b.* The reading should be within ± 5 percent of the wattage reading recorded in *a* above. |
| | | | *c.* Repeat the procedures in *a* and *b* above for transmitter frequencies of 50 MHz and 70 MHz. | *c.* The readings on the TS-2609A/U should be within ± 5 percent of those recorded when the AN/URM-120 was used. |

## 7-14. Reflected Power Accuracy Test

*a. Test Equipment and Materials.*

(1) Wattmeter AN/URM-120.

(2) Receiver-Transmitter, Radio RT. 524/VRC.

(3) Handset H-189/GR (or H-138/U).

(4) Cable Assembly, Radio Frequency CG. 1773A/U.

*b. Test Connections and Conditions.* Connect the equipment as shown in figure 7-3.

c. Procedure.

| Step No. | Control settings: Test equipment | Control settings: Equipment under test | Test procedures | Performance standard |
|---|---|---|---|---|
| 1 | RT-524/VRC<br>MC-TUNE switch: 30 MHz<br>KC-TUNE switch: 00<br>POWER switch: OFF | TS-2609A/U<br>Selector switch knob: on centerline. | *a.* Turn transmitter POWER switch to HIGH. Key the transmitter with the handset. Record the meter reading indicated on the AN/URM-120 meter. | *a.* None. |
| | | | *b.* Disconnect the cable to AN/URM-120 from the transmitter and attach the TS-2609A/U using cable assembly CG-4906G/U as depicted on figure 7-3 by the dotted lines, to permit the signal to pass through the TS-2609A/U to the DA-75/U in the same direction as a reflected wave travels. Key the transmitter; set the TS-2609A/U selector knob to 100 RFL. Record the reading. | *b.* The reading should be within ± 5 percent of the wattage reading recorded in *a* above. |
| | | | *c.* Repeat the procedures in *a* and *b* above for transmitter frequencies of 50 MHz and 70 MHz. | *c.* The reading on the TS-2609A/U should be within ± 5 percent of those recorded when the AN/URM-120 was used. |
| 2 | Same as step 1 above. | Same as step 1 above. | *a.* Turn transmitter POWER switch to LOW. Key the transmitter with the handset. Record the meter reading indicated on the AN/URM-120 meter. | *a.* None. |

| Step No. | Control settings | | Test procedures | Performance standard |
|---|---|---|---|---|
| | Test equipment | Equipment under test | | |
| | | | *b.* Disconnect the cable to the AN/URM-120 from the transmitter and attach the TS-2609A/U, as depicted on figure 7-3 by the dotted lines, to permit the signal to pass through the TS-2609A/U to the DA-75/U in the same direction as a reflected wave travels. Key the transmitter with the handset, place the TS-2609A/U selector switch in 10 RFL, and record the reading. Compare the reading from the TS-2609A/U with those from the AN/URM-120. | *b.* The reading should be within ±5 percent of the wattage reading recorded in *a* above. |
| | | | *c.* Repeat the procedures in *a* and *b* above for transmitter frequencies of 50 MHz and 70 MHz. | *c.* The readings on the TS-2609A/U should be within ±5 percent of those recorded when the AN/URM-120 was used. |
| | | | *d.* Turn the power off from all equipment. | *d.* None. |

### 7-15. Summary of Test Data

You may find it convenient to arrange a checklist similar to that shown below. The performance standards to be entered will depend upon the readings taken by the equipment used for testing and the equipment being tested.

RADIO FREQUENCY POWER TEST SET TS-2609A/U

1. FORWARD POWER ACCURACY

| *Input frequency* | *Power level measured* | *Performance standard* |
|---|---|---|
| 90 MHz for high and low power. | | ± 5 percent of power level measure. |
| 50 MHz for high and low power. | | ± 5 percent of power level measured. |
| 70 MHz for high and low power. | | ± 5 percent of power level measured, |

2. REFLECTED POWER ACCURACY

| *Input frequency* | *Power level measured* | *Performance standard* |
|---|---|---|
| 90 MHz for high and low power. | | ± 5 percent of power level measured. |
| 50 MHz for high and low power. | | ± 5 percent of power level measured. |
| 70 MHz for high and low power. | | ± 5 percent of power level measured. |

# APPENDIX A

# REFERENCES

Following is a list of applicable references that are available to the personnel responsible for the operation and maintenance of the AN/URM-182.

| | |
|---|---|
| DA Pam 310-4 | Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders. |
| DA Pam 310-7 | US Army Equipment Index of Modification Work Orders. |
| SB 38-100 | Preservation, Packaging, Packing, and Marking Materials, Supplies, and Equipment Used by the Army. |
| TB 746-10 | Field Instructions for Painting and Preserving Electronics Command Equipment |
| TM 11-5820-399-35 | Direct Support, General Support, and Depot Maintenance Manual (Including Repair Parts and Special Tools Lists): Receiver-Transmitters, Radio RT-246/VRC and RT-524/VRC. |
| TM 11-5965-257-15 | Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists: Handset H-138/U. |
| TM 11-5965-280-15 | Operator, Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tools List: Handset H-189/GR. |
| TM 11-6625-366-15 | Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS-352B/U. |
| TM 11-6625-446-15 | Operator's Organizational, DS, GS, and Depot Maintenance Manual: Wattmeter AN/URM-120. |
| TM 38-750 | The Army Maintenance Management System (TAMMS) |
| TM 750-244-2 | Procedures for Destruction of Electronic Materiel to Prevent Enemy Use (Electronic Command). |

# APPENDIX B

# OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST

## Section I. INTRODUCTION

### B-1. Scope

This appendix lists repair parts required for operation and performance of organizational and general support maintenance of the AN/URM-182.

### B-2. General

This Basic Issue Items, Items Troop Installed or Authorized, Repair Parts and Special Tools List is divided into the following sections:

*a. Section II. Basic Issue Items List.* Not applicable.

*b. Section III. Items Troop Installed or Authorized List.* Not applicable.

*c. Section IV. Repair Parts List.* A list of repair parts authorized for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts.

*d. Section V. Special Tools List.* Not applicable.

*e. Section VI. Federal Stock Number and Part Number Index.* A list, in ascending numerical sequence, of all Federal stock numbers appearing in the listings, followed by a list, in alphanumeric sequence, of all part numbers appearing in the listings. Federal stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance. This index is followed by a cross-reference list of reference designations to figure and item numbers when applicable.

### B-3. Explanation of Columns

The following provides an explanation of columns found in the tabular listings:

*a. Illustration.* This column is divided as follows:

(1) *Figure number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item number.* The number used to identify each item called out in the illustration.

*b. Source, Maintenance, and Recoverability Codes (SMR).*

(1) *Source code.* Source codes are assigned to support items to indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

| *Code* | *Definition* |
|---|---|
| XD – | A support item that is not stocked. When required, item will be procured through normal supply channels. |

**NOTE**

Cannibalization or salvage may be used as a source of supply for any items source coded above except those coded XA, XD, and aircraft support items as restricted by AR 700-42.

(2) *Maintenance code.* Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(a) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace, and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance:

| *Code* | *Application/ Explanation* |
|---|---|
| O – | Support item is removed; replaced, used at the organizational level. |
| H – | Support item is removed, replaced, used at the general support level. |

(b) The maintenance code entered in the fourth position indicates whether the item is to be

repaired and identifies the lowest maintenance level with the capability to perform complete repair (i. e., all authorized maintenance functions). This position will contain one of the following maintenance codes:

| *Code* | *Application/ Explanation* |
|---|---|
| H – | The lowest maintenance level capable of complete repair of the support item is the general support level. |
| Z – | Nonrepairable. No repair is authorized. |

(3) *Recoverability code.* Recoverability codes are assigned to support items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the Uniform SFR Code format as follows:

| *Recoverability Code* | *Definition* |
|---|---|
| Z – | Nonreparable item. When unserviceable, condemn and dispose at the level indicated in position 3. |
| H – | Reparable item. When uneconomically reparable, condemn and dispose at the general support level. |

*c. National Stock Number,* Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

*d. Part Number.* Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements, to identify an item or range of items.

**NOTE**

When a stock-numbered item is requisitioned, the repair part received may have a different part number than the part being replaced.

*e. Federal Supply Code for Manufacturer (FSCM).* The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc.

*f. Description.* Indicates the Federal item name and, if required, a minimum description to identify the item. Items that are included in kits and sets are listed below the name of the kit or set with the quantity of each item in the kit or set indicated in the quantity incorporated in unit column. The indented parts comprise the assembly under which they are listed.

*g. Unit of Measure (U/M).* Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e. g., ea, in, pr, etc.). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

h. Quantity Incorporated in Unit. Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group.

## B-4. How to Locate Repair Parts

*a.* When National stock number or part number is unknown:

(1) Identify the repair part on the illustration and note the item number of the repair part.

(2) Using the Repair Parts Listing, find the item number noted on the illustration.

*b.* When National stock number or part number is known:

(1) Using the Index of National Stock Numbers and Part Numbers, find the pertinent National stock number or part number. This index is in ascending NSN sequence, followed by a list of part numbers in ascending alphanumeric sequence, cross-referenced to the illustration figure number and item number.

(2) After finding the figure and item number, locate the figure and item number in the repair parts list.

## B-5. Abbreviations

(Not applicable)

**(Next printed page is B-5)**

| (1) ILLUSTRATION (A) FIG NO | (B) ITEM NO | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION | USABLE ON CODE | (7) UNIT OF MEAS | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | GROUP: 00 TEST SET, RADIO FREQUENCY POWER AN/URM-182 | | | |
| B-1 | 1 | XDOZZ | | 4110-120 | 70998 | CASE CY-6785/U | | EA | 1 |
| B-1 | 2 | AHHHH | | 4110-065 | 70998 | CABLE ASSEMBLY CG-409G/U | | EA | 1 |
| B-1 | 3 | PAFZZ | 6145-00-542-6092 | RG-58C/U | 81349 | CABLE | | IN. | 10 |
| B-1 | 4 | PAFZZ | 5935-00-835-0508 | UG-880/U | 81349 | CONNECTOR, MALE BNC | | EA | 2 |
| B-1 | 5 | ADOHH | | 4110-070 | 70998 | TEST SET, RADIO FREQUENCY TS-2609A/U | | EA | 1 |
| B-1 | 6 | PAOZZ | 5355-00-832-8905 | 4110-016 | 70998 | KNOB | | EA | 1 |
| B-1 | 7 | PAFZZ | 5305-00-281-3118 | MS51021-32 | 96906 | SETSCREW, CRES, NO. 8-32 X 1/4 IN. LG | | EA | 1 |
| B-1 | 8 | PAHZZ | | 4110-046 | 70998 | SCREW ASSEMBLY, CLAMPING | | EA | 1 |
| B-1 | 9 | PAHZZ | 5305-00-054-6650 | MS51957-26 | 96906 | SCREW, MACHINE, RH: CRES, NO. 6-32 X 1/4 IN. LG | | EA | 1 |
| B-1 | 10 | PAOZZ | | 4110-034 | 70998 | THUMBSCREW | | EA | 1 |
| B-1 | 11 | XDHZZ | | 7500-083 | 70998 | CHAIN | | EA | 1 |
| B-1 | 12 | PAHZZ | 5305-00-054-5647 | MS51957-13 | 96906 | SCREW, MACHINE, BINDING HD: NO. 4-40 X 1/4 IN. LG | | EA | 8 |
| B-1 | 13 | PAFZZ | 5935-00-087-0647 | 4110-014 | 70998 | CONNECTOR, FEMALE BNC | | EA | 2 |
| B-1 | 14 | PAHZZ | 5305-00-054-6651 | MS51957-27 | 96906 | SCREW, MACHINE, BINDING HD: CRES, NO. 6-32 X 5/16 IN. LG | | EA | 4 |
| B-1 | 15 | XDHZZ | | 4110-035 | 70998 | BLOCK, CLAMPING | | EA | 1 |
| B-1 | 16 | PAHZZ | 5305-00-054-6651 | MS51957-27 | 96906 | SCREW, MACHINE, FIL HD: CRES, NO. 6-32 X 5/16 IN. LG | | EA | 4 |
| B-1 | 17 | PAHHH | 6625-00-995-2303 | 4110-002 | 70998 | LINE SECTION ASSEMBLY | | EA | 1 |
| B-1 | 18 | PAHZZ | 5330-00-995-2306 | 4110-057 | 70998 | GASKET, LINE SECTION | | EA | 1 |
| B-1 | 19 | PAHZZ | 5930-00-997-2481 | 5-454 | 70998 | SWITCH ASSEMBLY | | EA | 1 |
| B-1 | 20 | XDHZZ | | MB25082B7 | 96906 | NUT, HEX: BRS, 3/8-32 | | EA | 1 |
| B-1 | 21 | PAHZZ | 5310-00-180-0277 | MB35333-76 | 96906 | WASHER, LOCK, INT, TOOTH, NO. 8 | | EA | 1 |
| B-1 | 22 | PAHZZ | 5305-00-054-5636 | MS51957-2 | 96906 | SCREW, MACHINE, PAN HD: PHILLIPS, CRES, NO. 2-56 X 3/16 IN. LG | | EA | 4 |
| B-1 | 23 | XDHZZ | | 4110-036 | 70998 | PLATE, SWITCH | | EA | 1 |
| B-1 | 24 | PAHZZ | 5305-00-207-7468 | MS35214-16 | 96906 | SCREW, MACHINE, PAN HD: CRES, NO. 4-40 X 1/2 IN. LG | | EA | 4 |
| B-1 | 25 | PAHZZ | 6625-00-995-2299 | 4110-004 | 70998 | METER ASSEMBLY | | EA | 1 |
| B-1 | 26 | PAHZZ | 5905-00-010-5387 | 4110-045 | 70998 | THERMISTOR ASSEMBLY | | EA | 1 |
| B-1 | 27 | XDHZZ | | 2080-013 | 70998 | METER | | EA | 1 |
| B-1 | 28 | XDHZZ | | 2080-013-1 | 70998 | PLATE, METER (PART OF ITEM 27) | | EA | 1 |
| B-1 | 29 | XDHZZ | | 9808-192416 | 65029 | GASKET, METER (PART OF ITEM 27) | | EA | 1 |
| B-1 | 30 | PAHZZ | 5305-00-054-5651 | MS51957-17 | 96906 | SCREW, MAHCINE, PAN HD: PHILLIPS, CRES, NO. 2-56 X 3/16 IN LG | | EA | 4 |
| B-1 | 31 | XDHZZ | | 4110-058 | 70998 | PLATE, INDENTIFICATION | | EA | 1 |
| B-1 | 32 | XBHZZ | | 4110-025 | 70998 | CASE, METER | | EA | 1 |

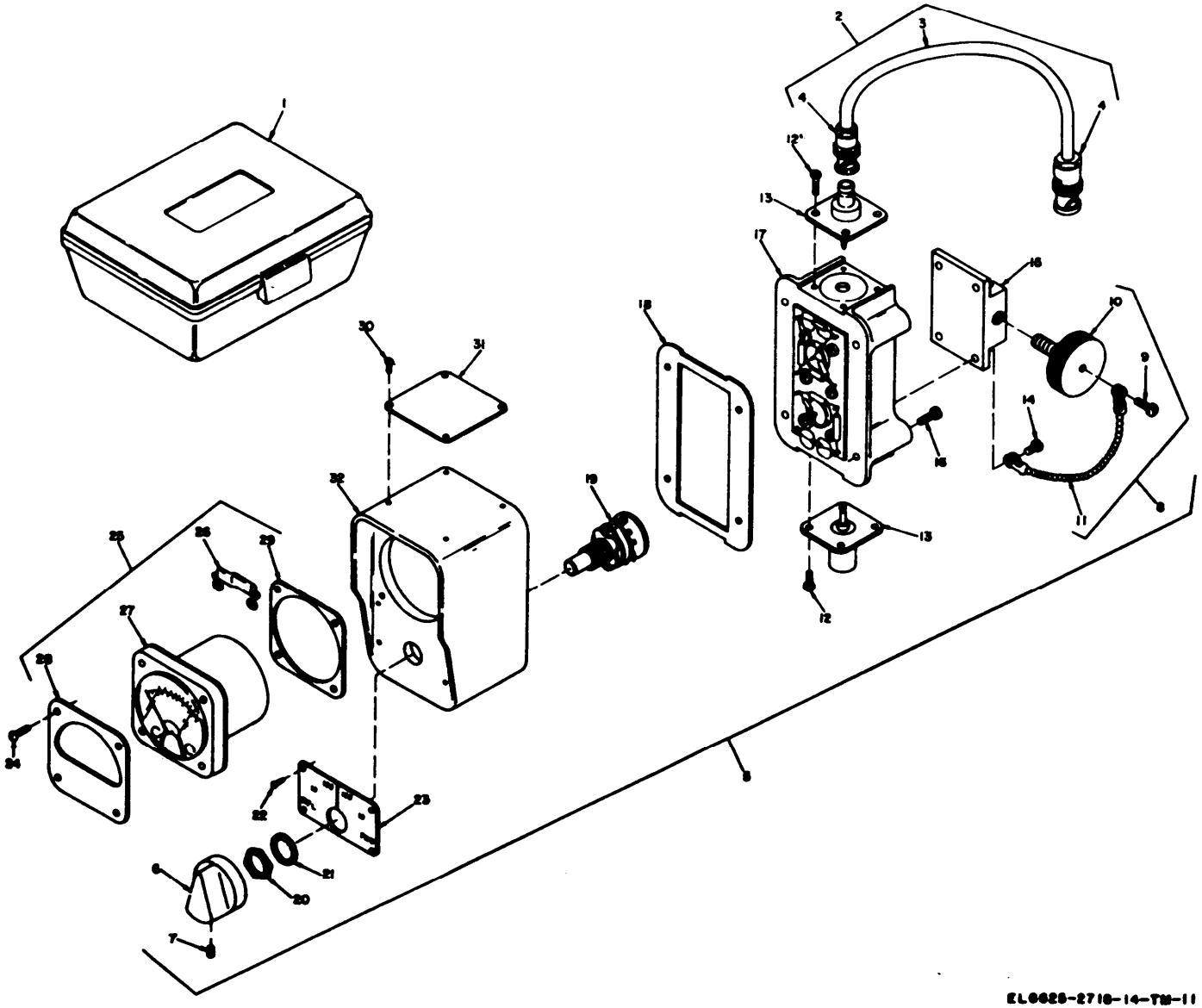


*Figure B-1. Test Set, Radio Frequency Power AN/URM-182, exploded view.*

| STOCK NUMBER | FIG NO | ITEM NO | STOCK NUMBER | FIG NO | ITEM NO |
|---|---|---|---|---|---|
| 5305-00-054-5636 | B-1 | 22 | | | |
| 5305-00-054-5647 | B-1 | 12 | | | |
| 5305-00-054-5651 | B-1 | 30 | | | |
| 5305-00-054-6650 | B-1 | 9 | | | |
| 5305-00-054-6651 | B-1 | 14 | | | |
| 5305-00-054-6651 | B-1 | 16 | | | |
| 5305-00-207-7468 | B-1 | 24 | | | |
| 5305-00-281-3118 | B-1 | 7 | | | |
| 5310-00-180-0277 | B-1 | 21 | | | |
| 5330-00-995-2306 | B-1 | 18 | | | |
| 5355-00-832-8905 | B-1 | 6 | | | |
| 5905-00-010-5387 | B-1 | 26 | | | |
| 5930-00-997-2481 | B-1 | 19 | | | |
| 5935-00-087-0647 | B-1 | 13 | | | |
| 5935-00-835-0508 | B-1 | 4 | | | |
| 6145-00-542-6092 | B-1 | 3 | | | |
| 6625-00-995-2299 | B-1 | 25 | | | |
| 6625-00-995-2303 | B-1 | 17 | | | |

SECTION IV. NATIONAL STOCK NUMBER AND PART NUMBER INDEX (CONTINUED)

| PART NUMBER | FSCM | FIG NO | ITEM NO | PART NUMBER | FSCM | FIG NO | ITEM NO |
|---|---|---|---|---|---|---|---|
| MS25082B7 | 96906 | B-1 | 20 | | | | |
| MS35214-16 | 96906 | B-1 | 24 | | | | |
| MS35333-76 | 96906 | B-1 | 21 | | | | |
| MS51021-32 | 96906 | B-1 | 7 | | | | |
| MS51957-13 | 96906 | B-1 | 12 | | | | |
| MS51957-17 | 96906 | B-1 | 30 | | | | |
| MS51957-2 | 96906 | B-1 | 22 | | | | |
| MS51957-26 | 96906 | B-1 | 9 | | | | |
| MS51957-27 | 96906 | B-1 | 14 | | | | |
| MS51957-27 | 96906 | B-1 | 16 | | | | |
| RG-58C/U | 81349 | B-1 | 3 | | | | |
| UG-880/U | 81349 | B-1 | 4 | | | | |
| 2080-013 | 70998 | B-1 | 27 | | | | |
| 2080-013-1 | 70998 | B-1 | 28 | | | | |
| 4110-002 | 70998 | B-1 | 17 | | | | |
| 4110-004 | 70998 | B-1 | 25 | | | | |
| 4110-014 | 70998 | B-1 | 13 | | | | |
| 4110-016 | 70998 | B-1 | 6 | | | | |
| 4110-025 | 70998 | B-1 | 32 | | | | |
| 4110-034 | 70998 | B-1 | 10 | | | | |
| 4110-035 | 70998 | B-1 | 15 | | | | |
| 4110-036 | 70998 | B-1 | 23 | | | | |
| 4110-045 | 70998 | B-1 | 26 | | | | |
| 4110-046 | 70998 | B-1 | 8 | | | | |
| 4110-057 | 70998 | B-1 | 18 | | | | |
| 4110-058 | 70998 | B-1 | 31 | | | | |
| 4110-065 | 70998 | B-1 | 2 | | | | |
| 4110-070 | 70998 | B-1 | 5 | | | | |
| 4110-120 | 70998 | B-1 | 1 | | | | |
| 5-454 | 70998 | B-1 | 19 | | | | |
| 7500-083 | 70998 | B-1 | 11 | | | | |
| 9808-192416 | 65029 | B-1 | 29 | | | | |

# APPENDIX C

# MAINTENANCE ALLOCATION

## Section I. INTRODUCTION

### C-1. General

This appendix provides a summary of the maintenance operations for AN/URM-182. 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.

### C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

*a. Inspect.* To determine the serviceability of an item by comparing its physical, mechanical, and /or electrical characteristics with established standards through examination.

*b. Test.* To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

*c. Service.* Operations required periodically to keep an item in proper operating condition, i. e., to clean, preserve, drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

*d. Adjust.* Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

*e. Align.* To adjust specified variable elements of an item to about optimum or desired performance.

*f. Calibrate.* To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

*g. Install.* The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment/system.

*h. Replace.* The act of substituting a serviceable like-type part, subassembly, model (component or assembly) for an unserviceable counterpart.

*i. Repair.* The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module /component/ assembly, end item or system.

*j. Overhaul.* That periodic maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

*k. Rebuild.* Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc. ) considered in classifying Army equipment/components.

### C-3. Column Entries

*a. Column 1, Group Number.* Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

*b. Column 2, Component/Assembly.* Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

*c. Column 3, Maintenance Functions.* Column 3 lists the functions to be performed on the item listed in column 2.

*d. Column 4, Maintenance Category.* Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of

maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown for each category. The number of man-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time and quality assurance/quality control time in additional to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C-Operator/Crew
O-Organizational
F-Direct Support
H-General Support
D-Depot

*e. Column 5, Tools and Equipment.* Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

**C-4. Tool and Test Equipment Requirements (Table C-1 )**

*a. Tool or Test Equipment Reference Code.* 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 or test equipment for the maintenance functions.

*b. Maintenance Category.* The codes in this column indicate the maintenance category allocated the tool or test equipment.

*c. Nomenclature.* This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

*d. National/NATO Stock Number.* This column lists the National/NATO stock number of the specific tool or test equipment.

*e. Tool Number.* This column lists the manufacturer's part number of the tool follow-d by the Federal Supply Code for manufacturers (5-digit) in parentheses.

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
TEST SET, RADIO FREQUENCY POWER AN/URM-182

| (1) GROUP NUMBER | (2) COMPONENT/ASSEMBLY | (3) MAINTENANCE FUNCTION | (4) MAINTENANCE CATEGORY | | | | | (5) TOOLS AND EQUIPMENT |
|---|---|---|---|---|---|---|---|---|
| | | | C | O | F | H | D | |
| 00 | TEST SET, RADIO FREQUENCY POWER AN/URM-182 | Inspect | | 0.5 | | | | |
| | | Test | | | 1.0 | 1.0 | | 1 thru 10 |
| | | Service | | 0.5 | | | | |
| | | Replace | | 0.5 | 0.5 | 1.0 | | 1 thru 10 |
| | | Repair | | 0.5 | 0.5 | 1.0 | | 1 thru 10 |
| | | Overhaul | | | | 1.0 | | 1,2,3,4,5,6,8,9, 10 |

TABLE C-1. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
TEST SET, RADIO FREQUENCY POWER AN/URM-182

| TOOL OR TEST EQUIPMENT REF CODE | MAINTENANCE CATEGORY | NOMENCLATURE | NATIONAL/NATO STOCK NUMBER | TOOL NUMBER |
|---|---|---|---|---|
| 1 | F,H | MULTIMETER, TS-352B/U | 6625-00-553-0142 | |
| 2 | H | RECEIVER-TRANSMITTER, RADIO RT-524/VRC | 5820-00-892-0622 | |
| 3 | F,H | TOOL KIT TK-100/G | 5180-00-605-0079 | |
| 4 | H | WATTMETER AN/URM-120 | 6625-00-813-8430 | |
| 5 | H | HANDSET H-189/GR<br>OR<br>H-138/U | 5965-00-069-8886<br>OR<br>5965-00-892-0972 | |
| 6 | H | DUMMY LOAD, ELECTRICAL DA-75/U | 6625-00-177-1639 | |
| 7 | 0 | TOOL KIT TK-101 | | |
| 8 | H | ADAPTER UG-201A/U | 5935-00-259-0205 | |
| 9 | H | ADAPTER, CONNECTOR UG-606/U | 5935-00-295-6295 | |
| 10 | H | CABLE ASSEMBLY, RADIO FREQUENCY CG-1773A/U | 5995-00-823-2986 | |

# GLOSSARY

**COAXIAL LINE-** A two conductor cable in which the one conductor surrounds and is insulated from an inner conductor.

**DUMMY LOAD-** An artificial load which accepts transmitter output, converting the rf power to heat. Used in place of an antenna during some transmitter rests.

**FORWARD POWER–** Power in a transmission line which moves from the transmitter to the load or antenna.

**HERTZ-** Cycles per second.

**MATCHED LOAD-** An electrical load which consumes full transmitter output, preventing any reflected power returning to the transmitter.

**MISMATCHED LOAD-** An electrical load whose ohmic value is not matched to the transmitter so that there is power reflected back to the transmitter.

**MHz-MEGAHERTZ-** One million hertz or one million cycles per second.

**REFLECTED POWER-** Traveling waves moving in a transmission line from the antenna or load back to the transmitter due to the ohmic mismatch of the load with the transmitter.

**STANDING WAVE-** Current and voltage distribution in a transmission line caused by two sets of waves traveling in opposite directions resulting in minimum and maximum stationary points.

**STANDING WAVE RATIO** The ratio of maximum current (or voltage) to the minimum current (or voltage) of standing waves in a transmission line.

**TRAVELING WAVE-** An electrical wave which moves through a transmission line in either a forward or reflected direction.

# INDEX

By Order of the Secretary of the Army:

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*General, United States Army,*
*Chief of Staff.*

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ARNG & USAR: None.
For explanation of abbreviations used, see AR 310-50.

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# THE METRIC SYSTEM AND EQUIVALENTS

## LINEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

## WEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

## LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

## SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

## CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

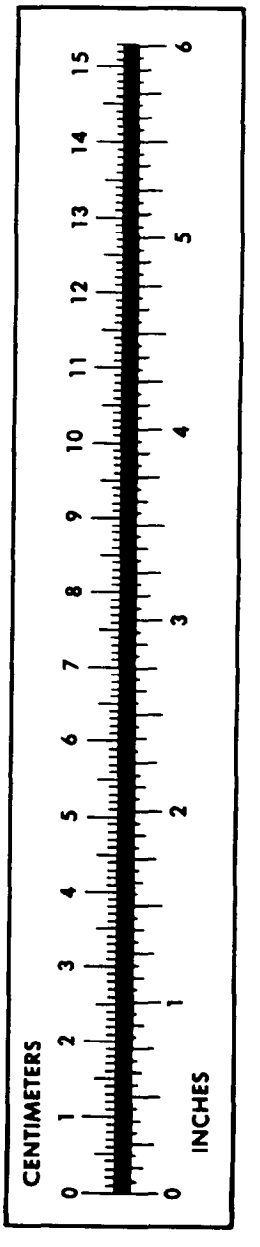
## TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

## APPROXIMATE CONVERSION FACTORS

| TO CHANGE | TO | MULTIPLY BY |
|---|---|---|
| Inches | Centimeters | 2.540 |
| Feet | Meters | 0.305 |
| Yards | Meters | 0.914 |
| Miles | Kilometers | 1.609 |
| Square Inches | Square Centimeters | 6.451 |
| Square Feet | Square Meters | 0.093 |
| Square Yards | Square Meters | 0.836 |
| Square Miles | Square Kilometers | 2.590 |
| Acres | Square Hectometers | 0.405 |
| Cubic Feet | Cubic Meters | 0.028 |
| Cubic Yards | Cubic Meters | 0.765 |
| Fluid Ounces | Milliliters | 29.573 |
| ıts | Liters | 0.473 |
| arts | Liters | 0.946 |
| allons | Liters | 3.785 |
| Ounces | Grams | 28.349 |
| Pounds | Kilograms | 0.454 |
| Short Tons | Metric Tons | 0.907 |
| Pound-Feet | Newton-Meters | 1.356 |
| Pounds per Square Inch | Kilopascals | 6.895 |
| Miles per Gallon | Kilometers per Liter | 0.425 |
| Miles per Hour | Kilometers per Hour | 1.609 |

| TO CHANGE | TO | MULTIPLY BY |
|---|---|---|
| Centimeters | Inches | 0.394 |
| Meters | Feet | 3.280 |
| Meters | Yards | 1.094 |
| Kilometers | Miles | 0.621 |
| Square Centimeters | Square Inches | 0.155 |
| Square Meters | Square Feet | 10.764 |
| Square Meters | Square Yards | 1.196 |
| Square Kilometers | Square Miles | 0.386 |
| Square Hectometers | Acres | 2.471 |
| Cubic Meters | Cubic Feet | 35.315 |
| Cubic Meters | Cubic Yards | 1.308 |
| Milliliters | Fluid Ounces | 0.034 |
| Liters | Pints | 2.113 |
| Liters | Quarts | 1.057 |
| ers | Gallons | 0.264 |
| ms | Ounces | 0.035 |
| ograms | Pounds | 2.205 |
| Metric Tons | Short Tons | 1.102 |
| Newton-Meters | Pounds-Feet | 0.738 |
| Kilopascals | Pounds per Square Inch | 0.145 |
| lometers per Liter | Miles per Gallon | 2.354 |
| meters per Hour | Miles per Hour | 0.621 |



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