TM 11-2535

WAR DEPARTMENT TECHNICAL MANUAL

METER
TEST EQUIPMENT
AN/GSM-1

WAR DEPARTMENT • MAY 1945

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WAR DEPARTMENT *MAY 1945*

WAR DEPARTMENT,
WASHINGTON 25, D. C., 26 MAY 1945.

TM 11-2535, Meter Test Equipment AN/GSM-1, is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICAL:
J. A. ULIO,
Major General,
The Adjutant General.

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(For explanation of symbols see FM 21-6.)

QUICK INDEX

WARNING

HIGH VOLTAGE

is used in the operation of
this equipment.

DEATH ON CONTACT

may result if operating personnel
fail to observe safety precautions.

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DESTRUCTION NOTICE

WHY —To prevent the enemy from using or salvaging this equipment for his benefit.
WHEN—When ordered by your commander.
HOW —1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
2. Cut —Use axes, handaxes, machetes.
3. Burn —Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
4. Explosives—Use firearms, grenades, TNT.
5. Disposal—Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT—1. Smash—Wooden cases, meters, front panels, controls, switches, and all exterior parts and connections on each component; tubes, relays, transformers, chokes, capacitors, variacs, rheostats, and resistors inside the components; and every other electrical or mechanical part.
2. Cut —As many wires and cables as time permits.
3. Burn —Wooden cases, circuit labels, and technical manuals accompanying the equipment.
4. Bend —Metal cases, fixtures, and mountings.
5. Bury or scatter—All of above pieces after destroying their usefulness.

DESTROY EVERYTHING

SAFETY NOTICE

VOLTAGES AS HIGH AS 3,000 VOLTS ARE USED IN THE OPERATION OF THIS EQUIPMENT. THESE VOLTAGES ARE DANGEROUS TO LIFE.

DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE THE SET WITH THE VOLTAGE ON!

A FEW SERVICE CHECKS MUST BE MADE INSIDE THE SET WITH THE VOLTAGE ON. WHEN MAKING THESE CHECKS, ALWAYS HAVE PRESENT ANOTHER PERSON CAPABLE OF GIVING AID. KEEP ONE HAND IN POCKET WHILE MAKING HIGH-VOLTAGE MEASUREMENTS. THIS PRECAUTION WILL PREVENT TOUCHING THE ELECTRICAL CIRCUIT WITH MORE THAN ONE PART OF THE BODY AT ONE TIME.

FIRST AID FOR ELECTRIC SHOCK

RESCUE.

In case of electric shock, shut off the high voltage at once and ground the circuits. If the high voltage cannot be turned off without delay, free the victim from contact with the live conductor as promptly as possible. Avoid direct contact with either the live conductor or the victim's body. Use a dry board, dry clothing, or other non-conductor to free the victim. An ax may be used to cut the high-voltage wire. Use extreme caution to avoid the resulting electric flash.

SYMPTOMS.

a. Breathing stops abruptly in electric shock if the current passes through the breathing center at the base of the brain. If the shock has not been too severe, the breathing center recovers after a while and normal breathing is resumed, provided that a sufficient supply of air has been furnished meanwhile by artificial respiration.

b. The victim is usually very white or blue. The pulse is very weak or entirely absent and unconsciousness is complete. Burns are usually present. The victim's body may become rigid or stiff in a very few minutes. This condition is due to the action of electricity and is not to be considered rigor mortis. Artificial respiration must still be given, as several such cases are reported to have recovered. The ordinary and general tests for death should never be accepted.

TREATMENT.

a. Start artificial respiration immediately. At the same time send for a medical officer if assistance is available. Do not leave the victim unattended. Perform artificial respiration at the scene of the accident, unless the victim's or operator's life is endangered from such action. *In this case only*, remove the victim to another location, but no farther than is necessary for safety. If the new location is more than a few feet away, artificial respiration should be given while the victim is being moved. During transportation other methods of resuscitation may be used, if the method of transportation prohibits the use of the Shaeffer prone pressure method. Pressure may be exerted on the front of the victim's diaphragm, or the direct mouth-to-mouth method may be used. Artificial respiration, once started, must be continued, without loss of rhythm.

b. Lay the victim in a prone position, one arm extended directly overhead, and the other arm bent at the elbow so that the back of the hand supports the head. The face should be turned away from the bent elbow so that the nose and mouth are free for breathing (1 and 2).

c. Open the victim's mouth and remove any foreign bodies, such as false teeth, chewing gum, or tobacco. The mouth should remain open, with the tongue extended. Do not permit the victim to draw his tongue back into his mouth or throat.

d. If an assistant is available during resuscitation, he should loosen any tight clothing to permit free circulation of blood and to prevent restriction of breathing. He should see that the victim is kept warm, by applying blankets or other covering, or by applying hot rocks or bricks wrapped in cloth or paper to prevent injury to the victim. The assistant should also be ever watchful to see that the victim does not swallow his tongue. He should continually wipe from the victim's mouth any frothy mucus or saliva that may collect and interfere with respiration.

e. The resuscitating operator should straddle the victim's thighs, or one leg, in such a manner that:

(*1*) The operator's arms and thighs will be vertical while applying pressure on the small of the victim's back (3).

(*2*) The operator's fingers are in a natural position on the victim's back with the little finger lying on the last rib.

(*3*) The heels of the hands rest on either side of the spine as far apart as convenient without allowing the hands to slip off the victim (1).

(*4*) The operator's elbows are straight and locked.

f. The resuscitation procedure is as follows:

(*1*) Exert downward pressure, not exceeding 60 pounds, for 1 second.

(*2*) Swing back, suddenly releasing pressure, and sit on the heels (4).

(*3*) After 2 seconds' rest, swing forward again, positioning the hands, and apply pressure for another second (2 and 3).

g. The forward swing, positioning of the hands, and the downward pressure should be accomplished in one continuous motion, which requires 1 second. The release and backward swing require 1 second. The addition of the 2-second rest makes a total of 4 seconds for a complete cycle. Until the operator is thoroughly familiar with the correct cadence of the cycle, he should count the seconds aloud,

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speaking distinctly and counting evenly in thousands. Example: One thousand and one, one thousand and two, one thousand and three, one thousand and four, etc. This method of counting insures accurate timing. The exact frequency of the operating cycle of resuscitation is of utmost importance.

h. Artificial respiration should be continued without interruption until the victim regains normal breathing or until pronounced dead by a medical officer. Since it may be necessary to continue resuscitation for several hours, relief operators should be used if available.

METHOD OF RELIEVING OPERATOR.

The relief operator kneels beside the operator, assuming the same position on an imaginary victim, and follows the operator through several complete cycles. When the relief operator is sure that he has the correct rhythm, on the next forward swing of the operator the relief operator places his hands on the top of the operator's hands without applying pressure. This indicates to the operator that the relief operator is ready to take over. On the backward swing, the operator moves off the victim, to the side, and the relief operator takes the position of the operator. On the next forward swing, the operator being relieved assumes the position on an imaginary victim beside the new operator, and follows through two or three complete cycles of the new operator, or until he is sure that the new operator has the correct rhythm. The operator being relieved remains alert to take over instantly if the new operator should falter or hesitate on the cycle. During the process of relief, the original operator should count aloud, by thousands, to give the relief operator the correct timing.

INHALANT STIMULANTS.

If an inhalant stimulant is used, such as aromatic spirits of ammonia, the individual administering the stimulant should first test it on himself to see how close he can hold the inhalant to his own nostrils for comfortable breathing. Be sure that the inhalant is not held closer to the victim's nostrils, and then only for 1 or 2 seconds every minute.

LIQUID STIMULANTS.

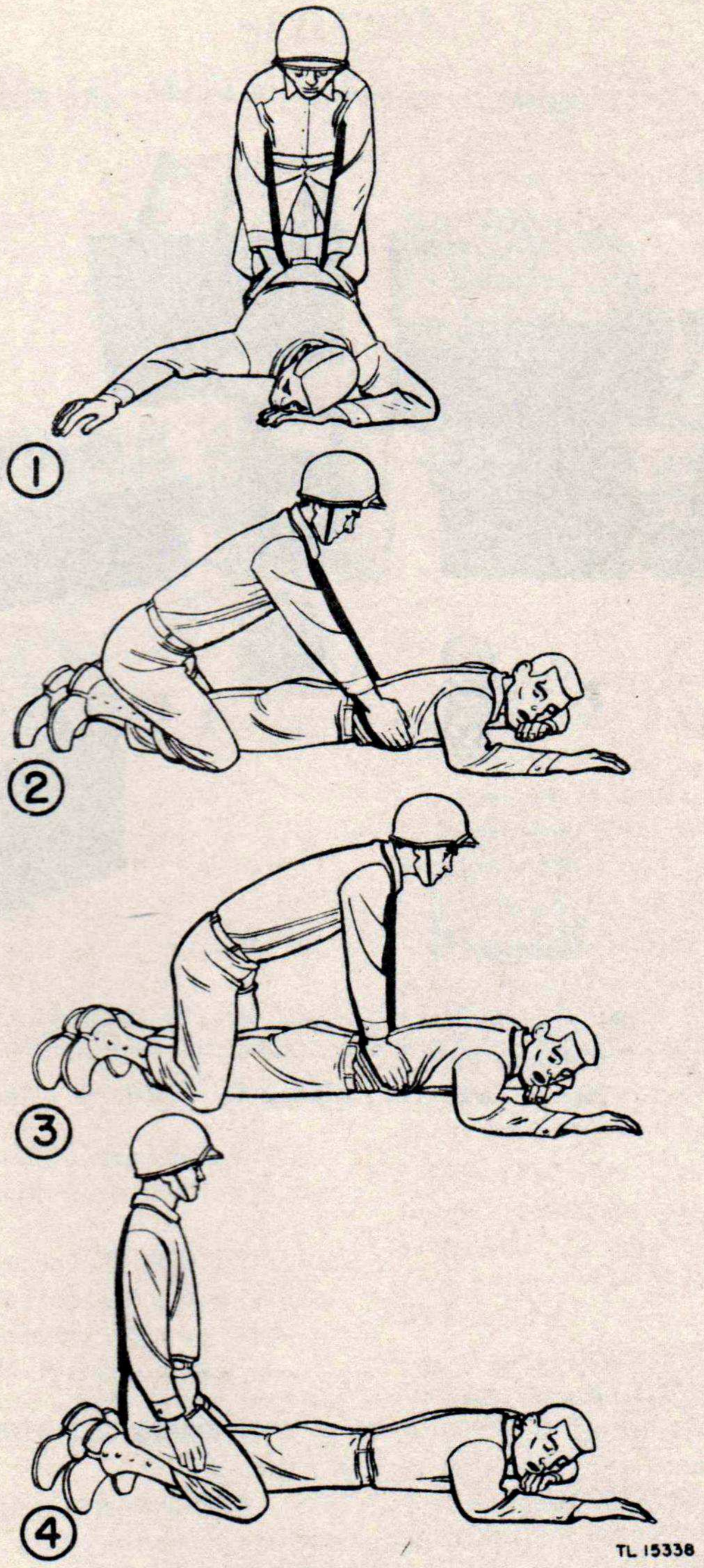
After the victim has regained consciousness, he may be given a glass of water with ½ teaspoonful of aromatic spirits of ammonia added, or he may be offered hot coffee or hot tea as a stimulant. DO NOT GIVE ANY LIQUIDS TO AN UNCONSCIOUS VICTIM.

CAUTIONS.

a. After the victim revives, keep him lying quietly. Do not allow him to get up and walk even though he may feel that he is strong enough. Any injury which a person might have received, including electric shock, may bring about a condition of shock or fainting. This condition should be guarded against at all times. Shock is present if the victim is pale and has a cold sweat. His pulse is weak and rapid and his breathing is short and gasping.

b. Keep the victim lying flat on his back, with his head lower than the rest of his body, and his hips elevated. Be sure that there is no tight clothing to restrict the free circulation of blood or hinder natural breathing. Keep him warm and quiet.

c. A resuscitated victim may suddenly stop breathing and require additional artificial respiration. For this reason, he must be carefully watched. NEVER LEAVE A RESUSCITATED PERSON ALONE UNTIL IT IS *CERTAIN* THAT HE IS FULLY CONSCIOUS AND BREATHING NORMALLY.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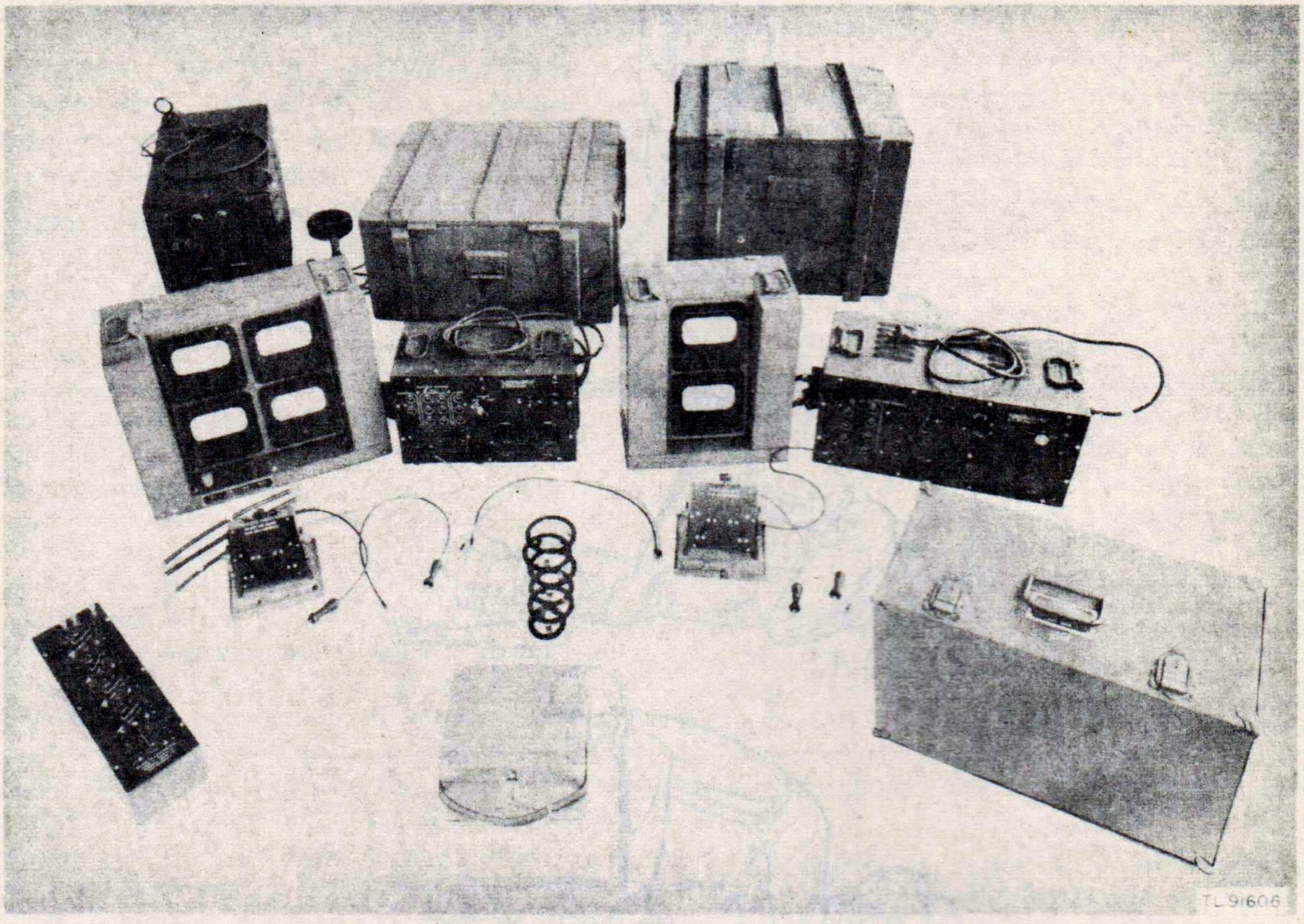

Figure 1. Meter Test Equipment AN/GSM-1.

PART ONE

INTRODUCTION

SECTION I
DESCRIPTION OF METER TEST EQUIPMENT AN/GSM-1

1. GENERAL.

a. Meter Test Equipment AN/GSM-1 consists of test equipment provided for use by Signal Corps repair personnel in repair depots and base maintenance companies. The equipment is portable and self contained, and may be carried in a repair truck.

b. Meter Test Equipment AN/GSM-1 (fig. 1) is composed of the following components:

(*1*) Voltage Supply Unit PP-14/GSM-1.
(*2*) Current Supply Unit PP-15/GSM-1
(*3*) Voltmeter Standards Unit TS-49/GSM-1.
(*4*) Ammeter Standards Unit TS-50/GSM-1.
(*5*) Case CY-25/GSM-1.
(*6*) Case CY-24/GSM-1.
(*7*) Mounting MT-135/GSM-1.
(*8*) Mounting MT-175/GSM-1.
(*9*) Test Set I-49.
(*10*) Test Set I-56-K.
(*11*) Cord CX-25-A/GSM-1.
(*12*) Cord CX-25-B/GSM-1.
(*13*) Cord CD-370 (2).
(*14*) Decade resistance box (Daven type 750-K).
(*15*) Decade resistance box (Daven type 750-L).
(*16*) Magnet Charger TS-336/GSM-1 (including demagnetizer).
(*17*) Frequency meter (Weston model 339).
(*18*) Set of meter-calibration panels (10 steel rings).

c. Meter Test Equipment AN/GSM-1 is designed to provide a means for testing and calibrating meters, except wattmeters, used as electronic measuring devices by the Signal Corps.

2. APPLICATION OF METER TEST EQUIPMENT AN/GSM-1.

a. Voltage Supply Unit PP-14/GSM-1. The voltage supply unit is used to provide a source of either d-c or a-c voltage, which is variable over a range from zero to 1,500 volts. This voltage is used to test the operation and accuracy of voltmeters.

b. Current Supply Unit PP-15/GSM-1. The current supply unit is designed to provide direct current, variable over a range from zero to 75 amperes, and alternating current, variable over a range from zero to 10 amperes, for testing the action and accuracy of microammeters, milliammeters, and ammeters.

c. Voltmeter Standards Unit TS-49/GSM-1. The voltmeter standards unit is used to check the accuracy of a-c or d-c voltmeters.

d. Ammeter Standard Unit TS-50/GSM-1. The ammeter standards unit is used to check the accuracy of current-measuring instruments, either a-c or d-c.

e. Case CY-25/GSM-1. Case CY-25/GSM-1 is a carrying case for the two standards units and spare leads.

f. Case CY-24/GSM-1. Case CY-24/GSM-1 is a carrying case for the two supply units, Mountings MT-135/GSM-1 and MT-175/GSM-1, and Cords CX-25-A/GSM-1 and CX-25-B/GSM-1.

g. Mounting MT-135/GSM-1. This mounting is used to hold and connect panel-type voltmeters while they are being tested and repaired.

h. Mounting MT-175/GSM-1. This mounting is used to hold panel-type current meters while they are being tested and repaired.

i. Test Set I-49. Test Set I-49 (a Wheatstone bridge) is used for making precise resistance measurements. Complete description and instructions in the use of this set are given in TM 11-2019, Test Set I-49.

j. Test Set I-56-K.

(*1*) Test Set I-56-K consists of Voltohmmeter I-166, Test Unit I-176, and Tube Tester I-177, complete with test leads and Carrying Case CS-130. Figure 2 shows Test Set I-56-K in its carrying case.

(*2*) Test Set I-56-K is used to make resistance and voltage measurements and to check vacuum tubes used in electrical circuits of test instruments with meter-type indicators. Since no amount of testing and repair can make a meter function

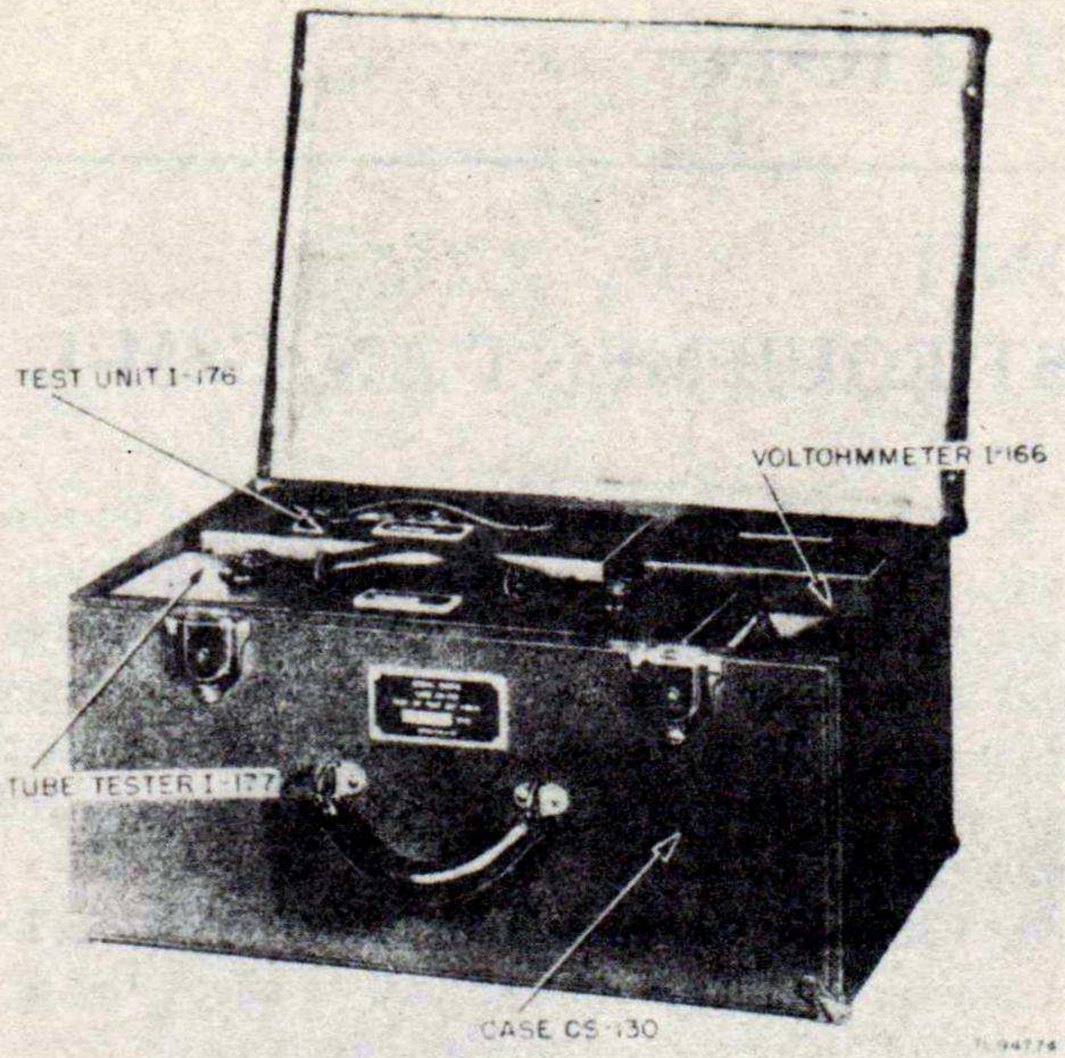

Figure 2. Test Set I-56-K, in carrying case.

properly if its associated circuits are faulty, the associated circuits of test instruments are checked at the same time the meters are serviced.

(*3*) Detailed description and information on the use of Test Set I-56-K is found in the three technical manuals furnished with the equipment:

(*a*) TM 11-2613, Voltohmmeter I-166.
(*b*) TM 11-2626, Test Unit I-176.
(*c*) TM 11-2627, Tube Tester I-177.

k. Cords.

(*1*) *Cords CX-25-A/GSM-1 and CX-25-B/-GSM-1.* These cords are used to connect a 6-volt storage battery to Current Supply Unit PP-15/-GSM-1. The cords are distinguished by a positive (+) mark on the battery clip, which attaches to the positive terminal of the battery; and a negative (—) mark on the battery clip, which attaches to the negative battery terminal.

(*2*) *Cord CD-370.* The two Cords CD-370 are used to connect Voltage Supply Unit PP-14/GSM-1 and Current Supply Unit PP-15/GSM-1 to a-c power outlets.

l. Decade Resistance Boxes. The decade resistance boxes are used to provide accurately known resistance values when testing meter circuits. They are also valuable for use as standards in resistance measurements.

m. Magnet Charger TS-336/GSM-1.

(*1*) The magnet charger is used to remagnetize meter magnets, which have lost part of the strength of their magnetic fields.

(*2*) A demagnetizer is supplied as a component of the magnet charger. The demagnetizer is used to reduce the field strength of magnets which have been magnetized too strongly.

n. Frequency Meter (Weston Model 339). As a component of Meter Test Equipment AN/GSM-1, this frequency meter is used as a standard in calibrating and testing the performance of power frequency meters between the limits of 50 and 70 cycles per second.

o. Meter Calibration Panels. These steel, cadmium-plated rings are used to duplicate the effect of mounting on a steel equipment panel, when a meter is being calibrated. The 10 rings range in size from 2.05 inches to 3.5 inches, inside diameter, to accommodate meters of different sizes. Each ring has three spring-steel meter retainers, at 120° intervals, to hold the meter in place during calibration.

3. TECHNICAL CHARACTERISTICS.

a. Voltage Supply Unit PP-14/GSM-1.

Input....100 to 120 volts (v), 60 cycles (regulated).
Input transformer.....multitap primary.
Output.....variable ac or dc.
Output ranges....dc, 0-1.5v, 0-7.5v, 0-15v, 0-75v, 0-150v, 0-750v, 0-1,500v; ac, 0-3v, 0-6v, 0-15v, 0-30v, 0-75v, 0-750v, 0-1,500v; accurate to ±1%.
A-c ripple on d-c output.....less than 5%.
Output available.....500 volt-amperes.

b. Current Supply Unit PP-15/GSM-1.

Input (d-c)....6 volts dc from battery capable of delivering 75 amperes for short period or, 6 volts dc from rectifier unit with a-c ripple less than 5%.
Input (a-c)....100 to 120 volts, 60 cycles (regulated).
Output.....variable ac or dc.
Output ranges....dc, 0-150 microamperes, 0-750 microamperes, 0-1.5 milliamperes (ma), 0-7.5 ma, 0-15 ma, 0-75 ma, 0-150 ma, 0-750 ma, 0-1.5 amperes (amp), 0-7.5 amp, 0-15 amp, 0-75 amp; ac, 0-150 ma, 0-750 ma, 0-1,000 ma, 0-5 amp, 0-10 amp.
A-c output available.....70 volt-amperes.

c. Voltmeter Standards Unit TS-49/GSM-1.

Accuracy.....±1%.

d. Ammeter Standards Unit TS-50/GSM-1.

Accuracy.....±1%.

e. Mounting MT-135/GSM-1.

Leakage current . . .not over 2 microamperes at 1,500 volts.

f. Mounting MT-175/GSM-1.

Drop due to contact resistance . . .0.02 volt (approx) at 1.5 amperes.

g. Decade Resistance Box (Daven Type 750-L).

Resistance range. . . .111,110 ohms in 1-ohm steps.
Decades. . . .5. Contacts per decade. . . . . 11.
Zero resistance. . . . . .0.010-0.015 ohm.
Temperature coefficient. . . . ±0.002% per °C at room temperatures.

h. Decade Resistance Box (Daven Type 750-K).

Resistance range. . . .11,111 ohms in 0.1-ohm steps.
Decades. . . .5. Contacts per decade. . . . .11.
Zero resistance. . . . . .0.010-0.015 ohm.
Temperature coefficient. . . . ±0.002% per °C at room temperatures.

i. Magnet Charger TS-336/GSM-1.

Input voltage. . . . . .105-125 volts, 60 cycles.
Peak input current. . . . . .10 amperes rms.
Average input current. . . . . .2 amperes rms.
Capacitor charging time. . . . . .10 seconds.
Peak discharge voltage through magnetizing fixture. . . . . .2.15 volts.
Peak discharge current through magnetizing fixture (approx)
7 switch blades. . . . . .50,000 amperes.
6 switch blades. . . . . .47,000 amperes.
5 switch blades. . . . . .44,000 amperes.
4 switch blades. . . . . .41,000 amperes.
3 switch blades. . . . . .38,000 amperes.
2 switch blades. . . . . .35,000 amperes.
Discharge frequency (½ cycle). . .40-80 cycles/-sec.

j. Demagnetizing Coil.

Input voltage. . . . . .110 volts, 60 cycles.
Input current. . . . . .3.5 amperes.
Max demagnetizing field (steady state). . . . 300 oersteds.
For intermittent duty only.
Temperature rise after 10 minutes continuous duty. . . . . .100°C.

k. Frequency Meter (Weston Model 339).

Input. . . . . .115v, 50-70 cps.
Range. . . . . .50-70 cps.
Accuracy. . . . . .±0.5%
Scale. . . . . .5¼".

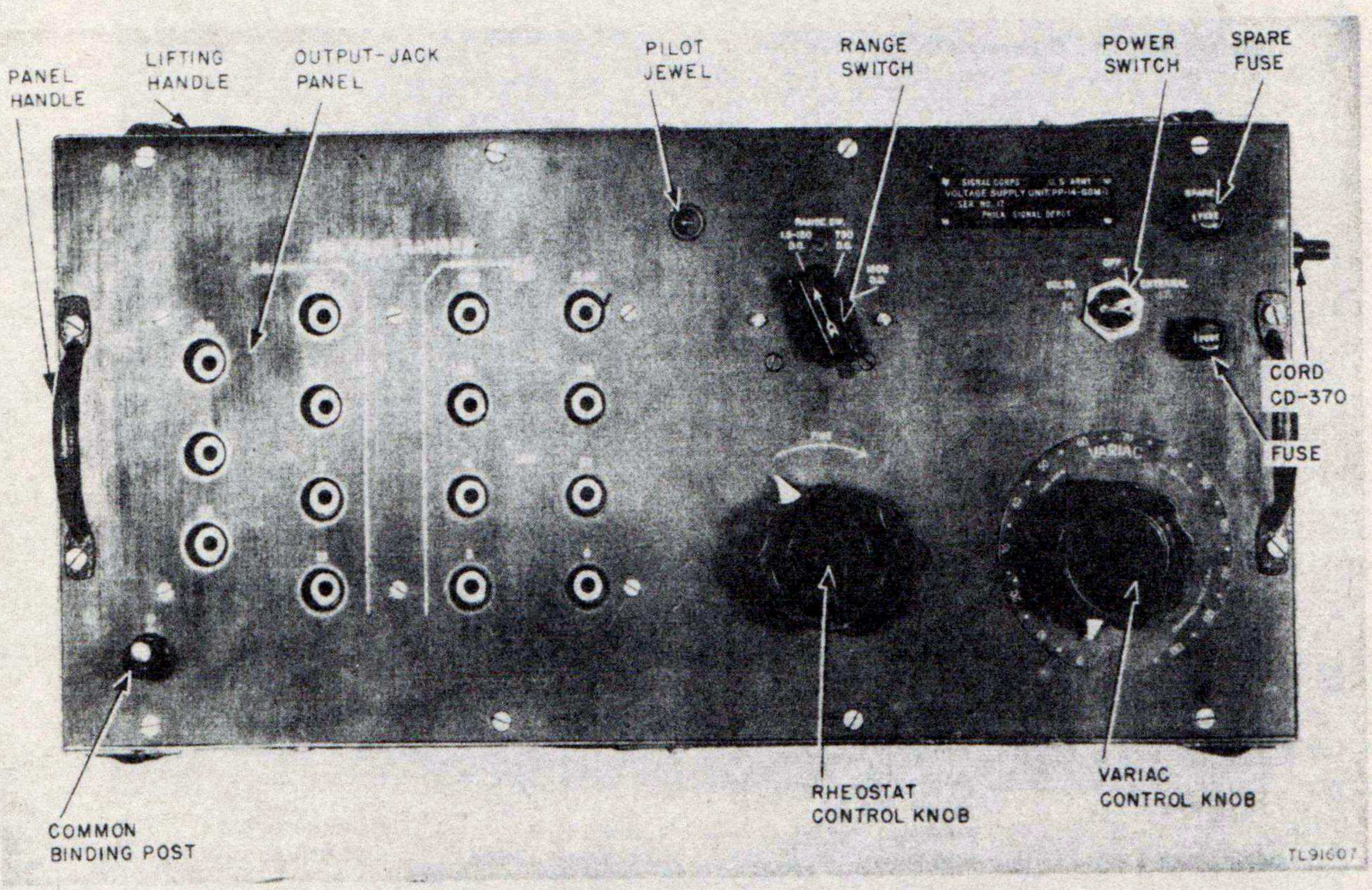

Figure 3. Voltage Supply Unit PP-14/GSM-1, front view.

4. VOLTAGE SUPPLY UNIT PP-14/GSM-1 (fig. 3).

a. Case. A one-piece, metal case contains the chassis of the voltage supply unit and protects the parts mounted on the chassis. Louvers are provided in the top, both ends, and the back of the case for dissipation of heat from the inside of the unit. Two handles on the top of the case are provided for convenience in lifting.

b. Panel. A phenolic panel covers the front of the voltage supply unit. Two metal handles, one at each end of the panel, are used to draw the chassis with panel attached from the metal case, when it is removed for servicing or repair. A protective fuse is mounted on the right side of the panel. A spare fuse is mounted just above the fuse in use. A red pilot jewel, behind which is mounted a pilot lamp, is located at the top center of the panel and indicates when power is being delivered to the unit.

c. Switches, Controls, and Jacks.

(*1*) A three-position power switch is located just to the left of the fuses. When the power switch is in center (OFF) position, no output voltage is available. When the toggle is pressed to the left to VOLTS position, power output is available to the jacks on the left side of the panel, according to the setting of the RANGE SW (range switch). When the toggle is pressed to the right to EXTERNAL A-C position, a-c voltage is provided across the terminals of a Jones-plug receptacle.

(*2*) The range switch is located to the left of the power switch and determines at which jacks voltage will be available. This switch has four positions and selects d-c voltages from 0 to 150 volts, from 0 to 750 volts, from 0 to 1,500 volts, or a-c voltages from 0 to 1,500 volts, according to its setting.

(*3*) A variac below the power switch controls the amount of a-c line voltage applied to the primary of the input transformer. A finer adjustment is provided by the rheostat located to the left of the variac.

(*4*) A binding post at the lower left corner of the panel is used as a common connection between the voltage supply unit and the meter under test.

(*5*) The balance of the left side of the panel is occupied by 15 jacks. Eight jacks supply a-c voltages; there are seven d-c voltage jacks. Each

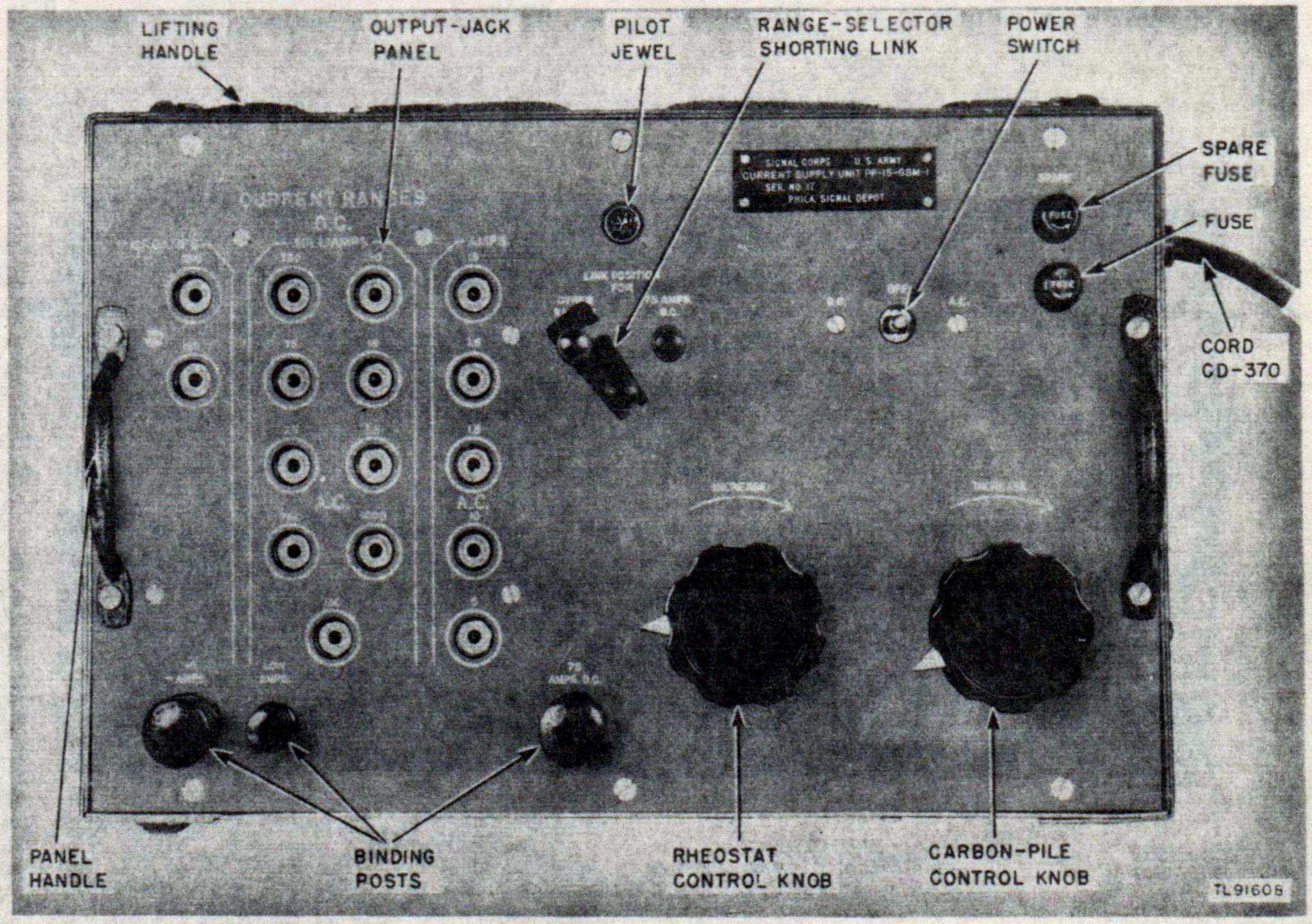

Figure 4. Current Supply Unit PP-15/GSM-1, front view.

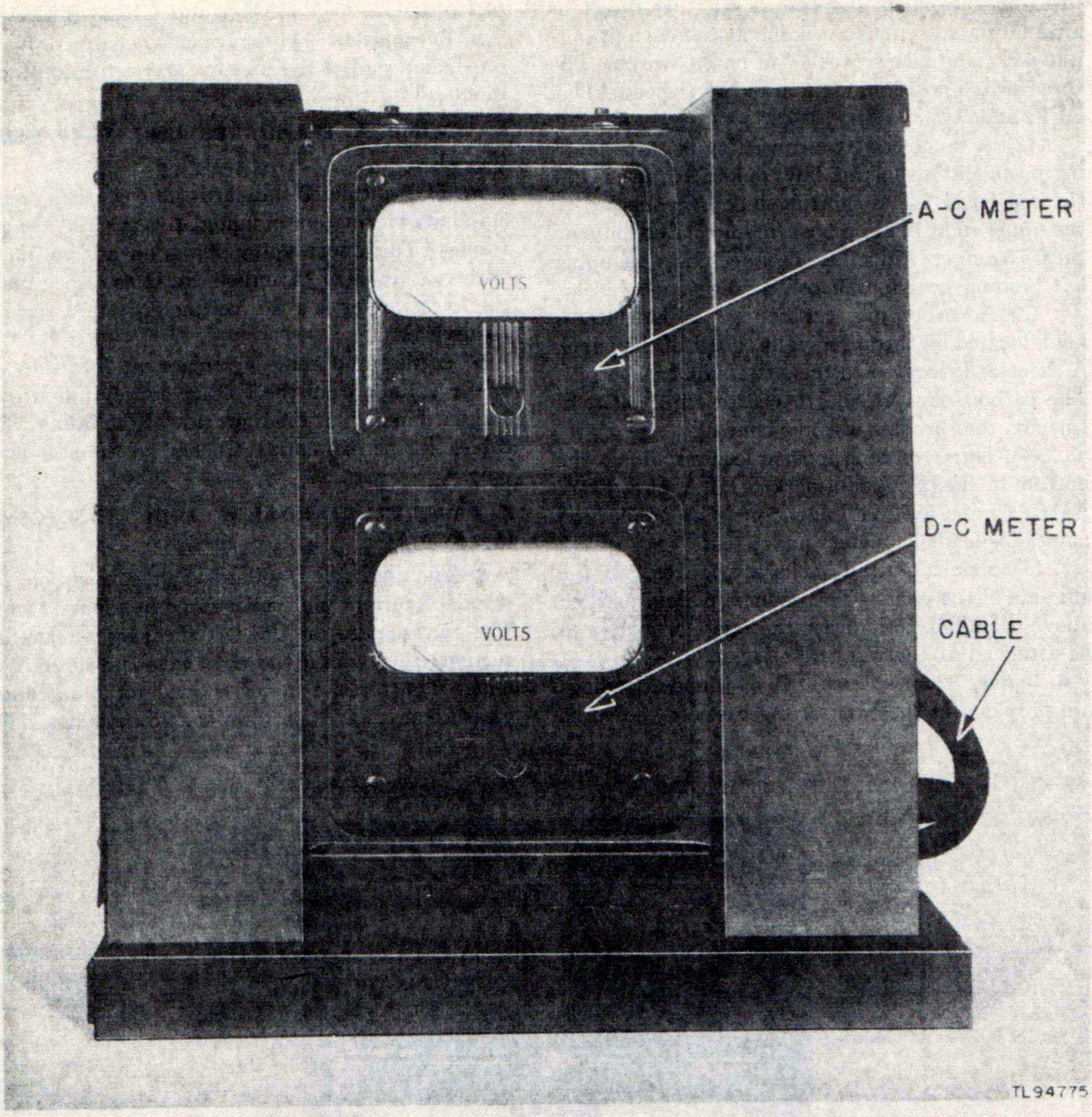

Figure 5. Voltmeter Standards Unit TS-49/GSM-1, front view.

jack is plainly labeled to indicate the range of meters that are to be attached at that jack. The d-c jacks are marked in white; the a-c jacks in orange.

d. Receptacles.

(*1*) An opening in the right end of the case provides access to a receptacle mounted on the chassis for power input from a 100/120-volt, 60-cycle line.

(*2*) Openings on the left end of the case provide access to three receptacles for exterior connections to the standards units.

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5. CURRENT SUPPLY UNIT PP-15/GSM-1 (fig. 4).

a. Case. A metal case, similar to the one used for the voltage supply unit, is used to contain the chassis and parts of Current Supply Unit PP-15/-GSM-1.

b. Panel. A phenolic panel, similar to the panel used on the voltage supply unit, covers the front of the current supply unit. Metal handles, fuses, and a jewel indicator are located on the panel as described in paragraph 4b.

c. Switches, Controls, and Jacks.

(*1*) A three-position switch to the left of the

fuses on the panel, determines whether direct or alternating current is available at the current output jacks and also serves as an on-off switch. The three switch positions are marked on the panel DC, OFF, and AC.

(*2*) A range selector, consisting of three binding posts and a shorting link, is located just below the red jewel. The shorting link is connected to the upper right binding post for current outputs on the 0-75 ampere range. It is connected to the upper left binding post for all other ranges.

(*3*) A carbon-pile resistor is adjusted by a knob located on the lower right corner of the panel. A rheostat is located to the left of the carbon pile. The carbon pile provides a coarse adjustment of current; the rheostat is a fine control.

(*4*) Three binding posts, located along the bottom of the panel and marked HI AMPS, LOW AMPS, and 75 AMPS DC, serve as connection points for leads to meters under test.

(*5*) Sixteen output jacks are located on the left side of the panel. The panel is plainly marked above each jack to indicate the range of meters to be attached at the respective jacks.

d. Battery Connections. Two round openings are provided in the back of the case for the entry of Cords CX-25-A/GSM-1 and CX-25-B/GSM-1.

e. Receptacles. Three openings are provided on the left end of the case for access to receptacles mounted on the chassis.

6. VOLTMETER STANDARDS UNIT TS-49/GSM-1 (fig. 5).

a. The voltmeter standards unit consists of two standard voltmeters mounted together in a metal frame. The upper voltmeter is an a-c voltmeter with two scales of 75 and 60 divisions respectively; the lower meter is a d-c voltmeter with a scale of 75 divisions.

b. A plug and cable arrangement furnishes a-c or d-c voltage from the voltage supply unit to the standard meters at the right side of the frame. The cables are permanently attached to the standards unit.

7. AMMETER STANDARDS UNIT TS-50/GSM-1 (fig. 6).

a. The ammeter standards unit consists of four standard current meters mounted in a metal frame. The two meters on the left measure alternating current; the two on the right measure direct current. The top a-c meter is used for milliampere measurements and its scale has 75 divisions. The

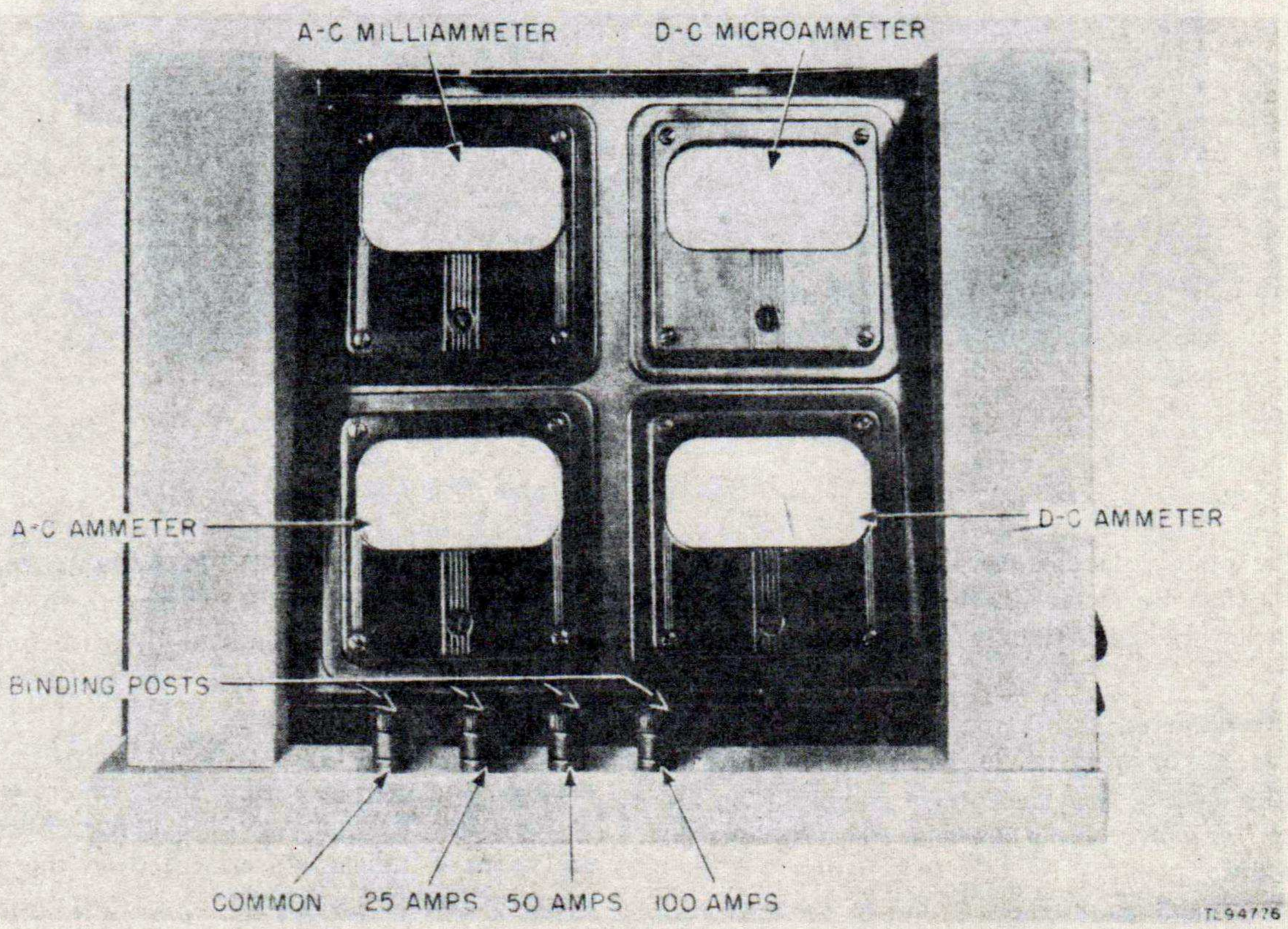

Figure 6. Ammeter Standards Unit TS-50/GSM-1 front view.

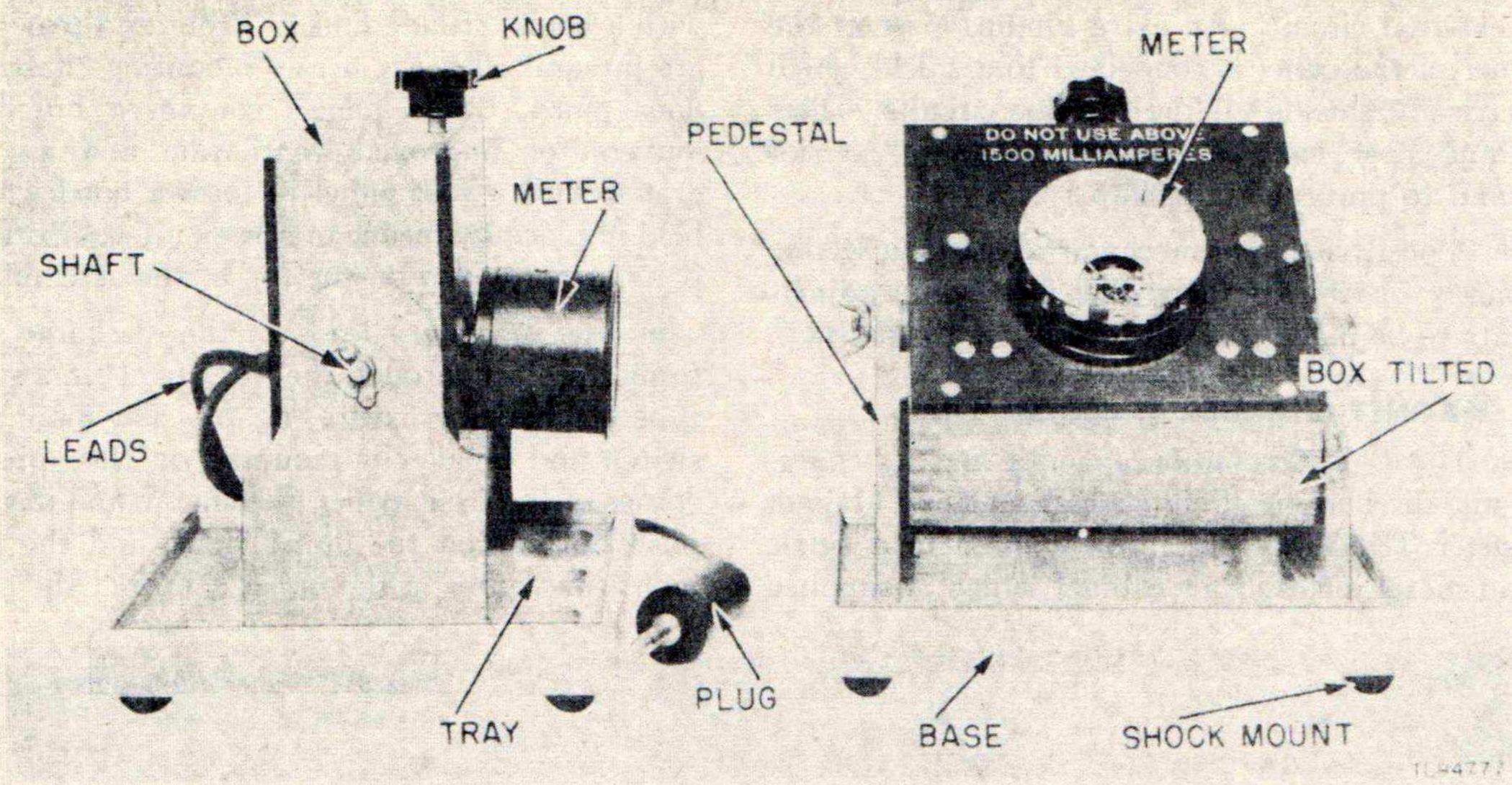

Figure 7. Mounting MT-135/GSM-1 or MT-175/GSM-1, side and tilted views.

meter below measures high alternating currents and has 50 scale divisions. The d-c meters each have 75 scale divisions. The low current values are measured on the upper d-c meter and high currents are measured on the lower meter.

b. A plug and cable arrangement provides for current flow between the current supply unit and the ammeter standards unit. The cables are permanently attached to the standards unit.

c. Four binding posts along the base of the frame are provided for a-c input to a current transformer when using high alternating currents.

d. Two special leads are provided for connection between the meter under test and the binding posts on the ammeter standards unit when measuring alternating currents of more than 10 amperes.

8. MOUNTINGS MT-135/GSM-1 AND MT-175/GSM-1.

a. Both mounting units are similar in construction. Each consists of a wooden box mounted on a metal shaft to a wooden pedestal (fig. 7). The box turns on the shaft so that the meter under test can be tilted to the same position it occupies during the operation of the equipment of which it is a component.

b. A knob on the top of the box, when pressed down, separates the knife-edged jaws inside the box and allows the meter posts of the meter under test to be inserted into the mounting. Releasing the knob allows the jaws to close and to hold the meter firmly during testing and repair.

c. The pedestal is mounted on a wooden base, which is provided with a tray to hold screws, nuts, or other small parts which have been removed from the meter during repair.

d. Two leads from terminals inside the box come out of the back of the box. One lead with a spade terminal connects to the common terminal on its supply unit. The other lead terminates in a plug designed to fit into the range jacks of the supply units.

(*1*) Mounting MT-135/GSM-1 uses a Plug PL-55 which fits the range jacks of the voltage supply unit.

(*2*) Mounting MT-175/GSM-1 uses a Plug PL-68 which fits the range jacks on the current supply unit.

9. DECADE RESISTANCE BOXES (DAVEN TYPES 750-K AND 750-L).

a. These decade resistance boxes are inclosed in walnut cases. An aluminum panel, on which the decade resistance values are marked and the switch pointers mounted, covers the top of each decade box. The resistance units and the switch contacts are completely inclosed within the boxes.

b. Five switches are mounted on the aluminum panel, one for each of the resistance decades. Each switch has 11 positions, one for each resistance step of the decade and a zero position, so that the contiguous decades overlap.

c. Two jack-top binding posts at the end of the panel are used to connect the resistance box into

an external circuit. An extra binding post at the corner of the panel is connected to a shield which electrically shields all the interior circuits. This binding post can be connected to an exterior ground to prevent a-c pickup.

d. A positive detent mechanism assists in setting squarely on the contacts and so permits adjustments to be made without looking at the dials.

10. MAGNET CHARGER TS-336/GSM-1.

a. The 135-microfarad capacitor and its charging and discharging circuits which make up Magnet Charter TS-336/GSM-1 are mounted in a single sheet-metal inclosure or cabinet which is supplied with a black, crinkle finish. Front and rear panels are integral with the heavy mounting chassis and floor panel. Side panels contain a number of louvers for improved ventilation and are integrated with a roof panel to form a hood which is held in place by means of screws. Two lifting eyebolts are provided on the top of the assembly.

b. The secondary leads of the discharge transformer project through the front panel in a switch-type magnetizing fixture (fig. 8). The main power switch and breaker is mounted on the upper left corner of the front panel, the charge and discharge push buttons on the upper right, and the power indicating lamps in the upper center of the panel.

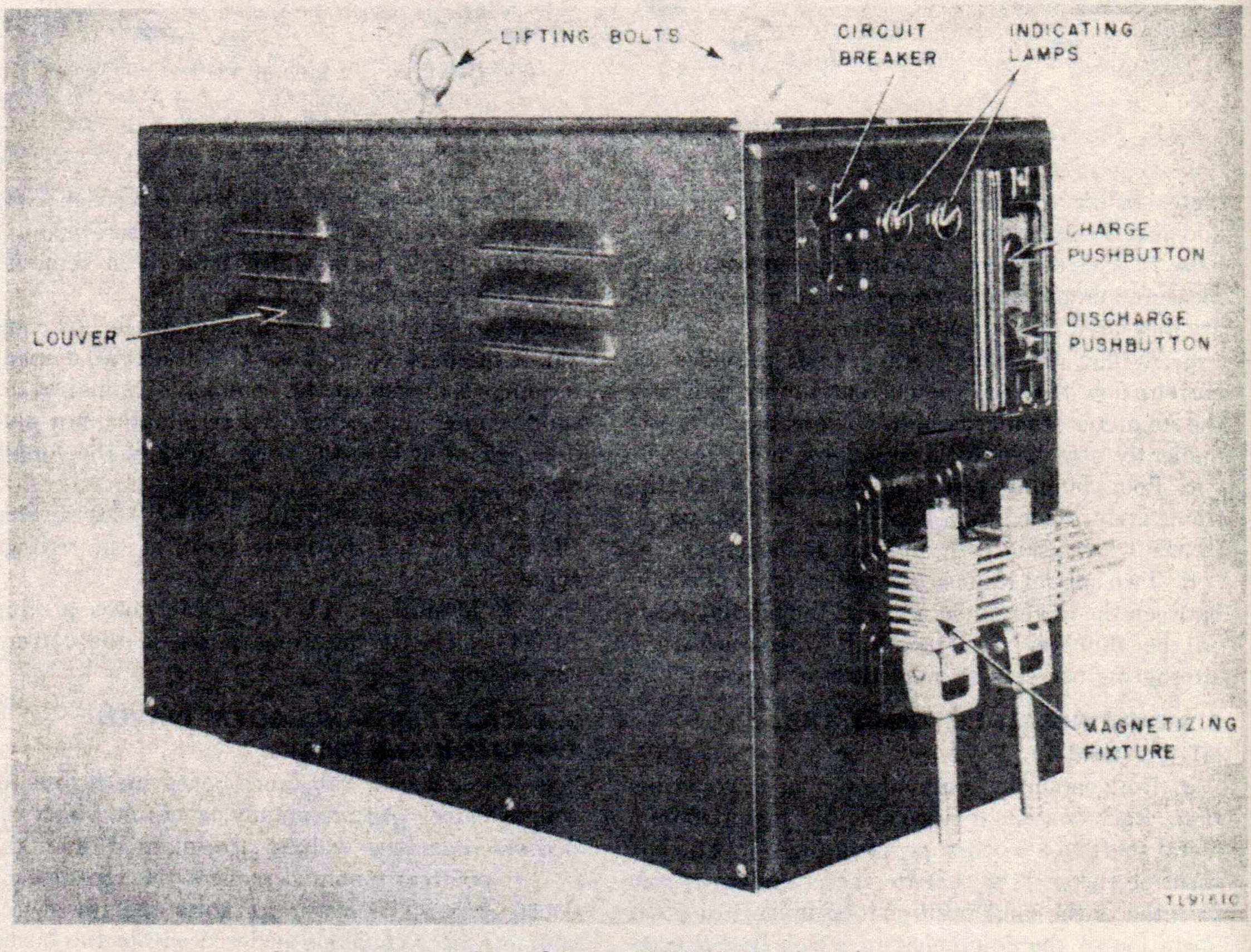

Figure 8. Magnet Charger TS-336/GSM-1, front view.

c. A separate 8-foot cord with plug connectors is used to connect the magnet charger to a 110-volt, 60-cycle supply. A receptacle for accommodating this cord is mounted in the rear panel.

d. The demagnetizing coil (fig. 9) which accompanies the magnet charger is inclosed in a brown, molded-bakelite case with a metal handle. A push button for actuating the coil is located in the handle. A cable connector is located in the end of the handle to accommodate the power-supply cable.

e. A separate 8-foot cord with plug connectors is provided to connect the demagnetizing coil to a 110-volt, 60-cycle power source.

11. FREQUENCY METER (WESTON MODEL 339).

The power-frequency meter (fig. 10) is inclosed in a wooden case with a detachable cover. A movable-iron-vane-type meter is mounted on the panel. The scale is calibrated in cycles per second with a range from 50 to 70 cps. Four binding posts at the edge of the panel are provided for connecting exterior leads. The interior of the case and meter mechanism inside the case are shielded from external magnetic fields by the construction of the case and panel. The panel may be removed for inspection or repair of interior parts by removing the four screws at the corners of the panel.

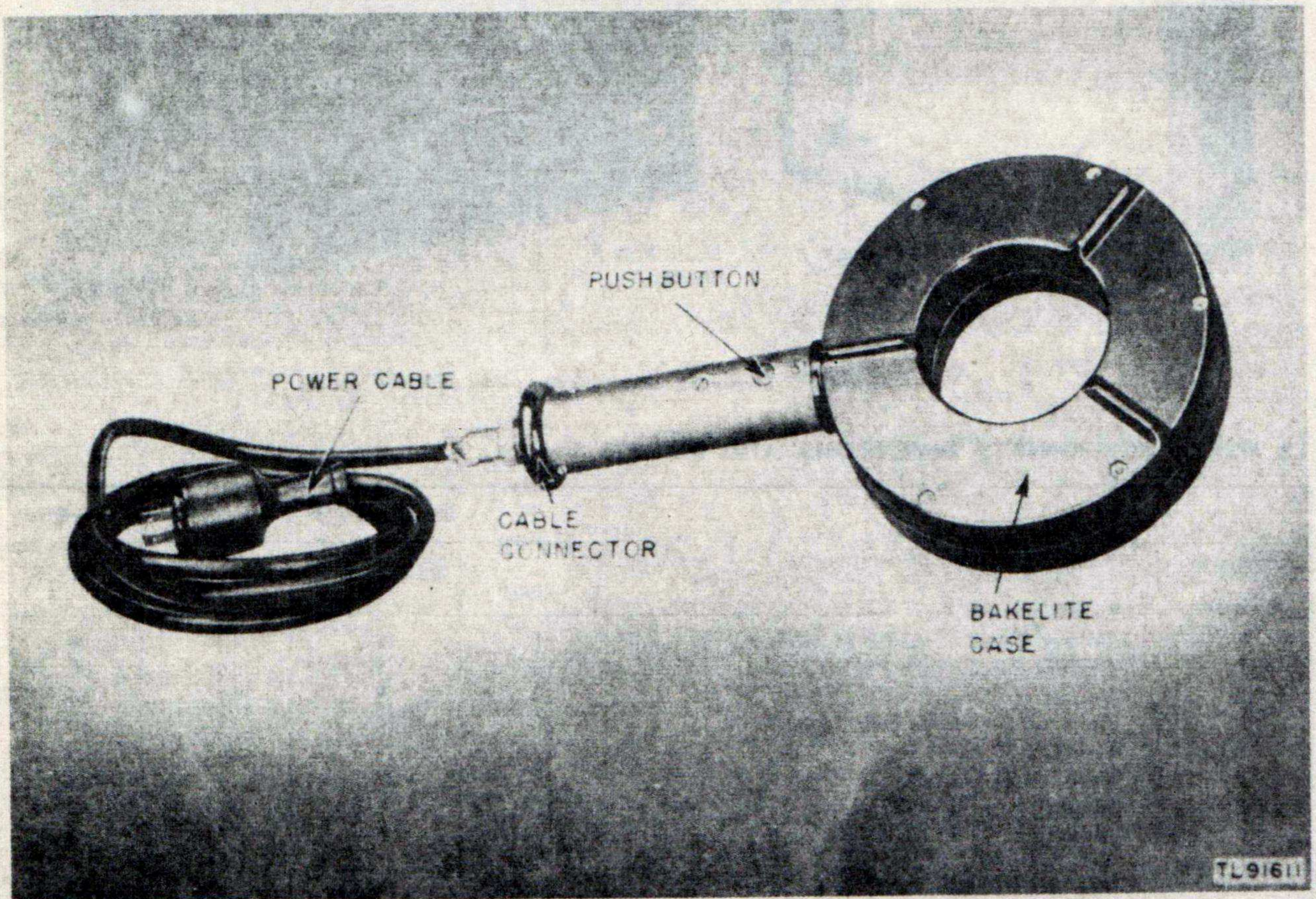

Figure 9. Demagnetizing unit.

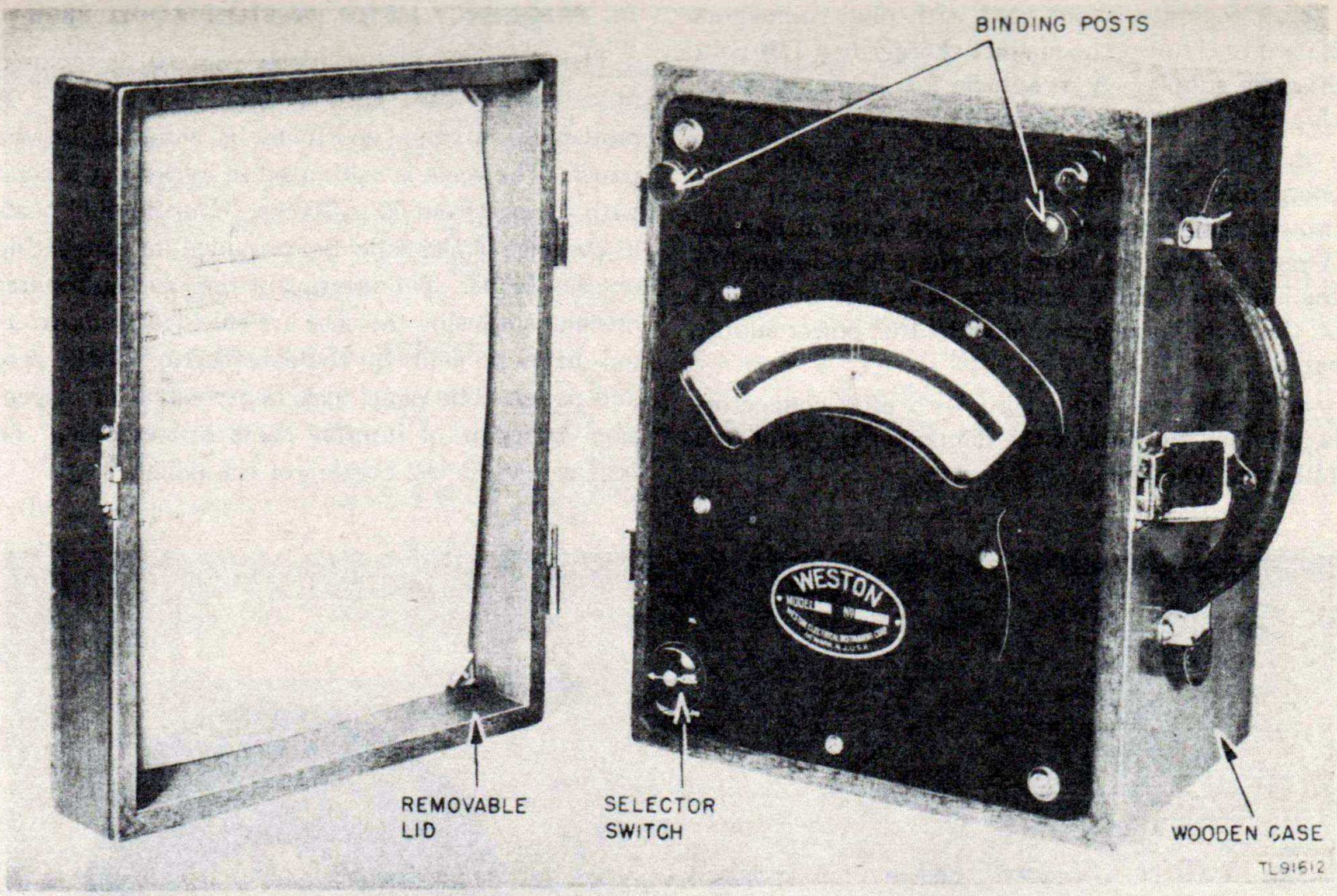

Figure 10. Frequency meter (Weston model 339).

12. LIST OF COMPONENTS, DIMENSIONS, AND WEIGHTS.

Quantity	Name of component	Dimensions (in.)			Weight
		Length	Width	Height	(lb)
1	Voltage Supply Unit PP-14/GSM-1.	21	10	10	60
1	Current Supply Unit PP-15/GSM-1.	16	8	10	30
1	Voltmeter Standards Unit TS-49/GSM-1.	16	8	14½	25
1	Ammeter Standards Unit TS-50/GSM-1.	20	10	16½	40
1	Case CY-25/GSM-1.	22	18	20	35
1	Case CY-24/GSM-1.	28	27	14	35
1	Mounting MT-135/GSM-1.	7½	6½	7½	2
1	Mounting MT-175/GSM-1.	7½	6½	7½	2
1	Test Set I-49.	8⅞	7⅜	5¾	8
1	Test Set I-56-K.	20½	14¾	9¾	55
1	Cord CX-25-A/GSM-1.	72	⅜ (diam)		
1	Cord CX-25-B/GSM-1.	72	⅜ (diam)		
2	Cord CD-370.	72	0.341 (diam)		
1	Decade resistance box (Daven type 750-K).	15⅝	5	5	6.25
1	Decade resistance box (Daven type 750-L).	15⅝	5	5	6.25
1	Magnet Charger TS-336/GSM-1.	27¼	17⅝	14	250
	Demagnetizer.	14	3⅜ ID 7⅝ OD	2 1/16	8
1	Frequency meter (Weston model 339).	10 7/16	8¼	8 3/16	23
1 set	Meter-calibration panels (10 steel rings).				

SECTION II
INSTALLATION AND ASSEMBLY OF METER TEST EQUIPMENT AN/GSM-1

13. LOCATION.

a. Meter Test Equipment AN/GSM-1 is designed for use on the test bench in repair depots and maintenance bases. The equipment normally is used in a building or shelter at permanent or semi-permanent locations.

b. Components of Meter Test Equipment AN/-GSM-1 function better and more accurately at temperatures between 50° F and 100° F. Therefore, every effort should be made to keep the temperature of the building housing this test equipment between these limits.

c. Some Meter Test Equipments AN/GSM-1 are mounted in repair trucks which travel from one Signal Corps installation to another. The repair personnel with the repair truck are trained to make meter tests and repairs in the field.

14. UNPACKING, UNCRATING, AND CHECKING.

a. Meter Test Equipment AN/GSM-1 is shipped in wooden cases. Remove components from the cases as follows:

(*1*) Cut or break the metal straps which are placed around each case.

(*2*) Remove the nails from the top of the case with a nail puller, and remove the top of the case. Avoid the use of hooks, screwdrivers, and similar tools, so that the painted surface will not be scratched or exterior parts of the components damaged.

(*3*) Lift the components out of the packing cases. Handle them carefully. Some of the components are heavy. Guard against smashed toes or fingers. The different components are sturdily constructed, but they are delicately calibrated. *Do not slam them around.*

b. Remove the waterproof liners.

c. Open the fiberboard containers and remove the components. Remove any protective packing material.

d. Inspect the components for any damage during shipment. Examine meters, switches, connectors, and binding posts on the exterior of the cabinets for damage. Open the cabinet or instrument case of each component and look for loose or damaged parts in the interior compartments.

e. Check to see that all components and parts are present.

f. Notify the person in charge, if there is any shortage or damage.

15. INSTALLATION OF TUBES.

After unpacking Magnet Charger TS-336/GSM-1, install tubes as follows:

a. Remove the screws holding the hood in place and remove the hood.

b. Loosen the three tube-base clamps and remove the WL-677 anode clamp.

c. Insert two 866A/866 tubes and one WL-677 tube in the sockets according to the type numbers stamped on the panel adjacent to the sockets.

d. Tighten the three base clamps and replace the WL-677 anode clamp.

e. Put on the anode caps (fig. 32).

f. Replace the hood and the screws which hold it in place.

NOTE: When setting up Magnet Charger TS-336/GSM-1 for the first time or when new tubes have been installed, the tube filaments should be allowed to heat for at least 30 minutes before the anode potential is applied.

16. ASSEMBLY.

a. Since most of the components are not interconnected and are used at different stages of testing, they should be distributed on the test bench so that all components can be used simultaneously by different repairmen or technicians. Experience will determine the most advantageous distribution of the test equipment which will provide most orderly and efficient progress from one workman to another.

b. Voltage Supply Unit PP-14/GSM-1 must be located at a point near an a-c outlet.

c. Current Supply Unit PP-15/GSM-1 must be located near an a-c outlet and a d-c source of 6 volts. A 6-volt heavy-duty storage battery may be used or any d-c supply meeting the requirements (par. 3b).

NOTE: If a storage battery is used, take care that it is not located underneath electronic equipment and circuits, when the battery is being charged. Storage batteries, during charge, generate fumes which cause corrosion of electrical wiring and equipment.

d. Voltmeter Standards Unit TS-49/GSM-1 and Ammeter Standards Unit TS-50/GSM-1 must be placed near enough to their respective supply units to permit the cords from the standards units to be plugged into the receptacles on the supply units.

e. Mounting MT-135/GSM-1 should be placed adjacent to the voltage supply unit and voltmeter standards unit.

f. Mounting MT-175/GSM-1 should be placed near the current supply unit and the ammeter standards unit.

g. Magnet Charger TS-336/GSM-1 and frequency meter (Weston model 339) must be located near enough to a-c outlets to permit connection of the service cord and power leads. The magnet charger weighs approximately 250 pounds. Therefore, if it is to be operated in an elevated position, it must be placed on a platform built strongly enough to support that weight.

CAUTION: Be sure that input voltage is not connected to voltage supply unit PP-14/-GSM-1 or current supply unit PP-15/GSM-1 before making interconnections. Voltages as high as 1,500 volts are exposed at the receptacles when power is on.

17. CONNECTIONS AND INTERCONNECTIONS.

a. Insert plugs E1 and E2, connected by cables to the voltmeter standards unit, into receptacles E3 and E4, respectively, on the voltage supply unit. The voltmeter standards unit is supplied with both a-c and d-c voltages through these connections.

b. Insert female plugs E4, E5, and E6, connected by cables to the ammeter standards unit, into receptacles E5, E6, and E7, respectively, on the current supply unit. This action provides a current path between the current supply unit and the ammeter standards unit.

c. To make a-c readings above 10 amperes, disconnect the cable leads between the standards units and their supply units and insert plug E7 from the ammeter standards unit into receptacle E2 of the voltage supply unit.

NOTE: Plug E7 remains disconnected whenever high a-c readings are not being taken.

d. Connect a-c power to receptacle E1 at the right end of the voltage supply unit.

e. Connect the current-supply unit to its a-c and d-c power sources.

f. A diagram (fig. 11) shows power connections to the supply units and interconnections between the supply units and the standards units.

g. Make the following connections to Magnet Charger TS-336/GSM-1:

(*1*) Ground the cabinet of the magnet charger, if practicable, before putting the unit in operation.

(*2*) Plug the power-supply cord into the receptacle on the rear panel of the magnet charger and screw up the locking cap.

(*3*) Plug the demagnetizer power-supply cord into the receptacle in the end of the demagnetizer handle and screw the locking cap until it is tight.

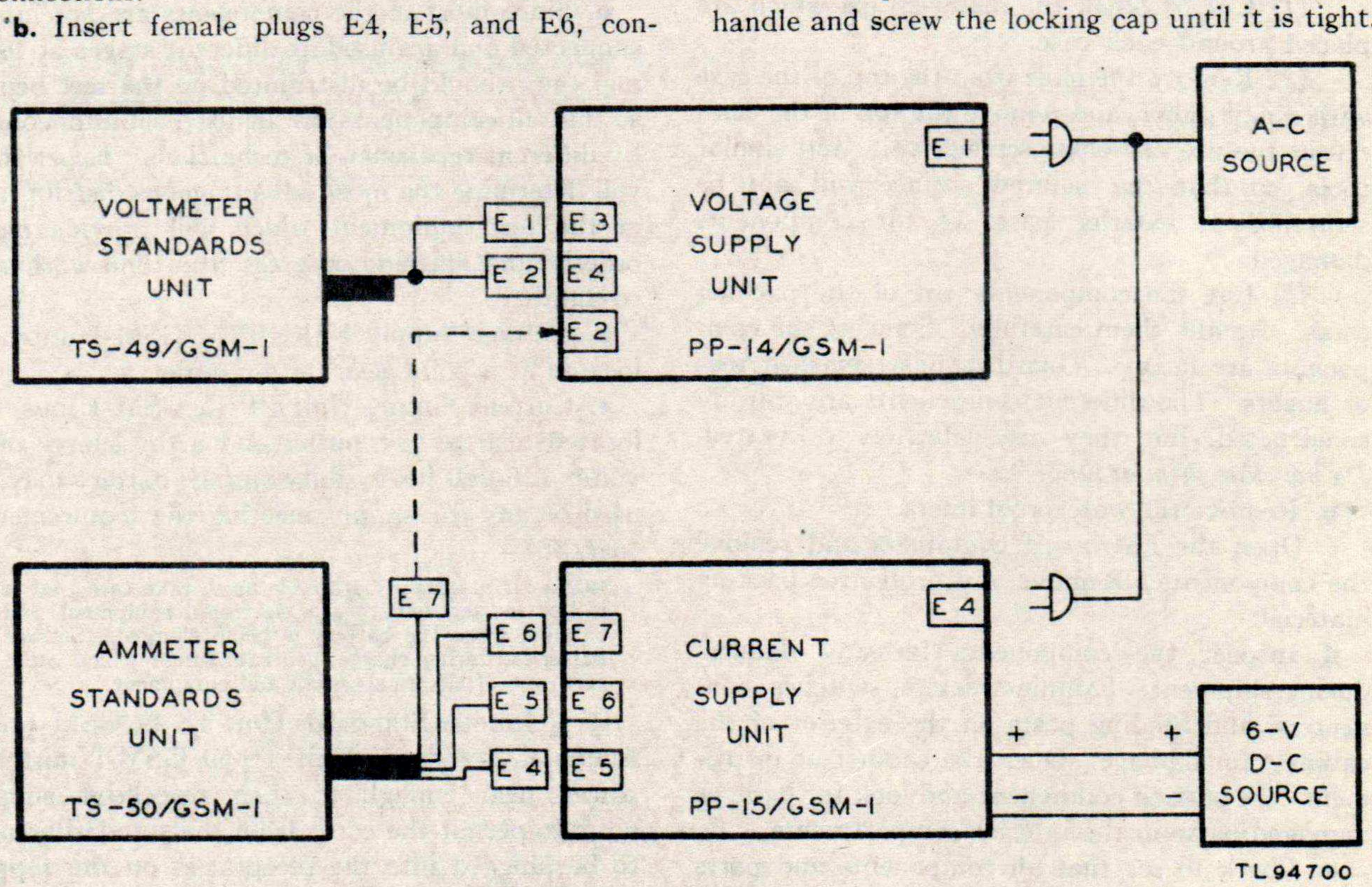

Figure 11. Interconnection diagram of supply units and standards units.

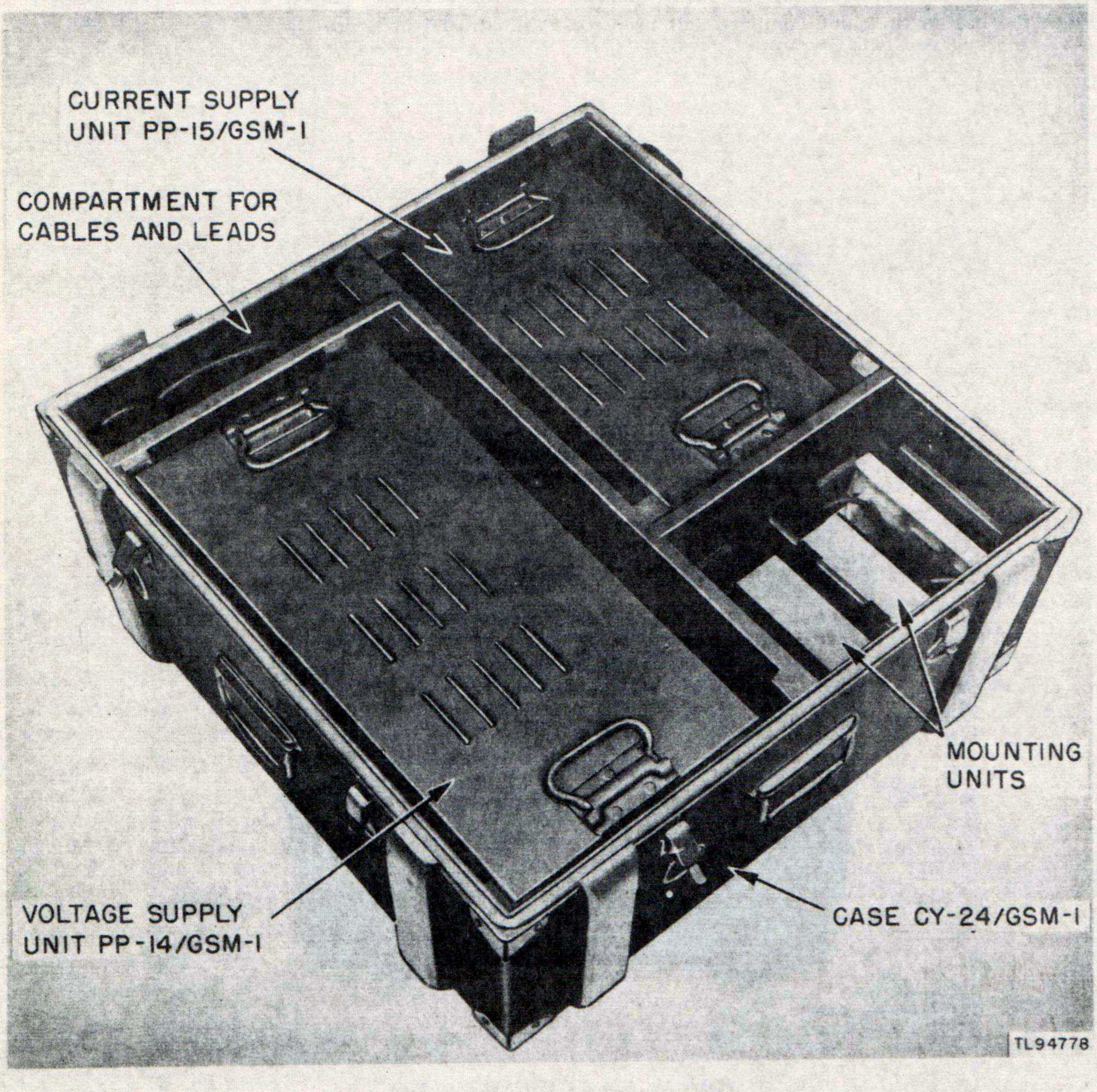

Figure 12. Case CY-24/GSM-1, packed.

18. PACKING FOR SHORT MOVEMENTS.

a. Pack Voltage Supply Unit PP-14/GSM-1, Current Supply Unit PP-15/GSM-1, and Mountings MT-135/GSM-1 and MT-175/GSM-1, with attached and associated leads in the compartments of Case CY-24/GSM-1. Also pack the small bag containing the 10 test rings, used when testing meters designed for mounting on metal panels. Place the bag in the same compartment used for the meter mountings. The components named above packed in the case are shown in figure 12.

b. Put Voltmeter Standards Unit TS-49/GSM-1, Ammeter Standards Unit TS-50/GSM-1, their connected cables and plugs, and spare leads into Case CY-25/GSM-1. The way in which these components are placed in Case CY-25/GSM-1 is illustrated in figure 13.

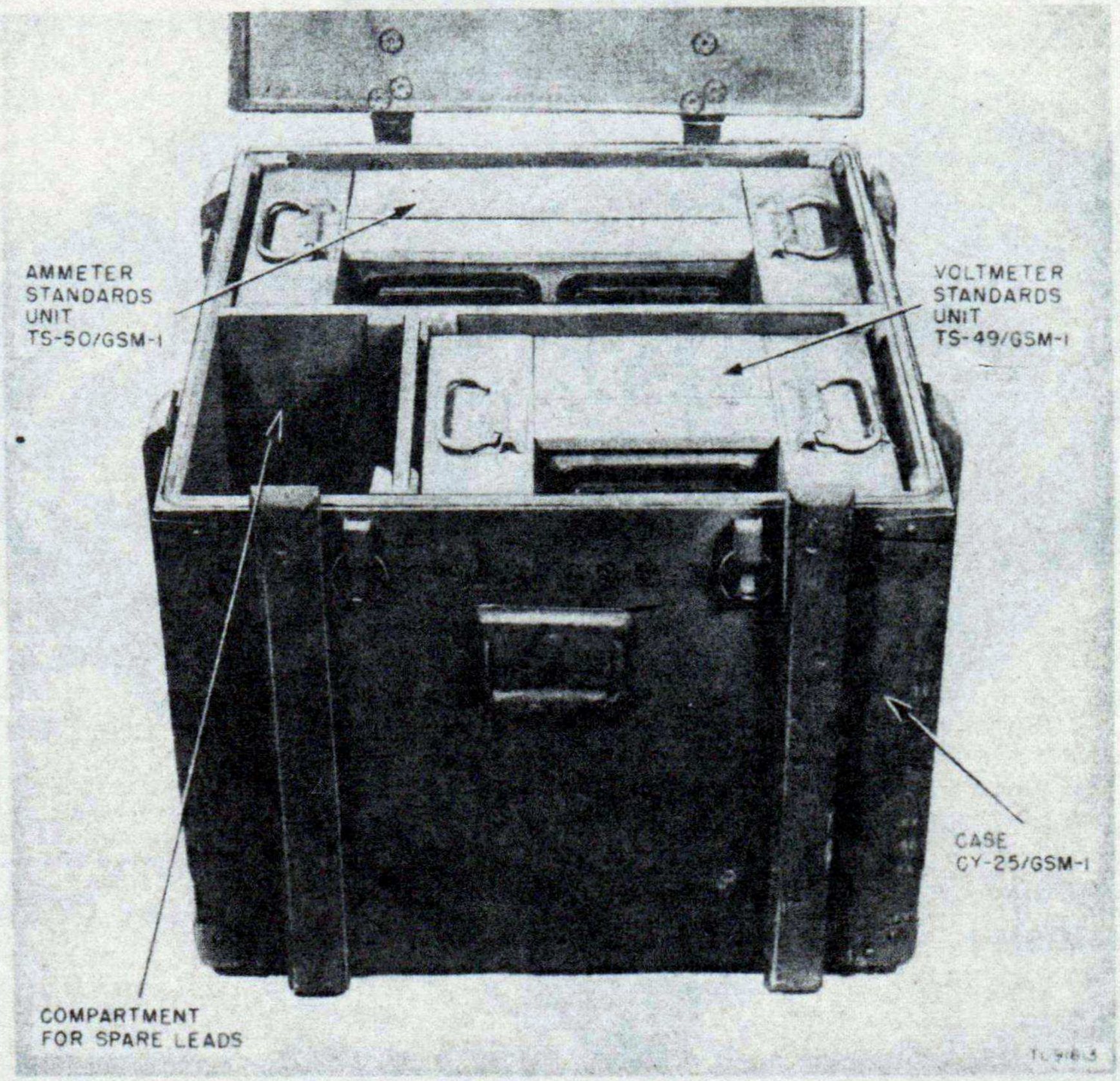

Figure 13. Case CY-25/GSM-1, packed.

SECTION III
INITIAL ADJUSTMENTS

19. INITIAL CHECKS AND ADJUSTMENTS FOR SUPPLY UNITS AND STANDARDS UNITS.

a. When setting up Meter Test Equipment AN/GSM-1 for the first time and before putting the equipment in operation, check to determine whether the equipment has been damaged during transportation (par. 14d) or is in condition to perform its proper testing functions. Subparagraphs b through f below list the checks and possible adjustments which will be made to insure proper operation of the supply and standards units and to prevent damage to the equipment or instruments under test.

b. Check the a-c voltage outlets to see that the supply available meets the requirements of the equipment (par. 3).

c. Check to see that the lead from the a-c input receptacle to the primary side of the input transformer of Voltage Supply Unit PP-14/GSM-1 is connected to the proper lug for the voltage available (fig. 33).

d. Make certain that all controls are in zero (maximum counterclockwise) positions before turning on the power switches of the voltage and current supply units.

e. Measure the voltage available at each jack of the voltage supply unit with an external voltmeter before attaching Voltmeter Standards Unit TS-49/GSM-1. Bring the output at the jacks to maximum by first setting the range switch to the proper range and then turning the variac and rheostat knobs (fig. 3) to their maximum clockwise positions. This check will protect the delicate mechanism of Voltmeter Standards Unit TS-49/-GSM-1 and meters under test, in case the voltage supply unit has been damaged during shipment and too much voltage is present at one or more jacks.

f. Check the output of the jacks of Current Supply Unit PP-15/GSM-1 (fig. 4) by bringing the current to the meters of Ammeter Standards Unit TS-50/GSM-1 (fig. 6) and the deflection of the meters to full scale gradually. Adjust the current flow by gradually turning the knobs of the carbon pile and the rheostat on the current supply unit panel clockwise.

NOTE: Only one meter of Ammeter Standards Unit TS-50/GSM-1 should show a deflection at any one time. If a second meter shows deflection, current leakage is indicated (par. 83f).

20. INITIAL ADJUSTMENTS ON MAGNET CHARGER.

a. Before putting Magnet Charger TS-336/-GSM-1 in operation for the first time, adjust the filament voltages of the WL-677 and 866A/866 tubes to values as near 5 volts and 2.5 volts respectively, as possible.

b. Make this adjustment after installing the tubes and with the hood removed. The adjustment consists in adjusting the primary connections of transformer T1 until the voltage between output terminals 6 and 8 is as near 5 volts as possible. Voltage between terminals 9 and 11 should then be 2.5 volts.

c. In testing and adjusting these voltages, observe the following procedure:

(*1*) Depress the discharge push button of switch S2.

(*2*) Plug in power-connecting cord.

(*3*) Close circuit breaker CB1.

(*4*) Depress cover-interlock switch S1.

(*5*) Measure voltages between terminals 6 and 8, or between 9 and 11 of transformer T1.

(*6*) Change taps on primary of transformer T1 if necessary. Different supply voltages will require transformer connections as shown in figure 14.

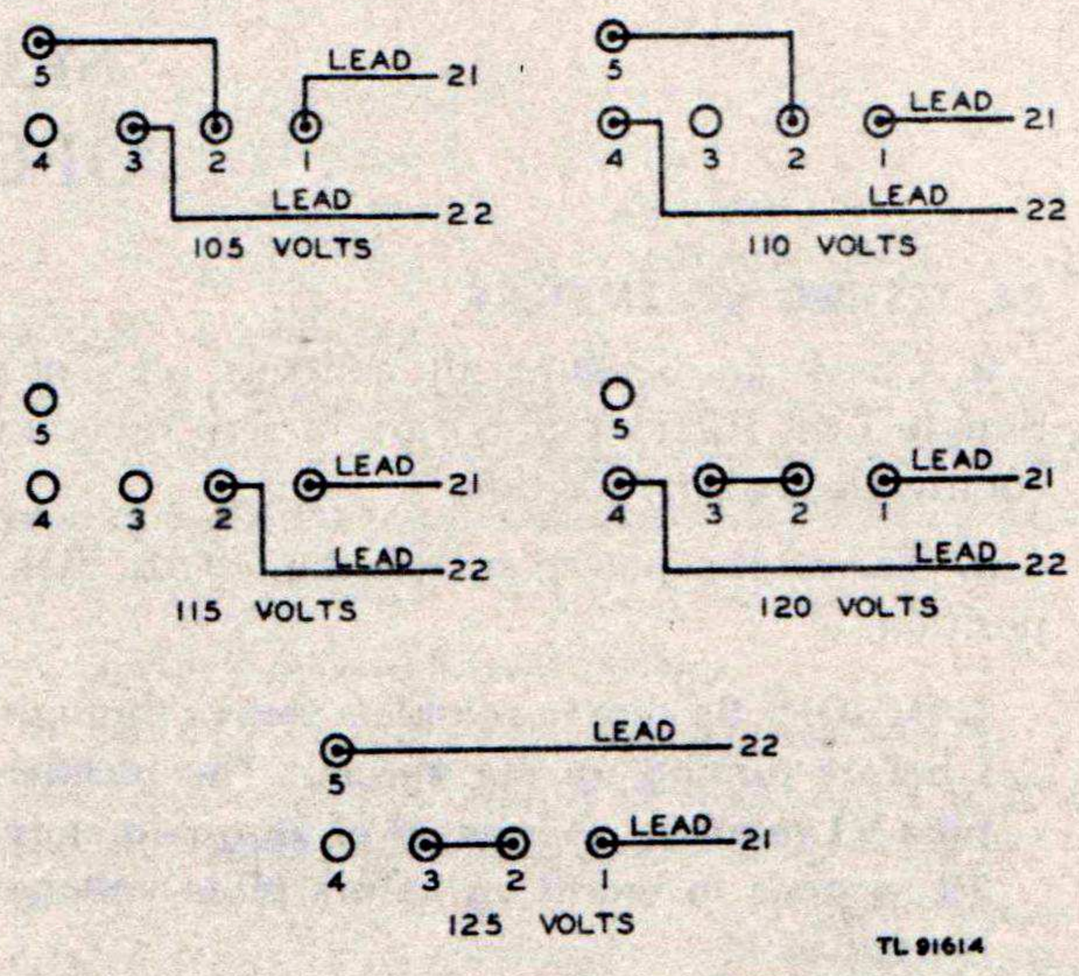

Figure 14. Diagram showing input-transformer primary connections for Magnet Charger TS-336/GSM-1.

PART TWO
OPERATING INSTRUCTIONS

NOTE: For information on destroying the equipment to prevent enemy use, refer to the destruction notice at the front of the manual.

SECTION IV
PREOPERATIONAL PROCEDURES

21. GENERAL.

Before operating any component of Meter Test Equipment AN/GSM-1, meter repair personnel should read carefully the instructions for its operation or be trained in its use. The components are delicate electrical instruments which must be handled with care.

22. VOLTAGE SUPPLY UNIT PP-14/GSM-1 AND VOLTMETER STANDARDS UNIT TS-49/GSM-1.

a. See that interconnecting cables are *firmly* connected (par. 17a).

b. Check to see that the variac and potentiometer knobs of the voltage supply unit (fig. 3) are in maximum counterclockwise position and the power switch is in center (OFF) position.

c. Connect the a-c power cord to the a-c input receptacle (fig. 11).

23. CURRENT SUPPLY UNIT PP-15/GSM-1 AND AMMETER STANDARDS UNIT TS-50/GSM-1.

a. See that interconnecting cables are *firmly* connected (par. 17b).

b. Check to see that the knobs of the carbon-pile resistor and the rheostat of the current supply unit (fig. 4) are in maximum counterclockwise position and the power switch is in OFF position.

c. Connect the a-c power cord to the a-c input receptacle (fig. 11).

d. Connect the battery clips on the ends of Cords CX-25-A/GSM-1 and CX-25-B/GSM-1 to the terminals of a 6-volt heavy-duty storage battery.

CAUTION: Be careful to observe polarity in attaching the cords to the battery terminals. The battery clips are identified by plus (+) or minus (—) marks to indicate to which battery terminal they should be connected. If a d-c source other than a battery is used, make connections to that source observing polarity.

SECTION V
OPERATION

24. TESTING VOLTMETERS.

a. Check to be sure all controls on Voltage Supply Unit PP-14/GSM-1 are in zero (maximum counterclockwise) position.

b. Throw the power switch (fig. 3) to VOLTS position.

CAUTION: Be sure to complete steps c through f before turning up the variac. The rectifier tube V1 requires an interval of approximately 30 seconds to warm up before plate voltage is applied.

c. Turn the range switch (fig. 3) to the proper d-c or a-c range.

(*1*) For a meter whose full-scale reading is 150 volts dc or less, use the 150-volt d-c range.

(*2*) For meters whose full-scale reading is between 150 and 750 volts dc, use the 750-volt range.

(*3*) For meters whose full-scale reading is between 750 and 1,500 volts dc, use the 1,500-volt range.

(*4*) For all a-c voltmeters, use the a-c range.

d. Connect the spade lead from Mounting MT-135/GSM-1 to the binding post in the lower left corner of the panel of Voltage Supply Unit PP-14/-GSM-1 (fig. 3).

e. Press down on the knob of the mounting and

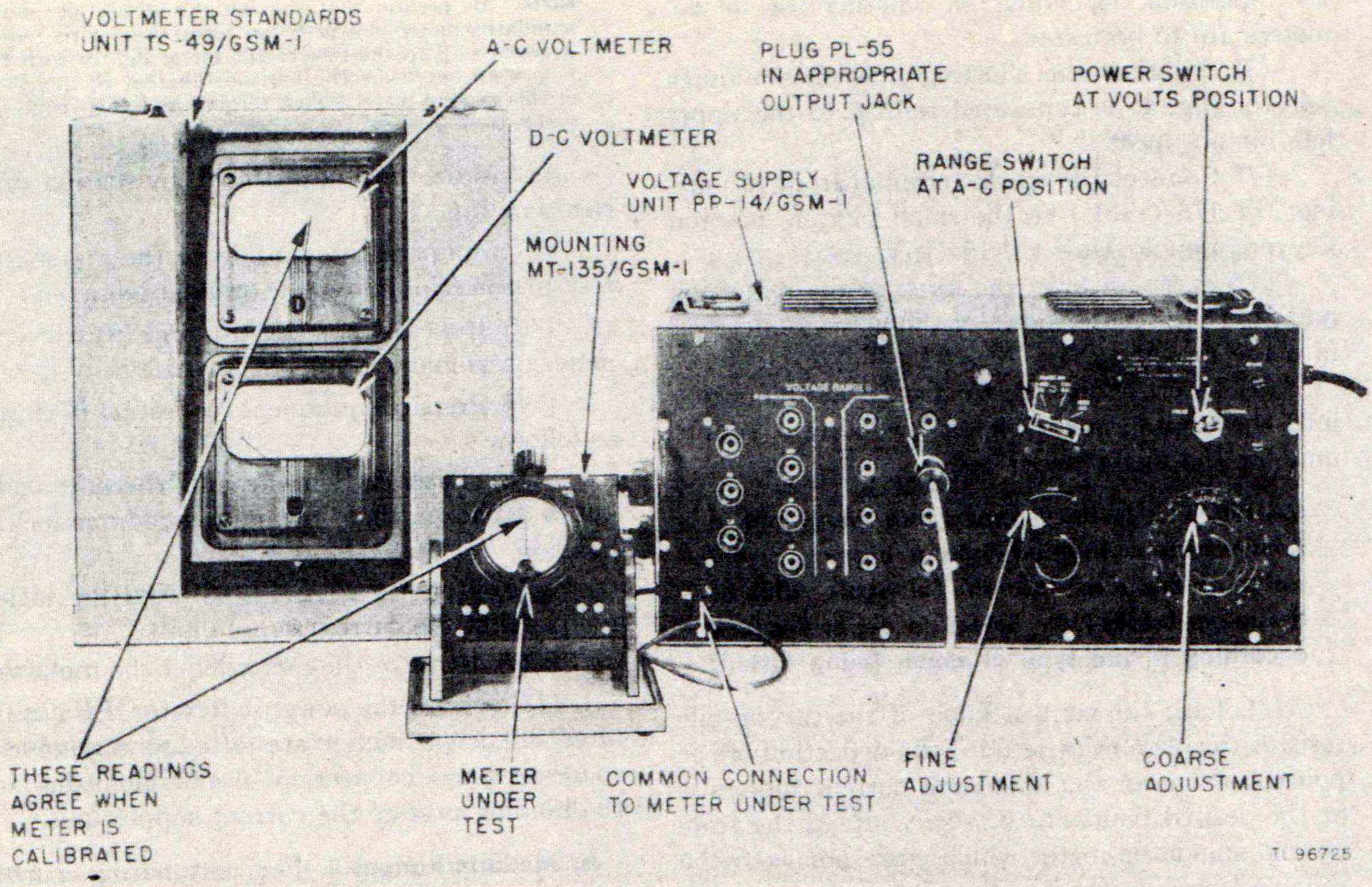

Figure 15. Testing a voltmeter.

insert the meter posts of the meter under test into the mounting.

f. Insert Plug PL-55 from the mounting into the appropriate jack on the voltage supply unit for the meter under test.

CAUTION: Never connect the plug into a jack which is labeled with a higher value on the panel than the full-scale value of the meter under test. Select an a-c or d-c jack according to the type of meter being tested.

g. Turn the control knob of the variac (fig. 3) clockwise slowly, until the deflection of the pointer of the standards meter is at the desired point on the scale. Read the scale on the standards meter which corresponds to the range selected on the supply unit panel.

NOTE: Be certain that the initial zero setting of the standards meter is exactly on zero. Adjust to zero if necessary. Tap the face of the meter lightly with the fingers to overcome the friction inherent in the pivot of this type of meter, when zeroing and each time the meter is read.

h. Make fine adjustment by means of the rheostat (fig. 3).

i. Compare the reading of the meter under test to the reading on the standards meter.

j. Repeat the procedure in subparagraphs g, h, and i above to test the action and accuracy of the meter under test at as many points on its scale as desired.

k. Prepare equipment for testing next meter as follows:

(*1*) Turn variac and rheostat controls back to zero.

(*2*) Remove Plug PL-55 from the jack on the panel of the voltage supply unit.

(*3*) Remove the meter from the mounting.

(*4*) Set the range switch for the next meter (subpar. c above).

l. Throw the power switch to OFF position after all meters are tested. Remove the spade-terminal connection of the mounting from the binding post of the voltage supply unit.

25. TESTING CURRENT METERS.

a. Low Ranges. For alternating currents up to 1,000 milliamperes (1 ampere) and direct currents up to 1.5 amperes, proceed as follows:

(*1*) Check to be certain that all controls on Current Supply Unit PP-15/GSM-1 are in zero (maximum counterclockwise) position.

(*2*) Throw power switch (fig. 4) to A.C. or

D.C. position depending on whether a-c or d-c meters are to be tested.

(*3*) See that the shorting link of the range selector (fig. 4) is connected tightly to the upper left binding post.

(*4*) Connect the spade terminal from Mounting MT-175/GSM-1 to the small binding post on Current Supply Unit PP-15/GSM-1.

(*5*) Press down on the knob of the mounting and insert the meter posts of the meter under test into the mounting.

(*6*) Insert Plug PL-68 from the mounting into the appropriate jack on the current supply unit for the meter under test.

CAUTION: Never connect the plug into a jack which is labeled with a higher current value on the panel than the full-scale value of the meter under test. Select an a-c or d-c jack according to the type of meter being tested.

(*7*) Turn the control knob of the carbon-pile resistor (fig. 4) clockwise until the deflection of the pointer of one of the standards current meters is at the desired point on the scale. Read the scale on the standards meter which corresponds to the range selected on the supply unit panel.

NOTE: Be certain that the initial zero setting of the standards meter is exactly on zero. Adjust to zero if necessary. Tap the face of the meter lightly with the fingers to overcome the friction inherent in the pivot of this type of meter, when zeroing and each time the meter is read.

(*8*) Make fine adjustment by means of the rheostat (fig. 4).

(*9*) Compare the reading of the meter under test to the reading on the standards meter.

(*10*) Repeat steps (7), (8), and (9) to test the meter at as many points on its scale as desired.

(*11*) Prepare equipment for testing next meter as follows:

(*a*) Turn carbon-pile and rheostat control knobs back to their maximum counterclockwise position.

(*b*) Remove Plug PL-68 from the jack on the panel of the current supply unit.

(*c*) Remove the meter from the mounting.

(*12*) Throw the power switch to OFF position, after all current meters are tested, and remove the spade-terminal connection of the mounting from the binding post of the current supply unit.

b. Medium Ranges. For alternating currents between 1 ampere and 10 amperes and direct cur-

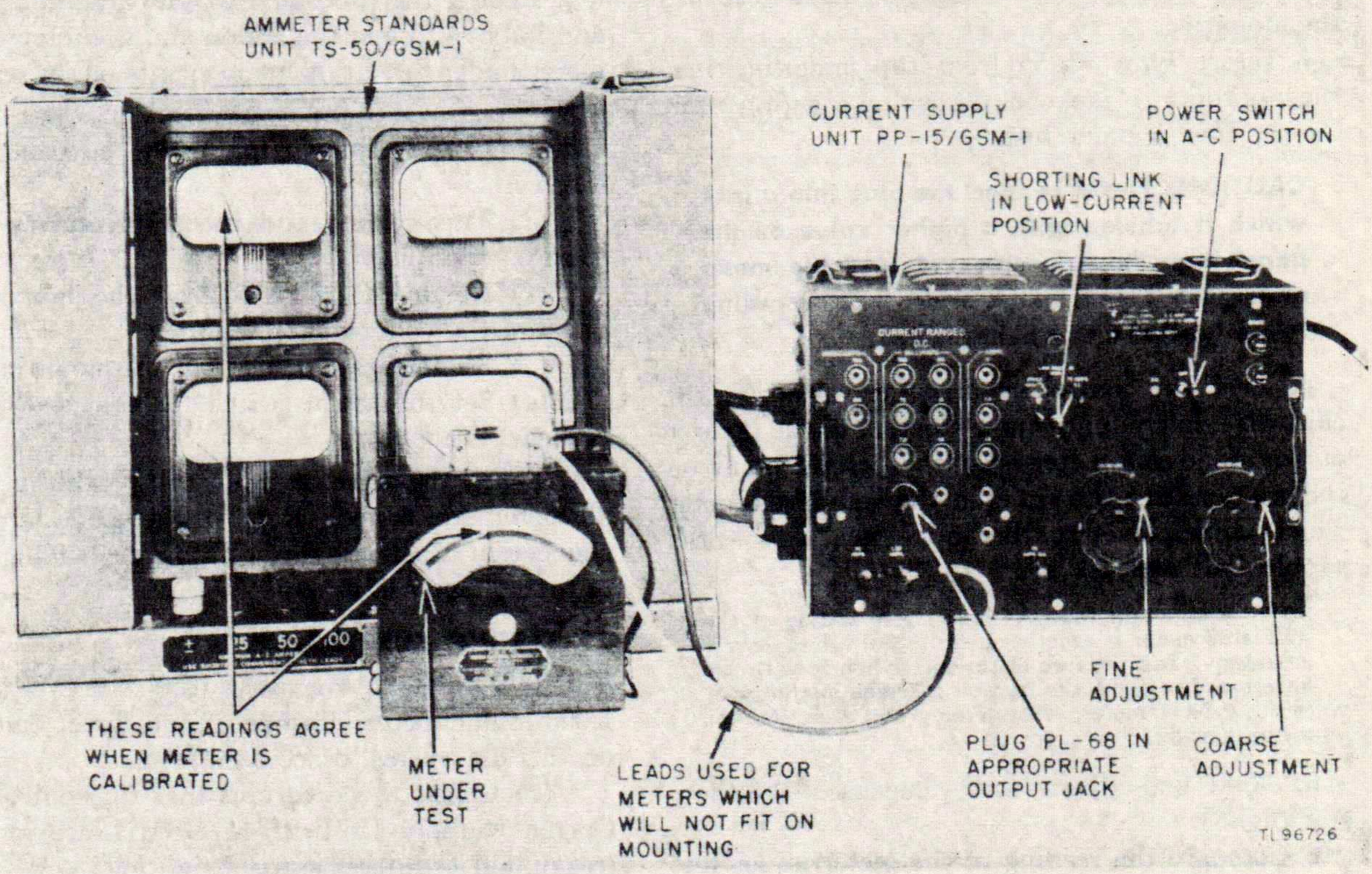

Figure 16. Testing a current meter.

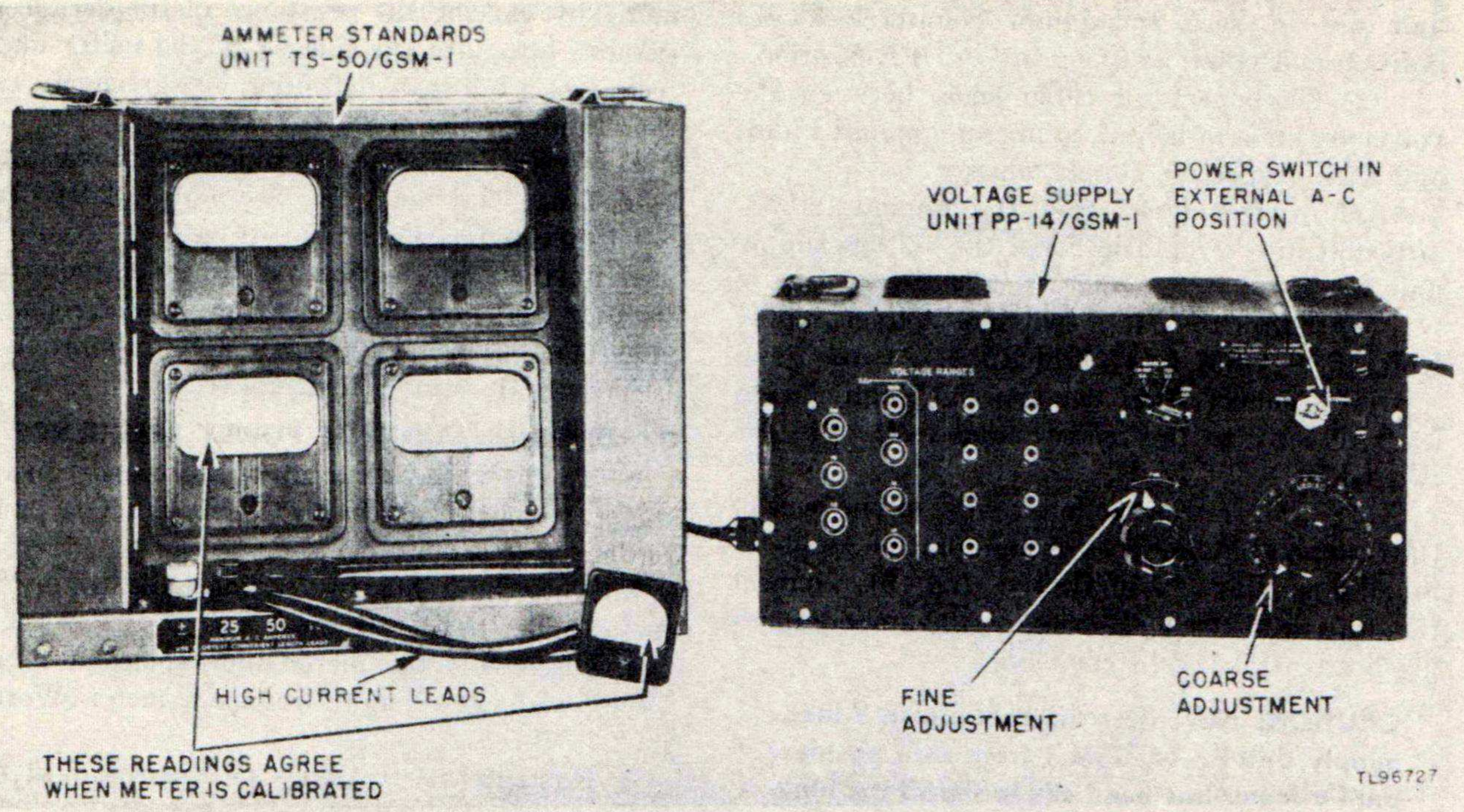

Figure 17. Testing an a-c ammeter on high-current range.

rents between 1.5 amperes and 15 amperes, proceed as follows

(*1*) Check to be sure all controls are in zero (maximum counterclockwise) position.

(*2*) Perform steps (2) and (3) as directed in subparagraph a above.

(*3*) Connect the two special leads provided with the equipment directly to the meter under test instead of using Mounting MT-175/GSM-1. *Be sure to observe polarity of the meter terminals of d-c meters.*

(*4*) Connect the spade terminal of one lead to the small binding post on the current supply unit.

(*5*) Insert Plug PL-68 on the second lead in the appropriate jack on the current supply unit for the meter under test.

NOTE: These leads may also be used for low-range meters, which are so constructed that they will not fit on the mounting, or when the mounting is being used to hold a meter during repair.

(*6*) Perform steps (7) through (11) (subpar. a above).

c. 75-ampere D-c Range. To check a d-c instrument on the 75-ampere range, proceed as follows:

(*1*) Check to be sure all controls are in zero (maximum counterclockwise) position.

(*2*) Throw power switch (fig. 4) to DC position.

(*3*) Change the position of the shorting link of the range selector to the upper right binding post.

(*4*) Connect the two special high-current leads directly to the meter under test. Use the two 1-foot No. 6 leads.

(*5*) Connect the spade terminal of the lead from the negative terminal of the meter under test to the large binding post at the lower left corner of the current supply unit panel (fig. 4).

(*6*) Connect the spade terminal of the lead from the positive terminal of the meter to the large binding post labeled 75 AMPS DC near the bottom center of the panel.

(*7*) Perform steps (7) through (10) (subpar. a above).

(*8*) Prepare equipment for testing next meter as follows:

(*a*) Turn carbon-pile and rheostat control knobs back to their maximum counterclockwise positions.

(*b*) Remove the leads from the meter under test.

(*c*) If there are no more meters to test on this range, disconnect the leads from the binding posts on the current supply unit.

d. High A-c Ranges. To check a-c ammeters with ranges above 10 and up to 100 amperes, proceed as follows:

(*1*) Check to make certain that all controls on the voltage supply unit and the current supply unit are in zero (maximum counterclockwise) position and power switches are in OFF position.

(*2*) Disconnect all cable leads between the voltmeter standards unit, ammeter standards unit, and their respective supply units.

(*3*) Insert plug E7 from the ammeter standards unit into receptacle E2 of the voltage supply unit.

(*4*) Throw the power switch of Voltage Supply Unit PP-14/GSM-1 to EXTERNAL AC position.

(*5*) Connect the two special high-current leads directly to the meter under test. Use the two 1-foot No. 6 leads.

(*6*) Connect the spade terminal of one lead to the common binding post on the front of Ammeter Standards Unit TS-50/GSM-1 (fig. 6); connect the other lead to the 25-, 50-, or 100-ampere binding post. Make tight connections.

CAUTION: Never turn the controls on Voltage Supply Unit PP-14/GSM-1 from zero position, until a meter has been connected to the binding posts. Failure to observe this precaution is injurious to the current transformer and dangerous to operating personnel.

(*7*) Adjust the current to the standards meter and the current meter under test by turning the knobs of the variac and rheostat on the voltage supply unit till the pointer on the standards meter shows the desired deflection.

(*8*) Compare the reading of the meter under test with the reading of the standards meter. Repeat at as many points on the scale as desired.

(*9*) Prepare equipment for testing next meter as follows:

(*a*) Turn variac and rheostat controls back to zero (maximum counterclockwise) position.

(*b*) Remove leads from the meter under test.

(*c*) Throw the power switch on the voltage supply unit to OFF position, disconnect the meter leads from Ammeter Standards Unit TS-50/GSM-1, disconnect the interconnecting cable between the ammeter standards unit and Voltage Supply Unit PP-14/GSM-1, and set up the equipment again in accordance with instructions in paragraph 17 if there are no more meters to test on this range.

26. DETERMINATION OF RESISTANCE VALUES.

a. In determining the proper resistance value of the series resistors, multipliers, and shunts used with meters, connect the decade resistance box (Daven type 750-K or 750-L) in the meter circuit, in place of the needed resistance. Calibrate the meter by varying the resistance of the decade resistance box until the pointer of the meter under test gives a full-scale deflection, in agreement with the standards meter.

b. For very accurate determination of resistance values, use Test Set I-49. See TM 11-2019, Test Set I-49, for instructions in its use.

c. Further information on types of meter resistance and techniques used in meter repair is given in TM 11-472, Repair and Calibration of Electrical Measuring Instruments.

27. DETERMINATION OF POWER FREQUENCY.

a. To check the accuracy of a power frequency meter, connect it across a 115-volt, 60-cycle power outlet.

b. Note the frequency reading indicated by the meter under test.

c. Disconnect the meter and replace it in the circuit with the standard frequency meter (Weston model 339).

d. Compare the readings of the standard frequency meter and the meter under test.

e. Frequency meter (Weston model 339) may also be used to determine the frequency of the a-c power source, when setting up Meter Test Equipment AN/GSM-1 for the first time (par. 19) or whenever it is necessary to check the frequency of the a-c power source.

28. CHARGING METER MAGNETS.

a. Plug the magnet-charger cable into a suitable power source (par. 3).

b. Place circuit breaker in upper left corner of the front panel (fig. 8) in ON position. The red pilot light will light.

c. After 5 minutes, the time-delay relay operates, the green pilot light lights, and Magnet Charger TS-336/GSM-1 is ready for operation.

d. Remove the meter magnets from their instrument cases while the tubes are warming up.

e. Determine the polarity of the meter magnets to be charged.

(*1*) The -pole of a meter magnet, which is attached to the left-hand meter terminal (when viewed from the rear), is the positive or north pole.

(*2*) If the polarity of a magnet is not known or marked, determine the polarity by bringing one pole of the meter magnet close to one pole of a bar magnet of known polarity. Like poles repel; unlike poles attract.

f. If the magnet and moving element cannot be removed as a unit, or if it is necessary to detach the

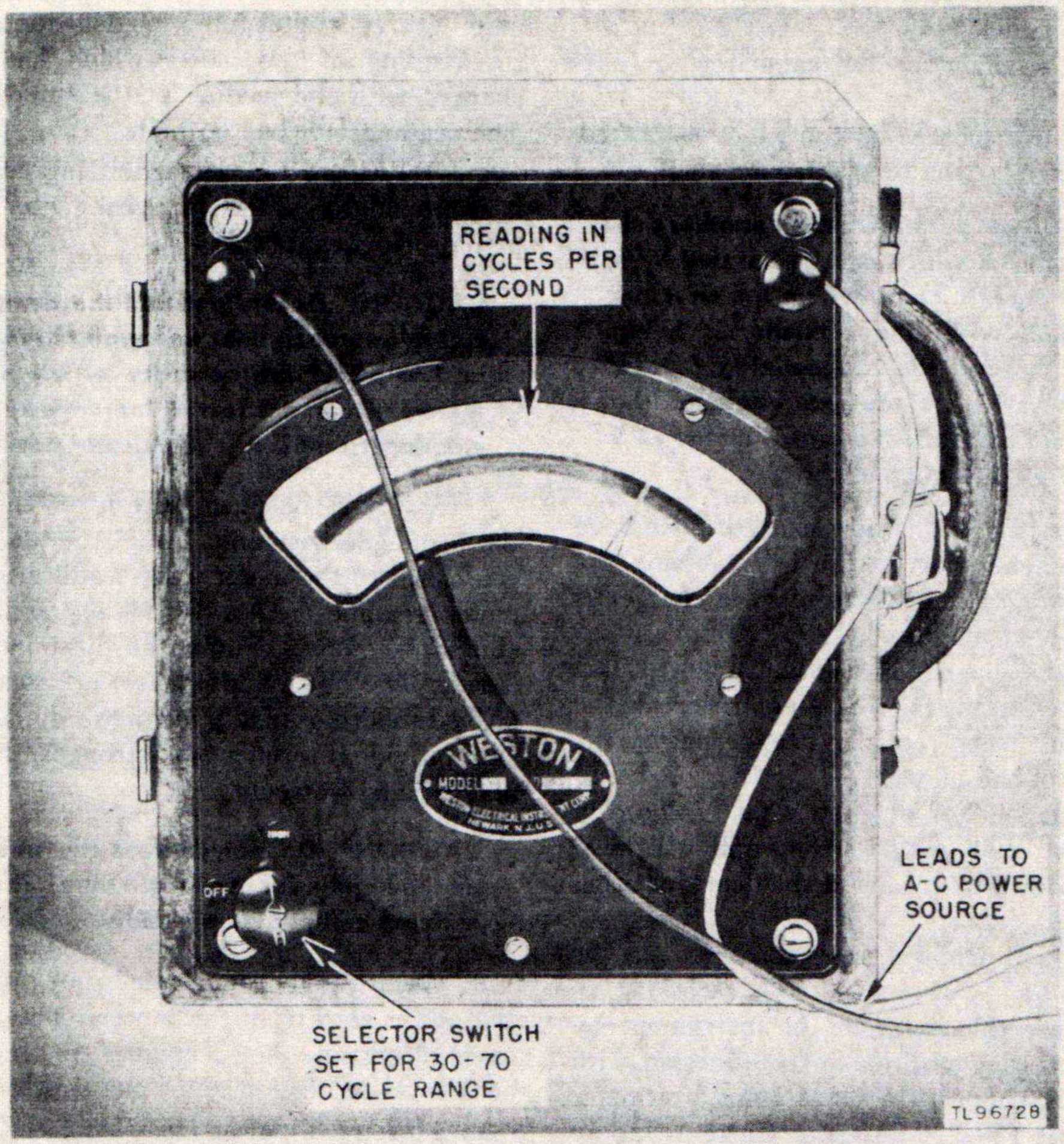

Figure 18. Frequency meter (Weston model 339) in use.

moving element from the magnet for repair purposes, use a soft-iron keeper to complete the magnetic circuit when charging the meter magnet. If it is apparent that loss of calibration is caused only by a weakened meter magnet, charge the magnet without detaching the moving element from the magnet. This will make it unnecessary to disturb the magnetic circuit when replacing the magnet in its instrument case.

CAUTION: Care must be taken to place the meter magnet, coil, and movement in a position so that the moving element will be subjected to only a minimum induced current from the magnetizing fixture. Otherwise, the moving element may be damaged.

g. Place meter magnet in charging position as follows:

(*1*) Release the two clamping handles and open the switch-type magnetizing fixture.

(*2*) Remove the switch-blade-coupling pin.

(*3*) Select the number of blades to be used according to the size of the magnet. Use the largest number of blades that will pass easily through the window of the magnet. Turn excess blades to the left as far as possible to get them out of the way.

(*4*) Place the meter magnet on the switch blades by sliding it over the end of the switch handle to the center of the switch blades. If physically possible, the poles should be positioned next to the panel with the south pole uppermost. If the mechanical construction of the magnet necessitates placing the poles away from the panel, the north pole should be uppermost.

(*5*) Replace the coupling pin and close the switch of the magnetizing fixture.

(*6*) Clamp the switch blades in closed position with the two clamping handles.

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h. Depress the charge button in the upper right corner of the panel.

i. Allow 10 seconds for the capacitor to fully charge.

j. Depress the discharge button which is located above the charge button on the front panel.

CAUTION: Do not permit watches or other delicate mechanisms which can be harmed by a magnetic charge, to come within the effective magnetic field while the capacitor is being discharged through the magnetizing fixture. When all the switch blades are engaged, the magnetic field may affect a watch as far as 5 feet away from the magnet charger.

k. The meter magnet is now charged. Remove it from the magnetizing fixture by reversing the steps in subparagraph g. The magnet charger is ready for the next magnet.

l. Replace the magnet in the instrument. If a keeper has been used, take care not to break the magnetic circuit when replacing the keeper by the coil structure of the meter.

m. The remagnetized magnet, when replaced in the instrument, will be too strong and will have to be bucked down by means of the demagnetizing coil (fig. 9).

(*1*) Plug in demagnetizer cord to an a-c power source.

(*2*) Actuate the meter in the instrument by placing it in testing position in conjunction with Voltage Supply Unit PP-14/GSM-1 and Voltmeter Standards Unit TS-49/GSM-1, or Current Supply Unit PP-15/GSM-1 and Ammeter Standards Unit TS-50/GSM-1 (pars. 24 and 25).

(*3*) Calibrate the meter at a point approximately three-fourths full-scale deflection. Compare the reading of the meter which has just been charged with the reading of the standards meter. The reading will be too high.

(*4*) Pick up the demagnetizing coil and hold it approximately 2 feet from the meter case of the meter being calibrated.

CAUTION: Do not permit the demagnetizing coil to approach near enough to the standards unit to affect the accuracy of the standards meters. Keep it 2 feet or more away from the standards unit if it is physically possible.

(*5*) Press the push button on the handle of the demagnetizer and bring the demagnetizing coil closer to the meter under calibration until the meter reading agrees with the reading on the standards meter. Pump the push button (alternately press down and release) in cases of particularly stubborn or highly magnetized magnets. This will provide the effect of stronger transient demagnetizing currents.

CAUTION: Do not depress the push button on the handle for too long a time. The demagnetizing coil heats up rapidly.

n. When the demagnetizer is not in use, remove the power cord from the power source, to prevent overheating of the demagnetizing coil through accidental depression of the push button.

o. To remove power from Magnet Charger TS-336/GSM-1, throw the circuit breaker to OFF position.

PART THREE

PREVENTIVE MAINTENANCE

SECTION VI
PREVENTIVE MAINTENANCE TECHNIQUES

29. MEANING OF PREVENTIVE MAINTENANCE.

Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off to eliminate major break-downs and unwanted interruptions in service, and to keep the equipment operating at top efficiency. To understand the meaning of preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is to *prevent* break-downs and, therefore, the need of repair. On the other hand, the prime function of trouble shooting and repair is to locate and correct *existing* defects. The importance of preventive maintenance cannot be overemphasized. The entire system of Signal Corps communications depends upon the readiness and operating efficiency of each item of the equipment when it is needed. It is vitally important that the test equipment, by which this operating efficiency is checked, should be kept in excellent operating condition at all times.

NOTE: The operations in sections VI and VII are first and second echelon (organization operators and repairmen) maintenance. Since Meter Test Equipment AN/GSM-1 is available only to Signal Corps repair personnel in repair depots and base maintenance companies, or with repair trucks, the using organization personnel will be qualified also to make necessary repairs to the equipment.

30. DESCRIPTION OF PREVENTIVE MAINTENANCE TECHNIQUES.

a. General. Many of the electrical and mechanical parts used in the components of Meter Test Equipment AN/GSM-1 require routine preventive maintenance. Those requiring maintenance differ in the amount and kind required. Because hit-or-miss maintenance techniques shall not be used, definite and specific instructions are needed. This section of the manual contains these specific instructions and serves as a guide for personnel performing the six basic maintenance operations, namely: Feel, Inspect, Tighten, Clean, Adjust, and Lubricate. Throughout this manual the lettering system for the six operations will be as follows:

F—Feel
I—Inspect
T—Tighten
C—Clean
A—Adjust
L—Lubricate

The first two operations establish the need for the other four. The selection of operations is based on a general knowledge of test equipment maintenance requirements. For example, dust is present in even the cleanest repair shop, and filters into the equipment regardless of how much care is taken to prevent it. Movements of the equipment in ordinary use, or transportation from one base of operations to another result in loosening of parts, connections, and mountings. Without frequent inspections and the necessary performance of tightening, cleaning, and lubricating operations, equipment becomes undependable and subject to break-down when it is most needed.

b. Feel. The feel operation is used most often to check motors, motor bearings, electrical connections, insulating bushings, and transformers for overheating. Feeling indicates the need for lubrication or the existence of other defects requiring correction. The maintenance man must become familiar with normal operating temperatures of the equipment in order to recognize signs of overheating.

NOTE: It is important that the feel operation be performed as soon as possible after shut-down of the equipment and before any other maintenance is done.

c. Inspect. Inspection is the most important operation in the preventive maintenance program. A careful observer will detect minor troubles so that they may be corrected before they lead to break-down of the equipment. Make every effort to become thoroughly familiar with the indications of normal functioning, in order to be able to recognize defects promptly, when they occur. Inspection consists of carefully observing all parts of the equipment, noticing their color, placement, state of cleanliness, etc. Inspect for the following conditions:

(*1*) Overheating, as indicated by discoloration, blistering, or bulging of parts or surfaces; leakage of insulating compounds; and oxidation of metal contact surfaces.

(*2*) Placement, by observing that all leads, cabling, and parts are in their proper positions.

(*3*) Cleanliness, by carefully examining all recesses in the components for accumulation of dust, especially around electrical terminals. Parts, connections, and joints should be free of dust, corrosion, and other foreign matter. In tropical and high-humidity locations, look for fungus growth, moisture, and mildew.

(*4*) Tightness, by testing any connection or mounting which appears to be loose.

d. Tighten, Clean, and Adjust. These operations are performed whenever inspection shows the necessity for them. Specific procedures to be followed in performing them are given wherever necessary throughout part three.

CAUTION: Screws, bolts, and nuts should be tightened carefully. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

e. Lubricate. Lubrication refers to the application of grease or oil to bearings, rotating shafts, hinges, or other sliding surfaces on the equipment.

31. APPLICATION OF PREVENTIVE MAINTENANCE TECHNIQUES.

Paragraphs 32 through 45 describe how the general techniques of preventive maintenance are applied to the components and parts of Meter Test Equipment AN/GSM-1. This section does not deal with individual vacuum tubes, resistors, capacitors, etc., used in the equipment, but describes the steps of preventive maintenance performed on the major classes of parts and devices.

32. TUBES AND SOCKETS.

CAUTION: Avoid touching any of the tubes immediately after shutdown. Severe burns may result from contact with the envelopes of hot tubes.

a. Inspect (I). Inspect tubes, tube caps, cap clips, and sockets for dirt and corrosion at exposed connections, poor pin contacts and socket connections, loose mountings and seals on tube envelopes. Inspect tubes for loose mounting by pressing them gently down in their sockets. Replace tubes having loose caps or loose glass envelopes.

b. Tighten (T). Tighten loose tube clamps,

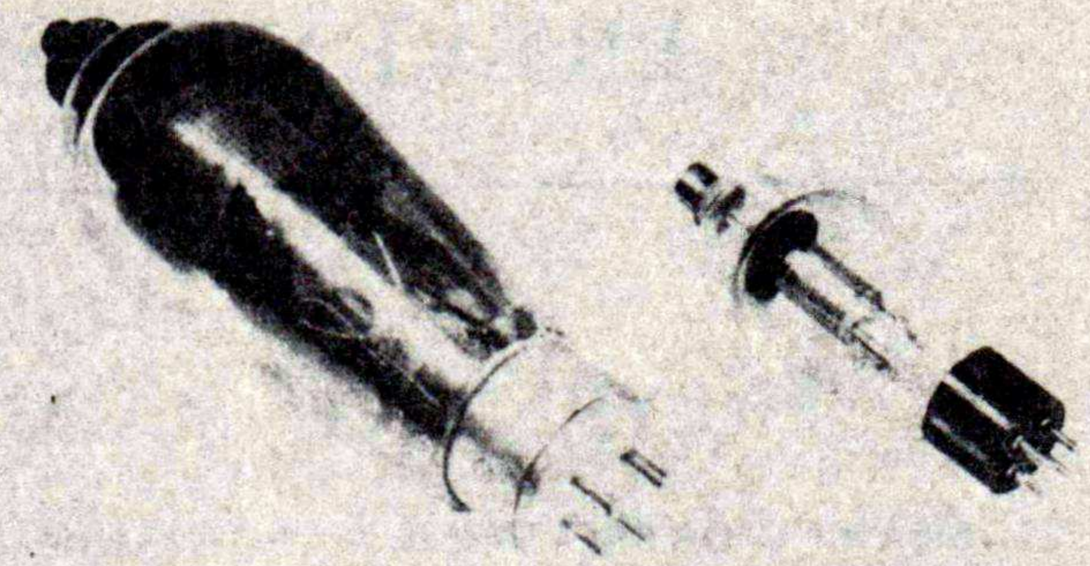

Figure 19. Types of tubes used in Meter Test Equipment AN/GSM-1.

insulated socket mountings, and bushing screws on high-voltage tube sockets carefully to avoid damaging the molded plastic or phenolic material of the tube base, socket, or bushing.

c. Clean (C). Keep rectifier tubes (fig. 19) spotlessly clean. Accumulations of dirt or dust form leakage paths which, at the high voltages used in these tubes, may result in arc-over and break-down.

(*1*) Do not remove tubes from their sockets for cleaning unless they are very dirty and cannot be readily cleaned while in the socket.

(*2*) Use a clean, dry cloth to clean tubes. When dirt is stubborn, use a cloth moistened with dry-cleaning solvent (Solvent, Dry Cleaning (SD), Federal spec No. P-S-661a). Crocus cloth may be used to remove corrosion from tube caps, tube pins, and socket contacts.

CAUTION: When cleaning tubes, exercise care to avoid twisting the envelope loose from the tube base.

33. CAPACITORS.

CAUTION: Discharge all large capacitors by use of a shorting stick before inspecting. Severe electrical shock may occur if this precaution is not observed.

a. Inspect (I). Inspect the terminals of all large capacitors for corrosion or loose connections. Inspect the mountings for loose mounting screws, studs, or brackets. Inspect the cases for leaks and bulges.

b. Tighten (T). Tighten loose terminals, mountings, and connections on the capacitors. If leakage occurs around the bushing gaskets of the large oil-filled capacitors, carefully tighten the retaining-nuts on the insulating bushings. When tightening a nut be careful not to break the bushing or damage the gasket.

c. Clean (C). Clean the cases of large fixed

capacitors, the insulating bushings, and any connections that are dirty or corroded. The capacitor cases and bushings can usually be cleaned with a dry cloth, but if the deposit of dirt is hard to remove, moisten the cloth with dry-cleaning solvent (SD). Carefully wipe the bushings with a dry cloth after they are cleaned. Clean corroded connections with ⁄0000 sandpaper and then tighten.

34. RESISTORS.

a. Wire-wound, Ceramic-coated, and Ferrule-type Resistors (fig. 20). Preventive maintenance of the wire-wound, ceramic-coated, and ferrule-type resistors is performed as follows:

(*1*) *Inspect* (*I*). Inspect the coating of the resistor for dirt, cracks, and chipping. Check for indications of overheating such as blistering and discoloration. Inspect for loose, dirty, or corroded mountings and connections.

(*2*) *Tighten* (*T*). Tighten loose mountings and connections.

(*3*) *Clean* (*C*). Clean the coating with a clean, dry cloth or cloth moistened with dry-cleaning solvent (SD) if dirt is hard to remove. Clean mountings and connections. Remove corrosion with ⁄0000 sandpaper and then tighten fastenings.

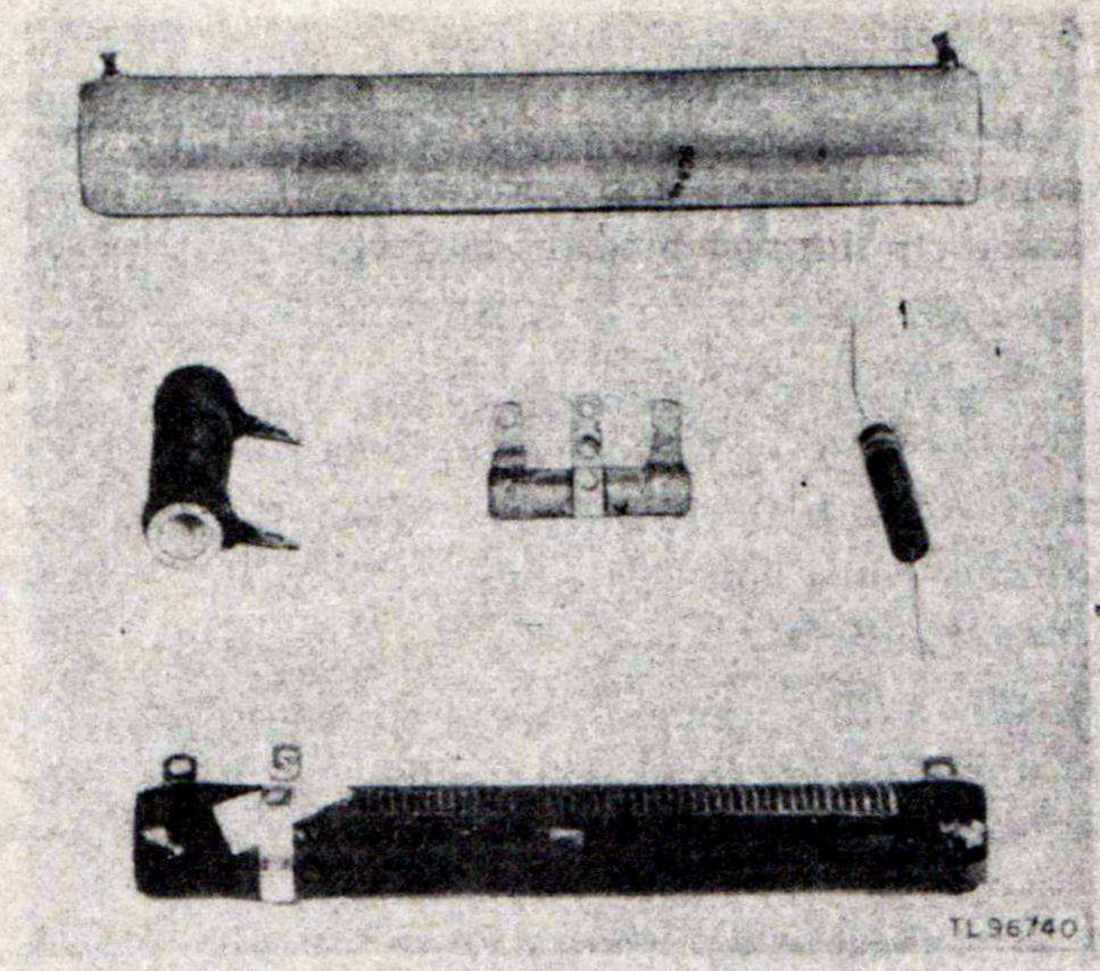

Figure 20. Typical resistors.

b. Pig-tail Resistors. Pig-tail resistors require very little preventive maintenance. When the chassis is inspected, inspect the pig-tail resistors for dirt and signs of overheating. When the chassis is cleaned, clean these resistors with a small brush if they are dirty.

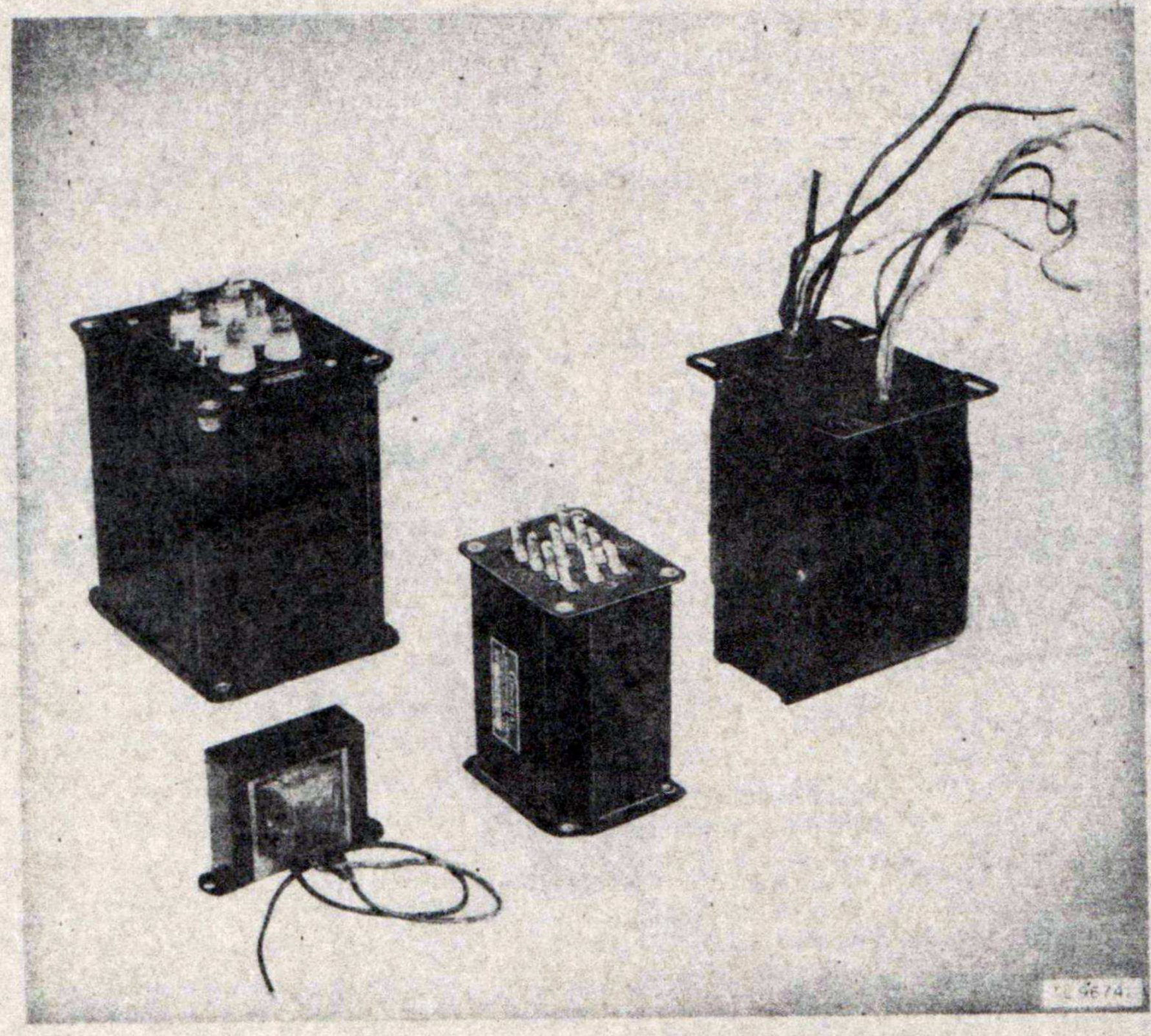

Figure 21. Typical transformers and chokes.

35. FUSES.

a. Inspect (I). Examine the fuse caps and mountings for charring and corrosion. Inspect fuse clips for dirt, improper tension, and loose connections. Examine the fuse to determine that it is of the proper size.

b. Tighten (T). Tighten loose fuse clips by bending them slightly inward. Where the fuse is inserted in a tubular fuse holder, screw the fuse cap into the panel until it is firmly seated. Avoid excessive pressure.

c. Clean (C). Remove corrosion from fuse ends and mountings with ✱0000 sandpaper. Wipe with a clean, dry cloth.

36. BUSHINGS AND INSULATORS.

a. Inspect (I). Examine bushings and insulators for chipping, cracks, and rough spots on the surface. Replace any which have these defects. Inspect for dirt and moisture. Check for loose, dirty, or corroded mountings and fastenings.

b. Tighten (T). Tighten loose mountings and fastenings. Avoid exerting excessive pressure on bushings and insulator mounting screws to prevent damaging the fragile ceramic material.

c. Clean (C). Keep high-voltage porcelain insulators and bushings spotlessly clean. Accumulations of dirt form leakage paths which may result in arc-over and break-down. Clean frequently with a clean, dry cloth. If dirt is difficult to remove, use a cloth moistened with dry-cleaning solvent (SD). *Never use an abrasive on the smooth, glazed bushing surface.* Wipe with a clean, dry cloth after cleaning with solvent. Clean corroded mountings and connections with ✱0000 sandpaper and then tighten.

37. TRANSFORMERS AND CHOKES (fig. 21).

a. Inspect (I). Inspect all transformers and chokes for dirt, corrosion, and loose mountings and connections.

(*1*) Examine transformers for signs of overheating. If there is evidence of overheating, determine the cause and correct it.

(*2*) Check oil-filled transformers for leaks. Repair all leaks.

b. Tighten (T). Tighten all loose mountings and connections.

c. Clean (C). Clean transformers and chokes with a clean, dry cloth (or a cloth moistened with dry-cleaning solvent (SD) if dirt is hard to remove). Clean corroded mountings and connections with ✱0000 sandpaper and then tighten. Remove corroded soldered connections and resolder.

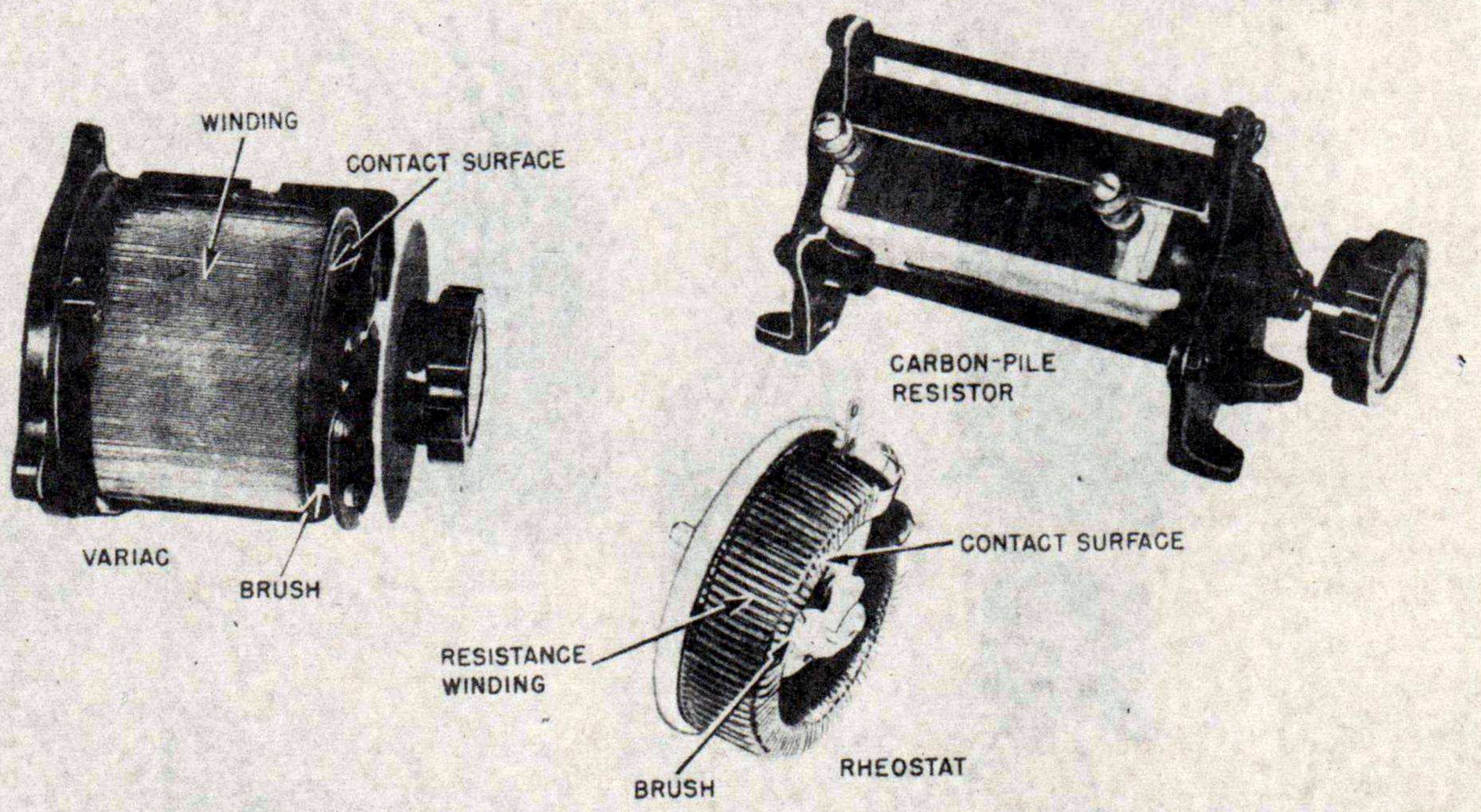

Figure 22. Typical rheostat, variac, and carbon-pile resistor.

38. POTENTIOMETERS AND RHEOSTATS (fig. 22).

a. Inspect (I). Examine moving parts for wear and resistance element for signs of overheating. Check the tension of potentiometer and rheostat wiping arms. They should make good contact without being tight enough to damage the resistor element. Inspect all metallic parts, mountings, and connections for dirt, corrosion, and looseness. Inspect shafts or other mechanisms associated with the potentiometer or rheostat for smooth action, dirt, corrosion, looseness, and need of lubrication.

b. Tighten (T). Tighten all loose mountings, fastenings, and connections. Tighten loose control knobs.

c. Clean (C). Clean potentiometers and rheostats with a clean, dry cloth (or a cloth moistened with dry-cleaning solvent (SD) where dirt is hard to remove). Remove corrosion from contact surfaces with crocus cloth. Remove corrosion from mountings and connections with ✻0000 sandpaper and then tighten.

d. Lubricate (L). Lubricate shafts (mechanisms associated with the potentiometer or rheostat) with Oil, Lubricating, Preservative, Special (PS) U. S. Army spec No. 2-120. Use oil sparingly. Lubricate sliding contact surfaces with Petrolatum (PET), U. S. Army spec No. 2-67A.

39. RELAYS AND SWITCHES.

a. Inspect (I). Inspect the housing, mountings, and connections for dirt, corrosion, and looseness. Determine that the mechanism is in proper operating condition by manually putting it through its cycle of operation two or three times. Simulate the operation of relays by moving the armature or solenoid plunger as it would be moved if the coil were energized. Examine coils for signs of overheating. Inspect metal parts of the mechanism for dirt, corrosion, looseness, and excessive wear. Inspect contacts for excessive wear, pitting, and improper alignment and spacing. Check to ascertain that good contact is made when the contacts are in the closed position.

NOTE: Do not disassemble relays or switches to make routine inspections unless specifically instructed to do so, or unless trouble is suspected in the unit.

b. Tighten (T). Tighten all loose mountings, fastenings, and connections.

c. Clean (C).

(*1*) Clean external and internal parts of relays and switches with a clean, dry cloth (or a cloth moistened with dry-cleaning solvent (SD) if dirt is hard to remove). Remove corrosion from mountings, fastenings, and connections with ✻0000 sandpaper and then tighten.

(*2*) Clean sliding copper contact surfaces in the same manner as the remainder of the unit. Remove corrosion, burning, and pitting with crocus cloth or ✻0000 sandpaper.

(*3*) Clean hard-alloy contacts while holding them together by drawing a strip of clean paper or cloth between them. Moisten with dry-cleaning solvent (SD) if dirt is difficult to remove. Polish with dry paper. Remove corrosion and pitting from hard-alloy contacts with a folded strip of crocus cloth or ✻0000 sandpaper in the same manner. Large contacts that are badly burned or pitted may be dressed with a fine-cut file or ✻0000 sandpaper. Maintain the original contour of the contact surface.

(*4*) Clean silver or silver-plated contacts with a cloth or brush moistened with dry-cleaning solvent (SD). Polish with a dry cloth. The brown discoloration found on silver and silver-plated contacts is a good conductor. Leave it alone unless the contacts must be cleaned for some other reason. Clean corroded and pitted silver contacts with crocus cloth. Polish with a clean cloth. Silver-plated contacts that have become corroded or pitted should be replaced if possible. Avoid using a coarse abrasive or file on silver or silver-plated contacts.

d. Adjust (A). Adjust contact spacing and spring tensions *if necessary*.

e. Lubricate (L). Lubricate shafts and moving parts of mechanisms with special preservative lubricating oil (PS). Lubricate sliding contact surfaces with petrolatum (PET). Use lubricant sparingly.

40. VARIACS (fig. 22).

a. Inspect (I). Inspect for loose, dirty, or corroded mountings, fastenings, and connections. Examine variacs for dirty or corroded contact surfaces and windings, and for excessive wear of mechanical parts and brushes. Replace badly worn brushes. Inspect windings for signs of overheating.

b. Tighten (T). Tighten all loose mountings, fastenings, and connections. Increase tension of brush springs if necessary.

c. Clean (C). Clean variacs with a clean, dry cloth or a cloth moistened with dry-cleaning solvent (SD) if dirt is difficult to remove. Remove corrosion from contact surfaces with crocus cloth or ✻0000 sandpaper. If the winding surface on which the brush bears becomes loaded with carbon particles, dismount the variac, remove the cover,

and dismount the brushes. Remove the loose particles with a fine brush and then clean with dry-cleaning solvent (SD).

d. Lubricate (L). If the variac shafts show signs of binding or if they squeak, apply a few drops of special preservative lubricating oil (PS) at the front and rear bearings, rotating the control or shaft back and forth a number of times.

41. TERMINAL STRIPS AND WIRING.

a. Inspect (I). Inspect terminal strips and wiring for dirt, corrosion, loose or broken lacing, frayed or damaged insulation, loose mountings, and poor connections.

b. Tighten (T). Tighten all loose mountings and fastenings. Tighten or re-tie loose or broken lacings. Repair damaged insulation.

c. Clean (C). Clean terminal strips and wiring with a dry brush or a cloth or brush moistened with dry-cleaning solvent (SD) where dirt is hard to remove.

42. CORDS, CABLES, CONNECTORS, AND JACKS.

a. Inspect (I). Inspect cords and cables for dirt, damaged or deteriorated insulation, and dirty, corroded, or damaged connectors. Cords and cables must not be strained, kinked, or forced against sharp edges or corners. Never make sharp bends in cords or cables. Examine connectors and jacks for good electrical contact, loose mounting, and loose wiring connections.

b. Tighten (T). Tighten loose cable clamps, coupling rings, and connections.

c. Clean (C). Clean cords and cables with a clean, dry cloth or a cloth moistened with dry-cleaning solvent (SD) where dirt is hard to remove. Clean dirty connectors in the same manner. Remove corrosion from connectors with #0000 sandpaper. Thoroughly clean the surface, onto which the filings drop, to prevent flash-over when the equipment is used again.

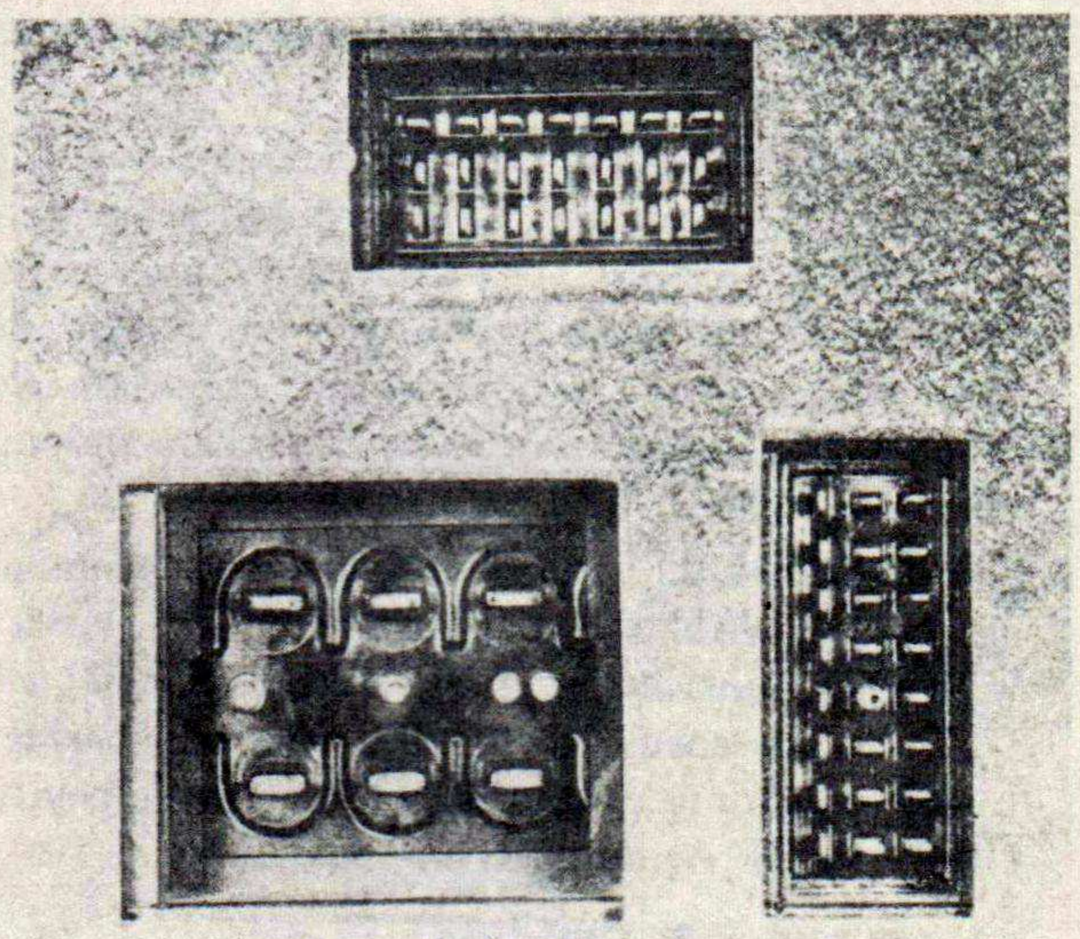

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Figure 24. Typical connectors.

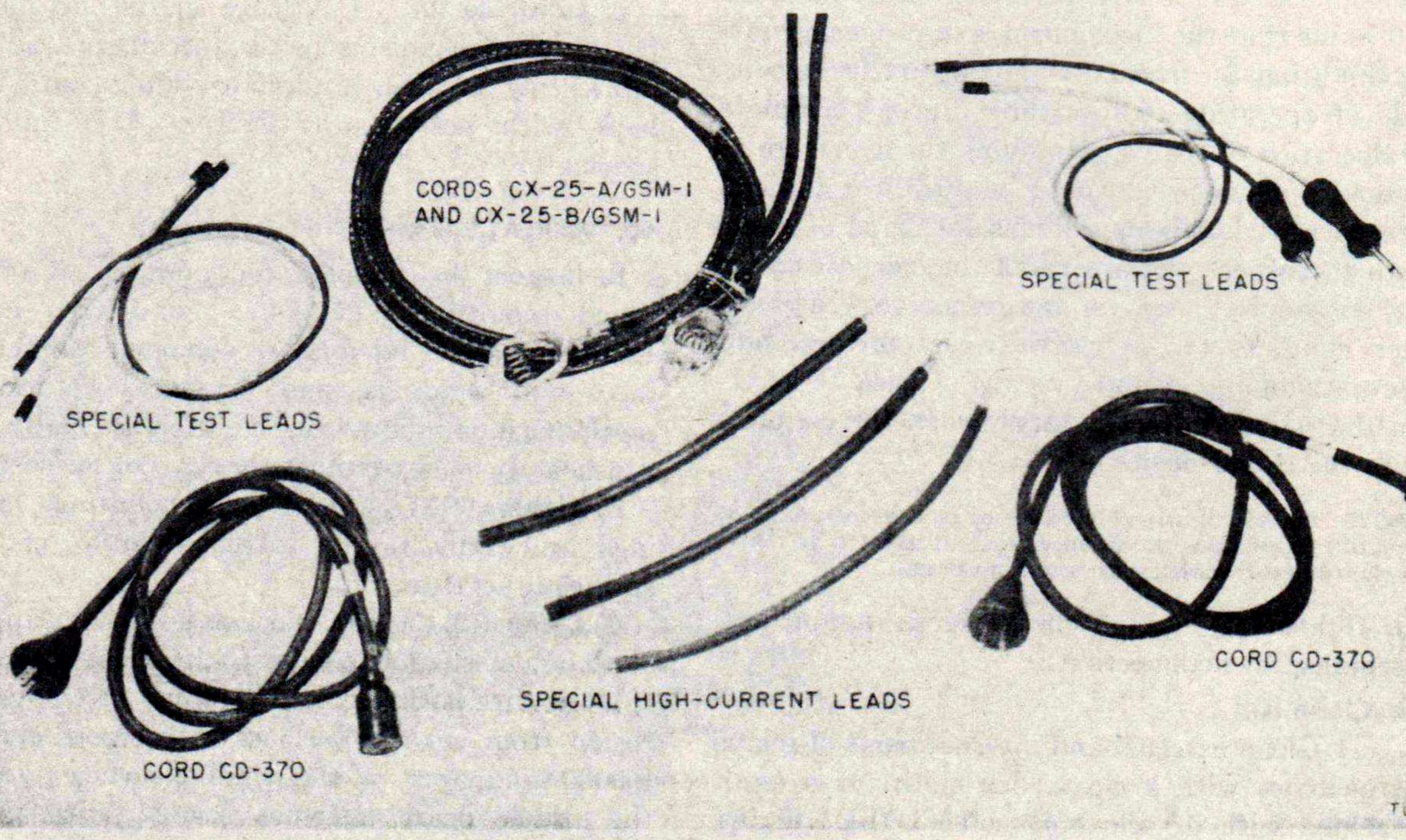

Figure 23. Cords and special leads.

43. METERS.

a. Inspect (I). Inspect meters for loose, dirty, or corroded mountings and connections, and cracked or broken cover glasses.

b. Tighten (T). Tighten loose mountings and connections. Tighten meter connections with care to avoid cracking the meter case.

c. Clean (C). Clean meter cases and cover glasses with a clean, dry cloth or a cloth moistened with dry-cleaning solvent (SD) if dirt is difficult to remove. Remove dirt from mountings and connections with a stiff brush moistened with dry-cleaning solvent. Remove corrosion from mountings and connections with ✱0000 sandpaper, and then tighten.

d. Adjust (A). A meter must be zero-adjusted if its needle does not return exactly to zero with the equipment turned off. View the needle from the front and tap lightly with a finger to overcome any slight bearing friction before deciding that adjustment is necessary. If adjustment is necessary, slowly turn the zero-adjustment screw below the meter glass until the pointer is at zero.

44. PILOT LIGHTS.

a. Inspect (I). Inspect pilot-light assemblies for dirt, broken or cracked pilot-light jewels, loose or defective bulbs, and dirty, loose, or corroded mountings and connections.

b. Tighten (T). Tighten loose bulbs, mountings, and connections. Replace defective or burned-out bulbs. Replace broken or cracked pilot-light jewels.

c. Clean (C). Clean pilot-light assemblies and parts with a clean, dry cloth or a cloth moistened with dry-cleaning solvent (SD) if dirt is not easily removed. Remove corrosion from metal parts and connections with ✱0000 sandpaper.

45. CABINETS AND CASES.

a. Inspect (I). Inspect all surfaces, mountings, fastenings, and hardware for dirt, deterioration of painted or plated surfaces, loose mountings and fastenings, rust on uncoated metallic surfaces, or other indications of wear. At the same time the cabinet is inspected, inspect all accessible controls, meters, switches, jacks, and pilot lamps for dirt, corrosion, looseness, and visible defects.

b. Tighten (T). Tighten all loose hinges, mountings and fastenings.

c. Clean (C). Clean all surfaces with a clean, dry cloth or a cloth moistened with dry-cleaning solvent (SD) if dirt is hard to remove. Touch up with matching paint any spots where paint has cracked or chipped.

d. Lubricate (L). Lubricate lid hinges and latches with Oil, Engine (OE) U. S. Army spec No. 2-104B when necessary. Use oil sparingly. Wipe off excess oil.

SECTION VII
ITEMIZED PREVENTIVE MAINTENANCE

46. PREVENTIVE MAINTENANCE ITEMS.

For ease and efficiency of performance, preventive maintenance on Meter Test Equipment AN/GSM-1 is broken down into operations that can be performed at different time intervals. In this section, the preventive maintenance work to be performed on the equipment at specified time intervals is broken down into units of work called items. The general techniques involved and the application of the FITCAL operations in performing preventive maintenance on individual parts are discussed in section VI. These general instructions are not repeated in this section. When performing preventive maintenance, refer to section VI if more information is required on the following items. All work is to be performed with the power removed from the equipment. After preventive maintenance has been performed on a given day, the equipment should be put into operation and checked for satisfactory performance.

47. COMMON MATERIALS NEEDED.

The following materials will be needed in performing the preventive maintenance items:

Oil, Engine, U. S. Army spec No. 2-104B.

Oil, Lubricating, Preservative, Special, U. S. Army spec No. 2-120.

Petrolatum, U. S. Army spec No. 2-67A.

Solvent, Dry Cleaning, Federal spec No. P-S-661a.

Tool Equipment TK-21/G (Electrical Instrument Repairman).

Tool Equipment TK-22/G (Non-electrical Instrument Repairman).

Tool Equipment TK-3/MSM-2.

The three tool equipments, listed above, are not furnished with Meter Test Equipment AN/GSM-1, but one or more of the tool equipments will be available to personnel of all organizations to which Meter Test Equipment AN/GSM-1 is issued. Any one of the tool equipments mentioned con-

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tains all tools necessary for preventive maintenance work on the meter test equipment.

NOTE: Gasoline will not be used as a cleaning fluid for any purpose. Solvent, Dry-Cleaning, is available as a cleaning fluid through established supply channels. Oil, Fuel, Diesel, may be used for cleaning purposes when dry-cleaning solvent is not at hand. Carbon tetrachloride will be used as a cleaning fluid only where specified for cleaning contact parts of electrical equipment, or as specified where inflammable solvents cannot be used because of the fire hazard. Oil, Fuel, Diesel, *will not* be used for cleaning electrical contacts.

48. ITEM 1, EXTERIOR OF VOLTAGE SUPPLY UNIT PP-14/GSM-1.

Operations.

ITC Case.
ITC Control knobs.
IC Jacks and binding post.
IC Pilot-light jewel.
IC Receptacles.

49. ITEM 2, EXTERIOR OF CURRENT SUPPLY UNIT PP-15/GSM-1.

Operations.

ITC Case.
ITC Control knobs.
ITC Jacks and binding posts.
IC Pilot-light jewel.
IC Receptacles.

50. ITEM 3, EXTERIOR OF VOLTMETER STANDARDS UNIT TS-49/GSM-1.

Operations.

ITC Frame.
IC Meters.
IC Cables and plugs.

51. ITEM 4, EXTERIOR OF AMMETER STANDARDS UNIT TS-50/GSM-1.

Operations.

ITC Frame.
IC Meters.
IC Binding posts.
IC Cables and plugs.

52. ITEM 5, MOUNTINGS MT-135/GSM-1 AND MT-175/GSM-1.

Operations.

IC Box, pedestal, and tray.
ITC Knob.
IC Leads and plugs.

53. ITEM 6, EXTERIOR OF DECADE RESISTANCE BOXES.

Operations.

IC Cases and panels.
ITC Switch knob.
IC Binding posts.

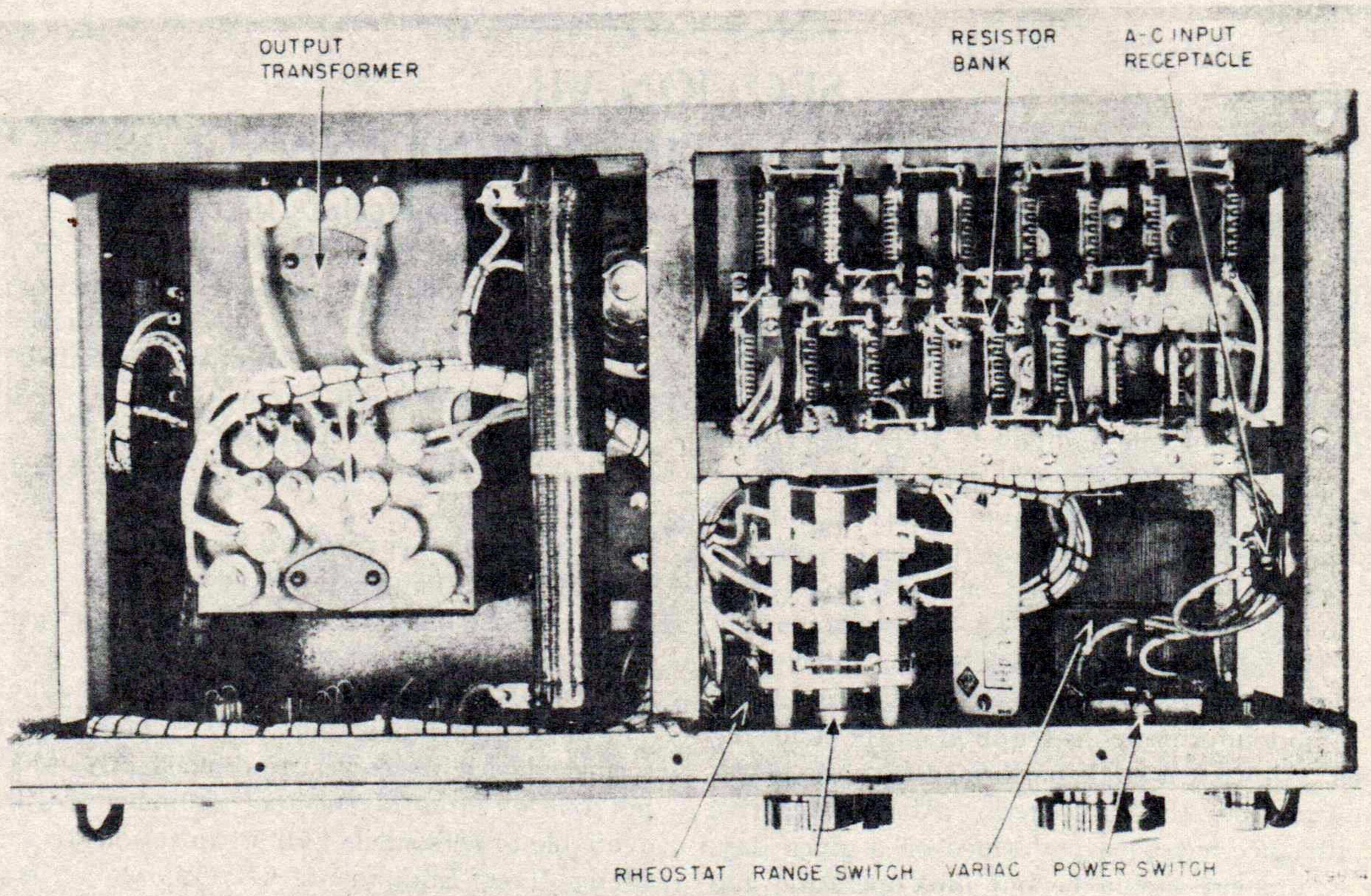

Figure 25. Voltage Supply Unit PP-14/GSM-1, top view of interior.

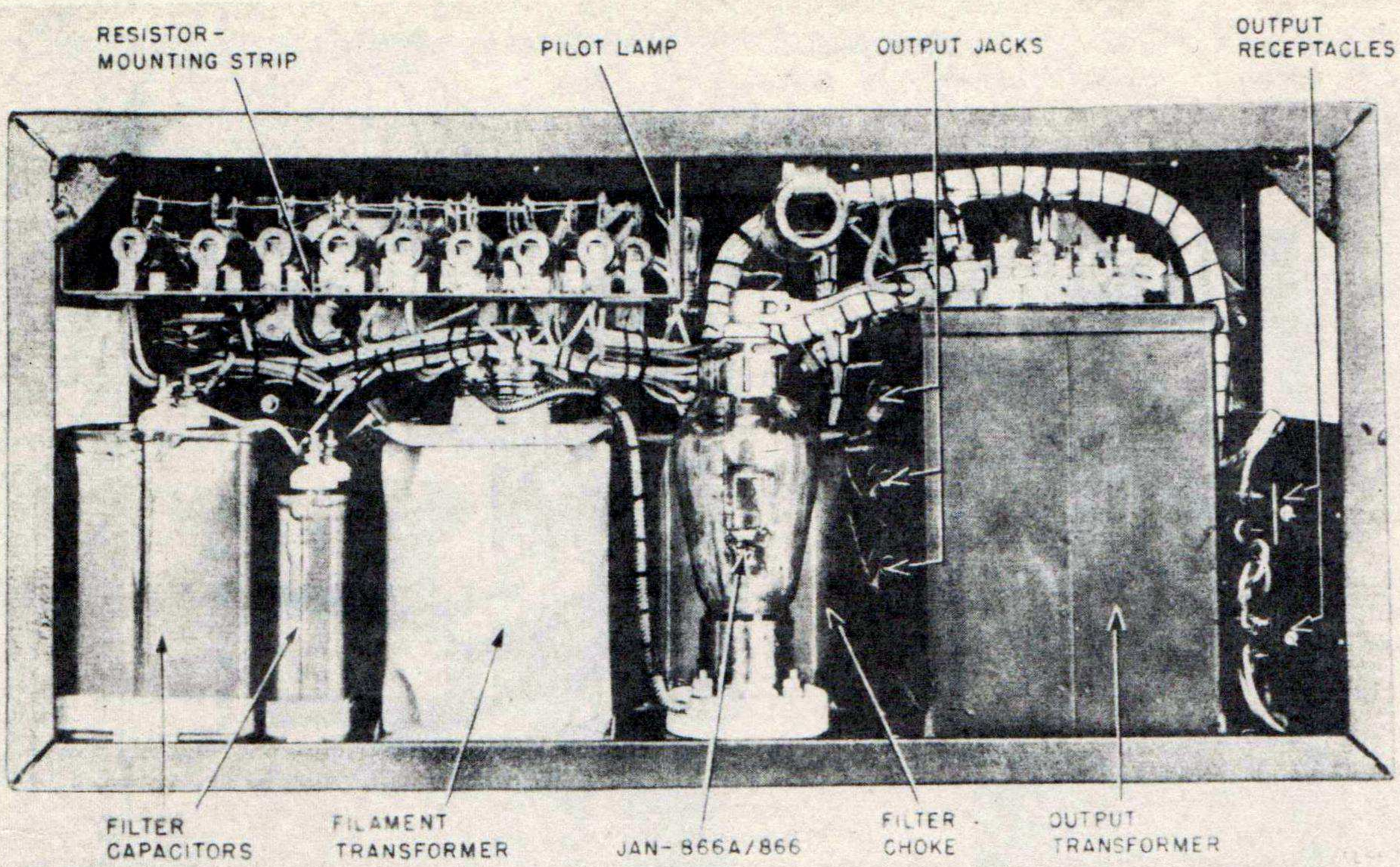

Figure 26. Voltage Supply Unit PP-14/GSM-1, rear view of interior.

54. ITEM 7, EXTERIOR OF MAGNET CHARGER TS-336/GSM-1.

Operations.

ITC Case, cover, and lifting lugs.
IC Panel lights.
IC Circuit breaker, push buttons, and magnetizing fixture.
L Magnetizing-fixture blades (par. 39).
IC Cord and receptacle.
IC Demagnetizer coil, cord, and plug.

55. ITEM 8, FREQUENCY METER (WESTON MODEL 339).

Operations.

IC Case and cover.
IC Panel, meter face, and binding posts.

56. ITEM 9, EXTERIOR OF TEST SET I-49.

Operations.

IC Case, cover, and panel.

REMARKS. See TM 11-2019 for maintenance instructions.

57. ITEM 10, EXTERIOR OF TEST SET I-56-K.

Operations.

IC Carrying case.
ITC Equipment cases, panels, lids, and handles.

REMARKS. See TM 11-2613, TM 11-2626, and TM 11-2627 for maintenance instructions for Voltohmmeter I-166, Test Unit I-176, and Tube Tester I-177.

58. ITEM 11, CASES CY-25/GSM-1 AND CY-24/GSM-1.

Operations.

IC Cases, lids, fasteners.
IC Compartments and contents (leads and spares).

59. ITEM 12, VOLTAGE SUPPLY UNIT PP-14/GSM-1.

PRELIMINARY STEPS. Remove all cables and cords connected to the receptacles. Remove the screws holding the chassis in the case. Pull the chassis and panel from the case by the handles mounted on each end of the panel.

Operations.

FITC Transformers and chokes.
ITC Tube and socket.
ITC Capacitors.
ITC Resistors.
ITC Fuses.
ITC Bushings and insulators.
ITCL Rheostat and variac.
ITCL Switches.
ITC Terminals and wiring.
ITC Pilot light.
ITC Chassis, mountings, and recesses.
ITC Jacks and receptacles.

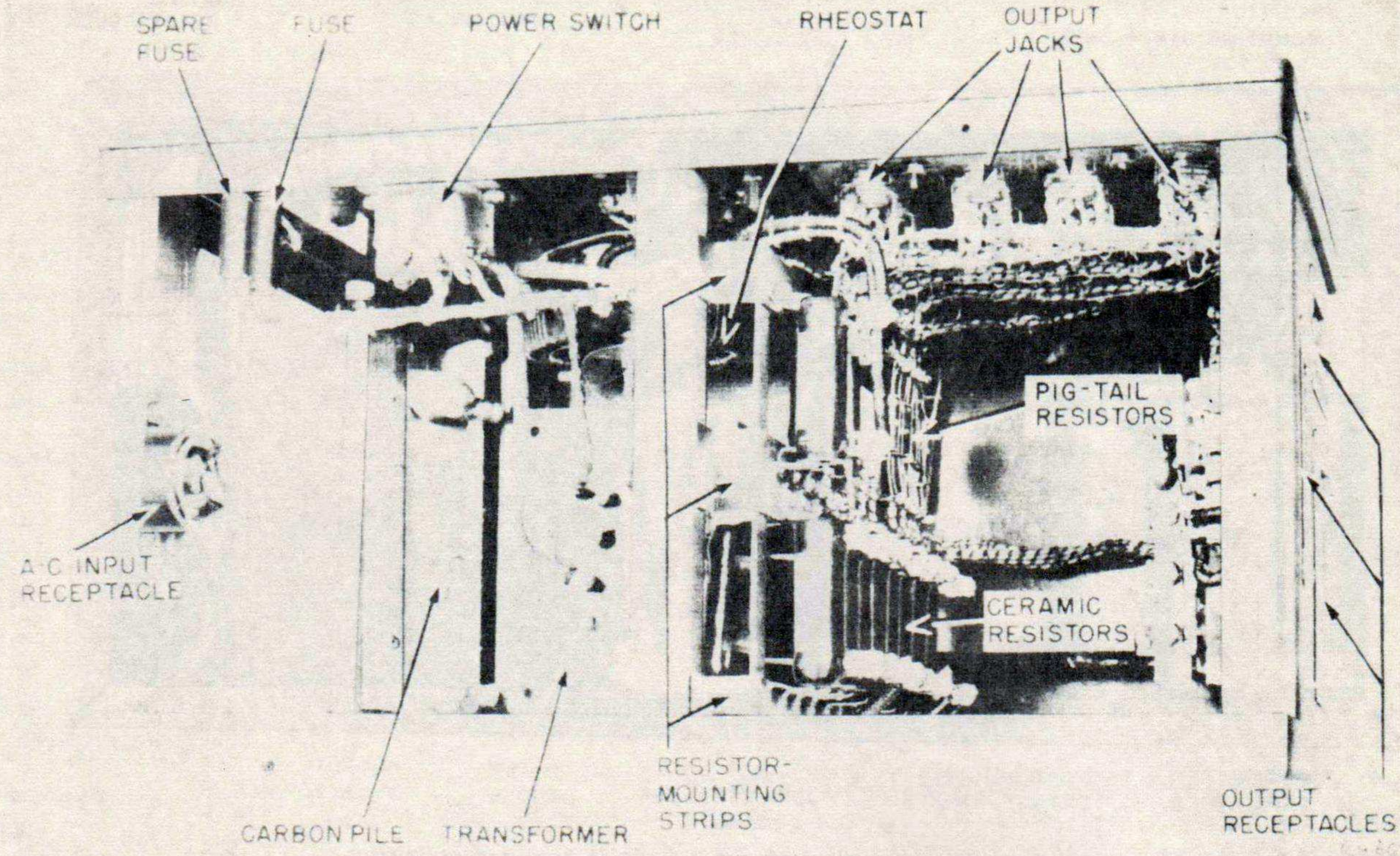

Figure 27. Current Supply Unit PP-15/GSM-1, top view of interior.

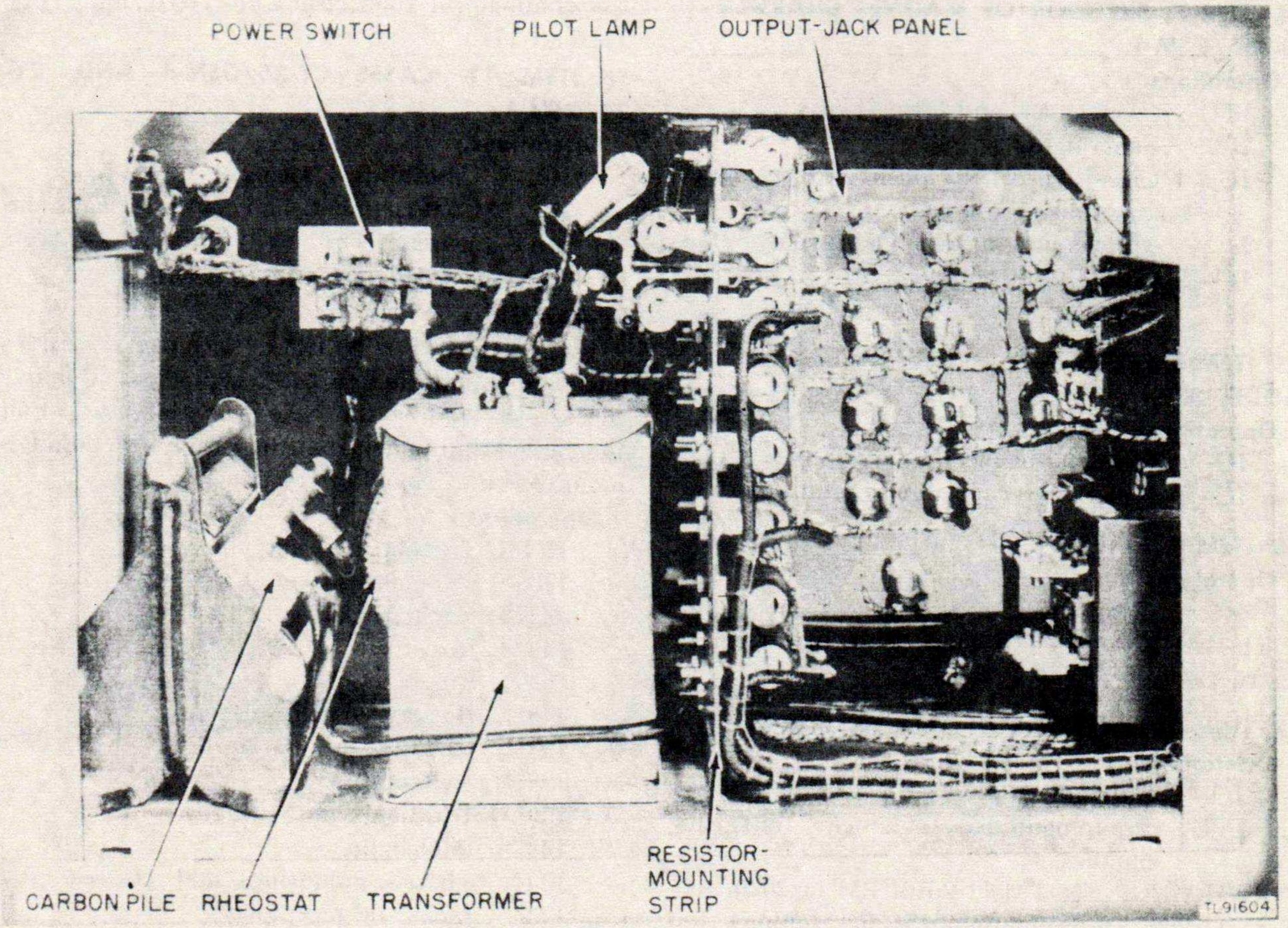

Figure 28. Current Supply Unit PP-15/GSM-1, rear view of interior.

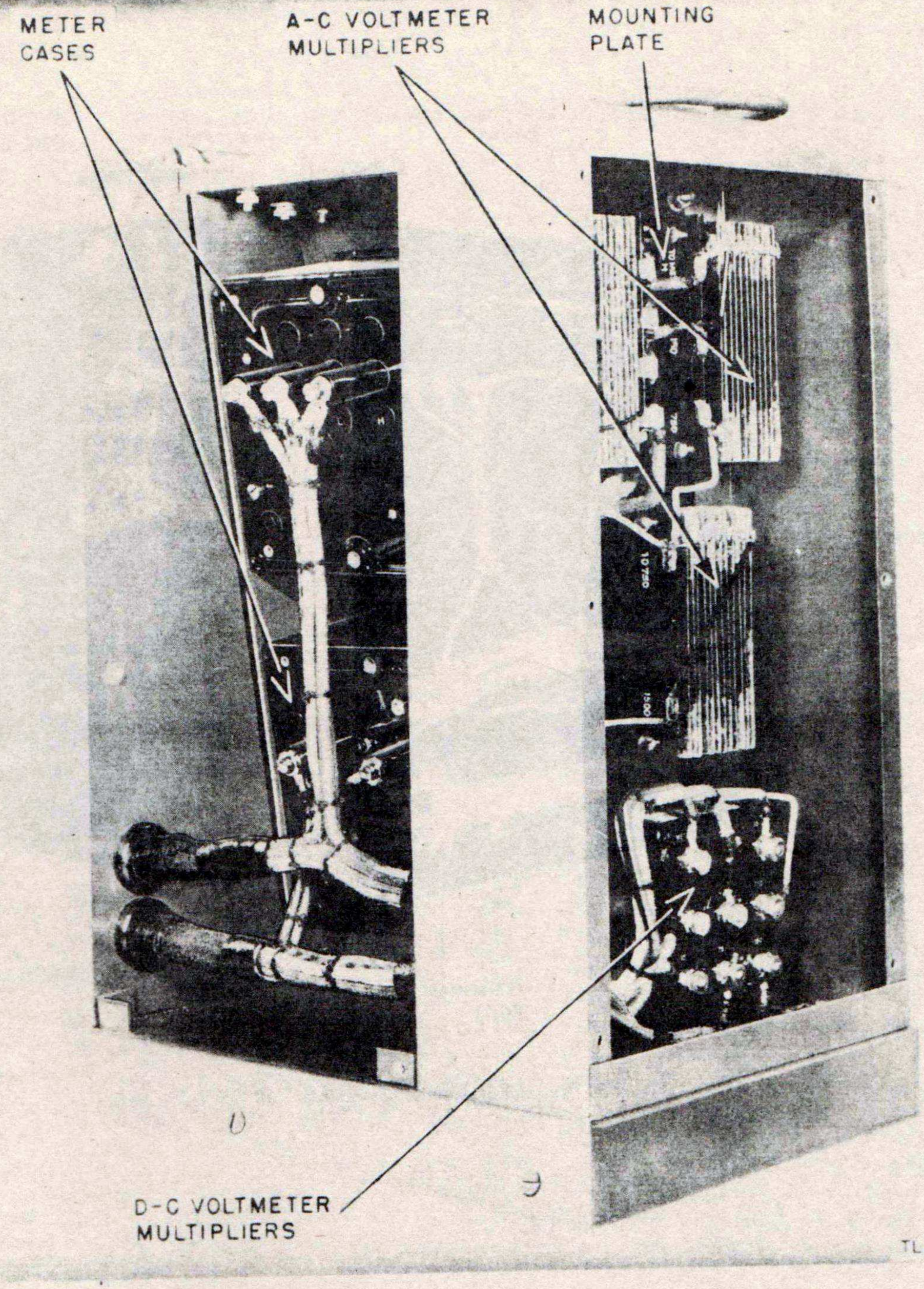

Figure 29. Interior of Voltmeter Standards Unit TS-49/GSM-1.

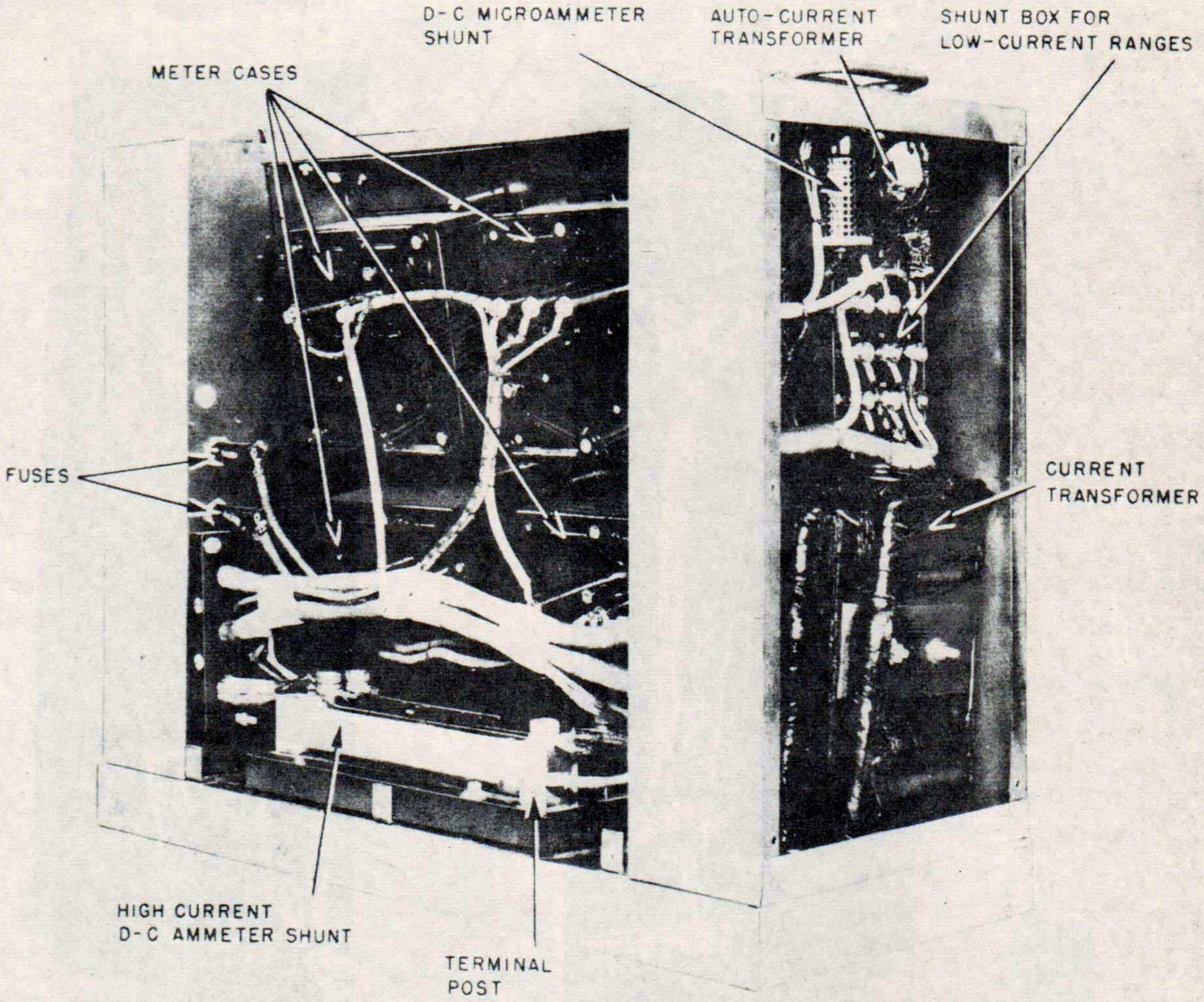

Figure 30. Interior of Ammeter Standards Unit TS-50/GSM-1.

60. ITEM 13, CURRENT SUPPLY UNIT PP-15/GSM-1.

PRELIMINARY STEPS. Remove all cables and cords connected to the receptacles. Remove the screws holding the chassis in the case. Pull the chassis and panel from the case by the two handles mounted on each end of the panel.

Operations.

FITC Transformer.
ITC Resistors.
ITC Fuses.
ITCL Rheostat.
ITC Carbon pile resistor.
ITC Switch.
ITC Terminals and wiring.
ITC Pilot light.
ITC Chassis, mountings, and recesses.
ITC Jacks and receptacles.

61. ITEM 14, VOLTMETER STANDARDS UNIT TS-49/GSM-1.

PRELIMINARY STEPS. Remove screws mounting the right-hand end cover and the rear cover. This gives access to all multipliers and interior connections.

Operations.

ITC Resistors (multipliers).
ITC Terminals and wiring.
ITC Chassis, mountings, and recesses.
ICA Meters.

62. ITEM 15, AMMETER STANDARDS UNIT TS-50/GSM-1.

PRELIMINARY STEPS. Remove screws mounting the right-hand end cover, the rear cover, and the bottom plate. This gives access to interior parts and connections.

Operations.

ITC Resistors (shunts).
ITC Transformer.
ITC Terminals and wiring.
ITC Chassis, mountings, and recesses.
ICA Meters.

63. ITEM 16, DECADE RESISTANCE BOXES.

PRELIMINARY STEPS. Remove the screws which hold the panels to the top of each decade resistance box. Lift panels off the boxes to gain access to resistance elements and switch contacts.

Operations.

IC Box and back of panel.
IC Resistance elements.
ICAL Switches.
IC Wiring.

REMARKS. Adjust leaves so they make good electrical contact on the contact surfaces, *if necessary.* Lubricate contact surface lightly with Petrolatum, U. S. Army spec No. 2-67A. Wipe excess lubricant off the contact surfaces with a clean, lint-free, dry cloth so that only a thin film remains on the contacts.

64. ITEM 17, MAGNET CHARGER TS-336/GSM-1.

PRELIMINARY STEPS. Remove the screws along the top and sides of the unit and lift off the hood.

Operations.

ITC Tubes and sockets.
ITC Capacitors.
ITC Resistors.
ITC Bushings and insulators.
ITC Transformers.
ITC Relay, circuit breaker, and switches.
ITC Wiring and connections.
ITC Interior of cabinet.

REMARKS. Short out high-voltage capacitor before performing maintenance on the inside of the cabinet. The safety-interlock switch may not be functioning. Do not disassemble the time-delay relay for service unless it gives trouble.

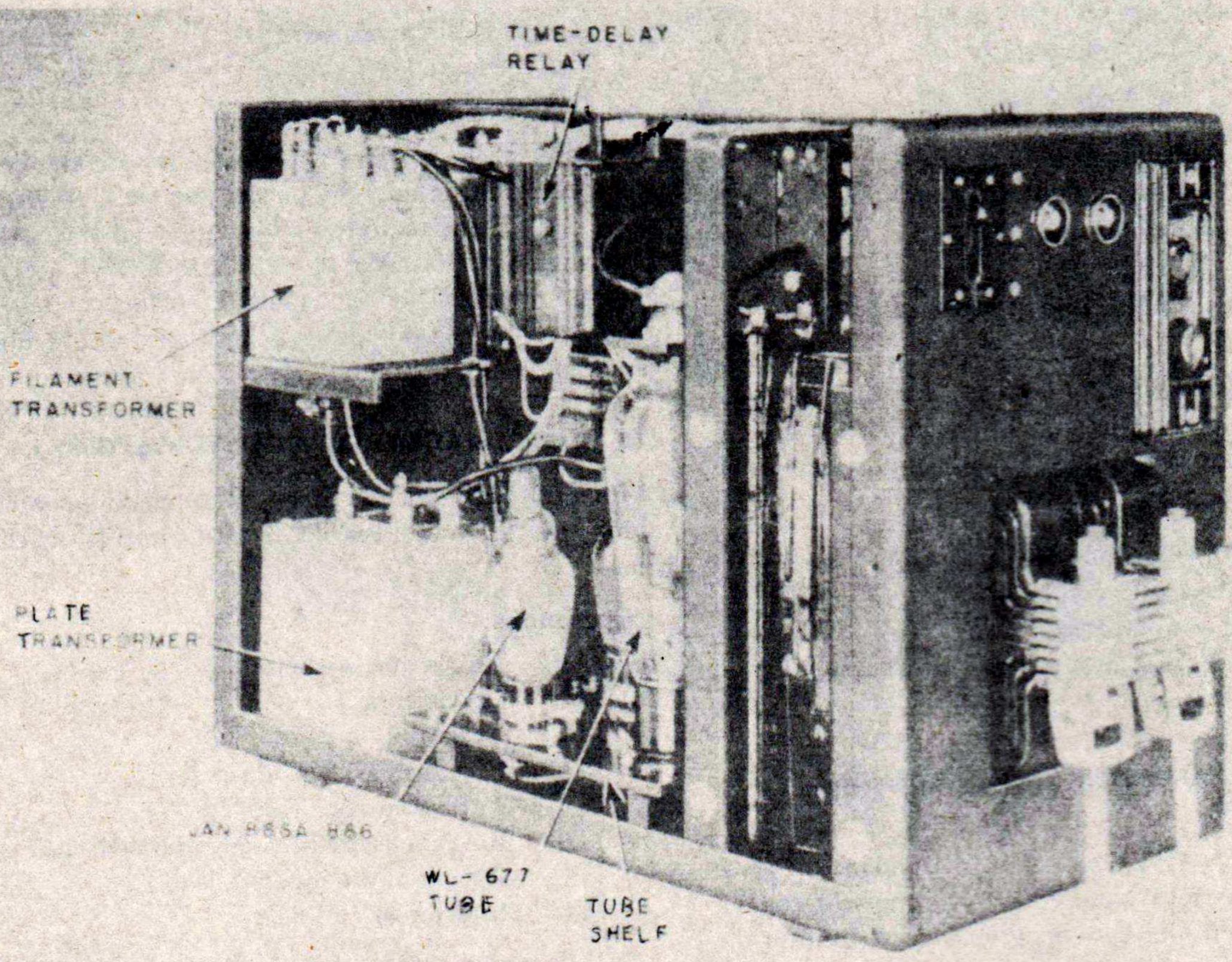

Figure 31. Magnet Charger TS-336/GSM-1, interior view from left side.

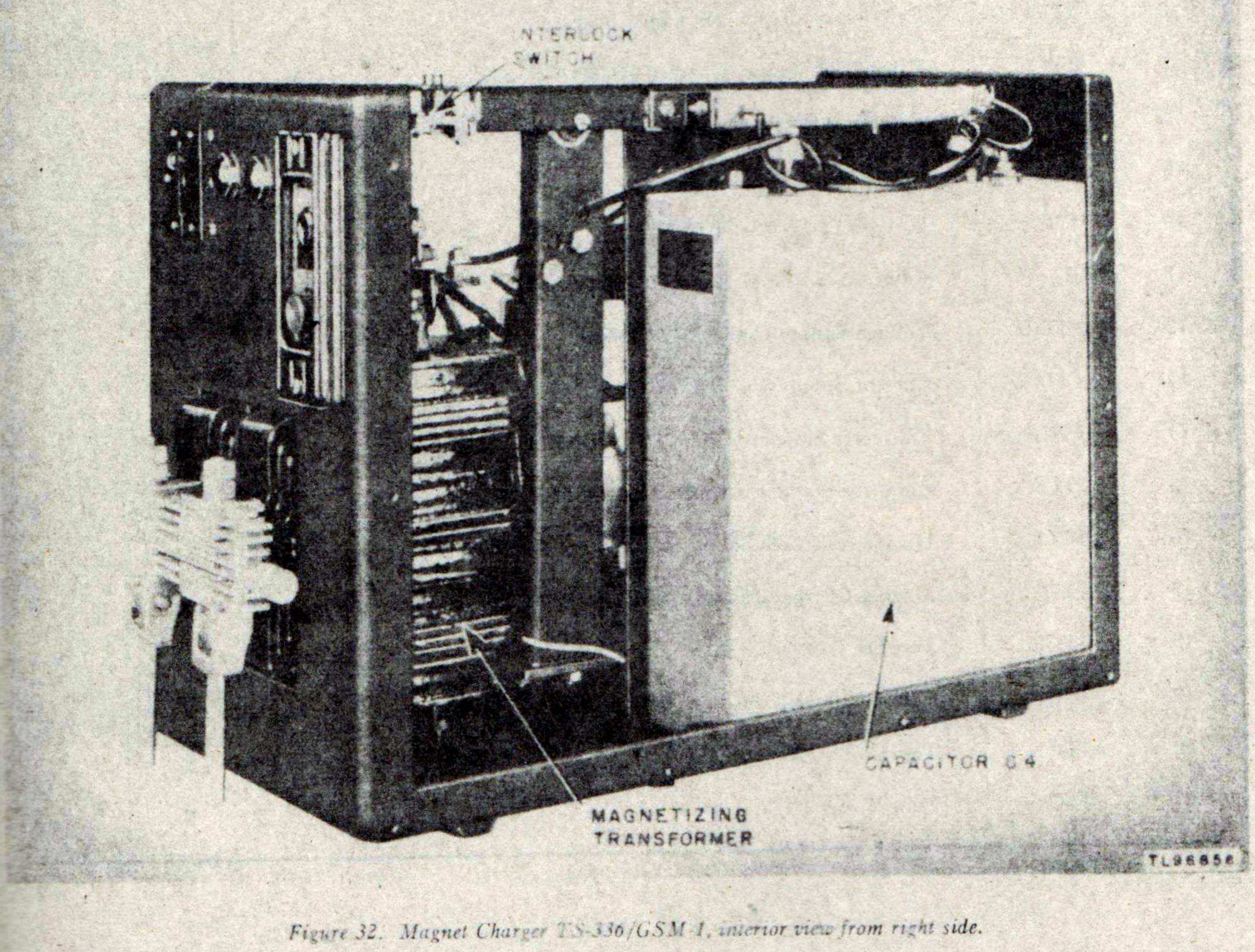

Figure 32. Magnet Charger TS-336/GSM-1, interior view from right side.

Item No.	Operations	Description of item	When performed		
			Weekly	Monthly	Semi-annually
1	ITC	Exterior of Voltage Supply Unit PP-14/GSM-1.	X		
2	ITC	Exterior of Current Supply Unit PP-15/GSM-1.	X		
3	ITC	Exterior of Voltmeter Standards Unit TS-49/GSM-1.	X		
4	ITC	Exterior of Ammeter Standards Unit TS-50/GSM-1.	X		
5	ITC	Mountings MT-135/GSM-1 and MT-175/GSM-1.	X		
6	ITC	Exterior of decade resistance boxes.	X		
7	ITCL	Exterior of Magnet Charger TS-336/GSM-1.	X		
8	IC	Exterior of frequency meter (Weston model 339).	X		
9	IC	Exterior of Test Set I-49.	X		
10	ITC	Exterior of Test Set I-56-K.	X		
11	IC	Cases CY-25/GSM-1 and CY-24/GSM-1.	X		
12	FITCL	Voltage Supply Unit PP-14/GSM-1.		X	
13	FITCL	Current Supply Unit PP-15/GSM-1.		X	
14	ITCA	Voltmeter Standards Unit TS-49/GSM-1.		X	
15	ITCA	Ammeter Standards Unit TS-50/GSM-1.		X	
16	ICAL	Decade resistance boxes.			X
17	ITC	Magnet Charger TS-336/GSM-1.		X	
18	ITCL	Test Set I-49.			X
19	ITC	Voltohmmeter I-166.		X	
20	ITC	Test Unit I-176.		X	
21	ITC	Tube Tester I-177.		X	

F I T C A L

FEEL INSPECT TIGHTEN CLEAN ADJUST LUBRICATE

65. ITEM 18, TEST SET I-49.

Operations.

ITC Case recesses and mountings.
ITCL Interior parts.

REMARKS. See TM 11-2019 for maintenance instructions.

66. ITEM 19, VOLTOHMMETER I-166.

Operations.

ITC Case recesses and mountings.
ITC Interior parts.

REMARKS. See TM 11-2613 for maintenance instructions.

67. ITEM 20, TEST UNIT I-176.

Operations.

ITC Case recesses and mountings.
ITC Interior parts.

REMARKS. See TM 11-2626 for maintenance instructions.

68. ITEM 21, TUBE TESTER I-177.

Operations.

ITC Case recesses and mountings.
ITC Interior parts.

REMARKS. See TM 11-2627 for maintenance instructions.

69. PREVENTIVE MAINTENANCE CHECK LIST.

The check list on page 38 is a summary of the preventive maintenance to be performed on Meter Test Equipment AN/GSM-1. The time intervals shown on the check list may be reduced at any time by the local commander. For best performance of the equipment, perform operations at least as frequently as called for in the check list. Extremely hot, cold, or dusty locations may necessitate more frequent scheduling of maintenance operations. Operations are indicated by the letters of the word FITCAL. For example, if the letters ITC appear in the "Operations" column, the item to be treated must be inspected (I), tightened (T), and cleaned (C).

SECTION VIII
LUBRICATION

No general lubrication is required for components of Meter Test Equipment AN/GSM-1. For lubrication instructions on different classes of parts, see appropriate paragraphs in section VI.

SECTION IX
MOISTUREPROOFING AND FUNGIPROOFING

NOTE: For general information on moistureproofing and fungiproofing, see TB SIG 13.

PART FOUR

AUXILIARY EQUIPMENT

(NOT USED)

PART FIVE
REPAIR INSTRUCTIONS

NOTE: Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on W. D., A. G. O. Form No. 468 (Unsatisfactory Equipment Report); by Army Air Forces, on Army Air Forces Form No. 54 (unsatisfactory report). If either form is not available, prepare the data according to the sample form reproduced in figure 44.

SECTION X
THEORY OF EQUIPMENT

70. VOLTAGE SUPPLY UNIT PP-14/GSM-1 (fig. 33).

a. Input Voltage. The a-c voltage input to receptacle E1 is controlled by a two-gang, three-position switch S1. Application of the a-c line voltage to the primary of the multiple-tap transformer T1 is coarsely controlled by variac T3. Finer adjustment of the primary voltage is accomplished by means of rheostat R18, which is connected to the movable arm of the switch. The amount of secondary voltage available depends on the adjustment of the controls in the primary circuit of transformer T1.

b. External A-c Output. Receptacle E2 supplies a separate a-c voltage, adjustable from zero to the maximum voltage obtainable from the a-c input receptacle. This voltage is available for exterior connections.

c. Rectifier Circuit. Filament transformer T2 is connected to the a-c line through switch S1A and supplies the required voltage for the filament of the rectifier tube V1. The single-section filter limits the a-c ripple of the half-wave rectifier output to less than 5 percent so that the d-c output is suitable for use in calibration and testing of d-c instruments.

d. Range Selection. Selection of voltage ranges is accomplished through the three-gang, four-contact switch S2. With the switch in the position shown in figure 33, only a-c voltages are obtainable at the output jacks, since the d-c return to common is discontinued at switch S2B. The other three switch positions select different d-c ranges, through connections to the multiple-tap secondary of transformer T1. The portion of the a-c secondary voltage of the transformer which is selected by switch S2A and rectified by the half-wave rectifier circuit determines the d-c voltage range available. D-c voltage is supplied to the various d-c output jacks through taps on the voltage divider (R1 to R8 inclusive).

e. Output Circuits. A-c voltage is supplied to the a-c voltmeter of Voltmeter Standards Unit TS-49/GSM-1 through receptacle E3 and plug E1 of the standards unit. D-c voltage is supplied to the d-c voltmeter of the standards unit through receptacle E4 and plug E2 of the standards unit. One terminal of the meter under test is connected to common and the other terminal to the plug on the end of the lead from Mounting MT-135/GSM-1. This plug is inserted into the appropriate output jack of the voltage supply unit. Insertion of the plug automatically completes the circuit and insures the same voltage across the standards meter and the meter under test.

71. CURRENT SUPPLY UNIT PP-15/GSM-1 (fig. 34).

a. Input Voltage. Separate sources of a-c and d-c voltage are provided. The a-c source is a 110-volt, 60-cycle supply; the d-c source is a 6-volt storage battery or other suitable d-c source. A three-position switch S1 selects the type of input and thus determines whether ac or dc is available at the output jacks. With the switch in AC position, the a-c input voltage is impressed across the primary of transformer T1 and alternating current is supplied to the testing circuit. When the switch is in DC position, ac is disconnected in the primary circuit of transformer T1 and dc is supplied to the testing circuit.

b. Current Controls. The amount of current supplied to the testing circuit is governed by the setting of the carbon-pile resistor R1 and the rheostat R2.

c. Series Circuit. The various ranges of current are brought to Ammeter Standards Unit TS-50/-

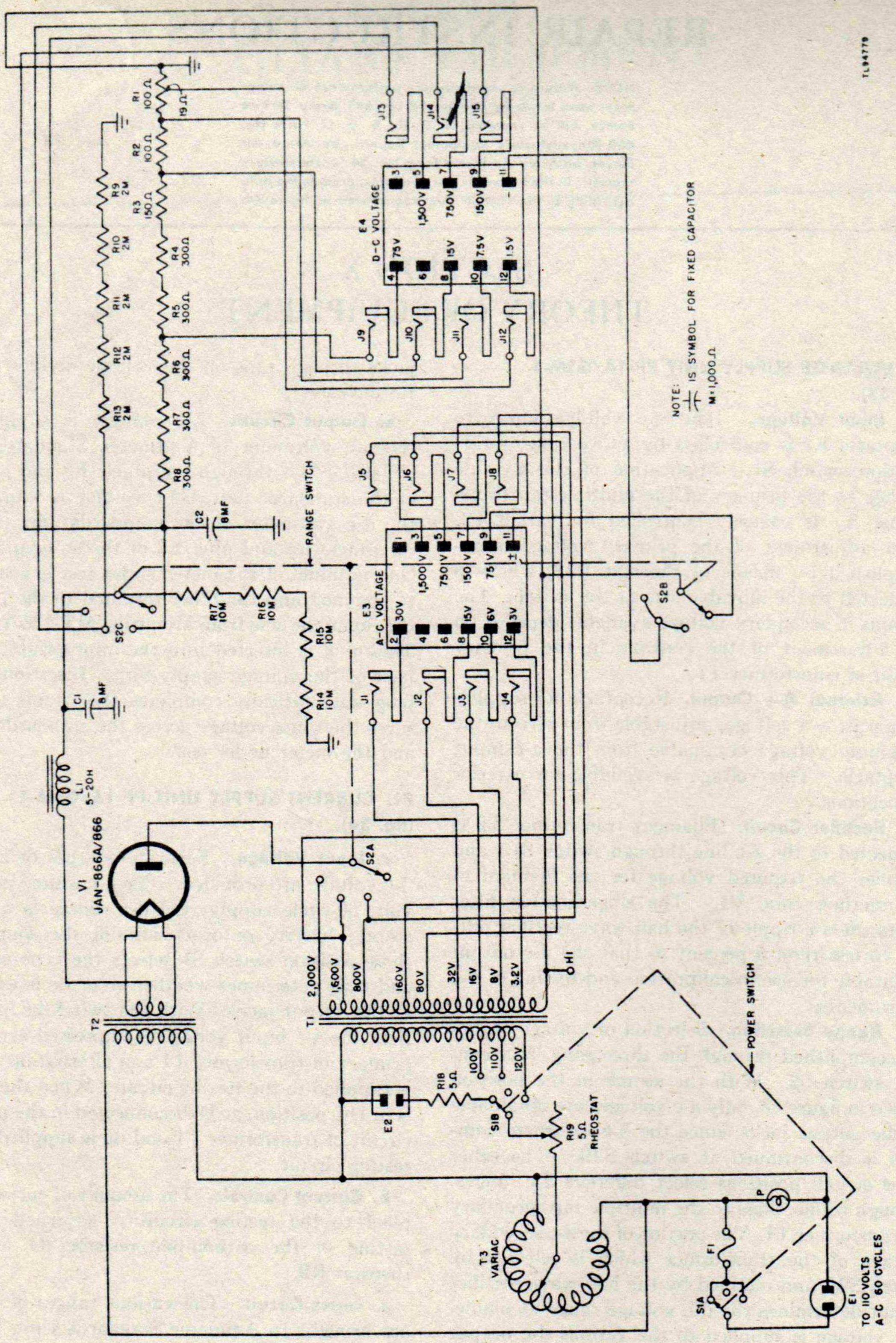

Figure 33. Schematic diagram of Voltage Supply Unit PP-14/GSM-1.

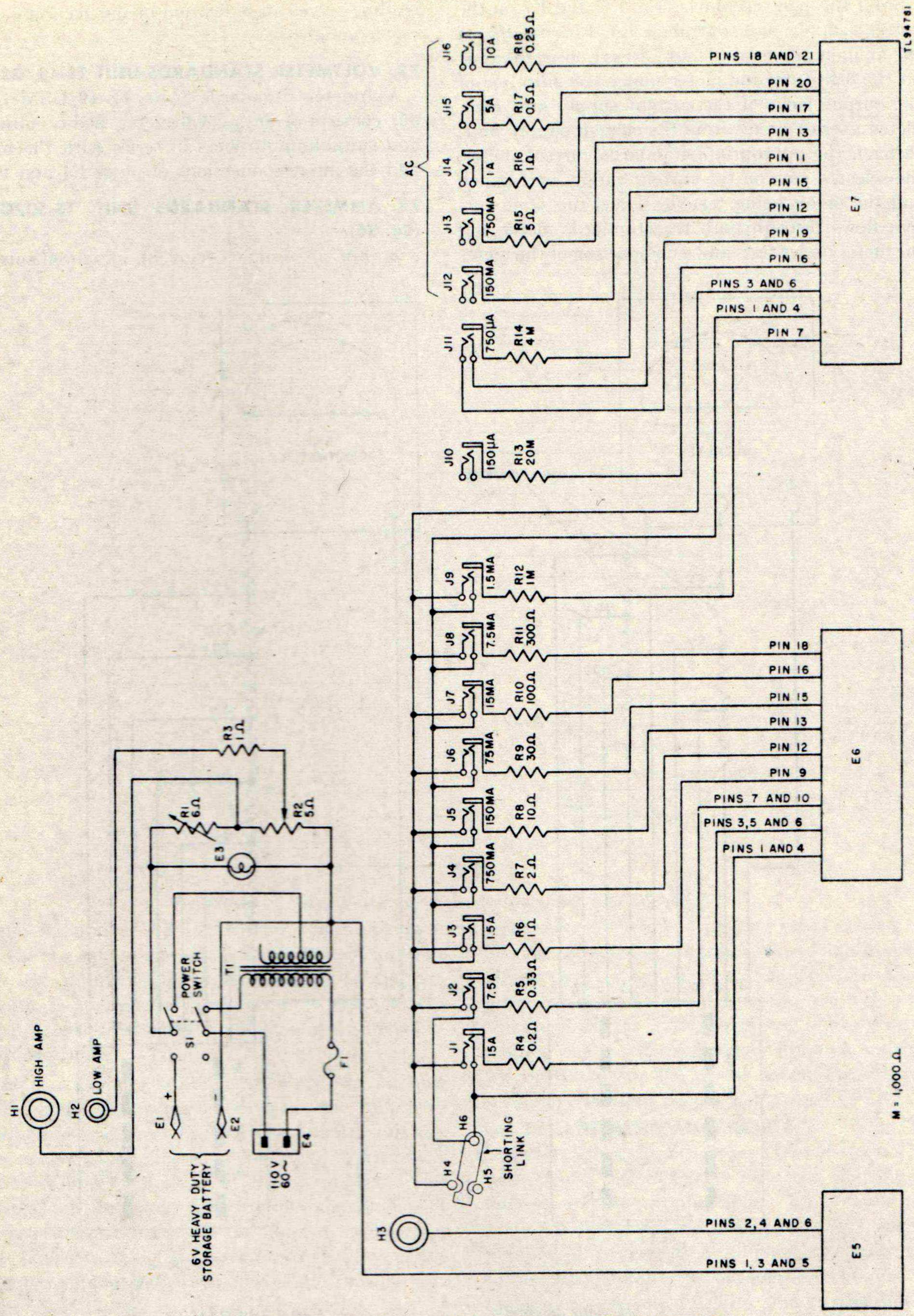

Figure 34. Schematic diagram of Current Supply Unit PP-15/GSM-1.

GSM-1 through receptacles E5, E6, and E7 on the current supply unit and plugs E4, E5, and E6 on the ammeter standards unit. Insertion of the plug on the lead from the meter under test into one of the output jacks of the current supply unit completes a series circuit from the current supply unit, through the appropriate standards current meter, the selected jack on the current supply unit panel, and the meter being tested. Thus, the same current flows through both the standards meter and the meter under test; and a comparison of the meter readings gives an indication of the accuracy of the meter under test.

72. VOLTMETER STANDARDS UNIT TS-49/GSM-1.

Voltmeter Standards Unit TS-49/GSM-1 (fig. 35) consists of an a-c voltmeter, a d-c voltmeter, and suitable multipliers in series with the meters and the input connections of plugs E1 and E2.

73. AMMETER STANDARDS UNIT TS-50/GSM-1 (fig. 36).

a. For all ordinary current measurements and

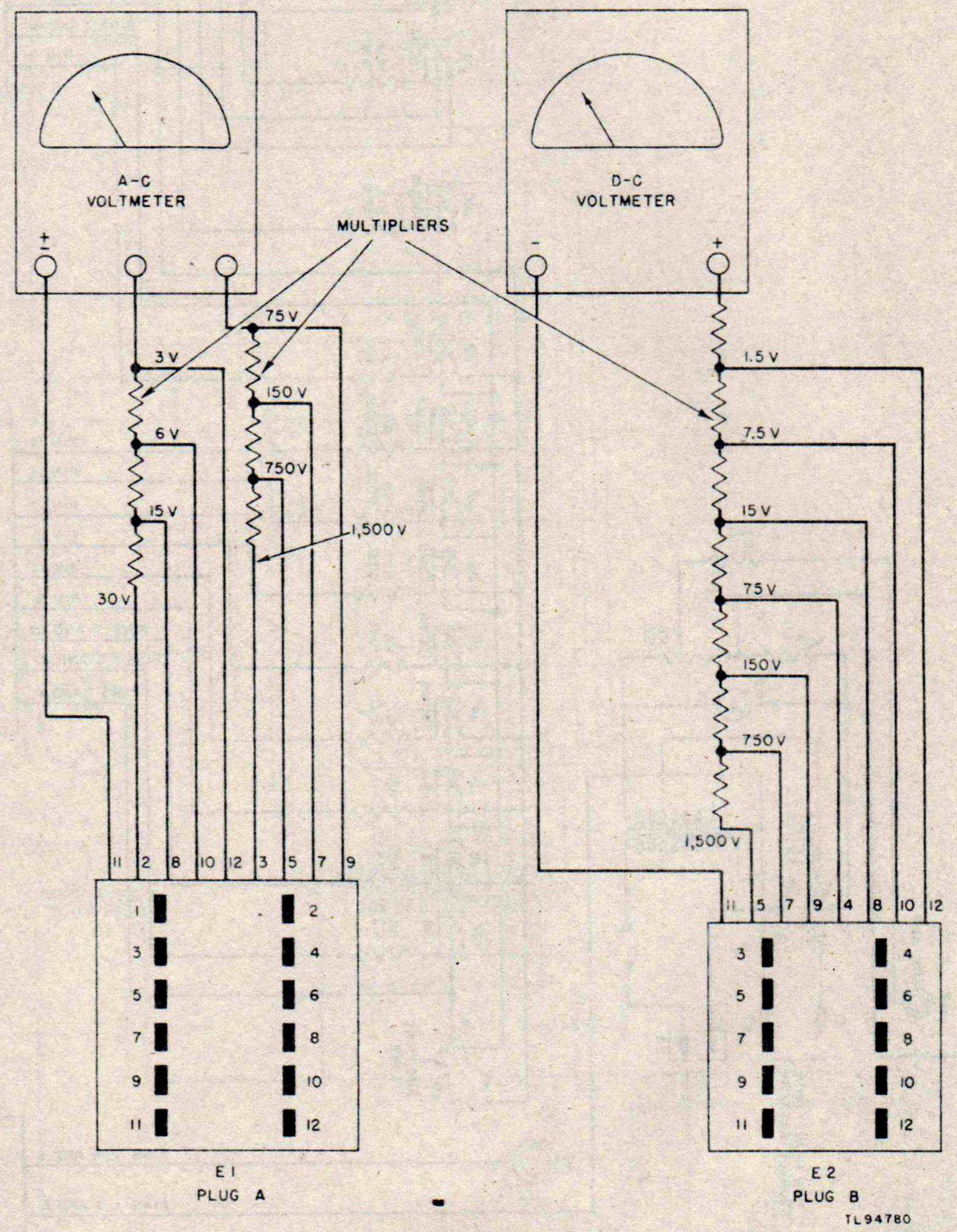

Figure 35. Schematic diagram of Voltmeter Standards Unit TS-49/GSM-1.

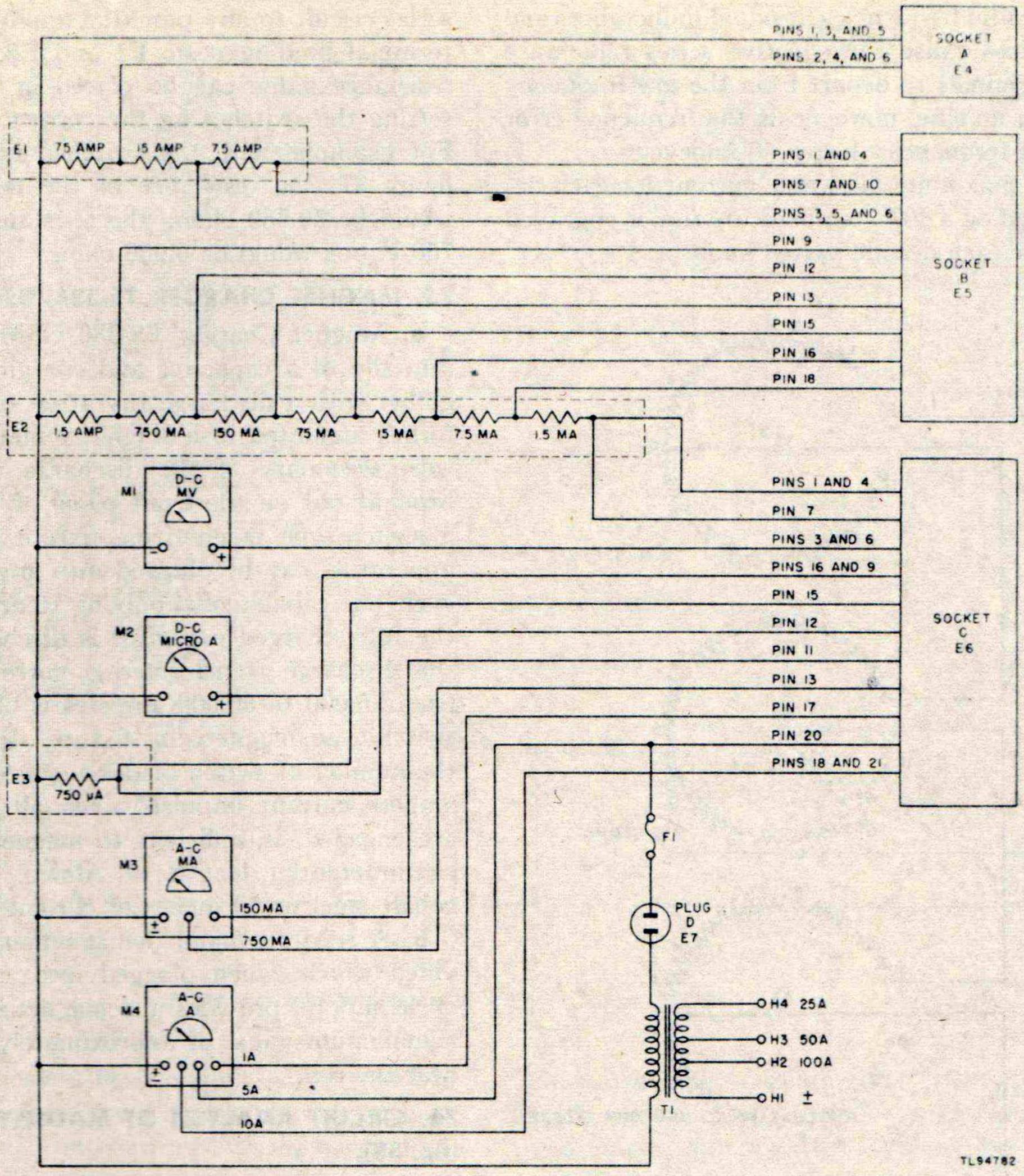

Figure 36. Schematic diagram of Ammeter Standards Unit TS-50/GSM-1.

tests, the ammeter standards unit circuits consist of the a-c and d-c standards meters and suitable current shunts. Through selection of the appropriate jack on the current supply unit, current is supplied to only one of the standards meters at any one time.

b. For a-c ranges above 10 amperes, the plug and cable connections between the ammeter standards unit and the current supply unit are disconnected and plug E7 is connected to receptacle E2 of Voltage Supply Unit PP-14/GSM-1. This places the 5-ampere range of standards current meter M4 in series with the current transformer T1. Adjustment of the variac and rheostat of the voltage supply unit then makes alternating current available across the primary of the current transformer. The secondary of the current transformer is connected to binding posts on the front of the ammeter standards unit. High-range a-c meters are connected to the appropriate binding posts for test. In comparing the readings on the standards meter and the meter under test, the reading of the standards meter must be multiplied by the factor 5, 10, or 20 depending on which secondary binding post is being used.

74. DECADE RESISTANCE BOXES.

a. Decade resistance boxes (Daven types 750-K and 750-L) are designed primarily for d-c and audio-frequency applications. They are useful however, well into the radio-frequency range for many applications. Since all resistors, except those in the 10,000-ohm-step decade, are wound with manganin wire, no difficulty due to thermal emf is encountered in d-c measurements, except when

using the high-resistance decade.

b. At radio frequencies, residual inductances and capacitances cause the effective series reluctance at the terminals to depart from the low-frequency value. In no case, however, is the frequency error serious at frequencies below 50 kilocycles.

c. The maximum allowable current for each decade, based on a 40°C temperature rise, is engraved just above each decade-switch knob.

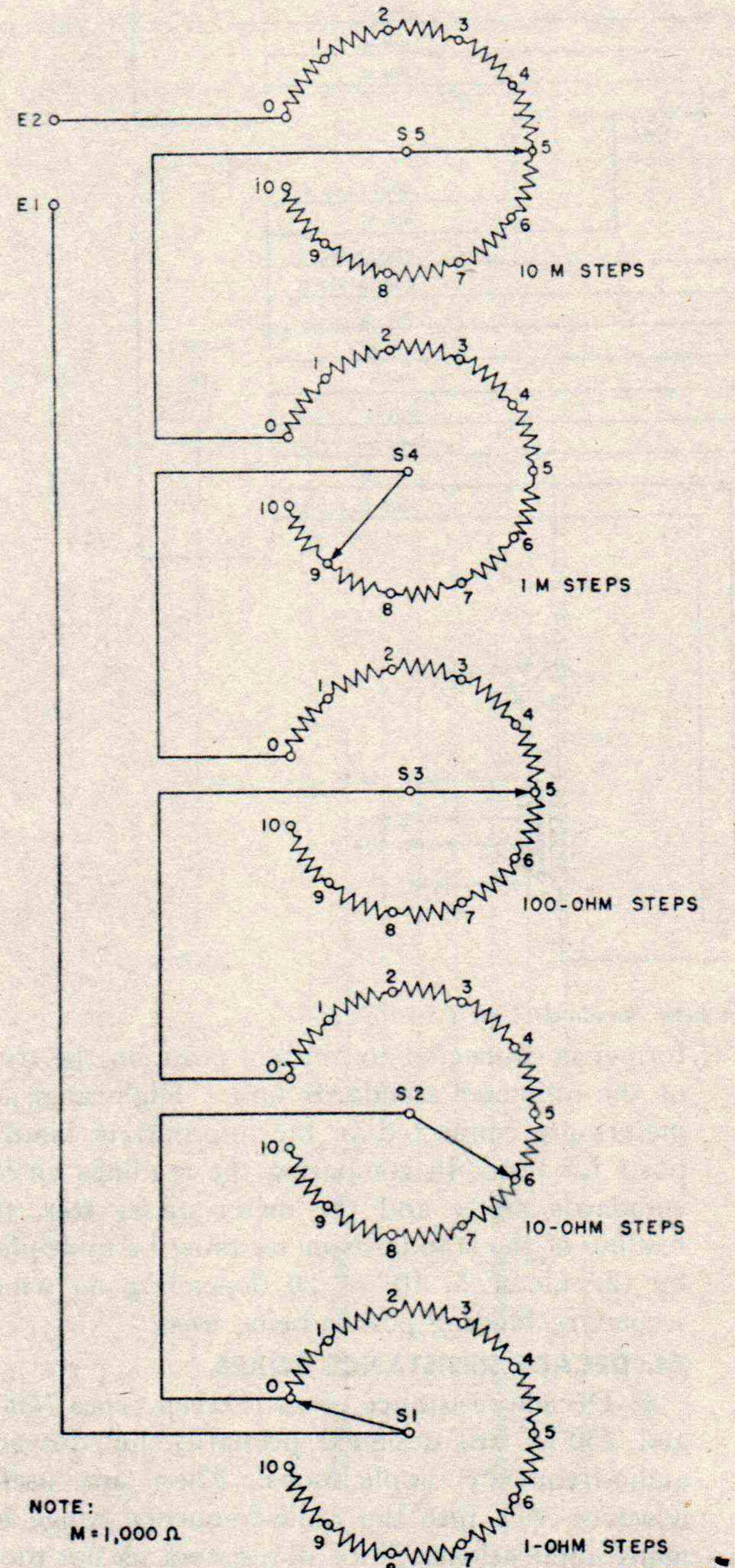

Figure 37. Schematic diagram of decade resistance box.

d. The wiring of the decades presents a simple series circuit to any potential applied between the terminal binding posts E1 and E2. The desired resistance value can be placed in the circuit by setting the switches on the correct contact studs. For example, with the switches set as shown in figure 37, the resistance of the type 750-L box would be 59,560 ohms; the resistance of the type 750-K box would be 5,956 ohms.

75. MAGNET CHARGER TS-336/GSM-1.

a. Magnet Charger TS-336/GSM-1 consists essentially of a capacitor and charging rectifier together with a discharge thyratron tube and transformer mounted in a single cabinet. The single-turn secondary of the discharge transformer is brought out on the front panel of the cabinet in a switch-type magnetizing fixture (fig. 8). The apparatus may be plugged into any 110-volt, 60-cycle line capable of supplying 10 amperes. When the fully-charged capacitor is discharged through the discharge transformer, a current impulse of from 35,000 to 50,000 amperes is obtained in the switch-type magnetizing fixture, depending upon the number of switch blades engaged. The 50,000 ampere current impulse, when all switch blades are engaged, is sufficient to magnetize a 10-inch circumferential length of Alnico, 20 inches of cobalt steel or 50 inches of chrome magnet steel.

b. A separate hand demagnetizing coil is provided which, when plugged into a 110-volt, 60-cycle supply, provides a demagnetizing field with a maximum value of approximately 300 oersteds near the coil.

76. CIRCUIT ANALYSIS OF MAGNET CHARGER (fig. 38).

a. Input Circuit. When circuit breaker CB1 is closed, transformer T1 is energized, filament current is supplied to tubes V1, V2, and V3, and the grid control circuit is energized. The red signal lamp lights and voltage is applied to the synchronous motor of the time-delay relay TD1. After 5 minutes, the mechanism of TD1 closes the con acts of the relay and the green signal lamp lights, indicating that voltage is available for the anode supply transformer T2, if the cover interlock switch S1 is closed, and the CHARGE push button of switch S2 is depressed.

b. Charge Circuit. When anode transformer T2 is energized, an a-c voltage of 1,875 volts is available at the anodes of V1 and V2 and there is a potential of 3,750 volts across the transformer secondary. Tubes V1 and V2 are 866A/866—type phanatron tubes. Two of these are used to com-

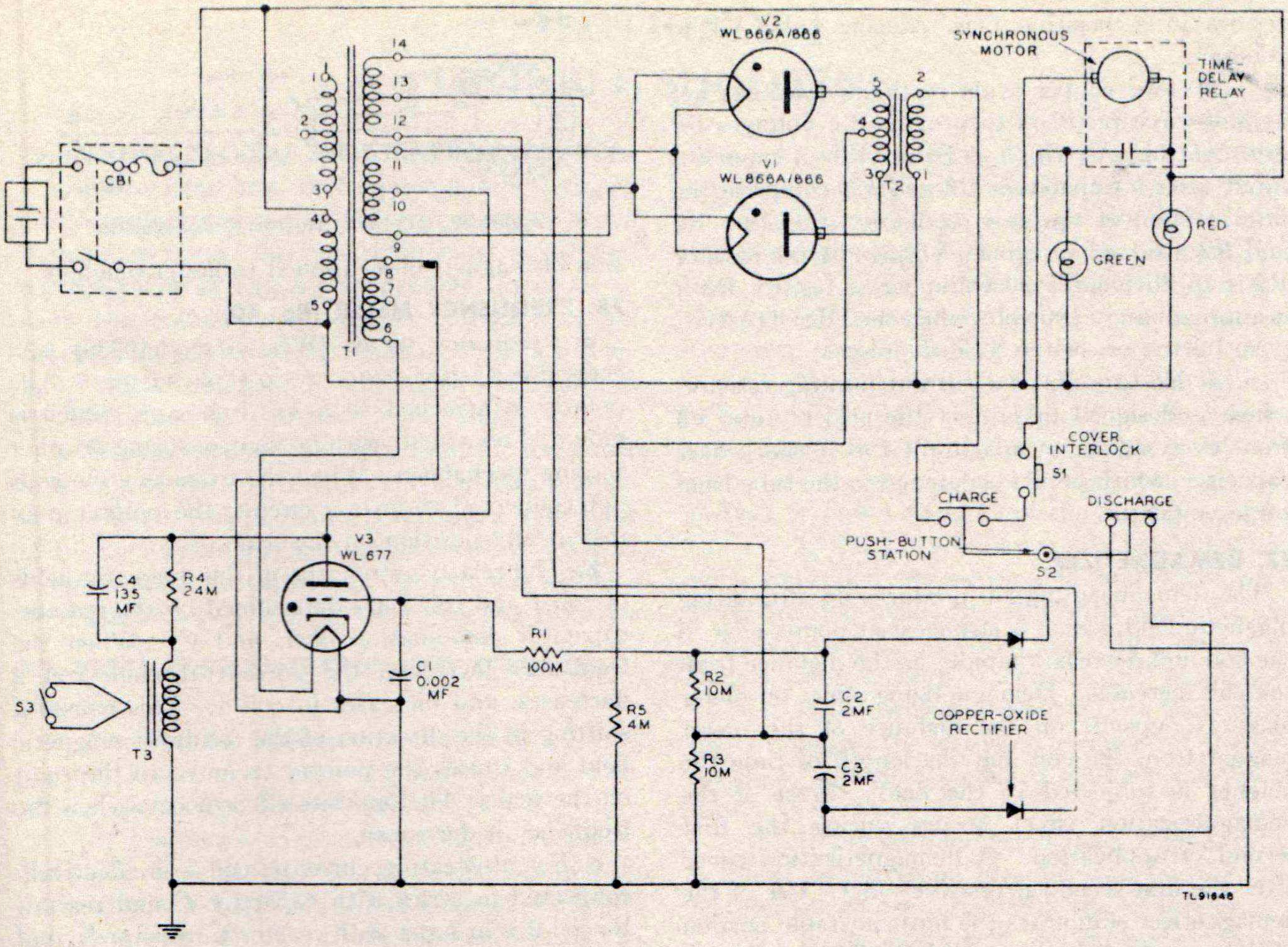

Figure 38. Schematic diagram of Magnet Charger TS-336/GSM-1.

prise a full-wave rectifier circuit. Charging current is supplied to capacitor C4 through the primary of transformer T3 and current-limiting resistor R5. The charging current is passed through the primary of transformer T3 to prevent magnetization of the transformer core by successive unidirectional discharges. When capacitor C4 is fully charged to 1,600 volts, current continues to flow through R4 to provide a flux bias for efficient use of the transformer.

c. Discharge Circuit. When the DISCHARGE push button of switch S2 is depressed, a positive bias is impressed on the grid of the thyratron tube, causing the tube to conduct. Capacitor C4 then discharges through tube V3 and the primary of transformer T3. The turns ratio of transformer T3 is 750-1, so that a current step-up of approximately 750-1 will be obtained in the secondary. The current flow through the magnetizing fixture S3 is from left to right (when facing the panel). The frequency and amplitude of the discharge impulse is determined almost entirely by the inductance and resistance of the magnetizing fixture. Presence of a magnet in the fixture affects these values only slightly. When tube V3 ceases to conduct, an inverse charge on capacitor C4 produces a reverse current through the primary of transformer T3, through resistor R5, and the charge circuit. The effect of this current adds to that due to any magnetic energy left stored in the transformer core to produce a demagnetizing current through the magnetizing fixture. Use of a Hipersil core in transformer T3 and proper selection of resistance value of resistor R5 limit the demagnetizing current, so that maximum demagnetization will never be more than 2.5 percent.

d. Thyratron Grid Control Circuit.

(*1*) At all times when the DISCHARGE button of switch S2 is not depressed, a negative grid bias of approximately 90 volts prevents tube V3 from conducting. When the DISCHARGE button is depressed, a positive voltage of approximately 100 volts overcomes the negative bias and

results in a positive bias, causing tube V3 to conduct.

(*2*) Two copper-oxide rectifiers (Rectox) act as half-wave rectifiers to provide d-c voltages for grid control. A-c ripple is reduced by a capacitor input filter. Capacitors C2 and C3 comprise the filter system of the two rectifiers. Resistors R2 and R3 are load resistors. Voltage across resistor R2 is approximately 90 volts; across resistor R3 it is approximately 100 volts when the DISCHARGE push button on switch S2 is depressed.

(*3*) Resistor R1 is a current limiting resistor, which is designed to protect the grid of tube V3 from overloading. Capacitor C1 is a shock-over capacitor, which prevents damage to the tube from surge voltages.

77. DEMAGNETIZER.

The demagnetizing coil produces an alternating magnetic field, which is strongest at points near to the coil and decreases rapidly as the distance from the coil increases. Demagnetizing effect on meter magnets depends on the distance of the meter magnet from the coil and the length of time the magnet is subjected to the field. Most of the demagnetization effect occurs during the first second of application. A demagnetization curve after the first second is relatively flat. Use of the demagnetizer eliminates the most unstable portion of the magnetization. See TM 11-472 for a discussion of magnetism as applied to meter magnets.

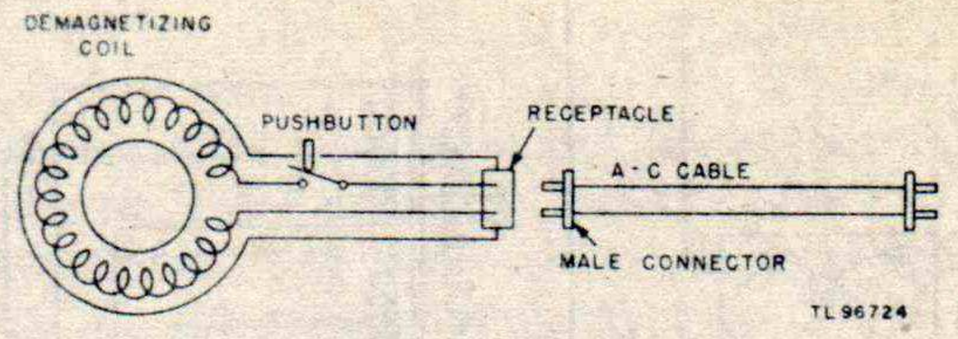

Figure 39. Schematic diagram of demagnetizer.

78. FREQUENCY METER (fig. 40).

a. Frequency meter (Weston model 339) is a crossed-coil, iron-vane, ratio-type meter. The pointer is attached to a soft-iron core, which is mounted on a shaft with no control spring or other zeroing mechanism. When the frequency meter is not connected to an a-c circuit, the pointer may rest at any position on the scale.

b. The relative strengths of the magnetic fields of coil 1 and coil 2 are determined by the reactor-capacitor combination of L and C. When the frequency increases, the current through coil 2 decreases, and increases in coil 1. This causes a shifting in the direction of the resultant magnetic field and causes the pointer to move to the right on the scale. The opposite effect occurs when the frequency is decreased.

c. For alternating currents, coil 1 is effectively connected in series with capacitor C and resistor R; coil 2 is in series with reactor L, resistor R, and the reactance and resistance of coil 1.

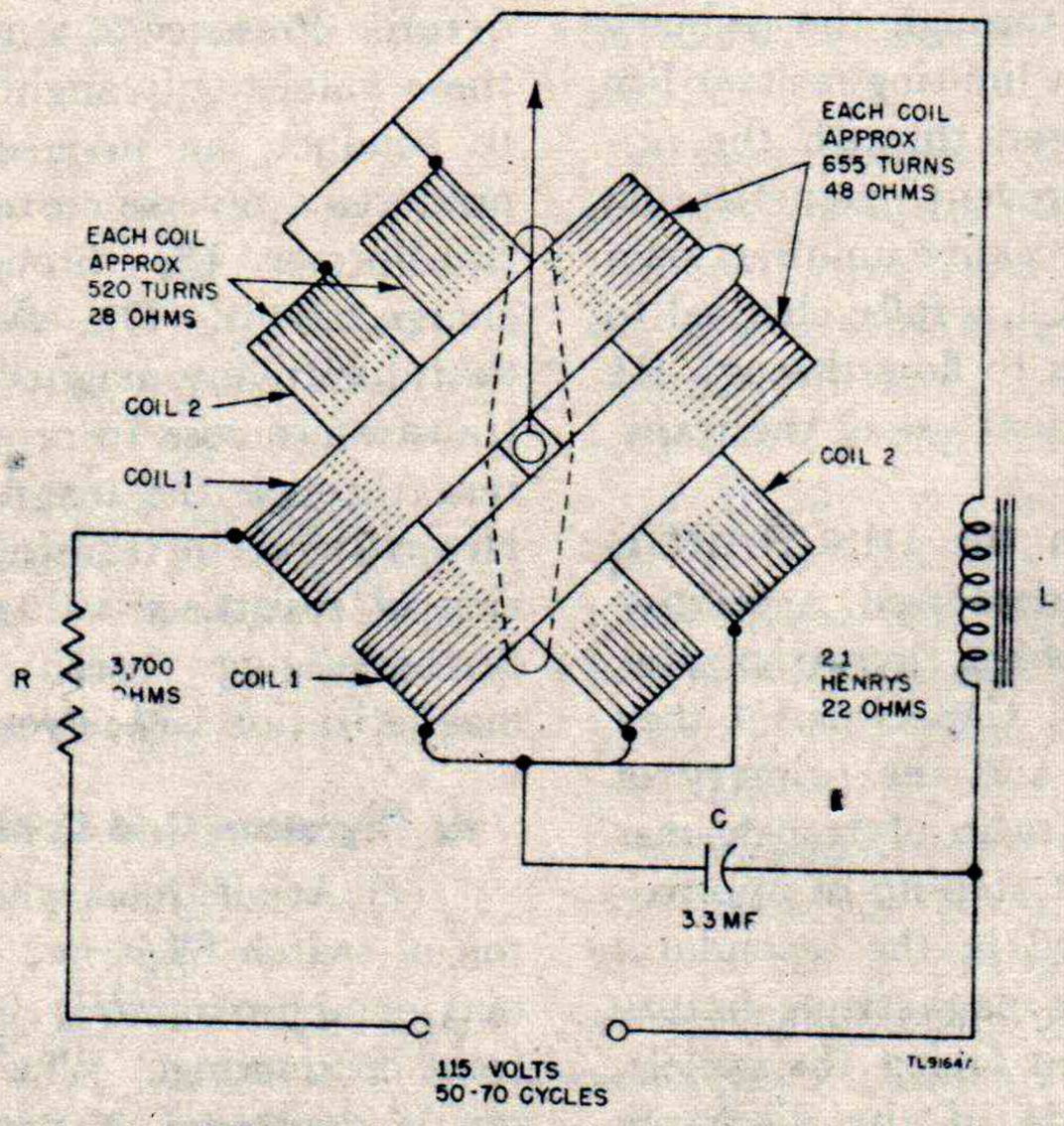

Figure 40. Schematic diagram of frequency meter (Weston model 339).

SECTION XI
TROUBLE SHOOTING

79. GENERAL TROUBLE-SHOOTING INFORMATION.

a. No matter how well equipment is designed and manufactured, faults occur in service. When such faults occur, the repairman must locate and correct them as rapidly as possible, in order to keep the equipment in usable condition at all times. This section of the manual contains specific information, designed to aid repair personnel in the important duty of trouble shooting.

b. Repair personnel should consult the schematic diagrams of the components given in this manual or in other technical manuals furnished with some of the components, when trouble shooting. Wiring diagrams and illustrations in the manuals will also be of assistance in locating and correcting troubles.

80. VOLTMETER STANDARDS UNIT TS-49/GSM-1 (fig. 41).

a. Checking A-c Voltmeter for Accuracy.

(*1*) Insert plug A (the 12 point plug) into its socket on Voltage Supply Unit PP-14/GSM-1.

(*2*) Place on a-c voltmeter of known accuracy, having a range of 0-3 volts, in testing position on Mounting MT-135/GSM-1 and connect the spade lead from the mounting to the binding post on the voltage supply unit (fig. 3).

(*3*) Energize the voltage supply unit in the normal manner and set its selector switch to AC position.

(*4*) Insert Plug PL-55 in the 3-volt a-c jack.

(*5*) Follow testing procedure given in paragraph 24, but check the reading of the standards unit meter against the reading of the testing meter.

CAUTION: Take care not to subject the testing voltmeter to overvoltage, by inserting Plug PL-55 in a jack which supplies a voltage higher than the range of the meter.

(*6*) Substitution of testing voltmeters with suitable ranges will enable the repairman to check all of the a-c ranges of the standards unit.

b. Checking A-c Circuit for Continuity on 3-volt Range.

If the a-c voltmeter on the standards unit indicates zero voltage when the testing voltmeter indicates 3 volts, check the circuit for continuity as follows:

(*1*) Remove plug A (the 12-point plug) from its socket on the voltage supply unit and, by means of two temporary jumpers, parallel the testing voltmeter with the left-hand (from rear) and center terminals of the a-c voltmeter on the standards unit.

(*2*) If, under this condition, the voltmeter on the standards unit indicates the same voltage as the testing voltmeter, the trouble indicated is an open circuit somewhere between the supply and the voltmeter terminals.

(*3*) To determine if this open circuit is in the voltmeter standards unit, remove the two temporary connections from the terminals of the voltmeter on the standards unit and connect them instead to pins 11 and 12 of the A plug.

(*4*) If the a-c voltmeter fails to read with 3 volts impressed across pins 11 and 12 of the A plug, but does read correctly with the same voltage across left-hand (from rear) and center terminals, either or both of leads 11 and 12 are open.

(*5*) By moving the jumper lead from pin 11 on the plug to the left-hand terminal of the voltmeter, it can be determined whether the No. 11 lead is open.

(*6*) If the voltmeter still fails to read, return one lead to pin 11 on the plug and try the other lead on the center terminal of the voltmeter.

(*7*) If the voltmeter on the standards unit reads under this condition, look for an open circuit somewhere between pin 12 and the center terminal of the voltmeter.

c. Checking A-c Circuit for Continuity on 6-volt Range.

(*1*) If the voltmeter indicates correctly on the 3-volt range; but not on the 6-volt range, leave plug A disconnected from its socket, adjust the output voltage from the supply unit to 3 volts or slightly less and by means of the jumper connections, apply this voltage across pins 10 and 11 of plug A.

(*2*) If the circuit from one pin to the other is complete, the voltmeter on the standards unit will read one-half of the voltage of the output.

(*3*) If the circuit is incomplete, leave one test lead on pin 11 and move the other to the 6-volt tap on the multiplying resistance.

(*4*) If this change causes the voltmeter to indicate correctly (one-half of the output voltage of the supply unit) there is an open circuit somewhere between pin 10 and the 6-volt tap on the multiplying resistor.

(*5*) If there is an open circuit in the multiplying resistor, the voltage applied to the 6-volt

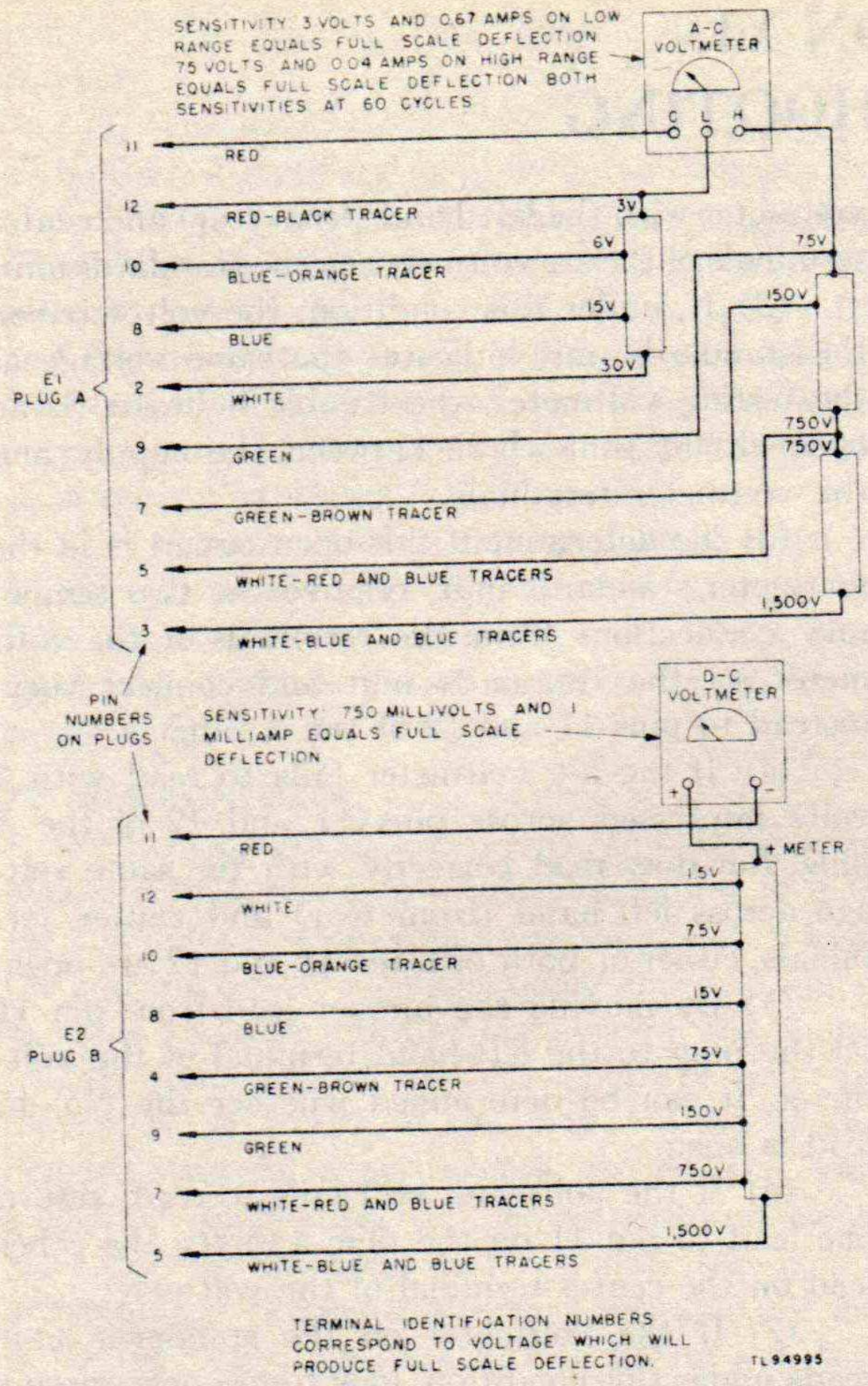

Figure 41. Voltmeter Standards Unit TS-49/GSM-1, internal schematic wiring diagram.

tap will not cause the voltmeter to indicate, but a jumper from the 6-volt tap to the 3-volt end of the resistance should cause the voltmeter to indicate the same as the output of the supply unit.

(*6*) As another means of detecting an open circuit in the multiplying resistance, supply 3 volts to pins 10 and 11 and use a jumper from the 6-volt tap on the resistance to the 3-volt end of the resistance.

(*7*) If placing this jumper across those terminals causes the voltmeter to read, the open circuit is in the resistance.

d. Checking A-c Circuit for Continuity on 15-volt Range.

(*1*) If the voltmeter reads correctly on the 3- and 6-volt ranges but not on the 15-volt range, apply 6 volts across pins 8 and 11 and use a jumper from the 15-volt tap to the 6-volt tap on the external multiplying resistor.

(*2*) If under this condition, the voltmeter reads approximately the same as the output voltage of the supply unit, the open circuit exists between the two taps connected together by the jumper.

e. Checking A-c Circuit for Continuity on 30-volt Range.

(*1*) To test the multiplying resistance, for the 30-volt range, apply 15 volts across pins 2 and 11.

(*2*) If the voltmeter on the standards unit reads zero voltage under the condition (subpar. (1) above), but reads approximately full-scale voltage with a jumper connected between the 15-volt tap and the 30-volt end of the multiplying resistor, the open circuit is in the multiplying resistance.

f. Checking A-c Circuit for Continuity on Higher Voltage Ranges.

(*1*) Apply the same procedure as outlined above to the 75-volt and higher voltage ranges.

(*2*) Note that it is not necessary to check the voltmeter circuits for continuity at full-scale deflection of the voltmeter.

(*3*) At the two highest voltage ranges, limit the continuity-test voltage to not more than 25 percent of the full-scale voltage.

CAUTION: Never apply more voltage than the rating of the next lower range, when checking the external multiplying resistance for an open circuit. Never short out more than one section of the external multiplying resistance at one time.

g. Checking D-c Voltmeter Circuits.

(*1*) Check the d-c voltmeter for accuracy and for circuit continuity by using the same methods as outlined above (subpars. a through f) for the a-c voltmeter.

(*2*) Use the B plug and the proper pin numbers selected from the wiring diagram (fig. 41).

(*3*) Note that on d-c instruments, correct polarity must be observed.

81. AMMETER STANDARDS UNIT TS-50/GSM-1 (fig. 42).

a. Checking D-c Ammeter for Accuracy.

(*1*) Insert sockets A(6-point heavy-current socket), B(24 points), and C(21 points) in their respective plugs on Current Supply Unit PP-15/-GSM-1.

(*2*) Connect a d-c ammeter of known accuracy and proper range, with necessary shunt if required, to the proper ammeter terminal, and to the plug for insertion in jacks on front of the current supply unit.

(*3*) Energize the current supply unit from its normal source or sources.

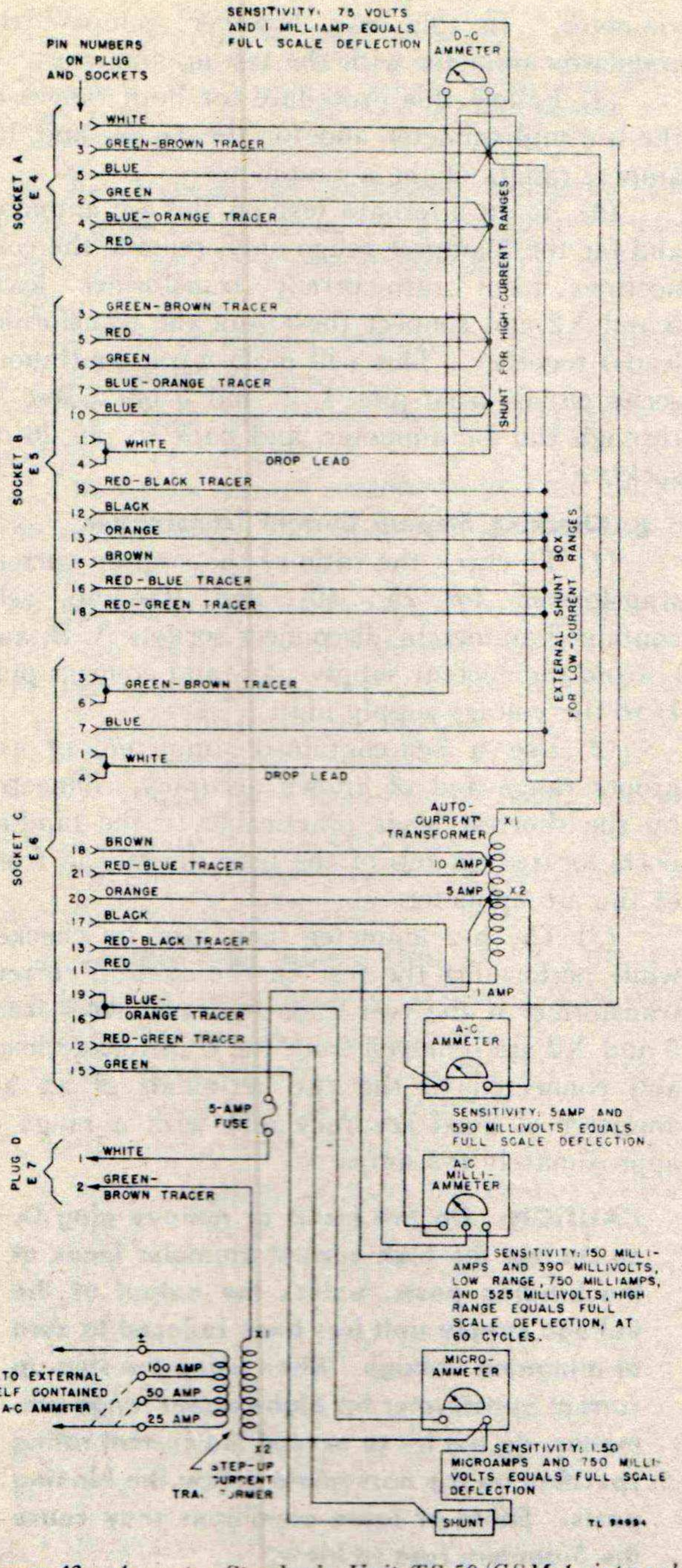

Figure 42. Ammeter Standards Unit TS-50/GSM-1, internal schematic wiring diagram.

(*4*) Plug the testing ammeter into each of the d-c jacks on the front panel of the current supply unit and compare readings between the testing ammeter and the ammeter on the ammeter standards unit.

b. Checking Circuit Continuity on Higher Ampere Ranges. If the testing ammeter, the leads of which are connected to the current supply unit, indicates that current flows in the 75-amp, 15-amp, or 7.5-amp circuit, but the ammeter on the standards unit does not indicate, the drop-lead circuit may be open. Test for the open circuit as follows:

(*1*) Try a temporary jumper between the 7.5 terminal on the shunt and the + right-hand terminal (from rear) on the ammeter.

(*2*) If this jumper causes the ammeter to indicate, the result shows that the positive drop lead is open either in the standards unit or in the supply unit.

(*3*) To determine whether the drop lead is open in the standards unit, remove sockets B and C from their plugs in the supply unit.

(*4*) Use a suitable self-contained testing ammeter and the 75-ampere range on the supply unit.

(*5*) Try a jumper from contact 1 or 4 on socket B to pin 3 or 6 on socket C.

(*6*) If that jumper causes the ammeter to indicate, the drop-lead circuit is complete within the standards unit. Test the drop-lead circuit in the supply unit for continuity.

(*7*) If the drop-lead circuit is continuous in both units, look for poor contacts between plugs and sockets.

(*8*) If the procedure outlined above indicates that the drop lead is open in the standards unit, a jumper from pin 3 or 6 of socket C to the 7.5 terminal on the shunt will complete the circuit, and will indicate that the drop lead is open between the 7.5 terminal on the shunt and pin 1 or 4 of socket B.

(*9*) Likewise a jumper from pin 1 or 4 of socket B to the + terminal on the ammeter will complete the circuit and will indicate that the fault lies between pin 3 or 6 of socket C and the + terminal on the ammeter.

c. Checking Circuit Continuity on Lower Ranges. If the d-c ammeter on the ammeter standards unit fails to indicate on the 1.5 ampere or lower ranges, when it is known that current flows through the external shunt for these ranges, test the drop-lead circuits for continuity as follows:

(*1*) With sockets A and B inserted in their plugs on the supply unit, try a jumper connection from pin 1 or 4 to pin 3 or 6 on socket C.

(*2*) If this jumper causes the ammeter to indicate, the drop leads in the ammeter standards unit are complete and the trouble may exist in the supply unit or between plug and socket C contacts.

(*3*) If that jumper does not result in the ammeter indicating, try a jumper from pins 3 or 6 on socket C to the 0.0015 terminal on the external shunt box for low-current ranges.

d. Checking D-c Ammeter.

(*1*) If it is suspected that the d-c ammeter on the standards unit is open circuited or burned out, remove the two leads from the ammeter terminals.

(*2*) Use the voltage supply unit and a low range d-c voltmeter to obtain 750 millivolts or less and apply this voltage to the two terminals of the d-c ammeter. The two instruments, connected in parallel, should read the same voltage.

(*3*) The d-c voltmeter on the voltmeter standards unit and the d-c ammeter on the ammeter standards unit have identical movements; only their scales are different. Full scale deflection of either of these instruments corresponds to 750 millivolts and one milliampere.

e. Checking D-c Microammeter. If the d-c microammeter is in good condition, it will indicate on the 150 microampere range when the testing microammeter indicates, since they are in series.

(*1*) If neither one of the microammeters indicates, look for an open circuit between pin 16 or 19 on socket C and the + left-hand terminal (from rear) of the microammeter.

(*2*) If the microammeter reads correctly on the 150-microampere range, but does not indicate at all on the 750-microampere range, look for an open circuit in the drop lead between the + terminal of the 750-microampere shunt and pin 15 on socket C.

(*3*) Test the shunt for continuity by connecting the microammeter in the 150-microampere circuit and a temporary jumper from its + terminal to the + terminal of the microammeter.

(*4*) If the shunt is in good condition, the jumper should reduce the indication on the microammeter to approximately 20 percent of its original indication.

(*5*) If the shunt is burned out or open circuited the jumper will have no effect on the microammeter indication.

f. Checking A-c Ammeter for Accuracy.

(*1*) Plug sockets A and C into the current supply unit. It is immaterial whether socket B is plugged in or not.

(*2*) Using an a-c ammeter of known accuracy, connect it to the proper terminal on front panel of the current supply unit and to the plug which may be plugged into the jacks on the front of the current supply unit.

(*3*) Set the selector switch to AC position and energize the unit in the usual way.

(*4*) Operate the supply unit as usual in comparing any other a-c ammeter with the standards ammeter. In this case, however, compare the standards ammeter with the testing ammeter.

(*5*) Follow this procedure for both ranges of the a-c milliammeter and for the 1-, 5-, and 10-ampere ranges of the a-c ammeter.

(*6*) As an alternate test on the a-c ammeter and for the 5-ampere range only, remove the connections from auto-current transformer leads 5 and X2 and connect these (not the transformer leads) together. This will make up a continuous series circuit from pins 1, 3, and 5 on socket A, through the a-c ammeter, and back to pin 20 on socket C.

g. Checking Step-up Current Transformer.

(*1*) To check the ratio of the step-up current transformer, for 25-, 50-, and 100-amp, self-contained ammeters, disconnect sockets A, B, and C from the current supply unit, and connect plug D to the voltage supply unit.

(*2*) Use a self-contained ammeter, of the proper range and of known accuracy, connected by the shortest leads practicable to the binding posts located on top of the base directly in front of the a-c ammeter.

(*3*) The a-c ammeter may also be checked while performing the test on the step-up current transformer if the two leads to transformer leads 5 and X2 are removed from the transformer leads and connected to the two terminals of an a-c ammeter of good accuracy and with a range of approximately 0-5 amps.

CAUTION: Do not insert or remove plug D, or change the high current ammeter leads at the binding posts, unless the output of the voltage supply unit has been reduced to zero or minimum voltage. When using the step-up current transformer for high-current range ammeters, do not try to exceed the current rating specified on the nameplate below the binding posts. Either of these conditions may cause the 5-ampere fuse to blow.

82. VOLTAGE SUPPLY UNIT PP-14/GSM-1.

If trouble is encountered in the voltage supply unit, the following checks may aid the repairman in quickly locating the fault (fig. 33).

a. No Voltage Available for Meters Under Test. If voltage is available at Voltmeter Standards Unit TS-49/GSM-1, but no voltage is available for meters under test, check the leads to the meter under test for continuity, check lead connections, and check binding post H1 for electrical ground.

NOTE: Use Voltohmmeter I-166 or Test Unit I-176 for making continuity checks. When using resistance ranges of these instruments, make certain that no voltage is being applied to Voltage Supply Unit PP-14/GSM-1. Turn switch S1A to OFF position or disconnect the unit from its exterior power supply.

b. No Voltage at Voltmeter Standards Unit TS-49/GSM-1. If voltage is available for meters under test, but not at the standards unit, make the following checks:

(*1*) Check leads between the jacks affected and the output receptacles.

(*2*) Check leads from output receptacles E3 and E4 to switch S2B.

(*3*) Check output receptacles E3 and E4 and the plugs leading to the standards unit for damage or poor electrical contact.

c. No D-c Output. If a-c output voltage is available, but there is no d-c output, check to see if rectifier tube V1 is lighted. If the rectifier tube lights, make the following checks:

(*1*) Check plate connection of tube V1.

(*2*) Check plate lead for continuity through switch S2A to transformer T1.

(*3*) Check choke L1, switch S2C, and connecting leads for continuity.

d. Rectifier Tube Burned Out. If rectifier tube V1 is burned out, check for a short circuit before replacing the tube with a new one.

(*1*) Check capacitors C1 and C2 for shorts.

(*2*) Check for a short to ground in switch S2C or in the wiring throughout the d-c output circuit.

e. No D-c Voltage at Some D-c Output Jacks. If d-c voltage is available at some of the d-c output jacks, but not at others, make the following checks:

(*1*) Check to see that the selector switch is in the right position.

(*2*) Check condition of jacks affected.

(*3*) Check leads from the jacks to voltage divider R1-R8.

f. Excessive Output Current. If excessive current causes the d-c standards meter and a voltmeter under test to show abnormally high readings or off-scale deflections, check the voltage divider and bleeder resistors R9-R13 and R14-R17 for a broken connection or open circuit to ground. Check to see that no multiplier which should be in the circuit is shorted out.

g. No A-c Output. If there is no a-c voltage output to the testing circuit or the standards unit and if d-c voltages are available, check for continuity between prong 11 on receptacle E3 and ground through switch S2B.

h. No A-c Voltage at Some A-c Output Jacks. If a-c voltage is available on some a-c ranges but not on others, check the jacks of the voltage ranges affected and the leads from the jacks to taps on transformer T1 or switch S2A.

i. No Output.

(*1*) If rectifier tube V1 lights and neither a-c or d-c output voltage is available, check for an open circuit in switch S1B, rheostat T19, variac T3, or their interconnecting leads. If this circuit is normal, the primary of transformer T1 is open or not connected.

(*2*) If the voltage supply unit is totally inoperative and pilot light P does not light, fuse F1 is probably blown out, switch S1A inoperative, or input receptacle E1 is defective.

(*3*) If these parts are normal, the fault lies outside Voltage Supply Unit PP-14/GSM-1 in the a-c supply to the equipment or in Cord CD-370.

83. CURRENT SUPPLY UNIT PP-15/GSM-1.

If trouble is encountered in the current supply unit (fig. 34), the following suggestions may aid the repairman in quickly locating the cause.

a. Since the meter in use on Ammeter Standards Unit TS-50/GSM-1 and the meter under test are connected in series, both meters will normally react in the same manner to any fault in the current supply unit.

b. When the meters fail to indicate on any range, check the series circuit affected. The fault is most likely to be in a jack in the current supply panel or in one of the receptacles or plugs. Check the wiring and connections between the jack and the pin contact in the receptacle affected. There is a possibility also of a defective current limiting resistor in the circuit.

c. If current is available at all jacks, but is erratic, check the rheostat and carbon-pile resistor.

d. Total lack of current on a-c ranges indicates a defective power switch S1, input transformer T1, input receptacle E4, a blown fuse, or loss of power outside of the current supply unit.

e. Total lack of current on d-c ranges indicates a defective power switch, a defective battery, or an open in the battery leads.

f. If there is an indication on two of the meters of Ammeter Standards Unit TS-50/GSM-1 at once, it is an indication of unwanted leakage current between jacks or between receptacle pins of the current supply unit. Moisture or dirt on the jack panel or in the receptacles may provide high resistance leakage paths, which do not interfere with the operation of the equipment, but do affect

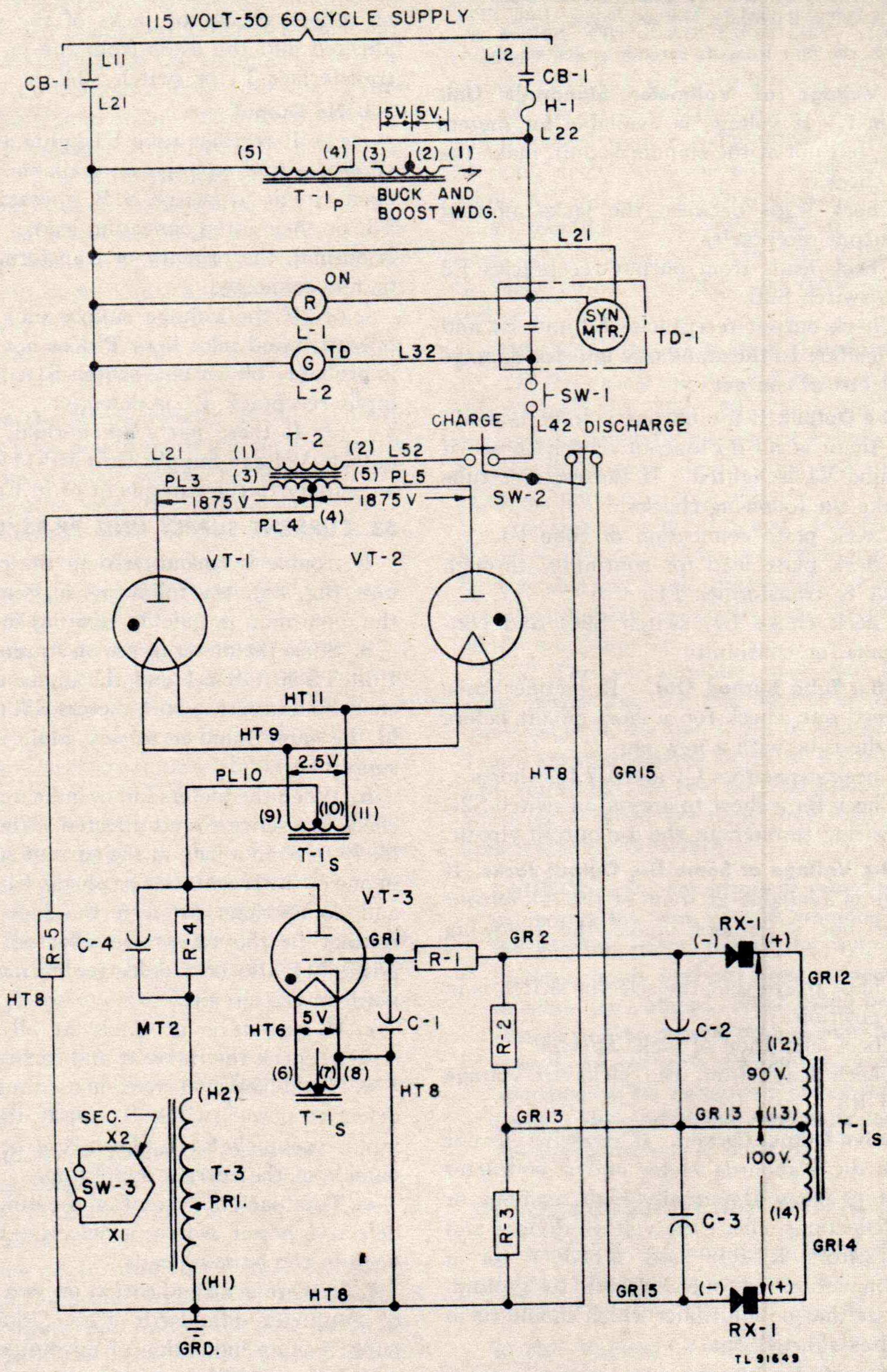

Figure 43. .Circuit label for Magnet Charger TS-336/GSM-1.

its accuracy to some extent. Thorough cleaning of the jacks and receptacles will usually correct this fault.

84. MAGNET CHARGER TS-336/GSM-1.

CAUTION: HIGH VOLTAGES are exposed during this trouble-shooting procedure. Only authorized personnel may perform trouble shooting in the interior of the component. OBSERVE ALL SAFETY PRECAUTIONS.

a. Whenever the magnet charger does not function properly, or does not adequately magnetize meter magnets, make the following checks to locate the trouble:

(*1*) Check to see if the red indicating lamp is lighted. If it is lighted, alternating current is being supplied to the primary of transformer T1. If it is not lighted, see if the lamp is good, and check circuit breaker CB1 and the a-c supply. Also check the wiring for a short circuit or an open circuit.

(*2*) If the red indicating lamp is lighted, see if the filaments of tubes V1, V2, and V3 are burning. If only one filament is not burning, try a new tube. If a new tube does not correct the fault, check the affected tube socket and lead wires to the socket for defects. If none of the tube filaments light, check for an open circuit in the primary of transformer T1.

(*3*) If the red indicating lamp is lighted and the green indicating lamp does not light after a delay of 5 minutes, check to see if the lamp is good. If the lamp and its associated leads are normal, connect a jumper across the time-delay relay. This will enable the repairman to check the operation of the high-voltage and control circuits. Repair or replace the time-delay relay, if it is defective. *Do not leave the relay shorted out when the magnet charger is put back in operation.*

(*4*) Depress the button on interlock switch S1 and the CHARGE push button (fig. 8). Hold the interlock closed for 10 seconds, and press the DISCHARGE push button. Note whether the thyratron tube V3 fires or not. If it fires, the grid control circuit is functioning. If it does not fire, check the voltage across resistors R2 and R3 (subpar. b below). If these voltages are abnormal, check the input and output voltages of the copper-oxide rectifier unit. If the voltages are normal, check resistor R1 and the grid and plate connections of the thyratron tube.

(*5*) If the thyratron and its grid-control circuit are normal, and a magnet placed in the magnetizing fixture does not become adequately magnetized when the DISCHARGE button is pushed, check the continuity of the discharge circuit through resistor R4 and the primary of transformer T3.

CAUTION: Turn circuit breaker CB1 to OFF position and short out high-voltage capacitor C4, before making any resistance measurements inside Magnet Charger TS-336/GSM-1.

(*6*) If magnets are insufficiently magnetized by the magnet charger, check the resistance value of resistor R5. If resistor R5 is open, or has a value much over 4,000 ohms, there will be an abnormal demagnetizing current when the thyratron tube ceases to conduct.

b. The following a-c and d-c voltages are normal in Magnet Charger TS-336/GSM-1.

(*1*) Transformer T1.
- (*a*) Across primary, 115 v ac.
- (*b*) Between terminals 6 and 8, 5 v ac.
- (*c*) Between terminals 9 and 11, 2½ v ac.
- (*d*) Between terminals 12 and 13, 90 v ac.
- (*e*) Between terminals 13 and 14, 100 v ac.

(*2*) Transformer T2.
- (*a*) Across primary, 115 v ac.
- (*b*) Between terminals 3 and 4, 1,875 v ac.
- (*c*) Between terminals 4 and 5, 1,875 v ac.
- (*d*) Between terminals 3 and 5, 3,750 v ac.

(*3*) Across capacitor C4, 1,600 v dc.

(*4*) Across resistor R2, 90 v dc.

(*5*) Across resistor R3, 100 v dc.

SECTION XII
REPAIRS

85. GENERAL REPAIR INSTRUCTIONS.

a. Removal and replacement of defective parts or circuit elements of the components of Meter Test Equipment AN/GSM-1 is not difficult. The chassis of each component can be removed from the case, making all the parts and circuit elements easily accessible. However, particular care should be observed when servicing and repairing this equipment to avoid further damage to delicate mechanisms and circuit elements. Only fully qualified repair personnel should attempt any repair to components of Meter Test Equipment AN/GSM-1.

b. Always use the correct tools in disassembly procedures. Tools available to personnel of organizations to which Meter Test Equipment AN/GSM-1 is issued, are adequate for all repair requirements. The following tool equipments are available:

(*1*) Tool Equipment TK-21/G (Electrical Instrument Repairman).

(*2*) Tool Equipment TK-22/G (Non-electrical Instrument Repairman).

(*3*) Tool Equipment TK-3/MSM-2.

c. Whenever it is necessary to disconnect a number of leads during the removal of a defective part, tag each lead so that it can be readily replaced in its proper location when reassembling the equipment.

d. When making solder connections, avoid using more solder than necessary. Excess solder dropped accidentally into the equipment is likely to short-circuit other circuit elements. Do not heat the lug or connection excessively because of possible damage to nearby circuit elements.

e. Save time and trouble by making a thorough electrical check of any part that is thought to be defective before removing it from the equipment.

CAUTION: Never change the location of parts or wiring leads. Never substitute a longer lead or a lead of different material or higher gauge number. Such changes may materially affect the accuracy of delicate test equipment by altering circuit resistance values.

86. REMOVAL OF METERS.

a. Remove the rear cover of Voltmeter Standards Unit TS-49/GSM-1 or Ammeter Standards Unit TS-50/GSM-1.

b. Disconnect leads to the meter (figs. 29 and 30).

c. Remove the long tubular nuts from the studs on the rear of the instrument flange. Screwdriver slots are provided in the ends of these nuts.

d. Remove the meter through the rectangular opening in the meter panel.

NOTE: When removing one of the lower meters, disconnect all of the meters in the voltmeter standards unit or ammeter standards unit and remove the meter panel from the front of the chassis, before removing the meter from the panel.

e. Replace the meter by following the removal steps in reverse order.

87. VOLTMETER RESISTORS (MULTIPLIERS).

a. The voltmeter multipliers are mounted on a phenolic plate in the left-hand end compartment of Voltmeter Standards Unit TS-49/GSM-1.

b. To remove the multipliers for the a-c voltmeter, proceed as follows:

(*1*) Remove all wiring connections to the multipliers.

(*2*) Remove the phenolic mounting plate.

(*3*) Remove the a-c voltmeter multiplier from the mounting plate.

c. The d-c voltmeter multiplier unit may be removed without disturbing the a-c voltmeter circuit elements and without removing the phenolic mounting plate.

88. REMOVING HIGH-CURRENT D-C AMMETER SHUNT.

a. The shunt for high-current d-c ammeter ranges (75 amps, 15 amps, and 7.5 amps) is located on the base of the chassis of Ammeter Standards Unit TS-50/GSM-1 just behind the meter panel.

b. Be careful when loosening or tightening the main connection terminal bolts. These bolts are tapped into the tops of the square, brass terminal posts which hold the shunt leaves.

(*1*) Use one wrench to hold the terminal post, and turn the terminal-bolt head with another wrench. An alternative method is to insert a tightly fitting block between the terminal post and an adjacent one, to prevent the terminal post from being turned.

(*2*) Turning the terminal post puts an undue stress on the shunt leaves and may break them loose from their connections.

c. Whenever a high-current d-c ammeter shunt is removed and replaced, make a thorough in-

spection to insure that all the shunt leads are tightly connected in the terminal posts.

89. REMOVING CURRENT TRANSFORMER.

a. Location. The current transformer is located in the left-hand end compartment of Ammeter Standards Unit TS-50/GSM-1.

b. Removal.

(*1*) Remove the microammeter shunt from the mounting plate in the top of the compartment.

(*2*) Remove the high-current leads from the underside of the high-current terminal binding posts. Straighten the leads as well as possible.

(*3*) Remove the two machine screws which pass through the corners of the transformer-core assembly.

(*4*) Remove the screws from the phenolic clamps which hold the transformer in place.

(*5*) Feed the high-current leads through the rubber bushings in the bottom of the standards unit, and remove the transformer.

c. Replacement.

(*1*) Replace the current transformer by reversing the procedures for removal (subpar. b above).

(*2*) Be careful not to remove any of the insulating varnish from the leads when feeding them through the rubber bushings or bending them to fit the high-current terminal binding posts.

(*3*) Be sure that the two machine screws are tightened securely so that the core laminations will not be loose.

90. REMOVING OUTPUT TRANSFORMER FROM MAGNET CHARGER.

To remove transformer T3 from the cabinet, proceed as follows:

a. Remove the switch blades and the clamping handle of the magnetizing fixture (fig. 8).

b. Remove tubes V1, V2, and V3 (par. 15).

c. Remove the tube-mounting panel by removing the three screws at the corners of the panel and one screw on the panel brace.

d. Remove the four mounting screws which fasten the transformer to the vertical braces.

e. Slide the transformer back into the cabinet, then to right, to clear the horizontal brace, and lift it upward. The transformer weighs approximately 90 pounds. Be careful not to drop it and damage other parts in the cabinet.

f. Replace the transformer in the cabinet by reversing the steps of disassembly.

91. CALIBRATION OF FREQUENCY METER.

The frequency meter (Weston model 339) can be calibrated if the special apparatus required is available. A variable-speed generator and speed-standardizing equipment are necessary for this calibration. Adjustments are made by varying the amount of inductive reactance in the circuit by adjusting reactor L (fig. 40).

92. PAINTING AND REFINISHING.

a. If the finish on metal cases of the components of Meter Test Equipment AN/GSM-1 has been badly scarred or damaged, the repairman should touch up the bared metal surface to prevent rust and corrosion. Proceed as follows:

(*1*) Clean the scarred surface down to the bare metal. Use ✻00 or ✻000 sandpaper to obtain a bright, smooth finish. To remove rust, clean the corroded metal with dry-cleaning solvent (SD). For severe rust, use dry-cleaning solvent to soften the rust and then use sandpaper to remove the rust.

CAUTION: Do not use steel wool in place of sandpaper. Minute particles of the metal may drop inside of the case or on exterior connections and cause harmful short circuits.

(*2*) When only a touch-up job is necessary, apply matching paint with a small brush. When numerous scars and scratches warrant a complete repainting job, remove the chassis from the case and spray the entire case with paint. Use authorized paint consistent with existing regulations.

b. Wooden cases should be kept in the best condition possible. Apply paint, varnish, stain, or lacquer when needed. Use authorized finishes consistent with existing regulations.

93. UNSATISFACTORY EQUIPMENT REPORT.

a. When trouble in equipment used by Army Ground Forces or Army Service Forces occurs more often than repair personnel feel is normal, War Department Unsatisfactory Equipment Report, W.D., A.G.O. Form No. 468 should be filled out and forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D.C.

b. When trouble in equipment used by Army Air Forces occurs more often than repair personnel feel is normal, Army Air Forces Form No. 54 should be filled out and forwarded through channels.

c. If either form is not available, prepare the data according to the sample form reproduced in figure 44.

WAR DEPARTMENT

UNSATISFACTORY EQUIPMENT REPORT

FOR	TECHNICAL SERVICE: Signal Corps — MATERIEL		DATE: 18 May 1945
FROM	ORGANIZATION: 579 Sig Rep Co		STATION: APO 791 New York, N.Y.
TO	NEXT SUPERIOR HEADQUARTERS: Signal Officer	STATION: Ninth Army	TECHNICAL SERVICE: SIG C

COMPLETE MAJOR ITEM

NOMENCLATURE	TYPE	MODEL	
Magnet Charger TS-336/GSM-1			
MANUFACTURER: Westinghouse	U. S. A. REG. No.: 8548-Phila-44	SERIAL No.: 49	DATE RECEIVED: 12 May 1945

EQUIPMENT WITH WHICH USED *(if applicable)*: Meter Test Equipment AN/GSM-1

DEFECTIVE COMPONENT—DESCRIPTION AND CAUSE OF TROUBLE

PART NO.	TYPE	MANUFACTURER	DATE INSTALLED
		Westinghouse	12 May 1945

DESCRIPTION OF FAILURE AND PROBABLE CAUSE *(If additional space is required, use back of form)*: Magnet charger too heavy and bulky to operate conveniently in repair truck.

DATE OF INITIAL TROUBLE	TOTAL TIME INSTALLED			TOTAL PERIOD OF OPERATION BEFORE FAILURE					
	YEARS	MONTHS	DAYS	YEARS	MONTHS	DAYS	HOURS	MILES	ROUNDS
13 May 1945									

BRIEF DESCRIPTION OF UNUSUAL SERVICE CONDITIONS AND ANY REMEDIAL ACTION TAKEN: Operated component by placing it on platform outside the truck.

TRAINING OR SKILL OF USING PERSONNEL			RECOMMENDATIONS *(If additional space is required, use back of form)*
POOR	FAIR	GOOD ✓	Design smaller and lighter component.

ORIGINATING OFFICER

TYPED NAME, GRADE, AND ORGANIZATION	SIGNATURE
R.S. SNOW, Capt, 579 Sig Rep Co	R. S. Snow, Capt, Sig C

FIRST ENDORSEMENT

TO CHIEF	TECHNICAL SERVICE	OFFICE	
NAME, GRADE, AND STATION		STATION	DATE

Instructions

1. It is imperative that the chief of technical service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in matériel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.
2. This form will be used for reporting manufacturing, design, or operational defects in matériel, petroleum fuels, lubricants, and preserving materials with a view to improving and correcting such defects, and for use in recommending modifications of matériel.
3. This form will not be used for reporting failures, isolated material defects or malfunctions of matériel resulting from fair-wear-and-tear or accidental damage nor for the replacement, repair or the issue of parts and equipment. It does not replace currently authorized operational or performance records.
4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 750-10 (change No. 3).
5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches, or other illustrative material are highly desirable.
6. When cases arise where it is necessary to communicate with a chief of service in order to assure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.
7. This form will be made out in triplicate by using or service organization. Two copies will be forwarded direct to the technical service; one copy will be forwarded through command channels.
8. Necessity for using this form will be determined by the using or service troops.

W. D., A. G. O. Form No. 468
30 August 1944

This form supersedes W. D., A. G. O. Form No. 468, 1 December 1943, which may be used until existing stocks are exhausted.

TL96857

U. S. GOVERNMENT PRINTING OFFICE 16—41546-1

Figure 44. Sample War Department Unsatisfactory Equipment Report, filled out.

SECTION XIII
REFERENCES

94. PARTS LIST.

SIG 1	Introduction to ASF Signal Supply Catalog (when published).
SIG 2	Complete Index to ASF Signal Supply Catalog.
SIG 3	List of Items for Troop Issue.
SIG 4-1	Allowances of Expendable Supplies.
SIG 4-2	Allowances of Expendable Supplies for Schools, Training Centers, and Boards.
SIG 5	Stock List of All Items.
SB 11-10	Signal Corps Kit and Materials for Moisture and Fungi-Resistant Treatment.

95. TECHNICAL MANUALS ON TEST EQUIPMENT.

TM 11-303	Test Sets I-56-C, I-56-D, I-56-H, and I-56-J.
TM 11-321	Test Set I-56-E.
TM 11-472	Repair and Calibration of Electrical Measuring Instruments.
TM 11-2613	Voltohmmeter I-166.
TM 11-2626	Test Unit I-176.
TM 11-2627	Tube Tester I-177.

96. SHIPPING INSTRUCTIONS.

U.S. Army spec No. 100-14A, Army-Navy General Specification for Packaging and Packing for Overseas Shipment.

97. DECONTAMINATION.

TM-3-220 Decontamination.

98. DEMOLITION.

FM 5-25 Explosives and Demolitions.

99. OTHER PUBLICATIONS.

FM 21-6	List of Publications for Training.
TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 66	Winter Maintenance of Ground Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TM 11-430	Storage Batteries for Signal Communication Except Those Pertaining to Aircraft.
TM 1-455	Electrical Fundamentals.
TM 11-453	Shop Work.
TM 11-455	Radio Fundamentals.
TM 37-250	Basic Maintenance Manual.

100. FORMS.

Army Air Forces Form No. 54.
W.D., A.G.O. Form No. 468.

101. ABBREVIATIONS.

A	adjust
ac	alternating current (noun)
a-c	alternating-current (adjective)
A.G.	Adjutant General
A.G.O.	Adjutant General's Office
amp	ampere
A.P.O.	Army Post Office
approx	approximately
A.R.	Army Regulations
ASF	Army Service Forces
C	centigrade
C	clean
Capt	captain
Co	company
contd	continued
cps	cycles per second
D.C.	District of Columbia
dc	direct current (noun)
d-c	direct-current (adjective)
diam	diameter
emf	electromotive force
etc	et cetera
F	Fahrenheit
F	feel
fig.	figure
FM	field manual
h	henry, henrys
I	inspect
ID	inside diameter
in.	inch, inches
L	lubricate
lb	pound, pounds
ma	milliampere (s)
max	maximum
mf	microfarad (s)
No.	number
N.Y.	New York
OD	outside diameter
par.	paragraph
Phila	Philadelphia
reg	registry
rep	repair
rms	root mean square
SB	supply bulletin

Sig	signal	TM	technical manual
Sig C	Signal Corps	TNT	trinitrotoluene
spec	specification	U. S.	United States
subpar.	subparagraph	U. S. A.	United States Army
T	tighten	v	volt, volts
TB	technical bulletin	W. D.	War Department

SECTION XIV
MAINTENANCE PARTS

102. MAINTENANCE PARTS FOR METER TEST EQUIPMENT AN/GSM-1.

The following information was compiled on 9 May 1945. The appropriate pamphlets of the ASF Signal Supply Catalog for Meter Test Equipment AN/GSM-1 are:

Organizational Spare Parts
SIG 7-AN/GSM-1 (when published)
Higher Echelon Spare Parts
SIG 8-AN/GSM-1 (when published)
SIG 8-PP-14/GSM-1 (when published)
SIG 8-PP-15/GSM-1 (when published)
SIG 8-TS-49/GSM-1 (when published)
SIG 8-TS-50/GSM-1 (when published)
SIG 8-TS-336/GSM-1 (when published)
SIG 8-I-56
SIG 8-I-166
SIG 8-I-176
SIG 8-I-177

For an index of available catalog pamphlets, see the latest issue of ASF Signal Supply Catalog SIG 2.

103. MAINTENANCE PARTS FOR DECADE RESISTANCE BOXES (DAVEN TYPES 750-K AND 750-L) AND FREQUENCY METER (WESTON TYPE 339).

Maintenance parts are not authorized for decade resistance box (Daven type 750-K), decade resistance box (Daven type 750-L), and frequency meter (Weston type 339), since these equipments will be replaced as units.

104. MAINTENANCE PARTS FOR CURRENT SUPPLY UNIT PP-15/GSM-1

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
Fig. 4	3H1415	CURRENT SUPPLY UNIT PP-15/GSM-1: input 110 v, 60 cyc AC or 6 v DC; provides variable current ranges by means of jacks on front panel; 18″ wd x 8″ lg x 8″ h overall.
TS 1	2Z9402.59	BOARD, terminal: 4 brass nickel pl terms; molded bakelite; 3-1/8″ lg x 1-13/16″ wd x 25/32″ thk; Jones HB No. 2-150.
	3E1370	CABLE ASSEMBLY, power: Sig C Cord CD-370; general purpose; RC; round, 1/4″ diam x 72″ lg; 2 No. 16 AWG flexible cond; Sig C dwg No. SC-D-4195 (Belden No. 1040 male plug on 1 end, female plug Belden No. H-838 on other end).
E 1, 2	3B921	CLIP, alligator: steel, lead finish; 4-1/32″ lg x 1-19/32″ wd x 3/4″ thk; Mueller No. 21A "Universal".
E4	3Z3022-33	CONNECTOR, male contact: 2 flat parallel cont; straight; 1-1/8″ lg x 1-3/4″ diam; Amphenol type S.
E 5 (P 2)	2Z3026-24	CONNECTOR, male contact: 6 flat parallel cont; straight; 3-1/2″ lg x 3-7/8″ wd x 2-3/8″ d; Jones HB No. P-506DB.

104. MAINTENANCE PARTS FOR CURRENT SUPPLY UNIT PP-15/GSM-1 (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
E-7 (P 4)	2Z3041-8	CONNECTOR, male contact: 21 flat cont; 14 parallel, 7 at 90° angle to others; straight; 3-1/2″ lg x 1-5/8″ wd x 1-3/8″ d; Jones HB No. P-321DB
E 6 (P 3)	2Z7134	CONNECTOR, male contact: 24 flat parallel cont; straight; 3-7/8″ lg x 1-5/8″ wd x 1-3/8″ d; Jones HB No. P-324DB.
F 1	3Z2603.10	FUSE, cartridge: 3 amp, 250 v; glass; ferrule 1/4″ diam x 5/16″ lg; 1-1/4″ lg x 1/4″ diam overall; Littelfuse No. 3AG.
J1-16 (J4-J19)	2Z5533A	JACK JK-33-A: for 2 cond 1/4″ diam plug; 15/16″ lg x 3/4″ diam; Sig C dwg No. SC-D-2339-F and SC-D-2332-F.
	2Z5850-36	KNOB, round: black bakelite; for 1/4″ diam shaft; single 1/8″ setscrew; 2-1/2″ diam x 1″ thk; GR No. 637P.
	2Z5758.1	KNOB, round: black bakelite; for 3/8″ diam shaft; single 1/8″ setscrew; 2-1/2″ diam x 1″ thk; GR No. 637Q.
E 3	2Z5927	LAMP LM-27: incandescent; 6 to 8 v, 0.25 amp; blue bead, bulb T-3-1/4; miniature bayonet base; Mazda No. 44.
	2Z5985.3	LAMPHOLDER: miniature bayonet base; brass, chrome pl; w/red jewel; 15/16″ wd x 2″ h, 90° angle bend; Drake No. 10G.
H 4, 5, 6 (BP 1, 2, 3)	3Z737-6.1	POST, binding: screw type; 1/2″ diam x 1-1/2″ lg; mtg stem No. 6-32 thd x 9/16″ lg; Eby No. 39 Ensign (link positions).
H 2	3Z737-7.1	POST, binding: screw type; 5/8″ diam x 7/8″ lg overall; mtg stem No. 10-32 x 3/4″ lg; Eby No. 45 Admiral (low amps).
H 1, 3	3Z741-10.1	POST, binding: screw type; 1″ diam x 2-1/2″ lg; mtg stem 5/16″-18 x 1-1/4″ lg; Standard Electric Time No. BPD-5.
R 4	NSNR	RESISTOR, fixed: wire wound; 0.2 ohm (see 1 ohm resistor, ref R-3 5 used in parallel).
R 5	NSNR	RESISTOR, fixed: wire wound; 0.33 ohm (see 1 ohm resistor ref R-3 3 used in parallel).
R 17	NSNR	RESISTOR, fixed: wire wound; 0.5 ohm (see 1 ohm resistor R 3,2 used in parallel).
R 6, 16	3ZK4801-4	RESISTOR, fixed: wire wound; 1 ohm ±10%; 10 w; 1-3/4″ lg x 5/16″ diam; WL type Z.
R 3, 4, 5, 17	3Z5991-13	RESISTOR, fixed: wire wound; 1 ohm ±10%; 25 w; 2″ lg x 9/16″ diam; Ohmite No. 0360.
R 7	3Z5992-24	RESISTOR, fixed: wire wound; 2 ohms ±5%; 10 w; 1-3/4″ lg x 5/16″ diam; IRC type AB.
R 15	3Z5995-13	RESISTOR, fixed: wire wound; 5 ohms ±10%; 10 w; 1-3/4″ lg x 5/16″ diam; Ohmite "Brown Devil".
R 8	3Z6001-36	RESISTOR, fixed: wire wound; 10 ohms ±5%; 1 w; 1-1/4″ lg x 1/4″ diam; IRC type BW-1.
R 9	3Z6003-4	RESISTOR, fixed: wire wound; 30 ohms ±10%; 1 w; 1 1/4″ lg x 1/4″ diam; IRC type BW-1.

104. MAINTENANCE PARTS FOR CURRENT SUPPLY UNIT PP-15/GSM-1 (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
R 10	3Z6010-27	RESISTOR, fixed: wire wound; 100 ohms ±5%; 1 w; 1-1/4″ lg x 1/4″ diam; IRC type BW-1.
R 11	3ZK6030-47	RESISTOR, fixed: wire wound; 300 ohms ±5%; 1 w; 1-1/4″ lg x 1/4″ diam; IRC type BW-1.
R 12	3Z6200-15	RESISTOR, fixed: wire wound; 2,000 ohms ±10%; 1 w; 1-1/4″ lg x 1/4″ diam; IRC type BW-1.
R 14	3Z6400-79	RESISTOR, fixed: wire wound; 4,000 ohms ±10%; 1 w; 1-1/4″ lg x 1/4″ diam; IRC type BW-1.
R 13	3RC31BE203J	RESISTOR, fixed: composition; 20,000 ohms ±5%; 1 w; max dimen 1.28″ lg x 0.310″ diam; RC31BE203J.
R 2	3Z7005-2	RESISTOR, variable (potentiometer): wire wound; 5 ohms; 150 w; 3 terms; 4″ diam x 2″ d, shaft 1/4″ diam x 5/8″ lg; Ohmite No. L.
R 1	3Z7006-6	RESISTOR, variable: carbon; 6 ohms; 2 terms; 8-1/8″ lg x 3-1/2″ wd x 4-7/8″ h overall including mtg, shaft 3/8″ diam x 1″ lg; Biddle No. 10 modified.
S 1	3Z9849.14	SWITCH, toggle: DPDT; single sect; metal case; 2-3/32″ lg x 19/32″ wd x 1-5/16″ h; C-H No. 8700.
T 1	2Z9611.351	TRANSFORMER, power: testing; completely inclosed metal case; pri 110 v 60 cyc; sec tapped 6.3 v 10 amp; 3-3/4″ wd x 4″ lg x 4-3/8″ h; Thordarson No. T48458.

105. MAINTENANCE PARTS FOR VOLTAGE SUPPLY UNIT PP-14/GSM-1.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	3H7500-14	VOLTAGE SUPPLY UNIT PP-14/GSM-1: input 110 v, 60 cyc; (provides variable voltage ranges by means of jacks on front panel; 18″ lg x 8″ wd x 8″ h overall).
	(Order through AGO channels)	TM 11-2535.
	3E1370	CABLE ASSEMBLY, power: Sig C Cord CD-370; general purpose; RC; round, 1/4″ diam x 72″ lg; 2 No. 16 AWG flexible cond; Sig C dwg No. SC-D-4195; (Belden No. 1040 male plug on 1 end, female plug Belden No. H-838 on other end).
C 2	3DB8-104	CAPACITOR, fixed: paper, oil-filled; 8 mf ±10%; 600 vdcw; 3-7/8″ lg x 3-3/4″ wd x 1-1/4″ h; Aerovox type No. 609.
C 1	3DB8-92	CAPACITOR, fixed: paper, oil-filled; 8 mf ±10%; 2000 vdcw; 4-3/4″ lg x 3-3/4″ wd x 3-3/16″ d; Aerovox type No. 2009.
L 1 (CH 1)	3C316-70	COIL, AF: filter; single winding; 5 hy at 200 ma, 20 hy at 20 ma DC; enclosed metal case; 3-3/4″ lg x 3-1/2″ wd x 4-1/2″ h; Thordarson No. T48457.
E 2 (SC 1)	2Z3063-61	CONNECTOR, female contact: 2 flat parallel cont; straight; 1-3/4″ lg x 1-5/8″ wd x 1-1/2″ thk; Jones HB No. S-2402DB.

105. MAINTENANCE PARTS FOR VOLTAGE SUPPLY UNIT PP-14/GSM-1. (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
E 4 (SC 3)	2Z3071-10	CONNECTOR, female contact: 10 flat parallel cont; straight; 3-1/2″ lg x 1-5/8″ wd x 1-5/8″ thk; Jones HB No. S-2410DB.
E 3 (SC 2)	2Z3073-14	CONNECTOR, female contact: 12 flat parallel cont; straight; 3-7/8″ lg x 1-5/8″ wd x 1-5/8″ thk; Jones HB No. S-2412DB.
E 1 (SC 4)	2Z3022-33	CONNECTOR, male contact: 2 flat parallel cont; straight; 1-1/2″ diam x 1-1/4″ lg; Amphenol type S.
F 1	3Z2605.2	FUSE, cartridge: 5 amps, 250 v; glass; ferrule 1/4″ diam x 1/4″ lg; 1-1/4″ lg x 1/4″ diam overall; Littelfuse No. 3AG.
	3Z3282	HOLDER, fuse: extractor post; for 3AG fuse; black bakelite; 5 amps, 250 v; 3/4″ lg x 5/8″ diam; Littelfuse No. 1212.
J 1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 15 (JK)	2Z5534	JACK JK-34-A: telephone; for 2 cond 1/4″ diam plug; 1-1/4″ lg x 1″ d x 3/4″ h overall.
J5, 6, 13, 14	2Z5572-10	JACK, telephone: for single cond 1/4″ diam plug; 1-20/32″ lg x 27/32″ d x 3/4″ wd overall; Utahrad No. SJ63.
	2C5148/10	KNOB, bar: black bakelite; for 1/4″ diam shaft; single 1/8″ setscrew; 1-1/2″ lg x 5/8″ wd x 3/4″ thk; (for range switch).
	2Z5850-36	KNOB, round: black bakelite; for 1/4″ diam shaft; single 1/8″ setscrew; 2-1/2″ diam x 1″ thk; GR No. 637P.
	2Z5758.1	KNOB, round: black bakelite; for 3/8″ diam shaft; single 1/8″ setscrew; 2-1/2″ diam x 1″ thk; GR No. 637Q.
P	2Z5903	LAMP, incandescent: 120 v, 6 w; clear 1/2″ diam pear shape bulb; 1-3/4″ lg overall; medium candelabra screw base; Mazda No. 6S6.
	2Z5991-39	LAMPHOLDER: pilot; medium candelabra base; brass; w/red jewel; 3″ lg x 3/4″ wd x 1/64″ thk; Drake No. 10C.
H 1 (BP 1)	3Z737-7.1	POST, binding: screw type; 5/8″ diam x 7/8″ lg overall; No. 10-32 x 3/4″ lg mtg stem; Eby No. 45 Admiral (low amps).
R 4, 5, 6, 7, 8	3ZK6030-50	RESISTOR, adjustable: wire-wound; 300 ohms ±10%; 25 w; 2″ lg x 9/16″ diam; Ohmite No. 0371B.
R 9, 10, 11, 12, 13	3Z6200-124	RESISTOR, adjustable: wire-wound; 2,000 ohms ±10%; 25 w; 9/16″ diam x 2″ lg; Ohmite No. 0377.
R 14, 15, 16, 17	3Z6610-208	RESISTOR, adjustable: wire-wound; 10,000 ohms ±10%; 25 w; 2″ lg x 9/16″ diam; Ohmite No. 0385.
R 18	3Z4805-1	RESISTOR, fixed: wire-wound; 5 ohms ±10%; 160 w; 1-1/8″ diam x 8-1/2″ lg; WL type D.
R 1, 2	3Z6010-94	RESISTOR, fixed: wire-wound; 100 ohms ±10%; 10 w; 1-3/4″ lg x 5/16″ diam; Ohmite No. 1012.
R 3	3Z6015-74	RESISTOR, fixed: wire-wound; 150 ohms ±10%; 10 w; 5/16″ diam x 1-3/4″ lg; Ohmite No. 1013.

105. MAINTENANCE PARTS FOR VOLTAGE SUPPLY UNIT PP-14/GMS-1 (contd.)

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
R 19	3Z7005-2.1	RESISTOR, variable: wire-wound; 5 ohms ±2%; 150 w; 3 terms; 4″ diam x 2″ thk; Ohmite No. L-0528.
	2Z8674.134	SOCKET, tube: 4 prong wafer; isolantite; 3″ diam x 1-3/4″ h; Birnback No. 435.
S2A, B, C (SW 1, 2, 3)	3Z9825-74.76	SWITCH, rotary: one pole, 4 position; 3 sect; isolantite body; 3″ diam x 4-1/2″ lg; GE dwg No. M7463231G-1 (range switch—requires modification).
S1A, B (SW 4, 5)	3Z9857.47	SWITCH, toggle: DPDT; bakelite body; 2″ lg x 1-5/16″ wd x 1″ thk; AH&H No. 27943U (on-off).
T2	2Z9611.353	TRANSFORMER, power: fil; pri 110 v 60 cyc; secd 2.5 v CT; fully inclosed steel case; 3-5/8″ wd x 4-3/16″ lg x 4-3/4″ h; Thordarson No. T48456.
T1	2Z9612.90	TRANSFORMER, power: plate; pri 110 v 60 cyc; secd 2,000 v w/8 taps; fully inclosed steel case; 7″ x 6-1/8″ x 7-3/4″ overall; Amertran No. 32162, dwg. No. 62958.
T3	2Z9957-17	TRANSFORMER, variable power: variac; pri 115 v, 860 w; secd 115 to 135 v, 7-1/2″ amp; unshielded; 4-3/8″ diam x 5-3/4″ h overall; GR No. 200CU.
V1 (RA)	2J866A/866	TUBE, electron: JAN-866A/866 (VT-46-A).

106. MAINTENANCE PARTS FOR VOLTMETER STANDARDS UNIT TS-49/GSM-1.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	3F4325-49	VOLTMETER STANDARDS UNIT TS-49/GSM-1: A-c voltmeter; d-c voltmeter; and multiplier units; mtd on an inclined panel shock-mtd in steel frame w/sides, back and top inclosed in metal mesh; 6 ft cord stored in corner; 10″ lg x 16″ h x 8″ d overall.
	(Order through AGO channels)	TM 11-2535.
	1B3038-10	CABLE, power: general purpose; RC; round, 11/16″ max diam; 8 cond; 6 No. 16 AWG stranded cotton wound, 2 No. 22 AWG stranded tinned; Wemco No. PHz-64700; dwg No. Ph12372-J.
	1B3038-9	CABLE, power: general purpose; RC; round, 11/16″ max diam; 9 cond; 7 No. 16 AWG stranded cotton wound, 2 No. 22 AWG stranded tinned; Wemco No. Phz-64700; dwg No. Ph12372-J.
E2 (P3)	2Z3030-17	CONNECTOR, male contact: 10 flat cont; straight; 2-5/8″ lg x 2-7/16″ wd x 1-1/8″ thk less cap; cap 1-15/16″ lg; Jones No. P-2410-CCT.
E1 (P2)	2Z3032-20	CONNECTOR, male contact: 12 flat cont; straight; 2-5/8″ lg x 2-7/8″ wd x 1-1/8″ thk less cap; cap 1-15/16″ lg; Jones No. P-2412-CCT.
	6ZK5019-3	HANDLE, chest: U shaped; steel and all steel olive drab japanned bright; plate 3-7/16″ lg x 1-3/4″ wd x 0.074″ thk; handle 3-3/8″ lg x 3″ wd; Stanley Tools No. 1207.

106. MAINTENANCE PARTS FOR VOLTMETER STANDARDS UNIT TS-49/GSM-1 (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
M5	3F8075-7	METER, voltmeter: A-c; 60 cyc; 2 ranges 0 to 3 v, 0 to 75 v; rectangular; sheet steel semi-flush mtg case; 6-15/16″ sq flange, 5-1/2″ sq x 4-1/16″ d body; Wemco type No. HA, style No. N-635851, dwg No. 27-C-920 and 9-D-8035; (includes external multipliers).
M6	3F8750-17	METER, voltmeter: D-c; 0 to 750 mv; rectangular; sheet steel semi-flush mtg case; 6-15/32″ sq flange; 5-1/2″ sq x 4-1/16″ d body; Wemco type No. HX, style No. 635852, dwg No. 27-C-920; (including external multipliers).
	2Z8403-41	MOUNT, vibration: diamond; normal load rating 6 lbs; 2.310″ lg x 1-3/4″ wd x 5/8″ thk; Lord No. 150PD6.

107. MAINTENANCE PARTS FOR AMMETER STANDARDS UNIT TS-50/GSM-1.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	3F4325-50	AMMETER STANDARDS UNIT TS-50/GSM-1: A-c milliammeter; d-c microammeter; d-c ammeter; a-c ammeter, and external shunts; mtd on inclined panel shock-mtd in steel frame w/sides and top inclosed in metal mesh; 20″ lg x 16″ h x 8″ d overall.
	(Order through AGO channels)	TM 11-2535.
	1B3018-2.22	CABLE, power: general purpose; braided, flexible; round, 7/16″ max diam; 2 cond No. 18 AWG stranded; Hazzard Wire, "HAZA-CORD".
	1B3014-6.2	CABLE, power: general purpose; RC; round, 13/16″ max diam; 6 cond No. 14 AWG stranded; American Steel and Wire Co, spec No. 305.
	1B3018-12.1	CABLE, power: general purpose; RC; round, 11/16″ max diam; 12 cond; No. 18 AWG stranded; American Steel and Wire Co, spec No. 307.
E4 (X1)	2Z8676.32	CONNECTOR, female contact: 6 flat parallel cont; straight; 3-5/8″ lg x 2-1/4″ wd x 3″ h overall; Jones HB, No. S-506-CE.
E6 (X3)	2Z3082-1	CONNECTOR, female contact: 21 flat cont; straight; 2-5/16″ x 1-1/8″ x 1-13/16″; Jones HB No. S-321-CCT.
E5 (X2)	2Z8694.1	CONNECTOR, female contact: 24 flat cont in 3 tiers; straight; 2-9/16″ x 1-1/16″ x 1-3/4″; Jones HB, No. S-324-CCT.
E7 (PL1)	2Z3022-59	CONNECTOR, male contact: 2 flat cont; straight; 2-1/2″ lg x 1″ wd x 5/8″ thk; Jones HB, No. P-2402-CCT.
F1	3Z1925	FUSE FU-25, cartridge: 5 amps, 25 v; glass body, metal ferrule; 1-1/4″ lg x 1/4″ diam; Sig C dwg No. SC-D-350.
	6Z5010-7	HANDLE, chest: U-shaped, steel and wood; olive drab finish; plate 3-7/16″ lg x 1-3/4″ wd x 0.074″ thk; handle 3-3/8″ lg x 3″ wd; Stanley Tools No. 1207.
	3Z3275	HOLDER, fuse: extractor post; for 3AG fuse; molded black bakelite body w/red extractor knob; 10 amps max, 125 v; 5/8″ diam x 2-1/8″ lg overall; Littelfuse No. 1075.
M4	3F1005-47	METER, ammeter; A-c; 0 to 5 amps; rectangular semi-flush sheet steel case; flange 6-15/32″ sq, body 5-1/2″ sq x 4-1/16″ d; Wemco type HA, style No. Phs 124-2, dwg No. 27-C-920.
M1	3F1150-19	METER, ammeter: D-c; scales 0 to 75 ma or amps and 0 to 150 ma or amps; rectangular semi-flush sheet steel case; flange 6-15/32″ sq, body 5-1/2″ sq x 4-1/16″ d; Wemco type HX, style No. N-635848; dwg No. 27-C-920 (includes external shunts).

107. MAINTENANCE PARTS FOR AMMETER STANDARDS UNIT TS-50/GSM-1. (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
M2	3F877	METER, microammeter: D-c; scale 0 to 150 ua and 0 to 750 ua, rectangular semi-flush sheet steel case; flange 6-15/32″ sq, body 5-1/2″ sq x 4-1/16″ d; Wemco type HX, style No. N-635849; dwg No. 27-C-920 (includes external shunts).
M3	3F915-45	METER, milliammeter: A-c; 0 to 150 ma, rectangular semi-flush sheet steel case; flange 6-15/32″ sq; body 5-1/2″ sq x 4-1/16″ d; Wemco type HA, style No. N-635850; dwg No. 27-C-920 and No. 9-B-2259.
	2Z8403-41	MOUNT, vibration: diamond; normal load rating 6 lbs; 2.310″ lg x 1-3/4″ wd x 5/8″ thk; Lord No. 150PD6.
	3Z741-10.3	POST, binding: screw; black knurled; 1″ diam x 2-1/2″ lg overall, shaft 5/16″-18 x 1-1/4″; Standard Electric Time No. BPD-5 special.
	3Z741-10.2	POST, binding: screw; red knurled; 1″ diam x 2-1/2″ lg overall, shaft 5/16″-18 x 1-1/4″; Standard Electric Time No. SPD-5 special.
(T2)	2Z9614-140	TRANSFORMER, power: testing; pri, 1 amp-5 amps-10 amps; secd 5 amps; shielded; 2-1/4″ lg x 2-1/4″ h x 11/32″ thk; Wemco style No. 93-RS-355, dwg No. S-D-9576 and No. 63-D-252.
T1	2Z9614-141	TRANSFORMER, power: testing; pri, 5 amps; secd 25 amps-50 amps-100 amps; unshielded; 7-1/2″ lg x 3-1/8″ wd x 5-1/32″ h max; Wemco style No. 93-RS-367, dwg No. 51-D-906.

108. MAINTENANCE PARTS FOR MAGNETIC CHARGER TS-336/GSM-1

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	3F4325-336	MAGNET CHARGER TS-336/GSM-1: consists of meter magnet charger and demagnetizing coil; magnet charger 110 v, 50/60 cyc single-phase, 5 to 8 amp; 28″ x 19″ wd x 13″ h; Wemco Style No. 343976, type MC; demagnetizing coil 110 v, 50/60 cyc single-phase; 3-1/2 amp; in brown bakelite case; 14-5/8″ lg x 7-5/8″ OD; Wemco Style No. 1367795.
	3E4013-8	CABLE ASSEMBLY, power: rubber jacketed; round, 5/8″ OD; 8 ft lg: two #14 copper cond: Paranite Wire & Cable Co, Dreadnaught "S" Buna (w/rubber plug ea end) (u/w magnet charger).
	3E3158-96-23	CABLE ASSEMBLY, power: rubber jacketed; round, 5/8″ OD; 8 ft lg; two #16 copper cond; Nat'l Elec Prod Co. Indestructo Type SJ, Style 300 (w/Erickson No. 15P male connector one end and Jones HB No. S-202-B connector other end) (u/w demagnetizing coil).
C1	3DA2-152	CAPACITOR, fixed: mica; 2000 mmf ±10%; 5000 vdcw; 1-13/16″ lg x 1-7/16″ wd x 3/4″ thk; Wemco No. 920810.
C2,3	3DB2-66	CAPACITOR, fixed: paper; 2 mf ±10%; 440 vdcw; 5-3/4″ lg x 4″ wd x 1″ thk; Wemco Style No. 945029, type FL.
C4	3DB135	CAPACITOR, fixed: paper; oil-filled; 135 mf ±10%; 1600 vdcw; 13-3/4″ lg x 13-1/2″ wd x 4-1/8″ h; Wemco No. 1310522.
CB1	3H900-12.8	CIRCUIT BREAKER: thermal overload; 2 pole; 230 v AC max; 2-29/32″ wd x 1-15/32″ d x 2-19/32″ h; Wemco No. S-831320, type H.

108. MAINTENANCE PARTS FOR MAGNET CHARGER TS-336/GSM-1 (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	6Z1862-1	CLAMP ASSEMBLY: electron tube; consisting of 2 unfinished phosphor bronze strips ea 3/8″ wd x 0.051″ thk formed to encircle tube w/2 unfinished phosphor bronze supports, ea 3/8″ wd x 0.051″ thk; Wemco S No. 968212 (for WL677 electron tube.)
	6Z1862	CLAMP ASSEMBLY: electron tube; consisting of 2 unfinished phosphor bronze strips ea 3/8″ wd x 0.051″ thk formed to encircle tube w/2 unfinished phosphor bronze supports, ea 3/8″ wd x 0.051″ thk; Wemco S No. 1083496 (for WL866/866A electron tube).
	2Z2708.14	CLIP, tube contact: molded; phenolic; 1-9/16″ lg x 13/16″ wd x 25/32″ h; Nat'l Co No. SPG (for mtg on 9/16″ electron tube cap).
	3C332-956	COIL, solenoid: demagnetizing; single winding; 110 v AC; 3-1/2 amps; 50/60 cyc; completely inclosed in brown molded bakelite case; 14-5/8″ lg x 7-5/8″ OD x 2-1/16″ thk; Wemco S No. 1367795.
	6Z7784-1	CONNECTOR, female contact: 2 flat parallel cont: straight; w/cap groove and retainer ring; Amphenol No. 61-F1.
	2Z3022-70	CONNECTOR, male contact: 2 flat parallel polarized blades; straight; 1-3/16″ OD x 1-3/32″ less cont; Amphenol No. 61-MP4.
	7A481C/10	GROMMET: rubber; 11/16″ OD x 3/8″ ID; Wemco S No. 152442 (for mtg on 1/8″ plate).
TD1	2Z7590-153	RELAY, time delay: DPST, normally open; w/cover; 4-1/2″ lg x 3″ wd x 3-5/64″ h; Wemco S No. 1358237.
R2.3	3RC41AE103J	RESISTOR, fixed: composition; 10,000 ohms ±5%; 2 w; max dimen 1.78″ lg x 0.405″ diam; RC41AE103J.
R1	3RC41AE104J	RESISTOR, fixed: composition; 100,000 ohms ±5%; 2 w; max dimen 1.78″ x 0.405″ diam; RC41AE104J.
R5	3Z6400-44	RESISTOR, fixed: wire wound: 4000 ohms ±5%; 50 w; 4″ lg x 7/8″ diam overall; Sprague Koolohm No. 50N1; Wemco No. 1216646.
R4	3Z6624-15	RESISTOR, fixed: wire wound; 24,000 ohms ±10%; 100 w; 10″ lg x 1-1/8″ diam; Wemco S No. 896431A.
	2Z8674.138	SOCKET, tube: 4 prong: bakelite: 3-7/16″ lg x 2-11/16″ wd x 13/16″ h; Wemco S No. 974935 (for thyratron tube).
	2Z8650-3	SOCKET, tube: 4 prong; phenolic; 2-5/32″ lg x 1-3/8″ wd x 7/8″ h; Amphenol No. RS-4TM (for Ref V-1 and V-2 tubes).
SW-3	2Z556-20	SWITCH, Bar shorting: SPST; 7 laminated copper bars pivoted on the magnetizing transformer: 5 laminations 7-3/8″ lg x 3/4″ wd x 1/8″ thk, 2 laminations 8-5/8″ lg x 3/4″ wd x 1/8″ thk; Wemco dwg No. 13-B-4691, assembly No. 1.
SW1	3Z3890	SWITCH, push: interlock; 2 pole shorting spring disk bakelite body; 2-1/4″ lg x 1-1/2″ wd x 1″ h; Wemco S No. 511813 (cover interlock).
	3Z3490H-1	HANDLE, lever switch: "D" shaped; brass; 8″ lg x 1-3/4″ wd x 15/16″ thk; attached to pivoted bolt 1/2″ diam x 4-1/8″ lg, threaded 1-5/8″; Wemco dwg No. 13-B-4697, Assembly No. 1 (used to operate knife switch).

108. MAINTENANCE PARTS FOR MAGNET CHARGER TS-336/GSM-1 (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	2Z9057-30	INSERT, tube support: Micarta; 3/4″ lg x 1-9/16″ OD x 1-3/16″ ID: Wemco dwg No. 13-D-3780, items 1 and 2 (for thyratron tube).
	2Z5903	LAMP, incandescent: 110v, 7.5 w; bulb clear; 1-3/4″ lg; medium screw base; Wemco No. S-6 (u/w red indicator light) Mazda.
L2	2Z5991-48	LIGHT ASSEMBLY, indicator: medium screw base; w/red glass lens 1-1/8″ diam, marked "ON" w/smooth front and frosted back; 3″ lg x 1-1/8″ diam, mtg hole 1″ diam; Wemco No. S6, S No. 1228693, dwg No. 98-C-548 (includes 110 v, 6 w lamp.
L1	2Z5991-47	LIGHT ASSEMBLY, indicator: medium screw base; w/green glass lens 1-1/8″ disk, marked "TD" w/smooth front and frosted back; 3″ lg x 1-1/8″ diam, mtg hole 1″ diam; Wemco No. S-6, S No. 1249389 dwg. No. 98-C-548 (includes 110 v, 6 w lamp).
	2Z8402-13	MOUNT, vibration: diamond shaped; 4 lb load; 1-5/8″ lg x 1-3/16″ wd x 13/32″ thk; Lord No. 102PD-4.
RX1	3H4860-19	RECTIFIER, metallic; copper oxide; full-wave; output 175 v DC, 18 ma; 6-3/32″ lg x 1-3/4″ wd x 1-3/16″ h; Wemco S No. 1039843 (furnishes bias voltage to grid of thyratron).
SW2	3Z9824-68.4	SWITCH, push: single pole, 2 position; bakelite body; 6-3/32″ lg x 3-1/8″ wd x 3″ h; Wemco S No. 1033426 (charge-discharge).
H1	3H5565-4	THERMAL ELEMENT, overload: 110/220 v; 5.3 to 6.0 amp; overload rating 6.6 amp; Wemco S No. 831313 (p/o Wemco Type H circuit breaker).
T3	2Z9614-146	TRANSFORMER, power magnetizing; pri 1380 v AC, 60 cyc: secd 0.92 v AC, 60 cyc: 2 kva: unshielded; 12″ lg x 8-3/4″ wd x 9-5/8″ d: Wemco S No. 1356128.
T2	2Z9612.183	TRANSFORMER, power: plate; pri 115 v AC, 60 cyc: 620 va; secd 1875/1875 v AC, 60 cyc, CT, 71 ma; Wemco S No. 136672.
T1	2Z9611.361	TRANSFORMER, power: fil; pri #1 115 v AC, 60 cyc; pri #2 10 v ct, secd 2.5/5.0/190 v AC, 60 cyc; fully enclosed steel case; 5-1/2″ lg x 4-1/2″ wd x 3-1/2″ d; Wemco S No. 1366122.
VT1,2	2J866A/866	TUBE, electron: JAN 866A/866.
VT3	2JWL677	TUBE, electron: Wemco No. WL677.

109. OVERALL MAINTENANCE PARTS FOR METER TEST EQUIPMENT AN/GSM-1.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	3F3941-1	METER TEST EQUIPMENT AN/GSM-1: calibrating.
Fig. 23	3E1370	CABLE ASSEMBLY, power; Sig C Cord CD-370; general purpose; RC; round 1/4″ diam; 72″ lg; 2 #16 AWG flexible cond; w/Belden #1040 male plug one end, Belden #H-838 female plug other end; Sig C dwg #SC-D-4195.
Fig. 23	3E6000-25A	CABLE ASSEMBLY, power: Army-Navy Cord CX-25A/GSM-1; rubber insulated w/moistureproof cotton braid jacket; round, 1/2″ diam; 72″ lg; single #6 AWG copper cond comprising 49 strands; w/Mueller #21A battery clip, w/plus mark one end, spade lug other end; Sig C spec #71-1689.

109. OVERALL MAINTENANCE PARTS FOR METER TEST EQUIPMENT AN/GSM-1 (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
Fig. 23	3E6000-25B	CABLE ASSEMBLY, power: Army-Navy Cord CX-25B/GSM-1; rubber insulated w/moistureproof cotton braid jacket; round, ½" diam; 72" lg; single #6 AWG copper cond comprising 49 strands; w/Mueller #21A battery clip w/minus sign one end, spade lug other end; Sig C spec #71-1689.
Fig. 23	3B925	CLIP, battery: steel, lead pl; 4" lg; marked "+"; Mueller Elec Co #21A plus.
Fig. 23	3B921	CLIP, battery: Sig C Clip TL-110; steel, lead pl; 4" lg; marked "−".
Fig. 10	3F2789-6	METER, frequency: 50/70 cyc, accuracy 0.5%; 110/125 v; portable rectangular wooden case; 8-3/16" x 10-7/16" x 8-1/4" overall; w/carrying strap; Weston model #339.
Fig. 7	3F3386-135	MOUNTING MT-135/GSM-1: meter; wood box; 5" lg x 2-1/2" wd x 5" h on base 8" lg x 6" wd x 3/4" thk; w/2 #18 flexible RC leads 30" lg; Sig C dwg #SC-D-12562 (mounts meters during test).
Fig. 7	3F3386-175	MOUNTING MT-175/GSM-1: meter; wood box; 5" lg x 2-1/2" wd x 5" h on base 8" lg x 6"wd x 3/4" thk; w/2 #18 flexible RC leads terminating w/spade lug one end, PL-68 other end; Sig. C dwg #SC-D-12566 (mounts meters during test).
Fig. 37	3F1800-1	RESISTOR, decade: 111,110 ohms in steps of 1 ohm; ± 0.1% accuracy; walnut case w/aluminum panel; 15-5/8" lg x 5" wd x 5" h; 5 rotary switch adj; Davenco #750-L or GR #602M.
Fig. 37	3F1800-1.2	RESISTOR, decade: 11,111 ohms in steps of 0.1 ohm; ± 0.1% accuracy; walnut case w/aluminum panel; 15-5/8" lg x 5" wd x 5" h; 5 rotary switch adj; Davenco #750-K or GR #602N.
Fig. 1	3F51802-25	RING, calibration: meter; steel; cadmium pl; 2.065" ID, 3.065" OD x 0.09" thk; 3 L shaped spring clips 1/2" wd x 5/8" h riveted to ring 120° apart.
Fig. 1	3F51802-30	RING, calibration: meter; steel; cadmium pl; 2.710" ID, 3.710" OD x 0.09" thk; 3 L shaped spring clips; 1/2" wd x 5/8" riveted to ring 120° apart.
Fig. 1	3F51802-30.1	RING, calibration: meter; steel; cadmium pl; 2.770" ID, 3.770" OD x 0.09" thk; 3 L shaped spring clips, 1/2" wd x 5/8" h riveted to ring 120° apart.
Fig. 1	3F51802-31	RING, calibration: meter; steel; cadmium pl; 2.820" ID, 3.820" OD x 0.09" thk; 3 L shaped spring clips, 1/2" wd x 5/8" h riveted to ring 120° apart.
Fig. 1	3F51802-32	RING, calibration: meter; steel; cadmium pl; 2.960" ID, 3.960" OD x 0.09" thk; 3 L shaped spring clips, 1/2" wd x 5/8" h riveted to ring 120° apart.
Fig. 1	3F51802-33	RING, calibration: meter; steel; cadmium pl; 3.140" ID, 4.140" OD x 0.09" thk; 3 L shaped spring clips, 1/2" wd x 5/8" h riveted to ring 120° apart.
Fig. 1	3F51802-34	RING, calibration: meter; steel; cadmium pl; 3.270" ID, 4.270" OD x 0.09" thk; 3 L shaped spring clips, 1/2" wd x 5/8" h riveted to ring 120° apart.
Fig. 1	3F51802-35	RING, calibration: meter; steel; cadmium pl; 3.400" ID, 4.400" OD x 0.09" thk; 3 L shaped spring clips, 1/2" wd x 5/8" h riveted to ring 120° apart.
Fig. 1	3F51802-36	RING, calibration: meter; steel; cadmium pl; 3.520" ID, 4.520" OD x 0.09" thk; 3 L shaped spring clips, 1/2" wd x 5/8" h riveted to ring 120° apart.
Fig. 1	3F51802-45	RING, calibration: meter; steel; cadmium pl; 4.580" ID, 5.580" OD x 0.09" thk; 3 L shaped spring clips, 1/2" wd x 5/8" h riveted to ring 120° apart.
Fig. 1	3F4049	TEST SET I-49: resistance; 0-10, 110 ohms in 1 ohm steps; accuracy 1/10 of 1%; open wood case, 8-7/8" x 7-3/8" x 5-5/8"; w/leather handle; Sig C spec #71-110.

U. S. GOVERNMENT PRINTING OFFICE : O—1951

TM 11-2535
C1

TECHNICAL MANUAL

METER TEST EQUIPMENT AN/GSM-1

CHANGES
No. 1

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *18 October 1951*

TM 11-2535, 26 May 1945, is changed as follows:

PART ONE
INTRODUCTION

Note (Added). Voltmeter Standards Unit TS-49/GSM-1 procured on Order No. 6783-Phila-51-04 is similar to Voltmeter Standards Unit TS-49/GSM-1 covered in this manual. All information in the manual applies equally to the Voltmeter Standards Unit TS-49/GSM-1 (6783-Phila-51-04) unless otherwise specified in these changes.

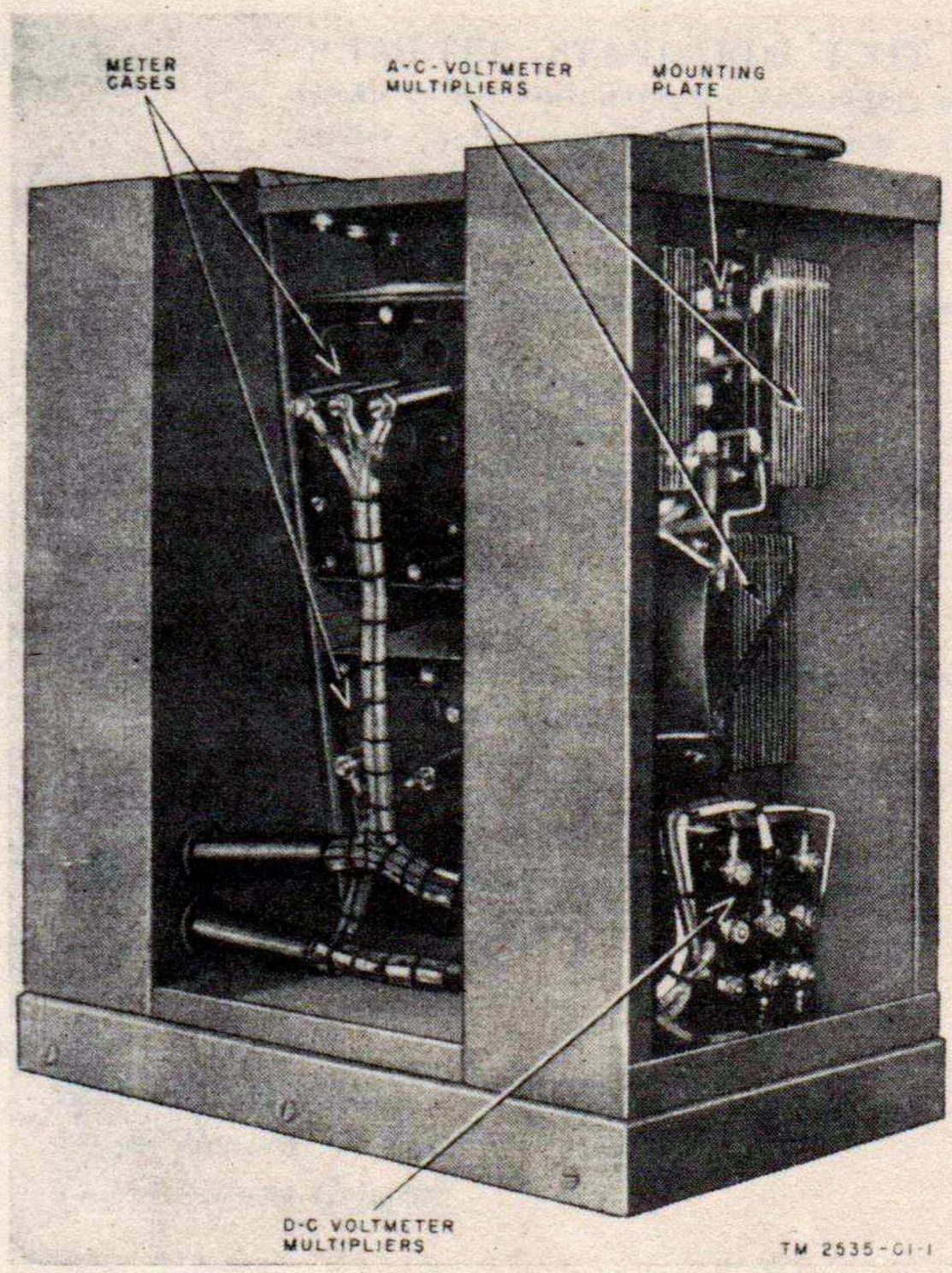

Figure 29.1 (Added). *Interior of Voltmeter Standards Unit TS-49/GSM-1 (6783-Phila-51-04).*

80. Voltmeter Standards Unit TS-49/GSM-1 (figs. 41 and 41.1)

* * * * *

g. CHECKING D-C VOLTMETER CIRCUITS.

* * * * *

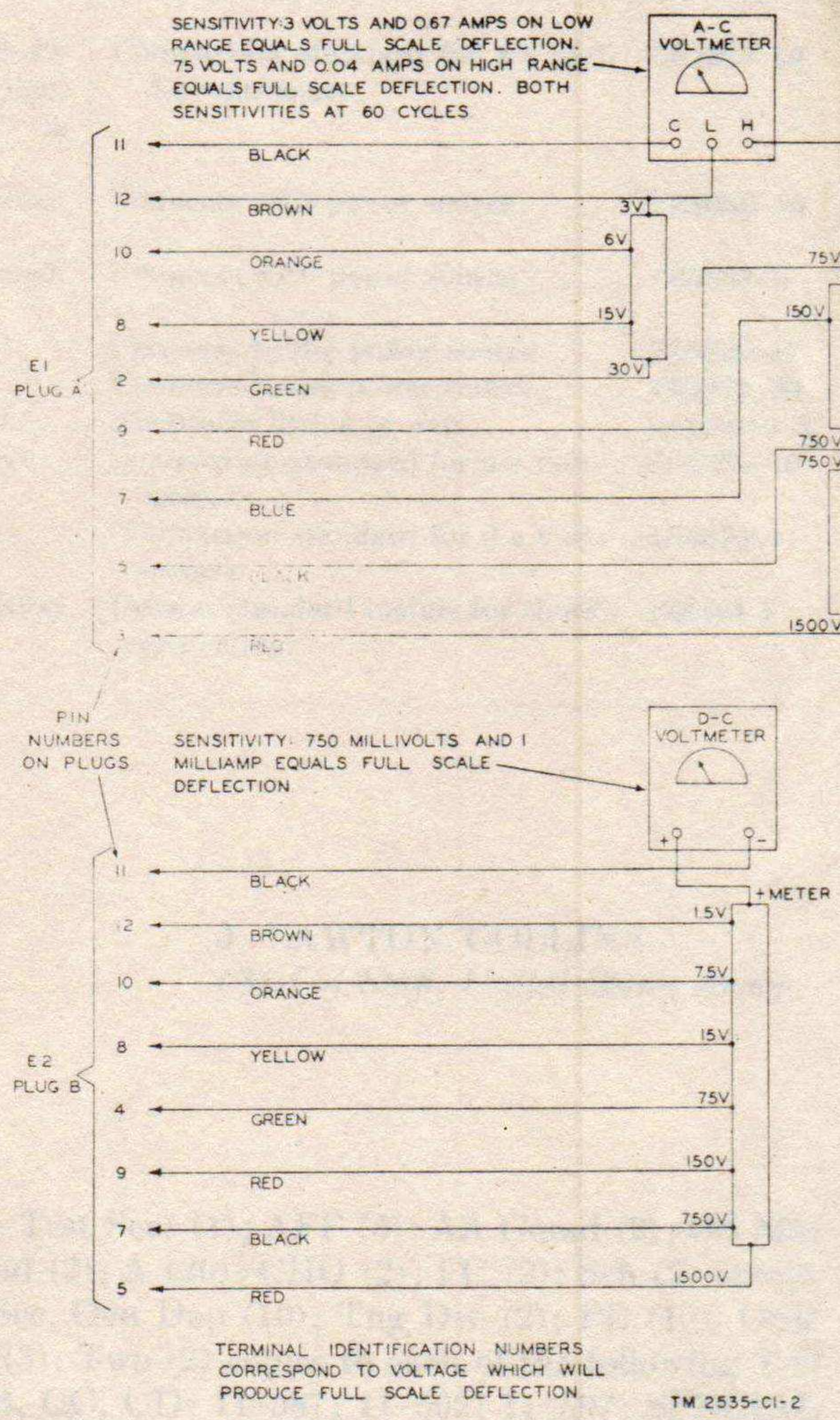

Figure 41.1 (Added). *Voltmeter Standards Unit TS-49/GSM-1 (6783-Phila-51-04), internal schematic wiring diagram.*

(2) Use the B plug and the proper pin numbers selected from the wiring diagram (**figs.** 41 **and 41.1**).

* * * * *

86. Removal of Meters

* * * * *

b. Disconnect leads to the meter (figs. 29 **29.1**, and 30).

* * * * *

106.1 Identification Table of Parts for Voltmeter Standards Unit TS–49/GSM–1 (6783–Phila–51–04)

(Added)

Note. The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis, such as T/O & E, T/A, SIG 7–8–10, SIG 10, list of allowances of expendable material, or other authorized supply basis. The Department of the Army supply catalog applicable to the equipment covered in this manual is SIG 7 & 8 TS–49/GSM–1. For an index of available supply catalogs in the Signal portion of the Department of the Army supply catalog, see the latest issue of SIG 1.

Fig. No. & ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Fig. 29.1	VOLTMETER STANDARDS UNIT TS–49/GSM–1: a-c voltmeter, d-c voltmeter, and multiplier units; portable installation: 14¾″ lg x 8½″ wd x 17½″ h.	Comparison standard for a-c and d-c voltmeters.	3F4325–49
	CABLE, special purpose, electrical: copper tinned, 11/16″ OD.	Connects with power source	1B3038–10
	CABLE, special purpose, electrical: copper tinned, 11/16″ OD.	Connects with power source	1B3038–9
P3	CONNECTOR, plug: straight	Connects to d-c power source	2Z3030–17
P2	CONNECTOR, plug: straight	Connects to a-c power source	2Z3032–20
	HANDLE, side: drop type; 3½″ lg x 1¾″ wd.	Facilitates lifting of unit	6ZK5019–3
M5	METER, voltmeter: a-c; designed for 25–135 cyc.	Comparison standard for a-c voltmeters.	3F8075–10
M6	METER, voltmeter: d-c; 0 to 75 CW	Comparison standard for d-c voltmeters.	3F8075–11
A1	MOUNTING: for vibration and shock protection of standard meters.	Isolates standard meters for shock protection.	2Z8401.1

[AG 300.7 (4 Oct. 51)]

By Order of the Secretary of the Army:

J. LAWTON COLLINS
Chief of Staff, United States Army

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