

USER'S GUIDE

60 KV HIPOT I-373

MODEL NO: 860PL

PART NO : DS111-016

DANGER HIGH VOLTAGE

WARNING: This publication describes a product engineered and designed to supply HIGH VOLTAGE. Accordingly, maximum safeguards have been built into the equipment and the best safety techniques possible are set forth in the unit's operating instructions. These instructions contain cautions, warning the user to exercise great care in the use of certain controls and at appropriate points in the operating procedures. Despite these written warnings the operator of this equipment is nevertheless strongly advised to maintain a safety consciousness at all times. The following rules are particularly relevant and must be followed at all times.

BEFORE CONNECTING INPUT POWER, GROUND CASE.
BEFORE UNGROUNDING CASE, DISCONNECT POWER.

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GENERAL DESCRIPTION

This section is intended to acquaint the user with the major features of the models in HIPOTRONICS 800PL Series, and the functions performed by each of the controls and indicators of the control panel.

FEATURES AND SPECIFICATIONS

The HIPOTRONICS 800PL Series consists of five portable dc insulation testers: Model 815PL, Model 860PL, Model 880PL, Model 8120-5PL and Model 8170-5PL. Designed to be a fully instrumented, easy to use, high voltage proof testers. The units feature a rugged construction and conservatively rated components.

These units are particularly suited for use in the utility and wire and cable industries, for testing insulated cables, capacitors and other one-sided grounded specimens.

All models in the 800PL Series are designed for maximum equipment and operator protection. Surge devices built into the equipment preclude damage to any component from repeated short circuits at full output.

All models operate from an input of 120 volts ac, 50/60 Hz, 5 amps (815PL, 860PL, 880PL, 8120-5PL), 10 amps (8170-5PL). Rated output current is 5 mA for 15 minutes. (Capacitor Charging Duty)

FEATURES

- a triple-range kV meter
- a four-range current meter
- an adjustable voltage control
- zero start interlock
- insulated return and guard circuits
- HV shorting solenoid with a discharge resistor
- provisions for external interlock and a deadman switch
- input and backup overload fuses
- pilot light indicators for ac input and High Voltage output

Each unit (except for the 8120-5PL & 8170-5PL) is housed in a rugged Formica cabinet, containing an oil filled, hermetically sealed steel can to ensure long life and trouble-free operation. The rear storage of the cabinet houses two insulated return leads, an auxiliary power plug, a three-pronged input power cord and a shielded HV output cable with a battery clamp.

The 8120-5PL and 8170-5PL contains an oil-filled, air sealed steel tank. The control section houses two insulated return leads, an auxiliary power plug and a three-pronged input power cord.

Table 1 lists the five 800PL models, along with the specifications unique to each model.

MODEL	OUTPUT VOLTAGE	RIPPLE	IMPEDANCE	WEIGHT	SIZE
815PL	0-15 kV	2.5%	0.5 M ohms	44 lbs (20 kg)	11 3/4"H (298 mm) 16 3/4"W (425 mm) 12 1/2"D (318 mm)
860PL	0-60 kV	2.5%	2 M ohms	54 lbs (24.5 kg)	11 3/4"H (298 mm) 16 3/4"W (425 mm) 12 1/2"D (318 mm)
880PL	0-80 kV	2.5%	3 M ohms	65 lbs (29.5 kg)	11 3/4"H (298 mm) 16 3/4"W (425 mm) 12 1/2"D (318 mm)
8120-5PL (CONTROLS)	0-120 kV	2.5%	4 M ohms	25 lbs (54 kg)	12" H (305 mm) 16 3/4"W (425 mm) 12 3/8"D (314 mm)
TANK				95 lbs (43 kg)	22"H (559 mm) 12"W (305 mm) 9" D (229 mm)
8170-5PL (CONTROLS)	0-170 kV	2.5%	5 M ohms	25 lbs (54 kg)	12"H (305 mm) 12 3/8"D (314 mm) 16 3/4"W (425 mm)
TANK				140 lbs (64 kg)	30"H (762 mm) 12"W (305 mm) 9" D (229 mm)

TABLE 1 - Specifications of portable 800PL Series

CONTROLS AND INDICATORS

A diagram of the control panel for your particular model in the 800PL Series is contained in the pocket at the back of this publication. The diagram and the control panel should be used as references during installation and operation. The various functions and users of the controls and indicators are described in the following pages.

VOLTMETER AND RANGE SELECTOR

The kilovoltmeter is located at the top left of the control panel and is labeled "DC KV" on the scale. The KV Meter has a triple-range selector switch directly below it. Each range corresponds to a different set of numbers on the scale. The LOW range corresponds to the bottom row of numbers, the MED range to the middle row and the HIGH range to the top row. The voltmeter indicator should be at "0" when unit is OFF. Minor adjustments may be made only when the HV control is OFF, via the adjusting screw below the meter window.

CURRENT METER AND RANGE SELECTOR

The Current Meter is located at the top right of the control panel and is labeled "DC μ A" on the scale. Directly below the Current Meter is a four-range selector switch. To obtain proper dc readings, simply multiply the scale reading by the factor at which the range selector is positioned. The factors associated with the various range settings are given in Table 2.

SETTING	VALUE	SETTING	VALUE
X1	1	X100	100
X10	10	X1K	1,000

TABLE 2 - Value Equivalents of Range Setting

EXAMPLE: In performing a dc insulation test, the current meter indication is "4" on the dc μ A scale, with the CURRENT RANGE control set at "X1K". The proper reading is $4 \times 1,000$ or 4,000 μ A.

The current meter indicator should be at zero when the unit is OFF. Minor adjustments may be made only when the HV control is OFF, via the adjusting screw below the meter window.

AC POWER CONTROLS

The AC POWER section of the control panel contains an ON/OFF toggle switch, a pilot light and a input fuse. The unit has ac power when the toggle switch is up and the pilot light glows. The input fuse protects the input and may be accessed for replacement by pressing the black cap down while turning it counterclockwise.

GUARD - GROUND - RETURN FRONT PANEL CONNECTIONS

There are three plug-in connection posts on the front panel labeled "GUARD", "GROUND" and "RTN". The "GUARD" or "RTN" POST IS ALWAYS CONNECTED TO "GROUND" BY A JUMPER LINK WHENEVER TESTING. An explanation of these two connections follows:

1. Jumper Link connected between "GROUND" and "GUARD" Post
(See Drawing on page 5.)

The sole function of this mode of operation is to separate the paths of two types of leakage current. These leakage currents are: Leakage current which we do want to monitor and extraneous leakage current which we do not want to monitor. With a "GUARD" hookup, the leakage current we want to monitor will be accurately measured by the Current Meter while all other leakage currents will be bypassed around the Current Meter.

NOTE: It is not possible to test installed cables in this mode of operation as the cable shields are always grounded, thus making it impossible to see leakage current.

2. Jumper Link connected between the "GROUND" and "RTN" Post
(See drawing on pages 6.)

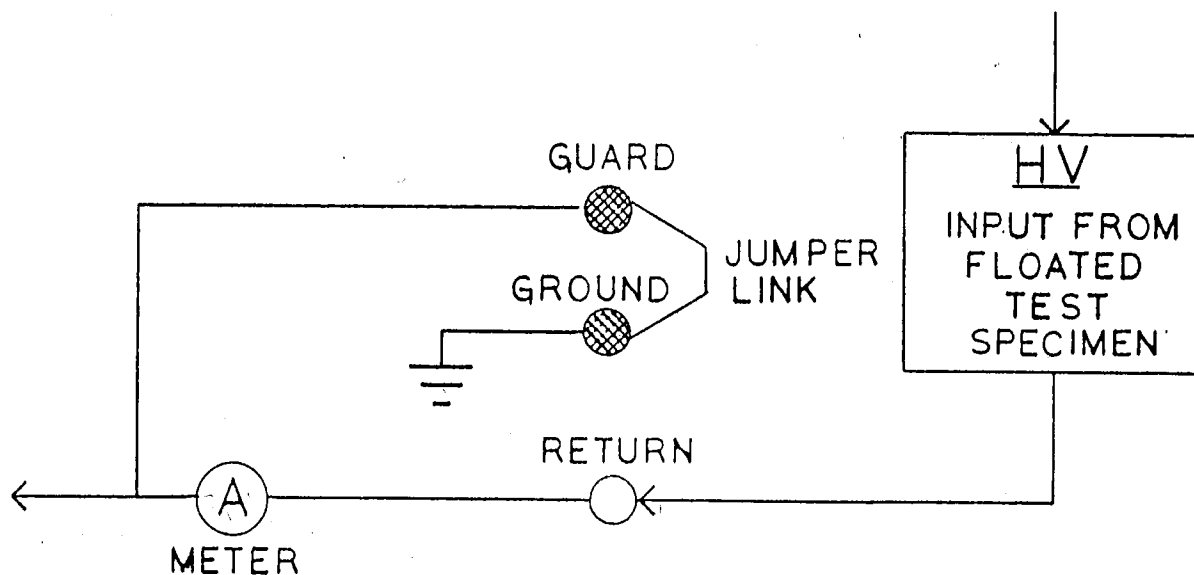
This front panel hookup will be used when total leakage is to be monitored and sensitive measurements are not required.

NOTE: No connection is made to the "GUARD" post in this mode.

1 - GROUNDING GUARD

(JUMPER LINK BETWEEN GROUND AND GUARD.)

THIS ALLOWS ALL EXTRANEIOUS LEAKAGE CURRENT FLOWING DIRECTLY TO GROUND TO BYPASS THE CURRENT METER. ONLY LEAKAGE CURRENT FLOWING DIRECTLY ON OR WITHIN THE ACTUAL TEST OBJECT WILL BE MEASURED AND EXTRANEIOUS LEAKAGE TO GROUND WILL BE IGNORED. THIS MODE ALLOWS THE MOST SENSITIVE LEAKAGE MEASUREMENTS TO BE MADE. NOTE: THIS MODE CAN ONLY BE USED WHEN THE TEST SPECIMEN CAN BE ISOLATED FROM GROUND. IT IS TYPICALLY USED FOR DISCRETE COMPONENTS OR WHEN LEAKAGE TO GROUND IS TO BE DISREGARDED, E.G. WHEN TESTING A TRANSFORMER FOR LEAKAGE (OR RESISTANCE) BETWEEN THE SECONDARY AND THE PRIMARY, THE GUARDED RETURN MODE WILL ALLOW LEAKAGE TO THE CORE OR FRAME TO BYPASS THE METER, THUS READING ONLY LEAKAGE BETWEEN THE TWO COILS.

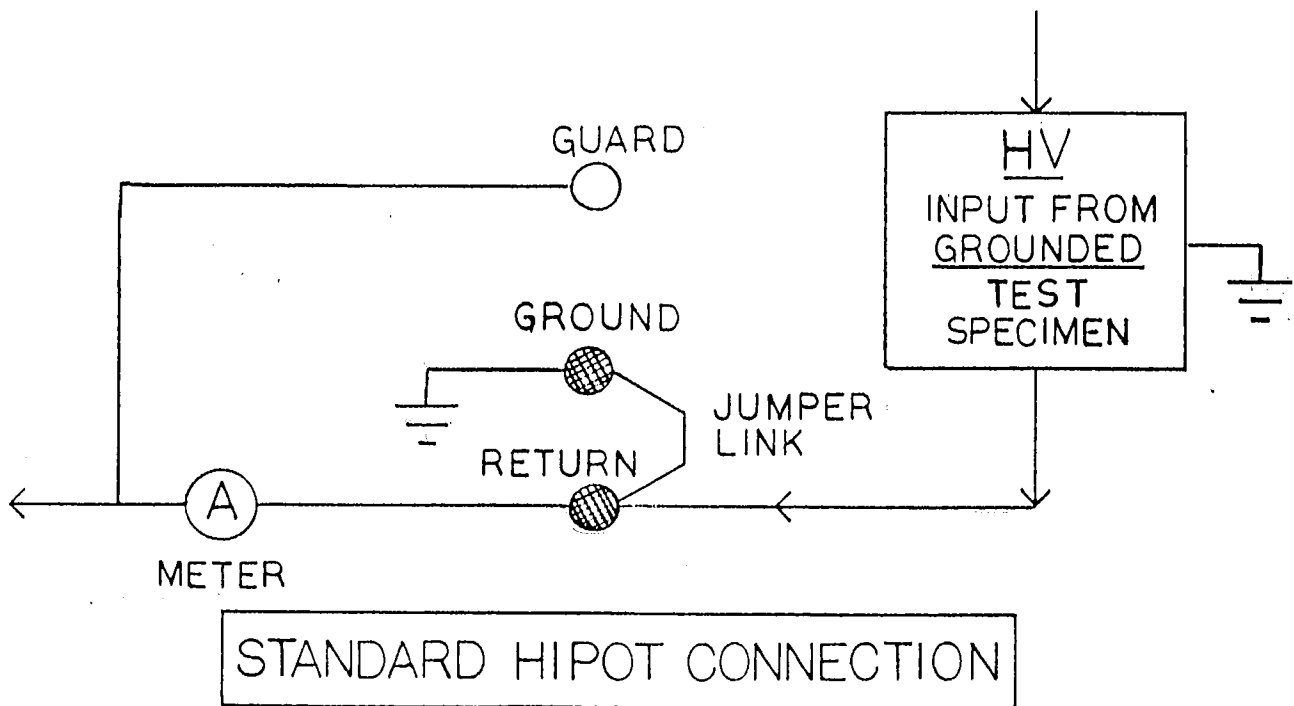


2 - GROUNDING RETURN

JUMPER LINK BETWEEN GROUND AND RTN. THIS IS THE NORMAL AND MOST COMMON MODE OF OPERATION. ALMOST ALL CABLE TESTS ARE MADE IN THIS MODE.

CAUTION: IN THIS MODE ANY CONNECTION TO THE GUARD TERMINAL WILL CAUSE THE CURRENT METER TO BE INACCURATE.

IN THIS MODE ALL LEAKAGE CURRENT IS READ BY THE CURRENT METER INCLUDING ANY EXTRANEIOUS LEAKAGE THAT MAY BE FLOWING TO GROUND. THIS MODE DOES NOT SEPARATE THE EXTRANEIOUS LEAKAGE FROM THE LEAKAGE ON OR IN THE ACTUAL DISCRETE TEST OBJECT.



HIGH VOLTAGE CONTROLS

The HIGH VOLTAGE controls consist of ON and OFF pushbuttons, a pilot light and a RAISE VOLTAGE control. HV can be energized by positioning the voltage control to "zero" (zero start interlock) and depressing the HV ON pushbutton. HV is energized when the pilot light lights up. If the HV OFF pushbutton is depressed or the test is terminated by some other means, e.g. overload circuit trips, the pilot light goes out and HV is de-energized.

The RAISE VOLTAGE control is located in the center of the control panel, and is used to regulate the output voltage. Markings on the RAISE VOLTAGE control indicate percent of output.

The user is cautioned to keep the RAISE VOLTAGE control set on zero when not in use, and to lower the control back to zero immediately upon completion of a test.

INTERLOCK AND AUXILIARY POWER SOCKET

The INTL AND AUX POWER socket provides the facility for an external interlock or deadman switch, which must be connected to the interlock and auxiliary power plug provided with the unit. Whether or not this facility is used, the power plug must be plugged into the socket in order for the unit to operate.

HV FUSE

Located beneath the INTLK & AUX POWER socket is a backup overload fuse, labeled "HV FUSE". It is 5 amp (5 A) for models 815PL, 860PL, 880PL and 8120-5PL and 10 amps (10 A) for model 8170-5PL. It is accessed in the same manner as the AC POWER fuse described earlier in this section, and serves as current surge protection in addition to the overload tripping facility.

INSTALLATION INSTRUCTIONS

The HIPOTRONICS 800PL Series is designed to perform dc insulation testing with a minimum of effort in the installation or set-up of these units as well as during the actual testing. The step-by-step procedure for installation of the units is described below:

1. Select a location for the unit that will place the meters at a level to allow maximum accuracy in reading.
2. Set the RAISE VOLTAGE control to zero, and check to ensure that the AC POWER toggle switch is in OFF (down) position.
3. Ground the unit before connecting the input power. The GROUND Post on the front panel may be used for this purpose. The "GROUND" bar jumper should be tied to the "RETURN" Post for most cable tests.
4. Insert the five-pronged shorting plug provided with the unit into the INTLK & AUX POWER socket on the control panel. (Plug may also be used as connector to the external interlock or capacitor discharge unit.) See schematic for pin connections.
5. Connect the insulated return leads supplied with the unit as described on page 4.
6. MODEL 8120-5PL & 8170-5PL - Connect 25 ft interconnect lead between HV tank and controls. Make sure HV tank is grounded to a reliable ground.

OPERATION INSTRUCTIONS

This section provides step-by-step instructions for performing dc insulation testing of one-side grounded and ungrounded specimens. It includes a special section for the testing of high voltage cables, and a section containing additional safety hints. The procedures for performing dc insulation testing using HIPOTRONICS 800PL units are as follows:

1. Ensure that the steps described in the previous section, "Installation Instructions", have been performed.
2. Set the CURRENT RANGE control to the appropriate range setting. (To locate the appropriate range, it is suggested that the user start at the "X1K" range setting.)
3. Set the VOLTAGE RANGE control to the desired setting (LOW, MED or HIGH) for voltmeter reading.
4. Connect the HV output lead to the test specimen.
5. Plug the line cord of the unit into a 120 volt, 50/60 Hz outlet. If a two-prong adapter is used, be sure to ground the third wire.
6. Turn the AC POWER switch ON (up position).
7. Depress the HIGH VOLTAGE ON switch. (The HIGH VOLTAGE pilot light will glow.)
8. Increase the output voltage to the desired level via the RAISE VOLTAGE control. Note that the current meter readings will increase along with voltage.
9. Maintain the output voltage at the desired level for the required amount of the test time. At a steady voltage only, leakage and not charging current will be read.
10. After test is complete, slowly reduce the RAISE VOLTAGE control back to zero and await the return of the voltmeter reading to zero before you depress the "OFF" button. Position current meter range switch to highest range (X1K) when reducing voltage to help prolong the life of the meter.
11. If the test specimen fails, the overload circuit will trip the HIGH VOLTAGE OFF, and the internal HV shorting solenoid with the discharge resistor will bleed off the remaining charge in the specimen.

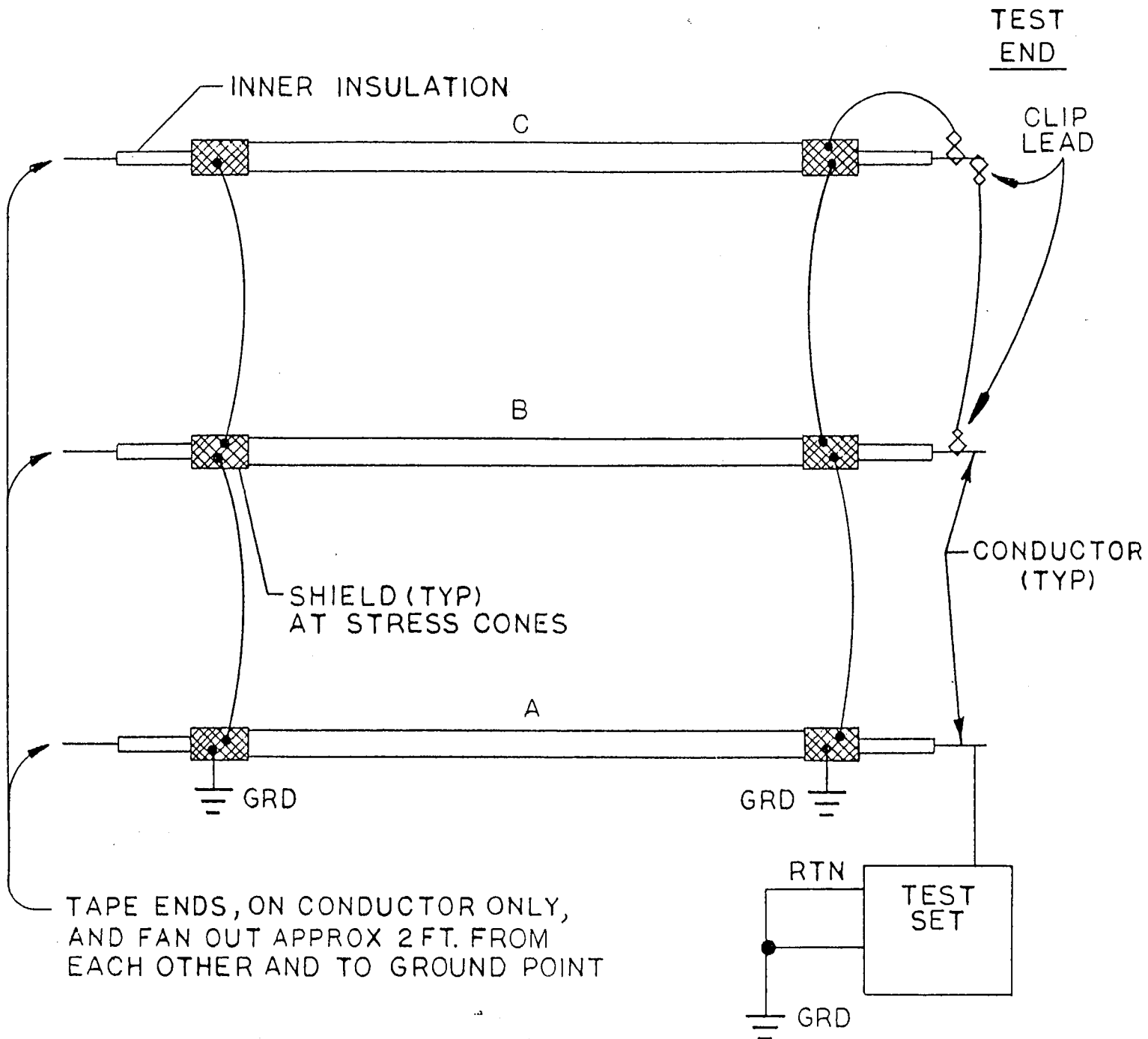
TESTING HIGH VOLTAGE CABLES

A number of additional steps and/or precautions must be taken when performing dc insulation tests on any three-phase or single-phase cables.

1. Ensure that all insulators, pot heads and stress cones are clean and free of dust or moisture.
2. Ensure that the shields of all three cables are grounded and tied together at the near end of the cable.
3. Isolate the far end of the cable conductors under test from each other and from all ground points. They must also be free of all other potential sources of leakage such as sharp points.
4. When testing each of three conductors separately, the other two must be grounded to protect against dangerous charge buildup, as must other de-energized cables in the vicinity of the test.
5. Voltage should be increased slowly, following the test specifications outlined by the cable manufacturer or any relevant standards.
(Charging current will depend on rate of rise of voltage.)
6. In an average test of a three-conductor, three-phase circuit, the current meter readings should be approximately the same on all three conductors. Higher than expected readings or flashover are indicative of a faulty cable, poor splice, dirty pot head or insulator, or a leaky cable end.
7. Upon completion of the test, follow the proper TURN-OFF procedures described in the next section, "Additional Safety Hints".

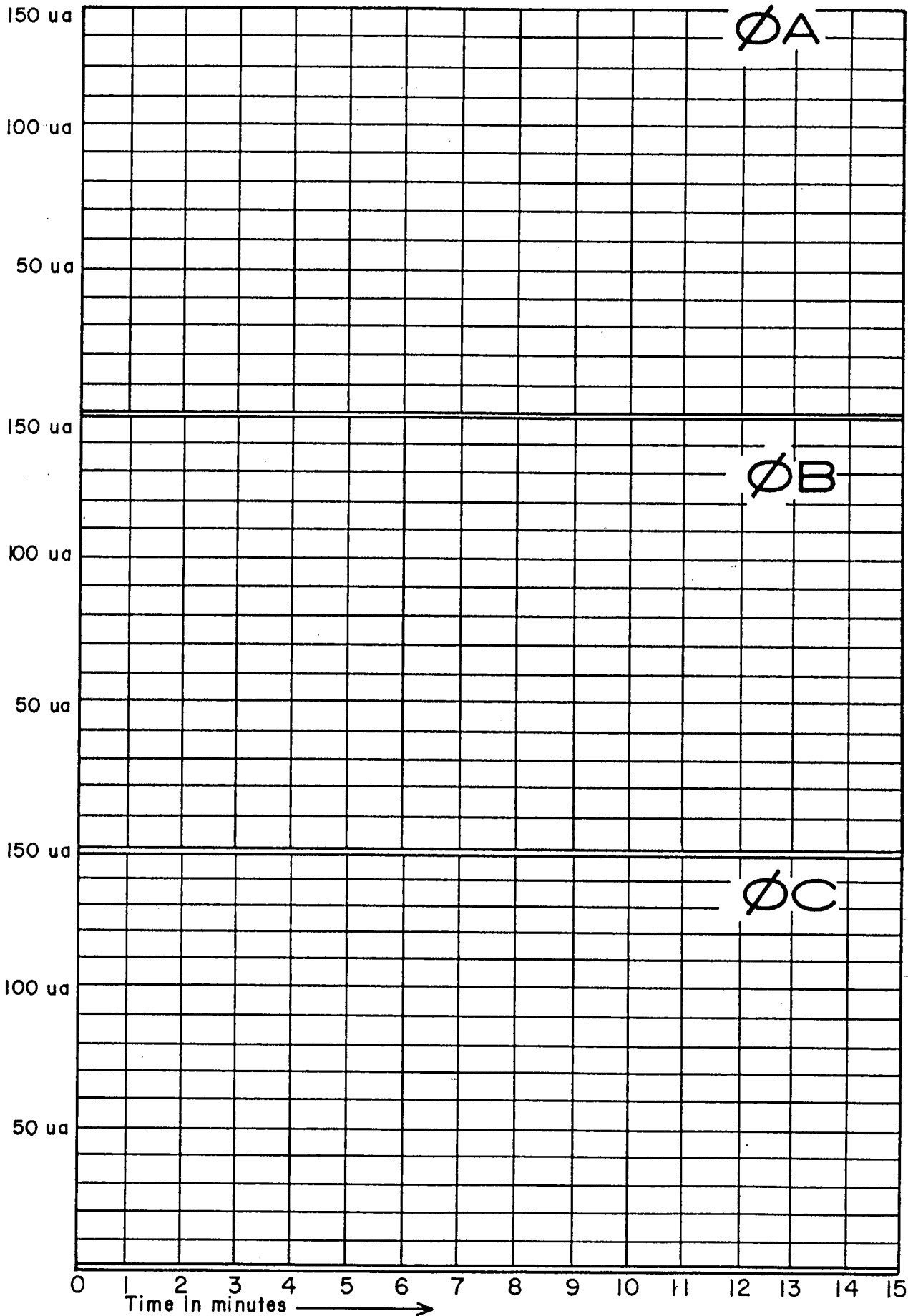
EXAMPLE: One thousand feet of cable rated at 15 kV ac is to be tested for five minutes at a voltage level of approximately 50 kV dc, in accordance with manufacturer's specifications. Using a HIPOTRONICS 860PL or higher and following the INSTALLATION INSTRUCTIONS and OPERATION INSTRUCTIONS described previously it will be noted that current meter readings in the order of magnitude of 100 μ A will exist until voltage has been increased to 50 kV dc. Current meter readings will then drop off to approximately 10 μ A for the duration of the test on a good cable. Current meter reading can vary significantly according to the length and size of the cable under test. Readings can also be affected by damp weather, cable splices, switchgear in the circuit, and voltage change in the input source.

CABLES



NOTE: GROUND RETURN ON HV TEST SET WILL READ ALL CHARGING AND LEAKAGE CURRENT

WHEN USING GUARD POST THIS WILL BYPASS ALL CURRENT TO METER



1000 V/sec.
rise

Voltage

Size

Footage

Weather

Customer

-12-

Cable Ident.

Date

Tester



ADDITIONAL SAFETY HINTS

Considerable effort has been expended to build maximum safeguards in the HIPOTRONICS 800PL Series for the protection of the user as well as the equipment. Safety precautions have also been emphasized in the instructions contained in this manual for operating the units. This section includes additional safety measures for reference upon completion of testing.

TURN-OFF PROCEDURE

The user is cautioned to never depress the HIGH VOLTAGE OFF button or turn off the main power switch immediately upon completion of a high voltage test. When stored energy is greater than 1 kJ, the energy should be allowed to bleed down until the voltmeter reading is zero. The following steps are recommended:

1. Slowly turn back the RAISE VOLTAGE control to zero reading. Make sure current meter is in highest (X1K) range.
2. Allow the charged cable to bleed down to approximately 10 kV reading on voltmeter, or proceed to Step 3.
3. Completely discharge the cable through a resistive grounding (shorting) stick.
4. Attach a solid ground connection before touching the sample.

TESTING LARGE CAPACITIVE LOADS

Upon completion of a dc insulation test of large capacitive loads, the following steps are recommended for the protection of both the user and the equipment:

1. Secure a tested hand-held resistive grounding (Shorting) stick.
2. Using a hand-held grounding stick, bleed down the charged cable or other capacitive load. This eliminates the unnecessary discharge of a highly capacitive cable back into the high voltage section of the 800PL unit when the HIGH VOLTAGE OFF button is depressed.
3. Place a solid earth connection before touching the sample.

SPECIAL OPERATIONS

This section describes the step-by-step procedures required to perform special operations incidental to the major functions described in the preceding sections. These special operations are Voltmeter Recalibration and Trouble-Shooting. (The current meter is pre-calibrated with fixed precision resistors and cannot be recalibrated through simple adjustment.)

VOLTMETER RECALIBRATION

1. Ensure that voltmeter is set at zero. Adjust with setting screw if necessary.
2. Select a location for the unit that will place the voltmeter at a level to allow maximum accuracy in calibration.
3. Set the RAISE VOLTAGE control to zero, and check to ensure that the AC POWER toggle switch is in the OFF (down) position.
4. Ground the case before connecting the input power. The GROUND post on the front panel may be used for this purpose.
5. Ensure that the five-pronged shorting plug provided with the unit is inserted into INTLK & AUX POWER socket on control panel.
6. Set VOLTAGE RANGE control to the LOW position.
7. Connect the RETURN post to the GROUND post on the control panel with the jumper clip.
8. Select calibrated external voltmeter with the meter range appropriate for the unit to be calibrated. (HIPOTRONICS Model kV 100A or equal.)
9. Connect the low side (ground) of the external voltmeter to the RETURN post of the unit, using the insulated return lead supplied with the unit.
10. Connect the HV output lead of the unit to the high side of the external voltmeter, using the HV insulated lead supplied with the unit.
11. Unscrew the control panel from the cabinet, tipping the control panel into the vertical position, and locate kV calibration potentiometer (pot) in the corner of the circuit board attached to the back of the voltmeter.
12. Secure control panel in vertical position, allowing ease of access to kV calibration pot, as well as accurate meter readings.
13. Position range switch to LOW and turn high voltage on. Raise voltage to approximately 70% of the full scale on control panel kV meter.
14. Calibrate the control panel meter against the external meter using the calibration pot. (2% accuracy is recommended.)

15. Calibration of the LOW range should automatically calibrate the MED and HIGH ranges, but it is recommended that each range be checked individually.
16. Return the RAISE VOLTAGE control to zero and turn high voltage off.

TROUBLE-SHOOTING

All products shipped by HIPOTRONICS are thoroughly tested against a rigid set of standards by the firm's Quality Control Department. In the event a unit appears not to function upon delivery, the user is referred to the section, "RETURNED MATERIAL".

This section of the publication is intended to aid the user in locating the source of a problem when a unit is either not functioning or functioning improperly.

Use of these procedures is at the user's own risk. It is not recommended that these procedures be used while the equipment is under Warranty, as some of the recommended steps involve the removal, testing or disconnecting of components which could result in voiding the Warranty.

These procedures are intended for use only by a trained repair technician, and are not recommended for use by individuals trained only to operate the equipment, except under strict supervision.

An attempt has been made to provide information to aid the user in trouble-shooting those problems that are most commonly encountered, either as a result of normal wear and tear or direct damage to the unit. Trouble-shooting procedures are described in tabular form on the next two pages, for ease in reference. Procedures are listed according to problem area. Possible causes of each problem are listed, along with appropriate remedial action for each case.

A chart summarizing the trouble-shooting process appears on Page 17. A schematic diagram of the unit, and a Parts List is contained in the pocket of this publication for reference when trouble-shooting.

TROUBLE-SHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	RECOMMENDED ACTION
NO HIGH VOLTAGE OUTPUT	A. Defective F2 fuse. B. INTLK & AUX POWER plug faulty or not plugged in. C. Zero start faulty.	A. Replace F2 fuse. B. Plug in INTLK plug or replace faulty plug. (See J1 in schematic; prongs 2 & 3 should be connected.) C. Clean contact between T1 swinger and arm of zero start.
LOW VOLTMETER READINGS	A. Voltmeter out of adjustment. B. Low line voltage.	A. Recalibrate voltmeter. B. Obtain reading at power source and inform responsible authority.
ERRATIC HIGH VOLTAGE OUTPUT	A. Variac (RAISE VOLTAGE control) brushes dirty or worn. B. Fluctuating line voltage.	A. Clean or replace Variac brushes. B. Obtain reading at power source and inform responsible authority.
OVERLOAD DOESN'T TRIP	A. Faulty RY1 relay. B. C1 capacitor shorted. C. RY1 operation impaired.	A. Replace RY1 relay. B. Replace C1 capacitor. C. Check wire harness to ensure it does not impair RY1 operation.
OVERLOAD TRIPS BEFORE HOOKUP	A. Short in HV output cable.	A. Replace HV output cable.
CURRENT METER DOESN'T WORK	A. Jumper clip on front panel not connected properly.	A. Connect jumper clip properly as described in Step 5 of "Installation Instruction" Page 9.

RETURNED MATERIAL

If, for any reason, it should become necessary to return the equipment described in this publication to the factory, the Warranty Service Department of HIPOTRONICS must be contacted, at which time the following data must be given in order that we may identify the unit and determine the necessity for return. (Tel. (914) 279-8035) MODEL, SERIAL NO. and TYPE (Part No) is indicated on the black and silver tag affixed to the unit.

MODEL:

SERIAL NUMBER:

TYPE (Part No):

REASON FOR RETURN:

DEFECT:

ALLEGED CAUSE OF DEFECT:

If, HIPOTRONICS deems return of the unit appropriate, an "Authorization for Return" tag will be issued. This will instruct you as to the method of return. The pink copy is for your records, the hard copy to be affixed to the unit being returned. If return is not deemed advisable, other inspection arrangements will be made.

NOTE: Material received at this point without the proper authorization shall be held as "customer's property," with no service performed until such time as the proper steps have been taken.

Your cooperation is requested in order to ensure prompt service.
Thank you.

PARTS ORDERING

To order replacement parts of this unit, please refer to the Parts List contained in the pocket of this publication. The number of the specific component is required, along with the TYPE (Part No) of the unit. The TYPE (Part No) is indicated on your Parts List, and on the black and silver tag affixed to the unit.

WARRANTY

HIPOTRONICS, INC. warrants to the original purchaser of any new merchandise that the merchandise is free from defects in material and workmanship under normal use and service for a period of one year from the date of shipment. The obligation of HIPOTRONICS, INC. under this Warranty is limited, in its exclusive option, to repair, replace or issue credit for parts or materials which prove to be defective, and is subject to Purchaser's compliance with the HIPOTRONICS, INC. Warranty Claim Procedure as set forth below. The happening of any one or more of the following events will serve to void this Warranty and any defect or damage resulting therefrom is specifically excluded for Warranty coverage: (a) defects due to accident, negligence, alteration, modification, faulty installation by Purchaser or Purchaser's agents or employee, abuse or misuse; (b) attempted or actual dismantling, disassembling, service or repair by any person, firm or corporation not specifically authorized in writing by HIPOTRONICS, INC. (c) defects caused by or due to handling by carrier, or incurred during shipment, transshipment or other move.

This Warranty covers only those parts and/or materials deemed by HIPOTRONICS, INC. to be defective within the meaning of this Warranty. The liability of HIPOTRONICS, INC. shall be limited to the repair, replacement or issuance of credit for parts deemed defective within the meaning of this Warranty. Costs incurred by purchaser for labor or other expenses incidental to the inspection, repair, replacement or issuance of credit for such parts and/or material shall be the sole responsibility of purchaser. This Warranty shall not apply to any accessories, parts, or materials not manufactured or supplied by HIPOTRONICS, INC. and if, in the sole discretion of HIPOTRONICS, INC., Purchaser's claim relates to any materials or workmanship manufactured or performed by the supplier of a component part, or of the manufacturer of a device of which the defective part is a component, HIPOTRONICS, INC. reserves the right to disclaim liability under this Warranty and to direct that the Purchaser deal directly with such supplier or manufacturer. HIPOTRONICS, INC. agrees to assist the Purchaser in processing or settling any such claim without prejudicing its position as to liability.

WARRANTY CLAIM PROCEDURE

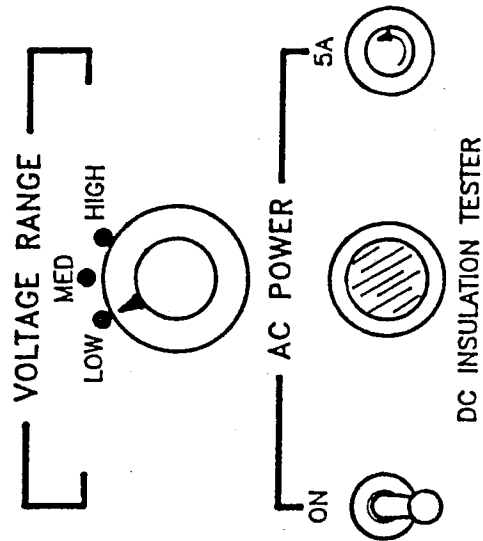
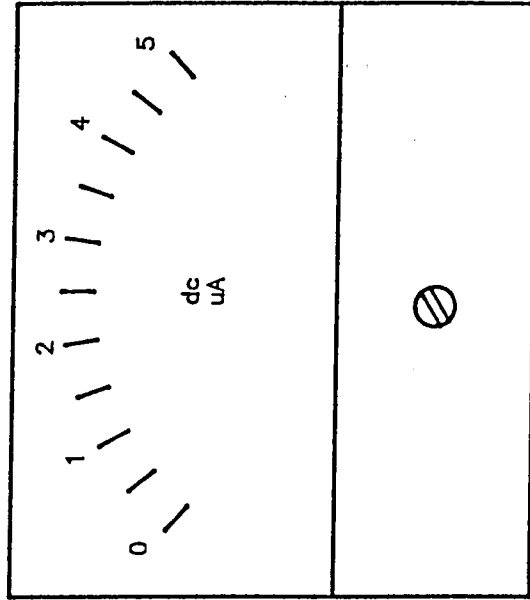
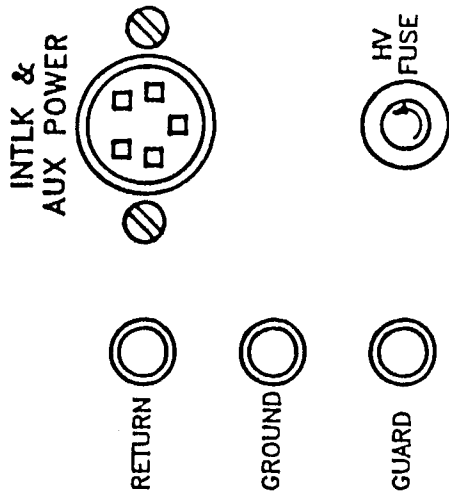
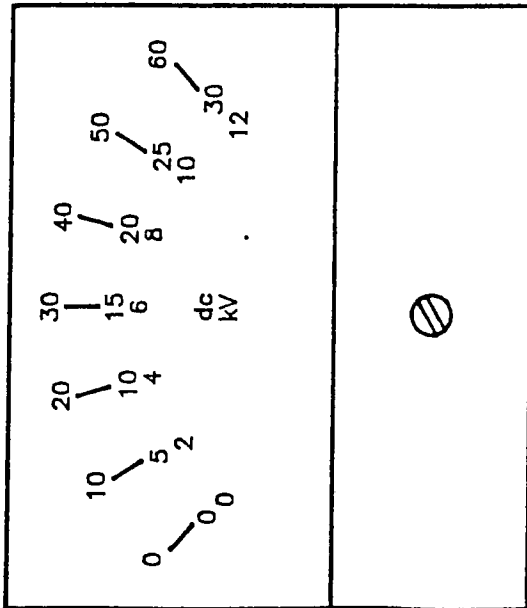
Compliance with the following Warranty claim Procedure is a condition precedent to the obligation of HIPOTRONICS, INC. under this Warranty:

- a) Purchaser must notify HIPOTRONICS, INC. in writing by certified or registered mail, of the defect claimed within twelve months after date of original shipment. Said notice shall describe in detail the defect, the defective part, and the alleged cause of defect.

- b) At the exclusive option of HIPOTRONICS, INC., Purchaser shall dismantle or disassemble at Purchaser's cost and expense and shall ship the defective part or material prepaid to HIPOTRONICS, INC., Brewster, New York 10509, for inspection, or permit an authorized service representative of HIPOTRONICS, INC. to inspect the defective part or material at Purchaser's premises. If HIPOTRONICS, INC. shall inspect the part or material at the Purchaser's premises, Purchaser shall provide facilities for, and at Purchaser's cost and expense, dismantle, disassemble, or otherwise make accessible the subject part or material whether or not same is a component of or installed in a device other than that manufactured or supplied by HIPOTRONICS, INC. If disclosure shows that the defect is not one for which HIPOTRONICS, INC. is liable, the Purchaser agrees to reimburse HIPOTRONICS, INC. for all expense incurred.
- c) Upon receipt of the defective part or material, or after access to same, HIPOTRONICS, INC. shall inspect the part or material to determine the validity of Purchaser's claim.

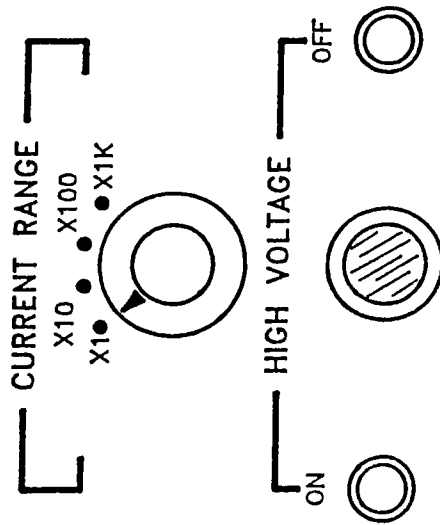
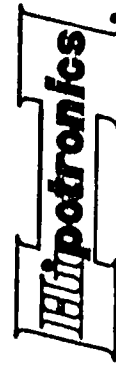
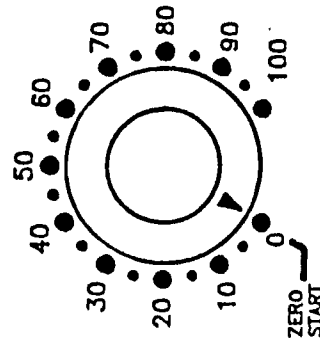
The validity of any Warranty Claim, Purchaser's compliance with HIPOTRONICS, INC. Warranty Claim Procedure, the obligation to either repair, replace, or issue credit, or direct the purchaser to deal directly with a manufacturer or supplier are to be determined solely and exclusively by HIPOTRONICS, INC. and any determination so made shall be final and binding.

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