TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS

(INCLUDING DEPOT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS)

This copy is a reprint which includes current pages from Changes 1 and 2.

TEST SET, MOTOR-GENERATOR AN/GSM-65A

(NSN4920-00-348-5793)

HEADQUARTERS, DEPARTMENT OF THE ARMY

APRIL 1975

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

During testing operations, high currents are present. Serious injury or death may result from contact with internal connections at switches and transformers.

WARNING

DON'T TAKE CHANCES!

After the dc power source is connected to the 28 vdc input terminals on the front panel of the test set, bind the input dc terminals with electrical insulation tape (NSN 5970-00-296-1625), leaving no bare metal of the binding posts or conductor exposed. Failure to observe this warning can result in severe burns to personnel.

TECHNICAL MANUAL
No. 11-6625-680-14-2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *24 April 1975*

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

TEST SET, MOTOR-GENERATOR AN/GSM-65A (NSN 4920-00-348-5793)

REPORTING OF ERRORS

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

LIST OF ILLUSTRATIONS

Figure 1-1. Test Set, Motor-Generator AN/GSM-65A.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Test Set, Motor-Generator AN/GSM-65A (fig. 1-1). It includes instructions for installation, operation, and maintenance of the equipment.

b. Appendix A contains a list of references and appendix B contains the maintenance allocation chart.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

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

1-3. Forms and Records

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

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report (as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DLAR 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 4610.33B/AFR 75-18/ MCO P4610.19C and DLAR 4500.15.

1-4. Reporting Equipment Improvement Recommendations (EIR)

EIR's will be prepared using DA Form 2407, Maintenance Request. Instructions for preparing EIR's are provided in TM 38-750. The Army Maintenance Management System. EIR's should be mailed direct to Commander, US Army Communications, and Electronics Material Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

1-5. Administration Storage

For procedures, forms, and records and inspection required during administrative storage of this equipment, refer to TM 740-90-1.

1-6. Destruction of Army Material

requirements for destruction will be those prescribed in TM 750-244-2.

Section II. DESCRIPTION AND DATA

1-7. Purpose and Use

Test Set, Motor-Generator AN/GSM-65A (tester) is used to test aircraft inverters that have up to a maximum output of 2,500 volt-amperes at unity power factor. Testing is accomplished by applying a load to the inverter under test while metering the input voltage and current and the output voltage, current, and frequency. A source of power capable of providing up to 180 amperes at 28 volts direct current (dc) is required to test inverters having a maximum output of 2,500 volt-amperes.

1-8. Description

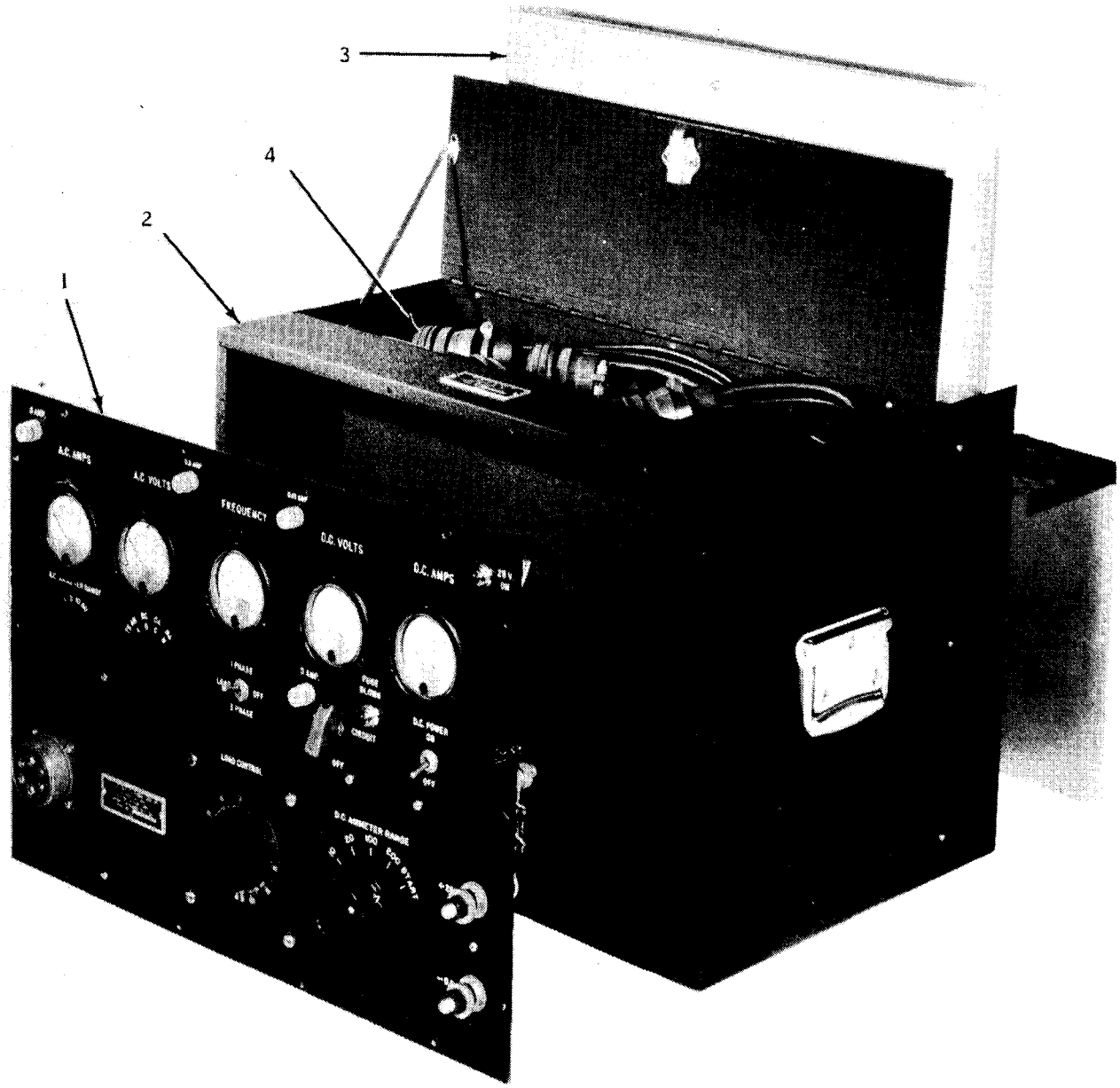
a. The tester (fig. 1-2) consists of a panel assembly (1), a cabinet assembly (2), a load bank (3), and eight cable set assemblies (4). The panel assembly is mounted on the front of the cabinet assembly and the load bank is mounted on the rear. The cable set assemblies are stored in a compartment in the top of the cabinet.

b. Mounted on the panel assembly (fig. 1-3) are five meters, four fuses, three selectors, three switches, two indicators, one connector, one pair of 28 volts direct current (vdc) input connections, and one control.

c. The A.C. AMPS meters (2), A, C. VOLTS meter (3), FREQUENCY meter (5), and D.C. VOLTS meter (7) are protected by a sensitive-type relay connected in the circuit so that a meter overload from 10 to 30 percent will operate the

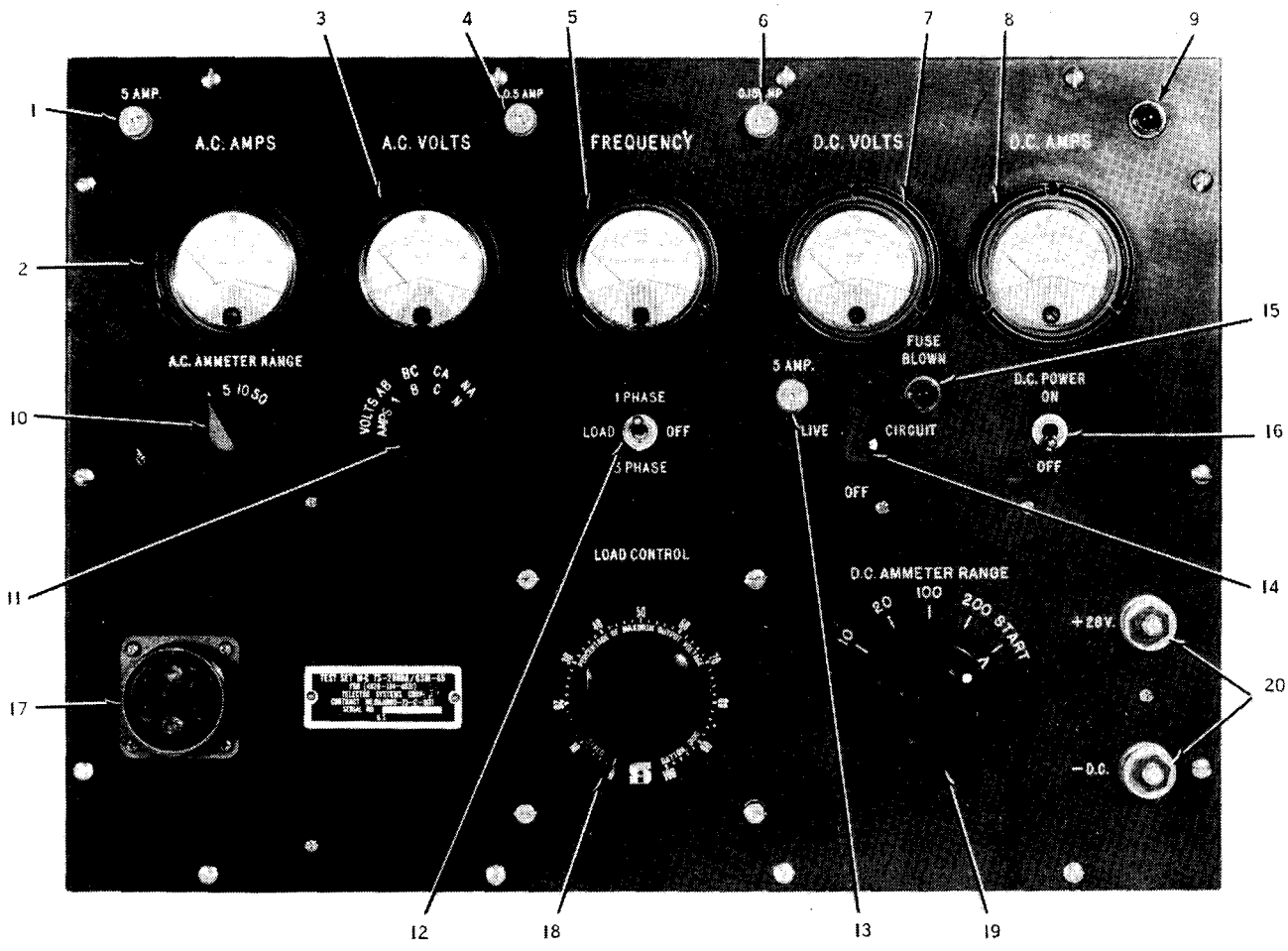
sensitive relay and open the direct current power input by a special interlock-type circuit.

d. With the 28-volt dc source connected to the tester, the 28V. ON indicator (9) glows green when the D. C. PWR ON-OFF (16) switch is set ON. The FUSE BLOWN indicator (15) glows red when the 5 AMP. fuse (13) in the live circuit opens.



1. Panel assembly
2. Cabinet assembly
3. Load bank
4. Cable set assemblies

Figure 1-2. Major components



EL 6625-680-14-2-TM-3

1. 5 AMP fuse
2. A. C. AMPS meter
3. A. C. VOLTS meter
4. 0.5 AMP fuse (A. C. VOLTS meter)
5. FREQUENCY meter
6. 0.15 AMP fuse (D. C. VOLTS meter)
7. D. C. VOLTS meter
8. D. C. AMPS meter
9. 28V. ON indicator
10. A. C. AMMETER RANGE selector
11. VOLT-AMPS switch
12. LOAD switch (A. C. phase switch)
13. 5 AMP fuse
14. LIVE CIRCUIT switch
15. FUSE BLOWN indicator
16. D. C. POWER ON-OFF SWITCH
17. Connector
18. LOAD CONTROL autotransformer
19. D. C. AMMETER RANGE selector
20. +28 V. and — D. C. input connections

Figure 1-3. Panel assembly and controls.

1-9. Items Comprising an Operable Equipment

Qty	NSN	Component	Dimensions (in.)			Weight (lb)
			Height	Width	Depth	
1	4920-00-348-5793	Test Set, Motor-Generator AN/GSM-65A	17 1/8	24 1/8	18	92
1	4920-00-134-4831	Test Set, Motor-Generator TS-2888A/GSM-65	17 1/8	24 1/8	7.5	36
1	4920-00-437-2468	Cable Assembly, Power Electrical CX-12082/GSM-65				
1	4920-00-437-2443	Cable Assembly, Power Electrical CX-12083/GSM-65				
1	4920-00-437-2442	Cable Assembly, Power Electrical CX-12084/GSM-65				
1	4920-00-437-2446	Cable Assembly, Power Electrical CX-12086/GSM-65				
1	4920-00-437-2461	Cable Assembly, Power Electrical CX-12088/GSM-65				
1	4920-00-437-2467	Cable Assembly, Power Electrical CX-12089/U (3 ft)				

CHAPTER 2

INSTALLATION AND OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Unpacking

a. Packaging Data. When packed for shipment, the tester is placed in protective material and packed in a wooden packing case. A typical wooden packing case and its contents are shown in figure 2-1. The volume is 9,993 cubic feet and the total weight is 160 pounds.

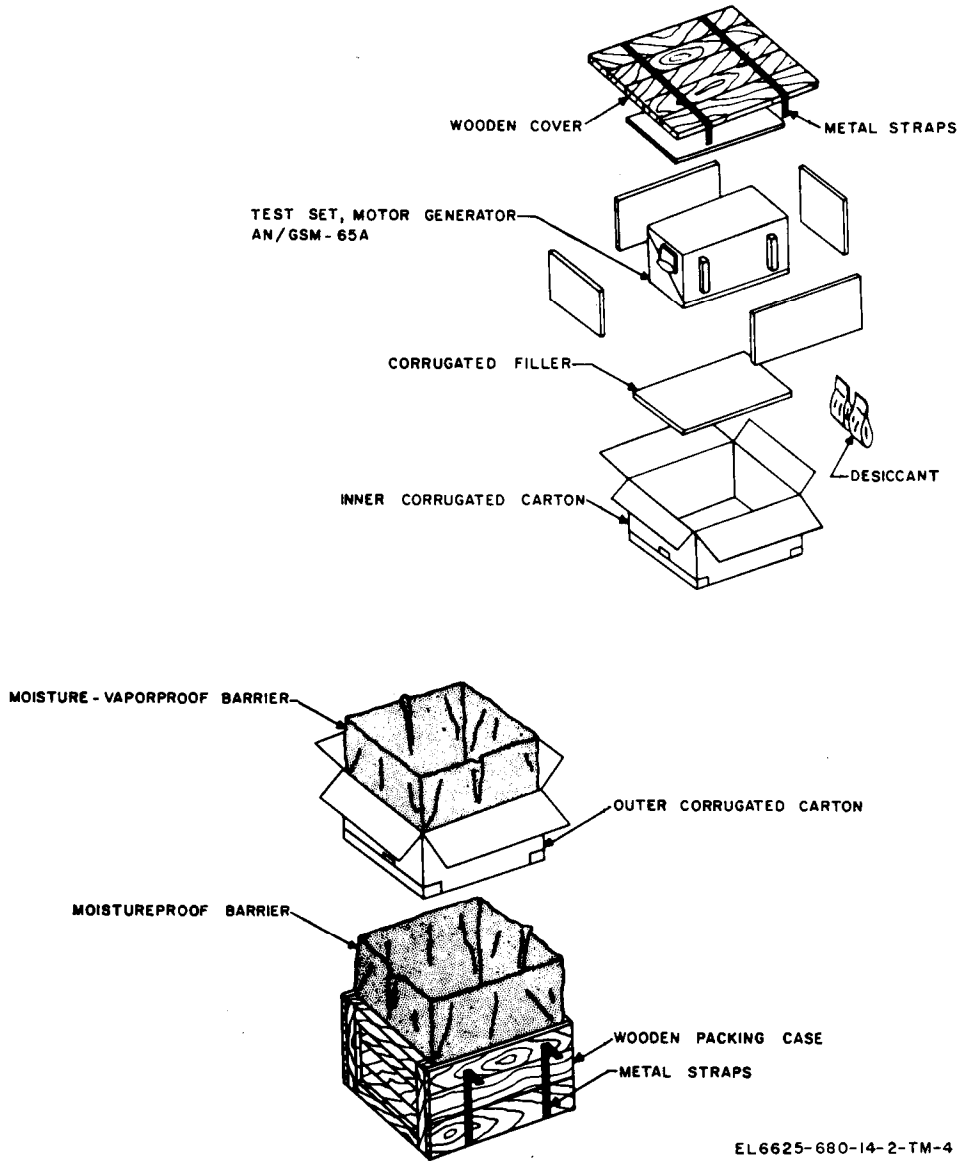


Figure 2-1. Test Set, Motor-Generator AN/GSM-65A, packing and packaging diagram.

b. Removing Contents.

(1) Cut and remove the metal straps.

(2) Remove the nails that secure the sides of the wooden case to the mounting base.

(3) Lift the wooden packing case off the base.

(4) Remove the packing material and lift the tester off the base.

(5) Stow all loose material in the wooden packing case.

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage that may have occurred during shipment. If the equipment has been damaged, fill out and forward DD Form 6 (para 1-3 b).

b. Check to see that the equipment is complete as listed on the packing slip. If a packing slip is not available, check the equipment against the list in paragraph 1-9. Report all discrepancies in accordance with TM 38-570. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.

c. Check to see whether the equipment has been modified. If the equipment has been modified, the MWO number will appear on the front panel, near the nomenclature plate. Check also to see whether all MWO's current at the time the equipment is placed in use have been applied.

NOTE

Current MWO's applicable to the equipment are listed in DA Pam 310-7.

Section II. OPERATOR'S CONTROLS AND INDICATORS

2-3. Damage From Improper Settings

Haphazard operation or improper settings of the controls can damage the tester; therefore, knowledge of the function of the controls, meters, selectors and connections before operating the tester important (para 2-4).

2-4. Controls, Meters, Selectors, Connectors, and Indicators

The following chart lists the controls, meters, selectors, connectors and indicators of the tester and indicates their functions. Refer to figure 1-3 for the control or indicators location on the tester. Numbers in parentheses represent item number on figure.

Control or Indicator	*Functions*
D. C. POWER ON-OFF switch (16)	When set to ON, connects 28-volt dc input power to tester.
LIVE CIRCUIT switch (14)	Completes circuit between input of tester and regulators of inverter.
+28V. and –D. C. input connections (20)	Input power terminals.
Cable set assembly connector (J101) (17)	Receptacle for input and output connections to inverter under test.
28V. ON indicator (9)	With 28-volt dc source connected to tester, indicator glows green when the D.C. POWER ON-OFF switch is set ON.
0.5 AMP fuse (4)	Protects A. C. VOLTS meter from overload.
0.15 AMP fuse (6)	Protects D. C. VOLTS meter from overload.
5 AMP fuse (1)	Two fuses. One protects A. C. AMPS meter from overload. The other fuse protects live circuit from overload.
FUSE BLOWN indicator (15)	Pilot light glows red when 5-ampere fuse in the live circuit opens.
LOAD CONTROL autotransformer (18)	Adjusts load applied to inverter under test.
A. C. AMPS meter (2)	Indicates ac output current of inverter under test. A. C. AMPS meter scale reads either from 0 to 50 amperes, 0 to 10 amperes, 0 to 5 amperes, or 0 to 1 ampere when A. C. AMMETER RANGE selector is on either the 50, 10, 5, or 1 position, respectively.
A. C. AMMETER RANGE selector (10) (4 position switch)	Selects 1, 5, 10, 50 D.C. AMPS meter scale as appropriate for inverter under test. The 50, 10, 5, and 1 positions connect the respective A. C. AMPS meter scale to read a maximum of amperes indicated by the setting.
D. C. AMMETER RANGE selector (19) (5 position switch)	Selects 10, 20, 100, 200 D. C. AMPS meter scale as appropriate for inverter under test. When in START position, bypass D. C. AMPS meter is bypassed to protect it from starting current surges. The 200, 100, 20, and 10 positions

Control or Indicator	*Functions*
	connect the respective D. C. AMPS meter scale to read a maximum of amperes indicated by the setting.
VOLT-AMPS switch (11) (4 position switch)	Selects load on A. C. VOLTS meter and A. C. AMPS meter to measure voltage and current of one-phase output of inverter under test or three-phase output of inverter under test. To obtain voltage and current readings of individual circuits of a three-phase inverter, turn VOLTS-AMPS switch through AB/A, BC/B, CA/C. To obtain voltage and current readings of a single-phase inverter, turn VOLTS/AMPS switch to NA/N position.
LOAD switch (12)	Connects load to inverter under test. When set to 1 PHASE position, connects appropriate load (determined by position of LOAD CONTROL) for a single phase output. When set to 3 PHASE position, connects appropriate load for three-phase output. The OFF position disconnects load from inverter under test.
D. C. AMPS meter (8)	Indicates dc input current to inverter under test. D. C. AMPS meter scale reads either from 0 to 200 amperes, 0 to 100 amperes, 0 to 20 amperes, or 0 to 10 amperes when D. C. AMMETER RANGE selector is on either 200, 100, 20, or 10 position, respectively.
D. C. VOLTS meter (7)	Indicates dc input voltage to inverter under test. D. C. VOLTS meter scale reads from 0 to 50 volts.
A. C. VOLTS meter (3)	Indicates ac voltage ouput of inverter under test. A. C. VOLTS meter scale reads from 0 to 150 volts.

Section III. OPERATION

2-5. Cable Set Assemblies

The eight cable set assemblies are stored in the rear of the tester (fig. 1-2) and are numbered 1 through 8, respectively. Figure 2-2 shows a wiring diagram of each cable set assembly. Refer to the chart below to select the cable set assembly required to connect the inverter to be tested to the tester:

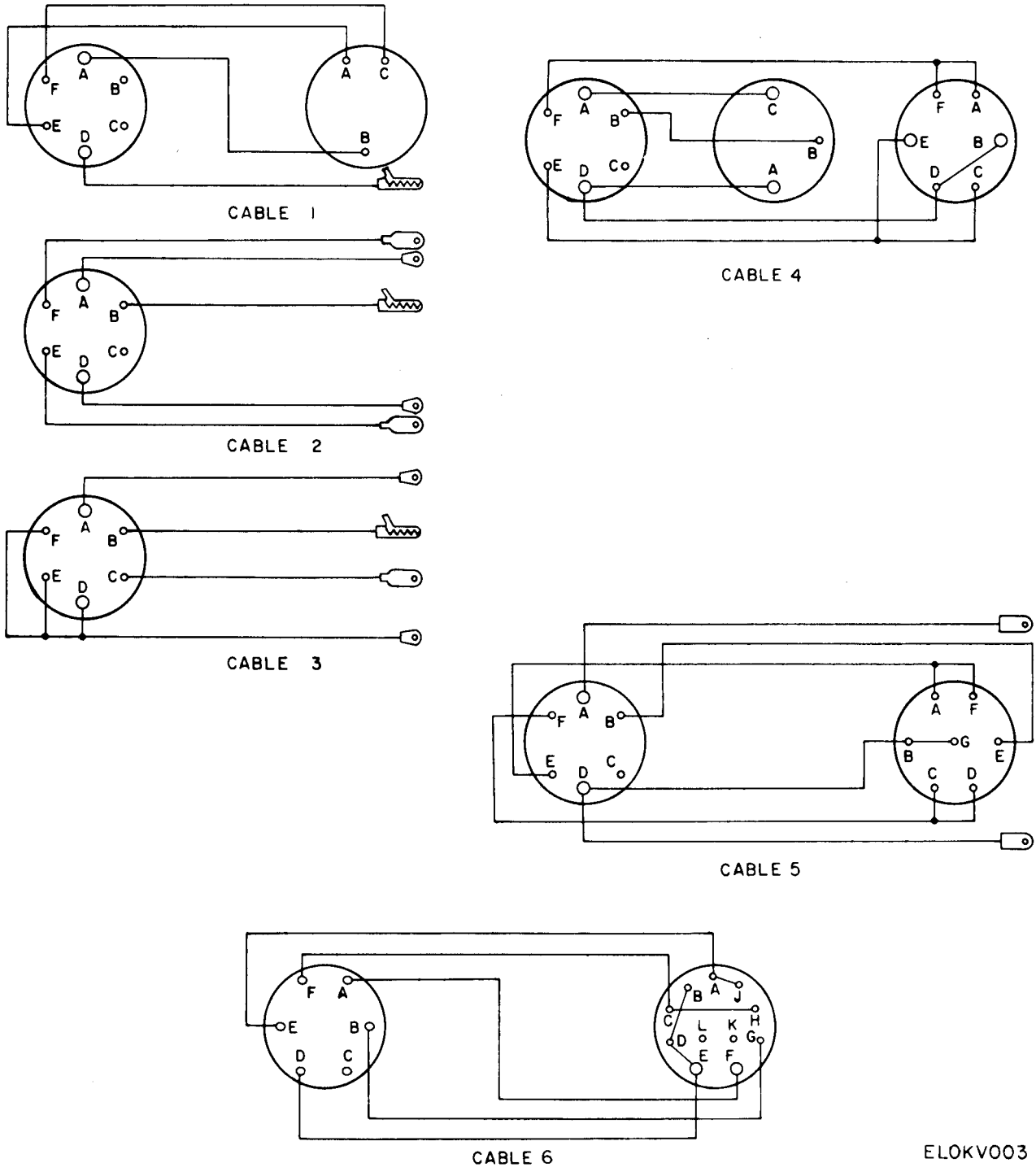


Figure 2-2. Cable set assemblies, wiring diagrams.

Inverter number or nomenclature	*Rated output in volt-amperes*	*Cable set assembly number—nomenclature*
AN3534-1	750	2 CX-12083/GSM-65
F16-4	250	2 CX-12083/GSM-65
F20-4	500	2 CX-12083/GSM-65
MS25094	500	5 CX-12086/GSM-65
MS25095	750	5 CX-12086/GSM-65
MS25096	1500	7 CX-12088/GSM-65
MS25097	2500	7 CX-12088/GSM-65
MS25162	2500	2 CX-12083/GSM-65
MS25173	250	2 CX-12083/GSM-65
MS25173	250	3 CX-12084/GSM-65
MS25174	500	2 CX-12083/GSM-65
MS25174	500	3 CX-12084/GSM-65
MS25175	750	2 CX-12083/GSM-65
MS25175	750	3 CX-12084/GSM-65
PU16	750	3 CX-12084/GSM-65
3011-1EICOR	100	1 CX-12082/GSM-65
PU-542( )/A	100	3θ 115V 1 CX-12082/GSM-65
	60	1θ 115V 1 CX-12082/GSM-65
PU-543( )/A	250	1θ 115V 8 CX-12089/GSM-65
		3θ Delta 115V 8 CX-12089/GSM-65
PU-544( )/A	750	1θ 115V 5 CX-12086/GSM-65
		3θ Delta 115V 5 CX-12086/GSM-65
PU-545( )/A	2500	1θ 115V 7 CX-12088/GSM-65
		3θ Delta 115V 7 CX-12088/GSM-65
PU-750( )/A	5000	1θ 115V 7 CX-12088/GSM-65
		3θ Delta 200V 7 CX-12088/GSM-65

2-6. Operating Procedure

NOTE

The tester provides protection for an overload of input direct current by automatically opening the input power circuit when the input direct current is greater than 110 to 130 percent of the full-scale range of the D. C, AMPS meter (for *example:* between 11 and 13 amperes with D. C. AMMETER RANGE selector set to 10. Whenever the overload occurs (input dc power to the inverter shuts off), set the D. C. POWER switch to OFF and the D. C. AMMETER RANGE selector to START, then set the D. C, POWER switch to ON and the D. C. AMMETER RANGE selector to the appropriate position.

a. General. Determine the number and rated output of the inverter under test (whether single-phase or three-phase) and select cable assembly designated in paragraph 2-5. Verify the selection of the proper cable assembly by matching the number and type of terminals of the cable assembly to those of the inverter. If the inverter to be tested is not listed in paragraph 2-5, determine the rated output of the inverter, then select the cable assembly from the list that meets single-phase or three-phase delta output requirement and matched connection points of the inverter. (Refer to the inverter technical manual or handbook of instruction.)

NOTE

All tests should be conducted making constant reference to the publication pertaining to the specific inverter being tested. It is imperative that all control switches are set correctly in accordance with the instructions in the applicable literature of the inverter being tested.

b. Starting Procedures. Set switches and controls as follow:

(1) D. C. POWER to OFF.

(2) A. C. AMMETER RANGE to 50.

(3) LOAD to OFF. (The 1 PHASE position is used for a single-phase inverter and the 3 PHASE position is used for a three-phase inverter.)

(4) LIVE CIRCUIT to OFF. LIVE CIRCUIT switch is positioned up and energized for inverters requiring heat in control circuits, and down and OFF for inverters not requiring heat in control circuits.

(5) Adjust LOAD CONTROL to 0 (fully counterclockwise).

(6) D. C. AMMETER RANGE to START.

(7) VOLTS/AMPS switch to AB/A. Positions AB/A, BC/B, and CA/C are used for a

three-phase inverter. Position NA/N is used for a single-phase inverter.

c. Operating Procedure.

WARNING

Do not touch rear of cabinet during test operation. Do not place any equipment on or near rear of cabinet during test operation. Failure to observe this warning can result in severe burn to personnel or fire hazard to equipment.

CAUTION

Before turning the D. C. POWER switch to ON, check to be sure the inverter does not incorporate an internal power relay or tubes requiring an external live circuit. If it does, refer to the applicable publication and turn the D. C. POWER switch and LIVE CIRCUIT switch to ON in order and follow instructions regarding warm-up.

(1) Connect the dc input power source (set for 28 volts and capable of providing 160 amperes to the — D. C. and +28V terminal posts. *(Do not* turn on the dc input power at this time.)

WARNING

After the dc power source is connected to the 28 vdc input terminals, bind the input dc terminals of the test set with electrical insulation tape (NSN 5970-00-296-1625), leaving no bare metal of the binding posts or conductor exposed. Failure to observe this warning can result in severe burns to personnel.

(2) Select the cable set assembly as given in *a* above and connect the cable set assembly to the inverter under test and the tester. Verify the inverter requirements for maintaining current to provide heat in control circuits.

(3) After performing the procedures given in *a* above, turn on the dc input power and) then set the D. C. POWER switch to ON. The 28V. ON indicator lamp will illuminate and the inverter under test will run.

(4) After 3 to 4 minutes of inverter under test warmup, set the A. C. AMMETER RANGE, VOLTS/AMPS, LOAD, and D. C. AMMETER RANGE switches as stated in the inverter under test technical manual.

(5) Slowly apply the load by adjusting the LOAD CONTROL for the value of alternating current as stated in the inverter under test manual. Observe the readings on the A. C. AMPS, A.C. VOLTS, FREQUENCY, D.C. VOLTS, and D. C. AMPS meters to determine results of the test.

d. Stopping Procedure.

(1) After performing the tests given in the inverter under test manual, slowly adjust the LOAD CONTROL counterclockwise until the LOAD CONTROL reaches 0.

(2) Set the D. C. POWER switch to OFF. (The 28V. ON indicator lamp goes off and the inverter under test stops running.)

(3) Turn off the dc input power source.

(4) Disconnect the cable set assembly.

(5) If the inverter does incorporate an internal power relay or tubes requiring an external live circuit, refer to the inverter under test manual for turning off the D. C. POWER switch and the LIVE CIRCUIT switch.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE

NOTE

The operator will perform organizational maintenance. All test set repairs will be referred to general support category.

Section I. GENERAL

3-1. Scope of Organizational Maintenance

This chapter provides instructions for organizational maintenance of the AN/GSM-65A. The following instructions list the actions to be taken at the organizational maintenance category and the tools, materials, and test equipment required.

a. Daily preventive maintenance checks and services (para 3-4).

b. Weekly preventive maintenance checks and services (para 3-5).

c. Monthly preventive maintenance checks and services (para 3-6).

d. Quarterly preventive maintenance checks and services (para 3-7).

e. Cleaning (para 3-8).

f. Touchup painting (para 3-9).

g. Troubleshooting (para 3-10).

h. Replacement of indicator lamp (para 3-11).

3-2. Tools, Materials and Test Equipment Required for Organizational Maintenance

a. Tools. All tools required are contained in Tool Kit, Electronic Equipment TK-101/G.

b. Materials.

(1) Trichloroethane (cleaning compound) (NSN 6810-00-664-0273).

(2) Lint free cloth (NSN 8305-00-170-5062).

(3) Sandpaper, fine (NSN 5350-00-264-3485).

(4) Camel's-hair brush (NSN 8020-00-242-9625).

c. Test Equipment. The only test equipment required is Multimeter AN/URM-105.

Section II. ORGANIZATIONAL PREVENTIVE MAINTENANCE

3-3. Preventive Maintenance

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

a. Systematic Care. The procedures given in paragraphs 3-4 through 3-8 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 3-4 through 3-7) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronics 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 chart indicates what to check, how to check, the normal conditions, and the minimum time required for inspection. If a defect cannot be remedied by the corrective actions listed, higher category of 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.

c. Preventive Maintenance Checks and Services Periods. Preventive maintenance checks and services of the equipment are required daily, weekly, monthly, and quarterly.

(1) Paragraph 3-4 specifies the checks and services that must be accomplished daily (or at least once each week if the equipment is maintained in standby condition).

(2) Paragraphs 3-5, 3-6, and 3-7 specify additional checks and services that must be performed on a weekly, monthly, and quarterly basis, respectively.

3-4. Daily Preventive Maintenance Checks and Services

Time required: 0.6

Sequence No.	ITEM TO BE INSPECTED	PROCEDURES	WORK TIME
1	Completeness	See that the equipment is complete (para 1-7)	0.1
2	Exterior surfaces	Clean the exterior surfaces, including the panel and meter glasses. Check both meter glasses and indicator lens for cracks (para 3-8)	0.1
3	Connectors	Check the tightness of all connectors.	0.1
4	Controls and indicators	While making the operating checks (items 5 and 6), observe that the mechanical action of each switch is smooth, and free of external or internal binding, and that there is no excessive looseness. Also, check the meters for sticking or bent pointers. Replace fuses, knobs, and lamps as required.	0.1
5	Operation	Operate the equipment (para 2-6). The indicator lamp should glow. The D. C. VOLTS and D. C. AMPS meters should indicate output voltage and current, respectively.	0.1
6	D. C. POWER ON switch	Set to OFF. Note that the 28V. ON indicator lamp extinguishes.	0.1

3-5. Weekly Preventive Maintenance Checks and Services

Time required: 0.2

Sequence No.	ITEM TO BE INSPECPED	PROCEDURE	WORK Time (M/H)
1	Cables	Inspect cables for chafed, cracked, or frayed insulation. Inspect for loose terminals.	0.1
2	Metal surfaces	Inspect exposed metal surfaces for rust and corrosion.	0.1

3-6. Monthly Preventive Maintenance Checks and Services

Time required: 0.3

Sequence No.	ITEM TO BE INSPECTED	PROCEDURE	WORK Time (M/H)
1	Transformer terminals	Inspect the terminals on the power transformer. All nuts must be tight. There should be no evidence of dirt or corrosion.	0.1
2	Gaskets and insulators	Inspect gaskets, insulators, bushing and sleeves for cracks, chipping and excessive wear.	0.1
3	Interior	Clean the interior of the chassis and cabinet.	0.1

3-7. Quarterly Preventive Maintenance Checks and Services

Time required: 0.2

Sequence No.	ITEM TO BE INSPECTED	PROCEDURE	WORK Time (M /H)
1	Publications	See that all publications are complete, serviceable, and current (DA Pam 310-4).	0.1
2	Modifications	Check DA pam 310-7 to determine whether new applicable MWO's have been published. ALL URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	0.1

3-8. Cleaning

Inspect the exterior of the equipment. The exterior surfaces should be free of dust, dirt, grease, and fungus.

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

WARNING

The fumes of trichloroethane used for cleaning purposes are toxic. Provide thorough ventilation whenever used. Do not use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the fumes to a highly toxic, dangerous gas.

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

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

CAUTION

Do not press on the meter glass when cleaning; the meters may become damaged.

d. Clean the front panel, meters and switches; use a soft, clean cloth. If necessary, dampen the cloth with water; mild soap may be used for more effective cleaning.

3-9. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TB 746-10.

3-10. Organizational Troubleshooting

a. General. The troubleshooting chart (*b* below) will help locate trouble in the tester. Only those corrective measures are given which the unit repairmen can accomplish. If the corrective measure does not restore normal equipment performance, higher category of maintenance is required.

b. Troubleshooting Chart.

Sequence No.	*Item to be inspected*	*Probable trouble*	*Corrective measures*
1	28V. ON indicator lamp does not illuminate.	Defective indicator lamp, or no power input.	Check power input and indicator lamp. If correct, higher category of maintenance is required.
2	D. C. VOLTS meter does not indicate properly.	Connections to meter faulty or defective.	Check for loose connection in output circuit. Check connections to meter. If meter connections are not faulty, higher category of maintenance is required.
3	D. C. AMPS meter does not indicate properly.	Connections to meter or to D. C. AMMETER RANGE selector faulty or defective.	Check for loose connections at meter and switch. If connections are not faulty, higher category of maintenance is required.
4	With D. C. POWER switch set to OFF, D. C. VOLTS meter does not indicate, lamp does not extinguish.	Defective switch	Higher category of maintenance is required.
5	Overheating	Poor ventilation	Check vent openings for excessive dirt or foreign matter.

3-11. Replacement of 28V. ON Indicator Lamp

a. Turn the indicator jewel counterclockwise and pull it out to expose the defective lamp.

b. Press in the lamp and turn it counterclockwise to unlock it.

c. Pull the defective lamp out and replace it with a new one. Push the new lamp in and twist it clockwise to lock it.

d. Secure the indicator jewel in place by turning it clockwise.

CHAPTER 4

FUNCTIONING OF EQUIPMENT

4-1. Principles of Operation

a. The tester is designed so that any inverter, whether single-phase or three-phase delta output, may be plugged into it by means of a suitable cable set. The dc voltage is fed into the input section of the inverter to be tested and thereby activates the inverter to be tested.

b. The input voltage and current are monitored by reading the D.C. VOLTS meter and the D.C. AMPS meter. The output voltage, frequency, and current of the inverter under test are indicated by the A.C. VOLTS meter, FREQUENCY meter, and A.C. AMPS meter, respectively.

4-2. Load Bank

The load bank imposes a load on the inverter being tested. Variable electrical load is imposed on the inverter by routing current through the tester load bank, with variable LOAD CONTROL settings providing the limits. The LOAD CONTROL setting varies in terms of percentage of the maximum output voltage. The value of the output voltage, frequency, and current are then monitored on the A.C. VOLTS meter, FREQUENCY meter, and A.C. AMPS meter, respectively.

4-3. Live Circuit

a. A live circuit supplies current to the filament and cathode heaters of electronic tubes used in the control circuits of some inverters. The live circuit supplies power to the inverter through the B and D posts of connector J101 terminal block (fig. FO-2).

b. Connection of the live circuit is made automatically by the cable set assembly and is connected to the power side of the special interlock circuit so that tubes may be heated before the D.C. POWER switch is set to ON, thereby protecting the inverter at all times.

c. The live circuit is protected by a 5-ampere cartridge-type fuse with circuit interruption displayed by a red indicator light.

4-4. Overload Provision

Fuses protect all meters, except the D.C. AMPS meter. The D.C. AMPS meter circuit includes a sensitive-type relay that provides circuit interruption for a current overload from 110 to 130 percent. The excessive current activates the sensitive relay, which opens the dc power input to the tester and opens the interlock circuit.

CHAPTER 5

GENERAL SUPPORT MAINTENANCE

5-1. General Instructions

Troubleshooting at the general support maintenance category includes all the techniques outlined for organizational maintenance and any special or additional techniques required to isolate a defective part. Paragraph 5-4 *d* provides the troubleshooting chart to be used by the repairman.

5-2. Organization of Troubleshooting Procedures

a. General. The first step in servicing a defective tester is to localize the fault, which means tracing the fault to the defective circuit responsible for the abnormal indication. The second step is to isolate the fault, which means locating the defective part or parts. Most defective parts, however, must be isolated by checking the metering and meter circuits, voltages and resistance.

b. Localization and Isolation. The first step in tracing trouble is to locate the circuit or part at fault by the following methods:

(1) *Visual inspection.* The purpose of visual inspection is to locate faults without testing or measuring circuits. All meter indications or other visual signs should be observed and an attempt made to localize the fault to a particular part.

(2) *Operational test.* Operational test frequently indicates the general location of trouble. In many instances the test will help in determining the exact nature of the fault. The daily preventive maintenance chart (para 3-4) contains a good operational test.

(3) *Troubleshooting chart.* The troubleshooting chart (para 5-4 *d)* lists symptoms of common troubles and gives corrective measures (or references). Such a chart cannot include all troubles symptoms that may occur; therefore, the repairman should use this chart as a guide in analyzing symptoms that may be listed.

5-3. Test Equipment Required

The test equipment required for troubleshooting Test Set, Motor-Generator AN/GSM-65A is Multimeter TS-352B/U. Additional equipment required is Motor-Generator PU-545()/A.

5-4. Localizing Troubles

a. General. The troubleshooting chart *(d* below) outlines procedures for localizing troubles and for isolating troubles within the various circuits of the tester. Refer to figure 1-3 for parts location. Refer to the schematic diagram (fig. FO-2) to identify circuit components. Depending on the nature of the operational symptoms, one or more of the localizing procedures will be necessary. When trouble has been localized to a particular circuit. Use voltage and resistance measurements to isolate the trouble to a particular part.

b. Use of Chart. When an abnormal symptom is observed in the equipment, look for a description of the symptom in the *Symptom* column and perform the corrective measure given in the *Corrective measures* column.

c. Conditions to Test. All checks outlined in the troubleshooting chart are to be conducted using an inverter known to be in good operating condition.

d. Troubleshooting Chart.

Symptom	*Probable trouble*	*Corrective measures*
1. 28V. ON indicator lamp does not light when D. C. POWER switch is set to ON.	*a.* No dc power is applied to tester. *b.* Defective switch.	*a.* Check for input voltage. *b.* Check switch; replace if defective.
2. Indication on D. C. VOLTS meter M102 differs from voltage present at input.	Defective meter M102.	Replace meter M102.
3. With D. C. POWER switch ON and load applied to inverter under test, no indication on D. C. AMPS meter M101.	*a.* Defective M101. *b.* Defective relays K101, K102, K103, K104. *c.* Defective microswitch S103 (located in back of D. C. AMMETER RANGE selector). *d.* Defective D. C. AMMETER RANGE selector.	*a.* Replace M101. *b.* Replace relays K101, K102, K103, K104. *c.* Remove and replace microswitch S103. *d.* Replace switch S107.

Symptom	*Probable trouble*	*Corrective measures*
4. Indication on D. C. AMPS meter M101 differs from current present at output.	*a.* Defective D. C. AMMETER RANGE selector S107.	*a.* Replace switch S107.
	b. Defective meter M101.	*b.* Replace meter M101.
5. No indication on D. C. VOLTS meter M102.	*a.* Blown 0.15-ampere fuse.	*a.* Replace F101 fuse.
	b. Power supply not connected to the +28V.	*b.* Check the connections to the +28V. and —D. C. input connections.
	c. Defective M102 meter.	*c.* Replace M102 meter.
6. No indication on FREQUENCY meter M103.	*a.* Defective reactor box Z101.	*a.* Replace reactor box Z101.
	b. Blown 0.5 AMPS fuse F102.	*b.* Replace 0.5 AMPS fuse F102.
	c. Defective VOLTS/AMPS switch.	*c.* Replace VOLTS/AMPS switch S106A.
7. No indication on A. C. VOLTS meter M104.	*a.* Blown 0.5 AMPS fuse F102.	*a.* Replace fuse F102.
	b. Defective VOLTS/AMPS switch S106A.	*b.* Replace switch S106A.
	c. Defective meter M104.	*c.* Replace meter M104.
8. Inverter will not start.	*a.* D. C. AMMETER RANGE selector not properly positioned.	*a.* Set D. C. AMMETER RANGE selector on START.
	b. DC power source.	*b.* Check dc power source.
	c. Defective microswitch (located in back of D. C. AMMETER RANGE selector).	*c.* Remove and check or replace microswitch.
	d. Defective K101 relay.	*d.* Check and/or replace relay.
	e. Defective inverter.	*e.* Troubleshoot inverter starting circuit.
	f. Inverter requires that LIVE CIRCUIT switch be turned on.	*f.* Follow instructions in paragraph 2-6.
9. A. C. AMPS meter not indicating when LOAD switch is on.	*a.* Blown fuse F103.	*a.* Replace fuse F103.
	b. Defective LOAD switch.	*b.* Replace LOAD switch.
10. With D. C. POWER switch ON and inverter operating, green indicating light does not go on.	*a.* Burned-out light bulb.	*a.* Replace bulb.
	b. Defective D. C. POWER switch.	*b.* Replace D. C. POWER switch.
11. Inverter stops when D. C. AMMETER RANGE selector is moved.	D. C. AMMETER RANGE selector moved to wrong position, overloading the D. C. AMMETER.	Refer to note before paragraph 2-6a.
12. Live circuit cannot be energized.	Live circuit fuse blown and light burned out.	Replace indicating light bulb and fuse.

5-5. General Parts Replacement Techniques

No special tools are required to service the Test Set, Motor-Generator AN/GSM-65A. Ordinary handtools, normally used by technicians and electricians, are required for routine service, operation, and calibration. Refer to figures 1-3 and B-3 for the location of all parts.

5-6. Checking Meters

a. Meter Tolerance Check. Use the following test equipment to verify that the meter is within tolerance:

Test equipment	*Meter*	*Tolerance*
Ammeter ME-65/U	A. C. AMPS	2%
Ammeter, panel	D. C. AMPS	2%
Multimeter TS-352B/U	D. C. VOLTS	2%
Voltmeter, Electronic ME-202A/U	A. C. VOLTS	2%
Counter, Electronic, Digital Read-out AN/USM-207	FREQUENCY	±2 Hz

b. Frequency Meter Adjustment. Perform the following steps for frequency meter out of tolerance.

(1) Connect Counter, Electronic, Digital Readout AN/USM-207 to the ac terminals of the reactor box (fig. 5-1) or to the output terminals of an inverter.

(2) Connect the inverter as instructed in paragraph 2-6.

(3) Adjust the inverter output to 400 cycles (as read on Counter, Electronic, Digital Readout AN/USM-207) at 115 volts.

(4) If the FREQUENCY meter on the tester panel reads less than 399 or more than 401 cycles,

turn the adjusting screw (accessible through the case cutout) until the FREQUENCY meter reads exactly 400 cycles.

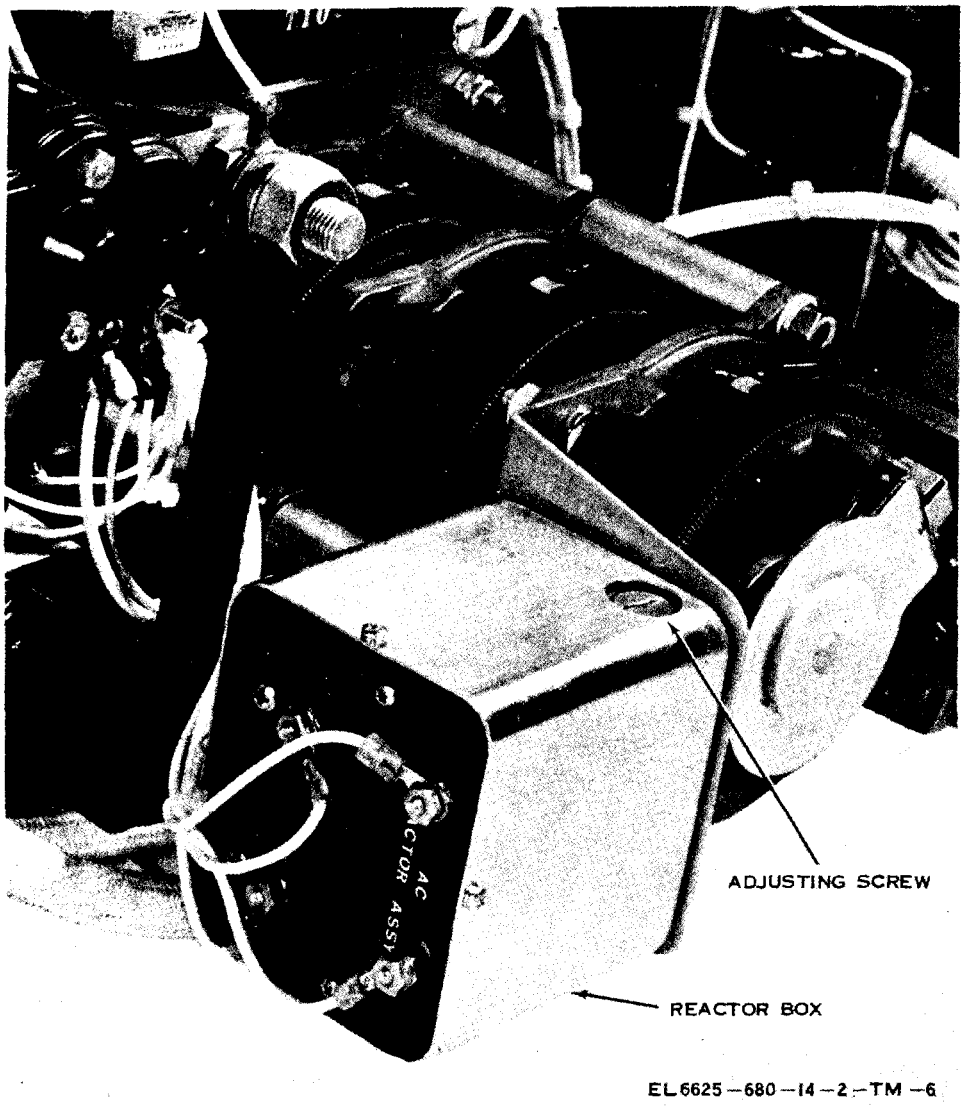


Figure 5-1. Reactor box and frequency meter adjusting screws

5-7. Replacing Meters

If any meter is defective, or cannot be adjusted by the zero setting screw, remove the meter from the tester panel and replace it with one that is known to be accurate.

CHAPTER 6

GENERAL SUPPORT TESTING PROCEDURES

6-1. General Instructions

a. Testing procedures are prepared for general support maintenance of electronics equipment to determine the acceptability of repaired equipment. These procedures set forth specific requirements that repaired equipment must meet before it is returned to the using organization.

b. Comply with the instructions preceding each chart before proceeding to the chart. Perform each step in sequence. Do not vary the sequence. For each step, perform all the actions required in the *Control settings* column; then perform each specific test procedure and verify it against its performance standard.

6-2. Test Equipment and Materials

All test equipment and materials required to perform the testing procedures given in this chapter are listed in *a* and *b* below.

a. Test Equipment. Use an operational Motor-Generator PU-545/A (NSN 6125-00-958-6915).

b. Materials.

Nomenclature	*National stock number*
Cable Assembly, Power, Electrical CX-12088/GSM-65.	4920-00-437-2461

6-3. Physical Tests and Inspection

a. Test Equipment and Materials. None required.

b. Test Connections and Conditions. No connections are necessary. Remove front panels and load bank.

c. Procedure.

Step No	*Test equipment*	*Control Settings Equipment under test*	*Test procedures*	*Performance standard*
1	None	Controls may be in any position.	Remove the front panel, back panel, heat shield, and load bank.	No damage should occur as a result of removing the front panel, back panel, heat shield, and load bank.
2	None	Controls may be in any position.	*a.* Inspect case and front panel for damage, missing parts and condition of paint. NOTE Touchup painting is recommended instead of refinishing whenever practical; screwheads, binding posts, receptacles and other plated parts will not be painted or polished with abrasives.	*a.* No damage evident or parts missing. External surfaces intended to be painted will not show bare metal. Panel lettering will be legible.
			b. Inspect control end mechanical assemblies for loose or missing screws, bolts, and nuts.	*b.* Screws, bolts, and nuts will be tight. None missing.
			c. Inspect meters for loose damaged or missing parts.	*c.* No loose, damaged, or missing parts.
3	None	Controls may be in any position.	Operate D. C. POWER switch. Check mechanical zero of each meter and adjust if necessary.	Switch will operate properly. Each meter, except the FREQUENCY meter, should be zero set. The FREQUENCY meter should be zero set at the 400 Hz mark.
4	None	Controls may be in any position.	Assemble the front panel, back panel, heat shield and load bank.	No damage should occur as a result of assembling the front panel, back panel, heat shield and load bank.

6-4. Functional Test

a. Test Equipment and Materials. For operational test equipment, use a PU-545/A inverter. For material, use Cable Assembly, Power, Electrical CX-12088/GSM-65.

b. Test Connections and Conditions. Connect the equipment as instructed in paragraph 2-6. Set the switches and controls as follows:

(1) D.C. POWER switch to OFF.

(2) A.C. AMMETER RANGE selector to 50.

(3) LOAD switch to OFF.

(4) LIVE CIRCUIT switch to OFF.

(5) Adjust LOAD CONTROL to 0 (fully counterclockwise).

(6) D.C. AMMETER RANGE switch to START.

(7) VOLTS/AMPS switch to AB/A for a 3-phase inverter and to NA/N for a 1-phase inverter.

(8) Connect the dc input power source (set for 28 volts and capable of providing 160 amperes) to –D.C. and +28V. terminal posts. (Do not turn on dc input power at this time.)

WARNING

Do not touch rear of Test Set, Motor-Generator AN/GSM-65A cabinet during test operation. Do not place any equipment on or near rear of cabinet during test operation. Failure to observe this caution can result in severe burn to personnel or fire hazard to equipment.

WARNING

After the dc power source is connected to the 28 vdc input terminals on the front panel of the test set, bind the input dc terminals with electrical insulation tape (NSN 5970-00-296-1625), leaving no bare metal of the binding posts or conductor exposed. Failure to observe this warning can result in severe burns to personnel.

c. Procedure. The procedure for a functional test is given below using a PU-545( )/A inverter as an example.

Step No.	*Control settings*		*Test procedure*	*Performance standard*
	Test equipment	*Equipment under test*		
1	PU-545( )/A inverter.	*a.* Test Set, Motor-Generator AN/GSM-65A.	*a.* Turn D. C. POWER switch to ON.	*a.* Inverter should start. A. C. VOLTS meter should read approximately 115 volts. FREQUENCY meter should read approximately 400 Hz.
		b. Set the LOAD switch to 3 phase.	*b.* Set D. C. AMMETER RANGE selector to 200.	*b.* None.
		c. Set the VOLTS/AMPS switch to AB/A.	*c.* Set LOAD CONTROL for 12.5 amperes on the A. C. AMPS meter.	*c.* None.
			d. Observe FREQUENCY meter.	*d.* FREQUENCY meter reads between 390 to 410 Hz.
			e. Observe D. C. AMPS meter.	*e.* D. C. AMPS meter reads less than 165 amperes.
			f. Observe A. C. VOLTS meter.	*f.* A. C. VOLTS meter reads between 112.5 and 117.5 volts.
			g. Set VOLTS/AMPS switch to BC/B.	*g.* FREQUENCY meter, D. C. AMPS meter and VOLTS meter readings should be the same as in *d, e,* and *f* above.
			h. Set VOLTS/AMPS switch to CA/C.	*h.* FREQUENCY meter, D. C. AMPS meter, and VOLTS meter readings should be the same as in *d, e,* and *f* above.

d. Stopping Procedure. After performing the test, perform the following procedures.

(1) Slowly turn the LOAD CONTROL to 0.

(2) Set the LOAD switch to OFF.

(3) Set the D.C. POWER switch to OFF.

(4) Turn the dc power supply off.

(5) Disconnect the cable at Test Set, Motor-Generator AN/GSM-65A and the inverter.

CHAPTER 7

SHIPMENT, LIMITED STORAGE, AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

7-1. Disassembly and Repacking of Equipment

The information concerning the original packaging (para 2-1) is to be used in repacking.

a. Main Unit. Cushion the main unit on all sides with excelsior, flexible corrugated fiberboard. Secure the cushioning with pressure-sensitive tape. Wrap the cushioned unit with corrugated, single-faced, flexible paper and secure the wrap with pressure-sensitive tape.

b. Technical Manual. Wrap the technical manual in waterproof paper and seal the package with pressure-sensitive tape. Fasten the package containing the technical manual on top of the tester with pressure-sensitive tape.

7-2. Repackaging

Repackaging of equipment for limited storage normally will be performed at a packaging facility or by a repacking team. If emergency packaging is required, select the materials from those listed in SB 38-100.

Section II. DEMOLITION TO PREVENT ENEMY USE

7-3. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. Use the destruction procedures outlined in paragraph 7-4 to prevent further use of the equipment.

7-4. Methods of Destruction

The tactical situation and time available will determine the method to be used when destruction of equipment is ordered. In most cases, it is preferable to demolish completely some portions of the equipment rather than partially destroy all equipment components.

a. Smash. Smash the cabinet, meters and controls. Smash the internal components.

b. Cut. Cut the wiring of the power supply.

c. Burn. Burn the technical manual first. Bum as much of the equipment as is flammable.

d. Dispose. Bury or scatter the destroyed parts.

APPENDIX A

REFERENCES

The following publications contain information applicable to the maintenance of Test Set, Motor-Generator AN/GSM-65A.

AR 746-1	Color, Marking, and Preparation of Equipment for Shipment of Army Material.
DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals, (Types 7, 8, and 9), Supply Bulletins and Lubrication Orders.
DA Pam 310-7	US Army Equipment Index of Modification Work Orders.
SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.
SB 38-100	Preservation, Packaging, Packing and Marking Materials, Supplies, and Equipment Used by the Army.
SC 5180-91-CL-R13	Sets, Kits, and Outfits Components List: Tool Kit, Electronic Equipment TK-101/G.
TB 746-10	Field Instructions for Painting and Preserving Electronics Command Equipment.
TB 43-180	Calibration Requirements for the Maintenance of Army Material.
TM 11-6125-240-15	Operator's, Organizational, DS, GS, and Depot Maintenance Manual including Repair Parts and Special Tools List: Motor-Generator PU-545/A.
TM 11-6625-203-12	Operator and Organizational Maintenance: Multimeter AN/URM-105, Including Multimeter ME-77/U.
TM 11-6625-366-15	Operator's, Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS-352B/U.
TM 11-6625-537-15-1	Organizational, DS, GS, and Depot Maintenance Manual: Voltmeter, Electronic ME-202A/U.
TM 11-6625-585-45	Organizational Direct Support, and General Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools): Ammeter ME-65A/U, FSN 6625-985-5251.
TM 11-6625-700-10	Operator's Manual: Digital Readout, Electronic Counter AN/USM-207.
TM 38-750	The Army Maintenance Management Systems (TAMMS).
TM 740-90-1	Administrative Storage of Equipment.
TM 750-244-2	Procedures for Destruction of Electronics Material to Prevent Enemy Use (Electronics Command).

APPENDIX B
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B-1. General

This appendix provides a summary of the maintenance operations for Test Set, Motor-Generator AN/GSM-LSA. 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.

B-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, hydraulic 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 specified 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 publication. 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 material 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.

B-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify component, 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 "worktime" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different

maintenance categories, appropriate "worktime" figures will be shown for each category. The number of task-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in 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.

j. 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.

B-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.

B-5. Remarks (see 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.

(Next printed page is B-3.)

SECTION II MAINTENANCE ALLOCATION CHART FOR

TEST SET, MOTOR-GENERATOR AN/GSM-65A

(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, MOTOR-GENERATOR AN/GSM-65 and AN/GSM-65A	Inspect		0.1					
		Test		0.1				2	Operation
		Service		0.2				1	Clean Exterior
		Replace		0.1				1	Cables, Fuses, Knobs, Lamps
		Test				0.3		3-9	
		Service				0.6		3	
		Adjust				0.2		5,6	
		Repair				0.1		3	
		Overhaul					16	3-10	
01	CABLE ASSEMBLY CX-12082/GSM-65	Inspect		0.1					
		Test		0.1				2	
		Service		0.1				1	
		Replace		0.1				1	
		Repair				0.1		3,4	
02	CABLE ASSEMBLY CX-12083/GSM-65	Inspect		0.1					
		Test		0.1				2	
		Service		0.1				1	
		Replace		0.1				1	
		Repair				0.1		3,4	
03	CABLE ASSEMBLY CX-12084/GSM-65	Inspect		0.1					
		Test		0.1				2	
		Service		0.1				1	
		Replace		0.1				1	
		Repair				0.1		3,4	
04	CABLE ASSEMBLY CX-12086/GSM-65	Inspect		0.1					
		Test		0.1				2	
		Service		0.1				1	
		Replace		0.1				1	
		Repair				0.1		3,4	
05	CABLE ASSEMBLY CX-12088/GSM-65	Inspect		0.1					
		Test		0.1				2	
		Service		0.1				1	
		Replace		0.1				1	
		Repair				0.1		3,4	
06	CABLE ASSEMBLY CX-12089/U	Inspect		0.1					
		Test		0.1				2	
		Service		0.1				1	
		Replace		0.1				1	
		Repair				0.1		3,4	

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
TEST SET, MOTOR-GENERATOR AN/GSM-65A

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O	TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5178	
2	O	Multimeter, AN/URM-105( )	6625-00-581-2036	
3	H, D	Tool Kit, Electronic Equipment TK-105/G	5180-00-610-8177	
4	H, D	Multimeter, AN/USM-223/U (Rs TS-3352B/U)	6625-00-999-7465	
5	H, D	Counter, Electronic Digital AN/USM-207A	6625-00-044-3228	
6	H, D	Motor-GeneratorPU-545/A	6125-00-958-6915	
7	H, D	Ammeter, ME-65( )/U	6625-00-985-5251	
8	H, D	Ammeter, Panel	6625-00-089-5645	
9	H, D	Voltmeter, Electronic ME-202( )/U	6625-00-709-0288	
10	D	Dummy Load, Electrical DA-638/U	6625-00-422-2111	

By Order of the Secretary of the Army:

FRED C. WEYAND
General, United States Army,
Chief of Staff.

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

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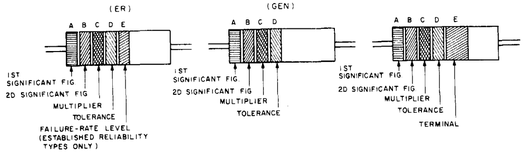


COLOR CODE MARKING FOR COMPOSITION TYPE RESISTORS.

COLOR CODE MARKING FOR FILM-TYPE RESISTORS.

TABLE I
COLOR CODE FOR COMPOSITION TYPE AND FILM TYPE RESISTORS.

BAND A		BAND B		BAND C		BAND D		BAND E		
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)	COLOR	FAILURE RATE LEVEL	TERM.
BLACK	0	BLACK	0	BLACK	1			BROWN	M=1.0	
BROWN	1	BROWN	1	BROWN	10			RED	P=0.1	
RED	2	RED	2	RED	100			ORANGE	R=0.01	
ORANGE	3	ORANGE	3	ORANGE	1,000			YELLOW	S=0.001	
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	±10 (COMP. TYPE ONLY)	WHITE	.....	SOLDERABLE
GREEN	5	GREEN	5	GREEN	100,000	GOLD	±5			
BLUE	6	BLUE	6	BLUE	1,000,000	RED	±2 (NOT APPLICABLE TO ESTABLISHED RELIABILITY)			
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7							
GRAY	8	GRAY	8	SILVER	0.01					
WHITE	9	WHITE	9	GOLD	0.1					

BAND A — THE FIRST SIGNIFICANT FIGURE OF THE RESISTANCE VALUE (BANDS A THRU D SHALL BE OF EQUAL WIDTH.)

BAND B — THE SECOND SIGNIFICANT FIGURE OF THE RESISTANCE VALUE.

BAND C — THE MULTIPLIER (THE MULTIPLIER IS THE FACTOR BY WHICH THE TWO SIGNIFICANT FIGURES ARE MULTIPLIED TO YIELD THE NOMINAL RESISTANCE VALUE.)

BAND D — THE RESISTANCE TOLERANCE.

BAND E — WHEN USED ON COMPOSITION RESISTORS, BAND E INDICATES ESTABLISHED RELIABILITY FAILURE-RATE LEVEL (PERCENT FAILURE PER 1,000 HOURS). ON FILM RESISTORS, THIS BAND SHALL BE APPROXIMATELY 1-1/2 TIMES THE WIDTH OF OTHER BANDS, AND INDICATES TYPE OF TERMINAL.

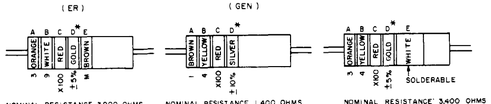
RESISTANCES IDENTIFIED BY NUMBERS AND LETTERS (THESE ARE NOT COLOR CODED.)

SOME RESISTORS ARE IDENTIFIED BY THREE OR FOUR DIGIT ALPHA NUMERIC DESIGNATORS. THE LETTER R IS USED IN PLACE OF A DECIMAL POINT WHEN FRACTIONAL VALUES OF AN OHM ARE EXPRESSED. FOR EXAMPLE:

2R7 = 2.7 OHMS 10R0 = 10.0 OHMS

FOR WIRE-WOUND-TYPE RESISTORS COLOR CODING IS NOT USED. IDENTIFICATION MARKING IS SPECIFIED IN EACH OF THE APPLICABLE SPECIFICATIONS.

EXAMPLES OF COLOR CODING



NOMINAL RESISTANCE 3,900 OHMS
RESISTANCE TOLERANCE ±5%
FAILURE RATE LEVEL M

NOMINAL RESISTANCE 1,400 OHMS
RESISTANCE TOLERANCE ±10%

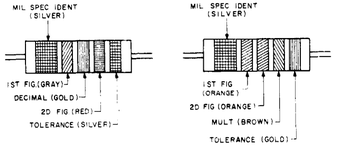
NOMINAL RESISTANCE 3,400 OHMS
RESISTANCE TOLERANCE ±5%
TERMINAL SOLDERABLE

COMPOSITION-TYPE RESISTORS

FILM-TYPE RESISTORS

* IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ±20% AND THE RESISTOR IS NOT MIL-STD.

A. COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS.



COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES. AT A, AN EXAMPLE OF THE CODING FOR AN 8.2UH CHOKE IS GIVEN. AT B, THE COLOR BANDS FOR A 330UH INDUCTOR ARE ILLUSTRATED.

TABLE 2
COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES

COLOR	SIGNIFICANT FIGURE	MULTIPLIER	INDUCTANCE TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	1
RED	2	100	2
ORANGE	3	1,000	3
YELLOW	4		
GREEN	5		
BLUE	6		
VIOLET	7		
GRAY	8		
WHITE	9		
NONE			20
SILVER			10
GOLD	DECIMAL POINT		5

MULTIPLIER IS THE FACTOR BY WHICH THE TWO COLOR FIGURES ARE MULTIPLIED TO OBTAIN THE INDUCTANCE VALUE OF THE CHOKE COIL.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS.

CAPACITORS, FIXED, VARIOUS-DIELECTRICS, STYLES CM, CN, CY, AND CB.

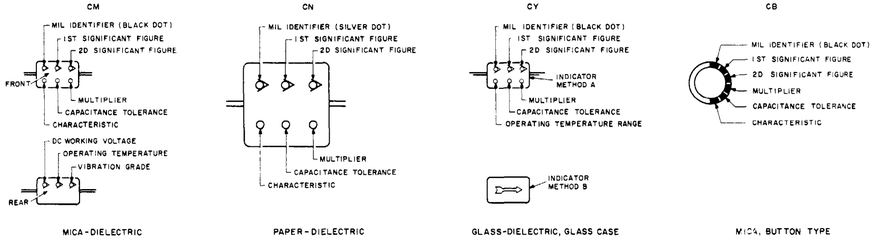


TABLE 3 — FOR USE WITH STYLES CM, CN, CY AND CB.

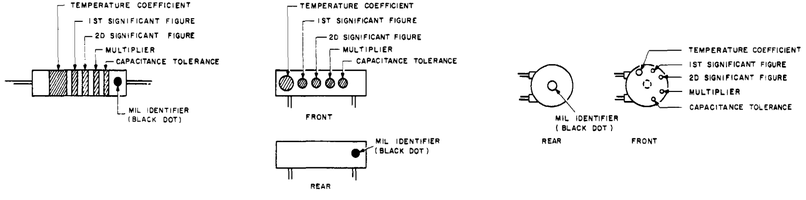
COLOR	MIL ID	1ST SIG FIG.	2D SIG FIG	MULTIPLIER	CAPACITANCE TOLERANCE				CHARACTERISTIC				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CB	CY	CM	CY, CM	CM
BLACK	CM, CY, CB	0	0	1			±20%	±20%		A				-55°TO+70°C	10-55 Hz
BROWN		1	1	10					B	E	B				
RED		2	2	100	±2%		±2%	±2%	C					-55°TO+85°C	
ORANGE		3	3	1,000		±30%			D		D	300			
YELLOW		4	4	10,000					E					-55°TO+125°C	10-2,000Hz
GREEN		5	5		±5%				F			500			
BLUE		6	6											-55°TO+150°C	
PURPLE (VIOLET)		7	7												
GRAY		8	8												
WHITE		9	9												
GOLD				0.1			±5%	±5%							
SILVER	CN			0.01	±10%	±10%	±10%	±10%							

TABLE 4 — TEMPERATURE COMPENSATING, STYLE CC.

COLOR	TEMPERATURE COEFFICIENT[4]	1ST SIG FIG.	2D SIG FIG.	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					CAPACITANCES OVER 10 UUF	CAPACITANCES 10 UUF OR LESS	
BLACK	0	0	0	1		±2.0 UUF	CC
BROWN	−30	1	1	10	±1%		
RED	−80	2	2	100	±2%	±0.25 UUF	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		±5%	±0.5 UUF	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GRAY		8	8	0.01*			
WHITE		9	9	0.1*	±10%		
GOLD	+100			0.1		±1.0 UUF	
SILVER				0.01			

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-25D, MIL-C-11272B, AND MIL-C-10950C RESPECTIVELY.
3. LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL-C-11015D.
4. TEMPERATURE COEFFICIENT IN PARTS PER MILLION PER DEGREE CENTIGRADE.

* OPTIONAL CODING WHERE METALLIC PIGMENTS ARE UNDESIRABLE.



C. COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS.

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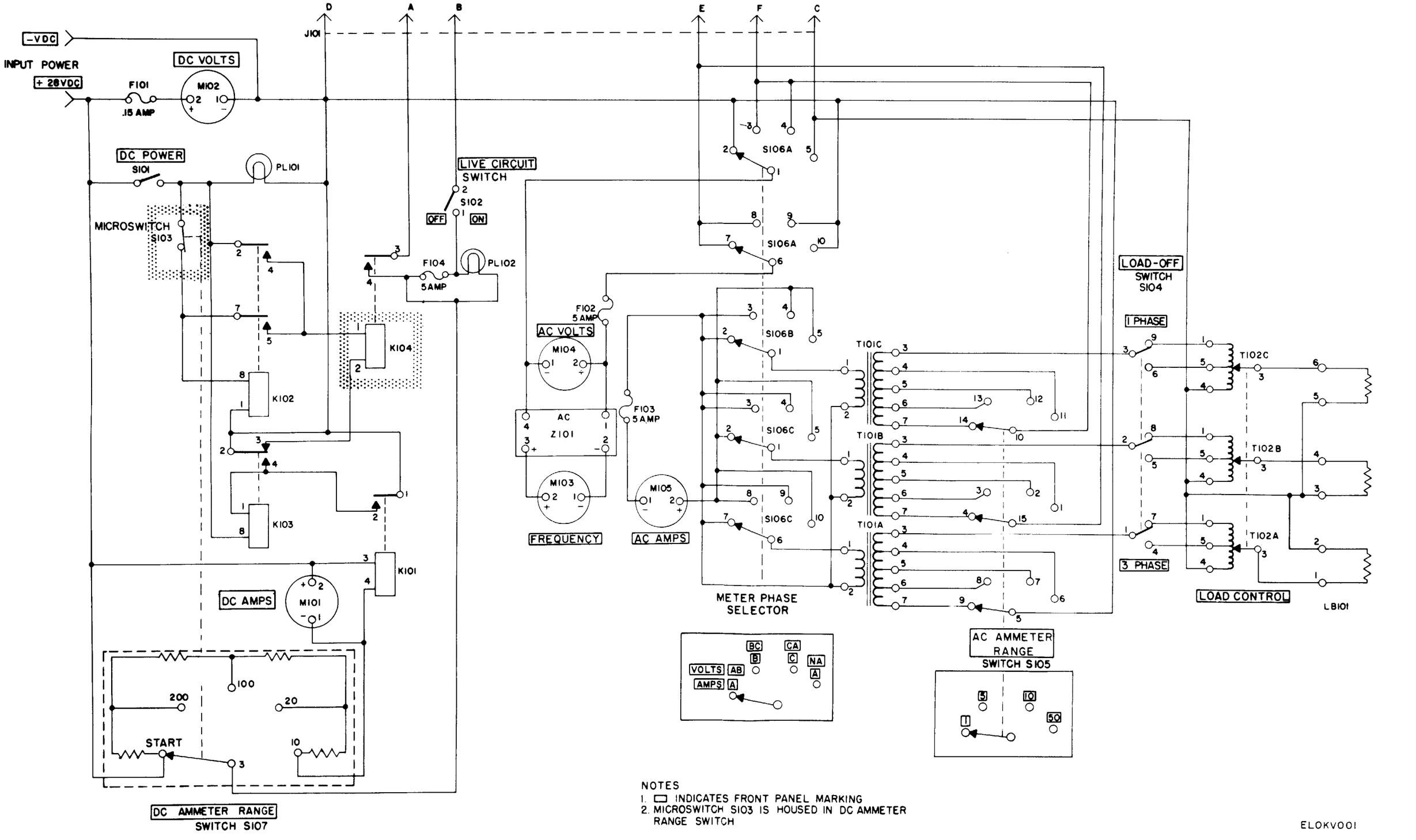
Figure FO-1. Color code markings for MIL-STD resistors, inductors, and capacitors.



NOTES
1. ▭ INDICATES FRONT PANEL MARKING
2. MICROSWITCH S103 IS HOUSED IN DC AMMETER RANGE SWITCH

ELOKV001

Figure FO-2. Schematic diagram.

NOTE:
ALL WIRES ARE NO 18 AWG, WHITE, PER MIL-W-5086/2 EXCEPT:
WIRE NOS 9, 10 ARE NO 14 AWG
12, 15, 17, 19, 20, 22 AND 23 ARE NO 22 AWG
41 IS NO 10 AWG
94, 95 ARE NO 0 AWG

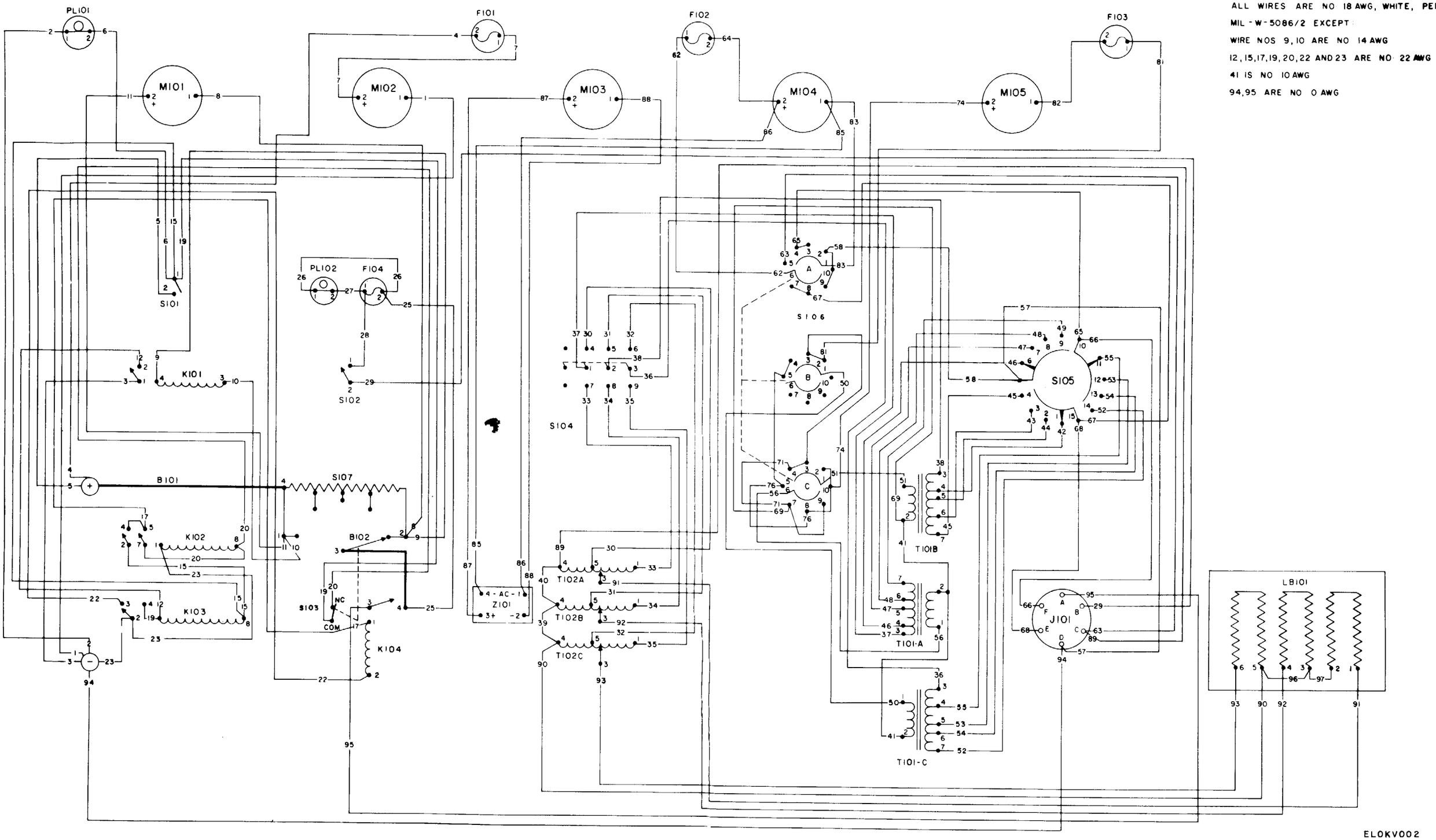


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Figure FO-3. Wiring diagram.

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