BIG THUMP FAULT LOCATOR AND HI-MEG D.C. TESTER
OPERATING INSTRUCTIONS

Caution: The output of this unit can be as lethal as a live high voltage AC conductor. Wear insulated safety gloves when connecting or disconnecting the unit to cable and equipment. We recommend that insulated safety gloves be worn while impulse fault locating. **Always externally ground cable and equipment terminals to be sure they are not energized!**

Safety: Standard safety practices must be followed when operating this high voltage equipment. ALWAYS externally ground all cable or equipment terminals before making or breaking connections. Make sure that good ground connections are made to the case of the unit. The high current (100,000 amp) very fast discharge impulse (6 nanosecond rise time) returns to the unit by the lowest impedance path to ground. **Never install or remove the hv test lead unless the on-off lever is in the off-discharge position and the kilovoltmeter reads zero**. A ground relay is provided to prevent this unit from operating when the resistance between the 120/240 volt input line ground, the HV test lead ground clamp, and the case ground exceeds 50 ohms. The 120/240 volt input lines and the case are tied together with varistors so an alternate ground is always available.

General:

1. Prepare cable and equipment by disconnecting it from service and grounding it to insure it is unenergized. ALWAYS externally ground cable and equipment before making and breaking connections. Isolate all terminations with safety tape or barriers so that personnel cannot come in contact with high voltage. Disconnect any accessories such as CT's that cannot withstand the test voltage to be used.

2. Remove the top cover. Open the end storage compartment. Remove the coaxial test lead, ground lead, and the input power cord.

3. Insure that the on-off lever is in the OFF-DISCHARGE position, the variable autotransformer is turned to zero, and the voltmeter reads zero before plugging the test lead into the output test or output impulse socket as required. A slight mechanical resistance will be felt as banana plugs in the HV test lead connector mate. Tighten the wing nut to hold the HV connector in position.

4. Connect the case ground stud to a good ground. Connect the HV test lead ground clamp to the cable neutral or equipment ground and any nearby grounds such as the system neutral. The shield of the HV test lead provides the return path for the impulse and must be grounded to operate the ground relay. If no ground is available at the terminations, run a separate lead to the HV test lead ground clamp from a good ground. The flexible #16 ground lead furnished is suitable for testing, but at least a #10 lead should be used when fault locating.

5. **Follow all company safety practices when connecting or disconnecting the conductor under test**. **Ground** the cable or equipment to insure it is unenergized before connecting or disconnecting. Connect the center conductor of the test lead to the termination of the cable or sample under test. When testing clean all terminations of the cable to prevent surface leakage. When testing above 30kv, it will be necessary to wrap the sharp edges of all terminations of the cable with polyethylene bags, sheet plastic, or glass jars, duct seal, etc., to eliminate corona from the leakage measurements.

6. Set the input selector switch to "240 VOLT INPUT" or "120 VOLT INPUT"
   A. Line - Plug the power cord into a 110 to 280 volt 50 to 600 hertz service with its third ground wire actually connected to a ground with a resistance of less than 50 ohms to the case ground.
   B. Inverter - Connect the battery leads from the inverter to a 12 volt battery with red-positive and black-negative. The negative side of the battery must be grounded for the unit to operate. A high frequency hum indicates the inverter is working. Plug the input line cord into the inverter for power. Due to 20 ampere battery drain while fault locating, leave the vehicle engine operating. Battery drain is only 5 amps while testing.

7. Set the kilovoltmeter range switch for best resolution at the maximum test or discharge voltage selected.

8. After locating the fault or completing the test as described below, pull the on-off lever up for off and discharge. Watch the kilovoltmeter to insure the voltage is zero. Place a solid external ground on the cable. **Follow all company safety practices when disconnecting the test lead from the cable.**

FAULT LOCATING: Decide the best voltage at which the faulted cable should be impulsed or thumped. For 15kv and above rated cable, this would be between 25kv and 30kv. Turn the control gap handle in the storage compartment full clockwise to close. Be sure the test lead is installed in the output impulse socket. Push the on-off lever down. A click will be heard as the ground relay picks up. Turn the variable autotransformer clockwise until the input ammeter reads about 1.5 amps. Open the impulse control gap by turning the handle in the counterclockwise direction until the kilovoltmeter reads the desired voltage upon discharge. A rise and fall of the kilovoltmeter indicates the capacitor is discharging across the fault. Adjust the variable autotransformer until the average current is 1.5 amps for maximum rate. The resistance of a wet or carbonized fault is apt to change for a while as it is pulsed. Therefore during the first 15 minutes or so, adjust the gap and variable autotransformer as necessary to keep the impulse voltage stable. Faults are located by the noise of the discharge that occurs at the point of failure. For direct buried cable, walk the cable listening and feeling for a thump. In rigid conduit, duct or overhead, listen for a ping or a crack.

TESTING: Decide the test voltage to be used. Be sure the test lead is installed in the output test socket. Push the on-off lever down. A click will be heard as the ground relay picks up. Rotate the variable autotransformer clockwise until the test voltage selected is reached. Turn the output current range switch to the lowest range or until the output current meter reads in the upper two thirds of its scale. Hold test voltage on the cable for the specified time. Record test voltage and output current or record megohm resistance.

THE MEGOHM SCALE: Megohms are listed above both the 0-10 and 0-30 scales on the output current meter. To measure megohms resistance with minimum calculation, set the output voltage precisely on a value selected from the chart. Turn the output current range switch to the lowest range or until the output meter reads in the middle or the right third of its scale. Record the megohm reading just above the current scale used and multiply this by the multiplier found on the chart for megohms resistance. As a check, the minimum, center scale, and maximum resistance readings are listed for each range setting.

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VOLTAGE TEST	RANGE SWITCH SETTING	MEGOHM MULTIPLIER UPPER SCALE	MEGOHM MULTIPLIER LOWER SCALE	MAXIMUM OHMS	CENTER OHMS	MINIMUM OHMS
1,000 V	10 mA	.1		10 MEG	200,000	100,000
	3 mA		.1	40 MEG	666,000	333,000
	1 mA	1		100 MEG	2 MEG	1 MEG
	300 mic		1	400 MEG	6.66 MEG	3.33 MEG
	100 mic	10		1,000 MEG	20 MEG	10 MEG
	30 mic		10	4,000 MEG	66.6 MEG	33.3 MEG
	10 mic	100		10,000 MEG	200 MEG	100 MEG
2,500 V	10 mA	.25		25 MEG	500,000	250,000
	3 mA		.25	100 MEG	1.66 MEG	832,000
	1 mA	2.5		250 MEG	5 MEG	2.5 MEG
	300 mic		2.5	1,000 MEG	16.6 MEG	8.32 MEG
	100 mic	25		2,500 MEG	50 MEG	25 MEG
	30 mic		25	10,000 MEG	166 MEG	83.2 MEG
	10 mic	250		25,000 MEG	500 MEG	250 MEG
5,000 V	10 mA	.5		50 MEG	1 MEG	500,000
	3 mA		.5	200 MEG	3.33 MEG	1.66 MEG
	1 mA	5		500 MEG	10 MEG	5 MEG
	300 mic		5	2,000 MEG	33.3 MEG	16.6 MEG
	100 mic	50		5,000 MEG	100 MEG	50 MEG
	30 mic		50	20,000 MEG	333 MEG	166 MEG
	10 mic	500		50,000 MEG	1,000 MEG	500 MEG
10,000 V	10 mA	1		100 MEG	2 MEG	1 MEG
	3 mA		1	400 MEG	6.66 MEG	3.33 MEG
	1 mA	10		1,000 MEG	20 MEG	10 MEG
	300 mic		10	4,000 MEG	66.6 MEG	33.3 MEG
	100 mic	100		10,000 MEG	200 MEG	100 MEG
	30 mic		100	40,000 MEG	666 MEG	333 MEG
	10 mic	1,000		100,000 MEG	2,000 MEG	1,000 MEG
20,000 V	10 mA	2		200 MEG	4 MEG	2 MEG
	3 mA		2	800 MEG	13.3 MEG	6.66 MEG
	1 mA	20		2,000 MEG	40 MEG	20 MEG
	300 mic		20	8,000 MEG	133 MEG	66.6 MEG
	100 mic	200		20,000 MEG	400 MEG	200 MEG
	30 mic		200	80,000 MEG	1,333 MEG	666 MEG
	10 mic	2,000		200,000 MEG	4,000 MEG	2,000 MEG
30,000 V	10 mA	3		300 MEG	6 MEG	3 MEG
	3 mA		3	1,200 MEG	19.9 MEG	9.99 MEG
	1 mA	30		3,000 MEG	60 MEG	30 MEG
	300 mic		30	12,000 MEG	199 MEG	99.9 MEG
	100 mic	300		30,000 MEG	600 MEG	300 MEG
	30 mic		300	120,000 MEG	1,999 MEG	999 MEG
	10 mic	3,00		300,000	6,000 MEG	3,000 MEG