TM 11-6625-415-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, FIELD AND DEPOT MAINTENANCE MANUAL

MULTIPLIER, ELECTRICAL INSTRUMENT TS-265A/UP

HEADQUARTERS, DEPARTMENT OF THE ARMY

1961

TAGO 2026A—October

WARNING

DANGEROUS VOLTAGES ARE USED IN THE OPERATION OF THIS EQUIPMENT

Be extremely careful and take the following precautions before coming in contact with the voltage divider. Make sure that the equipment under test is off. With a proper shorting bar, short to ground all terminals of connections to the voltage divider.

DON'T TAKE CHANCES!

EXTREMELY DANGEROUS VOLTAGES MAY EXIST AT THE FOLLOWING LOCATIONS DURING OPERATION:

J103----------up to 50,000 volts ac.
J102----------up to 5,000 volts ac.
J101----------up to 500 volts ac.
J100----------up to 500 volts ac.

GPO 827–901–1

TECHNICAL MANUAL
No. 11-6625-415-15

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *4 October 1961*

OPERATOR, ORGANIZATIONAL, FIELD AND DEPOT MAINTENANCE MANUAL
MULTIPLIER, ELECTRICAL INSTRUMENT TS-265A/UP

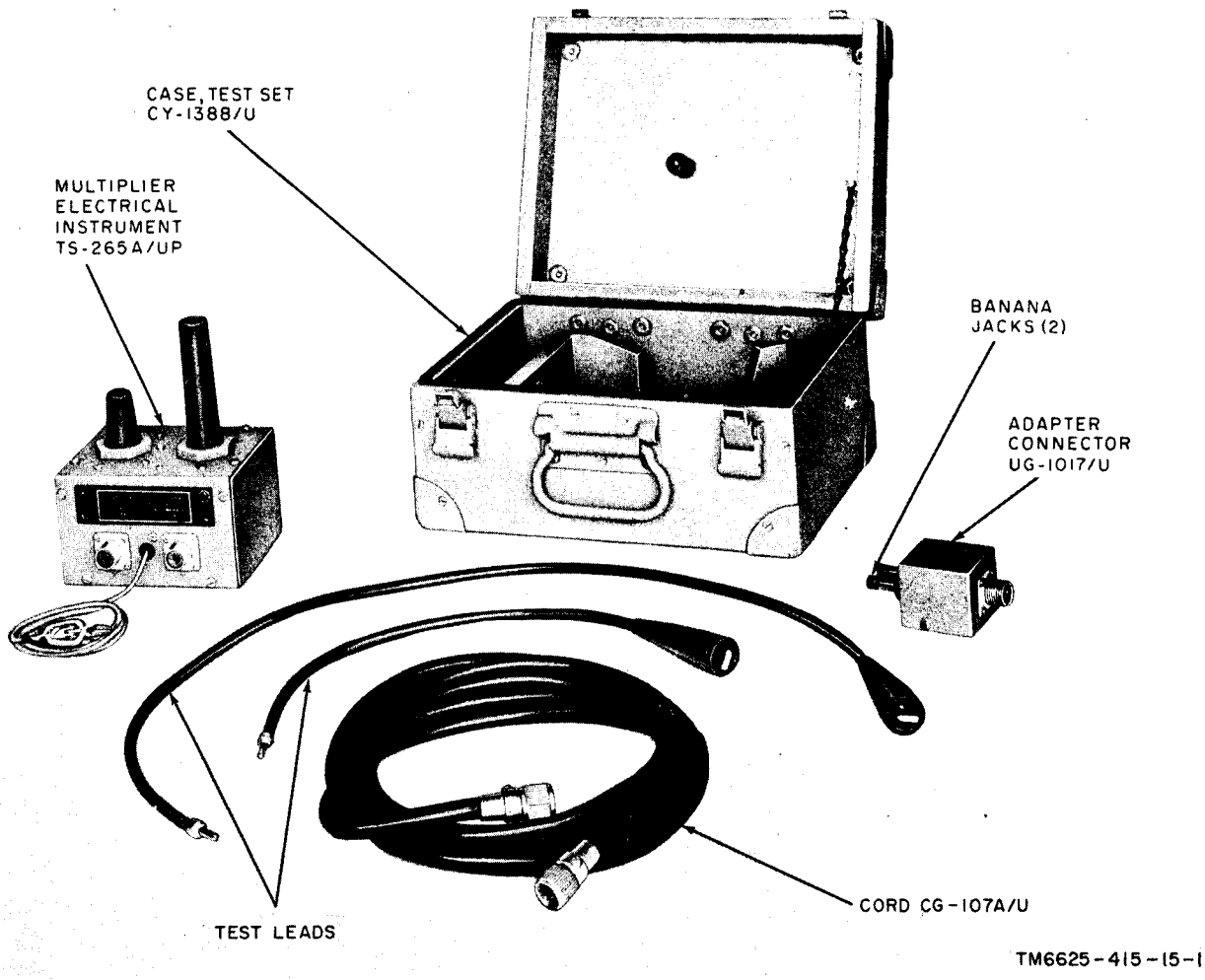


Figure 1. *Multiplier, Electrical* Instrument TS-265A/UP with accessories, less technical manual.

CHAPTER 1
INTRODUCTION

Section 1. GENERAL

1. Scope

This manual describes Multiplier, Electrical Instrument TS–265A/UP and covers its installation, operation, and maintenance. It includes theory, troubleshooting, repairs, final testing, and directions for shipment, limited storage, and demolition to prevent enemy use.

2. Forms and Records

a. Unsatisfactory Equipment Reports. Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-ML, Fort Monmouth, N. J., as prescribed in AR 700-38.

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.

c. Preventive Maintenance Forms. Prepare DA Form 11-266 (figs. 5 and 6) (Maintenance Check List for Signal Equipment (Test Equipment)) in accordance with instructions on the form.

d. Parts List Form. Forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manuals 7, 8, or 9) direct to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-ML, Fort Monmouth, N. J., with comments on parts listings.

e. Comments on Manual. Forward all other comments on this manual direct to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-PA2d, Fort Monmouth, N. J.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

Multiplier, Electrical Instrument TS-265A/UP is a portable, general purpose test equipment designed to step down high high alternating current (at) voltages by a known stepdown ratio of either 10 to 1 or 100 to 1 to allow the pulses to be observed on a standard oscilloscope or synchroscope. All measurements are made on associated test equipment.

4. Technical Characteristics

Alternating current voltage-dividing ratios:

10:1 ratio section ..... ±5%.
100:1 ratio section ..... ±5%.

Ac voltage maximum inputs:

10:1 ratio section ..... 5kv, peak to peak.
100:1 ratio section ..... 50kv, peak to peak.

5. Table of Components

(fig. 1)

Quantity	Item	Height (in.)	Depth (in.)	Width (in.)	Unit weight (lb)
1	Multiplier, Electrical Instrument TS–265A/UP.	6¾	4¾	5⅜	2.1
1	Case, Test Set CY–1388/U.	6¼	8½	11¼	6.5
1	Adapter, Connector UG–1017/U.	1⅝	1⅞	3½	0.5
1	Cord CG–107A/U, (10 ft).				0.5
1	Test Lead SC–DL–24915 (18 in.).				0.5
1	Test Lead SC–DL–24915 (36 in.).				0.5
2	TM11–6625–415–15.				

6. Common Names

Nomenclature	Common name
Multiplier, Electrical Instrument TS-265A/UP.	Voltage divider
Case, CY-1388/U	Case
Connector Adapter UG-1017/U	Adapter
Cord CG-107A/U	Coaxial cable

7. Description

a. Multiplier, Electrical Instrument TS-265A/UP (fig. 1) is a voltage divider and is issued with the following accessories: Connector Adapter UG-1017/U, Cord CG-107A/U, two test leads, and Case CY-1388/U.

b. The voltage divider is a portable, self-contanined unit. Included on the front panel (fig. 3) are two coaxial connectors and a ground wire that is terminated with an electrical clip. Two high-voltage jacks are installed on the top of the voltage divider.

c. The adapter consists of a coaxial connector on one side of a metal box and two binding posts on the opposite side.

d. Cord CG-107A/U is a coaxial cable (RG-8A/U), 10 feet long, and contains electrical coaxial connectors on both ends, and provides a means of coupling from the coaxial cable output of the voltage divider to indicating devices that are not equipped with coaxial inputs.

e. The two test leads have a banana-type plug on one end and an insulated battery clip on the other. The test leads are identical except for length.

f. Case CY-1388/U is a wooden transit case which provides space for all the components.

CHAPTER 2

INSTALLATION AND OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

8. Unpacking

a. Packaging Data.

(1) When packaged and packed for oversea shipment, each Multiplier, Electrical Intrument TS-265A/UP, with accessories, is packaged in water-resistant fiberboard cartons, with all joints and seams sealed with water-resistant, pressure-sensitive tape. The packaged equipment is further protected by packing four each voltage dividers in another fiberboard carton (fig. 2).

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

(3) The following chart gives the outside dimensions for the oversea shipment packaging. Dimensions and weights are indicated for four equipments.

Box No.	Item	Outside dimensions			Vol Cu ft	Wt (lb)
		Length (in.)	Width (in.)	Depth (in.)		
1	Multiplier, Electrical Instrument TS-265A/UP (4 ea).	23	19	7	1.8	45

b. Removing Contents.

Caution: Be careful when unpacking and unpackaging the equipment. Do not thrust tools into the interior of any container or wrap. Select a site that is close to the base of operation, and free from dust, dirt, and excessive moisture.

(1) Unpacking equipment overseas.

(a) Cut the filament banding on top of the carton.

(b) Cut through the three edges of the shipping container.

(c) Remove the inner fiberboard container.

(2) Unpacking equipment overseas.

(a) Cut through the three edges of a fiberboard container.

(b) Remove the contents of the fiberboard container.

(3) Unpacking equipment in CONUS. Follow the applicable procedures as specified in (1) or (2) above.

9. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, refer to paragraph 2.

b. Check the equipment against the packing list. When no packing list accompanies the equipment, use the table of components (par. 5) as a general check.

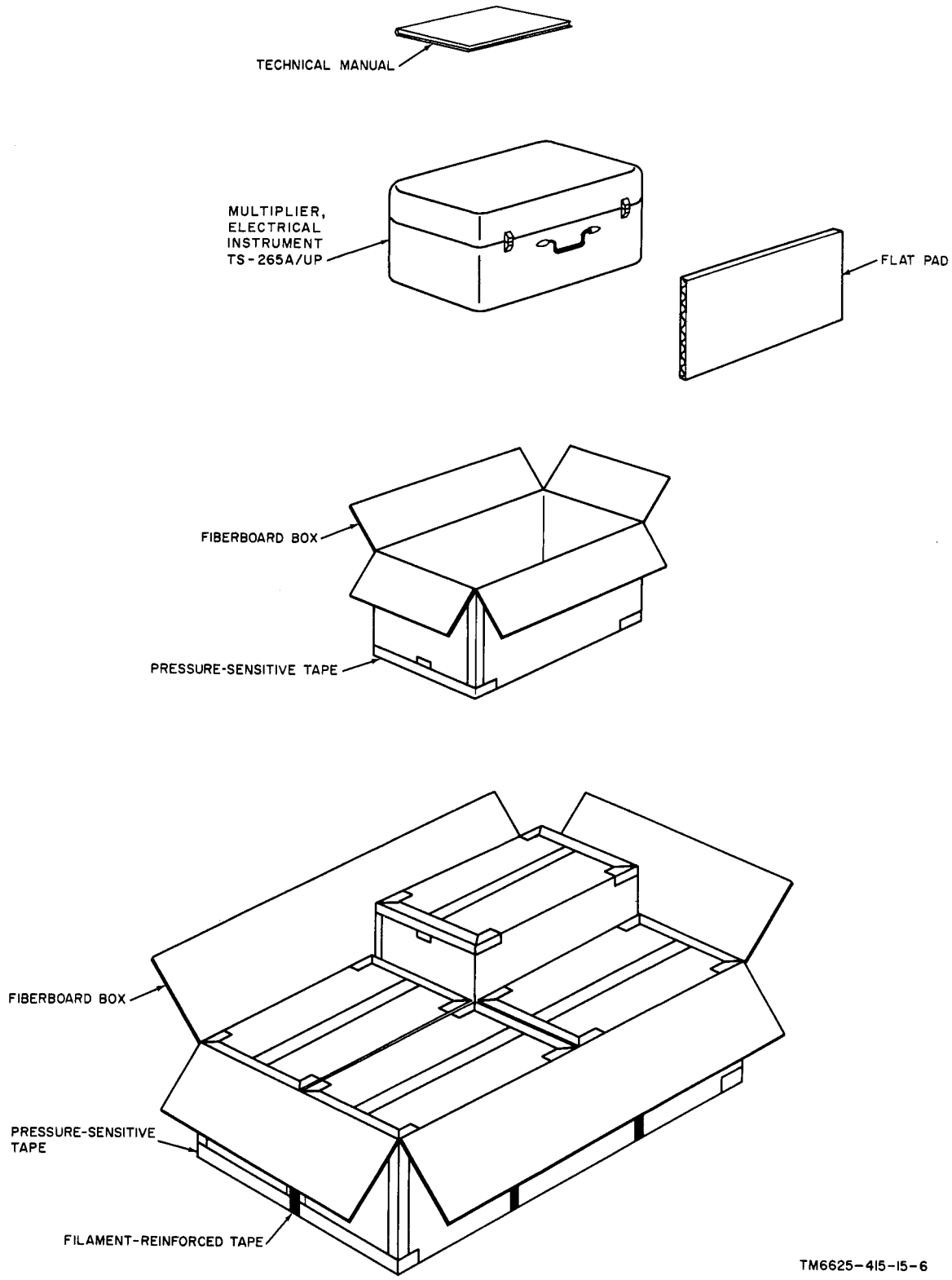


Figure 2. Typical packaging,

Section II. OPERATING INSTRUCTIONS

10. Multiplier, Electrical Instrument TS-265A/UP Operating Connections

(fig, 3)

Connection	Function
RATIO 10:1 INPUT jack J102.	Provides the input receptacle for high-voltage test lead. Used in conjunction with output receptacle RATIO 10:1.
RATIO 100:1 INPUT jack JI03.	Provides the input receptacle for high-voltage test lead. Used in conjunction with output receptacle RATIO 100:1.
coaxial connector RATIO 10:1 output J100.	Provides the output receptacle for coaxial cable.
Coaxial connector RATIO 100:1 output J101.	Provides the output receptacle for coaxial output cable.
Ground lead	Provides the ground connection for the input and output of the voltage divider, and provides a discharge path to enable the operator to discharge the capacitors of the voltage divider.

11. Preliminary Starting Procedure

a. Determine the approximate ac peak-to-peak voltage to be measured.

b. If the input voltage to be measured exceeds 5 kilovolt (kv) peak to peak, use input jack J103 marked RATIO 100:1; otherwise use either jack J103 RATIO 100:1 or jack J102, RATIO 10:1.

c. Check to see that no voltage higher than 50KV peak to peak is applied to the input jack RATIO 100:1, and that no voltage higher than 5KV peak to peak is applied to input jack RATIO 10:1.

d. Turn off the power on the equipment to be measured.

12. Starting and Operating Procedure

Warning: **Before making any connection to the equipment under test, make sure that the power is off and that the high-voltage capacitors are discharged.**

a. Connect the ground lead (A, fig. 4) extending from the voltage divider to the ground terminal of the equipment to be tested.

b. Connect the coaxial cable to the coaxial output connector marked RATIO 100:1 (A, fig. 4) to measure a maximum 50-kv input, or to the connector marked RATIO 10:1 (B, fig. 4) to measure a maximum 5-kv input.

c. Connect the other end of the coaxial cable to the corresponding indicating instrument (oscilloscope). If the indicating instrument is not provided with a coaxial cable connector, terminate the coaxial cable into Connector Adapter UG–1017/U (fig. 1) supplied with the voltage divider. Connect both banana jacks on the adapter to the corresponding terminals of the indicating instrument. Make sure that the banana jack marked GD is connected to the ground terminal of the indicating instrument.

d. Insert the test lead (36-inch) plug into jack J103 marked RATIO 100:1 to measure a 50-kv input, or insert the test lead (18-inch) plug into jack J102 marked RATIO 10:1 to measure a 5-kv input.

e. Clip the other end of the high-voltage test lead to the high-voltage terminal on the equipment to be measured.

f. Check all cable connections for good contacts. *The test setup and the equipment under test must be properly grounded.*

g. Turn on the equipment to be measured.

h. Proceed with the measurements or observations.

13. Stopping Procedure

a. Turn off the equipment being measured.

b. Discharge the high-voltage capacitors by placing a high-voltage shorting device between ground and the point of contact of the test clip of the voltage divider on the equipment being measured.

c. Disconnect the coaxial cable.

d. Disconnect the test lead.

e. Disconnect the ground lead from the ground terminal.

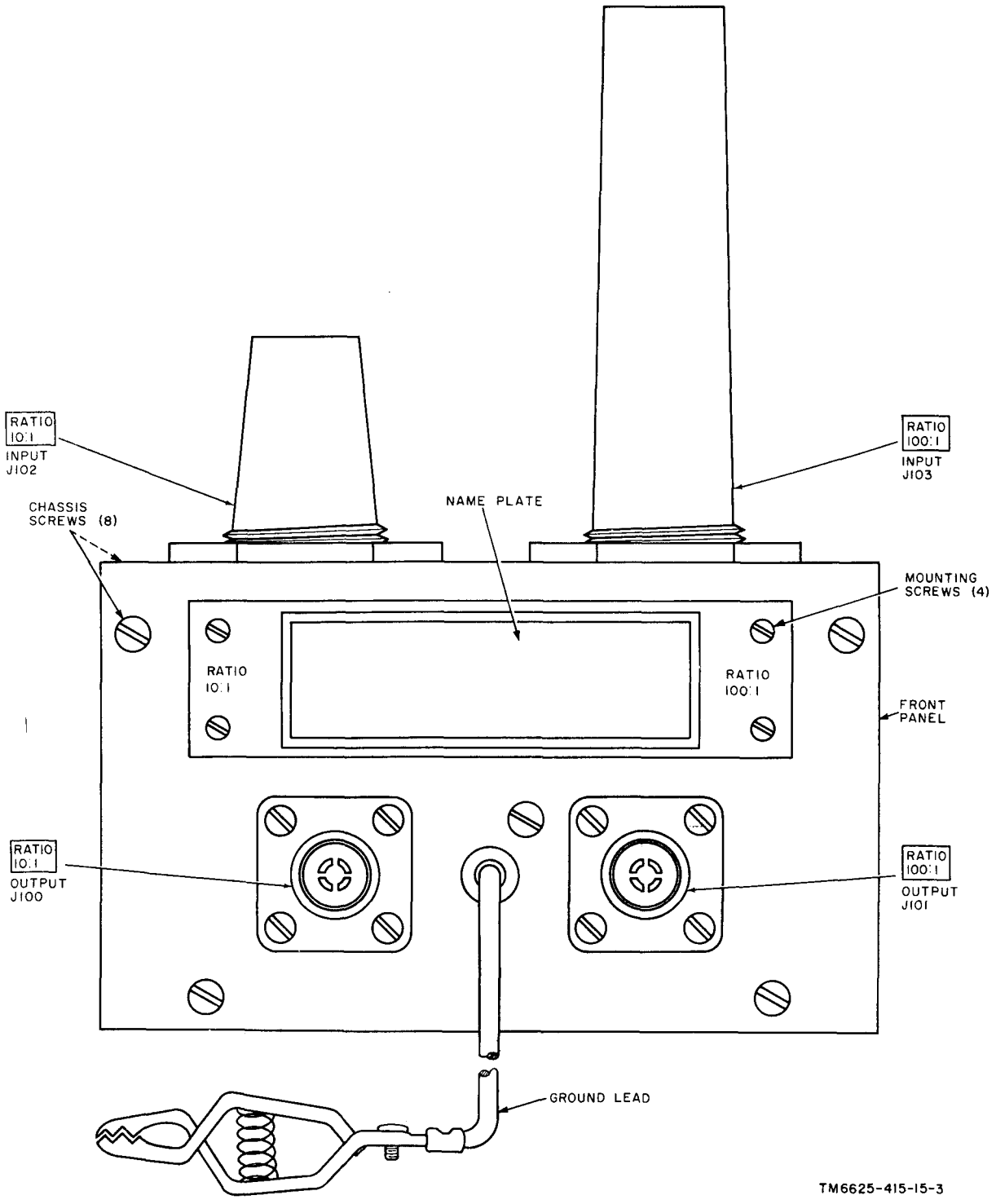


Figure 3. Multiplier, Electrical Instrumnt TS-265A/UP, front panel.

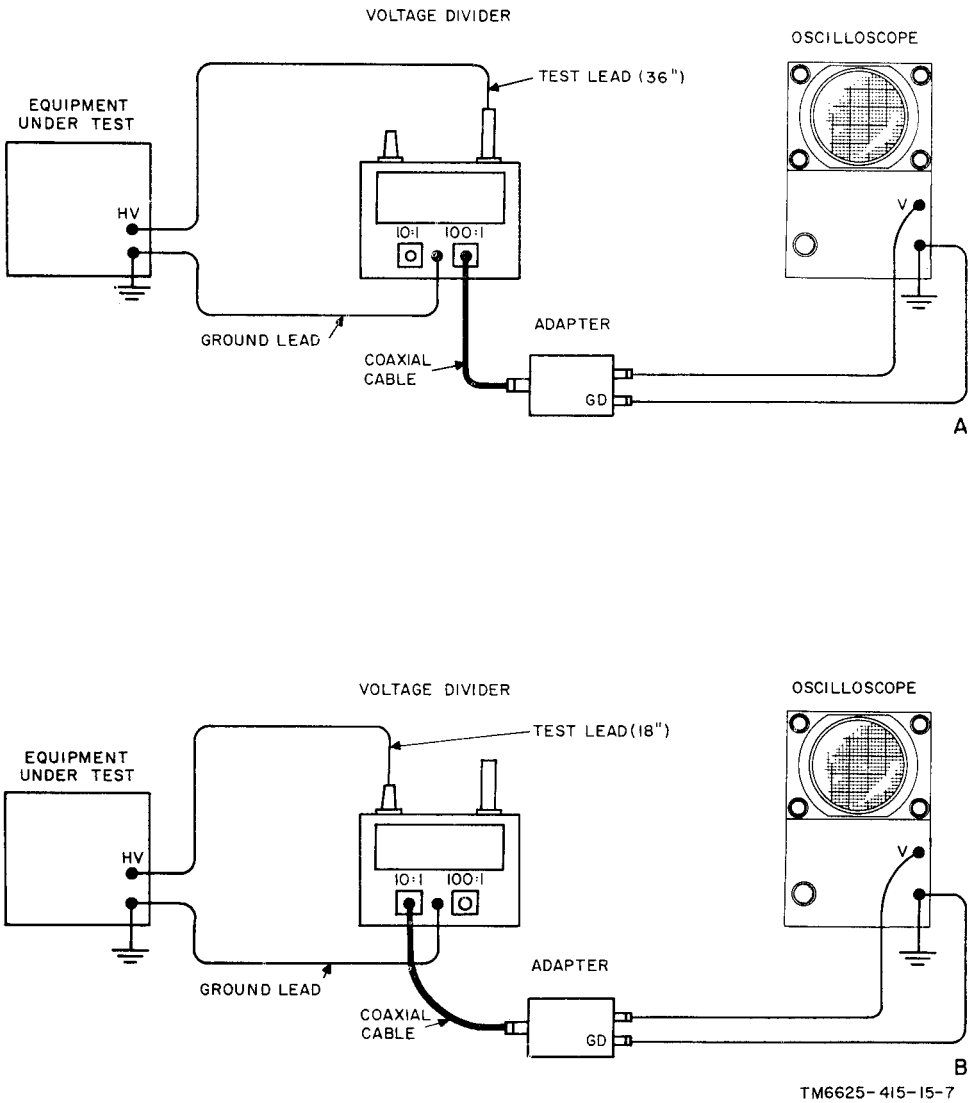


Figure 4. Equipment Test Setup.

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

14. Scope of Maintenance

a. The following is a list of maintenance duties normally performed by the user of the voltage divider. These procedures do not require special tools or test equipment.

b. Maintenance for the voltage divider consists of the following:

(1) Preventive maintenance (par. 15).

(2) Visual inspection (par. 16).

(3) Checking cable and test lead connections (par. 17b).

(4) Operational checks (par. 17).

15. Preventive Maintenance

a. DA Form 11-266. Da Form 11-266 (figs. 5 and 6) is a preventive maintenance checklist. Items not applicable to the voltage divider are lined out in the figures. References in the item block in the figures are to paragraphs that contain additional maintenance information pertinent to the particular item. Instructions for use appear on the form.

b. Items. The information shown in this subparagraph supplements DA Form 11-266. The item numbers correspond to the ITEM numbers on the form.

Item	Maintenance procedure
1	Use a clean cloth to remove dust, dirt, moisture, and grease from the voltage divider and case. If necessary, wet the cloth with Cleaning Compound (Federal stock No. 7930-395-9542) and then wipe the parts with a dry clean cloth.
4	Use the information in paragraph 17 to determine whether the voltage divider is operating normally.
5	Make a visual inspection of cords and cables. Follow the procedure outlinted in paragraph 17.
7	Check to see that all panel and chassis screws are tight.
10	When the finish on the voltage divider has been scarred or damaged badly, touch up the bare surfaces to prevent corrosion. Use No. 000 sandpaper to clean the surface down to the bare aluminum; obtain a bright smooth finish. Sand the area back to solid paint and feather the paint edge that leads to the exposed metal. Wipe the area clean and apply one coat of zinc chromate metal primer and two finish coats of paint, od TT-E-485C, type 2, to the metal surfaces.

Warning: Cleaning compound is flammable and its fumes are toxic. Do not use near a flame; provide adequate ventilation.

16. Visual Inspection

Warning: **Before handling the equipment, make sure that all power is removed and high-voltage capacitors are discharged (par. 13).**

Before operating the equipment, inspect it. Inspection will save repair time and may also avoid further damage. Inspect the following for obvious defects:

a. Seating of all chassis and cable connectors.

b. High-voltage test leads for insulation damages.

c. High-voltage insulation sleeves for insulation damages.

d. Coaxial cable for insulation damages.

17. Operational Checks

a. Indications of Improper Operation of Voltage Divider.

(1) Any kind of electrical insulation breakdown or sparkover usually associated with noisy operation indicates improper operation of the voltage divider.

(2) The indicating instrument used in conjunction with the voltage divider, an oscilloscope or synchroscope, normally provides the best means of indicating improper operation of the voltage divider. No indication, intermittent indication, or excessive size of distorted pattern on the scope is a good sign of a defective voltage divider.

MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
TEST EQUIPMENT
(AR 750-625)

EQUIPMENT NOMENCLATURE: MULTIPLIER, ELECTRICAL INSTRUMENT TS-265 A/UP

EQUIPMENT SERIAL NUMBER:

INSTRUCTIONS

This form may be used for a period of one month by using the correct dates and weeks of the month. It is to be used as a Preventive Maintenance check list for Signal equipment in actual use, or for a check on equipment prior to issue.

1. For detailed Preventive Maintenance instructions see:
   a. The Technical Manual *(in TM 11 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   b. The Supply Bulletin *(SB 11-100 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   c. The Department of the Army Lubrication Order. *(See DA Pamphlet Number 310-4)*

2. The following action will be taken by either the Communications Officer/Chief for 1st echelon, or the Inspector for higher echelon
   a. Enter Equipment Nomenclature and Serial Number.
   b. Strike out items that do not apply to the equipment.

3. Operator/Inspector will enter in the columns entitled CONDITION, on the proper line, a notation regarding the condition, using symbols specified under LEGEND.

4. After operator completes each daily inspection he will initial over the appropriate dates under "Daily Condition for Month", then return form to his supervisor.

FOLD

TYPE OF INSPECTION: PREVENTIVE MAINTENANCE

OPERATOR	2/3 ECHELON	DATE	SIGNATURE
✓		6 SEPT 61	Walter Brown
	✓	7 SEPT 61	Harold Johnson

U. S. GOVERNMENT PRINTING OFFICE 1957 O - 427138

4

DA FORM 1 MAY 57 11-266

TM6625-415-15-9

Figure 5. DA Form 11-266, pages 1 and 4.

LEGEND for marking conditions:
Satisfactory, ✓.
Adjustment, Repair or Replacement required, X.
Defect corrected, (X).

DAILY CONDITION FOR MONTH OF SEPTEMBER 1961

NO.	DAILY ITEM	1 W3 17	2 W3 18	3 W3 19	4 W3 20	5 W3 21	6 W3 22	7 W3 23	8 24	9 25	10 26	11 27	12 28	13 29	14 30	15 31	16	2D 3D ECHELON
1.	CLEAN DIRT AND MOISTURE FROM EXPOSED SURFACES OF HOUSINGS, CASES, CABINETS, CONTROL PANELS, INTERCONNECTING PLUGS, CABLES, ~~HEADSETS, METER WINDOWS~~, ETC.	✓	✓	✓	✓	✓	✓	✓										✓
2.	INSPECT FOR LOOSENESS OF EXTERIOR ITEMS SUCH AS ~~SWITCHES, KNOBS, JACKS~~, CONNECTORS ~~AND PILOT LIGHTS~~.	✓	✓	✓	✓	✓	✓	✓										
3.	~~INSPECT CONTROLS FOR BINDING, SCRAPING. TAP CONTROLS LIGHTLY FOR CUT-OUT DUE TO LOOSE CONTACTS.~~																	
4.	DURING OPERATION BE ALERT FOR ANY UNUSUAL PERFORMANCE OR CONDITION.	✓	✓	✓	✓	✓	✓	✓										

WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D 3D ECH
5. INSPECT CORDS, CABLES, WIRE AND SHOCK MOUNTS FOR BREAKS, CUTS, KINKS, DETERIORATION, STRAIN AND FRAYING.	✓					✓
6. ~~INSPECT CANVAS AND LEATHER ITEMS FOR FUNGUS, FRAYING, TEARS, BROKEN ZIPPERS AND SNAP FASTENERS.~~						
7. ~~HAND CHECK FOR LOOSENESS OF EXTERIOR ITEMS SUCH AS HANDLES, LATCHES, HINGES.~~						
8. ~~INSPECT FOR LUBRICATION IN ACCORDANCE WITH APPLICABLE DA LUBRICATION ORDER.~~						
9. ~~INSPECT DRY BATTERIES FOR DIRT, LOOSE TERMINALS AND LEAKAGE.~~						
10. INSPECT EXPOSED METAL SURFACES FOR RUST AND CORROSION.	✓					✓
11. ~~INSPECT METERS FOR DAMAGED GLASS AND CASES.~~						

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
12. INSPECT SEATING OF READILY ACCESSIBLE ITEMS OF A ~~PLUG-OUT NATURE: CRYSTALS, FUSES~~, CONNECTORS, ~~PLUG-IN COILS, LAMPS~~, ETC. DO NOT REMOVE, ROCK OR TWIST TO INSPECT. USE ONLY A DIRECT PRESSURE TO INSURE THE ITEM IS FULLY SEATED.	
13. ~~INSPECT FOR CLEANLINESS AND TIGHTNESS OF SUCH ITEMS AS SHOCK MOUNTS, ANTENNA, ANTENNA MOUNTS AND WAVE GUIDES.~~	
14. ~~INSPECT RELAY AND CIRCUIT BREAKER ASSEMBLIES FOR DIRT, CORROSION, WORN OR BURNED CONTACTS.~~	

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
15. INSPECT RESISTORS, BUSHINGS, INSULATORS FOR CRACKS, CHIPPING, BLISTERING, DISCOLORATION AND MOISTURE.	X
16. INSPECT JACKS AND CONNECTORS FOR SNUG FIT AND GOOD CONTACTS.	✓
17. ~~INSPECT VARIABLE CAPACITORS FOR DIRT AND MOISTURE.~~	
18. ~~INSPECT AIR FILTERS FOR CLEANLINESS.~~	
19. ~~INSPECT SCREWTYPE TERMINALS OF TRANSFORMERS, FIXED CAPACITORS, RESISTORS, CHOKES, POTENTIOMETERS AND RHEOSTATS FOR CORROSION, DIRT AND LOOSE CONTACTS.~~	
20. ~~CLEAN AND TIGHTEN SWITCHES, BLOWERS, RELAY BASES.~~ CLEAN INTERIOR OF CHASSIS AND CABINETS.	✓
21. ~~INSPECT GENERATORS, MOTORS AND DYNAMOTORS FOR BRUSH WEAR, SPRING TENSION, ARCING AND COMMUTATOR WEAR.~~	
22. INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.	✓
23. INSPECT GASKETS AND BUSHINGS FOR WEAR AND DAMAGE.	✓
24. ~~INSPECT CATHODE RAY TUBES FOR BURNED SCREEN SPOTS.~~	
25. ~~BEFORE STORING OR SHIPPING REMOVE ALL BATTERIES.~~	

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. *(Continue on page 4, if more space is needed)*

ITEM 15. STANDOFF INSULATOR ON CAPACITOR C100 CRACKED. REPORTED TO HIGHER ECHELON MAINTENANCE FOR REPAIR.

2 3

TM6625-415-15-10

Figure 6. DA Form 11-266, pages 2 and 3.

(3) It is very important to see that the indicating device itself is not defective and that the test setup associated with the voltage divider is correct before concluding that the voltage divider is defective.

b. Corrective Measures. When the equipment fails to perform properly, turn off the power, discharge the high-voltage capacitors, and check for the conditions listed below. *Do not check any item with the power on.*

(1) Wrong input or output test cable connections.
(2) Disconnected or poorly connected test leads or coaxial cable.
(3) Broken clips, leads, or coaxial cable.
(4) Incorrectly connected coaxial cable adapter to the indicating instrument.

c. If the checks indicated in (1) through (4) above do not locate the trouble, troubleshooting is required by a higher echelon repairman.

CHAPTER 4
THEORY

18. General Theory

a. The Multiplier, Electrical Instrument TS-265A/UP (fig. 7) is a capacitive-type voltage divider; therefore, it is useful only for ac voltage measurements or observations. It is based on the theory that when an ac voltage is applied across two or more capacitors connected in series, the voltage applied will be divided so that the voltage drop across an individual capacitor will be inversely proportional to the capacitance value of each capacitor. Consequently, the ac voltage drops across the capacitors can be adjusted for any suitable ratio by proper selection of the capacitor values.

b. For the voltage divider, the capacitors are selected for 100:1 and 10:1 voltage dividing ratios. The voltage divider consists of-two independent and separate voltage divider sections. One section is provided for a voltage-dividing ratio of 100:1, and the other is provided for a voltage-dividing ratio of 10:1, The 100:1 voltage divider section consists of fixed capacitors C104 and C106, and trimmer capacitor C105 which is used to provide the adjustment for the proper dividing ratio, The input voltage is applied to the voltage divider through the test lead connected into jack J103, which also serves as capacitor C104. The flexible ground lead is provided for the ground return. When the output coaxial cable is inserted in coaxial connector J101, the capacitance ratio is such as to provide 1/100 of the input voltage. The 10:1 voltage divider section consists of fixed capacitors C100, C101, and C103, and trimmer capacitor C102. Trimmer capacitor C102 is used to provide the adjustment for the proper dividing ratio. The input voltage is applied to the voltage divider through the test lead connected into jack J102. When the coaxial cable is inserted into coaxial connector J100, the capacitance ratio is such as to provide one-tenth of the input voltage.

19. Signal Paths in Voltage Divider Operation

(fig. 7)

a. When the voltage divdier is used for 100:1 dividing ratio, the signal is picked up by the test lead and is fed to the 100:1 section of the voltage divider through input jack J103. At J103, the voltage is applied across the series-parallel combination of capacitors C104, C105, and C106. The voltage across the parallel combination of capacitors C105 and C106 will be only one-hundredth of the voltage applied to J103. The remainder of the voltage applied will be across capacitor C104. The reduced output is available through impedance matching resistor R101 in the corresponding 100:1 coaxial cable connector J101.

b. When the voltage divider is used for 10:1 dividing ratio, the signal is picked up by the test lead and fed to the 10:1 section of the voltage divider through input jack J102. At J102, the voltage is applied across the series-parallel combination of capacitors C100, C101, C102, and C103. The voltage across the parallel combination of capacitors C102 and C103 will be one-tenth of the voltage applied to J102. The remainder of the voltage applied will be across the series combination of capacitors C100 and C101. The reduced output is available through impedance matching resistor R100 in the corresponding 10:1 coaxial cable connector J100.

c. A coaxial cable is furnished for both the 100:1 and 10:1 output jacks to connect the voltage divider to an indicating device. The adapter (fig. 1) is used to furnish a straight-through connection from the coaxial output cable to indicating devices that are not equipped with coaxial connectors.

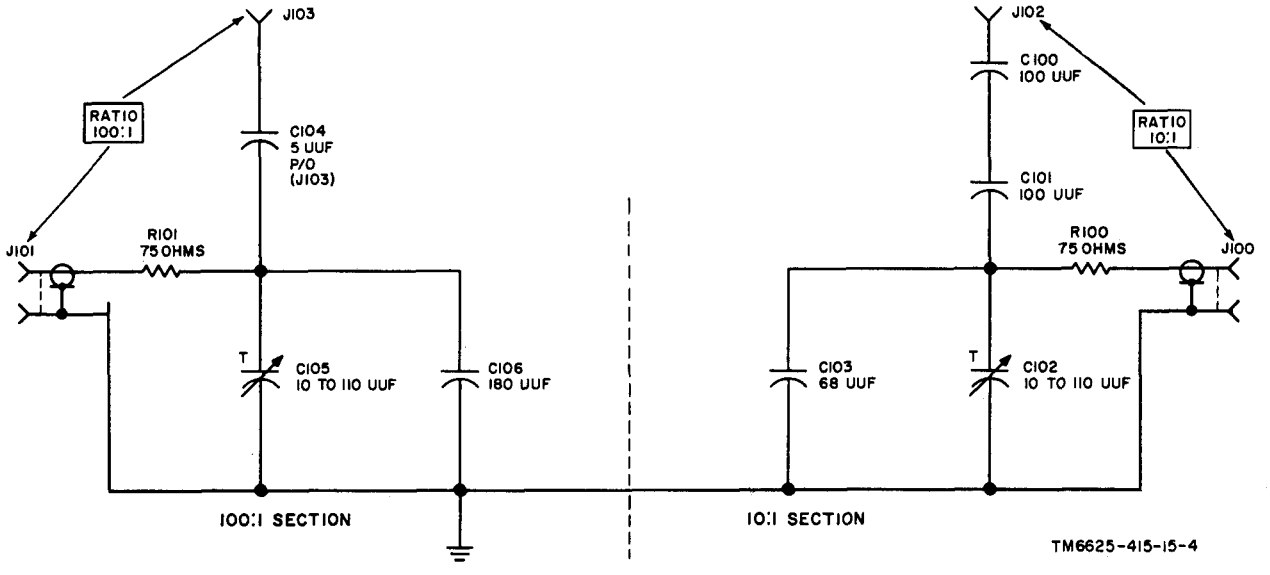


Figure 7. Multiplier, Electrical Instrument TS-265A/UP, Schematic diagram.

CHAPTER 5
TROUBLESHOOTING

Section 1. GENERAL TROUBLESHOOTING TECHNIQUES

Warning: When servicing the voltage divider, be extremely careful because of the high voltage. Before touching the voltage divider, always turn off the equipment under test, discharge the high-voltage capacitors, and disconnect the high-voltage test lead.

20. General Instructions

Troubleshooting at field and depot maintenance level includes all the techniques outlined for organizational maintenance and any special or additional techniques required to isolate a defective part. The field maintenance and depot procedures are not complete in themselves but supplement the procedures described in this manual.

21. Organization of Troubleshooting Procedures

a. General. To troubleshoot a defective voltage divider, the repairman must first localize the fault. Localization means tracing the fault to the defective section that is responsible for the abnormal condition. Some faults, such as burned-out resistors and arcing, can often be located by sight, smell, and hearing. The majority of faults, however, must be localized by checking voltages and resistance.

b. Localization. The tests listed in (1) through (4) below will aid in isolating the trouble. First localize the trouble to a single stage or cirucit, and then isolate the trouble within that circuit by voltage, resistance, and continuity measurements.

(1) *Visual inspection.* The purpose of visual inspection is to locate faults without testing or measuring circuits.

(2) *Operational tests.* Operational tests frequently indicate the general location of trouble. Operational checks are given in paragraph 17.

(3) *Troubleshooting chart.* The trouble symptoms listed in the troubleshooting chart (par. 25d) will aid in localizing the trouble to a component part.

(4) *Intermittent troubles.* In all these tests, the possibility of intermittent troubles should not be overlooked. If present, this type of trouble often maybe made to appear by tapping or jarring the equipment. Check the wiring and connections of the equipment.

22. Test Equipment Required

The following chart lists the test equipment required for troubleshooting Multiplier, Electrical Instrument TS-265A/U, and also includes the associated technical manuals and the assigned common names for the test equipment.

Test equipment	Technical manual	Common name
Generator, Pulse SG-69/PPM-l (p/o Pulse Generator AN/PPM-l	TM 11-2678	Pulse generator
Oscilloscope AN/USM-50	TM 11-5129	Oscilloscope
Test Set, Insulation Breakdown AN/GSM-6	TM 11-6625-273-12	High-voltage supply
Multimeter TS-352/U	TM 11-5527	Multimeter
Frequency Meter AN/TSM-16	TM 11-6625-218-12	Frequency meter

Section II. TROUBLESHOOTING MULTIPLIER, ELECTRICAL INSTRUMENT TS-265A/UP

Note. The test procedures described in this section enable the repairmen to locate the trouble. The same test procedures are used for proper voltage ratio alignment, which must be checked whenever the voltage divider is repaired.

23. Short-Circuit Tests

a. Test Preparations, 100:1 Section.

(1) Remove the voltage divider from the case (fig. 1).

(2) Insert the test lead (36-inch) into RATIO 100:1 input jack J103 (fig. 3).

(3) Insert the coaxial cable into RATIO 100:1 coaxial connector J101.

(4) Remove the eight chassis screws, four of which are located on the front panel and four on the top of the voltage divider.

(5) Separate the chassis to expose the parts.

b. Measurements, 100:1 Section. Make the resistance measurements indicated in the following chart. Use the highest resistance range on the multimeter (0-1000 MEG) when checking the capacitors or the coaxial cable. Use the (0-100) ohm range when checking the resistors on the multimeter. When the faulty part is found, repair the trouble and recheck the resistance measurements before applying power to the unit. After making repairs, perform the voltage breakdown test (par. 26) and the voltage-dividing ratio test (par. 24).

Short-circuit tests

Point of measurement	Normal indication	Isolating procedure
Between the center conductor of the coaxial cable connector located on the far end of the cable and the junction point of R101 and C105 (fig. 8).	Approx 75 ohms.	Infinite resistance indicates open cable, defective receptacle, or open resistor R–101 (fig. 8.). Check continuity of each item separately. Low or zero resistance indicates defective R101.
Between the outside conductor of the coaxial cable connector located on the far end on the cable and the ground lead clip (fig. 3)	Short.	Infinite resistance indicates open cable, loose connectors, broken ground lead, or loose receptacle J101 (fig. 8), or loose ground connection.
Between the junction point of R101, C105, (fig. 8), and ground lead clip (fig. 3).	Infinite resistance.	Short indicates defective C105 or C106 (fig. 8). Approx 75 ohms indicates shorted coaxial cable or cable connectors. Check each item separately.
Between the high-voltage test lead (fig. 4) and the junction point of C105 and R101 (fig. 8)	Infinite resistance.	Resistance reading indicates defective C104 (fig. 8).

c. Test Preparations, 10:1 Section.

(1) Insert the test lead (18 in.) into RATIO 10:1 input jack J102.

(2) Insert the coaxial cable into RATIO 10:1 coaxial connector J100.

d. Measurements, 10:1 Section. Make the resistance measurements indicated in the following chart. Use the highest resistance range on the multimeter (0-1000 MEG) when checking the capacitors. Use the (0-100) ohm range on the multimeter when checking the resistors. When the faulty part is found, repair the trouble and recheck the resistance measurements before applying power to the unit. After making repairs, perform the voltage breakdown test (par. 26) and the voltage-dividing ratio test (par. 24).

Short-circuit tests

Point of measurement	Normal indication	Isolating procedure
Between the center conductor of the coaxial cable connector located on the far end of the cable and the junction point of resistor R100 and capacitor C101 (fig. 8).	Approx 75 ohms.	Infinite resistance indicates open cable, defective cable connectors, defective receptacle, or open resistor R100 (fig. 8). Check continuity of each item separately. Low or zero resistance indicates defective R100.
Between the outer conductor of the coaxial cable connector located on the far end of the cable and the ground lead clip (fig. 3).	Short.	Infinite resistance indicates open cable, loose connectors, broken ground lead, or loose receptacle J100 (fig. 8), or loose ground connection.

Short-circuit tests		
Point of measurement	Normal indication	Isolating procedure
Between the junction point of resistor R100, capacitor C101 (fig. 8), and the ground lead clip.	Infinite resistance.	Short indicates defective C103 or C102 (fig. 8). Approximately 75 ohms indicates shorted coaxial cable or cable connectors. Check each item separately.
Between the high-voltage test lead (fig. 4) and the junction of C100 and C101 (fig. 8).	Infinite resistance.	Resistance reading indicates defective C100 (fig. 8).
Between the high-voltage test lead (fig. 4) and the ground lead clip (fig. 3).	Infinite resistance.	Resistance reading indicates defective J012 (fig. 8).
Between both ends of C101 (fig. 8)----------	Infinite resistance.	Resistance reading indicates defective C101 (fig. 8).

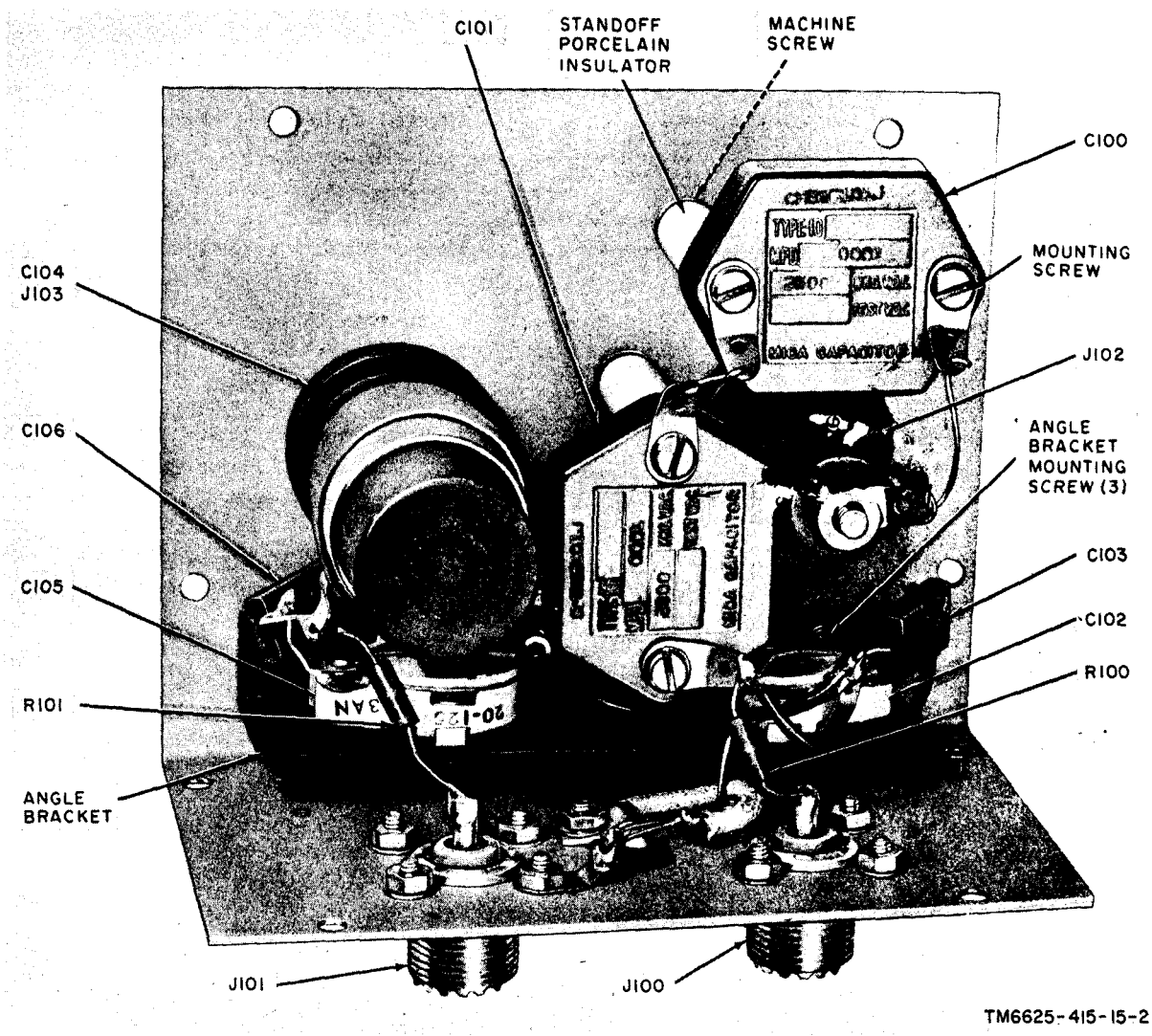


Figure 8. Multiplier, Electrical Instrument TS-265A/UP, interior.

24. Voltage-Dividing Ratio Test

Warning: **Before making any connections to the equipment, make sure that the power is off and that the high-voltage capacitors are discharged.**

a. Connect the output of the pulse generator to the RATIO 100:1 input jack J103 (fig. 9); use the test lead (36-inch) and the ground lead that extends from the voltage divider.

b. Set the pulse generator frequency to approximately 2.5 kilocycles (kc) (pulse rate); follow the operating instructions given in TM 11–2678.

c. Connect the vertical terminals of the oscilloscope across the output of the pulse generator (fig. 9).

d. Connect the output coaxial cable into the RATIO 100:1 coaxial connector J101.

e. Adjust the output of the square wave generator for 10-volt output; measure the output with the oscilloscope (TM 11-5129).

f. Adjust the oscilloscope controls (TM 11-5129) for steady and sharp display of the square wave on the oscilloscope screen.

g. Remove the power from the pulse generator and from the oscilloscope.

h. Disconnect the oscilloscope from the pulse generator and connect it to the output coaxial cable of the voltage divider (or to the adapter, if used) as shown in the dotted line in figure 9.

i. Apply the power to both the pulse generator and the oscilloscope.

j. Set the oscilloscope controls to calibrate and measure a voltage of one one-hundredth of the voltage that was obtained in e above (0.1 volt).

k. If the vertical amplitude of the leading edge of the tilted square wave pattern does not measure 0.1 volt with a deviation that does not exceed ±5 percent, perform the adjustments outlined in (1) through (5) below.

(1) Remove the power from the pulse generator and from the oscilloscope.

(2) Loosen and take out the four mounting screws and remove the nameplate from the voltage divider.

(3) Apply the power to both the pulse generator and the oscilloscope.

(4) Adjust trimmer capacitor C105 (fig. 8) of the voltage divider to obtain a vertical amplitude of 0.1 volt at the leading edge of the tilted square wave.

(5) If the adjustment of trimmer capacitor C105 does not yield the required voltage (0.1 volt) with a deviation that does not exceed ±5 percent, refer to the trouble-shooting chart (par. 25d).

l. Repeat the procedures given in *a* through *i* above for the 10:1 voltage-dividing ratio section;

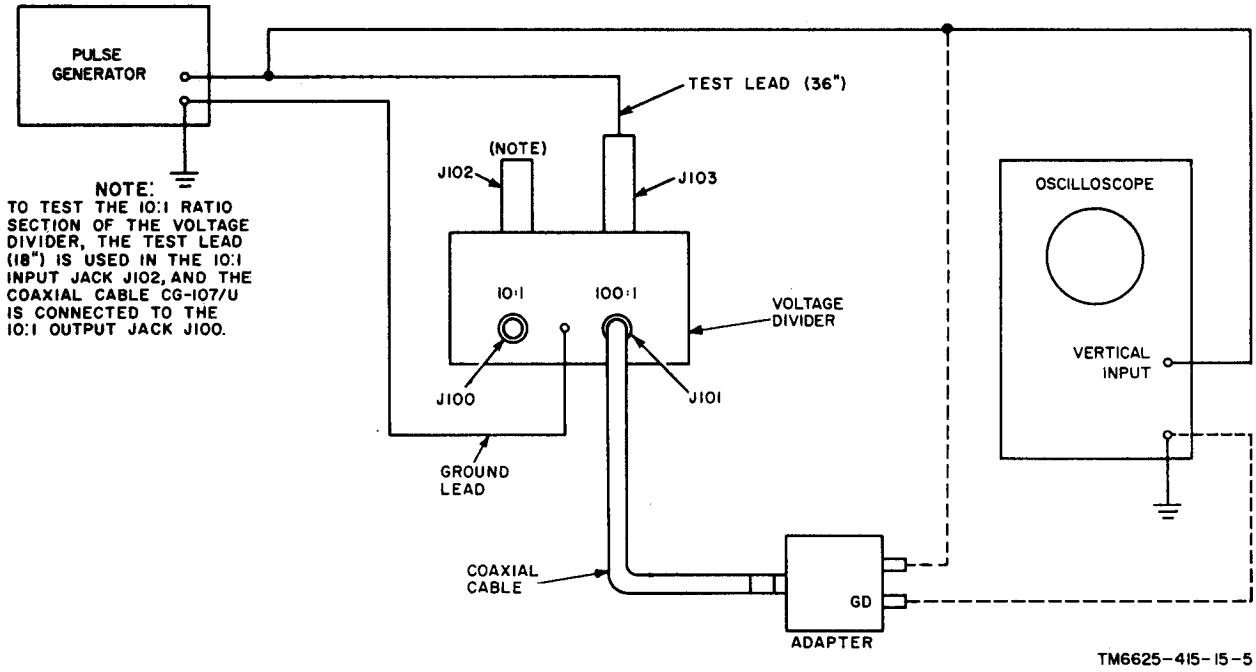


Figure 9. Voltage-dividing ratio test setup.

use the RATIO 10:1 input jack J102 and the output RATIO 10:1 coaxial connector J100.

m. Set the oscilloscope controls as necessary to calibrate and measure l-volt input.

n. If the vertical amplitude of the leading edge of the tilted square wave pattern does not measure 1 volt with a deviation that does not exceed ±5 percent, complete the adjustments outlined in (1) and (2) below.

(1) Adjust trimmer capacitor C102 (fig. 8) of the voltage divider to obtain a vertical amplitude of 1 volt at the leading edge of the tilted square wave patterns.

(2) If the adjustment of trimmer capacitor C102 does not yield the required voltage (l-volt) with a deviation that does not exceed ±5 percent, refer to the troubleshooting chart (par. 25d).

25. Localizing Troubles

a. General. In the troubleshooting chart *(d* below), the procedures are outlined for localizing troubles to the 100:1 ratio section or the 10:1 ratio section of the voltage divider, and for isolating troubles to a component within these two sections. Parts locations are indicated in figures 3 and 8. A schematic diagram of the voltage divider is shown in figure 7. When trouble has been localized to a particular stage, use voltage and resistance measurements to isolate the trouble to a particular part.

b. Use of Chart. The troubleshooting chart *(d* below) is designed to supplement the operational checks detailed in paragraph 17. If these checks have resulted in reference to a particular item in the troubleshooting chart, go directly to the referenced item. If no operational symptoms are known, begin with the first item of the short-circuit tests (par. 24) and proceed until a symptom of trouble appears.

Caution: **If the operational symptoms are not known or if they indicate the possibility of short circuits within the voltage divider, be sure to make the short-circuit tests (par. 23) before applying any input to the unit.**

c. Conditions of Tests. All checks outlined in the troubleshooting chart are to be conducted with the voltage divider connected for the voltage-dividing ratio tests (par. 24).

d. Troubleshooting Chart (fig. 8).

Symptom	Probable trouble	Correction
Output voltage across the output of the coaxial cable too low when 100:1 ratio is used.	Leaky or shorted capacitor C104, C105 or C106; or coaxial cable.	Check each item separately (par. 23). Replace the defective item.
Output voltage across the output of the coaxial cable too high when 100:1 ratio is used.	C105 or C106 open, or C104 shorted or leaky.	Check each item separately (par. 23) Replace the defective item.
Output voltage across the output of the coaxial cable too low when 10:1 ratio is used.	Leaky or shorted C103, C102, or coaxial cable. Open C100 or C101, or defective J102.	Check each item separately (par. 23). Replace the defective item.
Output voltage across the output of the coaxial cable too high when 10:1 ratio is used.	C100 or C101 shorted; C103 or C102 open.	Check each item separately (par. 23). Replace the defective item.

26. Voltage Breakdown Test

Warnings:

1. **Before making any connections to the voltage divider, make sure that the power is off and high-voltage capacitors are discharged.**

2. Always connect the ground lead first.

3. Always connect the output coaxial cable before applying high voltage.

4. Always first disconnect the high-voltage lead.

a. Connection of Voltage Divider for Voltage Breakdown Test.

(1) Connect the ground lead of the voltage divider (fig. 10) to the ground connection of the high-voltage supply.

(2) Connect the test lead (18-inch) between the output of the high-voltage supply and the 100:1 input jack J103 of the voltage divider.

b. Applying high voltage.

(1) Turn on the high-voltage supply and gradually increase the output voltage to 50 kv as indicated on the meter scale of the high-voltage supply.

(2) Maintain 50 kv across the input terminals for 1 minute. (There should be no evidence of insulation breakdown or spark-over as a result of this test.)

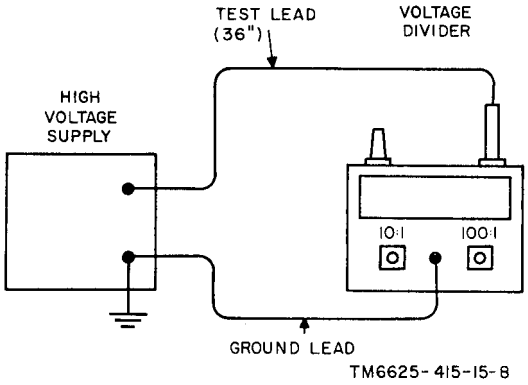


Figure 10. Voltage breakdown test setup.

CHAPTER 6

REPAIRS AND ALIGNMENT

Warning: **Before performing the procedures given in this chapter, review the stopping procedure (par. 13) for the discharge of capacitors.**

27. General Parts Replacement Techniques

Most of the parts on the voltage divider can be reached and replaced easily without special procedures or tools. To reach the components discussed in paragraphs 28 through 31, remove the eight chassis screws (fig. 3). Separate the chassis to expose the parts.

Note. After the replacement of any component, the following tests must be made: short-circuit test (par. 23); voltage-dividing ratio test (par. 24); voltage breakdown test (par. 26).

28. Removal and Replacement of High-Voltage Capacitors C 100 and C 101

(fig. 8)

a. Removal.

(1) Remove the two mounting screws from capacitor C100 or C101.

(2) Bend back the terminal and the bus wire.

(3) Lift the capacitor from the insulators.

b. Replacement.

(1) Replace capacitor C100 or C101.

(2) Bend back the terminal and the bus wire in line with the mounting holes.

(3) Reinsert the two mounting screws.

29. Removal and Replacement of Stand-off Porcelain Insulators

(fig. 8)

a. Removal.

(1) Capacitor C100 or C101 need not be removed or disconnected during removal of the insulators.

(2) Remove the machine screws of capacitor C100 or C101, as required, from the outside of the chassis.

(3) Remove the corresponding mounting screw from capacitor C100 or C101.

(4) Slip out the standoff insulator from between the chassis and the capacitor.

b. Replacement.

(1) Reinsert the new insulator.

(2) Replace the mounting screws.

30. Removal and Replacement of Trimmer Capacitors C105 and C102

(fig. 8)

a. Removal.

(1) With a soldering iron, disconnect all the terminal points for both the C105 and C120.

(2) Remove the three angle bracket mounting screws from the outside of the chassis.

(3) Slide the angle bracket out the side, with trimmer capacitors C102 and C105 still in place on the bracket.

(4) Remove the damaged capacitor by removing the two mounting screws that hold the capacitor to the angle bracket.

b. Replacement.

(1) Replace the trimmer capacitor and reinsert the mounting screws that hold the capacitor to the angle bracket.

(2) Slide the angle bracket back into place and replace the three angle bracket mounting screws.

(3) Resolder the terminal connections to the capacitor.

31. Removal and Replacement of Connectors J100 and J101

(fig. 8)

a. Removal.

(1) Place soldering iron on the terminal at the rear of the connector. As the solder

melts, use a pair of pliers to remove the resistor lead (R100 or R101).

(2) Remove the four mounting screws from the front of the chassis.

(3) Lift the old connector out from the front.

b. Replacement.

(1) Install the new connector.

(2) Replace and tighten the four mounting screws.

(3) Insert the resistor lead (R100 or R101) into the terminal at the rear of the connector.

(4) Resolder the terminal; be careful not to burn the phenolic insulation part of the connector.

CHAPTER 7
FINAL TESTING

32. Purpose of Final Testing

The tests in this chapter are designed to measure the performance capability of a repaired equipment. Equipment that meets the minimum standards stated in the tests will furnish satisfactory operation equivalent to that of new equipment.

33. Tests

To perform final testing on the voltage divider and its accessories, follow the procedures outlined in paragraphs 23, 24, and 26. These tests will not only prove that the equipment is satisfactory, but will also provide instructions for calibration if necessary.

CHAPTER 8

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section 1. SHIPMENT AND LIMITED STORAGE

34. Preparation for Packing

a. Check to see that all components (fig. 1) of the equipment are contained in Case CY-1388/U and that the technical manuals are present.

b. If the equipment is to be stored, insert suitable moisture-proofing bags (silica gel) inside the case whenever possible.

c. See that the cover gaskets are in place; close and latch the cover.

35. Repacking for Shipment or Limited Storage

a. If the original packing materials are available, use them and reverse the unpacking procedures given in paragraph 8. Pack the equipment so as to prevent damage during transit or limited storage. Pack securely and use enough cushioning to minimize the effects of severe jolting. Make certain that the equipment is protected from rain and snow.

b. If the original packing materials are not available, obtain a water-resistant fiberboard carton, 6½ inches high, 9½ inches wide, and 11¼ inches long (all inside dimensions). Obtain a flat pad, 6½ inches wide, 11¼ inches long, and 1 inch thick for cushioning. At least 8 feet of pressure-sensitive tape is required. Pack as described in a above.

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

Use any of the following methods to destroy the equipment.

a. Smash. Smash all capacitors, resistors, standoff insulators and the transit case; use sledges, axes, handaxes, pickaxes, hammers, or crowbars.

b. Cut. Cut the output coaxial cable and input test leads: use axes, handaxes, or machetes.

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

d. Bend. Bend the panel, the chassis, and the case of the voltage divider.

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

e. Explode. If explosives are necessary, use firearms, grenades, or TNT.

f. Dispose. Bury or scatter the destroyed parts in slit trenches or foxholes, or throw them into streams.

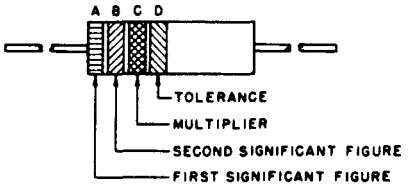
APPENDIX I
REFERENCES

Following is a list of references applicable and available to the repairman of Multiplier, Electrical Instrument TS-265A/UP.

TM 11-2678	Pulse Generator AN/PPM-l.
TM 11-5129	Oscilloscopes AN/USM-50A, B, and C.
TM 11-5527	Multimeters TS-352/U, TS-352A/U, and TS-352B/U.
TM 11-6625-218-12	Operation and Organizational Maintence: Frequency Meter AN/TSM-16.
TM 11-6625-273-12	Operation and Organizational Maintenance: Insulation Breakdown Test Set AN/GSM-6.

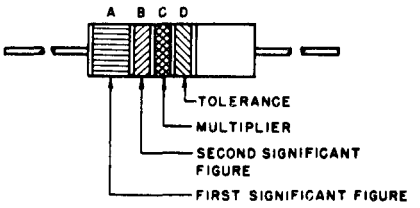
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS

COMPOSITION-TYPE RESISTORS



BAND A— Equal Width Band Signifies Composition-Type

WIREWOUND-TYPE RESISTORS

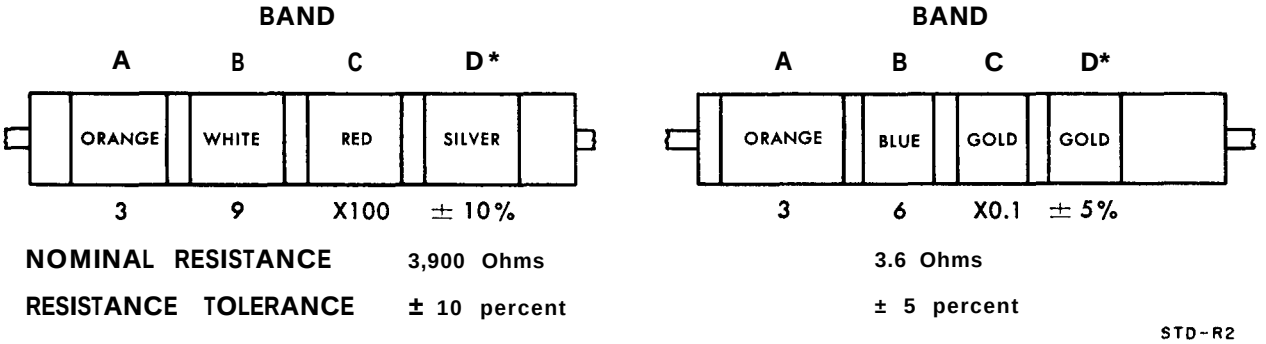


BAND A— Double Width Signifies Wire-wound Resistor

COLOR CODE TABLE

BAND A		BAND B		BAND C		BAND D*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1		
BROWN	1	BROWN	1	BROWN	10		
RED	2	RED	2	RED	100		
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	± 10
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	SILVER	0.01		
WHITE	9	WHITE	9	GOLD	0.1		

EXAMPLES OF COLOR CODING



NOMINAL RESISTANCE 3,900 Ohms 3.6 Ohms

RESISTANCE TOLERANCE ± 10 percent ± 5 percent

STD-R2

*If Band D is omitted, the resistor tolerance is ±20%, and the resistor is not Mil-Std.

Figure 11. MIL-STD resistor color code markings.

COLOR CODE TABLES

TABLE I – For use with Group I, Styles CM, CN, CY and CB

COLOR	MIL ID	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CY	CB	CM	CM	CM
BLACK	CM, CY CB	0	0	1			± 20%	± 20%		A				−55° to +70°C	10–55 cps
BROWN		1	1	10					B	E		B			
RED		2	2	100	± 2%		± 2%	± 2%	C		C			−55° to +85°C	
ORANGE		3	3	1,000		± 30%			D			D	300		
YELLOW		4	4	10,000					E					−55° to +125°C	10–2,000 cps
GREEN		5	5		± 5%				F				500		
BLUE		6	6											−55° to +150°C	
PURPLE (VIOLET)		7	7												
GREY		8	8												
WHITE		9	9												
GOLD				0.1			± 5%	± 5%							
SILVER	CN				± 10%	± 10%	± 10%	± 10%							

TABLE II – For use with Group II, General Purpose, Style CK

COLOR	TEMP. RANGE AND VOLTAGE – TEMP. LIMITS[3]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE	MIL ID
BLACK		0	0	1	± 20%	
BROWN	AW	1	1	10	± 10%	
RED	AX	2	2	100		
ORANGE	BX	3	3	1,000		
YELLOW	AV	4	4	10,000		CK
GREEN	CZ	5	5			
BLUE	BV	6	6			
PURPLE (VIOLET)		7	7			
GREY		8	8			
WHITE		9	9			
GOLD						
SILVER						

TABLE III – For use with Group III, Temperature Compensating, Style CC

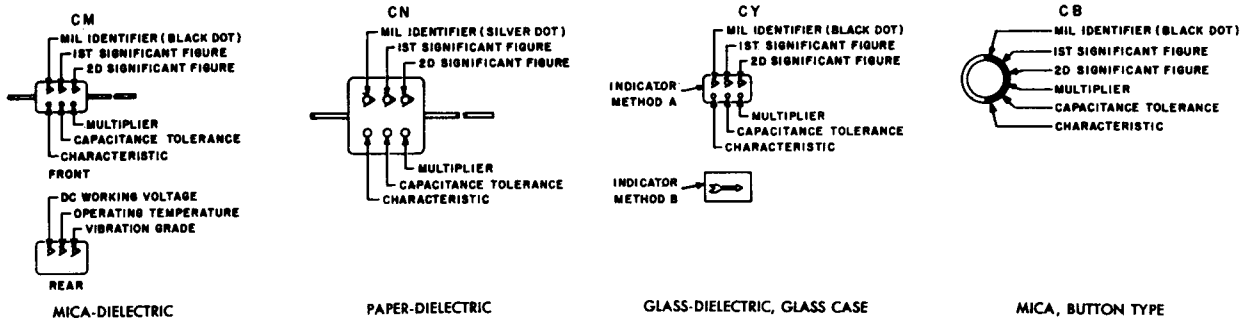
COLOR	TEMPERATURE COEFFICIENT[4]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					Capacitances over 10uuf	Capacitances 10uuf or less	
BLACK	0	0	0	1		± 2.0uuf	CC
BROWN	−30	1	1	10	± 1%		
RED	−80	2	2	100	± 2%	± 0.25uuf	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		± 5%	± 0.5uuf	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	± 10%		
GOLD	+100					± 1.0uuf	
SILVER							

1. The multiplier is the number by which the two significant (SIG) figures are multiplied to obtain the capacitance in uuf.
2. Letters indicate the Characteristics designated in applicable specifications: MIL–C–5, MIL–C–91, MIL–C–11272, and MIL–C–10950 respectively.
3. Letters indicate the temperature range and voltage-temperature limits designated in MIL–C–11015.
4. Temperature coefficient in parts per million per degree centigrade.

Figure 12. MIL–STD capacitor color code markings.

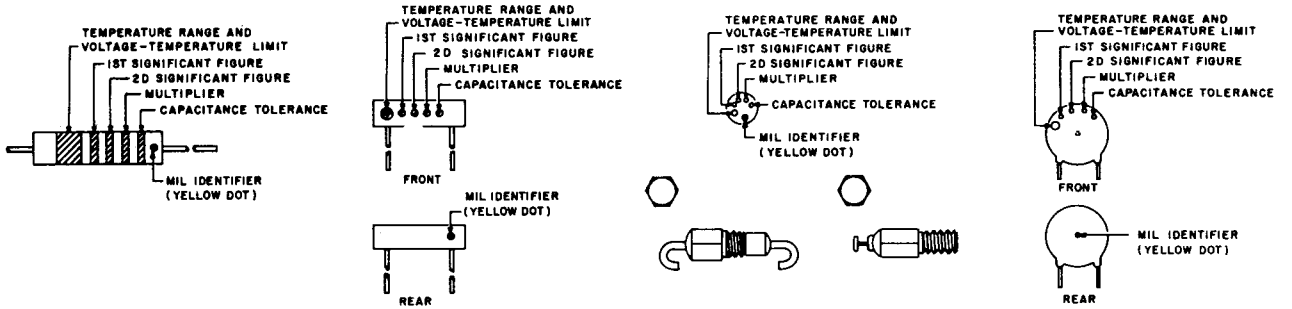
COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

GROUP I Capacitors, Fixed, Various-Dielectrics, Styles CM, CN, CY, and CB



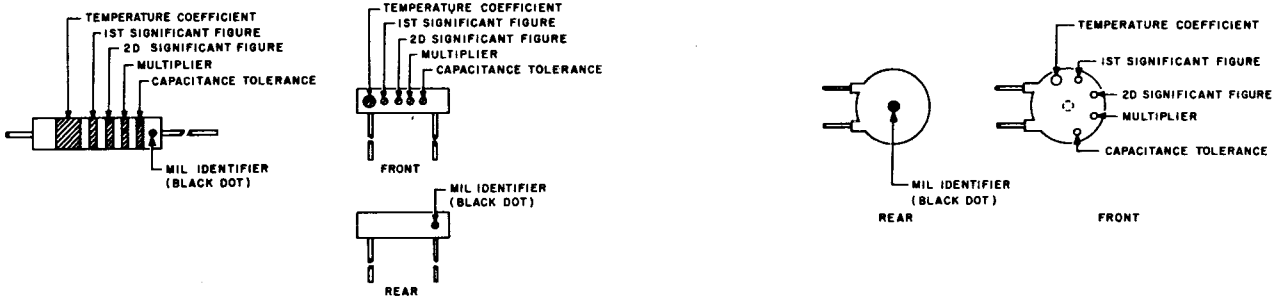
MICA-DIELECTRIC | PAPER-DIELECTRIC | GLASS-DIELECTRIC, GLASS CASE | MICA, BUTTON TYPE

GROUP II Capacitors, Fixed Ceramic-Dielectric (General Purpose) Style CK



AXIAL LEAD | RADIAL LEAD | FEED-THROUGH | STAND-OFF | DISK-TYPE

GROUP III Capacitors, Fixed, Ceramic-Dieletric (Temperature Compensating) Style CC



AXIAL LEAD | RADIAL LEAD | DISK-TYPE

Figure 12—Continued

APPENDIX II
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

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

b. Columns in the maintenance allocation chart are as follows:

(1) *Part or component.* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the part. Components and parts comprising a major end item are listed alphabetically. Assemblies and subassemblies are in alphabetical sequence with their components listed alphabetically immediately below the assembly listings.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operations.

(a) Service. To clean, to preserve, and to replenish fuel and lubricants.

(b) Adjust. To regulate periodically to prevent malfunction.

(c) Inspect. To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

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

(e) 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, inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, and straightening.

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

(g) Calibrate. To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(h) Overhaul. To restore an item to completely 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.

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

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment references. 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.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *1st, 2d, 3d, 4th, 5th echelon.* The dagger (†) indicates the echelons allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

(4) *Remarks.* Not used.

2. Mounting Hardware

The basic entries of the maintenance allocation chart do not include mounting hardware such as screws, nuts, bolts, washers, brackets, clamps, etc.

3. Maintenance by Using Organizations

When this equipment is used by signal service organizations organic to theater headquarters or communication zones to provide 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

Part or component (1)	Maintenance function (2)	1st ech (3)	2nd ech (4)	3rd ech (5)	4th ech (6)	5th ech (7)	Tools required (8)	Remarks (9)
VOLTAGE DIVIDER TS-265A/U	service				X		3	
	replace							
	inspect				X		6	
	test				X		1,2,3,4,5	
	repair				X		6,7	
	align							
	calibrate							
	rebuild					X	1,2,3,4,5,6,7	
VOLTAGE DIVIDER ASSEMBLY	repair				X			
	replace				X			
	rebuild					X		
CABLE ASSEMBLIES	repair				X			
	replace		X					
CASE, TEST SET	replace		X					
	repair				X			
CONNECTOR, ADAPTER	replace		X					
	repair				X			

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

Tools required for maintenance function (1)	1st ech (2)	2nd ech (3)	3rd ech (4)	4th ech (5)	5th ech (6)	Tool code (7)	Remarks (8)
FREQUENCY METER AN/TSM-16				X	X	1	
GENERATOR, PULSE SG-69/PPM-1				X	X	2	
MULTIMETER TS-352/U				X	X	3	
OSCILLOSCOPE AN/USM-50				X	X	4	
TEST SET, INSULATION BREAKDOWN AN/GSM-6				X	X	5	
TOOL EQUIPMENT TK-87/U				X	X	6	
TOOL EQUIPMENT TK-88/U				X	X	7	
TOOLS AND TEST EQUIPMENT AVAILABLE TO THE REPAIRMAN BECAUSE OF HIS ASSIGNED MISSION.	X						

APPENDIX III

BASIC ISSUE ITEMS LIST

Section 1. INTRODUCTION

1. General

This appendix lists items supplied for initial operation and for running spares. The list includes tools, accessories, 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. Columns

a. Source, Maintenance, and Recoverability Code. Not used.

b. Federal Stock Number. This column lists the 11-digit Federal stock number. In the absence of a Federal stock number, an interim number, for example L1S258-16 indicates that a Federal stock number is being processed for assignment. The L number may be used in emergencies to identify items.

c. Designation by Model. Not used.

d. Description. This column lists the nomenclature or standard item name and brief identifying data for each item. When requisitioning, enter the nomenclature and description.

e. Unit of Issue. The supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue pruposes.

f. Expendability. Nonexpendable items are indicated by NX.

g. 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 Spares and Accessory Items," the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

Section II. FUNCTIONAL PARTS LIST

Source, maintenance and recoverability code (a)	Federal stock No. (b)	Designation by model (c)	Description (d)	Unit of issue (e)	Expendability (f)	Quantity authorized (g)
			ITEMS COMPRISING AN OPERABLE EQUIPMENT			
			VOLTAGE DIVIDER TS-265A/UP			
	6625-242-7544		Voltage Divider TS-265A/UP	ea	NX	
	Order thru AGC		Technical Manual TM 11-6625-415-SBIIL	ea	X	2
	6625-841-9931		Case, Test Set CY-1388/U Purpose, Electrical, 18 in lg	ea	NX	1
	6625-850-9294			ea	NX	1
	L1Se58-16		Cord CG-107( )/U	ea	NX	1
	L1Se58-22		Cable Assembly, Special Purpose Electrical, 36 in lg	ea	NX	1
	L1Se58-21		Connector Adapter UG-1017/U	ea	NX	1
			RUNNING SPARES AND ACCESSORY ITEMS			
			Voltage Divider TS-265A/UP No parts authorized for stockage at First Echelon			

827-901-3

BY ORDER OF THE SECRETARY OF THE ARMY:

G. H. DECKER,
General, United States Army,
Chief of Staff.

Official:

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

Distribution:

Active Army:

DASA (6)
USASA (2)
CNGB (1)
Tech Stf, DA (1)
except CSigO (18)
Tech Stf Bd (1)
USCONARC (5)
USAARTYBD (1)
USAARMBD (2)
USAIB (1)
USARADBD (2)
USAABELCTBD (1)
USAAVNBD (1)
USAATBD (1)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
OS Base Comd (2)
LOGCOMD (2)
MDW (1)
Armies (2)
Corps (2)
Instl (2)
Ft Monmouth (63)
USATC AD (2)
USATC Armor (2)
USATC Engr (2)
USATC FA (2)
USATC Inf (2)
USAOMC (3)
Svc Colleges (2)
Br Svc Sch (2)
GENDEP (2) except
Atlanta GENEDEP (None)
Sig Sec, GENDEP (5)
Sig Dep (12)
WRAMC (1)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
OSA (1)
USAEPG (2)
AFIP (1)
AMS (1)
Army Pictorial Cen (2)
EMC (1)
Yuma Test Sta (2)
USACA (3)
USASSA (20)
USASSAMRO (1)
USASEA (1)
USA Caribbean Sig Agcy (1)
USA Sig Msl Spt Agcy (13)
Sig Fld Maint Shops (3)
USA Corps (3)
JBUSMC (2)
AFSSC (1)
Units org under fol TOE:
Two copies to each unit unless otherwise indicated:
11–7
11–16
11–57
11–97
11–98
11–117
11–155
11–500 (AA-AE, RA-RT) (4)
11–557
11–587
11–592
11–597

NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.
USAR: None.
For explanation of abbreviations used, see AR 320–50.

U. S. GOVERNMENT PRINTING OFFICE: 1961—610504

827–901–2