DEPARTMENT OF THE ARMY TECHNICAL MANUAL

GS AND DEPOT MAINTENANCE MANUAL

CHARGER, BATTERY PP-1659/G,

INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

Headquarters, Department of the Army, Washington, D.C. 20315

6 October 1965

WARNING

High voltages and currents exist in this equipment. Serious injury or death may result from contact with the output terminals. Deenergize the equipment before connecting or disconnecting the load to be powered and before performing any maintenance.

DON'T TAKE CHANCES!

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CHAPTER 1

FUNCTIONING OF EQUIPMENT

1-1. Scope

a. This manual contains general support and depot maintenance instructions for Charger, Battery PP-1659/G (battery charger). It includes instructions appropriate for troubleshooting, testing and repairing the equipment. It also lists the tools, materials, and test equipment required for maintenance. The functional analysis of the equipment is covered in paragraphs 1-3, 1-4, and 1-5.

b. The complete technical manual for this equipment includes TM 11-6130-238-12.

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

Note: **For applicable forms and records, see paragraph 1-3, TM 11-6130-238-12.**

1-2. Index of Equipment Publications

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

1-3. Input Control Circuit

(fig. 1-1)

The input control circuit consists of power plug P1, AC INPUT switch and circuit breaker CB1, indicator lamp DS1, INPUT VOLTAGE switch S1, and the primary winding of power transformer T1. INPUT VOLTAGE switch S1 has a red safety plate which must be removed from the front panel in order to position the switch to 115 or 230. For 115-volt alternating-current (ac) input power, switch S1 is placed in the 115 position (up), and the two primary windings of T1 (1-2 and 3-4) are connected in parallel across the power input terminals P1. For 230-volt ac input power, switch S1 is placed in the 230 position (down), and the two primary windings of T1 (1-2 and 3-4) are connected in series across the power input terminals of P1. Indicator lamp DS1 lights to indicate the presence of the ac input voltage when the AC INPUT switch and circuit breaker CB1 is set to the up position (on). AC INPUT switch and circuit breaker CB1 also provides protection for short circuits and overloads.

1-4. Voltage Selection and Rectification Circuit

(fig. 1-1)

The two secondary windings of power transformer T1 (terminals 1 through 12 in series with terminals 13 through 24) are connected to two 12-position rotary switches (S2 and S3). COARSE switch S3 connects to the taps of terminals 1 through 12 of T1, and FINE switch S2 connects to the taps of terminals 13 through 24 of T1. The magnitude of the ac voltage applied to the bridge rectifier consisting of CR1 through CR4 is controlled by the setting of switches S2 and S3. The minimum output voltage is obtained with switches S2 and S3 set to positions 1. When switches S2 and S3 are advanced from positions 1 through 12, the battery charger output voltage varies accordingly and the maximum output voltage is obtained at position 12. Bridge rectifier CR1 through CR4 provides full-wave rectification of the ac voltage across the secondary of power transformer T1. The direct-current (dc) output voltage from the bridge rectifier is connected to the OUT-PUT terminal (taken from the junction of CR3 and CR4) and the + OUTPUT terminal (taken from the junction of CR1 and CR2 in series with DC AMPS meter M1 and

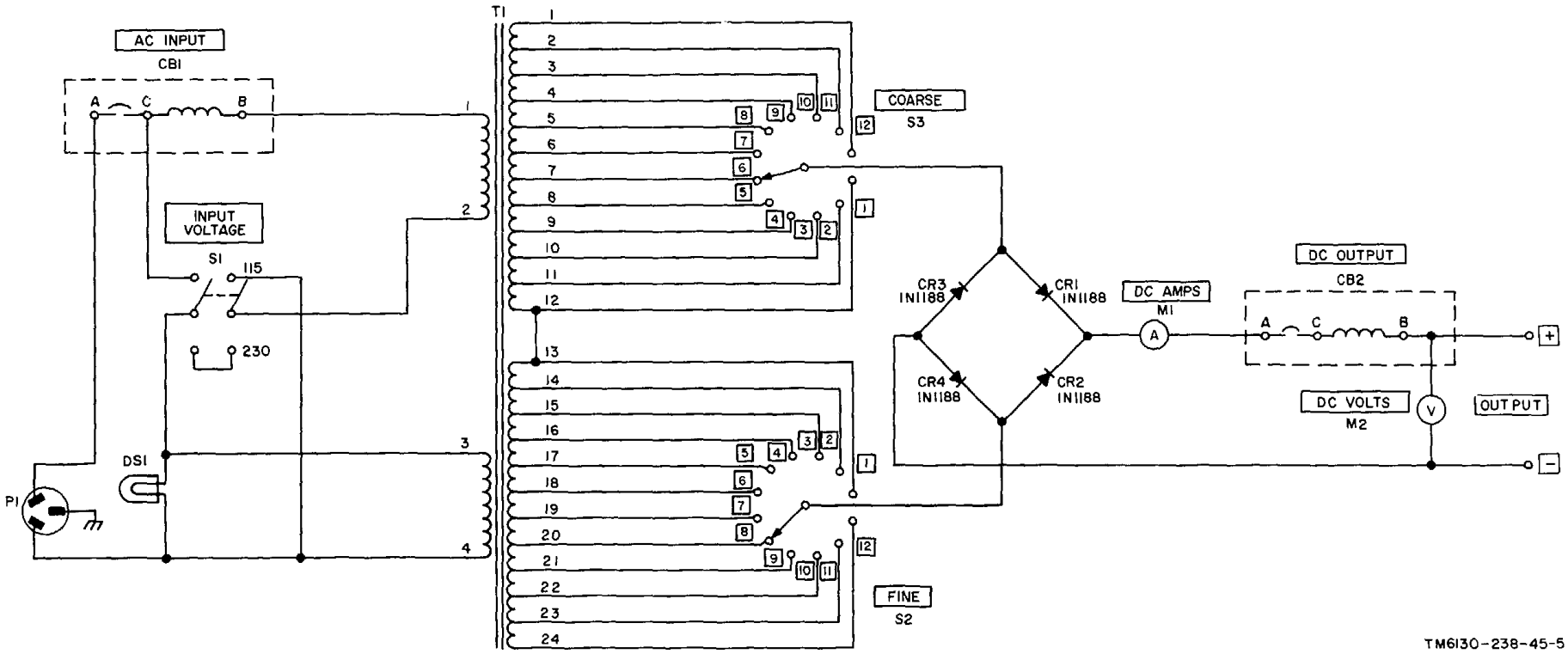

Figure 1-1. Charger, Battery PP-1659/G, schematic diagram.

DC OUTPUT switch and circuit breaker CB2).

1-5. Output Circuit
(fig. 1-1)

The output circuit consists of DC AMPS meter M1, DC VOLTS meter M2 and DC OUTPUT switch and circuit breaker CB2. With a storage battery connected to the - and + OUTPUT terminals and CB1 and CB2 set to the up position (on), direct current flows from the junction of CR3 and CR4, through the storage battery, CB2, and M1, to the junction of CR1 and CR2. DC AMPS meter M1 indicates the storage battery charging current. DC VOLTS meter M2 indicates the charging voltage.

CHAPTER 2

TROUBLESHOOTING

Warning: **When servicing the battery charger, be extremely careful of the high voltages.**

2-1. General Instructions

Troubleshooting at the general support and depot maintenance levels includes all the techniques outlined for organizational maintenance, and any special or additional techniques required to isolate a defective part. Paragraph 2-4*d* provides the troubleshooting chart to be used by the repairman.

2-2. Organization of Troubleshooting Procedures

a. General. The first step in servicing a defective battery charger is to localize the fault, which means tracing the fault to a defective circuit responsible for the abnormal indication. The second step is to isolate the fault, which means locating the defective part or parts. Some defective parts, such as shorted transformers, can often be located by sight, smell, and hearing. Most defective parts, however, must be isolated by checking 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 the 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 tests frequently indicate the general location of trouble. In many instances, the test will help in determining the exact nature of the fault. The daily maintenance service and

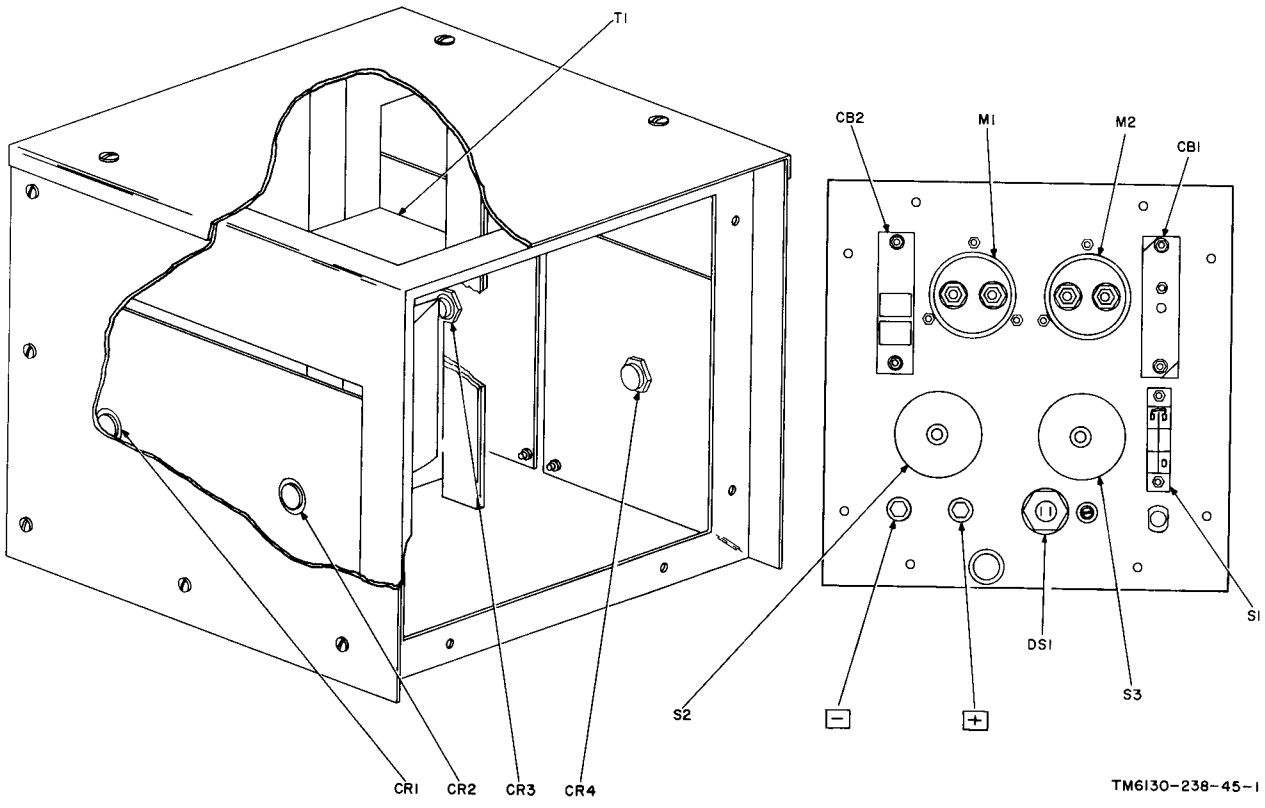

Figure 2-1. Charger, Battery PP-1659/G, parts location diagram.

inspection chart (TM 11-6130-238-12) contains a good operational test.

(3) *Troubleshooting chart.* The troubleshooting chart (para 2-4*d*) lists symptoms of common troubles and gives (or references) the corrective measures. Such a chart obviously cannot include all trouble symptoms that may occur. The repairman should use this chart as a guide in analyzing symptoms that may not be listed

2-3. Test Equipment Required

The test equipment required for troubleshooting the battery charger is Multimeter TS-352/U. Multimeter TS-352/U is used for continuity tests and dc voltage measurements.

2-4. Localizing troubles

a. General. In the troubleshooting chart (*d* below), procedures are outlined for localizing troubles and for isolating troubles within the various circuits of the battery charger. Refer to figure 2-1 for the parts locations. Refer to the schematic diagram (fig. 1-1) to identify the circuit components.

b. Use of Chart. When an abnormal symptom has been observed in the equipment, look for a description of this symptom in the *Symptom* column and perform the corrective measure shown in the *Corrective measures* column. If no operational symptoms are known, begin with item 5 of the daily preventive maintenance checks and services chart (TM 11-6130-238-12) and proceed until a trouble symptom appears.

c. Conditions to Tests. All checks outlined in the troubleshooting chart are to be conducted with the battery charger connected to a power source (no load connected to OUTPUT terminals).

d. Troubleshooting Chart.

Symptom	Probable trouble	Corrective measures
1. Indicator lamp DS1 does not light when AC INPUT switch and circuit breaker CB1 is on (up).	No ac power is applied to battery charger.	Check for input voltage.
	Defective CB1.....	Check CB1; replace if defective.
2. Indicator lamp DS 1 lights, but no output voltage is present regardless of position of COARSE (S3) and FINE (S2) switches.	Open in output circuit.....	Check for loose connection, broken lead, or faulty component.
	Defective power transformer T1.	Replace power transformer T1.
3. Output voltage does not change when COARSE (S3) and FINE (S2) switches are turned from position 1 to position 12.	Defective switch S3 or S2.....	Replace defective switch.
	Defective power transformer T1.	Replace power transformer T1.
4. Low output voltage	Defective rectifier CR1, CR2, CR3,	Replace defective rectifier.
5. Indication on DC VOLTS meter M2 differs from voltage present at OUTPUT terminals.	Defective DC VOLTS meter M2	Replace DC VOLTS meter M2.
6. Indication on DC AMPS meter M1 differs from current present at OUTPUT terminals.	Defective DC AMPS meter M1.....	Replace DC AMPS meter M1.

2-5. General Parts Replacement Techniques

The battery charger parts can be reached and replaced easily without special procedures. Refer to figure 2-1 for the locations of parts. When soldering connections to the diodes (CR1, CR2, CR3, and CR4), solder quickly; use a heat sink (such as long-nosed pliers) between the soldered joint and the diode.

2-6. Additional Troubleshooting Data

a. Voltage Outputs. The voltage output data of the battery charger (no load applied) are provided in the chart below as an aid to trouble-shooting.

COARSE switch S3 setting	FINE switch S2 setting	Dc voltage indications
2	1	11.5 ±1
3	1	23 ±2
4	1	34.5 ±3
5	1	46 ±4
6	1	57.5 ±5
7	1	69 ±6
8	1	80.5 ±7
9	1	92 ±8
10	1	103.5 ±9
11	1	115 ±10
12	1	126.5 ±11
1	2	1 ±0.2
1	3	2 ±0.4
1	4	3 ±0.6
1	5	4 ±0.8
1	6	5 ±1
1	7	6 ±1.2
1	8	7 ±1.4
1	9	8 ±1.6
1	10	9 ±1.8
1	11	10 ±2
1	12	11 ±2.2

b. Dc Resistances of Transformer T1. The dc resistance data ((3) below) are provided as an aid to troubleshooting. When using the data, observe the following:

Caution: **Do not measure resistance of the windings when input power is applied to the battery charger and when the AC INPUT switch and circuit breaker is on (up). Disconnect the input power plug and place the AC INPUT switch and circuit breaker off (down).**

(1) Before making resistance measurements of the windings, determine that faulty operation is probably caused by a faulty transformer. To do this, follow the troubleshooting procedures as outlined in paragraph 2-4*d*.

(2) Do not use the resistance measurements as the sole basis for discarding a transformer as defective. The values given in (3) below are typical average values.

(3) The dc resistances of transformer T1 are less than 1 ohm between the windings of the primary, and less than 1 ohm between the windings of the secondary.

CHAPTER 3

GENERAL SUPPORT TEST PROCEDURES

3-1. General

a. Testing procedures are prepared for use by Signal Field Maintenance Shops and Signal Service Organizations responsible for general support maintenance of electronic equipment to determine the acceptability of repaired equipment. These procedures set forth specific requirements that repaired equipment *must* meet before it is returned to the using organization. A summary of the performance standards is given in paragraph 3-6.

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* columns; then perform each specific test procedure and verify it against its performance standard.

3-2. Test Equipment and Tools

All test equipment and tools required to perform the testing procedures given in this chapter are listed in *a* and *b* below and are authorized under TA 11-17, Signal Field Maintenance Shops; and TA 11-100 (11-17), Allowances of Signal Corps Expendable Supplies for Signal Field Maintenance Shops (Continental United States).

a. Test Equipment.

Nomenclature	Federal stock No.	Technical manual
Multimeter ME-87/U	6625-223-5248	None
Ohmmeter ZM-21A/U	6625-246-5880	TM 11-2050
Transformer, Variable Power TF-171A/USM	5950-503-0632	None
Multimeter TS-352/U	6625-242-5023	TM 11-5527
Multimeter AN/USM-33	6625-870-2264	TM 11-6625-314-15
Resistor, variable, wire-wound, 7.5-ohm, 1,000-watt (4 each)	5905-195-4496	None

b. Tools. All the tools required are included in Tool Kit, Radar and Radio Repairman TK-87/U.

3-3. Physical Tests and Inspections

a. Test Equipment and Materials. None required.

b. Test Connections and Conditions. No connections necessary.

c. Procedure.

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equipment under test		
1	None	Controls may be in any position.	*a.* Inspect case and chassis 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 all controls and mechanical assemblies for loose or missing screws, bolts, and nuts.	*b.* Screws, bolts, and nuts will be tight; none missing.
			c. Inspect socket and meters for looseness, damage, or missing parts.	*c.* No loose parts or damage. No missing parts.
2	None	Controls may be in any position.	*a.* Rotate COARSE (S3) and FINE (S2) switches throughout the limits of travel.	*a.* Switches will rotate freely, without binding or excessive looseness.
			b. Operate AC INPUT and DC OUTPUT switches and circuit breakers, and INPUT VOLTAGE switch.	*b.* AC INPUT and DC OUTPUT switches and circuit breakers, and INPUT VOLTAGE switch will operate properly.

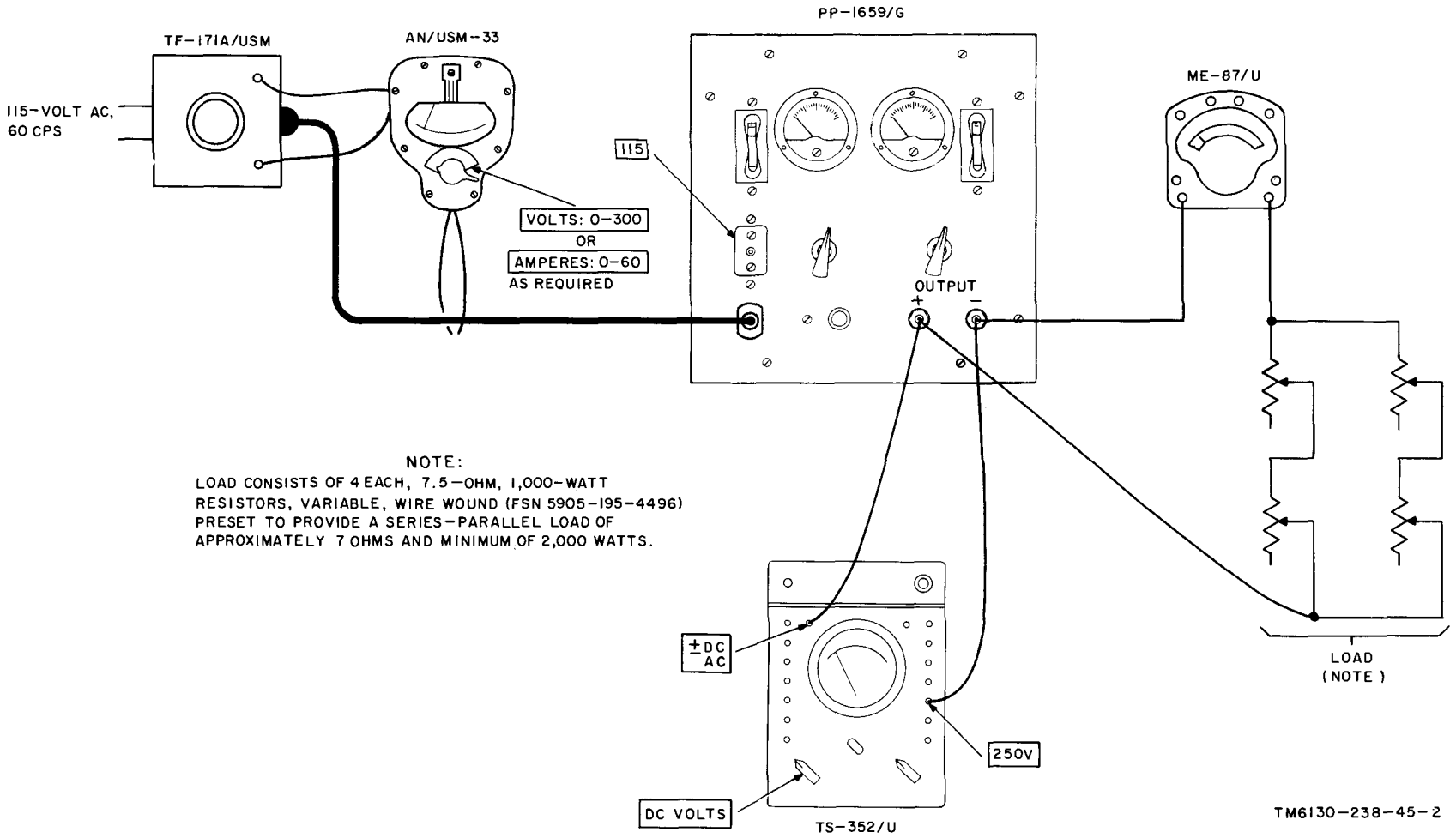

Figure 3-1. Input and output power test (115-volt ac input power) connection diagram.

3-4. Input and Output Power Test

a. Test Equipment and Materials

Multimeter ME-87/U
Transformer, Variable Power TF-171A/USM
Multimeter TS-352/U
Multimeter AN/USM-33
Resistor, variable, wire-wound, 7.5-ohm, 1,000-watt (four each).

b. Test Connections and Conditions. Connect the equipment as shown in figure 3-1. This test is established for 115-volt ac operation. Do not connect the load (four each, 7.5-ohm, 1,000-watt variable resistors) until instructed to do so in *c* below.

c. Procedure.

Control settings		Test procedure	Performance standard
Test equipment	Equipment under test		
TF-171A/USM Control: 115 *AN/USM-33* FUNCTION RANGE selector switch: AMPERES 0-60 or VOLTS 0-300, as required. *TS-352/U* FUNCTION: DC VOLTS *ME-87/U* Function: 0-30 amperes.	INPUT VOLTAGE switch: 115 AC INPUT switch and circuit breaker: Off (down). DC OUTPUT switch and circuit breaker: Off (down). COARSE switch: 1 FINE switch: 1	*a.* Connect the PP-1659/G to a 115-volt ac *b.* Adjust the control on the TF-171A/USM for a 115-volt ac output. *c.* Set the AC INPUT and DC OUTPUT switches and circuit breakers on (up). *d.* Rotate the COARSE and FINE switches from position 1 through 12 while observing the indication on the TS-352/U and the DC VOLTS meter on the PP-1659/G. *e.* Set the DC OUTPUT switch and circuit breaker off (down). *f.* Connect the four 7.5-ohm resistive load (set for approximately 7 ohms and minimum of 2,000 watts) across the + and - OUTPUT terminals of the PP-1659/G. *g.* Connect the ME-87/U in series with the load. *h.* With the COARSE and FINE switches set to 12, adjust the load for an indication of 15 amperes both on the DC AMPS meter of the PP-1659/G and the ME-87/U. *i.* Adjust the load and the COARSE and Fine switches for 105 volts dc output at 15 amperes while observing the current indication on the AN/USM-33. *j.* Set the AC INPUT and DC OUTPUT switches and circuit breakers off (down).	*a.* None *b.* None *c.* None *d.* The voltage reading should increase progressively from less than 2 volts to more than 105 volts as the COARSE and FINE switches are rotated to 12. *e.* None *f.* None *g.* None *h.* The reading is 15 amperes and the voltage indicated on the TS-352/U is greater than 105 volts. *i.* The current indication on the AN/USM-33 should be less than 25 amperes. *j.* None.

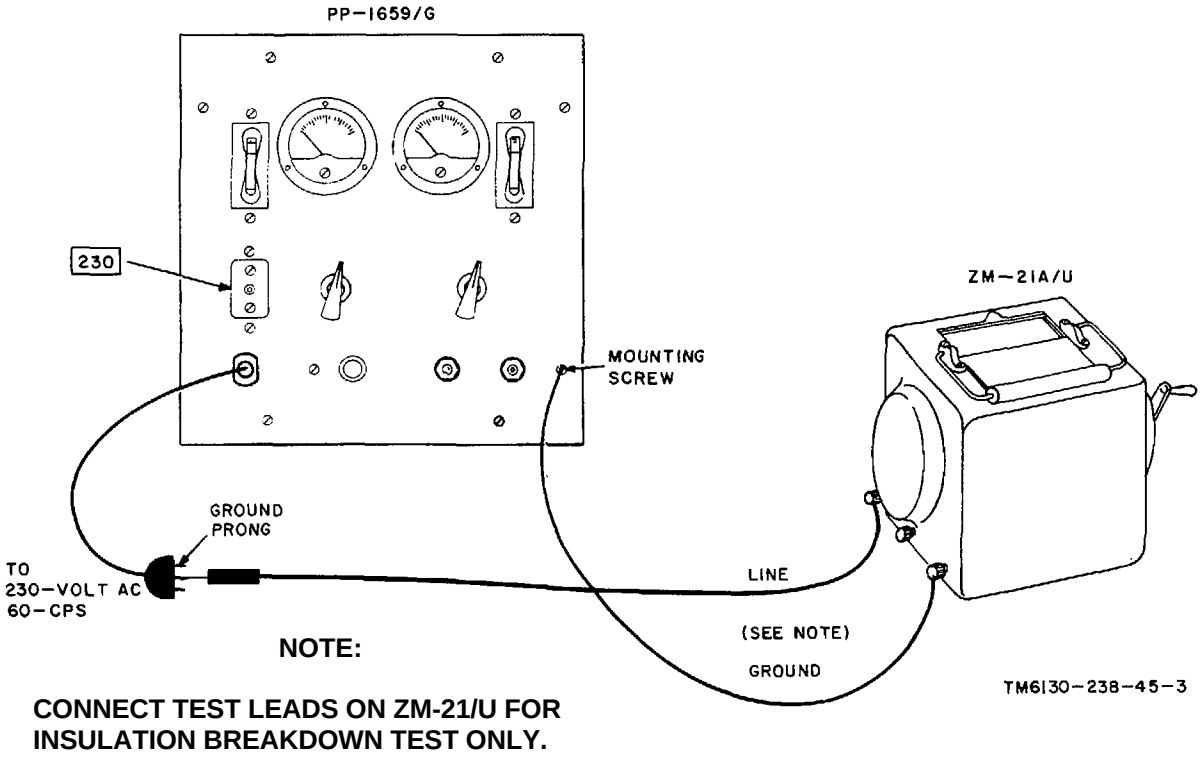

Figure 3-2. Two-hundred-and-thirty-volt operational test and insulation breakdown test connection diagram.

3-5. Two-Hundred-and-Thirty-Volt Operational Test and Insulation Breakdown Test

a. Test Equipment.
Ohmmeter ZM-21A/U

b. Test Connections and Conditions. Connect the equipment as shown in figure 3-2. Do not connect the test leads on the ZM-21A/U to the PP-1659/G unit until instructed to do so in step 2 of the procedures given in *c* below. This test is established for 230-volt ac operation.

c. Procedure.

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equipment under test		
1		INPUT VOLTAGE switch: 230	*a.* Connect the PP-1659/F to a 230-volt ac source.	a. None.
		AC INPUT switch and circuit breaker: Off (down)	*b.* Set the AC INPUT and DC OUTPUT switches and circuit breakers on (up).	b. The DC VOLTS meter reading on the PP-1659/G is greater than 105 volts.
		DC OUTPUT switch and circuit breaker: Off (down position)	*c.* Set the AC INPUT and DC OUTPUT switches and circuit breakers off (down).	c. None.
		COARSE switch: 12 FINE switch: 12	*d.* Disconnect the PP-1659/G from the 230-volt ac source.	d. None.
2		AC INPUT switch and circuit breaker: On (up).	*a.* Connect the ground lead on the ZM-21A/U to the case of the PP-1659/G.	a. None
			b. Connect the line lead on the ZM-21A/U to either one of the ac prongs on the ac plug, operate the ZM-21A/U, and observe the indication on the ZM-21A/U meter.	b. The meter reading is greater than 10 megaohms.
			c. Set the AC INPUT switch and circuit breaker off (down) and disconnect the ZM-21A/U from the PP-1659/G.	c. None

3-6. Test Data Summary

a. Input.	
(1) Voltage	115 volts
(2) Frequency	60 cps
(3) Phase	Single
b. Output.	
Power (COARSE and FINE switches set to 12)	Greater than 105 volts with 15-amperes load.
c. Input Current.	
Output adjusted for 105 volts dc with 15-ampere load.	Input current less than 25 amperes.

CHAPTER 4

DEPOT INSPECTION STANDARDS

4-1. Applicability of Depot Inspection Standards

The tests outlined in this chapter are designed to measure the performance capability of a repaired equipment. Equipment that is to be returned to stock should meet the standards given in these tests.

4-2. Applicable References

a. Repair Standards. The applicable procedures of the depots performing these tests and their general standards for repaired electronic equipment given in TB Sig 355-1, TB 355-2, and TB Sig 355-3 form a part of the requirements. for testing this equipment.

b. Technical Publication. The technical publication applicable to the equipment to be tested is TM 11-6130-238-12.

c. Modification Work Orders. Perform all modification work orders applicable to this equipment before making the tests specified. DA Pam 310-4 lists all available MWO's.

4-3. Test Facilities Required

The following items are required for depot testing:

Item	Technical manual
Transformer, Variable Power TF-171A/USM	None
Ohmmeter ZM-21A/U	TM 11-2050
Multimeter ME-87/U	None
Multimeter AN/USM-33	TM 11-6625-314-15
Resistor, variable, wire-wound, 7.5-ohm, 1,000-watt (4 each)	None
Multimeter TS-352/U	TM 11-5527

4-4. Tests

The depot inspection standards test procedures are the same as those for general support (para 3-4 and 3-5). Equipment that meets the performance standards stated in these tests will furnish satisfactory operation equivalent to that of new equipment.

APPENDIX I

REFERENCES

DA Pamphlet 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TA 11-7	Signal Field Maintenance Shops
TA 11-100(11-17)	Allowances of Signal Corps Expendable Supplies for Signal Field Maintenance Shops
TB Sig 355-1	Depot Inspection Standard for Repaired Signal Equipment.
TB Sig 355-2	Depot Inspection Standard for Refinishing Repaired Signal Equipment.
TB Sig 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TM 11-2050	Test Set I-48-B and Ohmmeter ZM-2A1/U.
TM 11-5527	Multimeters TS-352/U, TS-352A/U, and TS-352B/U.
TM 11-6130-238-12	Organizational Maintenance Manual: Charger, Battery PP-1659/G.
TM 11-6625-314-15	Operator, Organizational, Field, and Depot Maintenance Manual: Multimeter AN/USM-33.

APPENDIX II

GENERAL SUPPORT AND DEPOT MAINTENANCE REPAIR PARTS LIST

Section I. INTRODUCTION

A2-1. General

a. This appendix lists the quantities of repair parts for general support and depot maintenance and is a basis for requisitioning authorized parts. It is also a guide for depot maintenance in establishing initial levels of spare parts.

b. Columns are as follows:

(1) *Source, maintenance, and recoverability code.* Source, maintenance, and recoverability codes indicate the technical service responsible for supply, maintenance category at which an item is stocked, categories at which an item is stocked, categories at which an item is installed or repaired, and whether an item is repairable or salvageable. The source code column is divided into four parts.

(a) Column A. This column indicates the material code and designates the area of responsibility for supply. AR 310-1 defines the basic numbers used to identify the materiel code. If the part is Signal materiel responsibility, the column is left blank.

(b) Column B. This column indicates the point within the maintenance system where the part is available. "P1" indicates that the repair part is a low mortality part; procured by technical services, stocked only in and supplied from technical service key depots, and authorized for installation at indicated maintenance category.

(c) Column C. This column indicates the lowest maintenance category authorized to install the part.
"H"-General support maintenance.

(d) Column D. Not used.

(2) *Federal stock number.* This column lists the 11-digit Federal stock number.

(3) *Designation by model.* Not used.

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

(5) *Unit of issue.* The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement storage, requisitioning, allowances, and issue purposes.

(6) *Expendability.* Nonexpendable items are indicated by NX. Expendable items are not annotated.

(7) *Quantity incorporated in unit.* This column lists the quantity of each part found in a given assembly, component, or equipment.

(8) *Direct support.* No parts authorized for stockage.

(9) *General support.* The numbers in this column indicate quantities of repair parts authorized for initial stockage for use in general support maintenance. The quantities are based on 100 equipments to be maintained for a 15-day period.

(10) *Depot.* The numbers in this column indicate quantities of repair parts authorized for depot maintenance and for initial stockage for maintenance, and for supply support to lower categories. The entries are based on the quantity required for rebuild of 100 equipments.

(11) *Illustration.* The "Item No." column lists the reference symbols used for identification of the items in the illustration or text of the manual.

A2-2. Parts for Maintenance

When this equipment is used by signal service organizations organic to theater headquarters or communication zones to provide theater communications, those repair parts authorized up to and including general support are authorized for stockage by the organization operating this equipment.

A2-3. Requisitioning Information

a. The allowance factors are based on 100 equipments. In order to determine the number of parts authorized for initial stockage for the specific number of equipments supported, the following formula will be used and carried out to two decimal places.

Specific number of equipments supported

$$X \ \frac{\text{allowance factor}}{100} =$$

Number of parts authorized for initial stockage.

b. Fractional values obtained from above computation will be rounded to whole numbers as follows:

(1) When the total number of parts authorized is less than 0.5, the quantity authorized will be zero.

(2) When the total number of parts authorized is between 0.5 and 1.0, the quantity authorized will be one.

(3) For all values above one, fractional values below 0.5 will revert to the next lower whole number and fractional value 0.5 and above will advance to the next higher whole number.

c. The quantities determined in accordance with the above computation represent the initial stockage for a 15-day period.

Section II. FUNCTIONAL PARTS LIST

SOURCE CODE				FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	DIRECT SUPPORT	GENERAL SUPPORT	DEPOT	ILLUSTRATION	
A	B	C	D										FIGURE NO.	ITEM NO.
				6130-985-8185		CHARGER, BATTERY PP-1659/G: silicon rectifier; 105V charging; 12 amp continuous charging; alternate oper power req: 115 VAC, 60 cps, 1 ph; 230 VAC, 50 cps, 1 ph; 11-3/4 in lg x 11 in w x 12 in h		NX						
	P1	H		6625-752-7516		AMMETER; MIL type MR26W020DCAAR			1		2.5	8.0		M1
	P1	H		5975-803-2536		BUSHING, STRAIN RELIEF: Heyman Mfg Co part No. 8P			1		1.3	4.0		
	P1	H		6145-548-1268		CABLE POWER; MIL type CO-03HGF(3/14) 0560	ft		8		8.8	40.0		
	P1	H		5925-912-2549		CIRCUIT BREAKER: SPST; 250 VAC, 15 amp; 3-3/4 in lg x 1 in w x 4-1/4 in h. Heineman Electric part No. AM1510CSKMG			1		2.8	10.0		CB1
	P1	H		5925-822-6822		CIRCUIT BREAKER: Heinemann Electric Co. part No. AM1510MG3			1		2.8	10.0		CB2
	P1	H		5935-539-2854		CONNECTOR, PLUG, ELECTRICAL: 3 contacts, 1 mating end; 1-17/32 in dia x 25/32 in lg AH & H part No. 5266			1		1.7	8.0		P1
	P1	H		6210-299-6394		INDICATOR LIGHT: GE part No. LH64PR5			1		1.4	3.0		
	P1	H		5355-519-7702		KNOB: MIL type MS91531-3P2B			2		2.4	10.0		
	P1	H		6240-682-3411		LAMP, GLOW: GE part No. NE-51			1		1.9	100.0		DS1
	P1	H		5940-842-3367		POST BINDING; 1-3/4 in lg x 5/8 w; Herman H. Smith part No. 257					2.5	12.0		
	P1	H		5960-752-5701		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N1188			4		2.5	8.0		CR1 thru CR4
	P1	H		5930-472-1877		SWITCH, ROTARY: 1 sect; non-pile-up type 300V 25 amp; 1-1/2 in lg x 3-5/16 in dia; Ohmite Mfg Co. part No 312-12			2		2.8	10.0		S2, S3
	P1	H		5930-655-1582		SWITCH, TOGGLE: MIL type MS-35059-23			1		1.9	9.0		S1

SOURCE CODE				FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	DIRECT SUPPORT	GENERAL SUPPORT	DEPOT	ILLUSTRATION	
A	B	C	D										FIGURE NO.	ITEM NO.
						PP-1659/G (continued)								
	P1	H		6120-892-8360		TRANSFORMER, POWER, STEP-DOWN AND STEP-UP: primary 115, 230V 50 to 60 cps, 1 ph; 6 in h x 7-1/16 in w x 6-3/4 in w; New England Transformer Co. part No. NE7970			1		1.4	6.0		T1
	P1	H		6625-844-9925		VOLTMETER: MIL type MR26W150DCVVR			1		2.5	8.0		M2

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  USAES (5)
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NG: None.

USAR: None.

For explanation of abbreviations used, see AR-320-50.

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THE METRIC SYSTEM AND EQUIVALENTS

NEAR MEASURE

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

WEIGHTS

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

LIQUID MEASURE

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

SQUARE MEASURE

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

CUBIC MEASURE

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

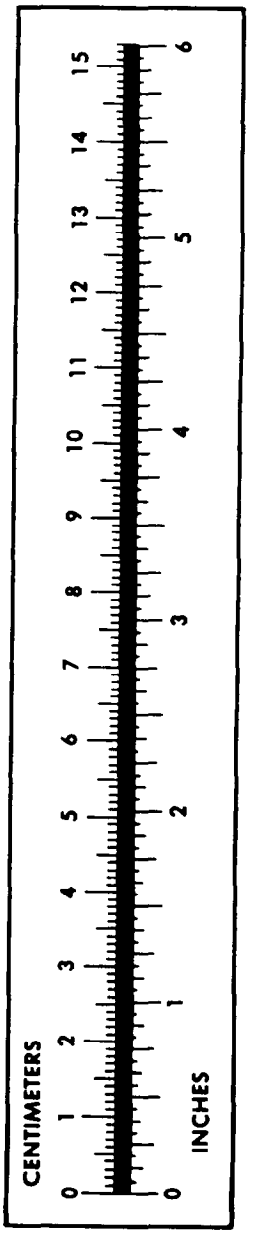
TEMPERATURE

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

APPROXIMATE CONVERSION FACTORS

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

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



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