User's Manual

Leakage Current Tester

Model LT-952HC

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www.ProductSafeT.com

!CAUTION!

READ MANUAL BEFORE USING

IMPORTANT NOTE

In order to properly measure leakage current, you are required to isolate the product being tested from ground. Failure to properly isolate the product will result in excessive leakage current, which will open the protective fuse incorporated in the Leakage Current Tester. Be sure that the product under test is isolated! Look for secondary ground paths such as shielded peripheral cables (i.e. cable to a monitor or printer may be shielded). If you cannot disconnect all ground paths (i.e. testing fixed permanently installed equipment), read the special instructions in the Field Testing section of this manual.

A WORD ABOUT SAFETY

Safe operation depends upon you, the operator. We recommend that you follow these simple safety rules:

I) Before using this meter, you should completely understand the Leakage Current ~ Test Requirements as outlined in the Standard for Safety which you are using. While this product will essentially perform the entire test for you, it is extremely important for you to understand all potential safety hazards involved with performing the test.

2) The Leakage Current Test, like many tests required by the Safety Standards, is inherently dangerous and adequate safeguards for personnel and property shall be employed when conducting this test.

3) This product is not intended to be an extension of the branch circuit, or used as an extension outlet. This product is to be used only while performing the Leakage Current Test.

WARNING: WHEN THE GROUND SWITCH IS TOGGLED "OPEN", THE GROUNDING CONDUCTOR TO THE OUTPUT RECEPTACLES (FRONT AND REAR) IS DISCONNECTED FROM THE GROUNDING CONDUCTOR OF THE MAIN CIRCUIT (EARTH GROUND). THIS IS REQUIRED FOR THIS TEST AND ALSO POSES A POTENTIAL B1SK OF ELECTRIC SHOCK! DO NOT TOUCH THE DEVICE UNDER TEST WHEN THE GROUND SWITCH IS "OPEN". FOR THIS REASON, THE GROUND SWITCH IS OF THE MOMENTARY TYPE.

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Introduction

The LT-952HC leakage current tester is a state-of-the-art test instrument designed to measure leakage current in accordance with the new U.S. and International Safety Standards that are based on the new touch current requirements of IEC 990. These standards include UL 2950 / CSA 950 (Bi-National Standard), IEC 950 2nd. edition w/amendments 1&2, and EN60950 2nd. edition w/amendments 1&2. The LT-952HC is designed to make leakage current testing easy! Gone are the jumble of wires necessary to simulate the prescribed test conditions. No more searching for an acceptable meter to use. No more worries about calibration or correlation with the testing agencies. The LT-952HC transforms what was once a one hour ordeal into a quick and simple test.

The features which make the LT-952HC easy to use include:

v Built-in 3-1/2 digit, LCD meter that measures the true RMS value of leakage current. True RMS is important in products where the leakage current is non-sinusoidal as is possible with switch-mode power sup- plies and products which use them.

v Test any single phase product rated 100-120 or 200-240 volts that requires 30 amps or less current.

v True 30 amp open neutral, open ground, and line polarity (forward! reverse) test conditions.

v 120V front panel receptacle provides quick access for testing 120V products at up to 20 Amps. The 30 Amp rear panel receptacle allows easy connection to any product rated 100-120V or 200-240V with any plug configuration, using the appropriate adapter cord-set.

v Front panel access to the internal meter circuit to measure leakage from surface to surface or from surface to reference as required by many safety standards.

v Rear panel jacks provide access to the Body Circuit impedance to observe the wave-shape of the leakage current or to connect a second meter.

v The ability to measure the leakage current of a product through the ground wire of the product's power cord.

v Reference to the meter circuit can be easily switched between Line. Neutral, and Ground as required by the applicable standard(s).

Understanding Leakage Current

A. What Is Leakage Current?

Leakage Current is the amount of current "filtered" to the grounding conductor by filtering components as well as current, which leaks through insulating materials. For a product, which is properly bonded to ground, the leakage current ideally follows this path to ground. However, if the product is not grounded or is improperly grounded, a person contacting the product may become the path of least resistance. If this occurs, the human body becomes the path for the leakage current with the result being dependent upon the level of the current and the person in question.

B. How Is Leakage Current Measured?

In order to measure leakage current, the scenario described above must be created. The worst case exists when the human body is the only path for the leakage current. Therefore, when conducting this test the product is energized with the grounding conductor disconnected and all other possible ground paths isolated.

A meter representing the human body (body impedance model) is then connected between the grounding conductor of the product (or the enclosure) and the grounded conductor of the power system (neutral). The grounded conductor is used rather than earth ground for several reasons, including reliability/repeatability of the test. (Distance from the ground point and other ground currents could affect the test).

> NOTE: In some field testing situations, where the product is reliably connected to ground through the building structure (i.e. mounted to a grounded pad, or connected to grounded water pipes, etc.), it may be appropriate to measure the leakage current in the grounding conductor or from any exposed surfaces to ground. (Refer to "Field Testing Grounded Products", chapter 2, for additional details.)

During this test, the unit is energized and any switches within the product control- ling primary power and likely to be operated in normal use are opened and closed in all possible combinations. Since the amount of leakage current is proportional to the supply voltage, this test is typically done at the product's maximum rated input voltage.

C. The Human Body Model

As indicated above, a meter is used which represents the human body. This means that a meter is used, which has a calibrated impedance correlating to the impedance of the human body. Extensive tests have been done to approximate the impedance of the human body. These tests have shown that in different environments, with the user subjected to different physical situations, the body impedance differs.

It should be noted that most of the body impedance is a result of skin resistance. Therefore, in cases where a persons' skin is likely to be cut (such as in a hospital), the human body resistance model may be different. Also, moisture lowers the skin resistance. Most Standards deal with this by lowering the leakage current limit for hand held products and products that may be exposed to moisture. Also, it has been proven that the perception to shock (threshold of perception) is directly related to frequency and therefore, different body impedance models may be used when testing products whose leakage current contains significant high frequency leakage.

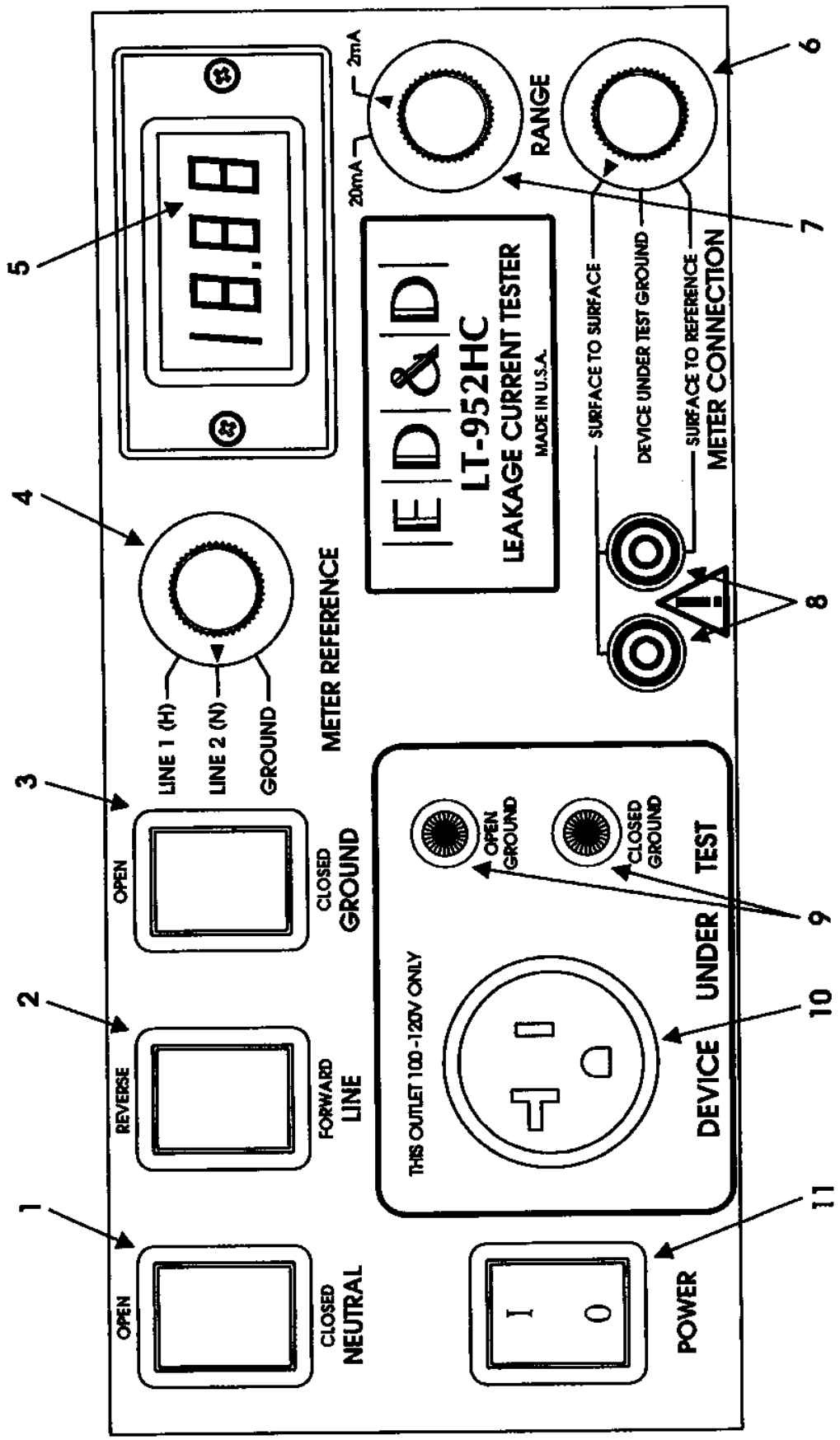
D. Leakage Current Limits

The limits for leakage current vary among Standards. Depending upon the environment the product is used in and assumptions concerning the user, different limits may be imposed. While the limits are imposed to minimize the Risk of Shock to the user, they are also established to limit the reaction by the user. This is important to emphasize because many people assume the limits are only for minimizing injury from electric shock. Although currents in the low milliampere range can cause injury or death in children and some adults, currents in these ranges can also cause involuntary reactions which cause injury. In other words, a

person may touch a product and receive an unexpected shock which in itself does not cause injury but which causes the person to react in a manner which causes injury.

Glossary and Symbol Definitions

D.U.T	Device Under Test
Body Circuit	A Resistance/Capacitance network which simulates the average human body impedance.
Risk of Shock	The voltage level which is considered to be hazardous. Most Safety Standards set the Shock Hazard Level as greater than 30 Vrms or 42.4 Vp. Some standards permit up to 60 VDC. Check your standard for the voltage level considered hazardous for your product category.
Surface	A conductive, operator accessible part that can be a source of leakage current.
	The triangle with the fuse rating information inside is the international symbol to indicate replace only with the same type and ratings of fuse. Se the "Maintenance" Section for fuse replacement information.
	The triangle with the exclamation point inside is the international symbol indicating a potential Risk of Shock. This symbol is located adjacent to all banana jacks. See Front and Rear panel Descriptions for additional details.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2
3
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7
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10
11
OPEN
CLOSED
NEUTRAL
REVERSE
FORWARD
LINE
OPEN
CLOSED
GROUND
LINE 1 (H)
LINE 2 (N)
GROUND
METER REFERENCE
18.88
2mA
20mA
RANGE
E|D&D
LT-952HC
LEAKAGE CURRENT TESTER
MADE IN U.S.A.
SURFACE TO SURFACE
DEVICE UNDER TEST GROUND
SURFACE TO REFERENCE
METER CONNECTION
OPEN GROUND
CLOSED GROUND
TEST
THIS OUTLET 100-120V ONLY
DEVICE UNDER
I
O
POWER

Chapter 1: Product Description

FRONT PANEL DESCRIPTION

1) NEUTRAL SWITCH - Controls the connection of the incoming neutral line to the product under test. This switch allows the neutral to be disconnected. With 240-volt operation, this switch disconnects one side of the 240-volt line (Line 2).

2) LINE SWITCH - Controls the connection of the incoming line and neutral conductors to the product under test. This switch allows the line and neutral polarity to be reversed. With 240-volt operation, this switch swaps both sides of the 240-volt line.

3) GROUND SWITCH - Controls the connection of the incoming ground line to the product under test. This switch allows the grounding conductor of the product under test to be disconnected. The red Ground Open light illuminates signaling the potential for danger, which exists when the product ground is disconnected. The momentary ground switch must be toggled to OPEN in order to isolate the ground at the D.U.T. output receptacles.

4) METER REFERENCE SWITCH - This switch controls the connection of one side of the meter measurement circuit to either Line 1 (Hot), Line 2 (Neutral), or Ground. .

5) METER DISPLAY - 3-1/2 digit LCD display that measures the true RMS value of leakage current.

6) METER CONNECTION SWITCH - Controls the connection of the meter measurement circuit to the product under test in the following manner:

> **Surface To Surface** - This selection connects both sides of the meter measurement circuit to the front panel banana jacks. Leads connected to these jacks are used for measuring the leakage between any two surfaces on the product under test.
>
> **Device Under Test Ground** - This selection connects the device under test ground to one side of the meter measurement circuit. The other ~ side of the meter measurement circuit is connected to the meter reference. The momentary Ground Switch must be toggled to OPEN while making measurements to complete the connection. This setting is used to measure leakage via the product's supply cord grounding lead.
>
> **Surface To Reference** - This selection connects one side of the meter measurement circuit to one front panel banana jack for connection to the measurement surface. The other side of the meter measurement circuit is connected to the meter reference. This connection is used to measure the leakage between an exposed metal surface and the meter reference point.

7) METER RANGE SWITCH - This Switch controls the sensitivity of the meter circuit. The meter can be set to either 0-2 or 0-20 mA full-scale range. .

8) BANANA JACKS - Allows external connection to the meter measurement circuit as described under the "Meter Connection Switch", item 6.

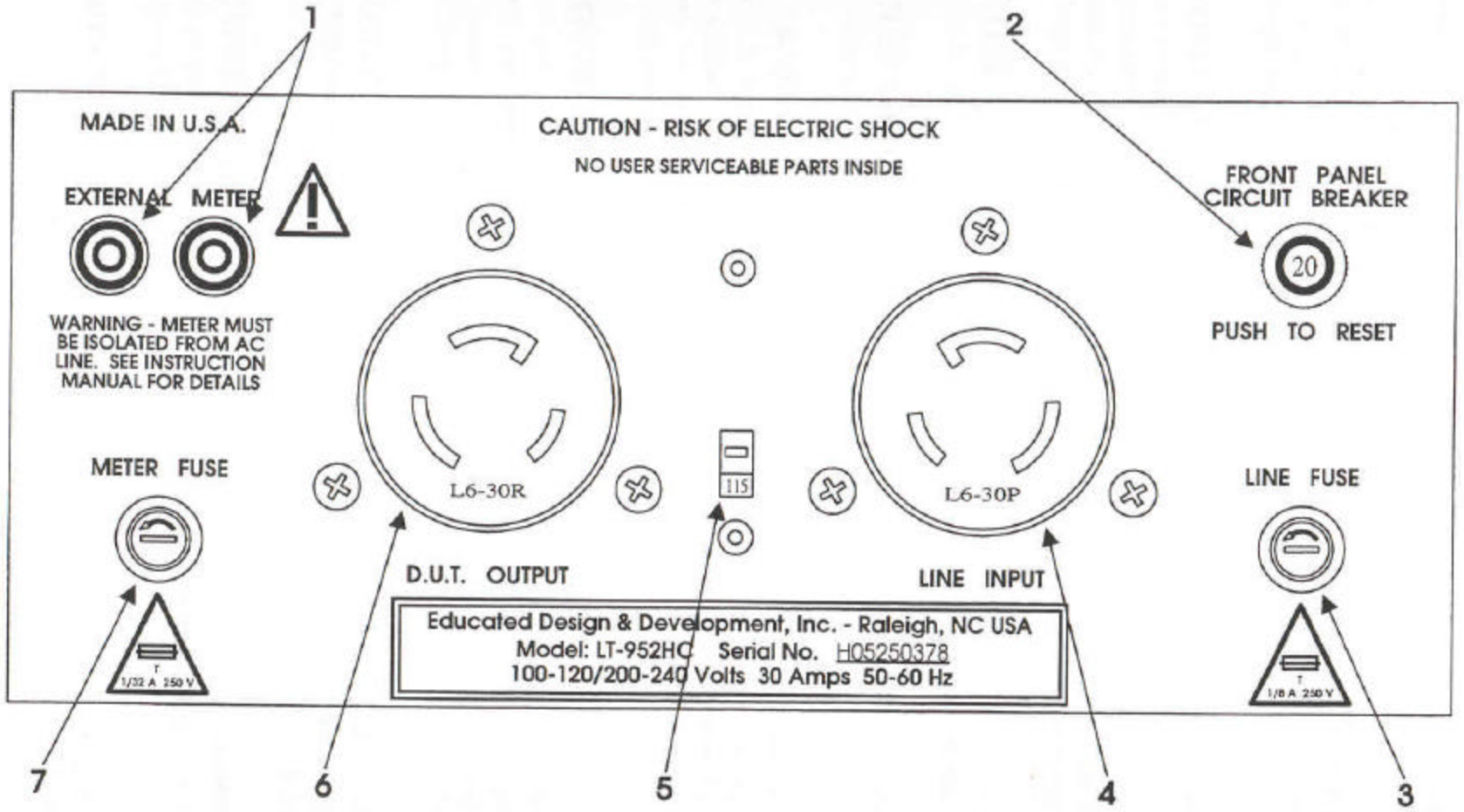
> **WARNING!** - Hazardous voltage exists at the banana jacks when the - Meter Reference Switch is set to Line and the LT-952HC is set for 115 volt operation. Hazardous voltage also exits at the banana jacks when the Meter Reference Switch is set to Line or Neutral and the LT-952HC is set for 230 volt operation.

9) GROUND INDICATORS - The Open Ground and Closed Ground indicators continuously display the state of the grounding conductor to the product under test. The Open Ground indicator is colored red to signal possible danger in that the product's safety ground has been defeated. The green Closed Ground indicator signals that the grounding conductor to the product under test is intact.

10) D.U. T. OUTLET - Provides a convenient way to connect 120-volt products to the L T-952. There is no need for a rear panel cord-set adapter. For safety, this outlet is disabled when the L T-952 is set for 240-volt operation.

11) POWER SWITCH - This switch controls power to the internal circuitry of the LT-952HC and the D.U.T. When the switch is ON, the meter display should be visible and the green Ground Closed lamp should be lit.

> **CAUTION!:** The line 1 (Hot) conductor of the rear panel D.U.T. output connector is energized at all times when the LT-952HC is connected to a power source!


1
2
MADE IN U.S.A.
CAUTION - RISK OF ELECTRIC SHOCK
NO USER SERVICEABLE PARTS INSIDE
EXTERNAL METER
FRONT PANEL
CIRCUIT BREAKER
20
PUSH TO RESET
WARNING - METER MUST BE ISOLATED FROM AC LINE. SEE INSTRUCTION MANUAL FOR DETAILS
L6-30R
115
L6-30P
METER FUSE
LINE FUSE
D.U.T. OUTPUT
LINE INPUT
Educated Design & Development, Inc. - Raleigh, NC USA
Model: LT-952HC Serial No. H05250378
100-120/200-240 Volts 30 Amps 50-60 Hz
7
6
5
4
3

REAR PANEL DESCRIPTION

1) EXTERNAL METER JACKS - These banana jacks allow direct access to the Body Impedance Network. This is used for connecting an external meter or for observing the wave-shape of the leakage current with a scope.

> **WARNING!** - Because these terminals are connected to the Body Impedance Network, hazardous voltages may exist on one or both jacks.
>
> **WARNING! -** Any external equipment connected to these jacks must be electrically isolated from the AC line. Failure to do so can result in damage to the LT-952HC or the connected equipment.

2) FRONT PANEL CIRCUIT BREAKER- This circuit breaker supplies 20 Amp overcurrent protection to the front panel outlet when the LT-952HC is connected to a 120 Volt 30 Amp source.

3) LINE FUSE - The line fuse protects the LT-952HC from power surges and from inadvertent connection to a 240-volt source when the Voltage Selector Switch is set to 115 Volts

4). LINE INPUT CONNECTOR - This standard IEC 320 connector is designed to connect the LT-952HC to the power source (mains). The LT-952HC can be powered by any power source of 100-120 or 200-240 Volts at up to 15 Amps by using the proper cord-set.

5) VOLTAGE SELECT SWITCH - This switch configures the LT-952HC to run off of either 100-120 or 200-240 V AC. The switch must be set to the proper position before power is applied to the LT-952HC.

6) D.U. T. OUTPUT CONNECTOR - This standard IEC 320 connector is designed to connect the LT-952HC to the product under test. This is normally used for products requiring 200-240 Volts. Connection can be made to any plug configuration by using the appropriate cord-set.

> **CAUTION!:** The line 1 (Hot) conductor of the rear panel D.U. T. output connector is energized <u>at all times</u> when the LT-952HC is connected to a power source!

7) METER FUSE - The meter fuse is designed to protect the LT-952HC's sensitive meter measurement circuit from damage in cases of overload.

Chanter 2: Using the LT-952HC

This chapter will explain the proper use of the LT-952HC. First we will show how to perform leakage measurements through the product under test's power cord grounding conductor. We will then show how to measure leakage current from surface to ground or neutral and between surfaces. All of these tests generally need to be run to test compliance with most safety standards such as UL, CSA, IEC, and ANSI. As such, they assume the product is completely isolated from ground. Finally we will show how to measure leakage current in field-testing situations' where the product cannot be isolated from ground.

For these examples, we will assume that the product under test is a 120 Volt cord connected piece of equipment that is being tested for compliance. Please refer to the particular standard you will be testing to for complete testing specifics. Some of these procedures may be different or may not apply.

Measuring Through the D.U. T. Power Cord Ground

1. Isolate the product under test from ground. This can be accomplished by placing the product on an insulated surface. This may also include disconnecting any accessory cables connected to the product under test (i.e. a shielded monitor or printer cable).

2. To verify that there are no other grounds to the equipment under test, connect an ohmmeter between the ground pin on the product under test and the power system ground. Readings of close to 0 ohms indicate the presence of an extraneous ground, which needs to be removed. This step can probably be omitted for simple test setups. The only penalty for an extraneous ground may be a blown meter fuse in the LT-952HC.

3. Secure the work area so that yourself or another person cannot accidentally come into contact with the product during testing. Since the product ground is disconnected while the Ground switch is toggled OPEN, the product under test poses a potential shock hazard.

4. Set the controls on the LT-952HC as follows:

Voltage selector	115
Power	OFF
Neutral	CLOSED
Line	FORWARD
Meter Connection	NEUTRAL
D.U.T.	D.U.T. GROUND
Range	20 mA

5. Connect the product under test to the front panel receptacle. Make sure that the product under test's power switch is ON.

6. Turn the Power switch of the LT-952HC to ON. Observe that the leakage indicated on the LT-952HC is ZERO! This is normal as the leakage current is flowing through the still connected product ground.

7. To measure leakage, depress and hold the Ground switch to the OPEN position. If the displayed result is less that 2 mA, change the Range switch to the 2 mA position.

8. The Safety standard will usually specify that the measurement taken in step 7 be repeated for each position of the products power switch and with all combinations of the "Neutral" and "Line" switches on the LT-952HC. Be sure to release the Ground switch before changing any of the test conditions (Line or Neutral switches). Failure to do so may result in blown meter fuses on the LT-952HC.

Surface to Reference Leakage Measurement Procedure

1. Isolate the product under test from ground. This can be accomplished by placing the product on an insulated surface. This may also include disconnecting any accessory cables connected to the product under test (i.e. a shielded monitor or printer cable).

2. To verify that there are no other grounds to the equipment under test, connect an ohmmeter between the surface to be tested and the power system ground. Readings of close to 0 ohms indicate the presence of an extraneous ground, which needs to be removed. This step can probably be omitted for simple test setups. The only penalty for an extraneous ground may be a blown meter fuse in the LT-952HC.

3. Secure the work area so that yourself or another person cannot accidentally come into contact with the product during testing. Since the product ground is disconnected while the Ground switch is toggled OPEN, the product under test poses a potential shock hazard.

4. Set the controls on the LT-952HC as follows:

Voltage Selector	115
Power	OFF
Neutral	CLOSED
Line	FORWARD
Meter Reference	NEUTRAL
Meter Connection	SURFACE TO REFERENCE
Range	20 mA

5. Connect the product under test to the front panel receptacle. Make sure that the product under test's power switch is ON.

6. Connect a test lead from the right front panel banana jack on the LT-952HC to the surface to be tested on the product.

7. Set the Power switch of the LT-952HC to ON. Observe that the leakage indicated on the LT-952HC is ZERO! This is normal as the leakage current is flowing through the still connected product ground.

8. To measure the true leakage, depress and hold the Ground switch to the OPEN position. If the displayed result is less than 2 mA, change the Range switch to the 2 mA position.

9. The safety standard will usually specify that the measurement taken in step 8 be repeated for each position of the products power switch and with all combinations of the Neutral and Line switches on the LT-952HC. Be sure to release the Ground switch before changing any of the test conditions (Line or Neutral switches). Failure to do so may result in blown meter fuses on the LT-952HC.

Surface to Surface Leakage Measurement Procedure

1. Isolate the product under test from ground. This can be accomplished by placing the product on an insulated surface. This may also include disconnecting any accessory cables connected to the product under test.

2. Secure the work area so that yourself or another person cannot accidentally come into contact with the product during testing. Since the product ground is disconnected while the Ground switch is toggled OPEN, the product under test poses a potential shock hazard.

3. Set the controls on the LT-952HC as follows:

Voltage Selector	115
Power	OFF
Neutral	CLOSED
Line	FORWARD
Meter Reference	n/a – setting has no effect
Meter Connection	SURFACE TO SURFACE
Range	20 mA

4. Set the Power switch of the LT-952HC to ON.

5. Connect the product under test to the front panel receptacle. Make sure that the product under test's power switch is ON.

6. Connect the test leads from the front panel banana jacks on the LT-952HC to the two surfaces to be tested on the product.

7. If the displayed result is less than 2 mA operate the Range switch to the 2 mA position.

8. The safety standard will usually specify that the measurement taken in step 7 be repeated for each position of the products power switch and with all combinations of the Neutral and Line switches on the LT-952HC. Be sure to release the Ground switch before changing any of the test conditions (Line or Neutral switches). Failure to do so may result in blown meter fuses on the LT-952HC.

Field Testing Grounded Products

(Products which cannot be isolated from earth ground)

These instructions will indicate how to measure leakage current when the device under test (D.U.T.) cannot be isolated from ground. This can be the case when conducting tests in the field since the D.U.T. may be reliably connected to ground through the building structure (i.e. mounted to a grounded pad, or connected to grounded water pipes, etc.).

Please read the section "Understanding Leakage Current" before proceeding. You will note that in order to measure the entire leakage current of a product, the product must be completely isolated from ground. However, in a field-testing situation, you may only be concerned with the leakage current through the grounding lead. Remember, the reason the product is isolated is to simulate the worst-case situation where the product is not reliably grounded and therefore the human body is subjected to the entire leakage current. If you are at the installation site and you can verify that the product is reliably grounded, you may not be concerned with the overall leakage current with the product completely isolated.

Rather, you may only want to know if there is extraneous leakage current from an operator surface which could present a shock hazard. Or, you may want to measure the current in the main grounding conductor after servicing the product. In order to make such measurements, refer to the previous instructions for Surface to Surface, Surface to Reference, and D.U.T. grounding conductor to reference.

> **WARNING: WHEN TESTING A PRODUCT WHICH CANNOT BE ISOLATED, ALWAYS SET THE METER REFERENCE SWITCH TO GROUND. SETTINGS OTHER THAN GROUND, WHEN THE DEVICE UNDER TEST IS NOT ISO LATED, CAN RESULT IN LINE VOLTAGE BEING APPLIED ACROSS THE METER MEASUREMENT CIRCUIT. THE RESULT IS EXCESSIVE CURRENT THROUGH THE METER WHICH CAN CAUSE THE METER FUSE TO BLOW.**

The Meter Reference switch can be set to neutral (line 2) when testing at 120 VAC with a grounded neutral.

Chapter 3: Specifications

Operating Ranges:

Range	Resolution	Accuracy
0 - 2 mA	1.0 uA	1%
0-20mA	0.01 mA	1%

Display: *3-1/2* Digit LCD display

Measurement Method: True RMS Responding Meter

Construction: All Metal Case

Size: *11-1/2"* wide by *5-1/4"* tall by *13-1/2"* deep

Weight: 13 lbs. (6 Kg)

Input Ratings:

Voltage	**Amperes**	**Frequency**
100 - 120 VAC	30A	50/60 Hz
200 - 240 VAC	30A	50/60 Hz

Output Ratings: Same as input ratings

Body Circuit Impedance: Precision network in accordance with UL *2950 /* CSA 950 (Bi-National Standard), IEC 950 2nd. edition w/amendments 1&2, and EN60950 2nd. edition w/amendments 1&2 (See Chapter 4).

Meter Measurement Reference: Allows the meter reference point to be set at:
- Line 1 (Hot)
- Line 2 (Neutral @ 120V AC)
- Ground

Meter Connection Selector Switch: Allows the meter measurement point to be selected as either:

- Through the products power cord grounding conductor,
- From an exposed surface to the meter reference point, or
- Between two exposed surfaces.

Chapter 4: Theory of Operation

This section of the manual contains a description of the circuitry used in the LT 952. During this discussion, please refer to the Block Diagram located following this section.

The LT-952HC is composed of 3 major sections. The first is the AC current switching section. The second is the meter measurement section, and the third is the low voltage power supply.

High Current Switching Circuit

The AC Current Switch section consists of the rear panel incoming power connector, and both front and rear panel D.U.T. outlets. This section also contains the Test Condition, Ground Switching, and 120 Volt Disconnect blocks.

Test Condition Simulator

This section is composed of 2 switches. The first, a SPST type, is used to simulate an open neutral condition. The second switch, a DPDT type, is used to physically reverse the hot and neutral wires to the product under test.

Ground Switching

A momentary SPDT switch is used to perform the ground switching function. In the normally closed position, the ground from the incoming power line is connected to the front and rear panel output receptacles. When the switch is toggled to the OPEN position the ground lead of the product under test is routed to the meter connection selector.

120-Volt Automatic Disconnect

Another power relay, a DPST type, is used to disconnect the front panel 120 Volt outlet when the rear panel voltage selector is set to 230 Volt operation. If 240 volts is accidentally applied to the LT-952HC while the voltage selector is set to 115, the line fuse is designed to open which will cause the relay contacts to open.

Meter Measurement Circuit

The Meter Measurement Circuit contains the electronics to convert low-level leakage currents in the microamp range into numbers that can be displayed on the front panel display. The meter Measurement Circuit contains the Meter Reference, Meter Connection, Body Circuit, Meter Range & Scaling, RMS to DC Converter, and Analog to Digital Converter blocks.

Meter Reference

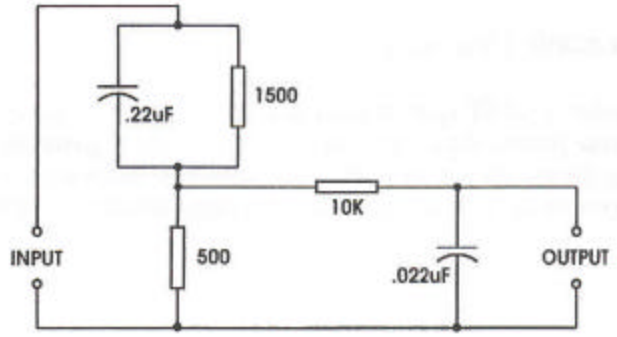
The meter reference circuit consists of the SP3T front panel Meter Reference switch. This switch selects between line, neutral, and ground references and sends the selected reference to the meter connection circuit.

Meter Connection

The meter connection circuit receives inputs from the front panel banana jacks, meter reference switch, and ground switching circuit. The front panel Meter Connection switch, a DP3T type, is used to select between the various inputs. The 3 possible meter connections are D.U.T. ground to reference, surface to reference, and surface to surface. The selected connection is then sent to the Body Circuit.

Body Circuit

The Body Circuit is composed of a precision resistance/capacitance network as shown below. The meter connection is such that the leakage current flows through the input section of the network. The rear panel Extemal Meter jacks are also connected in parallel with the input section of the network.



Meter Range & Scaling

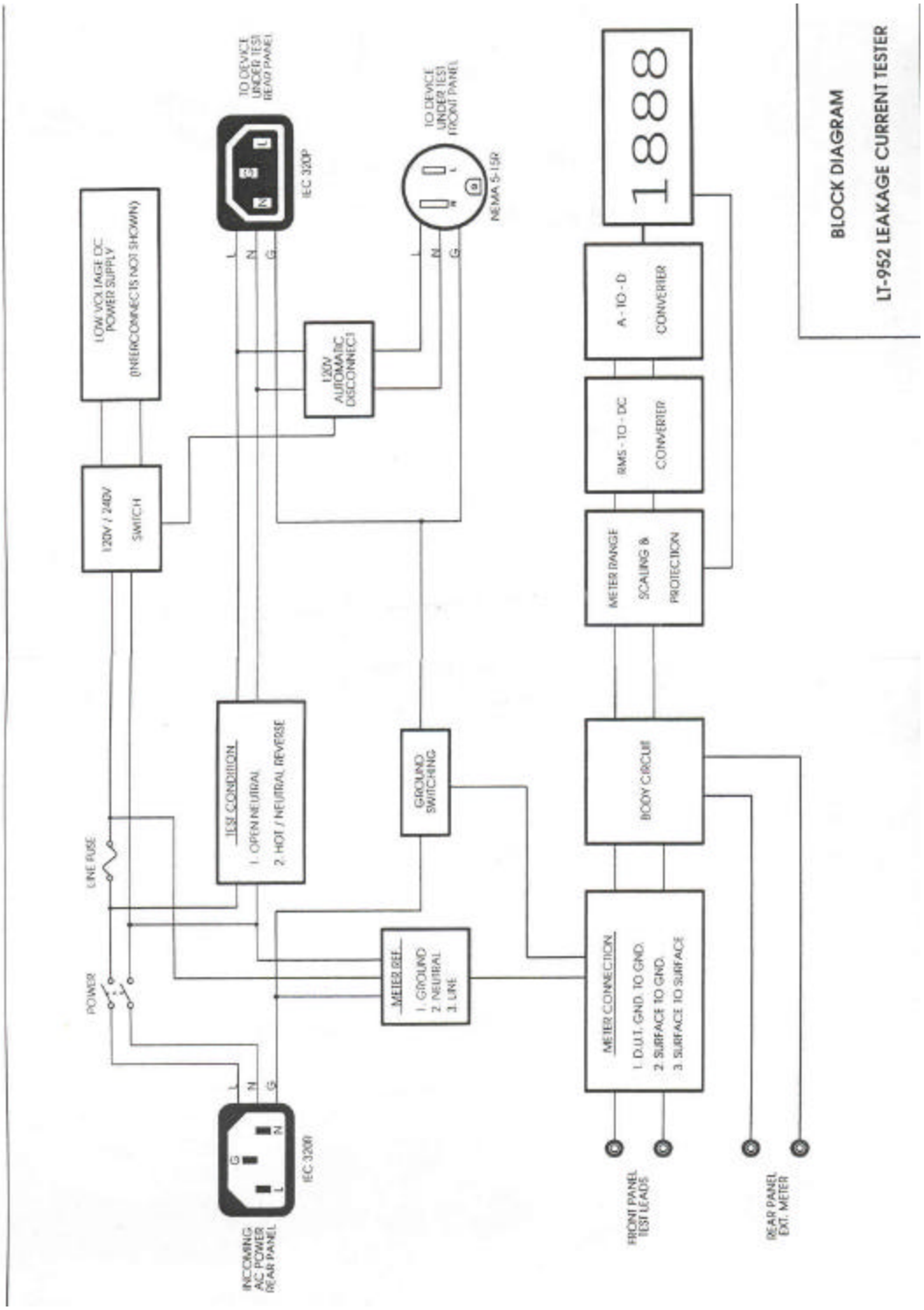
The voltage across the body circuit, which is proportional to the leakage current, is sent to the Meter Range & Scaling block. This output is then sent to a Xl or X10 attenuator which is controlled by the front panel Range switch. The output of the Range switch is connected to the RMS - DC converter.

RMS to DC Converter

This section is composed of a circuit that computes the true RMS value of the input waveform. The output of this circuit is a DC voltage that is directly proportional to the RMS value of the input.

Analog to Digital Converter

This section converts the output of the RMS to DC converter to a visible display on the LCD panel. This circuit drives the LCD display directly.


BLOCK DIAGRAM
LT-952 LEAKAGE CURRENT TESTER
1888
A - TO - D CONVERTER
RMS - TO - DC CONVERTER
METER RANGE SCALING & PROTECTION
BODY CIRCUIT
METER CONNECTION
1. D.U.T. GND. TO GND.
2. SURFACE TO GND.
3. SURFACE TO SURFACE
FRONT PANEL TEST LEADS
REAR PANEL EXT. METER
GROUND SWITCHING
METER REF.
1. GROUND
2. NEUTRAL
3. LINE
TEST CONDITION
1. OPEN NEUTRAL
2. HOT / NEUTRAL REVERSE
LINE FUSE
POWER
120V / 240V SWITCH
LOW VOLTAGE DC POWER SUPPLY
(INTERCONNECTS NOT SHOWN)
120V AUTOMATIC DISCONNECT
INCOMING AC POWER REAR PANEL
IEC 320P
IEC 320R
TO DEVICE UNDER TEST REAR PANEL
TO DEVICE UNDER TEST FRONT PANEL
NEMA 5-15R

Chapter 5: Maintenance

This instrument contains no user serviceable parts. A special calibration sticker is provided. Removal of the calibration sticker will void the required calibration as well as the warranty.

Fuse Replacement

WARNING: For continued protection against a risk of fire, replace only with the same type and rating of fuse.

Line Fuse:
LittleFUSE Slo-Blo, rated 1/8A, 250VAC or,
Bussman MDL, rated 1/8A, 250VAC

Meter Fuse:
Bussman MDL, rate 1/32A, 250VAC

Warning !

NO USER SERVICIABLE PARTS
ALL SERVICE BY
QUALIFIED SERVICE
PERSONNEL ONLY

Chapter 6: TROUBLESHOOTING

This chapter contains answers to the most frequent questions or problems that can be encountered during the use of the LT-952HC. Please read this section in its entirety before contacting ED&D for assistance.

Problem: The meter fuse blows

Solution: Check to make sure the fuse is correct type and rating as indicated in the Maintenance Section of the manual.

Solution: The device under test is inadvertently grounded through another connecting cable. This happens frequently when testing computers. The extra ground can come from the monitor or other cord connected peripherals. To avoid another blown fuse, it may be helpful to verify that there are no extra grounds by measuring with an ohmmeter before trying to measure leakage.

Solution: The device under test is connected to earth ground through the mounting means or from connection to a grounded water pipe. This can be the case when testing stationary cord connected equipment. If this is the case, please refer to "Field Testing Grounded Products".

Solution: Do not change test conditions while holding the Ground switch in the open position. This causes momentary transients which will blow the fuse. Depress the Ground switch only long enough to make a measurement.

Problem: The front panel AC receptacle is dead.

Solution: The front panel receptacle is designed to be disabled whenever the LT-952HC is connected to a 240 volt source. Check the position of the rear panel Voltage Selector switch.

Solution: The rear panel circuit breaker has tripped due to an overload. Reset the circuit breaker. Verify that the input current to the device under test does not exceed 20 Amps when using the front panel receptacle.

Solution: The neutral switch is set to OPEN.

Problem: The meter on the LT-952HC indicates a single "1" with the remaining 3 digits blanked.

Solution: This indicates an overrange condition. Switch to the higher 20 mA range. If already on the 20 mA range, the product under test has excessively high leakage or, there is a ground path from the device under test (possibly via an accessory cable).

Problem: The meter display is blank and the Ground Closed indicator does not light when the LT-952HC is turned on.

Solution: Check to make sure that the LT-952HC is receiving power and that the Voltage Selector switch is in the proper position. Check the Line Fuse on the LT-952HC.

Problem: The Line fuse on the LT-952HC blows.

Solution: Check to make sure the fuse is the correct type and rating as indicated in the Maintenance Section of the manual.

Solution: Verify that the rear panel voltage selector switch is in the proper position. The Line fuse is designed to blow if the LT-952HC is connected to 230 Volts and the Voltage Selector switch is set to 115. If the Voltage Selector switch is set to the proper position and the fuse still blows, the LT-952HC has been damaged and should be returned to ED&D for repair.

Problem: The LT-952HC always seems to measure near zero leakage when measuring leakage surface to reference.

Solution: The momentary Ground switch on the LT-952HC must be toggled to OPEN. Otherwise the leakage current is effectively shunted around the meter circuit to the ground.

Chapter 7: Calibration Information

The recommended calibration intervals are as follows:

6 Months – If the LT-952HC is being used in an environment where it is subject to vibration and frequent changes in temperature (i.e. field testing).

12 Months – If the LT-952HC is being used in a laboratory or production setting with a controlled environment.

Due to specialized equipment required, the LT-952HC should be returned to ED&D or an ED&D approved facility for calibration.

Warning !

NO USER SERVICIABLE PARTS

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Chapter 8: Technical Support

FREE

TECHNICAL SUPPORT

Please refer to Chapter 6: Troubleshooting Section before calling.

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