

INSTRUCTION MANUAL

For

MEGOMETERS

MODEL MG-25A, 50A, 100A & 150A

SERIAL NO.

It is essential that this instruction book be read thoroughly before putting the equipment in service.

IMPORTANT

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CAUTION

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HIGH VOLTAGE!!

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THIS IS A HIGH VOLTAGE TEST SET, AND THE OPERATOR IS RESPONSIBLE FOR ENSURING THE SAFETY OF ALL PERSONNEL WHILE HE IS USING IT.

CAREFUL, ADVANCED PLANNING IS NECESSARY TO ENSURE A SAFE TEST. DECIDE UPON THE PROPER TEST PROCEDURE TO BE FOLLOWED PRIOR TO STARTING THE TEST. ASSEMBLE THE PROPER TEST EQUIPMENT, HIGH VOLTAGE CABLES, GROUND LEADS, RUBBER GLOVES, HOT STICK AND ANY OTHER SPECIAL TOOLS.

WHILE MAKING A TEST, KEEP ALL PERSONNEL AT A SAFE DISTANCE FROM THE HIGH VOLTAGE OUTPUT OF THE TEST SET AND AT A SAFE DISTANCE FROM THE ITEM BEING TESTED.

BARRIERS SHOULD BE ERECTED AND A MAN SHOULD BE STATIONED AT ANY POINT WHERE THE ITEM UNDER TEST IS ACCESSIBLE TO UNAUTHORIZED PERSONS. SIGNS SHOULD BE POSTED READING "DANGER! HIGH VOLTAGE TEST IN PROGRESS. KEEP AWAY!" DO NOT USE ABBREVIATIONS SUCH AS "KV" OR "HV" OR WORDS SUCH AS "KILOVOLTS" SINCE THE AVERAGE PERSON DOES NOT UNDERSTAND THEIR MEANING.

REGARDLESS OF THE TYPE OF TEST TO BE CONDUCTED, CERTAIN PRELIMINARY STEPS MUST PROCEED THE ACTUAL TEST. FIRST OPEN ALL SWITCHES AND BREAKERS TO DE-ENERGIZE AND ISOLATE THE CABLE, TRANSFORMER, SWITCHGEAR OR EQUIPMENT TO BE TESTED. USE A HOT STICK AND RUBBER GLOVES TO GROUND ALL SECTIONS OF THE ITEM TO BE TESTED TO ENSURE THAT IT IS NOT CHARGED. WHEN TESTING A CABLE, BOTH ENDS SHOULD BE DISCONNECTED AND PROTECTED BY BARRIERS, SIGNS, ETC., TO WARN AND PROTECT PASSING PERSONNEL. THE CONDUCTORS AT THE FAR END OF THE CABLE SHOULD BE SEPARATED AND TAPED TO AVOID EXTERNAL FLASHOVER OR LEAKAGE DURING THE TEST.

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GROUNDING INSTRUCTIONS

FOR SAFETY OF THE OPERATOR, IT IS ABSOLUTELY ESSENTIAL THAT THE TEST SET IS PROPERLY AND EFFECTIVELY GROUNDED.

Effectively grounded, as defined by the National Electrical Code, means "...connected to earth through a ground connection of sufficiently low impedance and having sufficient ampacity that ground-fault current which may occur cannot build-up to voltages dangerous to personnel".

The test set is provided with an input line cord equipped with a three-prong, grounding-type plug. The test set will be grounded through the ground prong of the plug provided that the receptacle in which the plug is inserted is itself effectively grounded through a low impedance ground connection.

If a two-prong adaptor is used on the three-prong plug, the grounding lead or clip of the adaptor must be connected to a low impedance earth ground. For a low impedance earth ground, a continuous metallic underground water system may be used for the ground connection. Where this is not available, a driven ground rod can be used to provide an effective earth ground. The resistance to ground of the pipe system or of the driven ground rod should not exceed twenty-five ohms as required by the National Electric Code.

In addition to the ground conductor in the input line cord, the test set is equipped with a safety ground terminal. This terminal must be connected with heavy wire to a low impedance auxiliary ground such as a pipe system or driven ground-rod as described above.

If input power to the test set is being provided by a portable generator, alternator or battery-operated converter, it is not only necessary that the test set be grounded, but also that the metal frame or housing of the power source be grounded.

No rubber gloves are needed to operate the test set if all grounds are correctly made and the test set is properly operated. However, as a routine safety procedure, some users require the use of rubber gloves not only when making connections to the high voltage terminals, but also while using the test set. Multi-Amp Corporation considers this to be an excellent safety practice and encourages its use.

A DANGEROUS ELECTRICAL SHOCK HAZARD TO THE OPERATOR COULD RESULT IF THE ABOVE GROUNDING INSTRUCTIONS ARE NOT FOLLOWED.

CONTROL FUNCTIONS

ON/OFF circuit breaker	Serves as a switch to energize or de-energize input power to the test set. Also provides overload and short-circuit protection.
HV ON/OFF switch	Energizes or de-energizes high voltage output of the test set
HV ON lamp	Lamp glows when HV output switch is ON
0-HIGH VOLTAGE potential control knob	Used to adjust output to the desired test
Zero Start Interlock	Incorporated to prevent accidentally applying test potential. This interlock circuit requires that the output control be at "0" before the test potential can be energized.
Kilovoltmeter	Measures and indicates the test potential being applied to the item under test. Also indicates a multiplying factor which is used in conjunction with the megohmmeter reading.
Megohmmeter	Measures and indicates resistance of item being tested.
MEGOHMMETER RANGE Switch	Selects a multiplying factor and changes sensitivity of megohmmeter circuit.
HIGH VOLTAGE terminal	Output terminal in which the male connector of the high voltage test cable is inserted
RETURN terminal	Terminal to which return path of item being tested is connected
GUARD terminal	This terminal provides a means to bypass stray current around the megohmmeter. See GUARD CIRCUIT section of this instruction manual for further explanation.
METERED/NON-METERED switch	In the NON-METERED position, it provides a means to temporarily have all current bypass the megohmmeter. In the METERED position, the megohmmeter will read the leakage current if the item connected to the RETURN terminal.

SAFETY GROUND terminal

Terminal for connection of an auxiliary ground

Leads

The test set is provided with the following input and output leads with appropriate terminals:

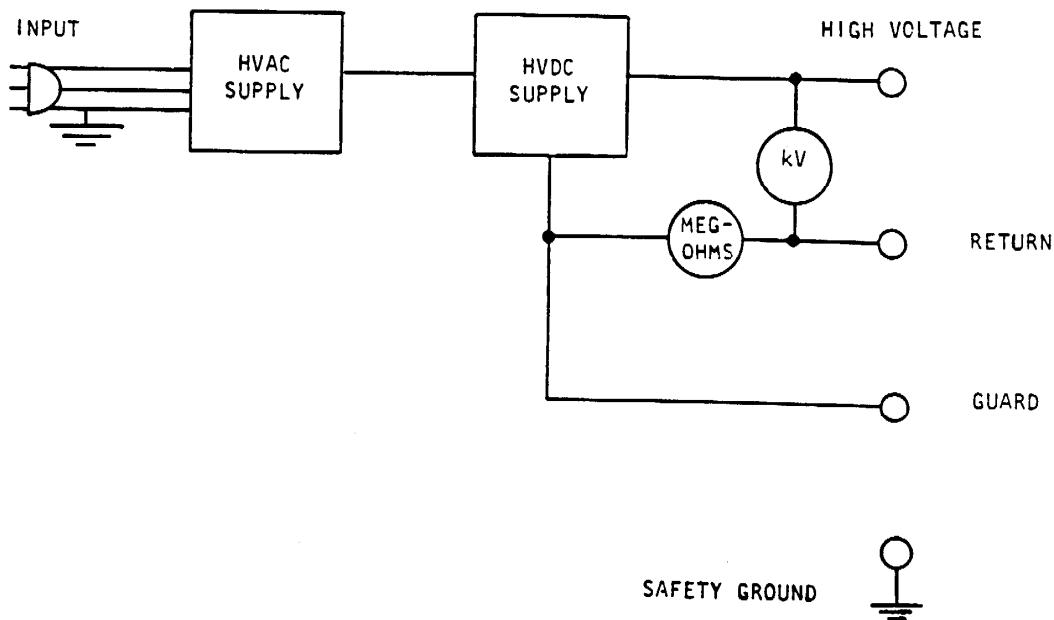
- a) 3-conductor input line cord with 3-prong plug
- b) high voltage output cable
- c) return lead
- d) guard lead

GUARD CIRCUIT

This test set incorporates a guard circuit which provides a means to bypass stray current around the microammeter so that it does not interfere with measuring the desired leakage current. These stray currents may be caused by things such as surface leakage or conductive paths which may be in parallel with the circuit being tested.

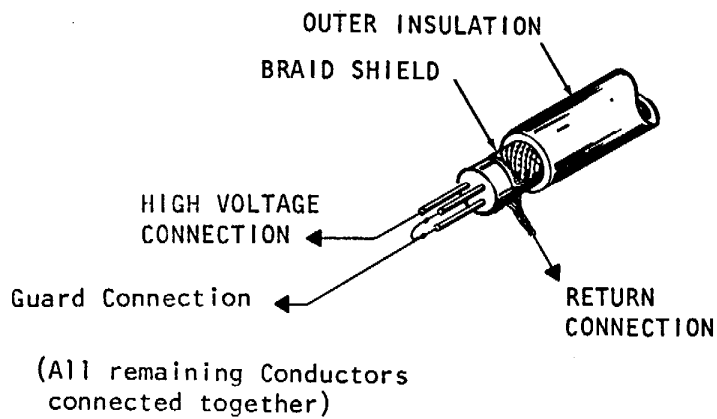
To separate the stray currents from the desired current, the Multi-Volt test set has two return circuits...one is through the RETURN terminal and provides a path through the megohmmeter circuit; the other is through the GUARD terminal and provides a path that bypasses the megohmmeter.

Therefore, the megohmmeter will measure only the leakage current of the item connected between the HIGH VOLTAGE output terminal and the RETURN terminal. When testing an item which may have isolated metallic components that provide an unwanted current path, connect these isolated components together and to the GUARD terminal. Several diagrams are shown on the following pages which illustrate typical connections and can be used as a guide.

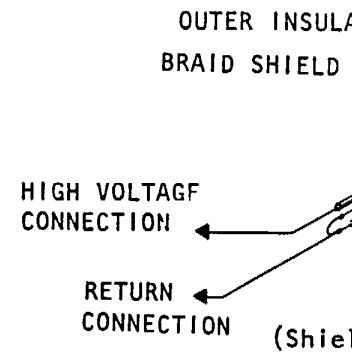


TYPICAL CONNECTION DIAGRAMS

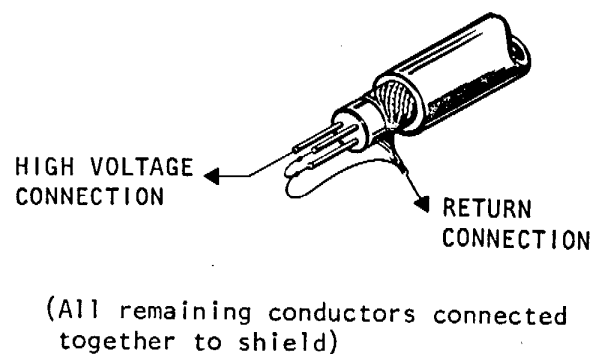
Testing Cable Insulation
Between One Conductor and Shield



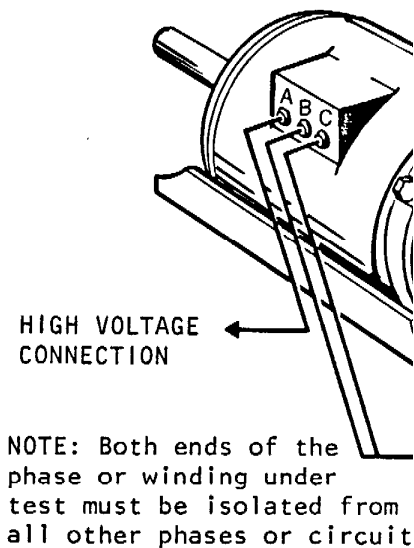
Testing Cable Insulation



Testing Cable Insulation
Between One Conductor and all
Others plus Shield

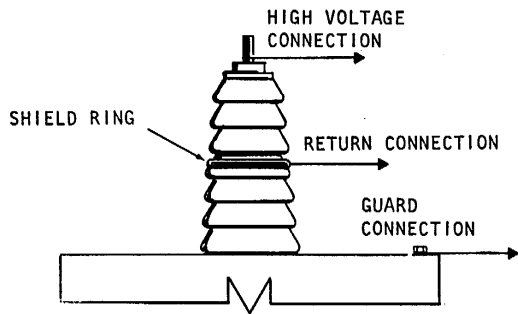


Testing Motor Winding Ins
One Winding to Grounded C

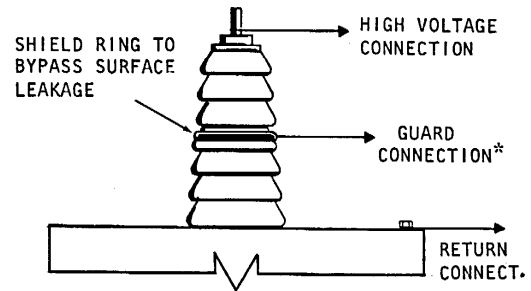


TYPICAL CONNECTION DIAGRAMS

Measuring Surface Leakage of a Bushing

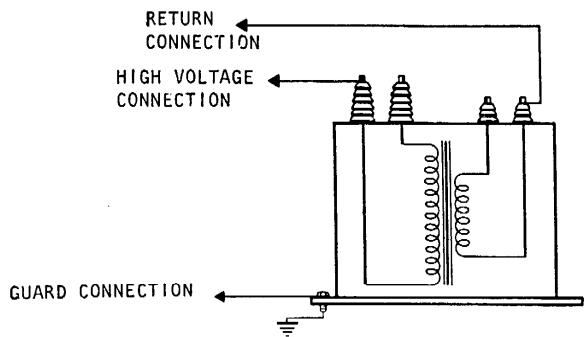


Measuring Bushing Leakage

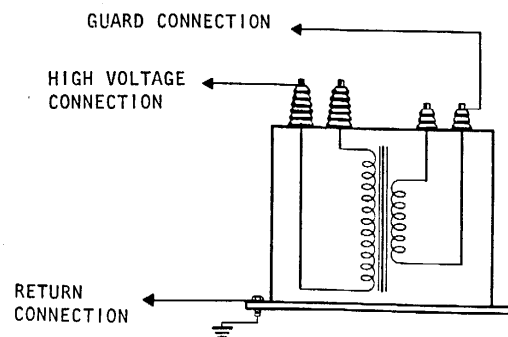


*To Eliminate Effect of Surface Leakage

Testing Transformer Winding Insulation
High Voltage Winding to Low Voltage Winding



Testing Transformer Winding Insulation
High Voltage Winding to Grounded Core or Case



OPERATING INSTRUCTIONS

CAUTION

1. OBSERVE ALL SAFETY PRECAUTIONS!!!
2. Initial set-up of controls

<u>CONTROL</u>	<u>POSITION</u>
ON/OFF switch	OFF
HV switch	OFF
Megohmmeter RANGE switch	2000
METERED/NON-METERED switch	METERED
OUTPUT CONTROL knob	"0" (Full counterclockwise)

3. Connect a grounding cable from the SAFETY GROUND terminal of the test set to a good electrical ground. Be sure a secure connection is made at both ends.
4. Insert one end of the high voltage output lead into the HIGH VOLTAGE terminal of the test set and connect the other end to the item to be tested.
5. Connect one end of a lead to the RETURN terminal and the other end to the item to be tested.
6. If it is desired to bypass stray current caused by parallel conductive paths around the megohmmeter, connect a lead from the GUARD terminal to the path(s) to be bypassed. See GUARD CIRCUIT section of manual for further explanation on use of this circuit.
7. Plug input line cord into a suitable power source as indicated on the nameplate of the test set.

BE SURE TEST SET IS GROUNDED. IF A 2-PRONG ADAPTOR IS USED, BE SURE GROUND LED OF ADAPTOR IS CONNECTED TO EARTH GROUND.

8. Turn ON/OFF switch to ON. No warm-up time is necessary.
9. Turn HV switch to ON.
10. Rotate output control knob clockwise until the desired test voltage is indicated on the kilovoltmeter.

If no output is obtained when rotating the output control knob clockwise, return it fully counterclockwise until the zero-start interlock switch is heard to "click". Then rotate clockwise to obtain desired test potential.

11. Resistance is now indicated on the megohmmeter.

If the megohmmeter reading is greater than the lowest readable point on the next range, change the MEGOHMMETER RANGE switch to the next higher multiplying factor. This increases the sensitivity of the megohmmeter circuit and may be repeated if the new reading is greater than the lowest readable point of the next range, etc.

12. The resistance of the item under test is determined by multiplying the megohmmeter reading times the MEGOHMMETER RANGE and by the multiplying factor (bottom scale) of the kilovoltmeter.

INSULATION RESISTANCE (MEGOHMS) = MEGOHMMETER READING X

MEGOHMMETER RANGE X KILOVOLTMETER MULTIPLYING FACTOR.

NOTE: If the desired test voltage is not at a cardinal point on the scale of the kilovoltmeter, the multiplying factor will have to be estimated.

13. Turn HV switch OFF.
14. Return output control knob to "0" (full counterclockwise).
15. Check to see that the kilovoltmeter reads "0" (the capacitive component of the item under test will hold a charge, and may take a long time to discharge).
16. Use a hot stick and rubber gloves to ground the item under test before disconnecting. After a test has been performed, the ground should be left on the item which was tested for at least as long as the total time that high voltage was applied. This is to prevent a voltage buildup due to absorption currents. It is a good policy to leave a ground on any time the item is not undergoing a test or is not in service.

MAINTENANCE INSTRUCTIONS

Multi-Volt test sets are designed and built for field use by utilities, industrial plants, service organizations and government agencies. When reasonable care is taken in use and storage, this test set will provide long, trouble-free operation. A superficial inspection is recommended approximately once a month, and a complete inspection should be given approximately every six months.

On a monthly basis, the test set should be examined for structural damage. Verify that the fastening screws are secure and inspect the input line cord, test leads and terminals. Clean the case and control panel, and carefully clean-off the terminals with a lintless cloth or paper towel. Operate the test set and critically observe the action of control and instruments. Replace any burned-out indicator lamps.

In addition to the above, approximately every 6 months, the test set should be removed from its enclosure and an inspection made of the control and instrument panel for signs of corrosion, insulation damage, loose screws, dirt or other deterioration. Check the brush on the variable auto-transformer (output control) for wear.