DEPARTMENT OF THE ARMY TECHNICAL MANUAL

# OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

# TEST SETS TS-538/U, TS-538A/U, TS-538B/U, AND TS-538C/U

Headquarters, Department of the Army, Washington 25, D.C.

2 October 1963

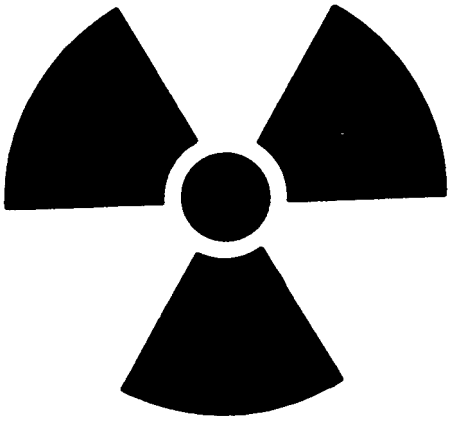
**WARNING**

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 160-volt cathode follower, rectifier, and amplifier circuits, or on the 117-volt ac line connections.

**DON'T TAKE CHANCES!**

**RADIATION HAZARD**



Ni 63 or Co 60

Tube type OB2WA used in this equipment contains radioactive material (para 4). This tube is potentially hazardous when broken; see qualified medical personnel and the Safety Director if you are exposed to or cut by a broken tube. Use extreme care in replacing this tube (para 31) and follow safe procedures in its handling, storage, and disposal (para 35).

Never place a radioactive tube in your pocket.

Use extreme care not to break a radioactive tube while handling it.

Never remove a radioactive tube from its carton until you are ready to use it.

Refer to paragraph 35 on handling, storage, and disposal of radioactive material.

*This manual supersedes so much of TM 11-5014, dated 3 May 1957, including C1, 16 September 1957, and C4. 22 March 1962, as is applicable to operation and organizational maintenance of this equipment.

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

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *2 July 1974*

# Operator and Organizational Maintenance Manual

# TEST SETS TS-538/U, TS-538A/U, TS-538B/U, AND TS-538C/U

TM 11-6625-213-12, 2 October 1963, is changed as follows:

*Page 5.* After paragraph 1, add:

## 1.1. 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.

Delete paragraph 2 and substitute:

## 2. 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 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58/NAVSUP PUB 378/AFR 71-4/MCO P4030.29, 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 4610.33/AFM 75-18/MCO P4610.19A, and DSAR 4500.15.

## 2.1. Reporting of Errors

Report 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-S, Fort Monmouth, NJ 07703.

*Page 7.* Delete paragraph 5 and substitute:

## 5. Items Comprising an Operable Equipment

| *FSN* | *QTY* | *Nomenclature, No., and mfr code* | *Fig. No.* |
|---|---|---|---|
| 6625-243-5174 | 1 | Test Set TS-538/U, TS-538A/U, TS-538B/U, and TS-538C/U; which includes: | 1 |
| | | NOTE<br>The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, or Government agency, etc. | |
| 6625-230-5471 | 1 | Antenna: SC-B-93850; 80063 | 1 |
| 6625-502-6077 | 1 | Cable Assembly, Power Electrical CX-337/U | 1 |
| 5995-644-0389 | 1 | Cable Assembly, Radio Frequency CG-299A/U | 1 |

*Page 11*, paragraph 10*b*. Delete the last sentence of subparagraph *b*.

*Page 28*. Delete appendix III and substitute:

# APPENDIX III
# BASIC ISSUE ITEMS LIST (BIIL) AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST (ITIAL)

## Section I. INTRODUCTION

### 1. Scope

This appendix lists only items troop installed or authorized required by the crew/operator for installation, operation, and maintenance of Test Sets TS-538/U, TS-538A/U, TS-538B/U, and TS-538C/U.

### 2. General

This Basic Issue Items and Items Troop Installed or Authorized List is divided into the following sections:

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

*b. Items Troop Installed or Authorized List – Section III.* A list, in alphabetical sequence, of items which, at the discretion of the unit commander, may accompany the end item, but are not subject to be turned in with the end item.

### 3. Explanation of Columns

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

*a. Illustration.* Not applicable.

*b. Federal Stock Number.* Indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

*c. 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.

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

*e. Description.* Indicates the Federal item name and a minimum description required to identify the item.

*f. Unit of Measure (U/M).* Indicates the standard of 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.

*g. Quantity Authorized (Items Troop Installed or Authorized Only).* Indicates the quantity of the item authorized to be used with the equipment.

## Section III ITEMS TROOP INSTALLED OR AUTHORIZED LIST

| (1) Federal stock number | (2) Part number | (3) FSCM | (4) Description / Usable on code | (5) Unit of meas | (6) Qty auth |
|---|---|---|---|---|---|
| 5120-408-2313 | SC-B-93210 | 80063 | WRENCH, SPANNER | EA | 1 |

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
*General, United States Army*
*Chief of Staff*

Official:
VERNE L. BOWERS
*Major General, United States Army*
*The Adjutant General*

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Ft Huachuca (5)
Ft Carson (5)
WSMR (1)
USASESS (5)
Svc Colleges (1)
USAFAS (5)
Ft Richardson (ECOM Ofc) (1)
AD (1) except
SAAD (30)
TOAD (14)
ATAD (10)
LBAD (10)
USA Dep (1)
Sig Sec USA Dep (2)
Sig Dep (2)
DPG (1)
JPG (2)
USAERDAA (1)
USAERDAW (1)
Sig FLDMS (1)
Units org under fol TOE: — 1 ea.
6-100
6-185
6-186
6-200
6-201
6-300
6-302
6-525
6-526
6-575
6-576
6-700
6-701
7
7-100
11-95
11-117
11-500(AA-AC)
17
17-100
29-134
29-136
37
37-100
39-51
57
67

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

CHANGE
NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *13 September 1978*

# Operator's and Organizational Maintenance Manual TEST SETS TS-538/U, TS-538A/U, TS-538B/U, and TS-538C/U (NSN 6625-00-243-5174)

TM 11-6625-213-12, 2 October 1963, is changed as follows:

The title of the manual is changed as shown above.

*Page 5.* Paragraph 2.1 is superseded as follows:

## 2.1. Reporting of Errors

Report 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 directly to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703.

Add paragraphs 2.2 and 2.3:

## 2.2. Report Equipment Improvement Recommendations (EIR)

EIR's will be prepared using SF 368 (Reporting Quality Deficiencies). Instructions for preparing EIR's are provided in TM 38-750, the Army Maintenance Management System. EIR's should be mailed directly to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. A reply will be furnished directly to you.

## 2.3. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

*Page 26.* Delete appendix II and substitute:

# APPENDIX II
# MAINTENANCE ALLOCATION

## Section I. INTRODUCTION

### II-1. General

This appendix provides a summary of the maintenance operations for TS-538(*)/U. 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.

### II-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 (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydrau-

lic fluids, or compressed air supplies.

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

*e. Align.* To adjust specified variable elements of an item to bring 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 equipments used in precision measurement. Consists of comparisons 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 or system.

*h. Replace.* The act of substituting a serviceable like type part, subassembly, or module (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 or assembly), end item, or system.

*j. Overhaul.* That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) 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 equipments/components.

## II-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. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

*d. Column 4, Maintenance Category.* Column 4 specifies, by the listing of a "work time" 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 "work time" figures will be shown for each category. The number of task-hours specified by the "work time" 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 addition 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.

*f. Column 6, Remarks.* Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

## II-4. Tool and Test Equipment Requirements (sec III)

*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 followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

## II-5. Remarks (sec IV)

*a. Reference Code.* This code refers to the appropriate item in section II, column 6.

*b. Remarks.* This column provides the required explanatory information necessary to clarify items appearing in section II.

## SECTION II MAINTENANCE ALLOCATION CHART FOR

TEST SET TS-538(*)/U

| (1) GROUP NUMBER | (2) COMPONENT/ASSEMBLY | (3) MAINTENANCE FUNCTION | (4) MAINTENANCE CATEGORY | | | | | (5) TOOLS AND EQPT. | (6) REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | C | O | F | H | D | | |
| 00 | TEST SET TS-538(*)/U | Repair | 0.1 | | | | | | A |
| | | Repair | | 0.7 | | | | 12 | B |
| | | Repair | | | 1.0 | | | 1,2,3,5, 6,11,13, 14,15 | |
| | | Calibrate | | | 1.0 | | | | C |
| | | Test | | | | 1.0 | | 1 thru 8, 10,11,13, 14,15 | |
| | | Overhaul | | | | | 40.0 | 1 thru 9, 11,13,14, 15 | |
| 01 | TEST SET ASSEMBLY (1A3) | Repair | 0.1 | | | | | | A |
| | | Repair | | 1.0 | | | | 12 | B |
| | | Repair | | | 1.0 | | | 1,2,3,5, 6,11,13, 14,15 | |
| 0101 | CAPACITOR-RESISTOR ASSEMBLY (1A3A5) | Repair | | | 0.8 | | | 11,13,14 | |
| 0102 | CAPACITOR-RESISTOR ASSEMBLY (1A3A6) | Repair | | | 0.8 | | | 11,13,14 | |
| 0103 | CAPACITOR-RESISTOR ASSEMBLY (1A3A8) | Repair | | | 0.8 | | | 11,13,14 | |
| 0104 | RESISTOR ASSEMBLY (1A3A15) | Repair | | | 0.8 | | | 11,13,14 | |
| 0105 | WAVE GUIDE ASSEMBLY (1A3A17) | Repair | | 1.0 | | | | 12 | B |
| | | Repair | | | 1.0 | | | 2,3,6,13, 14 | |
| 0106 | OSCILLATOR, RADIO FREQUENCY ASSEMBLY (1A3A12) | Repair | | | 1.2 | | | 2,3,11, 13,14,15 | |
| 0107 | ATTENUATOR, VARIABLE ASSEMBLY (1A3AT1) | Repair | | | 0.9 | | | 11,13,14 | |
| 02 | CABLE ASSEMBLY, RF, CG-299A/U | Replace | | 0.1 | | | | | |
| | | Repair | | | 0.5 | | | 5,13,14 | |
| 03 | CABLE ASSEMBLY, POWER, ELECTRICAL CX-337/U | Replace | | 0.1 | | | | | |
| | | Repair | | | 0.5 | | | 5,13,14 | |

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR

TEST SET TS-538(*)/U

| TOOL OR TEST EQUIPMENT REF CODE | MAINTENANCE CATEGORY | NOMENCLATURE | NATIONAL/NATO STOCK NUMBER | TOOL NUMBER |
|---|---|---|---|---|
| 1 | F, H, D | GENERATOR, SIGNAL AN/URM-127 | 6625-00-783-5965 | |
| 2 | F, H, D | COUNTER, ELECTRONIC CP-772A/U | 6625-00-973-4837 | |
| 3 | F, H, D | FREQUENCY CONVERTER CV-2003B/U | 6625-00-941-8474 | |
| 4 | H, D | LIGHT ASSEMBLY, ELECTRIC MX-1292/PAQ | 6695-00-378-5449 | |
| 5 | F, H, D | MULTIMETER TS-352B/U | 6625-00-553-0142 | |
| 6 | F, H, D | OSCILLISCOPE AN/USM-281C | 6625-00-106-9622 | |
| 7 | H, D | GENERATOR, SIGNAL AN/URM-64A-2 | 6625-00-087-4795 | |
| 8 | H, D | TRANSFORMER, VARIABLE CN-16/U | 5950-00-235-2086 | |
| 9 | D | TEST SET, ELECTRON TUBE TV-2/U | 6625-00-669-0263 | |
| 10 | H | TEST SET, ELECTRON TUBE TV-7D/U | 6625-00-820-0064 | |
| 11 | F, H, D | TEST SET, RADIO FREQUENCY POWER AN/URM-98 | 6625-00-566-4990 | |
| 12 | O | TOOL KIT, ELECTRONIC EQUIPMENT TK-101/GSQ | 5180-00-064-5178 | |
| 13 | F, H, D | TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G | 5180-00-605-0079 | |
| 14 | F, H, D | TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G | 5180-00-610-8177 | |
| 15 | F, H, D | WRENCH, SPANNER | 5120-00-408-2313 | |

## SECTION IV. REMARKS

| REFERENCE CODE | REMARKS |
|---|---|
| A | BY REPLACING FUSES |
| B | BY REPLACING V1, V2, V3, V5, CR2 ANDCABLES |
| C | CALIBRATE AND USE TEST EQUIPMENT SPECIFIED IN TB 11-6625-213-35 |

By Order of the Secretary of the Army:

BERNARD W. ROGERS
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*Chief of Staff*

Official:

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*The Adjutant General*

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Fort Carson (5)
Fort Gillem (10)
Fort Gordon (10)
Ft Huachuca (10)
Ft Richardson (CERCOM Ofc) (2)
Army Dep (1) except
LBAD (14)
SAAD (30)
TOAD (14)
SHAD (3)
USA Dep (1)
Sig Sec USA Dep (1)
Units org under fol TOE:
29-207 (2)
29-610 (2)
6-100 (1)
6-185 (1)
6-186 (1)
6-200 (1)
6-201 (1)
6-300 (1)
6-302 (1)
6-525 (1)
6-526 (1)
6-575 (1)
6-576 (1)
6-700 (1)
6-701 (1)
7 (1)
7-100 (1)
11-95 (1)
11-117 (1)
11-500 (AA-AC) (1)
17 (1)
17-100 (1)
29-134 (1)
29-136 (1)
37 (1)
37-100 (1)
39-51 (1)
57 (1)
67 (1)

*NG:* None
*USAR:* None
For explanation of abbreviations used see, AR 310-50



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TM 11-6625-213-12
C3

CHANGE
No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *4 April 1985*

# Operator's and Organizational Maintenance Manual
# TEST SETS TS-538/U, TS-538A/U, TS-538B/U AND TS-538C/U
# (NSN 6625-00-243-5174)

TM 11-6625-213-12, 2 October 1963, is changed as follows:

*Page 5.* Paragraph 1.1 is added after paragraph 1.

### 1.1. Consolidated Index of Army Publications and Blank Forms

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additional publications pertaining to the equipment.
Paragraphs 2,2.1 and 2.2 are superseded as follows:

### 2. Maintenance Forms, Records, and Reports

*a. Reports of Maintenance and Unsatisfactory Equipment.* Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in Maintenance Management Update.

*b. Report of Packaging and Handling Deficiencies.* Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73A/AFR 400-54/MCO 4430.3F.

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 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

### 2.1. Reporting Errors and Recommending Improvements

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007. In either case, a reply will be furnished direct to you.

### 2.2. Reporting Equipment Improvement Recommendations (EIR)

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007. We'll send you a reply.

*Page 7.* Paragraph 5 is superseded as follows:

### 5. Items Comprising an Operable Equipment

| *NSN* | *Qty* | *Nomenclature, No., and mfr code* | *Fig. No.* |
|---|---|---|---|
| 6625-00-243-5174 | 1 | Test Set TS-538/U, TS-538A/U, TS-538B/U, and TS-538C/U; which includes: | 1 |
| | | **NOTE** The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, or Government agency, etc. | |
| 6625-00-230-5471 | | Antenna: SC-B-93850, 80063 | 1 |
| 6625-00-502-6077 | | Cable Assembly, Power Electrical CX-337/U | 1 |
| 5995-00-644-0389 | | Cable Assembly, Radio Frequency CG-299A/U | 1 |

*Page 11.* Paragraph 10c. The note after subparagraph *c* is superseded as follows:

**NOTE**

Current MWOs applicable to the equipment are listed in DA Pam 310-1.

*Page 17.* Paragraph *18b.* In the last sentence, change "TM 38-750" to "DA Pam 738-750".

*Pages 17 and 18.* Paragraph 20. Items 6 through 9 are deleted and superseded by items 6,7, and 8 as follows:

| *Sequence No.* | *Item* | *Procedure* | *Reference* |
|---|---|---|---|
| *6* | Connectors | Check to assure that the antenna can be screwed into the receptacle at the top of the test set. Check that the rf cable will attach to J1 on the right side, and that the ac power cable will connect properly to the connector on the front panel. (Remove the antenna after check.) | |
| 7 | Equipment performance | Check the equipment performance. | Paragraph 13. |
| 8 | Stop | Perform stopping procedure. | Paragraph 16. |

*Page 19.* Paragraph *25b.* In last sentence, change "TM 38-750" to "DA Pam 738-750".

Paragraph 27, line 1 of chart. Delete "(appx III)" in procedure column and add in reference column "Para 5".

Paragraph 27. Items 10 through 14 are superseded as follows:

| *Sequence No.* | *Item* | *Procedure* | *Reference* |
|---|---|---|---|
| 10 | Connectors | Check to assure that the antenna can be screwed into the receptacle at the top of the test set. Check that the rf cable will attach to J1 on the right side, and that the ac power cable will connect properly to the connector on the front panel. (Remove the antenna after check.) | |
| 11 | Equipment performance | Check the equipment performance. | Paragraph 27.1. |
| 12 | Stop | Perform stopping procedure. | Paragraph 16. |
| 13 | Spare parts | 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. | Appendix III. |

Paragraph 27.1 is added after paragraph 27.

## 27.1 Operational Tests

| *Step* | *Action or Condition* | *Normal Condition* | *Corrective Measures* |
|---|---|---|---|
| 1 | Connect the test set to the rawin set receiver as illustrated in figure *8.* | | |
| 2 | Perform the starting procedure steps as prescribed in paragraph 13a. | | |
| 3 | Apply power to both the receiver and the test set and place the POWER switches to ON. | | |
| 4 | Depress the CRYSTAL CHECK switch. | The POWER MONITOR meter should deflect to the SET POWER point. | Perform the crystal calibration as described in paragraph 32.1.<br>Replace crystal CR2 (para 32). |
| 5 | Rotate the RF POWER SET control fully clockwise, then rotate the OSCILLATOR FREQUENCY control from one limit to the other. | The indication on the POWER MONITOR meter should not drop below the SET POWER point for any frequency setting. | Replace V5.<br>Replace V6.<br>Inform higher category of maintenance. |
| 6 | Set the OSCILLATOR FREQUENCY control to the center (zero) mark. Use the FREQUENCY METER to measure the rf value. | The measured value should be 1,680 ± 1 megahertz. | Aline dial (para 32.2). |
| 7 | Tune the receiver to 1,680 as prescribed in TM 11-6660-206-12. Set the OUTPUT POWER control to -40 dbm and observe the TUNING METER on the rawin set receiver. | The receiver TUNING meter should indicate 60 to 80 units. | Check operation of the receiver.<br>Check mixer and cabling.<br>Check OUTPUT POWER setting.<br>Inform higher category of maintenance. |
| 8 | Vary the OUTPUT POWER control | The receiver TUNING meter indication should increase as the control is turned clockwise; the indication should decrease as the control is turned counterclockwise. | Inform higher category of maintenance. |

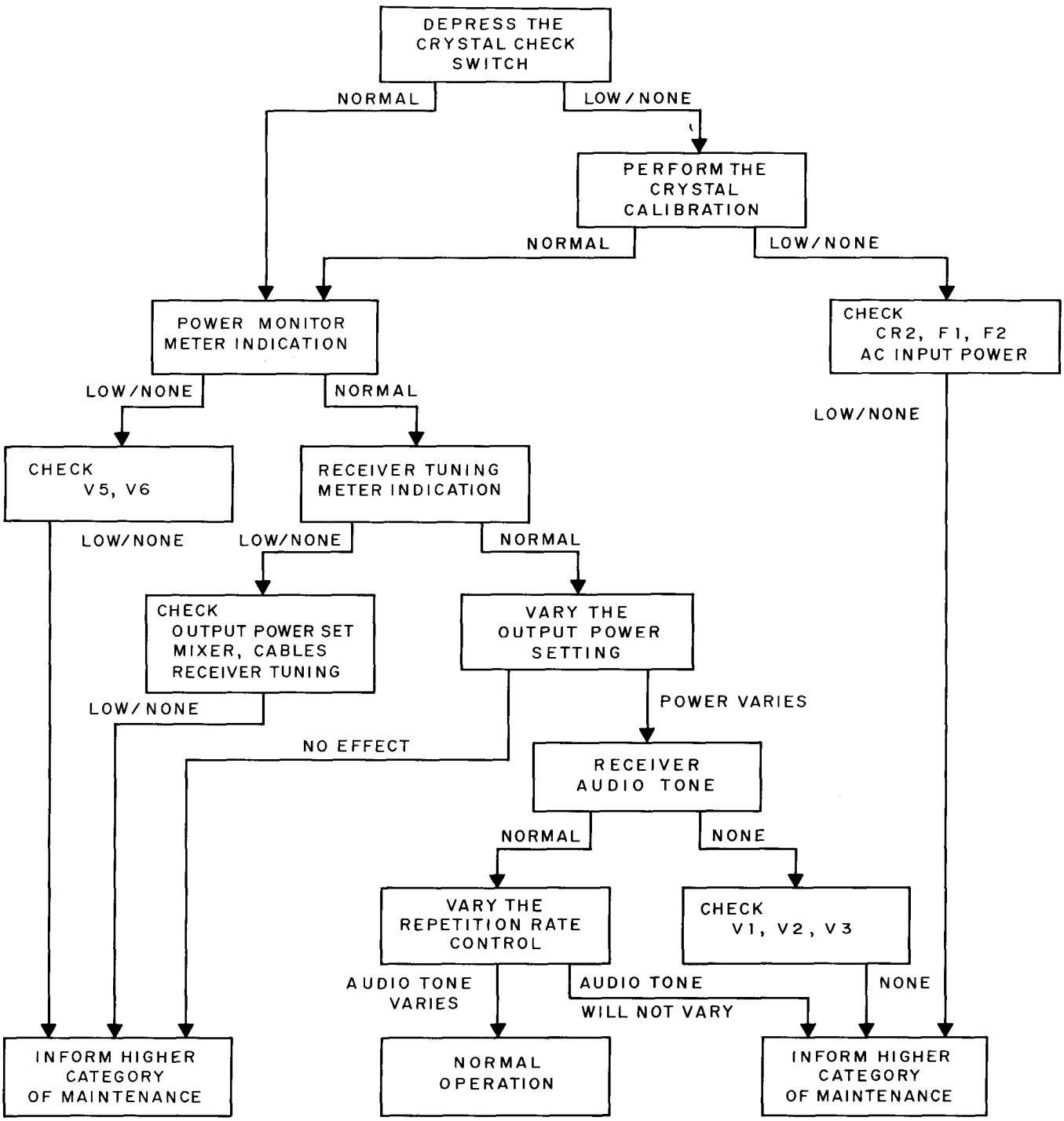
27.1 Operational Tests-Continued

| *Step* | *Action or Condition* | *Normal Condition* | *Corrective Measures* |
|---|---|---|---|
| 9 | Place the MODULATION switch to ON, back to OFF, then back to the ON position. | An audio tone is produced by the receiver loudspeaker when the switch is ON; no audio is produced when the switch is OFF. | Replace tubes V1, V2, or V3. Inform higher category of maintenance. |
| 10 | Vary the REPETITION rate control (audio frequency). | The audio tone produced by the receiver should correspond to the PRF (pulse repetition frequency) indicated by the dial of the test set. | Inform higher category of maintenance. |

*Page 20.* Paragraph 29 is superseded as follows:

29. General Troubleshooting Information

Troubleshooting this equipment is best performed by connecting the test set and the rawin set receiver as when performing the receiver sensitivity check. The sequence of troubleshooting is based on the operational test (para 27.1) and is presented as a flow chart in figure 9.1. To troubleshoot the equipment, perform the preliminary setup described in figure 9.1, then perform the step indicated by the top block (DEPRESS THE CRYSTAL CHECK SWITCH). Based on the symptoms obtained by this check, perform the second troubleshooting step. Continue through each step of the chart until the trouble is located or there is a need to inform higher category of maintenance.
Figure 9.1 is added after paragraph 29.




PRELIMINARY SETUP:

1. CABLE THE TEST SET TO THE RECEIVER AS WHEN PERFORMING A RECEIVER SENSITIVITY CHECK.
2. APPLY POWER TO BOTH THE TEST SET AND RECEIVER. ALLOW SUFFICIENT WARM-UP TIME.
3. SET THE OSCILLATOR FREQUENCY CONTROL TO 1,680 Mhz.
4. SET THE RF POWER SET CONTROL TO MAXIMUM CLOCKWISE POSITION.
5. TURN THE RECEIVER TO 1,680 Mhz.

EL9MZ003

*Figure 9.1. Troubleshooting Chart.*

Paragraph 30 is deleted in its entirety.

*Page 21.* Paragraphs 32.1 and 32.2 are added after paragraph 32.

### 32.1. Crystal Calibration

*a.* Connect the power cable to a 117-volt ac source and to the test set, and place the POWER switch to the ON position.

*b.* Depress the CRYSTAL CHECK switch to the left. The power monitor meter should deflect to the SET POWER point. If the meter indicates zero, replace the crystal (para 32). If the meter provides an indication, but is not at the SET POWER point, adjust crystal calibrate screwdriver control R17 (located just below the frequency meter inside the test set) until the power monitor meter is exactly at the SET POWER point.

### 32.2. Alinement of OSCILLATOR FREQUENCY Dial

If the OSCILLATOR FREQUENCY dial does not indicate the rf oscillator frequency, binds, or rotates past the mechanical limits, the position of the dial on the shaft must be changed.

*a.* Rotate the dial through its range of operation. The dial must not bind and the limit stop must engage at both the upper and lower limit.

*b.* Measure the oscillator frequency by following the procedures in paragraphs 13a and 13b(1) through (6). When the dial indicates zero, the measured frequency should be 1,680 ± 1 Megahertz.

*c.* As necessary, aline the dial on the shaft as follows:

(1) Loosen the two setscrews securing the dial onto the shaft.

(2) Position the dial so that the zero mark is alined with the pointer.

(3) Tighten one of the setscrews.

(4) Recheck step a above. As necessary, loosen the setscrew and slide the dial in or out on the shaft to provide proper operation. Again tighten one setscrew.

(5) Repeat steps *a*, *b*, and *c* above as necessary, then tighten the remaining setscrew.

*Page 22.* Figure 11 is superseded as follows:

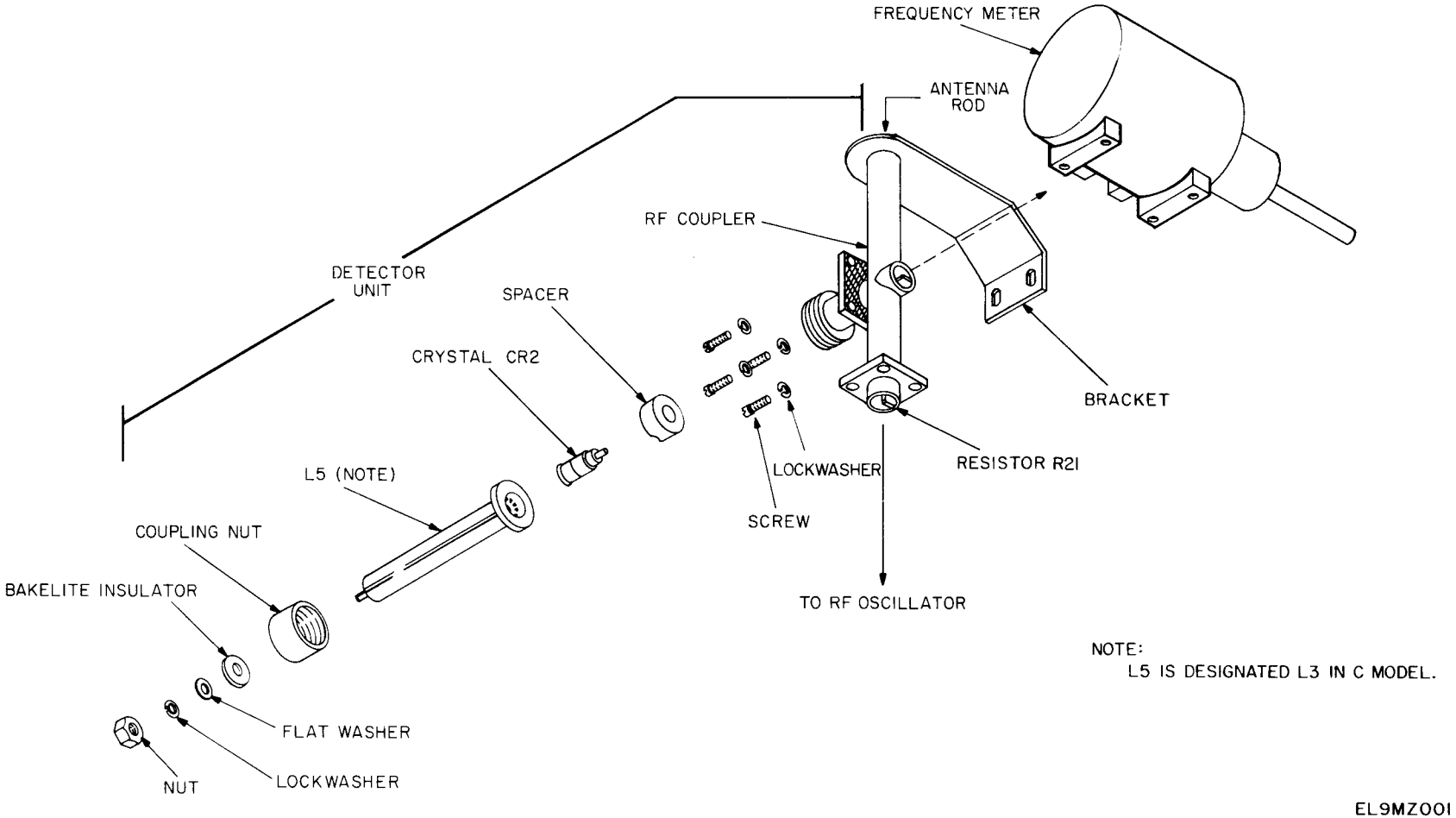



*Figure 11. Frequency Meter and Detector Unit Assembly, Exploded View.*

Figure 11.1 is added after figure 11.

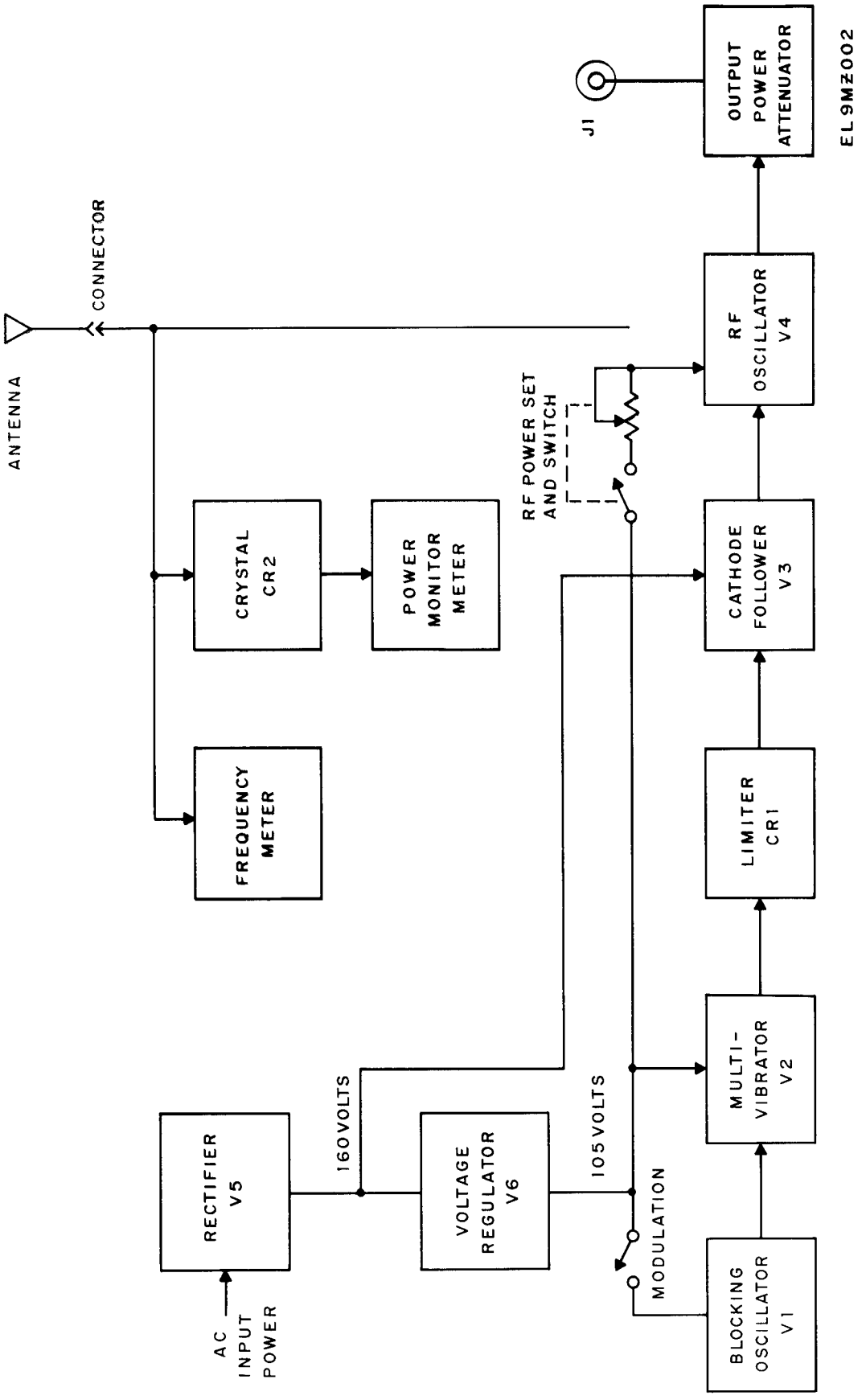



*Figure 11.1. Test Set TS-538(*)/U, Block Diagram.*

*Page 25.* Appendix I is superseded as follows:

## APPENDIX I

## REFERENCES

| | |
|---|---|
| AR 735-11-2 | Reporting of Item and Packaging Discrepancies. |
| DA Pam 310-1 | Consolidated Index of Army Publications and Blank Forms. |
| DA Pam 738-750 | The Army Maintenance Management System (TAMMS). |
| MIL-M-19590B | Marking of Commodities and Containers to Indicate Radioactive Material. |
| MIL-STD-129B | Marking for Shipment and Storage. |
| SB 38-100 | Preservation, Packaging, Packing and Marking Materials, Supplies and Equipment used by the Army. |
| TB-0116 | Identification of Radioactive Items in the Army Supply System. |
| TM 11-6625-213-20P | Organizational Maintenance Repair Parts and Special Tools Lists: Test Sets TS-538/U, TS-538A/U, TS-538B/U, and TS-538C/U (NSN 6625-00-243-5174). |
| TM 11-6660-206-12 | Operator's and Organizational Maintenance Manual, Rawin Sets AN/GMD-1A and AN/GMD-1B. |
| TM 11-6660-228-10 | Operator's Manual, Radiosonde Sets AN/AMT-4D and AN/AMT-4E (NSN 6660-00-542-1964). |
| TM 43-0139 | Painting Instructions for Field Use. |

By Order of the Secretary of the Army:

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*Chief of Staff*

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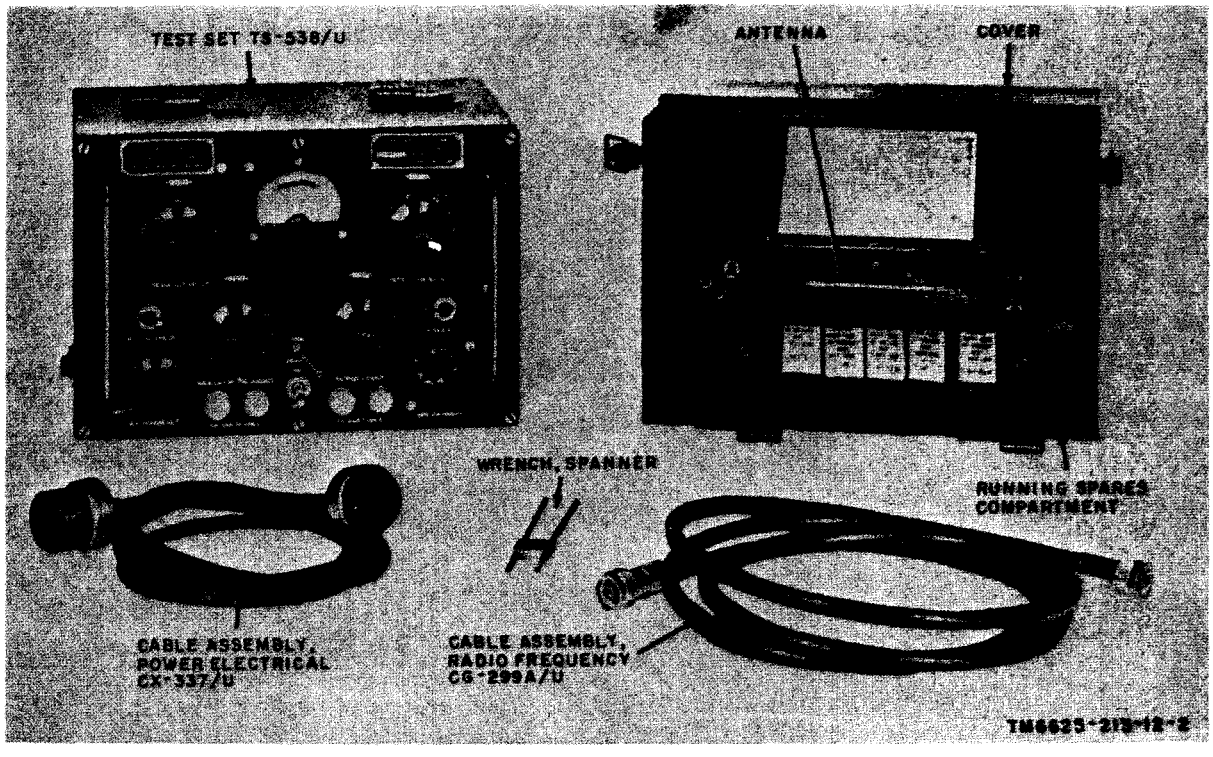


*Figure 1. Test Set TS-538(*)/U.*

# CHAPTER 1

# INTRODUCTION

## Section I. GENERAL

### 1. Scope

*a.* This manual describes Test Sets TS-538/U, TS-538A/U, TS-538B/U, and TS-538C/U (fig. 1) and covers their installation, operation, and operator's and organizational maintenance. It includes cleaning and inspection of the equipment, and replacement of parts available to first and second echelon maintenance.

*b.* Official nomenclature that includes (*) is used to designate all models of the equipment covered in this manual. Thus, Test Set TS-538(*)/U represents Test Set TS-538/U, Test Set TS-538A/U, Test Set TS-538B/U, and Test Set TS-538C/U; Radiosonde AN/AMT-4(*) represents Radiosonde AN/AMT-4, Radiosonde AN/AMT-4A, Radiosonde AN/AMT-4B, Radiosonde AN/AMT-4C, and Radiosonde Set AN/AMT-4D; Rawin Set AN/GMD-1(*) represents Rawin Set AN/GMD-1A and Rawin Set AN/GMD-1B; Rawin Receiver R-301(*)/GMD-1 represents Rawin Receiver R-301A/GMD-1, Rawin Receiver R-301B/GMD-1, Rawin Receiver R-301C/GMD-1, and Rawin Receiver R-301D/GMD-1; and Radiosonde Transmitter T-304(*)/AMT-4A represents Radiosonde Transmitter T-304/AMT-4A and Radiosonde Transmitter T-304A/AMT-4A.

### 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 by the individual user of errors, omissions, and recommendations for improving this equipment manual is authorized and encouraged. DA Form 2028 will be used for reporting these improvements. This form may be completed using pencil, pen, or typewriter. DA Form 2028 will be completed in triplicate and forwarded by the individual using the manual. The original and one copy will be forwarded direct to: Commanding Officer, U.S. Army Electronics Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, New Jersey, 07703. One information copy will be furnished to the individual's immediate supervisor (officer, noncommissioned officer, supervisor, etc).

*d. Index of Publications.* Refer to the later issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to your equipment. Department of the Army Pamphlet 310-4 is an index of current technical manuals, technical bulletins, supply bulletins, lubrication orders, and modification work orders which are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc) and the latest changes and revisions of each equipment publication.

## Section II. DESCRIPTION AND DATA

### 3. Purpose and Use

*a.* Test Set TS-538(*)/U is designed primarily to measure the performance characteristics of the rawinsonde system that includes Radiosonde AN/AMT-4(*) and Rawin Set AN/GMD-1(*). In this application, it is used to:

(1) Measure the frequency and power

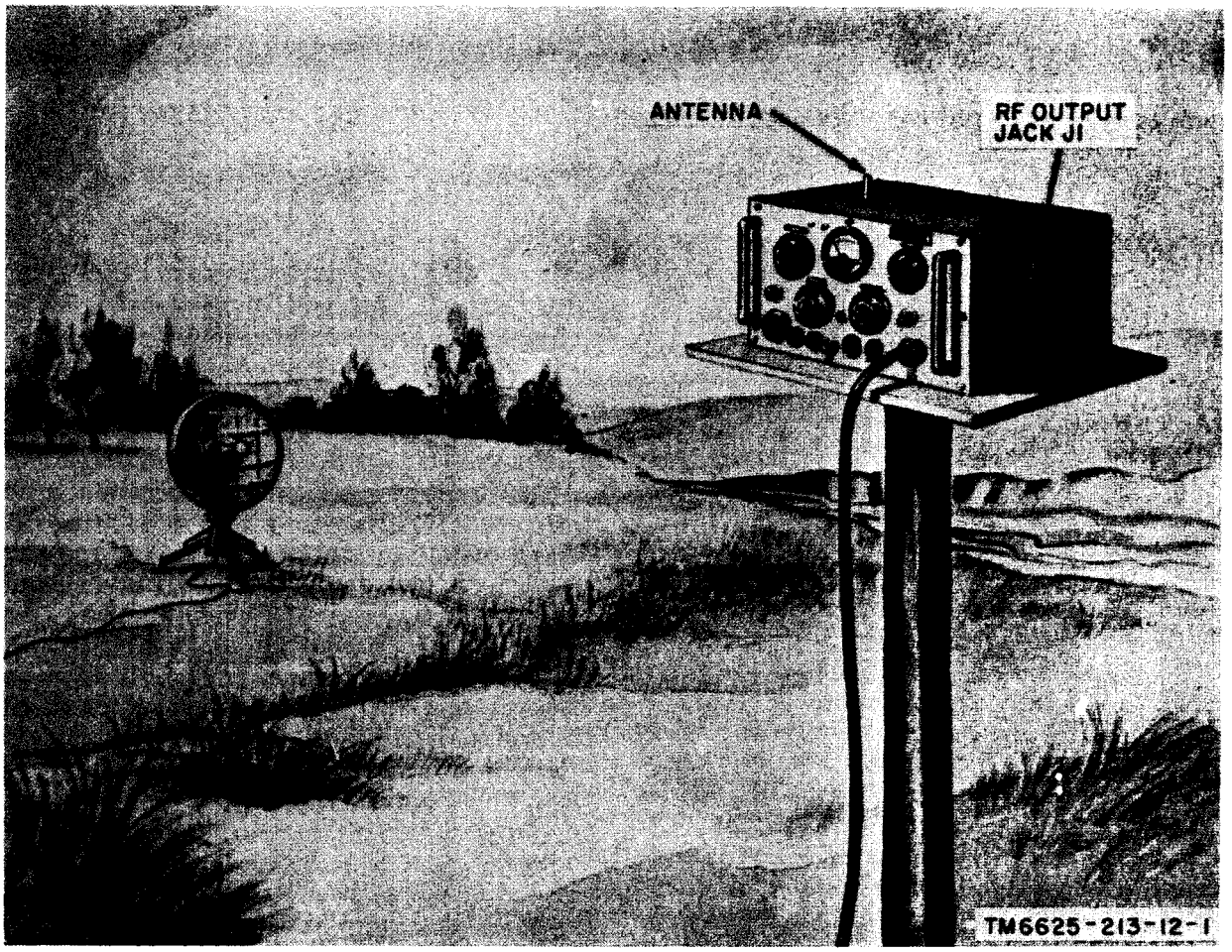


*Figure 2. Test Set TS-538(*)/U in use.*

output of Radiosonde Transmitters T-304(*)/AMT-4A and T-435/AMT-4B.

(2) Measure the sensitivity, bandwidth, and tracking accuracy of Rawin Set AN/GMD-1(*).

*b.* Test SetTS-538(*)/U may also be used for similar purposes with any transmitter and/or receiver that operates within its frequency range (para 4). Figure 2 shows a typical application.

## 4. Technical Characteristics

| | |
|---|---|
| Rf oscillator frequency range | 1,630 to 1,730 mc in TS-538/U, TS-538A/U, and TS-538B/U; 1,615 to 1,715 mc in TS-538C/U. |
| Types of rf output | Cw or interrupted cw. |
| Duration of interruption | 45 microseconds ±5. |
| Frequency of interruption | 5 to 200 cycles per second. |
| Maximum voltage standing wave ratio | l.45 to 1. |
| Output power | -107 to -20 dbm. |
| Output Impedance | 50 ohms. |
| Attenuator accuracy | ±1 dbm from -20 to -70 dbm; ±3 dbm from -70 to -107 dbm. |

Frequency meter range . . . . . 1,630 to 1,730 mc in TS-538/U, TS-538A/U, and TS-538B/U; 1,615 to 1,715 mc in TS-538C/U.

Frequency meter accuracy . . . . . ±2 mc.

Power monitor sensitivity . . . . . 150 to 250 milliwatts at 10 inches from source.

Types of tubes:

- Blocking oscillator . . . . 6101/6J6WA.
- Multivibrator . . 6101/6J6WA.
- Cathode follower . . . . . 6101/6J6WA.
- Rectifier . . . . . 6X4W.
- Voltage regulator . . . . . OB2WA.[1]
- Rf oscillator . . . . . A-2352 or 5675 in TS-538/U (para .8); 5675 in TS-538A/U, TS-538B/U, and TS-538C/U.

Line-voltage input . . . . . 117 volts ±12, 50 to 1,600 cycles per second.[2]

## 5. Components

The components of Test Set TS-538(*)/U are listed in appendix III. The major components are illustrated in figure 1. The running spares are illustrated in figure 3.

## 6. Common Names

A list of the common names for the components of Test Set TS-538(*)/U is given below. Also included are the common names of equipments which use Test Set TS-538(*)/U.

| Common name | Nomenclature |
|---|---|
| Ac power cable ----- | Cable Assembly, Power, Electrical CX-337/U. |
| Oscillator wrench -- | Wrench, Spanner |
| Radiosonde -------- | Radiosonde AN/AMT-4(*) |
| Radiosonde transmitter. | Radiosonde Transmitter T-304(*)/AMT-4A. |
| Rawin receiver ----- | Rawin Receiver R-301(*)/GMD-1. |
| Rawin set --------- | Rawin Set AN/GMD-1(*) |
| Rf cable ---------- | Cable Assembly, Radio Frequency CG-299A/U. |
| Test set ---------- | Test Set TS-538(*)/U |
| Crystal ---------- | Semiconductor device, CR1 or CR2. |

## 7. Description

Test Set TS-538(*)/U is portable and weighs about 23.5 pounds. Except for a primary source of electrical power, it is completely self-contained. Connection to an alternating current (ac) power source is proveded by a cable stored in the cover. When the test set is used as a frequency meter to check a transmitter, ac line power is not required. When it is used as a signal generator, its radiofrequency (rf) output may be radiated from a short antenna or it may be conducted by cable to the receiver under test. Both the rf cable and the antenna are stored in the cover. All dials are calibrated directly. A chart is provided for converting the -DBM dial readings to microvolt of signal across a 50-ohm line. Figure 1 shows the test set and major assemblies.

## 8. Differences in Models

a. The rf oscillator tube of the TS-538/U (type. A-2352) is replaced in the later models by tube 5675; this tube is also used as a replacement in the TS-538/U.

b. *In the* TS-538A/U, TS-538B/U, and TS-538C/U, CR1 may be either crystal type 1N43 or 1N69, and CR2 may be either 1N21B or 1N23B.

[1]Contains radioactive material as follows: Isotope Ni 63, 0.01-0.05 microcurie or isotope Co 60, 0.0067 microcurie, depending on manufacturer.

[2]Test sets bearing order No. 15903-PH-55 are designed for a power frequency range from 50 to 65 cycles per second only.

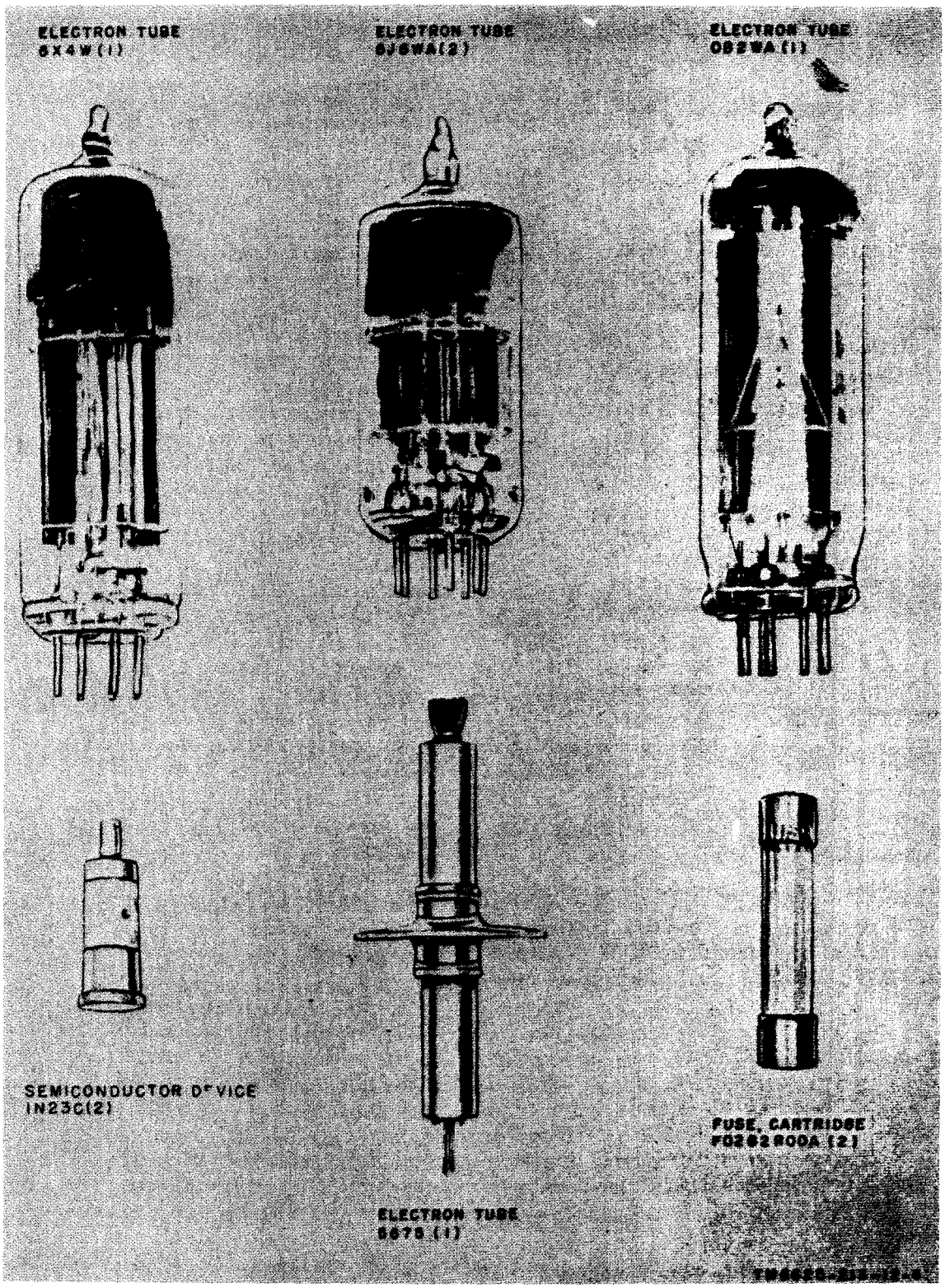


*Figure 3. Running spares.*

*c.* The frequency range of Test Set TS-538C/U is from 1,615 to 1,715 megacycles (mc); in earlier models, the frequency range is from 1,630 to 1,730 mc.

*d.* Test Sets TS-538C/U bearing Order No. 15903-PH-55 were designed to operate on an ac line power frequency from 50 to 65 cycles per second (cps); all other equipments operate on any power frequency from 50 to 1,600 cps.

*e.* The power receptacle in the lower right corner of the front panel is designated as P1 on Test Set TS-538/U; on all subsequent models, it is designated as J2.

# CHAPTER 2

# OPERATION

## Section I. SERVICE UPON RECEIPT OF EQUIPMENT

### 9. Unpacking

*a. Packaging Data.*

(1) When packaged and packed for oversea shipment, the test set is packaged in a water-resistant fiberboard carton and packed in a wooden box. A typical shipping box and its contents are shown in figure 4. The dimensions of the shipping box are 12 inches by 13-1/4 inches by 15-1/2 inches; the volume is 1.5 cubic feet the packed weight is 42 pounds.

(2) When packaged and packed for domestic shipment, the methods applied may vary depending on the supply source. The shipping container may be in the form of a fiberboard carton.

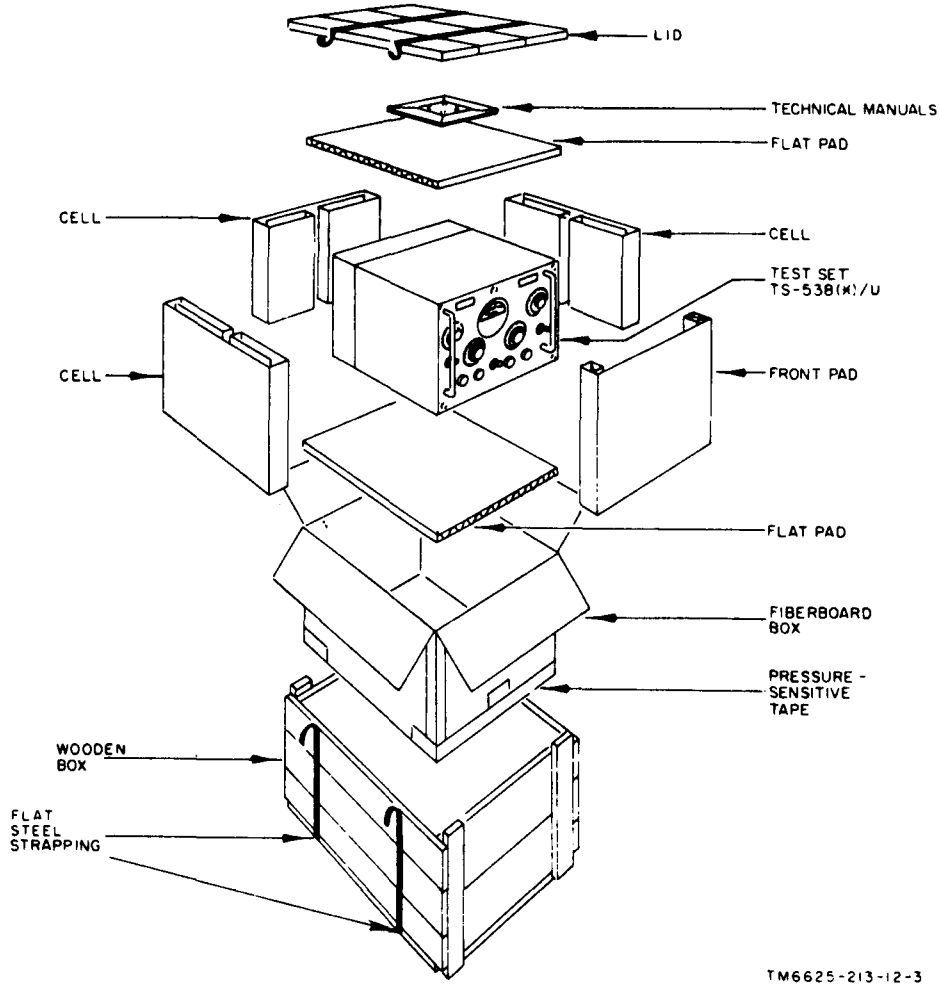


*Figure 4. Typical packaging.*

*b. Dimensions.* The dimensions of the test set are *8* inches by 9-1/4 inches by 11-1/2 inches; the volume is 0.5 cubic foot; the weight is 23.5 pounds.

*c. Removing Contents.* Be careful when unpacking and unpackaging. Do not thrust tools into the interior of any container or wrap. For removal, select a site free from dust, dirt, and excessive moisture.

(1) Cut and fold back the metal straps.
(2) Remove the nails from the top and one side of the box with a nailpuller. Remove the top and one side. Do not attempt to pry off the top and side; prying may damage the equipment.
(3) Remove the envelope that contains the technical manuals.
(4) Remove the fiberboard container and open it.
(5) Remove the contents.

### 10. Checking Unpacked Equipment

*a.* Inspect the equipment for damage that may have been incurred during shipment. If the equipment has been damaged, refer to paragraph 2b.

*b.* Check the equipment against the packing list. If no packing list accompanies the equipment, check the equipment against the items listed in appendix III and report any overages or shortages on DD Form 6 (para 2b).

Note: Shortages of special tools or spares that do not affect the proper functioning of the equipment should not prevent use of the test set.

*c.* If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If modified, an MWO number will appear on the front panel near the nomenclature plate.

Note: Current MWO's applicable to the equipment are listed in DA Pamphlet 310-4.

## Section II. OPERATING INSTRUCTIONS

### 11. Operating Controls and Indicators (fig. 5)

| Control or indicator | Function |
|---|---|
| Power monitor meter | Provides a visual indication of crystal CR2, rf output power of the test set, power output of the transmitter under test, and for tuning the OSCILLATOR FREQUENCY dial. |
| FREQUENCY METER dial | Indicates the frequency of the cw output in mc, or the frequency of a transmitter under test. |
| REPETITION RATE dial | Adjusts and indicates frequency of cw output interruption in cycles per second. |
| CRYSTAL CHECK switch | Enables the power monitor meter to check crystal CR2 (fig. 10). |
| OSCILLATOR FREQUENCY dial | Tunes to desired frequency indicated on FREQUENCY METER dial by tuning to a dip on power monitor meter. |
| OUTPUT POWER dial | Controls and indicates the amount of rf output power in -dbm. |
| MODULATION switch | In ON position, interrupts the cw output of the test set. In OFF position, turns off the cw output interruption. |
| R. F. POWER SET dial and switch | Dial adjusts the power monitor meter to the SET POWER reference point. Switch applies. operating voltages to the tubes. |
| POWER switch | In ON position, applies power to the test set. In OFF position, removes power from the test set. |

### 12. Types of Operation

*a.* Test Set TS-538(*)/U may be operated as a frequency meter, as a power output meter, or as a signal generator. It maybe used to measure the frequency and power output of Radiosonde Transmitters T-304(*)/AMT-4A and T-435/AMT-4B; it may be used to measure the sensitivity, bandwidth, and tracking accuracy of Rawin Set AN/GMD-1(*). Also, Test Set TS-538(*)/U may be used for similar purposes with any transmitter and/or receiver that operates within its frequency range (Para 4).

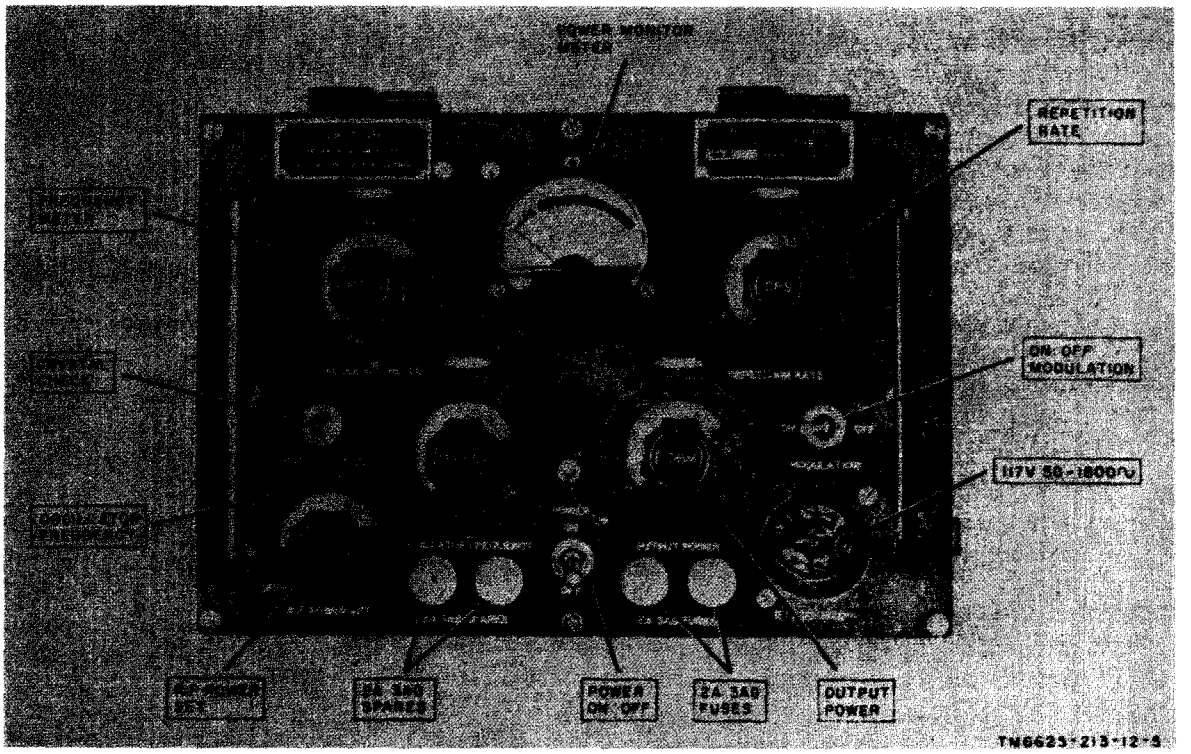


*Figure 6. Test Set TS-538(*)/U, front view.*

*b.* For any type of operation, perform the following procedures:

(1) Preliminary starting procedure (para 13a).
(2) Starting procedure (para 13b).
(3) Procedure for the desired type of operation (para 14 or 15).
(4) Stopping procedure (para 16).

## 13. Starting Procedure

a. *Preliminary.* Set the front panel (fig. 4) controls as follows:

| Control | Position |
|---|---|
| MODULATION switch -- | OFF |
| FREQUENCY METER dial. | To either the extreme clockwise or counter-clockwise side of 1,680 so that it will not affect the rest of the circuit. |
| REPETITION RATE dial | 5 |
| OSCILLATOR FREQUENCY dial. | 0 |
| OUTPUT POWER dial -- | -110 |
| R. F. POWER SET dial and switch. | OFF |

*Note: It is not necessary to install the antenna during the preliminary procedure.*

*b. Starting.* Follow the procedure below in order given. If abnormal results are noticed, refer to the troubleshooting chart (para 30).

(1) Place the test set in the desired location.
(2) Connect the ac power cable between the power receptacle on the lower right corner of the front panel (fig. 5) and a 117-volt ac power source.
(3) Set the POWER switch to ON and allow a 5-minute warmup period.
(4) Push the CRYSTAL CHECK switch to the left. The power monitor meter should deflect to the SET POWER point. Release the CRYSTAL CHECK switch.
(5) Turn the R. F. POWER SET dial clockwise until the switch clicks and the power monitor meter deflects to the SET POWER point.
(6) Set the FREQUENCY METER dial at 1680 and turn the OSCILLATOR FREQUENCY dial slowly until a pronounced dip on the meter is indicated; this dip may occur on either side of the 0 setting, but

should be close to it. At the point of maximum dip, the oscillator is tuned to 1,680 mc.

(7) Turn the FREQUENCY METER dial to the extreme clockwise (cw) or counterclockwise (ccw) direction so that it will not affect the rest of the circuit.

(8) The amount of rf power available at rf output jack J1 (fig. 2), when delivered to a 50-ohm load, is indicated on, and controlled by, the OUTPUT POWER dial, which is calibrated in -dbm.

### 14. Checking Radiosonde Transmitters T-304(*)/AMT-4A and T-435/AMT-4B

Test Set TS-538(*)/U is used to determine the frequency and power output of Radiosonde Transmitter T-93/AMT-4, T-304(*)/AMT-4A, or T-435/AMT-4B in the following manner:

a. Freguency Check (fig. 6). Ac power for the test set is not required for this test.

(1) Place the test set on a suitable workbench. Check to see that all controls are in the positions listed in paragraph 13a.

(2) Insert the antenna in the socket at the top of the case (fig. 2).

(3) Plug in power to the radiosonde transmitter.

(4) Hold the transmitter near enough to Test Set TS-538(*)/U to cause the power monitor meter pointer to deflect approximately two-thirds full scale.

(5) Rotate the FREQUENCY METER dial slowly until a dip is noted on the meter. Carefully adjust the FREQUENCY METER dial until the meter shows the lowest dip. The frequency of the radiosonde transmitter is now indicated by the FREQUENCY METER dial. If the frequency of the radiosonde transmitter is not within 2 mc of the assigned frequency (usually 1,680 mc), adjust the radiosonde transmitter frequency according to the instructions in TM 11-2432, TM 11-2432A, and TM 11-6660-228-10. Make another frequency check with the test set.

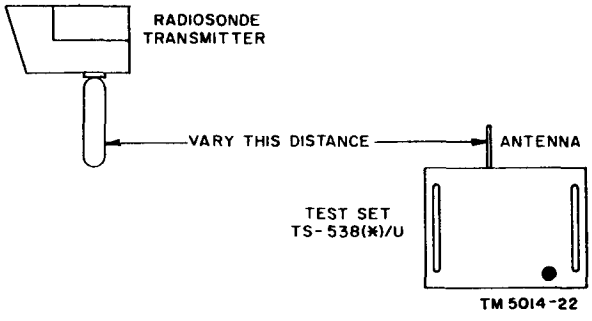


*Figure 6. Checking frequency of radiosonde transmitter.*

*b. Power Output Check* (fig. 7). Ac power for the test set is not required for this test.

(1) Follow the procedure in a(1) through (3) above.

***Caution:*** **Do not allow the radiosonde transmitter to come closer than *8* inches to the test set the test set may be damaged.**

(2) Place the radiosonde transmitter antenna at the right rear corner of the test set and 24 inches away from the test set antenna. The lower end of the radiosonde transmitter antenna should be level with the top of the test set. Make sure the FREQUENCY METER dial is tuned off resonance with the transmitter. Slowly move the radiosonde transmitter toward the test set and observe the deflection on the power monitor meter. If the meter deflects into the GOOD portion of the scale before the radiosonde transmitter is within 8 inches of the test set, the power output is adequate and the test is completed.

(3) If the meter deflection does not reach the GOOD portion, replace the batteries in the transmitter. If battery replacement does not help, replace the transmitter.

### 15. Checking Rawin Set AN/GMD-1(*) (fig. 8 and 9)

Test Set TS-538(*)/U is used to check the performance of the rawin receiver and the tracking accuracy of the antenna of

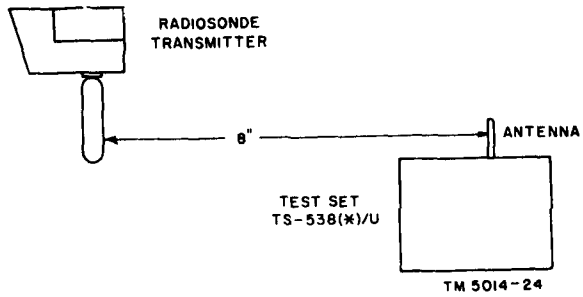


*Figure 7. Checking power output of radiosonde transmitter.*

Rawin Set AN/GMD-1(*). When the test set is placed some distance from the rawin set antenna (fig. 2), the test set is used as a target transmitter to check the direction-finding abilities of the rawin set. To determine the sensitively of the rawin receiver, the test set is connected directly to the mixer assembly.

*a. Test Set TS-538(*)/U as Target Transmitter.*

(1) Check to see that all controls are in the positions listed in paragraph 13a .

(2) Place the test set at least 100 feet (and not more than 300 feet) away from the antenna of the rawin set (fig. 2) and as high as possible from ground so that maximum radiation can reach the antenna of the rawin set.

(3) Remove the antenna from its position in the cover of the test set (fig. 1) and screw it into the threaded socket in the top of the unit.

(4) Insert the ac power cable in test set panel receptacle P1 and connect the other end to the ac power source. Set the POWER switch to the ON position.

(5) Turn the R. F. POWER SET dial clockwise and adjust it until the power monitor meter reads at the SET POWER point.

(6) Set the FREQUENCY METER dial to 1680.

(7) Set the OSCILLATOR FREQUENCY dial for maximum dip on the power monitor meter. The oscillator is now set at 1,680 mc.

(8) Rotate the FREQUENCY METER dial away from 1,680 mc until the meter no longer registers the dip.

(9) Adjust the rawin set AZIMUTH and ELEVATION controls to point the rawin set antenna in the general direction of the test set.

(10) Tune the rawin receiver to the same frequency as the test set (1,680 mc) by operating the TUNING switch to obtain a maximum reading of the TUNING METER on the receiver panel of Rawin Sets AN/GMD-lA and AN/GMD-1B. (When tuning the receiver of Rawin Set AN/GMD-1(*), obtain a maximum reading on the TUNING METER with the METER SELECTOR switch in the AFC position.) Move the rawin set antenna off the target transmitter about 6°. Turn the rawin set on automatic. The rawin set antenna should swing back to alignment on the target transmitter.

(11) Remove the antenna from the test set and replace it in the cover. Return the test set to its storage point.

*b. Measuring Sensitivity of Rawin Receiver R-301(*)/GMD-1 With Monitor Loudspeaker as Indicator.*

(1) Check to see that all controls are in the positions listed in paragraph 13a.

(2) Place the test set so that it maybe conveniently connected to the mixer assembly on Rawin Set AN/GMD-1(*).

(3) Insert the ac power cable in the test set panel receptacle and connect the other end to the ac power source. Set the POWER switch to the ON position.

(4) Turn the R. F. POWER SET dial clockwise and adjust it until the power monitor meter reads at the SET POWER point.

(5) Set the FREQUENCY METER dial to 1680.

(6) Set the OSCILLATOR FREQUENCY dial for maximum dip on the meter. The oscillator is now set at 1,680 mc.

(7) Rotate the FREQUENCY METER dial away from 1,680 mc until the

meter no longer registers the dip.

(8) If the antenna is screwed into the socket of the test set, remove and return it to its place in the cover.

(9) Place the MODULATION switch in the ON position.

(10) Adjust the REPETITION RATE dial to set the modulation at the desired frequency.

(11) Readjust the R. F. POWER SET dial until the power monitor meter is at the SET POWER point.

(12) Disconnect the mixer assembly from the transmission line in the base of the pylon. Connect the mixer assembly adapter to the mixer assembly. Connect the rf cable from rf output jack J1 on the side of the test set to the mixer assembly adapter (fig. 8). Turn on the rawin receiver.

(13) Rotate the OUTPUT POWER dial on the test set to 50. Tune the rawin receiver to the same frequency as that of the test set, by operating the TUNING switch on the rawin receiver so that maximum undistorted volume of the audible signal is heard at the monitor loudspeaker. The audible signal represents the modulation frequency of the test set.

(14) Rotate the OUTPUT POWER dial on the test set counterclockwise until the audible signal begins to distort. Note the reading of the OUTPUT POWER dial. This reading is the sensitivity of the rawin set in -dbm. To convert the reading from -dbm to microvolts across a 50-ohm load, refer to figure 9.

*c. Measuring Sensitivity of Rawin Receiver R-301(*)/GMD-1 With Oscilloscope as Indicator.*

(1) Repeat the procedure in b(1) through (12) above.

*(2)* Connect the vertical terminals of Oscilloscope OS-8A/U across the secondary of audio transformer T1001 (terminals 5 and 6) of the rawin receiver.

*(3)* Rotate the test set OUTPUT POWER dial to 50. Tune the rawin receiver to the same frequency as that of the test set, by operating the TUNING switch on the rawin receiver so that the sharp pulses displayed on the screen of the oscilloscope reach their maximum amplitude. Adjust the internal

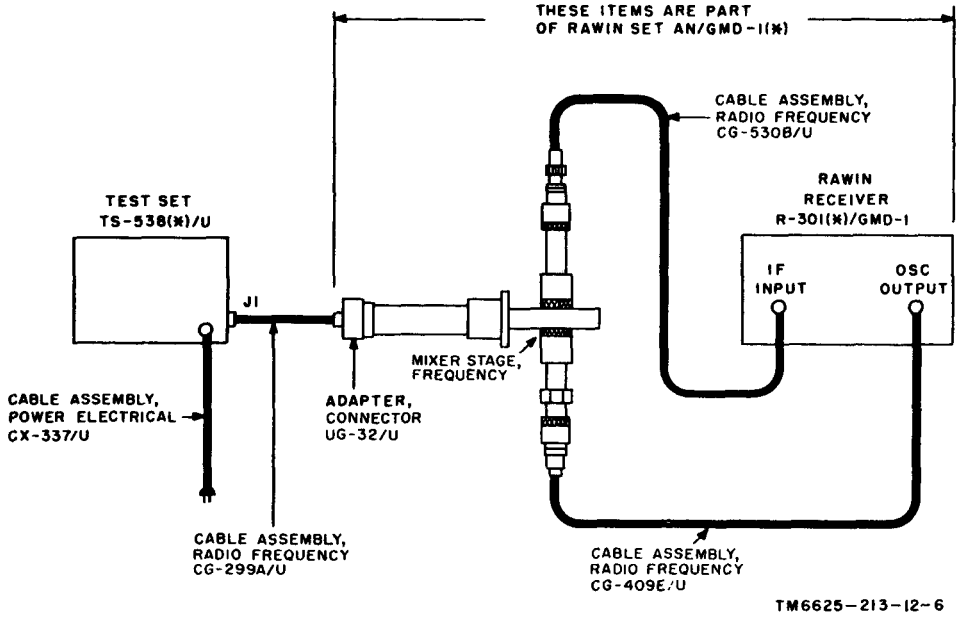


*Figure 8. Checking sensitivity of Rawin Receiver R-301(*)/GMD-1.*

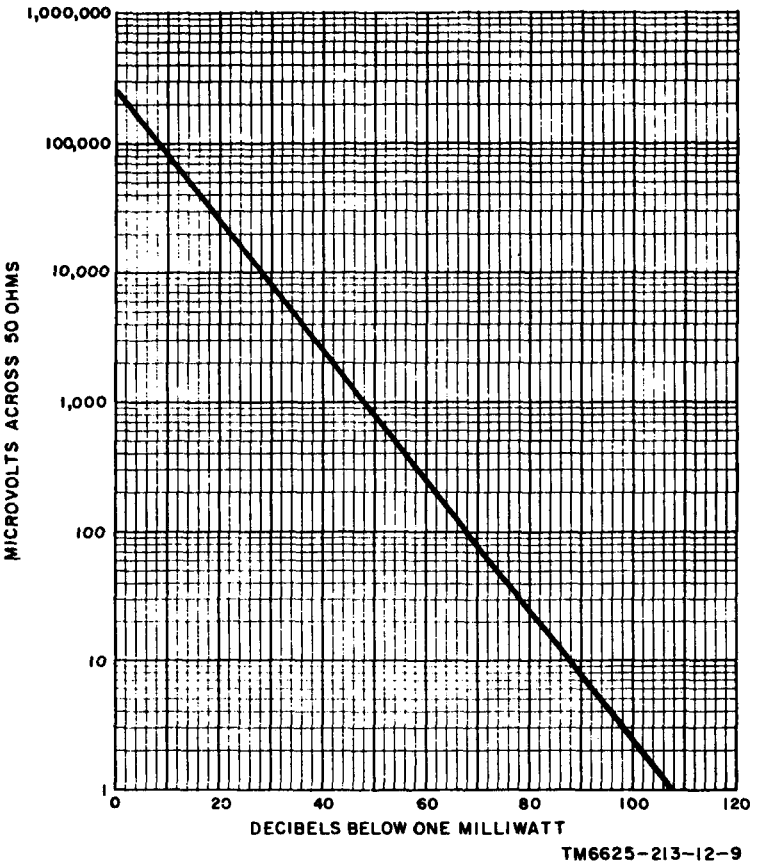


*Figure 9. Conversion chart, –dbm to microvlts across 50 ohms.*

sweep of the oscilloscope so that several stationary pulses are displayed on the screen.

(4) Rotate the test set OUTPUT POWER dial counterclockwise until the pulses on the oscilloscope just disappear. Note the reading on the OUTPUT POWER dial. This reading is the sensitivity of the rawin receiver in -dbm. To convert the reading from -dbm to microvolts across a 50-ohm 10 ad, refer to figure 9.

### 16. Stopping Procedure

*a.* Turn the R. F. POWER SET control to its OFF position.

*b.* Set the POWER switch to OFF.

c. Remove the antenna and return it to the clips provided in the cover of the case.

*d.* Remove the rf and ac power cables and return each to its position in the cover of the case.

*e.* Place the cover of the test set and secure it with the latches.

# CHAPTER 3

# MAINTENANCE INSTRUCTIONS

## Section I. OPERATOR'S MAINTENANCE

### 17. Scope of Maintenance

The maintenance duties assigned to the operator of Test Set TS-538(*)/U are listed below together with a reference to the paragraphs covering the specific maintenance function. The duties assigned do not require tools or test equipment other than those issued with the test set.

*a.* Daily preventive maintenance checks and services chart (para 20).

*b.* Weekly preventive maintenance checks and services chart (para 21).

*c.* Cleaning (para 22).

*d.* Replacement of fuses (para 23).

### 18. Operator's Preventive Maintenance

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

*a. Systematic Care.* The procedures given in paragraphs 20 through 23 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

*b. Preventive Maintenance Checks and Services.* The preventive maintenance checks and services charts (para 20 and 21) 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 what the normal conditions are. The *References* column lists the illustrations, paragraphs, or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by the operator, higher echelon 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.

### 19. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the TS-538(*)/U are required daily and weekly. Paragraphs 20 and 21 specify the items to be checked and serviced.

### 20. Daily Preventive Maintenance Checks and Services Chart

| Sequence No.. | Item | Procedure | Reference |
|---|---|---|---|
| 1 | Completeness ---------- | Check to see that the equipment is complete (appx III). | |
| 2 | Cleanliness---------- | Check to see that the equipment is clean ---------- | Para 22. |
| 3 | Fuses ---------- | Check to see that the fuses in use, and the spares, are properly seated and of the correct value (para 23). | Para 23. |
| 4 | Controls ---------- | While operating the equipment, observe that the mechanical action of each knob, dial, and switch is free of external or internal binding. | |
| 5 | Meter ---------- | While operating the equipment, check to see that meter window is not cracked or broken and that the meter indicator does not hang in its travel. | |
| 6 | Operational preset --- | *a.* Screw antenna into socket at top of test set.<br>*b.* Connect rf cable to J1 on right side of test set (fig. 8).<br>*c.* Connect ac power cable to male connector (117V 50-1600~) on front panel (fig. 1). | |

| Sequence No. | Item | Procedure | References |
|---|---|---|---|
| 7 | Start ---------- | Flip POWER switch to ON. | |
| 8 | Operation ---------- | *a.* Turn R. F. POWER SET switch to on (clockwise) and adjust it until the power monitor meter deflects to the SET POWER point (fig. 5).<br>*b.* Press CRYSTAL CHECK switch. The power monitor meter indicator should deflect to POWER SET.<br>*c.* Rotate FREQUENCY METER dial through its range. The power monitor meter should indicate a dip.<br>*d.* Set MODULATION switch to ON. The power monitor meter will vary slightly. | |
| 9 | Stop ---------- | Set POWER switch to OFF. | |

### 21. Weekly Preventive Maintenance Checks and Services Chart

| Sequence No. | Item | Procedure | References |
|---|---|---|---|
| 1 | Cables ---------- | Inspect power and rf cables for cuts, cracks, and deterioration -- | Fig. 1. |
| 2 | Exterior items ------ | Hand check for loose handles, hinges, and latches. | |
| 3 | Exterior surfaces --- | Inspect exposed metal surfaces for rust and corrosion. | |

### 22. Cleaning

Inspect the exteriors of the test set. The exterior surfaces should be clean, free from dust, dirt, 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.

*b.* Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with Cleaning Compound (Federal stock No. 7930-395-9542).

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

***Caution:*** **Do not press on the power monitor meter face (glass) when cleaning; the meter may be damaged.**

*d.* Clean the front panel, meter, and control knobs; use a soft clean cloth. If the removal of dirt is difficult, dampen the cloth with water; mild soap maybe used to make the cleaning more effective.

### 23. Replacement of Fuses
(fig. 5)

*a.* Turn the fuseholder cap counter-clockwise and remove it from the fuseholder.

*b.* Remove the defective fuse from the fuseholder.

*c.* Insert the new fuse in the fuseholder.

*Note:* Be sure the fuse is of the proper rating (2 amperes, 250 volts).

*d.* Replace the fuseholder cap in the fuseholder and turn it clockwise to tighten it.

## Section II. ORGANIZATIONAL MAINTENANCE

### 24. Scope of Organizational Maintenance

*a.* This section contains instructions covering second echelon maintenance of Test Set TS-538(*)/U. It includes instructions for performing preventive and periodic maintenance services, and repair functions to be accomplished by the organizational repairman.

*b.* Second echelon maintenance of Test Set TS-538(*)/U includes:

(1)Monthly maintenance (para 26).
(2)Monthly preventive maintenance checks and services (para 27).
(3)Troubleshooting (para 30).
(4)Tube testing and replacement (para 31).

(5) Replacement of crystal CR2 (para 32).

## 25. Organizational Preventive Maintenance

*a.* Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operation capability. Preventive maintenance is the responsibility of all echelons concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of Test Set TS-538(*)/U at the second echelon level are made at monthly intervals unless otherwise directed by the commanding officer.

*b.* Complete applicable maintenance forms and records in accordance with instructions in TM 38-750.

## 26. Monthly Maintenance

Perform the maintenance functions indicated in the monthly preventive maintenance checks and services chart (para 27) once each month. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for immediate operation) condition must have monthly preventive maintenance checks and services performed on it. Equipment in limited storage (requires service before operation) does not require monthly preventive maintenance.

## 27. Monthly Preventive Maintenance Checks and Services Chart

| Seq. No. | Item | Procedure | References |
|---|---|---|---|
| 1 | Completeness ------ | See that the equipment is complete (appx III). | |
| 2 | Cleanliness -------- | See that the equipment is clean (para 22). | |
| 3 | preservation ------- | Check all surfaces for evidence of fungus. Remove rust and corrosion and spot-paint bare spots. | Para 28. |
| 4 | Publications ------- | See that all publications are complete, serviceable, and current. | DA Pam 310-4. |
| 5 | Modification work orders (MWO). | 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. | DA Pam 310-4. |
| 6 | Connections -------- | Inspect jacks and connectors for snug fit and good contacts. | |
| 7 | Antenna ---------- | Inspect for cleanliness, cracks, and proper installation. | |
| 8 | Pluckout items ----- | Inspect clamps and seating of pluckout items, Check for wrong, bent, or broken parts. | |
| 9 | Resistors and capacitors. | Inspect for cracks, blistering, or other detrimental defects. | |
| 10 | Operational preset -- | a. Screw antenna into socket at top of test set.<br>*b.* Connect rf cable to J1 on right side of test set (fig. 8).<br>c. Connect ac power cable to male connector (117V 50-1600˜) on front panel (fig. 1). | |
| 11 | Start ---------- | Flip POWER switch to ON ---------- | Para 30. |
| 12 | Operation --------- | a. Turn R. F. POWER SET switch to on (clockwise) and adjust it until the power monitor meter deflects to the SET POWER point. | *a.* Para 30. |
| | | *b.* Press CRYSTAL CHECK switch. The power monitor meter indicator should deflect to POWER SET. | *b.* Para 30. |
| | | c. Rotate FREQUENCY METER dial through its range. The power monitor meter should indicate a dip. | *c.* Para 30. |
| | | d. Set MODULATION switch to ON. The power monitor meter will vary slightly. | *d.* Para 30, |
| 13 | stop ---------- | Set POWER switch to OFF. | |
| 14 | Spare parts -------- | 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. | APPX III. |

### 28. Touchup Pointing 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 TM 9-213.

## Section III. TROUBLESHOOTING

### 29. General Troubleshooting Information

Troubleshooting this equipment is based upon the operational check in the Monthly *preventive maintenance checks and services* chart (para 27). To troubleshoot the equipment, perform all functions starting with item No. 11 and proceed through the items until an abnormal condition or result is observed. When an abnormal condition or result is observed, note the item number and turn to the corresponding item number in the *Troubleshooting chart (para 30).* Perform the checks and corrective actions indicated in the troubleshooting chart. If the corrective measures indicated do not result in correction of the brouble, higher echelon maintenance is required.

### 30. Troubleshooting Chart

| Item No. | Trouble symptom | Probable Trouble | Checks and corrective measures |
|---|---|---|---|
| 11 | Tubes do not light<br>Tube does not light | Fuses F1 and/or F2 bad<br>Tube filament defective | Replace fuses F1 and/or F2 (para 21).<br>Replace defective tube (para 31). |
| 12 | *a.* Tube V6 fails to glow<br>*b.* Incorrect or no indication on power monitor meter.<br>*c.* Incorrect indication on power monitor meter.<br>*d.* Incorrect indication on power monitor meter. | *a.* Tube V5 defective<br>*b.* Crystal CR2 defective<br>*c.* Tube V4 defective<br>*d.* Tubes V1, V2, and/or V3 defective. | *a.* Replace tube V5; also check tube V6 (para 31).<br>*b.* Replace crystal CR2 (para 32).<br>*c.* Higher echelon maintenance required.<br>*d.* Replace tubes V1, V2, and V3; use tube substitution method (para 31). |

### 31. Tube Testing and Replacement (fig. 10)

When trouble occurs, check all cabling, connections, and control settings before removing any tubes. Try to isolate the trouble to a component or stage (para 30). If tube failure is suspected, use the applicable procedure below to check the tubes.

*a. Preferred-Type Tube.* A preferred-type electron tube, type OB2WA, has been developed as a direct replacement for nonpreferred-type OB2. The OB2 tube is used in voltage-regulator stage V6. When replacement of an OB2-type tube is necessary, replace it with an OB2WA. Do not substitue an OB2 for an OB2WA.

***Warning:*** The OB2WA tube contains radioactive material. Handle carefully to avoid breaking.

***Caution:*** Do not rock or rotate a tube when removing it from a socket; pull it straight out with a tube puller. Also, do not attempt to replace rf oscillator tube V4; higher echelon maintenance personnel are required to replace this tube.

*b. Tube Substitution Method.* Replace a suspected tube with anew tube. If the equipment still does not work, remove the new tube and put back the original tube. Repeat this procedure with each suspected tube until the defective tube is located.

### 32. Replacement of Crystal CR2 (fig. 10 and 11)

***Cautions:***

1. Always ground the test set before the crystal is Inserted or touched to the test set.

2. Before and during the handling of the crystal, the repairman should ground his fingers by touching the grounded chassis. With the crystal in hand, the repairman

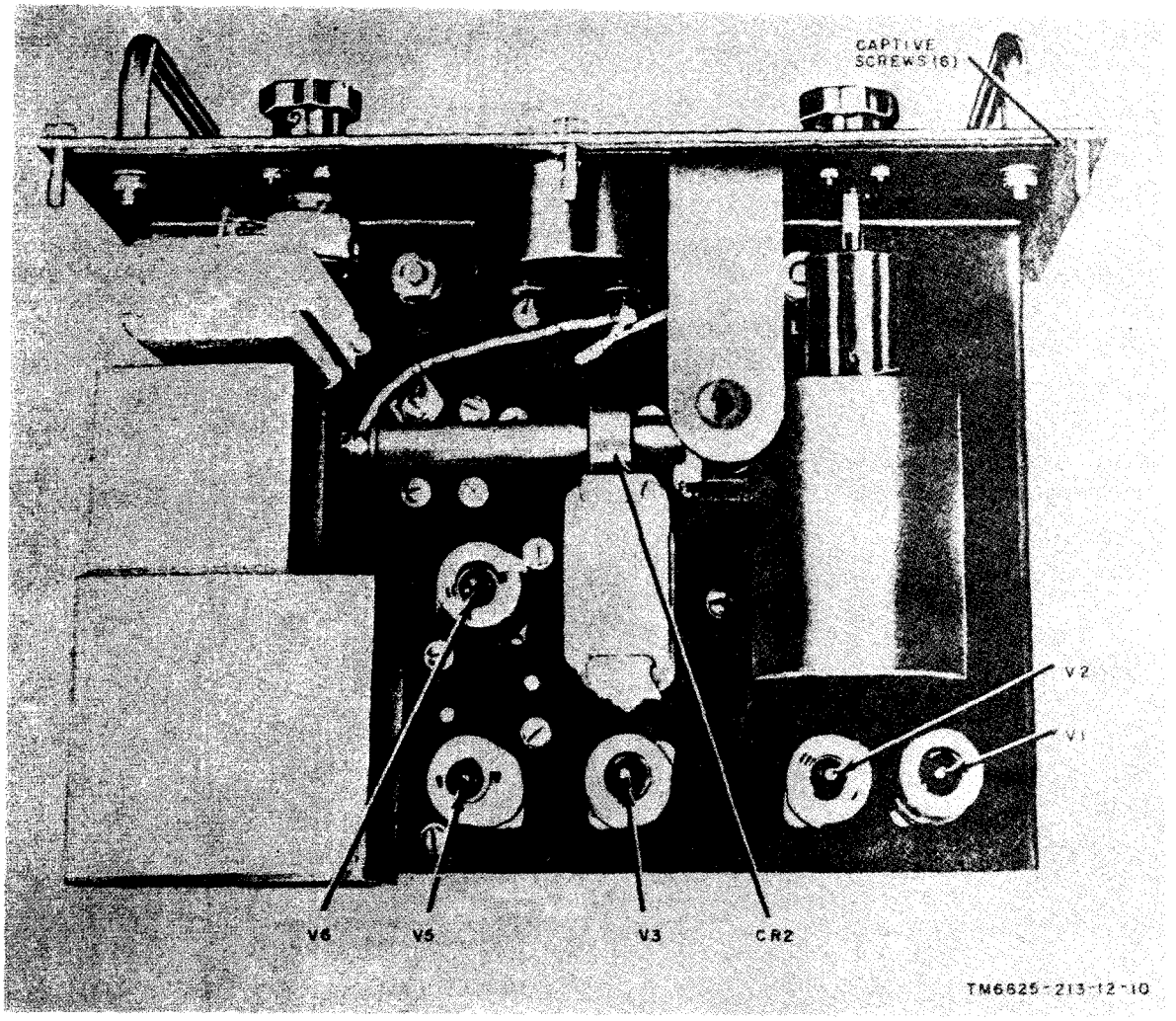


*Figure 10. Tube location diagram.*

should touch the equipment first before inserting the crystal in its holder. Electrical charges through the crystal can easily damage it.

3. When passing the crystal from one person to another, leave the crystal in its container.

4. Do not expose the crystal to high intensity rf fields unless it is packed in a padded metal container or In tightly wrapped metal foil.

5. Do not expose the crystal to mechanical shocks. Always carry the crystal in a padded metal container.

6. Do not apply excessive twisting force to the crystal.

*a.* Remove the chassis from its metal housing and place it on a work bench.

*b.* Unscrew the coupling nut that holds L5 (designated L3 in the TS-538C/U) to the rf coupling assembly and remove L5.

*c.* Crystal CR2 is now easily plucked out with the fingers. Replace it with a new crystal (IN23C).

*d.* Replace L5 and the coupling nut.

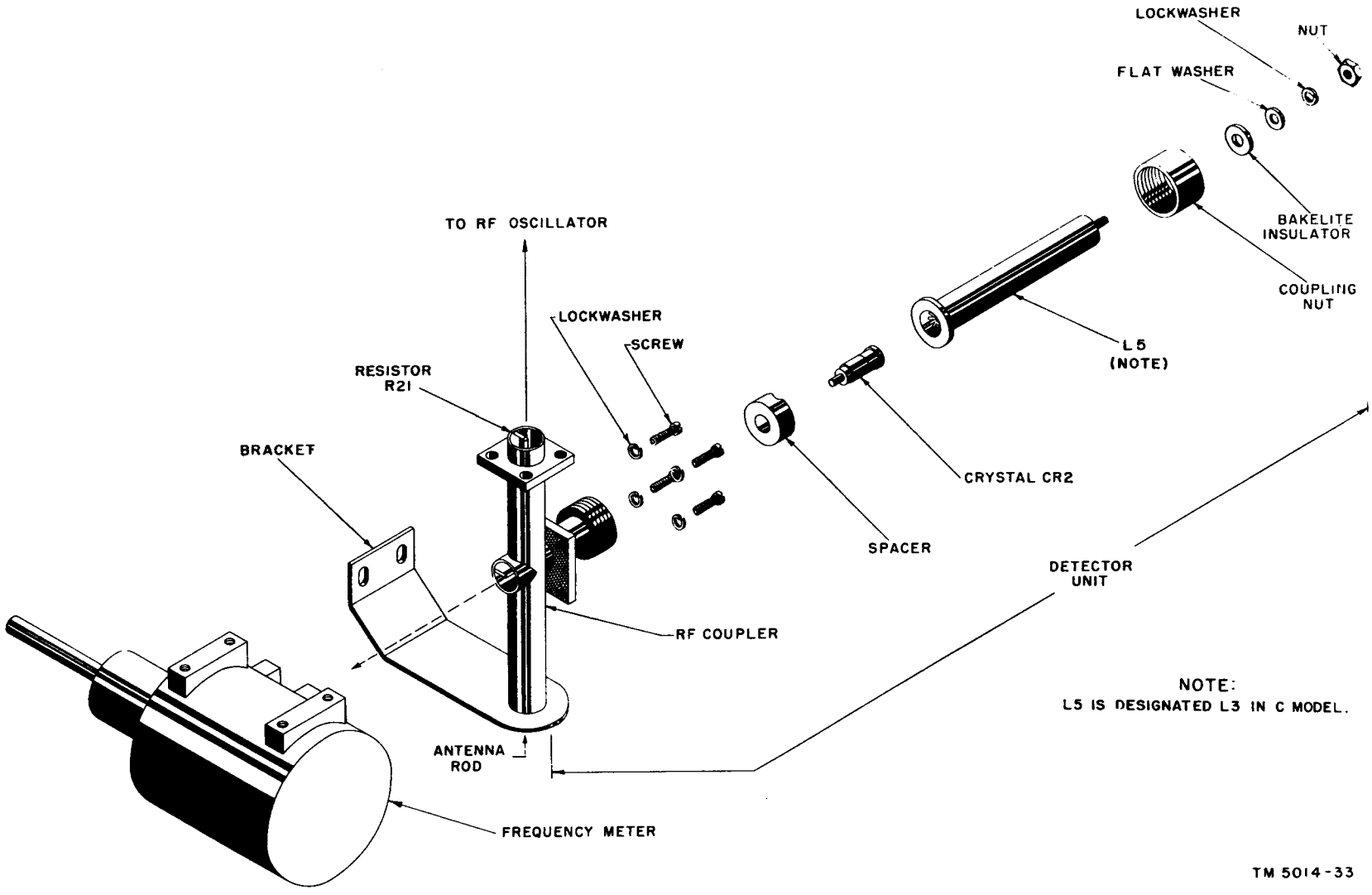


*Figure 11. Frequency meter and detector unit assembly, exploded view.*

# CHAPTER 4

# SHIPMENT, LIMITED STORAGE, AND DEMOLITION TO PREVENT ENEMY USE

## Section I. SHIPMENT AND LIMITED STORAGE

### 33. Disassembly of Equipment

Disassemble Test Set TN-538(*)/U as follows:

*a.* Remove the antenna and place it in the bracket in the cover of the test set (fig. 1).

*b.* Disconnect the rf and ac power cables and place them in the spare parts compartment (fig. 1).

*c.* Replace the cover on the test set and fasten the latches in place.

### 34. Repackaging for Shipment or Limited Storage (fig. 12)

The exact procedure for repackaging depends on the material available and the conditions under which the equipment is to be shipped or stored. Adapt the procedures outlined below whenever circumstances permit.

*a. Material Requirements.* The following materials are required for packaging Test Set TS-538(*)/U. For stock numbers of materials, consult SB 38-100.

| Material | Quantity |
|---|---|
| Waterproof wrapping paper | 18 sq ft |
| corrugated fiberboard | 22 sq ft |
| Pressure-sensitive waterproof tape (3 in.), | 14 ft |
| Paper gummed tape (3 in.) | 10 ft |
| Flat steel strapping (5/8 by 0.20 in.) | 10 ft |
| Wooden shipping box | 1 ea |

*b. Packaging.* Package the items of the test set as outlined below.

(1) Package each technical manual within a close-fitting bag fabricated of waterproof wrapping paper. Seal the bag securely with pressure-sensitive waterproof tape.

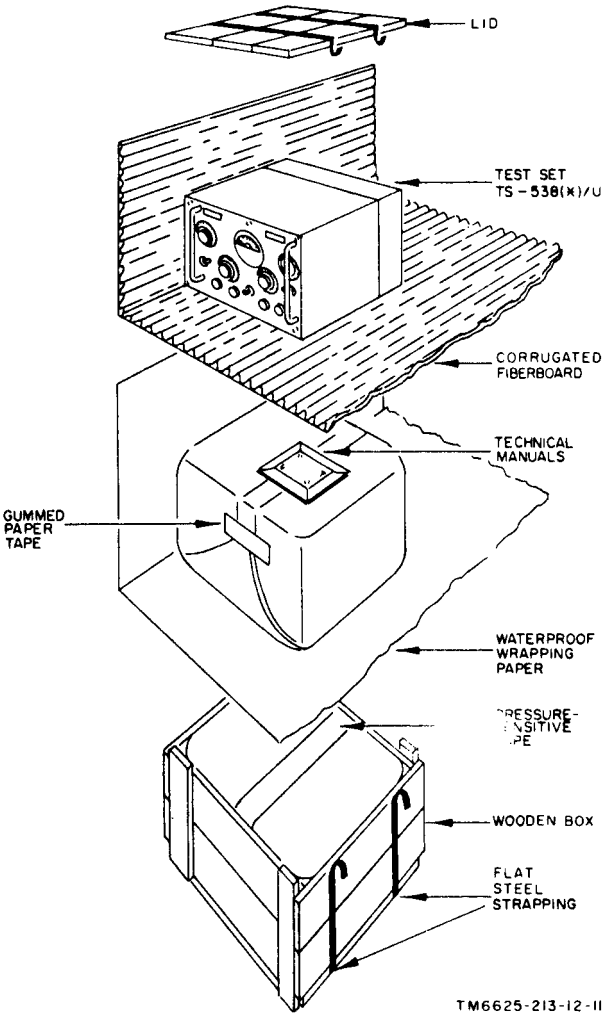


*Figure 12. Field repackaging diagram.*

(2) Wrap each spare part in corrugated fiberboard and secure with paper gummed tape. (Refer to paragraph 35 when packaging the OB2WA tube.) Place these items in the cover of the case (fig. 1).

(3) Cushion the test set by wrapping

with corrugated fiberboard and secure with paper gummed tape. Overwrap the cushioned item with waterproof wrapping paper. Secure the wrapping paper with pressure-sensitive waterproof tape.

c. *Packing.*

(1) Place the test set in a wooden box.

(2) Place the technical manuals on top of the test set.

(3) Place the lid on top of the wooden box and nail it down.

(4) If the equipment is to be shipped overseas, strap it with flat steel strapping.

*d. Marking.* Mark the box as prescribed in MIL-STD-129B and MIL-M-19590B.

### 35. Handling, Storage, and Disposal of Radioactive Material

Follow the procedures for safe handling, storage, and disposal of radioactive materials as directed by:

*a.* TB SIG 225, Identification and Handling of Radioactive Signal Items.

*b. AR 40-580,* Medical Service, Control of Hazards to Health from Radioactive Materials.

*c.* AR 755-380, Disposal of Supplies and Equipment, Disposal of Unwanted Radioactive Material.

## Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

### 36. Authority for Demolition

The demolition procedures given in paragraph 37 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon the order of the commander.

### 37. Methods of Destruction

Any or all of the methods of destruction given below may be used. The time available and the tactical situation will determine the method to be used when destruction of equipment is ordered.

***Warning:*** **The OB2WA tube contains radioactive material. See the warning notice on the inside of the front cover before attempting to destroy this tube.**

*a. Smash.* Smash the controls, tubes, coils, switches, capacitors, transformers, and meter; use sledges, axes, handaxes, pickaxes, hammers, or crowbars.

*b. Cut.* Cut the rf and ac power cables and slash the rf cable shield; use axes, handaxes, or machetes.

***Warning:*** **Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.**

*c. Burn.* Burn technical manuals and cables; use gasoline, kerosene, oil, flamethrowers, or incendiary grenades.

*d.* Explode. Use explosives to complete demolition or to cause maximum damage when time does not permit complete demolition by other means. Powder charges, fragmentation grenades, or incendiary grenades may be used. For quick destruction of the test set, place an incendiary grenade on top of the unit. Get away from the unit after the grenade is placed.

*e. Dispose.* Bury or scatter the destroyed parts in slit trenches, foxholes, or throw them into streams. This is particularly important if the test set has not been completely destroyed.

# APPENDIX I

## REFERENCES

Following is a list of publications available to the operator and organizational repairman of Test Set TS-538(*)/U:

| | |
|---|---|
| AR 40-580 | Medical Service, Control of Hazards to Health from Radioactive Materials. |
| AR 700-58 | Report of Damaged or Improper Shipment. |
| AR 755-380 | Disposal of Supplies and Equipment, Disposal of Unwanted Radioactive Materials. |
| DA Pamphlet 310-4 | Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders. |
| MIL-M-19590B | Marking of Commodities and Containers to Indicate Radioactive Material. |
| MIL-STD-129B | Marking for Shipment and Storage. |
| SB 38-100 | Preservation, Packaging and Packing Materials, Supplies, and Equipment used in the Army. |
| TB SIG 225 | Identification and Handling of Radioactive Signal Items. |
| TM 9-213 | Painting Instructions for Field Use. |
| TM 11-2432 | Radiosonde AN/AMT-4. |
| TM 11-2432A | Radiosondes AN/AMT-4A and AN/AMT-4B. |
| TM 11-6625-213-20P | Organizational Maintenance Repair Parts and Special Tools Lists: Test Sets TS-538/U, TS-538A/U, TS-538B/U, and TS-538C/U. |
| TM 11-6660-206-10 | Operator's Manual, Rawin Sets AN/GMD-1A and AN/GMD-1B. |
| TM 11-6660-228-10 | Operator's Manual, Radiosonde AN/AMT-4C and Radiosonde Set AN/AMT-4D. |

# APPENDIX II

# MAINTENANCE ALLOCATION

## Section I. INTRODUCTION

### 1. General

This appendix assigns maintenance functions and repair operations to be performed by the lowest appropriate maintenance echelon.

### 2. Columns

*a. Part or Component.* This column lists the nomenclature or standard item name. The assembly, which is part of the basic component, is listed below that component.

*b. Maintenance Function.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operations. These are defined as follows:

(1) *Service.* To clean and preserve.

(2) *Adjust.* To regulate periodically to prevent malfunction.

(3) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(4) *Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes, but is not limited to, welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare-type items, such as fuses, crystal diodes, or electron tubes.

(5) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.

(6) *Calibrate.* To determine, check, or rectify the graduation of an instrument.

(7) *Rebuild.* To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications, and subsequent reassembly of the item.

(8) *Overhaul.* To restore an item to complete serviceable condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(9) *Replace.* To substitute serviceable components, assemblies, or subassemblies, for unserviceable ones.

*c. 1st, 2d, 3d, 4th, 5th Echelon.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are also authorized to perform the indicated operation.

*d. Tools Required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and

maintenance equipment required to perform the maintenance function.

*e. Remarks.* Not used.

### 3. Columns of Allocation of Tools for Maintenance Functions Chart

a. *Tools Required for Maintenance Functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

*b. 1st, 2d, 3d, 4th, 5th Echelon.* The dagger (t) indicates the echelons normally allocated the facility.

*c.* Tool Code. This column lists the tool code assigned.

*d. Remarks.* Not used.

### 4. Maintenance by Using Organizations

When this equipment is used by Army organizations organic to theater headquarters or communication zones to protide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

## Section II. MAINTENANCE ALLOCATION CHART

| (1) Part or component | (2) Maintenance function | (4) 2d echelon | (5) 3d echelon | (6) 4th echelon | (7) 5th echelon | (8) Tools required |
|---|---|---|---|---|---|---|
| TEST SET TS-538/U, TS-538A, B, C/U | Service -- | ----- | ----- | x | x | 5 |
| | Adjust --- | ----- | ----- | x | x | 1,2,3,4,5,6,7,8,9,12 |
| | Test ---- | ----- | ----- | x | x | 1,2,3,4,5,6,7,8,9,10, 11,12 |
| | Repair -- | x | ----- | ----- | ----- | 13 |
| | Align ---- | ----- | ----- | x | x | 1,2,3,4,5,6,7,8,9,12 |
| | Calibrate | ----- | ----- | x | x | 1,2,3,4,5,6,7,8,9,12 |
| | Rebuild -- | ----- | ----- | x | | |
| | Overhaul | ----- | ----- | x | | |
| WAVEGUIDE ASSEMBLY | Replace-- | ----- | x | | | |
| | Repair -- | ----- | x | | | |

## Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

| (1) Tools required for maintenance functions | (3) 2d echelon | (5) 4th echelon | (6) 5th echelon | (7) Tool code |
|---|---|---|---|---|
| AUDIO OSCILLATOR TS-382/U | ----- | (†) | (†) | 1 |
| FREQUENCY METER TS-186D/UP | ----- | (†) | (†) | 2 |
| HEADSET HS-30/U | ----- | (†) | (†) | 3 |
| LIGHT ASSEMBLY, ELECTRIC MX-1292/PAQ | ----- | (†) | (†) | 4 |
| MULTIMETER TS-352/U | ----- | (†) | (†) | 5 |
| OSCILLOSCOPE AN/USM-50 | ----- | (†) | (†) | 6 |
| SIGNAL GENERATOR AN/URM-64 | ----- | (†) | (†) | 7 |
| TOOL EQUIPMENT TK-87/U | ----- | (†) | (†) | 8 |
| TRANSFORMER VAR CN-16/U | ----- | (†) | (†) | 9 |
| TEST SET ELECT TUBE TV-2/U | ----- | ----- | (†) | 10 |
| TEST SET ELECT TUBE TV-7/U | ----- | (†) | ----- | 11 |
| WATTMETER AN/URM-98 | ----- | (†) | (†) | 12 |
| TOOL AND TEST EQUIPMENT AVAILABLE TO THE REPAIRMAN USER BECAUSE OF HIS ASSIGNED DUTIES | (t) | ----- | ----- | 13 |

# APPENDIX III

# BASIC ISSUE ITEMS LIST

## Section I. INTRODUCTION

### 1. General

This appendix lists items supplied for initial operation and for running spares. The list includes tools, parts, and material issued as part of the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

### 2. Co!umns

*a. Federal Stock Number.* This column lists the 11-digit Federal stock number.

*b. Designation by Model.* Not used.

c. *Description.* Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

*d. Unit of Issue.* Not used.

*e. Expendability.* Nonexpendable items are indicated by NX. Expendable items are not annotated.

*f. Quantity Authorized.* Under "Items Comprising an Operable Equipment," the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spare Items," the quantities listed are those issued initially with the equipment as spare parts. These quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

g. *Illustrations.* The "Figure No." column lists the figures in which the items are illustrated. The "Items No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on illustrations of the equipment.

## Section II. FUNCTIONAL PARTS LIST

| (2) Federal stock No. | (4) Description | (6) Expendability | (7) Quantity authorized | (8) (9) Illustrations | |
|---|---|---|---|---|---|
| | | | | Figure No. | Item No. |
| 6625-243-5174 | TEST SET TS-538/U, TS-538A, B, C/U ----- | NX | ----- | 1 | ------ |
| | ITEMS COMPRISING AN OPERABLE EQUIPMENT | | | | |
| Ord thru AGC | TECHNICAL MANUAL TM 11-6625-213-12 --- | ----- | 2 | ----- | ------ |
| 6625-230-5471 | ANTENNA: Sig Dwg No. SC-B-93850 -------- | ----- | 1 | 1 | E l |
| 5995-644-0389 | CABLE ASSEMBLY, RADIO FREQUENCY CG-299A/U: (Not installed) ---------- | ----- | 1 | 1 | ------ |
| 6625-502-6077 | CABLE ASSEMBLY, POWER ELECTRICAL CX-337/U: (Not installed) ---------- | ------ | 1 | 1 | ------ |
| 5120-408-2313 | WRENCH, SPANNER : Sig Dwg No. SC-B-93210 (Not installed) ---------- | NX | 1 | 1 | H27 |

| (2) Federal stock No. | (4) Description | (6) Expendability | (7) Quantity authorized | (8) Illustrations Figure No. | (9) Illustrations Item No. |
|---|---|---|---|---|---|
| | RUNNING SPARES AND ACCESSORY ITEMS | | | | |
| 5960-166-7648 | ELECTRON TUBE: MIL type No. OB2 (Installed in equip) ---------- | ----- | 1 | 3 | V6 |
| 5960-542-7017 | ELECTRON TUBE: MIL type No. 6J6WA (Installed in equip) ---------- | ----- | 2 | 3 | V1, V2, V3 |
| 5960-188-0880 | ELECTRON TUBE: MIL type No. 6X4W (Installed in equip) ---------- | ----- | 1 | 3 | V5 |
| 5960-188-3899 | ELECTRON TUBE: MIL type No. 5675 (Installed in equip) ---------- | ----- | 1 | 3 | V4 |
| 5920-280-4466 | FUSE, CARTRIDGE; MIL type No. F02G2R00A (Installed in equip) ---------- | ----- | 2 | 3 | F1,F2 |
| 5960-284-6134 | SEMI-CONDUCTOR DEVICE: MIL type IN23C (Installed in equip) ---------- | ----- | 2 | 3 | CR2 |

By Order of Secretary of the Army:

EARLE G. WHEELER,
*General, United States Army,*
*Chief of Staff.*

Official:
J. C. LAMBERT,
*Major General, United States Army.*
*The Adjutant General.*

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| | |
|---|---|
| 6-100 | 17 |
| 6-101 | 17-100 |
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| 6-186 | 37 |
| 6-200 | 37-100 |
| 6-201 | 39-51 |
| 6-300 | 39-65 |
| 6-301 | 44-16 |
| 6-302 | 57 |
| 6-385 | |
| 6-386 | |
| 6-525 | |
| 6-565 | |
| 6-575 | |
| 6-576 | |
| 7 | |
| 7-100 | |
| 11-7 | |
| 11-16 | |
| 11-57 | |
| 11-97 | |
| 11-98 | |
| 11-117 | |
| 11-155 | |
| 11-157 | |
| 11-500 (AA-AE) (4) | |
| 11-557 | |
| 11-587 | |
| 11-592 | |
| 11-597 | |

*NG:* State AG (3); Units-Same as Active Army except allowance is one copy each unit.
*USAR:* None.
For explanation of abbreviations used, see AR 320-50.

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