DBT-75D

SERIES

Safety, Operation, and Procedure Instructions for the DBT Series of dc Benchtop Test Sets

Please Refer to Documentation Before Operation

Danger- Lethal Voltages:

Equipment to be used by trained personnel only

This Operator Manual contains instructions for the operation of a High Voltage power source. The operator of this equipment must use good judgement and follow all safety precautions noted in this guide to ensure the protection of himself and others in close proximity to the test area. Failure to follow the instructions could result in injury or death. Proper grounding of the test set must be done prior to connecting this unit to a power source.

Operator Manual

31 Route 7A
Copake, N.Y. 12516
Phone 518/329-3275 • Fax 518/329-3271
http://www.hvinc.com
E-Mail: factory@hvinc.com

Table of Contents

About the Operator Manual

Important

This Operator Manual describes the features and safe operation of a High Voltage Test Set. The instructions are intended to be clear and simple, but the operator must be trained and qualified according to established procedures for the use of this type of equipment.

This Operator Manual is organized to provide information on the DBT Series in steps that familiarize the new operator with the entire scope of operation of this test set.

Section 1: Specifications and Controls.

Section 2: Setup and Operation.

Section 3: Performing Special Operations.

The Functions, Features, and Specifications of the DBT Series of DC Benchtop Test Sets are also discussed in the DBT Brochure available from High Voltage, Inc.

SECTION

1

General Information

This section familiarizes the operator with the features and specifications of the

DBT Series of dc Benchtop Test Sets manufactured by HIGH VOLTAGE, INC.

Features and Specifications

The DBT Series of dc hipot test sets provide continuously adjustable output voltages for the test and measurement of leakage current in high voltage insulation and devices.

Standard features of the DBT Series of Benchtop Test Sets

- Continuously adjustable output voltage
- Fixed overload, factory set to 11 milliamperes of output current
- “Zero Start” and External Interlock provision
- Dual- range current meter , low range 0 to 199.9 dc uA, high range 0-10.00 mA.
- Single-range voltmeter, 0-75.0 kVdc
- Ferro-resonant input line regulator to minimize line generated output fluctuations to less than 1% for +/- 10% input voltage change
- Internal Discharge solenoid with series resistor rated for 5.0 kilojoules
- One piece design
- Transit protected meters
- Shielded high voltage output cable included.

DBT MODEL SPECIFICATIONS

See last page of parts list for Specifications

For particular unit

Operating Environment

Indoor/Outdoor-fair weather

Altitude: 100% of rating;Sea-level, up to 5000ft.(approx.1500M). The output power is de-rated 10% above 5000 ft. altitude, 20% above 12,000 ft.(approx. 3600M), and 30% above 15,000 ft.(approx. 4500M)

Storage Temperature: -20°C to 70°C(-4°F to 158°F)

Operating Temperature: -5°C to 45°C(22°F to 113°F) Output power is de-rated linearly by 15% from 30 to 45°C ambient.

Maximum Relative Humidity: 80% up to 31°C(88°F), decreasing linearly to 50% at 40°C(104°F)

Mains supply fluctuation: +/-10% of rated voltage

Installation: Category II

Pollution: Degree 2

Safety Symbol Identification

Warning! Please refer to documentation before operation

Protective Earth Terminal

Caution: Hot Surface!

Warning: Hazardous Voltage

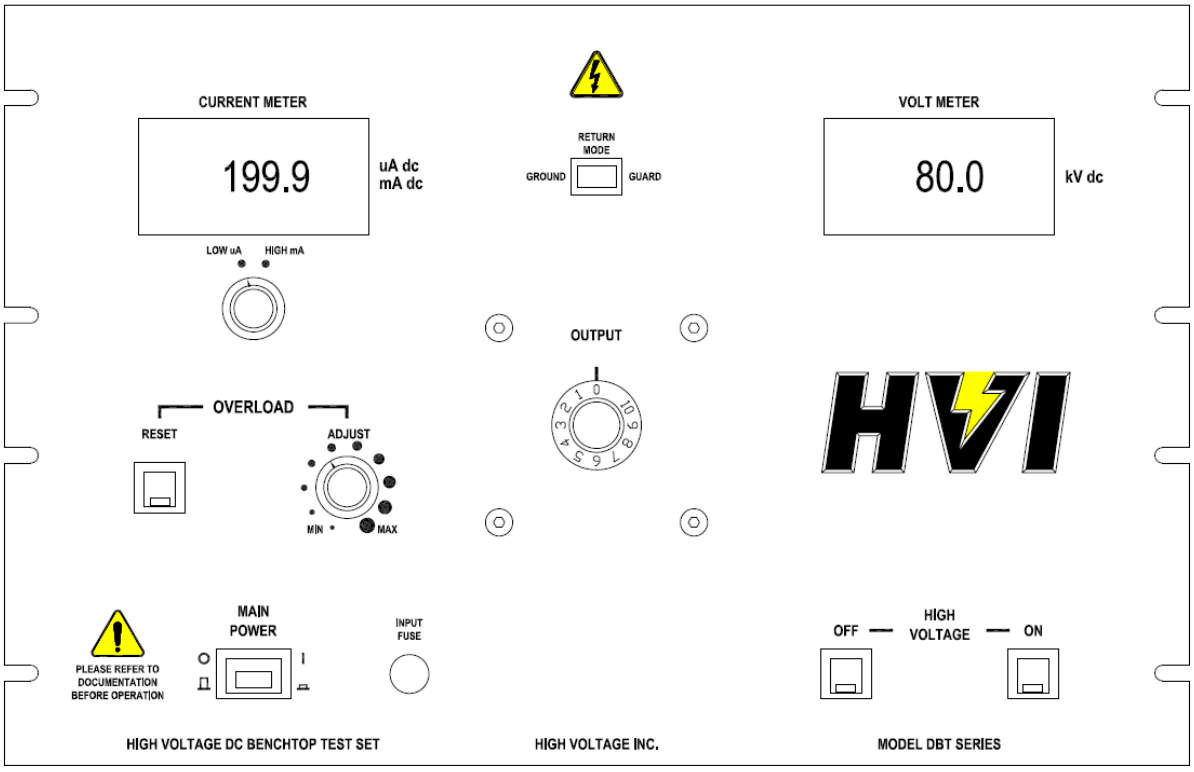


Figure 1 *DBT-75D front panel controls.*

MAIN POWER

The MAIN POWER pushbutton switch provides the power to the control and power circuits. The neon lamp in the switch will light when the power is on and voltage is available through input line cord. The INPUT FUSE located electrically before the MAIN POWER switch provides line fault protection for the unit.

HIGH VOLTAGE ON/OFF

The HIGH VOLTAGE ON (OFF) pushbuttons activate (de-activate) the high voltage power circuits. The LED indicators provide long life positive indication of the circuit status. The RED (ON) LED lights when high voltage is energized, the GREEN (OFF) LED lights when the high voltage is de-energized.

OUTPUT CONTROL

The OUTPUT control variable transformer adjusts the output voltage. The 0-10 markings on the knob indicate the low to high setting. The control must be at ZERO (0) to energize the high voltage circuits. The output control must always be returned to zero at the completion of testing, prior to de-energizing the output

VOLTMETER

The KILOVOLT METER measures output voltage. 1-% precision resistors minimize the need for re-calibration due to aging shift. See Voltmeter Re-calibration in Section 3 for details on calibration.

CURRENT METER AND RANGE SWITCH

The CURRENT METER and associated range switch allows for more accurate output current readings. The two current range resistors are precision 1% tolerance and as such reduce the need for adjustments. See Current Meter Re-calibration in

OVERLOAD ADJUSTMENT AND RESET SWITCH

The OVERLOAD trips from a secondary current in excess of the adjusted setpoint. Once tripped, the high voltage is turned off and the OVERLOAD must be RESET to resume testing. To set the Overload, refer to Section 2 in Operating The Equipment, Setting The Overload.

RETURN MODE (GUARD/GROUND)

The RETURN MODE rocker switch is used to choose the current measuring mode of the test set. The option of guarded or grounded return measurements has application under various testing conditions. A Grounded return will measure the load currents in the test sample plus any stray losses in the air, the unit, and test fixtures used. NOTE: The use of the guarded mode is restricted to the ability to isolate the load or test sample low side from ground. The guarded return mode does enable more accurate load current measurement as the stray currents in the surrounding items are not measured as load current. In the guarded return mode, the currents to ground are diverted around the metering circuit. Further discussion of the application of the GUARD/GROUND circuit is found in SECTION 2: OPERATING THE EQUIPMENT, Using the Guarded Return.

Rear Panel Controls

EXT.INTLK (EXTERNAL INTERLOCK)

The Ext. Intlk. connector is provided to allow for a normally open safety interlock switch to control the energizing of the high voltage output. .

LOAD RETURN

The LOAD RETURN connector is provided for the low side metering connection (Return) of the test object.

List of included components

- ☐ Black test lead with black boot for ground connections
- ☐ Red test lead with red boot for return connections
- ☐ Ext. Intlk. jumper plug
- ☐ Attached 20 ft. RG8/U output cable

SECTION

2

SETTING UP THE EQUIPMENT

The setup of this equipment has been minimized by careful consideration of the operator during design. The simple controls are easy to understand and operate.

1. **Select a location** for the unit that will allow easy viewing of the meters at a safe distance from the test object.

2. **Be sure that all the controls are off**, in their de-energized or fully counterclockwise position.

3. **Secure a Safety Ground test lead to the panel**. The **Ground** post on the rear of the cabinet should be used for that purpose. A black test lead with black boot has been provided for the ground connection. Place the **Return Mode** rocker switch in the **Ground** position.

4. **Insert the EXT INTLK plug into the socket on the rear panel.** The plug may also be wired to a normally open contact of a safety switch for added protection.

5. **Connect the red return lead to the RETURN binding post on the rear panel**. The information explaining the use of the GUARD/GROUND return circuit is found in the next part of this section, OPERATING THE EQUIPMENT, **Using the Guarded Return**.

Operating the Equipment

This section provides step-by-step instruction on various test methods and an explanation on when to use and when not to use the guarded return mode. Many facilities have their own in-house test procedures, and this manual is not to supercede these. The purpose of this section is to explain the capabilities of this test set in real-world applications.

Setting the Overload

1. Ensure that all the steps listed in **Setting up the Equipment** have been accomplished. Take special note to ground the cabinet to a solid earth ground.

2. Short the output cable to the GROUND stud on the rear of the cabinet.

3. Connect the input power cord to a grounded source (See the specification table for unit input requirements). Rotate the OVERLOAD ADJUST to the MAX setting.

4. Operate the MAIN POWER circuit breaker to energize the control circuits.

5. Set the desired CURRENT METER RANGE (LOW uA or HIGH mA).

CAUTION

POTENTIALLY LETHAL VOLTAGES MAY BE PRESENT

6. With the OUTPUT control at zero (zero start interlock engaged); depress the HV ON pushbutton. The HV ON light will glow.

7. Increase the output slowly by rotating the OUTPUT control clockwise until the desired output (overload) current is reached. Adjust the OVERLOAD ADJUST towards MIN until the OVERLOAD trips.

8. Re-energize High Voltage and raise the output current once more to verify the desired setting. At the completion of setting the overload, go to the next section for testing instructions.

DC Insulation Testing

9. Ensure that all the steps listed in Setting up the Equipment have been accomplished. Take special note to ground the control panel to a solid earth ground using the supplied black test lead. Then connect the GROUND HOOK to the same earth ground.

10. Set the CURRENT RANGE to the mA range (high range).

11. Prior to connecting the output cable to the test sample, be sure to short the sample to ground for safety.

12. Connect the red return lead to the low side of the test specimen. Select the GROUNDED RETURN mode if the low side of the test sample is grounded as in the case of a cable shield. For instruction in the use of the GUARDED RETURN mode see the next section Using the Guarded Return.

13. Connect the output lead to the test sample. ***Be sure that there is enough clearance to grounded objects for the expected test voltage. The minimum clearance in air is 10 kV dc/inch.***

14. Connect the input power cord to a grounded power source (see specifications table). The ferro-resonant input regulator will correct for 10% change in input voltage and not affect the output voltage more than 1%. A generator (frequency stable) is an acceptable power source. If the distance to a power source is greater than the cord provided, a standard grounded extension cord can be used.

15. Depress the MAIN POWER switch to energize the control circuits.

CAUTION

POTENTIALLY LETHAL
VOLTAGES MAY BE PRESENT

16. With the OUTPUT control at zero (zero start interlock engaged), depress the HV ON pushbutton. The HV ON light will glow.

17. Increase the output by rotating the OUTPUT control slowly clockwise until the desired output voltage is reached. Raising the output too fast may trip the output overload relay, so caution should be used not to exceed the full scale rating of 10 mA output current.

18. Maintain the output voltage for the test time specified in your standard procedures. To see leakage current, rotate the CURRENT RANGE to a more sensitive scale.

19. After the test is complete, rotate the OUTPUT control to zero, allowing the load to bleed down prior to depressing the HV OFF pushbutton.

20. If the test sample fails during the test, the internal overload relay will de-energize the high voltage, dropping the internal discharge solenoid and bringing the output to zero in less than 1 second.

21. Prior to removing the output cable from the load, observe that the output voltmeter is at zero, and then ground the test sample.

Using the Guarded Return

The use of the GUARD/GROUND return feature of this test set provides for very accurate leakage current measurements if certain conditions exist allowing for the GUARD circuit to be employed. The following explanation will detail different test samples and methods that lend themselves to the use of this circuit. The same setup precautions such as proper grounding still apply to the test but the grounds will be manipulated to accomplish the test requirements.

1. Grounded Return- With the output return in the grounded mode, the current meter reads all current to ground, internal and external to the power supply. This current might include corona, surface tracking, and any shunt resistance. The typical diagram for grounded return operation is shown in Figure 2 below.

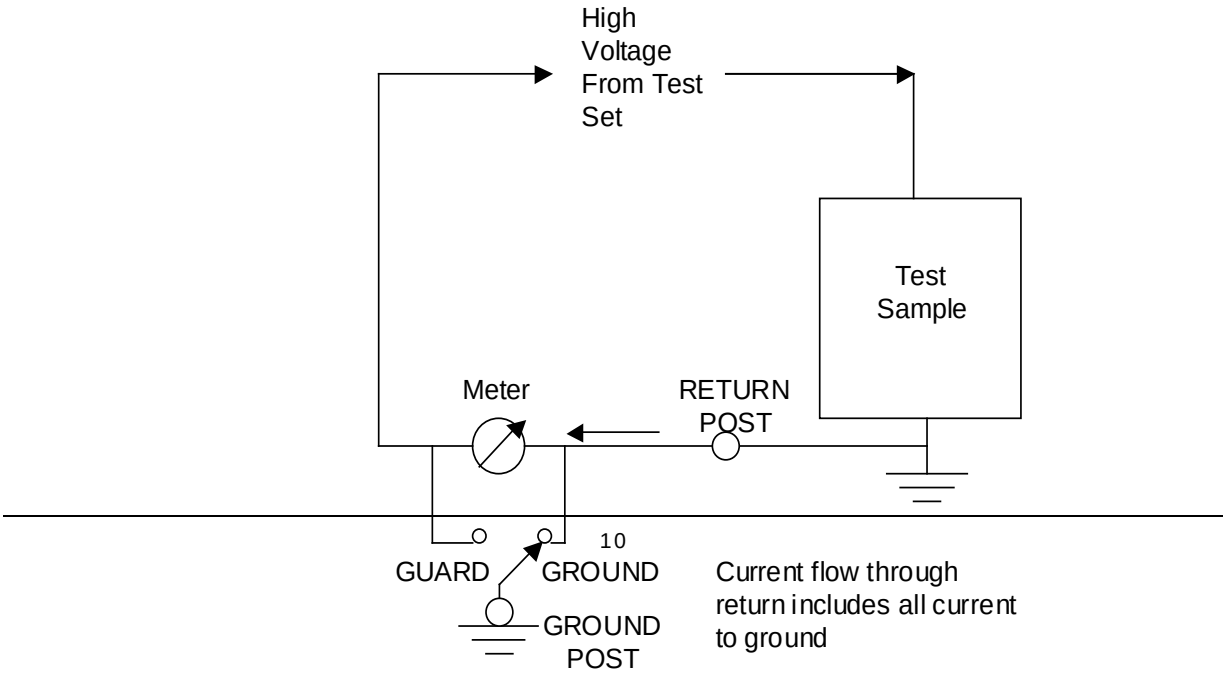


Figure 2, Grounded Return Diagram

2. Guarded Return- With the output return in the guarded mode, the current meter will only read currents through the test sample. The test sample must be isolated from ground on the low side as shown in Figure 3 below.

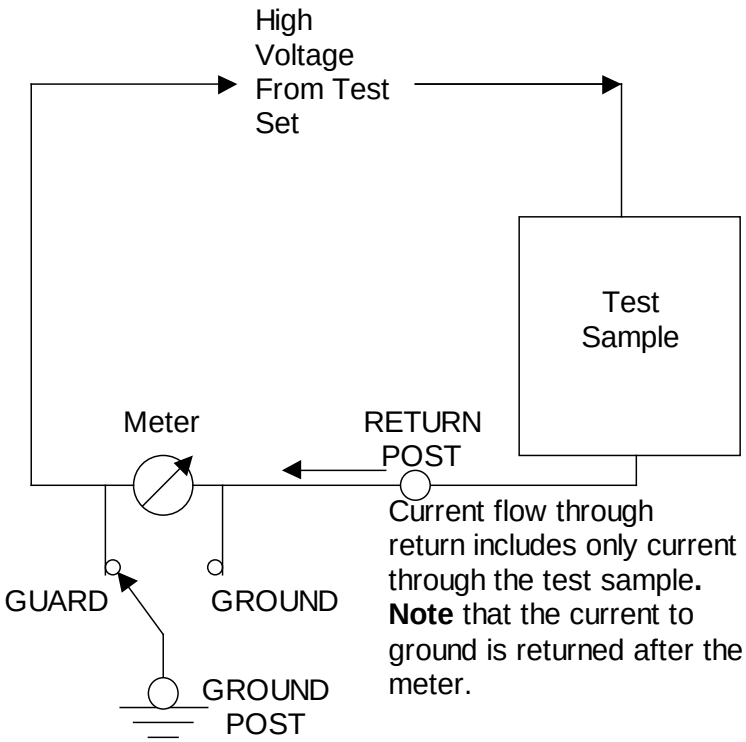


Figure 3, Guarded Return Diagram

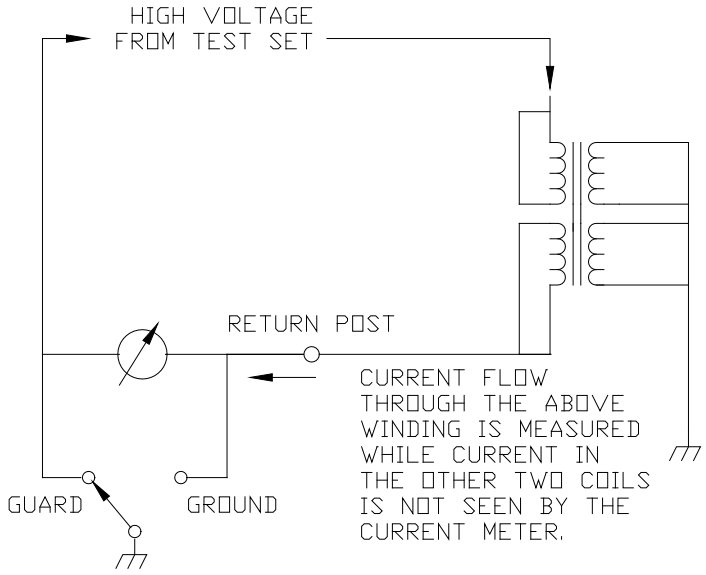


Figure 4, Using the Guarded Return to Test Windings

DC Testing of High Voltage Cables

When testing cables, either single or three phase, there are certain extra steps that must be observed to ensure safe operation.

1. Make sure that all insulators, stress cones, and pot heads are clean and free of moisture. This will prevent flashover and minimize leakage.

The shields of all cables must be securely tied to ground at the nearest end of the cable.

2. Isolate the far end of the conductors under test for the test voltage; that may mean separating some of the conductors in a multi-conductor cable from each other and their shields.

3. Any conductors or wires in the cable or the vicinity not being tested must be grounded to avoid a buildup of charge and possible shock hazard.

4. Voltage must be applied according to specifications from the cable manufacturer or any other applicable test standards.

5. The discharge solenoid in the oil filled high voltage tank will support a discharge of up to 5.0 kJ of energy. But, the recommended turn off procedure at the completion of the test is return the OUTPUT control to zero and allow the output voltage to bleed to zero before turning off the high voltage.

CAUTION

POTENTIALLY LETHAL VOLTAGES MAY BE PRESENT

STORED ENERGY LEVELS IN THE CABLE GREATLY INCREASE THE RISK OF FATAL INJURY IF CONTACT IS MADE WITH THE LOAD WHILE AT ANY VOLTAGE.

6. Always ground the cable(s) prior to disconnecting the RED booted output cable.

THIS PAGE LEFT BLANK FOR APPLICATION NOTES

SECTION 3

PERFORMING SPECIAL OPERATIONS

The following section contains information on the care and upkeep of your new DBT SERIES dc Benchtop Test Set. There are some notes on troubleshooting and service, which will save much time and money over the life of the unit.

Meter Re-calibration

The DBT SERIES of hipots use precision metal film resistors for measurement and calibration of the voltmeter and the current meter. The use of these resistors in both the high voltage tank and the metering circuits has minimized circuit drift due to aging and temperature. But, a potentiometer (R4) on the voltmeter PCB can be used to correct for changes from the aging of the meter.

The current meter circuit is designed for no-calibration. If the current meter becomes out of calibration, R4 on PCB-041C should be adjusted for uA calibration, or R4 on S5A is the mA calibration.

The certification of meters on a yearly basis is recommended to ensure accurate test results. It is recommended to use a Certified Calibration House or return the unit to the High Voltage Inc. factory when calibration is needed.

Voltmeter Re-calibration

1. Locate the unit in a position that will allow easy reading of the meters.
2. Remove the panel screws and support the panel vertically to gain access to the calibration pot on the back of the voltmeter.
3. Perform the steps in Setting up the Equipment at the start of SECTION 2. Be sure to ground the front panel to a solid earth ground using the supplied black ground test lead prior to connecting the unit to input power.
4. Connect the output cable to a calibrated reference meter with ability to read to the full output voltage of the unit. Be sure to ground the low side of the meter.

5. Place the RETURN MODE in GROUND position.

6. Raise the output to one half scale on the unit meter. Adjust R4 on PCB-041V on the kilovoltmeter as required.

7. Check calibration at full scale and on the high range at both half and full scale. If the customer facility calibration certification requires more points of reference, follow those procedures instead of these.

Current Meter Re-calibration

1. To properly calibrate the current meter, a reference meter with an accuracy of 0.25% on the 1-microampere range will be required.

2. Locate the unit in a position that allows for easy viewing of the meters.

3. Remove the panel screws and support the panel vertically to gain access to the calibration pots on the back of the current meter.

4. Perform the steps in Setting up the Equipment at the start of SECTION 2. Be sure to ground the front panel to a solid earth ground using the supplied black ground test lead prior to connecting the unit to input power.

5. Set the CURRENT METER RANGE to uA position..

6. With a suitable output limit resistor, the output should be raised until 100uA is read on the reference meter. If adjustment is required, adjust R4 (5K) on the current meter PCB.

7. Recheck calibration at both ½ scale and full scale and split any differences for maximum accuracy. Check the readings prior to moving on to the next range.

8. Next, to check the higher ranges, rotate the CURRENT METER RANGE switch to mA. Change the reference meter range as required.

9. With a suitable output limit resistor, the output should be raised until 5.00mA is read on the reference meter. If adjustment is required, series or parallel resistors onto R4 (500Ω) on the High/Low range switch.

10. Recheck calibration at both ½ scale and full scale and split any differences for maximum accuracy. Check the readings prior to moving breaking down the setup.

Miscellaneous

The only operator serviceable part on this test set is the input fuse. Should an input fuse fail, replace it with a 250Volt, 10Amp, Type F fuse.

Maintenance Cleaning

Cleaning of the DBT Series of hipots should be accomplished on a semi-annual basis. The control panel should be cleaned with a mild soap or detergent and dried with a clean cloth.

The output cable, return lead, and ground leads should be regularly inspected for fraying and excessive dirt buildup. If the return or ground test leads show signs of insulation damage or fraying, they should be replaced immediately.

Should the output cable arc along the insulation at the 'live' end of the cable, it should be cleaned using WD40 or LPS oils to cut the grease and carbon. The excess oil should then be removed with a clean, lint free cloth.

Oil Insulated High Voltage Tanks

The oil-filled tanks in all the DBT SERIES of hipots are field serviceable. The only requirement is that the tank must be oil filled under vacuum at re-assembly if left out of the oil for longer than 3 hours. The parts to service the tank are available from HIGH VOLTAGE, INC. at the address noted on the inside front cover of this manual.

The oil level in the tank should be .5 inches from the lid when the oil temperature is 20°C.

RETURNED MATERIAL

If for any reason it becomes necessary to return any equipment or materials to High Voltage, Inc., the Service Department of High Voltage, Inc. must be notified, and authorization received, prior to the shipment of the equipment. When notified, the following information must be provided:

MODEL:
SERIAL NO:
PART NO:
REASON FOR RETURN:
SUSPECTED DEFECT:
CAUSE OF DEFECT:

With the above information provided, High Voltage, Inc. will determine if the return of the equipment is appropriate. If deemed appropriate, a Return Authorization Number will be issued. At that time, the Purchaser will be instructed how to mark and return the equipment.

The above procedure must be adhered to in order to ensure prompt service. No equipment should be returned without the prior knowledge and authorization of High Voltage, Inc.

REPLACEMENT PARTS ORDERING

To order replacement parts, first refer to the Parts List for the product in question. Every part is issued a part number. It will be necessary for this part number and the product model and serial number to be provided. When calling High Voltage, Inc. request the Service Department.

TERMS AND CONDITIONS AND LIMITED WARRANTY Rev. 102113

High Voltage, Inc., 31 County Route 7A, Copake, NY USA 12516
Phone: (518) 329-3275 Fax (518) 329-3271 E-mail: factory@hvinc.com

THESE TERMS AND CONDITIONS OF SALE AND LIMITED WARRANTY OF HIGH VOLTAGE, INC. ("High Voltage") SHALL BE GOVERNED BY AND CONSTRUED ACCORDING TO THE INTERNAL LAWS OF THE STATE OF NEW YORK, USA, WITHOUT GIVING EFFECT TO ITS CONFLICT OF LAWS PROVISIONS. THE RIGHTS AND OBLIGATIONS OF ALL PARTIES AND ALL PERSONS OR ENTITIES CLAIMING HEREUNDER SHALL NOT BE GOVERNED BY THE PROVISIONS OF THE 1980 U.N. CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS.

1. **ACCEPTANCE.** All orders become effective only when accepted by High Voltage's written order acknowledgment at Copake, New York, USA. Unless modified in writing by an authorized representative of High Voltage, or modified in High Voltage's Quotation or order Acknowledgment, these Terms and Conditions and Limited Warranty shall solely control Purchaser's order. High Voltage expressly rejects any additional or different provisions, terms or conditions proposed by Purchaser at any time.

2. **SCHEDULING.** High Voltage's shipping date specified in High Voltage's quotation or purchase order acknowledgment is approximate and High Voltage shall use reasonable commercial efforts to effect timely shipment. Furthermore, High Voltage shall not be liable for any delay in the performance of orders or contracts or in the delivery or shipment of goods or for any damages suffered by Purchaser by reason of such delay when such delay is, directly or indirectly, caused by, or in any manner arising from Purchaser's fault, fires, floods, accidents, riots, acts of God, war, governmental interference or, embargoes, strikes, labor difficulties, shortage of labor, fuel, power, materials or supplies, transportation delays, or any other cause or causes (whether or not similar in nature to any of these hereinbefore specified) beyond the control of High Voltage.

3. **CANCELLATIONS.** Prior to shipment, Purchaser may request cancellation or delayed delivery of an order or part thereof, but such shall be conditioned upon written consent of High Voltage and upon payment to High Voltage of cancellation or delayed delivery charges to be determined by High Voltage.

4. **SALE AND DELIVERY.** Unless otherwise agreed in writing, sale and delivery of the goods hereunder shall be made EXW or FCA (Incoterms® 2010) at High Voltage's option, High Voltage's dock at Copake, New York, USA, at which time all risk of loss or damage shall pass to Purchaser. All shipments and packaging shall be made in the manner determined by High Voltage, unless otherwise requested by Purchaser, in which case any resultant additional changes and expenses shall be paid by Purchaser.

5. **TAXES.** Any and all sales, use, excise and similar taxes, and duty and all other charges levied or imposed by governmental authority, foreign and domestic, upon any goods sold or contracted to be sold shall be paid by Purchaser and added to the purchase price unless appropriate tax exemption certificates are supplied to High Voltage in form satisfactory to High Voltage.

6. **PAYMENTS.**

a. All payments shall be in US Dollars without discount unless otherwise specified in High Voltage's order acknowledgment. Credit card payments are accepted only if specified in High Voltage's order acknowledgment.

b. Terms of payment are net thirty (30) days from date of invoice, unless otherwise agreed by High Voltage in its order acknowledgment. Delinquent payments are subject to a service charge on the unpaid balance from invoice date equal to the lower of 1-1/2% per month or the maximum rate permitted by law until all amounts are paid in full. If the financial responsibility of Purchaser becomes unsatisfactory to High Voltage for any reason, or if Purchaser has been in default to High Voltage under any order, High Voltage may require full payment in cash before shipment of goods.

c. If Purchaser so requests and makes arrangements prior to shipment which meet High Voltage's full satisfaction, High Voltage in its discretion may accept irrevocable letters of credit in its favor issued by a United States bank which is satisfactory to High Voltage.

7. **INFRINGEMENT, ETC.** On goods manufactured to Purchaser's specifications, Purchaser shall and does indemnify and hold High Voltage harmless against any claims, damages, liabilities, costs and expenses (including attorneys' fees) arising out of or resulting from actual or alleged infringement of patent, copyright, trademark or other proprietary rights, or claim of unfair trade or unfair competition arising from or occasioned by the use, possession, sale or delivery of any such goods sold by High Voltage.

8. **REPRODUCTION RIGHTS.** Drawings, specifications, reports, photographs and other data relating to all orders and all proprietary rights and interests therein and the subject matter thereof shall be and remain the property of High Voltage. Purchaser agrees that it shall not use High Voltage's drawings, specifications or other materials covered by this order, or any similar article from any other source, or reproduce the same or otherwise appropriate them, without the prior written authorization of High Voltage.

9. **LIMITED WARRANTY.**

a. High Voltage warrants to the original Purchaser of any new goods that the goods are free from defects in material and workmanship under normal use and service for a period of one (1) year from the date of shipment by High Voltage. The obligation of High Voltage under this Limited Warranty is limited, in High Voltage's exclusive option, to repair, replace with new or reconditioned parts or issue credit for goods, parts or materials which prove to be defective. Costs incurred by Purchaser for labor or other expenses to repair or replace such goods, parts and/or materials shall be the sole responsibility of Purchaser. High Voltage shall not be responsible for any damage or lack of performance resulting from: (i) defects due to accident, negligence, alteration, modification, faulty installation, abuse or misuse, whether by Purchaser, Purchaser's agents or employees, or by others than High Voltage (ii) attempted or actual dismantling, disassembly, service or repair by any person, firm or corporation not specifically authorized in writing by High Voltage, or (iii) defects caused by or due to handling by carrier, or incurred during shipment, transshipment or other move.

b. High Voltage expressly disclaims any warranty whatsoever of (i) consumables, and of (ii) parts, components, software (including but not limited to object code and source code and software user instructions), accessories, and materials not prepared, compiled or manufactured by High Voltage, and Purchaser must deal directly with such other supplier. High Voltage may elect to assist Purchaser in settling such claim against such other supplier, but any such assistance shall not prejudice High Voltage's position as to its own liability.

c. Compliance with the following Limited Warranty Claim Procedure is a condition precedent to the obligation of High Voltage under this Limited Warranty:

i. Purchaser must notify High Voltage in writing as soon as is reasonably possible, but within the applicable warranty period, of any alleged defect in material, workmanship, or operation of any goods covered under this Limited Warranty. Such notice must describe in detail the defect, any and all defective parts, and the alleged cause of the defect. No goods may be returned to High Voltage without High Voltage's prior written permission, which permission may be withheld by High Voltage in its sole discretion.

ii. At the exclusive option of High Voltage, Purchaser may be directed in writing to dismantle the goods at the Purchaser's cost and expense and ship the goods prepaid to High Voltage (refer to "Returns" Section 10 for provisions regarding the return of any goods to High Voltage). If High Voltage elects to inspect the goods at Purchaser's site, and to repair, replace,

[Section 9.c.ii. continued on page 2]

or ship the defective goods to High Voltage's factory, Purchaser, at its own cost and expense, shall provide the facilities for such work as needed to inspect and evaluate and possibly repair/replace the goods. If inspection discloses that the defect is not one for which High Voltage is liable, then Purchaser shall promptly reimburse High Voltage for all expenses incurred.

iii. Upon receipt of the defective goods, or following access to the same, High Voltage shall inspect and evaluate the goods and determine the validity of Purchaser's claim.

iv. The validity of any warranty claim, Purchaser's compliance with the Limited Warranty and Limited Warranty Claim Procedure, and the obligation to replace, repair, or issue credit for any goods are solely and exclusively to be determined by High Voltage and any determination shall be final and binding.

d. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, STATUTORY OR EXPRESSED OR IMPLIED ON THE PART OF HIGH VOLTAGE, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT; FURTHERMORE, HIGH VOLTAGE MAKES NO WARRANTY REGARDING NON-INTERRUPTION OF USE OR SOFTWARE FREEDOM FROM BUGS. HIGH VOLTAGE NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON, FIRM, OR CORPORATION TO ASSUME ANY LIABILITY OR OBLIGATION IN CONNECTION WITH THIS SALE OR LIMITED WARRANTY ON HIGH VOLTAGE'S BEHALF AND PURCHASER ACKNOWLEDGES THAT NO REPRESENTATION EXCEPT THOSE MADE HEREIN HAS BEEN MADE TO PURCHASER.

10. **RETURNS.** No goods may be returned to High Voltage without High Voltage's prior written permission, which permission may be withheld by High Voltage in its sole discretion. Any request for return authorization must be in writing and include, as applicable, model number, serial number, part number, reason for return, alleged defect, and apparent cause of alleged defect. Except as specifically provided in Section 9 Limited Warranty, if High Voltage consents to return of goods: (a) all return shipments are to be via prepaid freight and with all other charges prepaid, (b) if goods are returned to High Voltage within sixty (60) days from the date of original shipment for reasons other than an error by High Voltage in filling the Purchaser's order, Purchaser shall only be entitled to receive a credit in an amount equal to the payment received by High Voltage for the goods minus (i) handling charges, and (ii) a restocking fee determined solely by High Voltage which shall not exceed twenty five percent (25%) of the invoiced amount, and (c) if goods are returned to High Voltage after sixty (60) days from the date of original shipment for reasons other than an error by High Voltage in filling the Purchaser's order, Purchaser shall only be entitled to receive a credit in the amount equal to the payment received by High Voltage for the goods minus (x) a handling fee, and (y) a restocking fee in excess of twenty five percent (25%) which shall be determined by High Voltage.

11. **SECURITY INTEREST.** In order to induce High Voltage to ship goods without full payment, Purchaser grants a security interest to High Voltage in any and all of Purchaser's right, title and interest in the goods, and Purchaser agrees to comply with any reasonable request of High Voltage to perfect such security interest. Purchaser hereby further authorizes High Voltage to perfect High Voltage's security interest in said goods and consents to filing one or more financing statements without the signature of Purchaser.

12. **ARBITRATION.** Any controversy arising out of or relating to this document, or any breach thereof, including, without limitation, any claim that this document is voidable or void, shall be submitted to final and binding arbitration before, and in accordance with, the Commercial Rules of the American Arbitration Association then in effect, and judgment upon the award may be entered in any court have jurisdiction thereof; provided, however, that this clause shall not be construed to limit any rights which High Voltage may have to apply to any court of competent jurisdiction for equitable, injunctive or provisional relief. This arbitration provision shall be deemed self-executing, and in the event that either party fails to appear at any properly noticed arbitration proceeding, an award may be entered against such party notwithstanding said failure to appear. Such arbitration shall be conducted before a single arbitrator under the aegis of the American Arbitration Association in Columbia County, State of New York. The arbitrator shall have the authority to award expenses to the successful party.

13. **LIMITATION OF LIABILITY.** TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW, AND NOTWITHSTANDING ANYTHING ELSE IN THIS DOCUMENT OR OTHERWISE, INCLUDING THAT HIGH VOLTAGE WAS WARNED THAT DAMAGES WOULD OCCUR OR WERE LIKELY TO OCCUR, HIGH VOLTAGE SHALL NOT BE LIABLE WITH RESPECT TO ANY SUBJECT MATTER OF THIS DOCUMENT UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY FOR (i) ANY AMOUNTS IN EXCESS IN THE AMOUNT PAID TO HIGH VOLTAGE FOR THE PARTICULAR GOODS OR PART THEREOF WHICH GAVE RISE TO THE APPLICABLE CAUSE OF ACTION OR CLAIM, OR (ii) ANY INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOST PROFITS OR LOST OR CORRUPTED DATA, OR (iii) COST OF PROCUREMENT OF SUBSTITUTE GOODS, SOFTWARE, TECHNOLOGY OR SERVICES. HIGH VOLTAGE SHALL HAVE NO LIABILITY FOR ANY FAILURE OR DELAY DUE TO MATTERS BEYOND ITS REASONABLE CONTROL.

14. **SEVERABILITY.** These Terms and Conditions and Limited Warranty are the entire understanding between Purchaser and High Voltage with respect to the subect matter hereof and supersede all prior agreements, dealings and negotiations. No modification, alteration or amendment shall be effective unless made in writing and signed by a duly authorized representative of High Voltage. No waiver of any breach hereof shall be held to be a waiver of any other or subsequent breach. Nothing contained in this document shall be construed as requiring the commission of any act contrary to law. Whenever there is any conflict between any provision of this document and any present or future statute, ordinance or regulation contrary to which the parties have no legal right to contract, the latter shall prevail, but in such event the provision of this document thus affected shall be curtailed and limited only to the extent necessary to bring it within the requirements of the law. In the event that any part, article, section, paragraph, sentence or clause of this document shall be held to be indefinite, invalid or otherwise unenforceable, the entire document shall not fail on account thereof, and the balance of the document shall continue in full force and effect. If any arbitration tribunal or court of competent jurisdiction deems any provision hereof (other than for the payment of money) unreasonable, said arbitration tribunal or court may declare a reasonable modification thereof, and this document shall be valid and enforceable, and the parties hereto agree to be bound by and perform the same as thus modified.

15. **BASIS OF BARGAIN**. Each party recognizes and agrees that the warranty disclaimers and liability and remedy limitations in this document are material, bargained for bases of their agreement and that they have been taken into account and reflected in determining the respective obligations of the parties.

[End]

THE WORLD'S SOURCE FOR HIGH VOLTAGE TEST EQUIPMENT

ADVANCED TEST EQUIPMENT FOR HIGH VOLTAGE PROOF AND PREVENTIVE MAINTENANCE TESTING OF ELECTRICAL APPARATUS

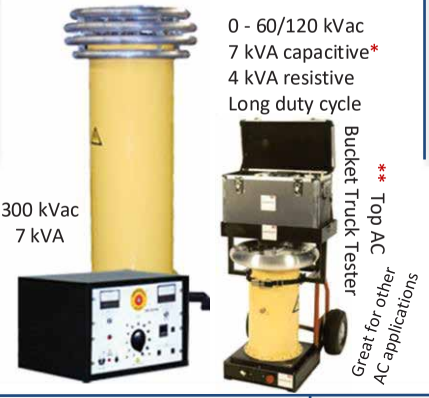
DC Hipot/Megohmmeter Test Sets

Two Testers in One

AC Hipots - Field Portable

Built for Field Use
Portable
Affordable
Rugged & Reliable
Easily Serviceable

Aerial Lift Test Sets - AC



Oil Dielectric Testing

Standard & Micro Controlled

60 kVac & 100 kVac models

60 kVac
.5/2/3 kV/sec
Digital Display

60 kVac
Fully Programmable
Panel Printer

Very Low Frequency AC Technology

Cables & Motors/Generators

0.1 – 0.01 Hz up to 200 kVac

VLF Withstand
VLF TD & VLF PD

200 kVac peak - sine wave
0.1 – 0.02 Hz to 3.75 uF

90 kVac peak - sine wave
0.1 – 0.02 Hz to 2.75 uF

30 kVac
0.4 uF

Many more models avail.

62 kVac peak - sine wave
0.1 – 0.01 Hz to 5.5 uF
Wind Farm Model

** **New Solid State Design**
34 kV peak - sine wave
0.1 – 0.01 Hz to 7 uF

50/60 Hz AC Dielectric Test Equipment: 5 kVA – 50 kVA

AC Testing of High Capacitance Loads – up to 300 kVac

100 kVac
10 kVA
PD <10 pc

5 kVac @ 1 A
Motor Testing

10 kVac @ 10 kVA
Low PD < 10 pc

Concentric Neutral Resistance Tester

Ω-CHECK™

HV Dividers

150 kV AC/DC
300 kV AC/DC

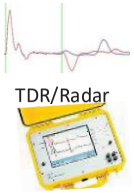
VLF Diagnostic Cable Testing

Tan Delta & Partial Discharge

Capacitor Discharge Systems – Thumpers

Three Full Joule Outputs – VLF/Thumper Combo

Models for URD & Network Systems



HVI Products 10/2015

31 COUNTY RT. 7A, COPAKE, NY 12516 | 518.329.3275 | FAX 518.329.3271 | SALES@HVINC.COM | WWW.HVINC.COM