OPERATION AND SERVICE MANUAL

MODEL 8104 OMNIA 4
MODEL 8105 OMNIA 5
MODEL 8106 OMNIA 6
Electrical Safety Compliance Analyzer

AC/DC HIPOT WITH INSULATION RESISTANCE TESTER, GROUND BOND, CONTINUITY TESTER AND RS-232 INTERFACE

8105 INCLUDES RUN TEST
8106 INCLUDES RUN TEST AND LINE LEAKAGE TEST

SERIAL NUMBER

Models

8104/8105/8106

Item 38550   *Ver 1.12*

Printed Sept. 12, 2006

$C\epsilon$ DECLARATION OF CONFORMITY

Manufacturer: Associated Research, Inc.

Address: 13860 W. Laurel Dr.
Lake Forest, IL 60045   USA

Product Name: OMNIA® Electrical Safety Compliance Analyzer

Model Number: 8104/8105/8106

Conforms to the following Standards:

Safety: EN 61010-1:2001
EN 61010-031:2002

EMC: EN 61326:1997 + A1:1998
(EN 55022:1998/A1:2000 Class A,
EN 61000-3-2:2000,
EN 61000-3-3:1995/A1:2001,
EN 61000-4-2:1995, EN 61000-4-3:1996,
EN 61000-4-4:1995, EN 61000-4-5:1995,
EN 61000-4-6:1996, EN 61000-4-8:1993,
EN 61000-4-11:1994)

Supplementary Information

*The product herewith complies with the requirements of the **Low Voltage Directive 73/23/EEC as amended by 93/68/EEC** and the **EMC Directive 89/336/EEC as amended by 92/31/EEC**.*

The CE marking has been affixed on the device according to article 10 of the EMC Directive 8/336/EEC.

The technical file and other documentation are on file with Associated Research, Inc.

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Joseph Guerriero
Vice President / General Manager

Associated Research, Inc.
Lake Forest, Illinois USA
October 11, 2004

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1. Introduction
1.1. Warranty Policies

Associated Research, Inc., certifies that the instrument listed in this manual meets or exceeds published manufacturing specifications. This instrument was calibrated using standards that are traceable to the National Institute of Standards and Technology (NIST).

Your new instrument is warranted to be free from defects in workmanship and material for a period of (1) year from date of shipment. You must complete the on-line registration at www.asresearch.com/register or call 1-800-858-TEST ext. 210 to register over the phone

5-Year Program
AR recommends that your instrument be calibrated on a twelve-month cycle. Instruments purchased and used in North America only, may have their warranty extended in one year increments to a maximum of **(5) years** provided they are returned to AR at least **annually** for calibration and inspection. The annual calibration and inspection must be performed annually every year following receipt of instrument. Any instrument not calibrated and inspected annually will not be eligible for extended warranty status. This extended warranty is non-transferable and is offered only to the original purchaser. A return material authorization (RMA) must be obtained from AR before returning this instrument for warranty service. Please contact our Customer Support Center at 1-800-858-TEST (8378) to obtain an RMA number. It is important that the instrument is packed in its original container for safe transport. If the original container in not available please contact our customer support center for proper instructions on packaging. Damages sustained as a result of improper packaging will not be honored. Transportation costs for the return of the instrument for warranty service must be prepaid by the customer. AR will assume the return freight costs when returning the instrument to the customer. The return method will be at the discretion of Associated Research.

3-Year Program
A 3-Year warranty is also available for instruments purchased and used in North America. All costs for this warranty are paid with the initial purchase and include warranty coverage, annual calibration and standard ground return freight for three years. However, unlike our 5-year program annual calibration and inspection by Associated Research is not required.

Except as provided herein, Associated Research makes no warranties to the purchaser of this instrument and all other warranties, express or implied (including, without limitation, merchantability or fitness for a particular purpose) are hereby excluded, disclaimed and waived.

Any non-authorized modifications, tampering or physical damage will void your warranty. Elimination of any connections in the earth grounding system or bypassing any safety systems will void this warranty. This warranty does not cover batteries or accessories not of Associated Research manufacture. Parts used must be parts that are recommended by AR as an acceptable specified part. Use of non-authorized parts in the repair of this instrument will void the warranty.

1.2. Safety Symbols

1.2.1. Product Marking Symbols

⚠ Product will be marked with this symbol when it is necessary to refer to the operation and service manual in order to prevent injury or equipment damage.

⚡ Product will be marked with this symbol when hazardous voltages may be present.

⏚ Product will be marked with this symbol at connections that require earth grounding.

1.2.2. Caution and Warning Symbols

WARNING Calls attention to a procedure, practice, or condition that could possibly cause bodily injury or death.

CAUTION Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data

1.3. Glossary of Terms

(As used in this manual)

Alternating Current, AC: Current that reverses direction on a regular basis, commonly in the U.S.A. 60 per second, in other countries 50 times per second.

Breakdown: The failure of insulation to effectively prevent the flow of current sometimes evidenced by arcing. If voltage is gradually raised, breakdown will begin suddenly at a certain voltage level. Current flow is not directly proportional to voltage. Once breakdown current has flown, especially for a period of time, the next gradual application of voltage will often show breakdown beginning at a lower voltage than initially.

Conductive: Having a volume resistivity of no more than 10^3 ohm-cm or a surface resistivity of no more than 10^5 ohms per square.

Conductor: A solid or liquid material which has the ability to let current pass through it, and which has a volume resistivity of no more than 10^3 ohm-cm.

Current: The movement of electrons through a conductor. Current is measured in amperes, milliamperes, microamperes, nanoamperes, or picoamperes. Symbol = **I**

Dielectric: An insulating material that is positioned between two conductive materials in such a way that a charge or voltage may appear across the two conductive materials.

Direct Current, DC: Current that flows in one direction only. The source of direct current is said to be polarized and has one terminal that is always at a higher potential than the other.

Hipot Tester: Common term for dielectric-withstand test equipment.

Hypot®: Registered trademark of Associated Research, Inc., for its dielectric-withstand test equipment.

Insulation: Gas, liquid or solid material which has a volume resistivity of at least 10^{12} ohm-cm and is used for the purpose of resisting current flow between conductors.

Insulation Resistance Tester: An instrument or a function of an instrument capable of measuring resistance's in excess of 200 megohms. Usually employs a higher voltage power supply than used in ohmmeters measuring up to 200 megohms.

Leakage: AC or DC current flow through insulation and over its surfaces, and AC current flow through a capacitance. Current flow is directly proportional to voltage. The insulation and/or capacitance are thought of as a constant impedance, unless breakdown occurs.

Resistance: That property of a substance that impedes current and results in the dissipation of power, in the form of heat. The practical unit of resistance is the *ohm*. Symbol = **R**

Trip Point: A minimum or maximum parameter set point that will cause an indication of unacceptable performance during a run test.

Voltage: Electrical pressure, the force which causes current through an electrical conductor.
Symbol = **V**

1.4. Safety

This product and its related documentation must be reviewed for familiarization with safety markings and instructions before operation.

This product is a Safety Class I instrument (provided with a protective earth terminal). Before applying power verify that the instrument is set to the correct line voltage (110 or 220) and the correct fuse is installed.

| WARNING | A Hipot produces voltages and currents that can cause **harmful or fatal electric shock.** To prevent accidental injury or death, these safety procedures must be strictly observed when handling and using the test instrument. |

1.4.1. Service and Maintenance

User Service
To prevent electric shock do not remove the instrument cover. There are no user serviceable parts inside. Routine maintenance or cleaning of internal parts is not necessary. Avoid the use of cleaning agents or chemicals on the instrument, some chemicals may damage plastic parts or lettering. Any external cleaning should be done with a clean dry or slightly damp cloth. Schematics, when provided, are for reference only. Any replacement cables and high voltage components should be acquired directly from Associated Research, Inc. Refer servicing to an Associated Research, Inc. authorized service center.

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www.asresearch.com

Service Interval
The instrument, its power cord, test leads, and accessories must be returned at least once a year to an Associated Research authorized service center for calibration and inspection of safety related components. Associated Research will not be held liable for injuries suffered if the instrument is not properly maintained and safety checked annually.

User Modifications
Unauthorized user modifications will void your warranty. Associated Research will not be responsible for any injuries sustained due to unauthorized equipment modifications or use of parts not specified by Associated Research. Instruments returned to Associated Research with unsafe modifications will be returned to their original operating condition at the customers expense.

1.4.2. Test Station

Location

Select an area away from the main stream of activity which employees do not walk through in performing their normal duties. If this is not practical because of production line flow, then the area should be roped off and marked for **HIGH VOLTAGE TESTING**. No employees other than the test operators should be allowed inside.

If benches are placed back-to-back, be especially careful about the use of the bench opposite the test station. Signs should be posted: **"DANGER - HIGH VOLTAGE TEST IN PROGRESS - UNAUTHORIZED PERSONNEL KEEP AWAY."**

Work Area

Perform the tests on a non-conducting table or workbench, if possible. If you cannot avoid using a conductive surface, be certain that it is connected to a good earth ground and the high voltage connection is insulated from the grounded surface.

There should not be any metal in the work area between the operator and the location where products being tested will be positioned. Any other metal in the work area should be connected to a good ground, never left "floating".

Position the tester so the operator does not have to reach over the product under test to activate or adjust the tester. If the product or component being tested is small, it may be possible to construct guards or an enclosure around the device to be tested. Construct the guards of a non-conducting material such as clear acrylic, so that the item being tested is within the guards or enclosure during the test. If possible, the guards or enclosure should also contain safety switches that will not allow the tester to operate unless the guards are in place or the enclosure closed.

Keep the area clean and uncluttered. All test equipment and test leads not necessary for the test should be removed from the test bench and put away. It should be apparent to both the operator and to any observers, the product that is being tested and the product that is waiting to be tested, or has already been tested.

Do not perform Hipot tests in a combustible atmosphere or in any area where combustible materials are present.

Power

Dielectric Voltage-Withstand Test Equipment must be connected to a good ground. Be certain that the power wiring to the test bench is properly polarized and that the proper low resistance bonding to ground is in place.

Power to the test station should be arranged so that it can be shut off by one prominently marked switch located at the entrance to the test area. In case of an emergency, anyone can cut off the power before entering the test area to offer assistance.

1.4.3. Test Operator

Qualifications

This instrument generates voltages and currents that can cause **harmful or fatal electric shock** and must only be operated by a skilled worker trained in its use.

The operator should understand the electrical fundamentals of voltage, current, and resistance. They should recognize that the test instrument is a variable high-voltage power supply with the return circuit directly connected to earth ground, therefore, current from the high-voltage output will flow through any available ground path.

Rules

Operators should be thoroughly trained to follow all of the aforementioned rules, in addition to any other applicable safety rules and procedures. Defeating any safety system should be considered a serious offense with severe penalties such as removal from the Hipot testing job. Allowing unauthorized personnel in the area during a test should also be dealt with as a serious offense.

Dress

Operators should not wear jewelry that could accidentally complete a circuit.

Medical Restrictions

Personnel with heart ailments or devices such as pacemakers should be informed that the voltages and currents generated by the instrument are very dangerous. If contacted it may cause heart-related problems that a person of good health may not experience. Please have the test operator consult their physician for recommendations.

1.4.4. Instrument Connections

WARNING   Never perform a hipot test on energized circuitry or equipment.

The instrument is equipped with a safety ground connection, be sure that this is connected to a good earth ground.

Always connect the return lead first, regardless of whether the item under test is a sample of insulating material, a component tested with the high voltage test lead, or a cord-connected device with a two or three prong plug. The return lead should be connected first for any type of hipot testing.

Plug in the high voltage test lead only when it is being used. Handle its clip only by the insulator---**never touch the clip directly.** Be certain that the operator has control over any remote test switches connected to the Hipot. Double check the return and high voltage connections from the Hipot and the Line, Neutral, Ground and Case connections from the Line Leakage tester to be certain that they are proper and secure.

1.4.5. Device Under Test

WARNING Never touch the Device Under Test (DUT) or anything connected to it while high voltage is being applied by the hipot.

When testing with DC, always discharge the capacitance of the item under test and anything the high voltage may have contacted--such as test fixtures--before handling it or disconnecting the test leads.

HOT STICK probes can be used to discharge any capacitance in the device under test as a further safety precaution. A hot stick is a non-conducting rod about two feet long with a metal probe at the end that is connected to a wire. To discharge the device under test, two hot sticks are required. First, connect both probe wires to a good earth ground. Then touch one probe tip to the same place that the return lead was connected. While holding the first probe in place, touch the second probe tip to the same place where the high voltage lead was connected.

1.4.6. Key Safety Points to Remember

- Keep unqualified and unauthorized personnel away from the test area.

- Arrange the test station in a safe and orderly manner.

- Never touch the product or connections during a test.

- In case of any problem, turn off the high voltage first.

- Properly discharge any item tested with DC before touching connections.

1.5. Introduction to Product Safety Testing

1.5.1. The Importance of Safety Testing
Product Safety Tests are specified during the design and development stages of a product as well as in the production of the products to insure that it meets basic safety requirements. These tests are designed to verify the safety of the electrical products in that they do not jeopardize the safety of the people, domestic animals, and property of anyone who may come in contact with these products. In an era of soaring liability costs, original manufacturers of electrical and electronic products must make sure every item is as safe as possible. All products must be designed and built to prevent electric shock, even when users abuse the equipment or by-pass built in safety features.

To meet recognized safety standards, one common test is the "dielectric voltage-withstand test". Safety agencies which require compliance safety testing at both the initial product design stage and for routine production line testing include: Underwriters Laboratories, Inc. (UL), the Canadian Standards Association (CSA), the International Electrotechnical Commission (IEC), the British Standards Institution (BSI), the Association of German Electrical Engineers (VDE) and (TÜV), the Japanese Standards Association (JSI). These same agencies may also require that an insulation resistance test and high current ground bond test be performed.

1.6. The Different Types of Safety Tests

1.6.1. Dielectric Withstand Test
The principle behind a dielectric voltage - withstand test is simple. If a product will function when exposed to extremely adverse conditions, it can be assumed that the product will function in normal operating circumstances.

Common Applications of the Dielectric Withstand Test:

- Design (performance) testing: Determining design adequacy to meet service conditions.

- Production Line testing: Detecting defects in material or workmanship during processing.

- Acceptance testing: Proving minimum insulation requirements of purchased parts.

- Repair Service testing: Determine reliability and safety of equipment repairs.

The specific technique used to apply the dielectric voltage - withstand test to each product is different. During a dielectric voltage - withstand test, an electrical device is exposed to a voltage significantly higher than it normally encounters, for a specified duration of time.

During the test, all current flow from the high voltage output to the return is measured. If, during the time the component is tested, the current flow remains within specified limits, the device is assumed safe under normal conditions. The basic product design and use of the insulating material will protect the user against electrical shock.
The equipment used for this test, a dielectric-withstand tester, is often called a "hipot" (for high

potential tester). The "rule of thumb" for testing is to subject the product to twice its normal operating voltage, plus 1,000 volts.

However, specific products may be tested at much higher voltages than 2X operating voltages + 1,000 volts. For example, a product designed to operate in the range between 100 to 240 volts can be tested between 1,000 to 4,000 volts or higher. Most "double insulated" products are tested at voltages much higher than the "rule of thumb".

Testing during development and prototype stages is more stringent than production run tests because the basic design of the product is being evaluated. Design tests usually are performed on only a few samples of the product. Production tests are performed on every item as it comes off the production line.

The hipot tester must also maintain an output voltage between 100% and 120% of specification. The output voltage of the hipot must have a sinusoidal waveform with a frequency between 40 to 70 Hz and has a peak waveform value that is not less than 1.3 and not more than 1.5 times the root-mean-square value.

Types of Failures only detectable with a Hipot test

- Weak Insulating Materials

- Pinholes in Insulation

- Inadequate Spacing of Components

- Pinched Insulation

Dielectric Withstand Test; AC verses DC
Please check with the Compliance Agency you are working with to see which of the two types of voltages you are authorized to use. In some cases, a Compliance Agency will allow either AC or DC testing to be done. However, in other cases the Compliance Agency only allows for an AC test. If you are unsure which specification you must comply with please contact our CUSTOMER SUPPORT GROUP at 1-800-858-TEST (8378).

Many safety agency specifications allow either AC or DC voltages to be used during the hipot test. When this is the case, the manufacturer must make the decision on which type of voltage to utilize. In order to do this it is important to understand the advantages and the disadvantages of both AC and DC testing.

AC testing characteristics
Most items that are hipot tested have some amount of distributed capacitance. An AC voltage cannot charge this capacitance so it continually reads the reactive current that flows when AC is applied to a capacitive load.

AC testing advantages

AC testing is generally much more accepted by safety agencies than DC testing. The main reason for this is that most items being hipot tested will operate on AC voltages. AC hipot testing offers the advantage of stressing the insulation alternately in both polarities, which more closely simulates stresses the product will see in real use.

Since AC testing cannot charge a capacitive load the current reading remains consistent from initial application of the voltage to the end of the test. Therefore, there is no need to gradually bring up the voltage since there is no stabilization required to monitor the current reading. This means that unless the product is sensitive to a sudden application of voltage the operator can immediately apply full voltage and read current without any wait time.

Another advantage of AC testing is that since AC voltage cannot charge a load there is no need to discharge the item under test after the test.

AC testing disadvantages

One disadvantage of AC testing surfaces when testing capacitive products. Again, since AC cannot charge the item under test, reactive current is constantly flowing. In many cases, the reactive component of the current can be much greater than the real component due to actual leakage. This can make it very difficult to detect products that have excessively high leakage current.

Another disadvantage of AC testing is that the hipot has to have the capability of supplying reactive and leakage current continuously. This may require a current output that is actually much higher than is really required to monitor leakage current and in most cases is usually much higher than would be needed with DC testing. This can present increased safety risks as operators are exposed to higher currents.

DC testing characteristics

During DC hipot testing the item under test is charged. The same test item capacitance that causes reactive current in AC testing results in initial charging current which exponentially drops to zero in DC testing.

DC testing advantages

Once the item under test is fully charged, the only current flowing is true leakage current. This allows a DC hipot tester to clearly display only the true leakage of the product under test.

Another advantage to DC testing is that the charging current only needs to be applied momentarily. This means that the output power requirements of the DC hipot tester can typically be much less than what would be required in an AC tester to test the same product.

DC testing disadvantages

Unless the item being tested has virtually no capacitance, it is necessary to raise the voltage gradually from zero to the full test voltage. The more capacitive the item the more slowly the voltage must be raised. This is important since most DC hipots have failure shut off circuitry

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which will indicate failure almost immediately if the total current reaches the leakage threshold during the initial charging of the product under test.

Since a DC hipot does charge the item under test, it becomes necessary to discharge the item after the test.

DC testing unlike AC testing only charges the insulation in one polarity. This becomes a concern when testing products that will actually be used at AC voltages. This is an important reason that some safety agencies do not accept DC testing as an alternative to AC.

When performing AC hipot tests the product under test is actually tested with peak voltages that the hipot meter does not display. This is not the case with DC testing since a sinewave is not generated when testing with direct current. In order to compensate for this most safety agencies require that the equivalent DC test be performed at higher voltages than the AC test. The multiplying factor is somewhat inconsistent between agencies which can cause confusion concerning exactly what equivalent DC test voltage is appropriate.

1.6.2. Insulation Resistance Test

Some "dielectric analyzers today come with a built in insulation resistance tester. Typically, the IR function provides test voltages from 500 to 1,000 volts DC and resistance ranges from kilohms to gigaohms. This function allows manufacturers to comply with special compliance regulations. BABT, TÜV and VDE are agencies that may under certain conditions, require an IR test on the product before a Hipot test is performed. This typically is not a production line test but a performance design test.

The insulation resistance test is very similar to the hipot test. Instead of the go/no go indication that you get with a hipot test the IR test gives you an insulation value usually in Megohms. Typically, the higher the insulation resistance value the better the condition of the insulation. The connections to perform the IR test are the same as the hipot test. The measured value represents the equivalent resistance of all the insulation which exists between the two points and any component resistance which might also be connected between the two points.

Although the IR test can be a predictor of insulation condition it does not replace the need to perform a dielectric withstand test.

1.6.3. Ground Bond Test

The Ground Bonding test determines whether the safety ground circuit of the product under test can adequately handle fault current if the product should ever become defective. A low impedance ground system is critical in ensuring that in case of a product failure, a circuit breaker on the input line will act quickly to protect the user from any serious electrical shock.

International compliance agencies such as CSA, IEC, TÜV, VDE, BABT and others, have requirements calling out this test. This test should not be confused with low current continuity tests that are also commonly called out in some safety agency specifications. A low current test merely indicates that there is a safety ground connection. It does not completely test the

integrity of that connection.

Compliance agency requirements vary on how different products are to be tested. Most specifications call for test currents of between 10 and 40 amps. Test voltages at these currents are typically required to be less than 12 volts. Maximum allowable resistance readings of the safety ground circuit are normally between 100 and 200 milliohms.

If you are testing a product that is terminated in a three-prong plug, you are required to perform a continuity or ground bond test on the ground conductor to the chassis or dead metal of the product.

1.6.4. Run Test
All manufacturers of a product that runs on line power normally need to run the DUT (Device Under Test) after final safety testing so that they can verify the functionality of their products. In addition to running the DUT to test its basic functionality many customers also require some basic test data to be recorded while the DUT is powered up. A Run Test System allows the product to be powered up immediately after the safety tests are completed with a single connection to the DUT. Measurements that are commonly made while the DUT is running can include Amperage, Voltage, Watts and Power Factor.

1.6.5. Line Leakage Test
The Line Leakage test is one of many product safety tests that are normally specified for electrical products by safety testing agencies such as Underwriters Laboratories (UL) and the International Electrotechnical Committee (IEC). The line leakage specifications vary as well as the method in which the measurements are taken depending upon the application or function of a product and the standard to which the product is being tested.

Current Leakage or Line Leakage tests are general terms that actually describe three different types of tests. These tests are Earth Leakage Current, Enclosure Leakage Current, and Applied Part Leakage Current. The main differences in these tests are in the placement of the probe for the measuring device. The Earth Leakage Current is the leakage current that flows through the ground conductor in the line cord back to earth. The Enclosure Leakage Current is the current that flows from any enclosure part through a person back to ground if it were contacted by a person. The Applied Part Leakage Current or Patient Lead Leakage Current is any leakage that flows from an applied part, between applied parts or into an applied part. The Applied Part Leakage Current test is required only for medical equipment. All of these tests are used to determine if products can be safely operated or handled without posing a shock hazard to the user.

Line Leakage Testers provide the capability of meeting the line leakage test specified in the following standards; UL 544, IEC 950, UL 1950, IEC 601-1, UL 2601, UL 1563, UL 3101, IEC 1010 and others. The Line Leakage test, is a test which measures the leakage current of a product, through a circuit that is designed to simulate the impedance of the human body. The simulation circuit is called the Measuring Device (MD). The instrument has five different MD circuits, selectable through the menu, which are representative circuits designed to simulate the impedance of the human body under different conditions. The impedance of the human body

will vary depending upon point of contact, the surface area of the contact and the path the current flows. For these reasons, the specifications of the Measuring Devices are different depending upon the type of test being performed as well as the maximum allowable leakage current. Leakage current measurements are performed on products under normal conditions and single fault conditions as well as reversed polarity. This simulates possible problems, which could occur if the product under test is faulted or misused while the product is operating under high line conditions (110% of the highest input voltage rating of the product).

Line Leakage tests are normally specified as "Type Tests" or "Design Tests" which are performed during the development of the product. This helps verify that the design is safe but it does not guarantee the safety of the products being produced on the production line. The only way to be sure you are shipping safe products is to test each product at the end of the production line. The user may perform a Leakage Current test along with other common safety test such as Dielectric Withstand, Insulation Resistance, and Ground Bond on the production line with a single connection to the device under test.

IF YOU SHOULD HAVE ANY QUESTIONS RELATING TO THE OPERATION OF YOUR INSTRUMENT CALL 1-800-858-TEST(8378) IN THE U.S.A.

1.7. Key Features and Benefits: OMNIA

§	**A complete all-in-one system with up to 6 functions in a single 19 inch rack mount cabinet**	OMNIA combines all of the most common electrical safety tests required by safety agencies (AC Hipot, DC Hipot, IR test, Ground Bond/Continuity, Line Leakage and Functional Run Test) into a single instrument which takes up less rack space and enables a single DUT connection. OMNIA is also available in 4-in-1 and 5-in-1 versions for those who do not need to perform all of the above mentioned tests.
§	**The first safety testing instrument with an enhanced graphic LCD display.**	This provides the operator with complete test setup and results in an easy-to-use interface. This eliminates the need to decipher cryptic abbreviations. The graphic display makes testing safer, easier and more reliable than ever before.
§	**Built-in calibration alert**	This feature automatically alerts the user when the instrument is due for re-calibration. This eliminates the need for manual tracking of calibration dates.
§	**PLC remote inputs & outputs**	This allows the instruments to be remotely monitored and set up completely through simple PLC control. Recall up to 10 different setups is possible through these remotes.
§	**Exclusive SmartGFI function**	The SmartGFI (patent pending) provides maximum operator protection to the user. If the circuit detects excessive leakage to ground it shuts down the high voltage in less than 1 millisecond. SmartGFI is automatically activated if the DUT is not grounded. The operator does not need to make the decision whether to activate the SmartGFI.
§	**Optional printer port**	This option allows direct connection of OMNIA to a printer. The user can select between several different print modes and all printouts are date stamped. This is a real benefit for those requiring hard copies of test data.
§	**Built-in Security settings**	This allows the instrument to be setup to allow for different levels of access to the instruments setup programs. Users can setup up passwords for restricting access to certain parts of the menu.

§ Storage of up to 50 setups with 30 steps per setup	A real benefit for manufacturers that test different products. Each setup can store up to 30 steps, which can be configured to perform any of the safety tests. Each setup can be stored and named any combination of alphanumeric characters so it can be easily identified for recall.
§ Exclusive prompt and hold function	OMNIA allows users to setup prompts in the test cycle so that the test can be paused. During the pause, a user-configured message is displayed instructing the test operator on the action they need to perform before continuing with the test. This is a very convenient feature for applications where test leads need to be moved or when DUT switches need to be activated as part of the test cycle.
§ Up to 40mA of current is available in AC Hipot mode and 20 mA in DC Hipot mode with resolutions of 1 microamps in AC and 0.1 microamp in DC	This makes these instruments true hipot testers with enough output current to test even highly capacitive loads while allowing them to be versatile enough to monitor leakage current of items with very low leakage measurement requirements.
§ Exclusive CHARGE LO and RAMP HI testing features allow for more effective DC Hipot testing	The RAMP HI feature allows the user to set a higher trip rate during the ramp to allow for quick charging of the product without nuisance tripping thereby increasing throughput when testing with DC. The CHARGE LO provides the user with the capability to ensure that the device under test is connected correctly.
§ Line and Load regulation	Maintains the output voltage to within 1% of setting even if the load or the line voltage varies. This ensures that the test results remain consistent and within safety agency requirements.
§ Built-in Real Current measurement	OMNIA allows for simultaneous monitoring of Real and Total current in AC Hipot mode. This allows the user to monitor total and real current on a single screen.
§ Digitally controlled arc detection system	Allows the operator to select whether low-level arcs should be detected and provides the operator with the ability to digitally select and program multiple sensitivity levels.

§	**Dual function Ground Bond and Ground Continuity functions**	The user can select whether to perform a high current ground bond test or a low current continuity test. The ground continuity test can be run as an independent test or it can be performed simultaneously with the hipot test. In addition, both tests can be run through the optional built-in scanner.
§	**Four wire measurement (Kelvin Method) and milliohm offset capability in the Ground Bond mode**	The four-wire measurement technique eliminates test lead resistance when using the standard test leads. The milliohm-offset function allows the use of longer test leads and test fixtures without compromising test results.
§	**Up to 40 amps of current available for testing the integrity of the ground circuit**	Meets the new testing requirements for 20 amp branch circuits as specified under UL 60950-1 requiring 2 X the branch circuit current rating for 2 minutes.
§	**Measures both Peak and RMS leakage current in the Line Leakage test mode**	Meets the Touch Current and Protective Conductor Current testing requirements as specified by IEC 60990
§	**7 Measuring Devices**	Multiple Measuring Devices to simulate different body impedance models as specified by various product safety standards for performing Line Leakage or Touch Current tests, making the Omnia 8106 the most versatile tester on the market.
§	**Neutral-V**	Safety circuit to monitor the Neutral of the DUT input receptacle. Does not allow a test to be conducted if voltage is present on the neutral conductor. Reducing the potential shock hazard to the operator since the leakage measurements are referenced to the neutral side of the line.

2. Getting Started

Introduction

This section contains information for the unpacking, inspection, preparation for use and storage of your Associated Research, Inc., product.

2.1. Unpacking and Inspection

2.1.1. Packaging

Your instrument was shipped in a custom foam insulated container that complies with ASTM D4169-92a Assurance Level II Distribution Cycle 13 Performance Test Sequence

If the shipping carton is damaged, inspect the contents for visible damage such as dents, scratches or broken display. If the instrument is damaged, notify the carrier and Associated Research's customer support department. Please save the shipping carton and packing material for the carriers inspection. Our customer support department will assist you in the repair or replacement of your instrument. Please do not return your product without first notifying us and receiving an RMA (return material authorization) number. To receive an RMA number, please contact our customer support department at (1-800-858-8378).

- Please retain all of the original packaging materials.

2.1.2. Contents of the Carton

Inside the carton should be the following:

Description	AR Part Number
Omnia Instrument	8104 or 8105 or 8106
High Voltage Cable	04040A-08
High Current Output Cable	38489
High Current Return Cable	38490
Return Cable (Qty. 2)	02100A-13 (8105 and 8106)
High Current Test Lead	CBLHC40-10TL (8105 and 8106)
Fuse	38503, 10A Slow-Blow 250VAC
RS232 Cable	37863
Line Cord*	33189 Standard
Line Cord	38071 (8105, 8106)
Adapter Box*	38482 Standard (8104)
Adapter Box*	38578 (8105 and 8106))
Bracket Rack Mount 3U (Qty 2)	38788
Handle Rack Mount 3U (Qty 2)	38787
Screw M4 x 12mm FHMS (Qty 4)	38549 For Rack Mount Handle

*The Adapter Box and Line Cord listed are American. Other combinations of Line Cord and Adapter Box are available upon request.

2.1.3. Returning the Instrument

When it is necessary to return the instrument for servicing or calibration, repackage the instrument in its original container, please include all accessories and test leads. Indicate the nature of the problem or type of service needed. Also, please mark the container "FRAGILE" to insure proper handling. Upon receipt, your instrument will be issued an AR service number. Please refer to this number in all correspondence.

If you do not have the original packaging materials, please follow these guidelines:

- Wrap the instrument in a bubble pack or similar foam. Enclose the same information as above.

- Use a strong double-wall container that is made for shipping instrumentation. 350 lb. test material is adequate.

- Use a layer of shock-absorbing material 70 to 100 mm (3 to 4 inch) thick around all sides of the instrument. Protect the control panel with cardboard.

- Seal the container securely.

- Mark the container "FRAGILE" to insure proper handling.

- Please refer in all correspondence to your AR service number.

2.2. Installation

2.2.1. Work Area

WARNING Locate a suitable testing area and be sure you have read all safety instructions for the operation of the instrument and suggestions on the test area set-up in the Safety section. Make sure the work area you choose has a three-prong grounded outlet. Be sure the outlet has been tested for proper wiring before connecting the instrument to it.

2.2.2. Power Requirements

This instrument requires a power source of either 115 volts AC $\pm$ 10%, 50/60 Hz single phase or 230 volts AC $\pm$10%, 50/60 Hz single phase. Please check the rear panel to be sure the proper switch setting is selected for your line voltage requirements before turning your instrument on. For operation at 115 and 230 Volts AC use a 10 A, 250VAC slow-blow fuse.

CAUTION Do not switch the line voltage selector switch located on the rear panel while the instrument is on or operating. This may cause internal damage and represents a safety risk to the operator.

2.2.3. Basic Connections

Power Cable

WARNING Before connecting power to this instrument, the protective ground (Earth) terminals of this instrument must be connected to the protective conductor of the line (mains) power cord. The main plug shall only be inserted in a socket outlet (receptacle) provided with a protective ground (earth) contact. This protective ground (earth) **must not be defeated** by the use of an extension cord without a protective conductor (grounding).

The instrument is shipped with a three-wire power cable. When the cable is connected to an appropriate AC power source, the cable will connect the chassis to earth ground. The type of power cable shipped with each instrument depends on the country of destination.

CAUTION The output power supplies of this instrument are referenced directly to earth ground. Any conductor that completes a path between the high voltage and earth ground will form a completed circuit.

Return Connection
When the instrument Return is grounded, any internal and external stray leakage will be monitored due to currents that flow from High Voltage to earth ground (such as from HV to the chassis of the instrument). This current is inherent and will cause errors when trying to monitor very low leakage currents in the micoamp range.

2.2.4. Environmental Conditions
This equipment is intended for indoor use only. The equipment has been evaluated according to Installation Category II and Pollution Degree 2 as specified in IEC 664.

This instrument may be operated in environments with the following limits:
> Temperature………….32° - 104° F (0° - 40° C)
> Relative humidity …….0 - 80%
> Altitude ………………6,560 feet (2,000 meters)

Storage and Shipping Environment
This instrument may be stored or shipped in environments with the following limits:
> Temperature.................-40° - 167° F (-40° - 75°C)
> Altitude....................…......50,000 feet (15,240 meters)

The instrument should also be protected against temperature extremes that may cause condensation within the instrument.

3. Specifications and Controls

3.1. Omnia Functional Specifications

INPUT	
Voltage	115 / 230V selectable, ± 10 % variation
Frequency	50/60 Hz ± 5%
Fuse	115 VAC, 230VAC – 10A Slow-Blo 250VAC
DIELECTRIC WITHSTAND TEST MODE	
Output Rating	5KV @ 40mA AC 5KV @ 20 mA DC
Voltage Setting	Range: 0–5000V AC 　　　　　0–5000V DC Resolution: 1 V Accuracy: ± (2% of setting + 5 volts)
Voltage Display	Range: 0.00 – 5.00KV Full Scale Resolution: 0.01 KV Accuracy: ± (2% of reading + 10 V)
Ramp-HI　　　DC	>20 mA peak maximum, ON/OFF Selectable
Charge-LO　　DC	Range: 0.0 – 350.0 µA DC or Auto set
HI and LO-Limit 　　　　　AC Total	Range: 0.000 – 9.999mA Resolution: 0.001mA Range: 10.00 – 40.00mA Resolution: 0.01mA Accuracy: ± (2% of setting + 2 counts)
AC Real	Range: 0.000 – 9.999mA Resolution: 0.001mA Range: 10.00 – 40.00mA Resolution: 0.01mA Accuracy: ± (3% of setting + 50 µA)
DC	Range: 0.0 – 999.9µA Resolution: 0.1µA Range: 1000 – 20000µA Resolution: 1µA Accuracy: ± (2% of setting + 2 counts)
Arc Detection	Range: 1 – 9
Ground Continuity	Current : DC 0.1 A ± 0.01A, fixed Max. ground resistance : 1 Ω ± 0.1Ω, fixed
Ground Fault Interrupt	GFI Trip Current: 450 µA max (AC or DC) HV Shut Down Speed: < 1mS

DIELECTRIC WITHSTAND TEST MODE (cont.)		
Current Display AC Total	Auto Range Range 1: Resolution: Range 2 Resolution:	0.000 mA – 3.500 mA 0.001 mA 3.00 mA – 40.00 mA 0.01 mA
	Accuracy:	± (2% of reading + 2 counts) All Ranges
AC Real	Range 1: Resolution: Range 2: Resolution:	0.000 mA – 9.999 mA 0.001 mA 10.00 mA – 40.00 mA 0.01 mA
	Accuracy:	± (3% of reading + 50µA) All Ranges PF > 0.1 V > 250VAC
DC	Range 1: Resolution: Range 2 Resolution: Range 3 Resolution:	0.0 µA – 350.0 µA 0.1 µA 0.300 mA –3.500 mA 0.001 mA 3.00 mA – 20.00 mA 0.01 mA
	Accuracy:	± (2% of reading + 2 counts) All Ranges
DC Output Ripple	≤ 4% Ripple RMS at 5 KV DC @ 20mA, Resistive Load	
Discharge Time	≤ 200 ms	
Maximum Capacitive Load DC Mode	1uF < 1KV 0.08uF < 4KV 0.75uF < 2KV 0.04uF < 5KV 0.5uF < 3KV	
AC Output Waveform	Sine Wave, Crest Factor = 1.3 – 1.5	
Output Frequency	Range: Accuracy:	60 or 50 Hz, User Selection ± 0.1 %
Output Regulation	± (1 % of output + 5 V) from no load to full load and over input voltage range.	
Dwell Timer	Range: Range: Resolution: Accuracy:	AC 0.4 –999.9 sec (0 = Continuous) DC 0.3 –999.9 sec (0 = Continuous) 0.1 sec ± (0.1% + 0.05 sec)

Ramp Timer	Range:
	
	Resolution:
	Accuracy:
		Ramp-Up: AC 0.1 – 999.9 sec
		                       DC 0.4 – 999.9 sec
		Ramp-Down: AC 0.0 – 999.9 sec
		                       DC 0.0 , 1.0 – 999.9 sec
		0.1 sec
		± (0.1% + 0.05 sec)

INSULATION RESISTANCE TEST MODE

Voltage Setting	Range:	50 – 1000 VDC
	Resolution:	1 V
	Accuracy:	± (2% of setting + 2 counts)
Charging Current	Maximum	>20mA peak
Voltage Display	Range:	0 – 1000 V
	Resolution:	1 V
	Accuracy:	± (2% of reading + 2 counts)

Resistance Display

Range: 0.05MΩ – 50000 MΩ (4 Digit, Auto Ranging)

Resolution:	50 – 499 VDC	500 – 1000VDC
MΩ	MΩ	MΩ
0.001	0.050 – 1.999	0.050 – 9.999
0.01	2.00 – 19.99	10.00 – 99.99
0.1	20.0 – 199.9	100.0 – 999.9
1	200 – 50000	1000 – 50000

Accuracy: 50 – 499V
    0.05M – 999.9M, ± (7% of reading +2 counts)
500 – 1000V
    0.05M – 999.9M, ± (2% of reading +2 counts)
    1000M – 9999M ± (5% of reading +2 counts)
    10000M – 50000M, ± (15% of reading +2 counts)

Charge-LO	Range:	0.000 – 3.500µA or Auto Set
HI and LO–Limit	Range:	0.05M – 99.99MΩ
	Resolution:	0.01M
	Range:	100.0M – 999.9M
	Resolution:	0.1M
	Range:	1000M – 50000M
	Resolution:	1M
	(HI – Limit: 0 = OFF)	
	Accuracy: Same as Resistance Display Accuracy	
Ramp Timer	Range:	Ramp-Up: 0.1 – 999.9 sec
		Ramp-Down: 0.0, 1.0–999.9 sec
	Resolution:	0.1 sec
	Accuracy:	± (0.1% + 0.05 sec)
Delay Timer	Range:	1.0 – 999.9 sec (0 = Continuous)
	Resolution:	0.1 sec
	Accuracy:	± (0.1% + 0.05 sec)
Ground Fault Interrupt	GFI Trip Current:	450 µA max (AC or DC)
	HV Shut Down Speed:	< 1mS

GROUND BOND TEST MODE		
Output Voltage (Open Circuit Limit)	Range:	3.00 – 8.00 VAC
	Resolution:	0.01 V
	Accuracy:	± (2 % of setting + 0.03V) O.C. Condition
Output Frequency	Range:	60 or 50 Hz, user selectable
	Accuracy:	± 0.1%
Output Current	Range:	1.00 – 40.00 A
	Resolution:	0.01 A
	Accuracy:	± (2 % of setting + 0.02 A)
Output Regulation	Accuracy:	± (1% of output + 0.02A)
	Within maximum load limits, and over input voltage range.	
Maximum Loading	1.00 – 10.00A, 0 – 600mΩ	
	10.01 – 30.00A, 0 – 200mΩ	
	30.01 – 40.00A, 0 – 150mΩ	
Current Display	Range:	0.00 – 40.00 A
	Resolution:	0.01 A
	Accuracy:	± (3 % of setting + 0.03 A)
HI and LO-Limits	Range:	0 – 150 mΩ for 30.01 – 40.00 Amps
		0 – 200 mΩ for 10.01 – 30.00 Amps
		0 – 600 mΩ for 1.00 – 10.00 Amps
	Resolution:	1 mΩ
	Accuracy:	Same as Ohmmeter Display
Ohmmeter Display	Range:	0 – 150 mΩ for 30.01 – 40.00 Amps
		0 – 200 mΩ for 10.01 – 30.00 Amps
		0 – 600 mΩ for 6.00 – 10.00 Amps
	Resolution:	1 mΩ
	Accuracy:	± (2% of reading + 2 mΩ)
	Range:	0 – 600 mΩ for 1.00 – 5.99 Amps
	Resolution:	1 mΩ
	Accuracy:	± (3% of reading + 3 mΩ)
Dwell Timer	Range:	0.5 – 999.9 sec (0 = Continuous)
	Resolution:	0.1 sec
	Accuracy:	± (0.1% + 0.05 sec)
Milliohm Offset	Range:	0 – 200mΩ
	Resolution:	1 mΩ
	Accuracy:	± (2 % of setting + 2 mΩ)

CONTINUITY TEST MODE	
Output Current	DC 0.1A ± 0.01A Total Resistance*:0.00 – 12.0Ω DC 0.01A ± 0.001A Total Resistance*:12.1 – 120Ω DC 0.001A ± 0.0001A Total Resistance*:121 – 1200Ω DC 0.0001A ± 0.00001A Total Resistance*:1201 – 10000Ω
Resistance Display	Range 1: 0.00 – 10.00 Ω Resolution: 0.01 Ω Accuracy: ± (1 % of reading + 0.03 Ω) Range 2: 10.1 – 100.0 Ω Resolution: 0.1 Ω Accuracy: ± (1 % of reading + 0.3 Ω) Range 3: 101 – 1000 Ω Resolution: 1 Ω Accuracy: ± (1 % of reading + 3 Ω) Range 4: 1001 – 10000 Ω Resolution: 1 Ω Accuracy: ± (1 % of reading + 10 Ω)
HI and LO-Limits	Range 1: 0.00 – 10.00 Ω Resolution: 0.01 Ω Accuracy: ± (1 % of reading + 0.03 Ω) Range 2: 10.1 – 100.0 Ω Resolution: 0.1 Ω Accuracy: ± (1 % of reading + 0.3 Ω) Range 3: 101 – 1000 Ω Resolution: 1 Ω Accuracy: ± (1 % of reading + 3 Ω) Range 4: 1001 – 10000 Ω Resolution: 1 Ω Accuracy: ± (1 % of reading + 10 Ω) (Max Limit: 0 = OFF)
Dwell Timer	Range: 0.0, 0.3 – 999.9 sec (0 = Continuous) Resolution: 0.1 sec Accuracy: ± (0.1% + 0.05 sec)
Milliohm Offset	Range: 0.00 – 10.00Ω Resolution: 0.01 Ω Accuracy: ± (1 % of reading + 0.03 Ω)

GENERAL SPECIFICATIONS	
PLC Remote Control	Input: Test, Reset, Interlock, Recall File 1 through 10
	Output: Pass, Fail, Test-in-Process
Safety	Built-in Smart GFI circuit
Memory	50 memories, 30 step/memory
Interface	Standard RS-232, Optional Printer Port with Date and Time Stamp or GPIB.
Security	Programmable password lockout capability to avoid unauthorized access to test set-up program.
Graphic Display	320 X 240 Monographic LCD
LCD Contrast Setting	Range: 1 – 9; 1 is lightest character, 9 is darkest character.
Alarm Volume Setting	Range: 0 – 9; 0 = OFF, 1 is softest volume, 9 is loudest volume.
Calibration	Adjustments are made through the front panel. Automatic Calibration alert function to signal operator when calibration is due.
Mechanical	Bench or rack mount with tilt up front feet.
Dimensions	3U (W x H x D) (430 X 133 X 500 mm) (16.93" x 5.24" x 19.69")
Weight	8104, 26.00kgs (57.32lbs)
	8105 and 8106, 29.00kgs (63.93lbs)
OPTIONS	
Scanning Matrix	8 channel high voltage and high current switching matrix.
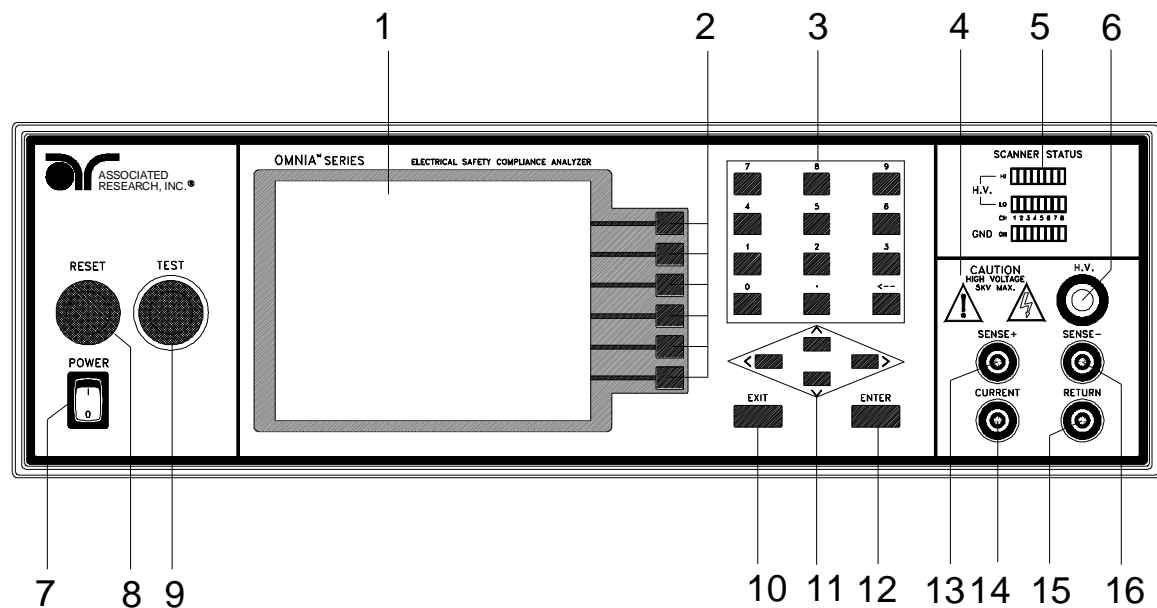
RUN TEST MODE (OMNIA 5, OMNIA 6)		
DUT POWER		
Voltage	0 – 277 VAC Single Phase Unbalanced (One Hot or Line conductor and One Neutral)	
Current	15AAC max continuous	
Voltage Display	Range:	0.0 – 277.0 VAC Full Scale
	Resolution:	0.1 V
	Accuracy:	$\pm$ (1.5% of reading +0.2V), 30.0 – 277.0VAC
Short Circuit Protection	23 AAC, Response Time < 3s	
DELAY and DWELL TIMER SETTINGS		
Delay time setting	Range:	0.2 – 999.9 seconds
	Resolution:	0.1 second
	Accuracy:	$\pm$ (0.1% + 0.05 sec)
Dwell time setting	Range:	0.1 – 999.9 seconds (0 = Continuous)
	Resolution:	0.1 second
	Accuracy:	$\pm$ (0.1% + 0.05 sec)
TRIP POINT SETTINGS		

Voltage:
    Volt-Hi
    Volt-LO
	Range:
	Resolution:
	Accuracy:
		0.0 – 277.0 VAC
		0.1 V
		$\pm$ (1.5% of setting + 0.2 V), 30.0 – 277VAC

Current:
    Amp-HI
    Amp-LO
	Range:
	Resolution:
	Accuracy:
		0.0 – 15.00 AAC
		0.01 A
		$\pm$ (2.0% of setting + 0.02A)

Watts:
    Power-HI
    Power-LO
	Range:
	Resolution:
	Accuracy:
		0 – 4200 W
		1 W
		$\pm$ (5.0% of setting + 3W)

Power Factor:
    PF-HI
    PF-LO
	Range:
	Resolution:
	Accuracy:
		0.000 – 1.000
		0.001
		$\pm$ (8% of setting + 2 Counts)

Leakage Current:
    Leak-HI
    Leak-LO
	Range:
	Resolution:
	Accuracy:
		0.00 – 10.00 mA (0 = OFF)
		0.01 mA
		$\pm$ (2% of setting + 0.02mA)

	Leakage current measuring resistor MD=2KΩ $\pm$ 1%	
METERING		
Voltmeter	Range:	0.0 – 277.0 VAC
	Resolution:	0.1 V
	Accuracy:	$\pm$ (1.5% of reading + 0.2 V), 30.0 – 277VAC
Ammeter	Range:	0.0 – 15.00 AAC
	Resolution:	0.01 A
	Accuracy:	$\pm$ (2.0% of reading + 0.02A)
Wattmeter	Range:	0 – 4200 W
	Resolution:	1 W

RUN TEST MODE (OMNIA 5, OMNIA 6)		
	Accuracy:	± (5% of reading + 3 W)
Power Factor	Range:	0.000 – 1.000
	Resolution:	0.001
	Accuracy:	± (8% of reading + 2 Counts)
Leakage Current	Range:	0.00 – 10.00 mA
	Resolution:	0.01 mA
	Accuracy:	± (2% of reading + 0.02 mA)
	Leakage current measuring resistor MD = 2KΩ ± 1%	
Timer display	Range:	0.0 – 999.9 seconds
	Resolution:	0.1 second
	Accuracy:	± (0.1% of reading + 0.05 seconds)

LINE LEAKAGE TEST MODE (OMNIA 6 Only)			
DUT POWER			
Voltage	0 – 277 VAC		
Current	15AAC max continuous		
Voltage Display	Range:	0.0 – 277.0 VAC Full Scale	
	Resolution:	0.1 V	
	Accuracy:	± (1.5% of reading +0.2V), 30.0 – 277.0VAC	
Short Circuit Protection	23 AAC, Response Time <3s		
LEAKAGE CURRENT			
Current Display RMS or PEAK	Range 1:	0.0 µA – 999.9 µA	
	Resolution:	0.1 µA/step	
	Range 2:	1000 µA – 6000 µA	
	Resolution:	1 µA/step	
Accuracy RMS	DC to 100 kHz	± (1.5% of reading + 3 counts)	
	>100k to 1 MHz	± 5% of reading, (10.0 µA – 6000 µA)	
Accuracy PEAK	DC to 1 MH z	± (10% of reading + 2uA)	
Measuring Device	A	UL544 Non Patient	
	B	UL544 Patient	
	C	UL2601-1, UL60601-1, IEC601-1 IEC60601-1 EN60601-1	
	D	UL1563	
	E	UL1950, UL3101, UL61010, IEC950, IEC1010, IEC 60950, IEC61010, IEC60335-1, IEC60990 Fig4-U2	
	H	IEC60990 Fig5-U3	
	I	IEC60990 Fig3-U1	
MD A – D and H - I components	Accuracy:	Resistance ± 1% Capacitance ± 5%	
MD E components	Accuracy:	Resistance ± 0.1% Capacitance ± 1%	
MD Voltage Limit	Maximum 30V peak or 30VDC		
HI-Limit:	Range:	0 – 6000 µA	
	Resolution	0.1µA	
Accuracy:	Same as Leakage Current Display Accuracy		
LO-Limit:	Range:	0 – 6000 µA	
	Resolution	0.1µA	
Accuracy:	Same as Leakage Current Display Accuracy		
Delay Timer:	Range:	0, 1.0 – 999.9 sec (0 = Continuous)	
	Resolution:	0.1 sec/step	
	Accuracy:	± (0.1% + 0.05 sec)	

3.2. Instrument Controls

3.2.1. Front Panel Controls

1. **GRAPHIC LCD:** 320 X 240 Monographic LCD.

2. **SOFT KEYS:** Multifunction parameter selection keys. Keys used to select screens and change parameters.

3. **NUMERIC DATA ENTRY:** Keys used to enter numeric data.

4. **HIGH VOLTAGE ON INDICATOR:** This indicator flashes to warn the operator that high voltage is present at the high voltage terminal.

5. **SCANNER STATUS LED's:** LED's that indicate the status of the 8 H.V. and 8 G-Bond channels on the internal scanner.

6. **HIGH VOLTAGE OUTPUT JACK:** Connector used to attach the High Voltage test lead, adapter box high voltage lead, or test fixture high voltage lead to the instrument. The connector is recessed for safety when not being used.

7. **POWER SWITCH:** Rocker style power switch with international ON (|) and OFF (0) markings.

8. **RESET BUTTON:** Momentary contact switch used to reset the instrument. If a failure condition occurs during a test, you will need to reset the system to shut off the alarm and signal the system that you are aware of a failure condition. The reset button must be pressed before you can proceed to the next test or change any of the set-up parameters. This switch also serves as an abort signal to stop any test in progress controlled by the Omnia.
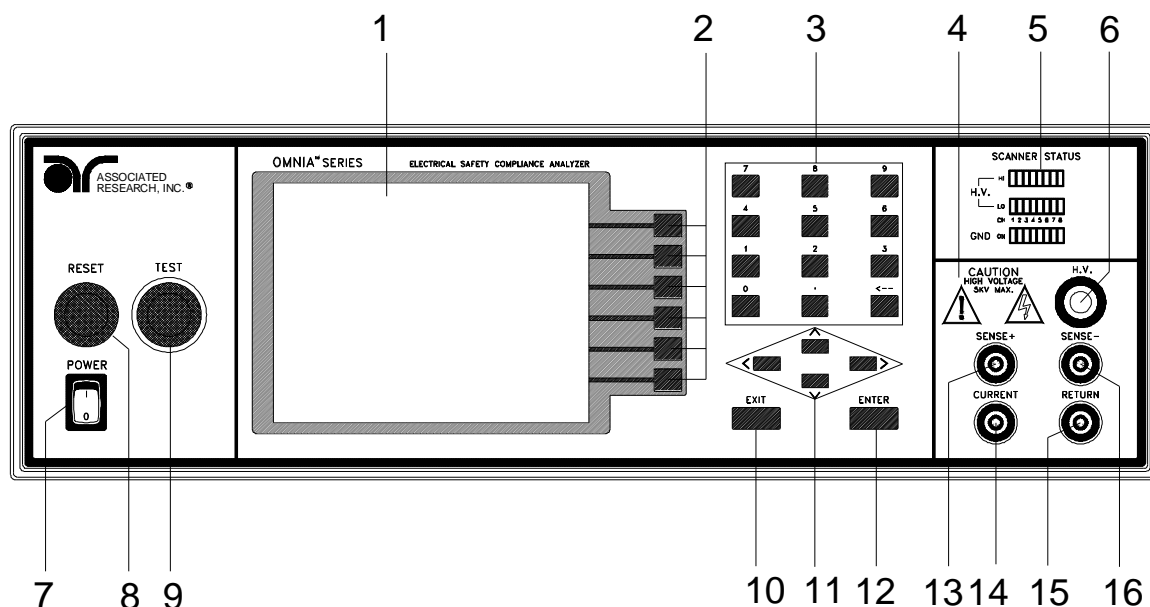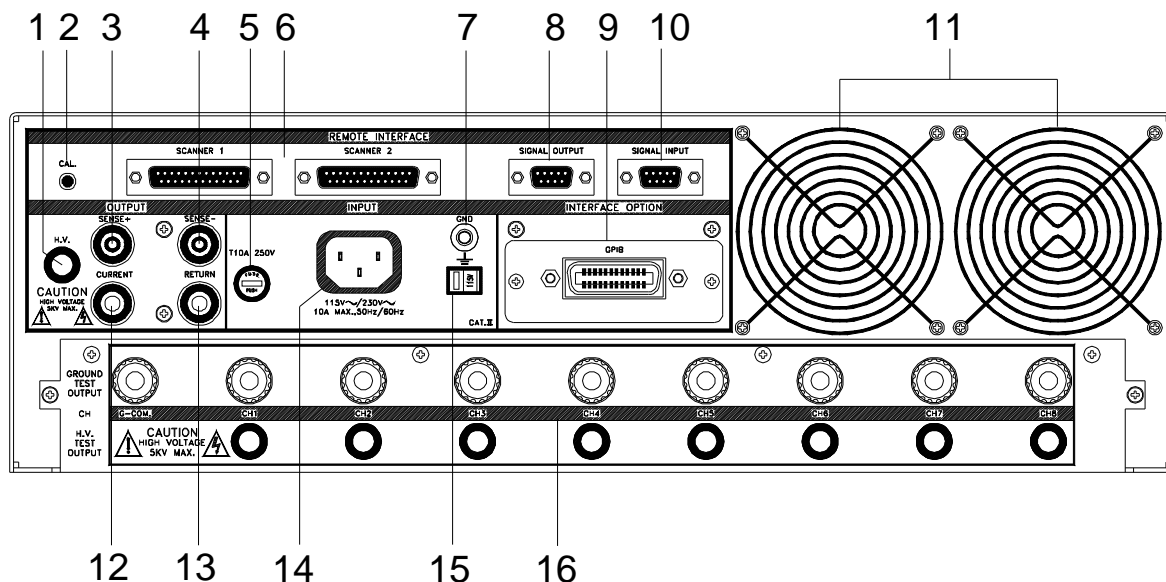
9. TEST BUTTON: Momentary contact switch used to start tests. Press the green button to activate the test that is set up in the test buffer shown on the display.

10. EXIT KEY: Key used to escape from parameter editing and returning to prior screens.

11. UP, DOWN, LEFT, AND RIGHT, ARROW KEYS: Keys used to scroll the highlighted area or cursor, up and down, left and right. When more than 5 steps are programmed in a test file, the left and right arrow keys will page through the screens of steps. The screens where the paging function is available are as follows: Setup Tests, Perform Tests, Results Summary, and Results

12. ENTER KEY: Key used to finalize parameter entries. The ENTER key may also be used to scroll the highlighted area to different parameters in the parameter-setting screens.

13. SENSE+ JACK: Connector used to attach the positive Kelvin sense lead to the instrument.

14. CURRENT OUTPUT JACK: Connector used to attach the high current output lead, adapter box high current lead or test fixture high current lead to the instrument. This connection provides the output current for the ground bond and continuity.

15. RETURN OUTPUT JACK: Connector used to attach the Return test lead, or test fixture return lead to the instrument. This connection provides the return current path for the high voltage, ground bond and continuity current.

16. SENSE- JACK: Connector used to attach the negative Kelvin sense lead to the instrument.

3.2.2. Rear Panel Controls
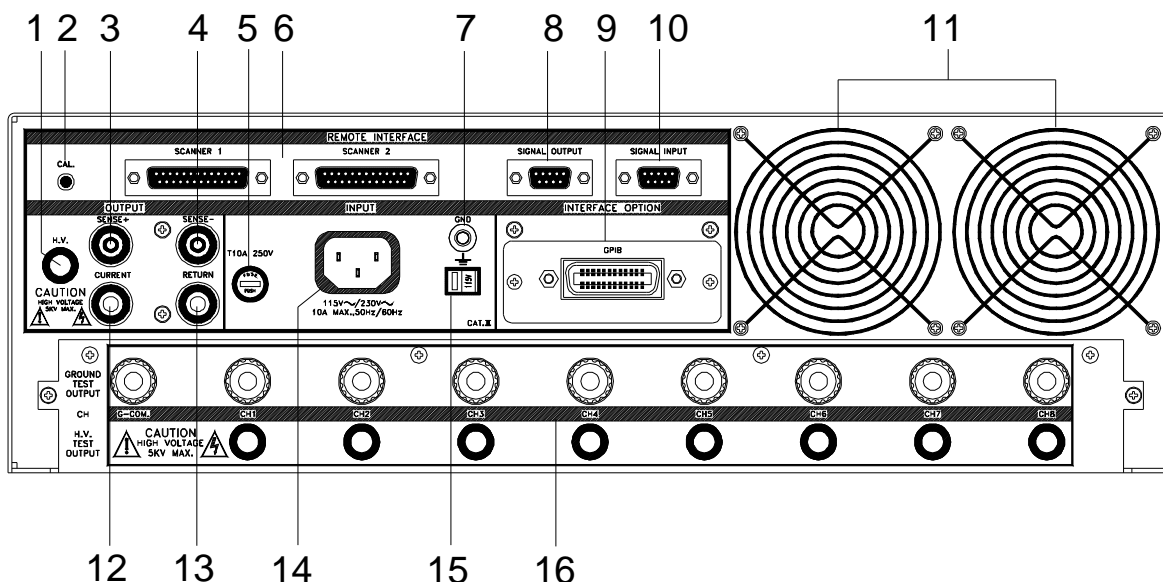
1. **HIGH VOLTAGE OUTPUT JACK:** Connector used to attach the High Voltage test lead, adapter box high voltage lead, or test fixture high voltage lead to the instrument. The connector is recessed for safety when not being used.

2. **CALIBRATION BUTTON:** To put the instrument into the calibration mode, push this button and turn on the power switch simultaneously.

3. **SENSE+ JACK:** Connector used to attach the positive Kelvin sense lead to the instrument.

4. **SENSE- JACK:** Connector used to attach the negative Kelvin sense lead to the instrument.

5. **FUSE RECEPTACLE:** To change the fuse, unplug the power (mains) cord and turn the fuse receptacle counter-clockwise. The fuse compartment will be exposed. Please replace the fuse with one of the proper rating.

6. **SCANNER OUTPUTS:** For connection of up to 2 External Scanning Matrixes.

7. **CHASSIS GROUND (EARTH) TERMINAL:** This terminal should be connected to a good earth ground before operation.

8. **REMOTE SIGNAL OUTPUT:** 9-Pin D sub-miniature female connector for monitoring PASS, FAIL, and PROCESSING output relay signals.

9. **BUS INTERFACE:** Standard connector for interconnection to the RS-232 Bus interface. Optional IEEE 488 interface may be substituted for the RS-232.

10. REMOTE SIGNAL INPUT: 9-Pin D subminiature male connector, for remote control of test, reset, and interlock functions, as well as remote program file selection.

11. THERMAL COOLING FANS: Thermally switched cooling fans.

12. CURRENT OUTPUT JACK: Connector used to attach the high current output lead, adapter box high current lead or test fixture high current lead to the instrument. This connection provides the output current for the ground bond and continuity.

13. RETURN OUTPUT JACK: Connector used to attach the Return test lead, or test fixture return lead to the instrument. This connection provides the return current path for the high voltage, ground bond and continuity current.

14. INPUT POWER RECEPTACLE: Standard IEC 320 connector for connection to a standard NEMA style line power (mains) cord.

15. INPUT POWER SWITCH: Line voltage selection is set by the position of the switch. In the up position it is set for 110-120 volt operation, in the down position it is set for 220-240 volt operation.

16. SCANNER OUTPUTS: Optional scanner matrix that provides 8 HV/Continuity/Return connections and 8 Ground Bond connections. Please refer to the Options section of this manual for additional connection information.

3.2.3. Additional Rear Panel Controls Models 8105 and 8106
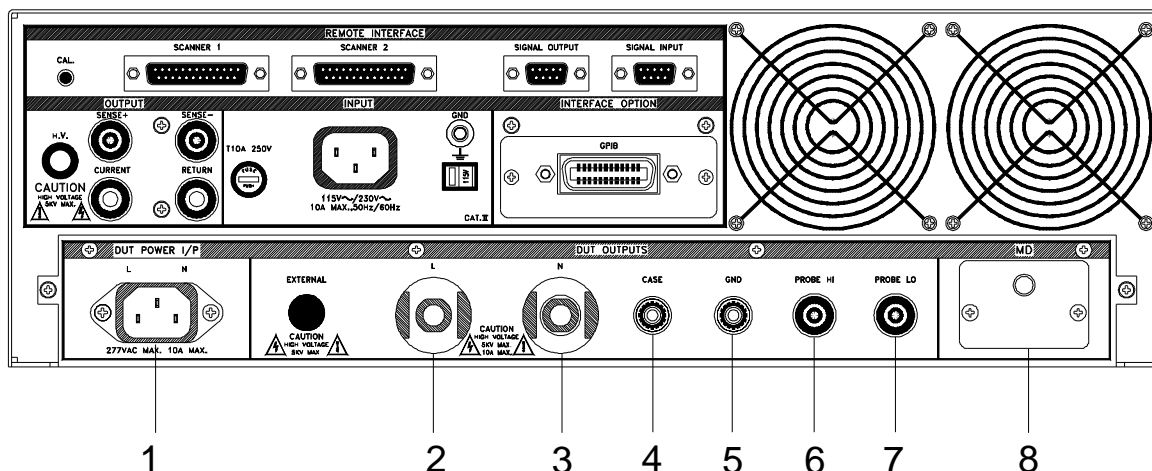
1. **DUT POWER INPUT CONNECTOR:** This connector provides the Line and Neutral input power connections on pin 1 and 2 respectively. An external single phase unbalanced AC power supply with a single Hot or Line conductor should be connected here, to supply power to the DUT while performing the leakage test. This input is rated for 0-277 volts 50/60 Hz.

2. **L:** This output terminal is where the LINE power connection from the adapter box is plugged into the run test or line leakage test. Line power is supplied to the DUT during the run test or line leakage test through this terminal and High Voltage is supplied to the DUT through this terminal during the Dielectric Withstand or Insulation Resistance. This terminal and the "N" Terminal are shorted together when Dielectric Withstand or Insulation Resistance are being performed.

3. **N:** This output terminal is where the NEUTRAL power connection from the adapter box is plugged into the run test or line leakage test. Line power is supplied to the DUT during the run test or line leakage test through this terminal and High Voltage is supplied to the DUT through this terminal during the Dielectric Withstand or Insulation Resistance. This terminal and the "L" Terminal are shorted together when Dielectric Withstand or Insulation Resistance are being performed.

4. **CASE:** This terminal is connected to the DUT case or dead metal and provides the return for the Ground Bond, Dielectric Withstand, and Insulation Resistance tests. During a Run test or Line Leakage test, this terminal is isolated from the test circuits.

5. **GND:** This terminal is where the Ground or Earth terminal from the adapter box is connected.
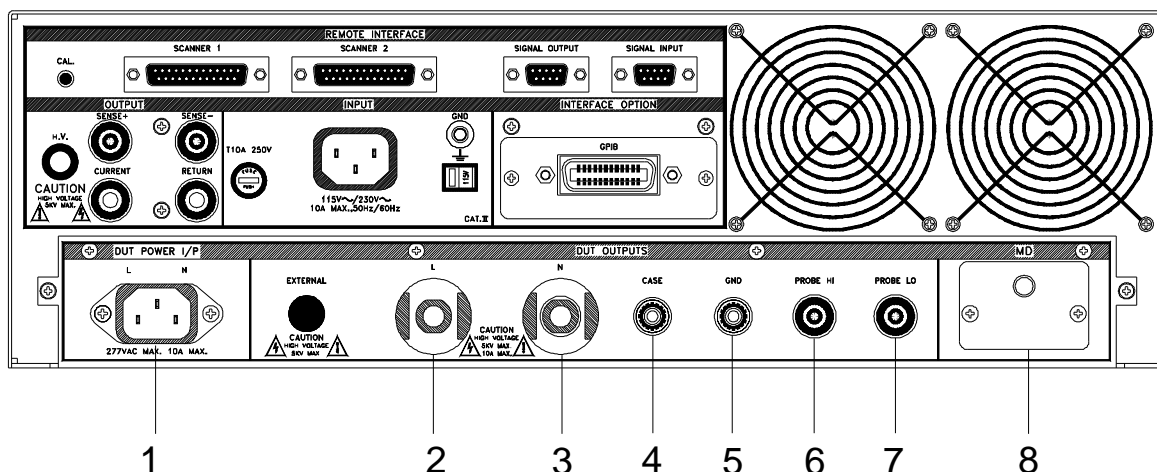
6. PROBE HI: This terminal is an input to one side of the MD(measuring device) and will be enabled during a line leakage test when ever Probe-HI has been selected at setup. This terminal is provided for performing Enclosure leakage or Applied Part leakage tests. When run tests and line leakage tests are not being performed, this terminal is isolated from the run test and line leakage test circuits. This connector is disabled in 8105.

7. PROBE LO: This terminal is an input to one side of the MD(measuring device) and will be enabled during a line leakage test when ever Probe-LO has been selected at setup. This terminal is provided for performing Applied Part leakage tests and is always used in conjunction with the Probe-HI terminal. When run tests and line leakage tests are not being performed, this terminal is isolated from the run test and line leakage test circuits. This connector is disabled in 8105.

8. EXTERNAL MEASURING DEVICE: This compartment contains an external Measuring Device PCB. This device will enable during a line leakage test when the "External" is selected from the Meas. Device soft key. The external measuring device allows the operator to test to a standard that calls for a custom measuring device or easily change the measuring device if the standard requirements change. The instrument is provided with a 1k ohm resistor on the measuring device PCB. The PCB can easily be reconfigured for a simple resistive component or a complex two-pole measuring device. This board should always remain installed in both the 8105 and 8106 even though the external measuring device is not used in any 8105 operation.

3.3. Quickstart

This quick start guide assumes the operator has some familiarity with automated Electrical Safety testing.

WARNING Locate a suitable testing area and be sure you have read all safety instructions for the operation of the instrument and suggestions on the test area set-up in the Safety section. Locate a three prong grounded outlet. Be sure the outlet has been tested for proper wiring before connecting the instrument to it.

CAUTION Check to be sure that the correct input line voltage has been selected on the rear panel, either 115 volts AC or 230 volts AC. Connect the power-input plug into its socket on the rear panel of the instrument. Connect the male end of the plug to the outlet receptacle. Please be sure that the safety ground on the power line cord is not defeated and that you are connecting to a grounded power source.

Turn on the POWER switch located on the lower left-hand side of the front panel. The Omnia Information screen will appear with a message at the bottom indicating Press TEST to Verification. You now have the option to press the TEST button and activate the Verification Menu (Refer to the **section 6. Instrument Verification**). The option to activate the Verification expires approximately 4 seconds after power-up. If you do not press the Test button with in the 4-second window, the message at the bottom of the screen will change to PRESS ANY KEY TO CONTINUE. This screen will remain on until any key is pressed. The initialization screen will appear as follows:
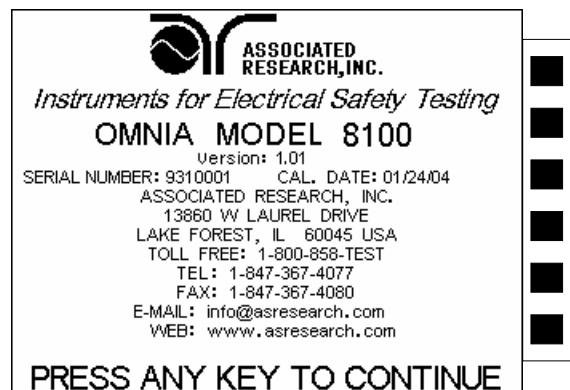
If any of the parameters at the Power-On Screens have been altered from their original settings, the sequence of initialization screens may not follow suite with what was described in the previous paragraph. Please refer to the section **4.1 Setup System Menu** for a description of the Power-On Screen parameters.

After pressing any key, the Main Menus screen will be displayed. The Main Menu screen will appear as follows:

```
  M a i n    M e n u
                             ┌─┐
                             │■│
                             ├─┤
    S e t u p  S y s t e m ▶ │■│
                             ├─┤
       S e t u p  T e s t s ▶│■│
                             ├─┤
    P e r f o r m  T e s t s ▶│■│
                             ├─┤
                             │■│
                             ├─┤
                             │■│
                             └─┘
```
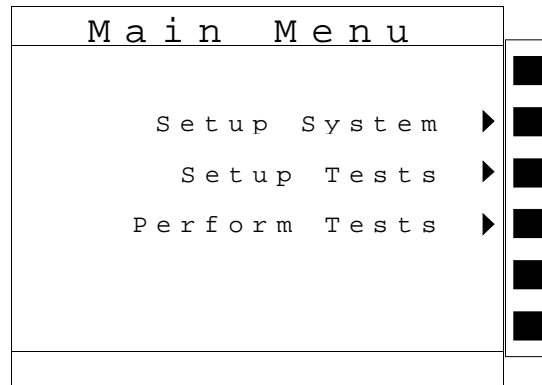
At the Main Menu screen, press the "Perform Tests" soft key. The Perform Tests screen will now be displayed. The Perform Test screen will appear as follows:

```
P e r f o r m    T e s t s
01 ACW    Settings ◀   Load │File│   ┌─┐
   1200V   10.00mA                   │■│
   1.0s    2.00mA                    ├─┤
                      Single Step │ OFF │ │■│
                                     ├─┤
                      Fail Stop │ OFF │   │■│
                                     ├─┤
                            Results    │■│
                                     ├─┤
                                     │■│
                                     ├─┤
File Name:NEW FILE                   │■│
                                     └─┘
▲Move up ▼Move down  To initiate this
◀Page up ▶Page down  test, press the
                     TEST button.
```
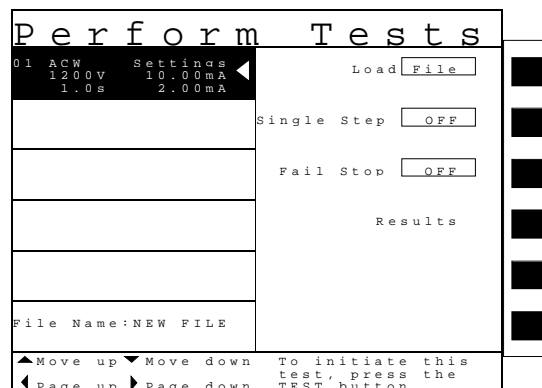
The Omnia comes pre-loaded with one default test file which consists of a single step AC withstand test loaded with the default parameters. The left side of the display shows the pre-loaded program step and the parameters stored with in it. If this test is unacceptable for your DUT then refer to the section **4.3 Setting Up a Test**, for instructions on how to program tests into the instrument.

If these test file parameters are acceptable then connect an appropriate set of test leads to the device under test (DUT) or test fixture. Connect the return lead (Black) to the DUT or test fixture followed by the high voltage output lead (Red). Make sure the safety ground of this instrument is connected to a known good ground.

Refer to section **4.1.3 Hardware**, Smart GFI, for an explanation of DUT grounding configurations.

| WARNING | DO NOT TOUCH THE DEVICE UNDER TEST ONCE THE TEST HAS BEEN STARTED. |

Remote Interlock

Omnia is equipped with a featured referred to as "Remote Interlock". Remote Interlock is a feature that utilizes a set of closed contacts to enable the instruments output. In other words, if the Interlock contacts open, the output of the instrument will be disabled. Remote Interlock could also be referred to as a remote system lockout, utilizing "Fail When Open" logic. If the Interlock contacts are open and the Test button is pushed, a pop-up message will be displayed on the screen for two seconds. The message will appear as follows:

```
Interlock  is
Open

Please check the Remote Interlock
connection.
```

If the Interlock contacts are opened during a test, the pop-up message will be displayed and the test will abort. The hardware and has been configured to provide the interlock connections on pins 4 and 5 of the Remote Interface, Signal Input port. The instrument can still be used without the external interlock device as long as the Interlock Connector (38075 provided with unit) is plugged into the Remote Interface, Signal Input port. If there is nothing connected to the Remote Interface, Signal Input port to provide a connection to the interlock, the instrument will not perform tests.

Please check your connections to be sure they are making good contact. Clear the area of any debris that may create a hazardous situation and ask any unnecessary personnel to leave the area. To initiate the test, press the GREEN test button on the front panel. This is a momentary button and does not need to be held in the pressed position during the test. The instrument will then initiate the test presently loaded from the selected default file.

If the DUT passes the step, you will hear a short audible beep. If a failure occurs during a step, you will hear a long audible alarm and the red failure indicator will light up. If the fail stop is set to OFF then the next step in the sequence will begin (which in the case of the default file can not happen because there is only one step). If a failure occurs during any step of the test sequence, a continuous alarm will sound and the red indicator light in the Reset button will illuminate at the end of the last step.
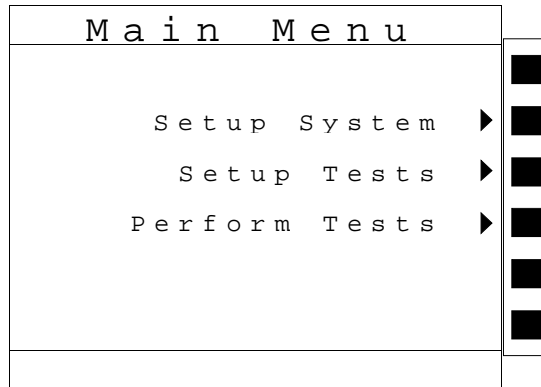
To stop the alarm you must press the illuminated RED button marked "RESET." This will silence the alarm, clear the red fail light, and reset the instrument for the next test. The RESET button may also be used to quickly ABORT a test and cut off the power to the DUT.

When a test is being performed, a red lightning bolt indicator located in the lower right side of the front panel will illuminate and flash until the test is finished. If the DUT passed the entire test sequence, you will hear a brief beep indicating the DUT passed and that the tests are complete.
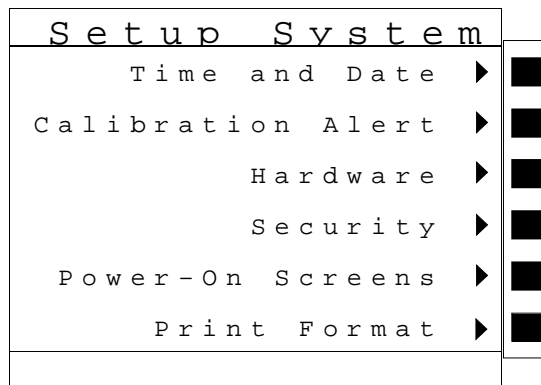
4. Programming Instructions

4.1. Setup System Menu
From the Main Menu screen, press the "Setup System" soft key.

```
 M a i n    M e n u
                            ■

    Setup  System   ▶       ■
      Setup  Tests   ▶      ■
    Perform  Tests   ▶      ■
                            ■
                            ■
```

The Setup System Menu will now be displayed. From the Setup System screen, six different Hardware and Software controls may be accessed; Time and Date, Calibration Alert, Hardware, Security, Power On Screens, and Print Format (Print Format will only be displayed if the printer card option has been installed). Pressing the EXIT key at any time will return you to the Main Menu. The Setup System screen will appear as follows:

```
 S e t u p    S y s t e m
       Time  and  Date   ▶   ■
  Calibration  Alert   ▶      ■
          Hardware   ▶        ■
          Security   ▶        ■
   Power-On  Screens   ▶      ■
       Print  Format   ▶      ■
```

4.1.1. Time and Date

From the System Setup screen, press the "Time and Date" soft key. The Time and Date setting screen will now be displayed**.** From the Time and Date setting screen, four different parameters may be accessed, Set Date, Set Time, Date Format and Time Format. The Time and Date Setting screen will appear as follows:

```
 T i m e     a n d     D a t e
         S e t   D a t e    01/27/2001   ■

         S e t   T i m e    16:20:45      ■

      D a t e   F o r m a t   mm/dd/yyyy ▶ ■

      T i m e   F o r m a t   24 hour    ▶ ■

                                           ■

                                           ■
```

Set Date

From the Time and Date setting screen, highlight the Set Date parameter by using the up and down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Set Date and Set Time.

Within the Set Date parameter are three separate fields, month, day, and year. Using the left and right arrow keys select the field within the date, you want to edit. Using the numeric keypad enter the new number. Once you begin typing a new number, the parameter will blank and the cursor will begin blinking. This indicates that the parameter is being edited. Once a parameter is edited, it is necessary to complete the edit either by pressing the ENTER key to accept the new number or the EXIT key to escape from the edit and return to the original number.

Set Time

From the Time and Date setting screen, highlight the Set Time parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Set Date and Set Time.

Within the Set Time parameter are three separate fields, hours, minutes, and seconds. The time must be set using 24-hour Military time. Using the left and right arrow keys to select the field within the time parameter you want to edit. Using the numeric keypad enter the new number. Once you begin typing a new number, the parameter will blank and the cursor will begin blinking. This indicates that the parameter is being edited. Once a parameter is edited, it is necessary to complete the edit either by pressing the ENTER key to accept the new number or the EXIT key to escape from the edit and return to the original number.

Date Format

From the Time and Date setting Screen, press the "Date Format" soft key. As the soft key is pressed, the displayed date will toggle between two different date formats, yyyy/mm/dd or mm/dd/yyyy.

Time Format

From the Time and Date setting Screen, press the "Time Format" soft key. As the soft key is pressed, the time format will toggle between 12 hour and 24 hour modes. Although the time format may be set to either 12 or 24-hour modes, the time must still be set using 24-hour Military time.

4.1.2. Calibration Alert

Calibration Alert is a feature that will allow the instrument to give an advanced alert that the calibration for the instrument is coming due. From the System Setup screen, press the "Calibration Alert" soft key. The Cal. Alert setting screen will now be displayed**.** From the Cal. Alert setting screen, three different parameters may be accessed, Cal Due, Alert Date, Cal. Alert. The Cal. Alert setting screen also displays the date of the last performed calibration. The Cal. Alert setting screen will appear as follows:

```
┌──────────────────────────────┐ ┌──┐
│  C a l .   A l e r t         │ │■ │
│   Cal. Date  01/01/2001      │ ├──┤
│    Cal. Due ┌01/01/2002┐     │ │■ │
│  Alert Date └01/01/2001┘     │ ├──┤
│                              │ │■ │
│  Cal. Alert ┌   OFF   ┐ ▶    │ ├──┤
│                              │ │■ │
│                              │ ├──┤
│                              │ │■ │
│                              │ ├──┤
│                              │ │■ │
│                              │ └──┘
└──────────────────────────────┘
```

Calibration Due Date

It is recommended that calibration should be performed at least once a year. It is recommended that the Calibration Due date not bet set greater than one year from the Cal. Date displayed.

From the Cal. Alert setting screen, highlight the Cal. Due parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Cal Due and Alert Date.

Using the left and right arrow keys and the numeric keypad enter the Calibration Due date. Press the ENTER key to finish.

Alert Date

The Alert date is like an alarm clock that will warn you in advance of the actual calibration due date. After a calibration is performed, the Alert Date is automatically set 11 months after the

calibration date. For example, if the calibration is performed on 12/15/2001 the Alert Date will automatically be set to 11/15/2002. Although this date is automatically written into the Alert Date location, it may be manually overwritten to any advanced date desired.

At the Cal. Alert setting screen, highlight the Alert Date parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Cal Due and Alert Date.

Within the Alert Date parameter are three separate fields, month, day, and year. Using the left and right arrow keys select the field within the date, you want to edit. Using the numeric keypad enter the new number. Once you begin typing a new number, the parameter will blank and the cursor will begin blinking. This indicates that the parameter is being edited. Once a parameter is edited, it is necessary to complete the edit either by pressing the ENTER key to accept the new number or the EXIT key to escape from the edit and return to the original number.

The Calibration Alert Warning screen appears as follows:

```
 C a l .   A l e r t
┌─────────────────────────────────┐ ┌───┐
│ Model Omnia 4, serial number 1234567 is │ │ ■ │
│ due for Calibration on 9/21/2000.       │ └───┘
│ Please contact Associated Research Inc. │ ┌───┐
│ to arrange for calibration.             │ │ ■ │
├──────────────────────┬──────────────────┤ └───┘
│ Associated Research Inc. │ Show this     │ ┌───┐
│ 13860 W. Laurel Drive    │ screen again? │ │ ■ │
│ Lake Forest, IL 60045-4545│              │ └───┘
│ U.S.A                    │  ┌──────┐     │ ┌───┐
│                          │  │  Yes │ ►   │ │ ■ │
│ Phone: 1-847-367-4077    │  └──────┘     │ └───┘
│ Toll Free 1-800-858-8378 │  Password     │ ┌───┐
│ Fax: 1-847-367-4080      │  ┌──────────┐ │ │ ■ │
│ email: info@asresearch.com│ │xxxxxxxxxx │ │ └───┘
│ Web: www.asresearch.com  │  └──────────┘ │ ┌───┐
│                          │     O K  ►    │ │ ■ │
└──────────────────────────┴──────────────┘ └───┘
```

At the Calibration Alert Warning screen there are three options, "Show this screen again?", Password and OK. "Show this screen again?" is asking if you would like to continue seeing the Calibration Alert Warning screen every time you power up the instrument. You may turn this screen "OFF" by toggling to the word "No" using the soft key next to this parameter. If the instrument is password protected you will need to enter the password in order to turn off the "Show this screen again" parameter. Selecting the "Show this screen again" parameter "OFF" will disable the Calibration Alert function. Pressing the OK soft key will exit the Calibration Alert Warning screen and go to the standard introduction screen.

Calibration Alert On/Off
From the Cal. Alert setting screen, you may turn the Calibration Alert function ON and OFF by pressing the "Cal. Alert" soft key. If the "Show this screen again?" function has been turned "OFF" at the Calibration Alert Warning screen, this parameter will automatically be set to "OFF". Turning this parameter "ON" will activate the Cal Alert function and when the date

matches the Alert Date, the instrument will display the Calibration Alert warning screen upon power up.

4.1.3. Hardware

From the System Setup screen, press the "Hardware" soft key. The Hardware setting screen will now be displayed. From the Hardware setting screen, five different parameters may be accessed: Alarm Volume, LCD Contrast, GPIB Address, Smart GFI, and PLC Remote. The Hardware setting screen will appear as follows:

```
                H a r d w a r e
A l a r m   V o l u m e [      5 ]      ■

L C D   C o n t r a s t [      6 ]      ■

G P I B   A d d r e s s [     2 2 ]     ■

  S m a r t   G F I    [    O F F ] ▶   ■

  P L C   R e m o t e  [    O F F ] ▶   ■

D U T - H V   S e t u p [     O N ] ▶   ■

                                        ■
```

Alarm Volume

From the Hardware setting screen, highlight the Alarm Volume parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Alarm Volume, LCD Contrast and GPIB Address.

Use the numeric keypad to set the Volume of the alarm in the instrument. Enter a number between 0 and 9, 0 being the volume is off and 9 being the loudest setting. After the number is entered, a momentary alarm chirp will occur to indicate the volume of the new setting.

LCD Contrast

From the Hardware setting screen, highlight the LCD Contrast parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Alarm Volume, LCD Contrast and GPIB Address.

Using the up and down arrow keys and the numeric keypad set the Contrast of the display. Enter a number between 0 and 9, 0 being the lightest color of displayed characters and 9 being the darkest color of displayed characters. After the number is entered, the display will automatically adjust to the new display setting.

GPIB Address

From the Hardware setting screen, highlight the GPIB Address parameter by using the up or down arrow keys. The up and down arrow keys will toggle the highlighted area of the screen between the Alarm Volume, LCD Contrast and GPIB Address.

Use the numeric keypad to select the GPIB Address number between 0 and 30. Finish by pressing the ENTER key.

Smart GFI (Ground Fault Interrupt)
The High Voltage power supply of the instrument is internally referenced to earth ground. The leakage current measuring circuits monitor only currents that flow through the Return lead. Therefore, the possibility exists for current to flow directly from the High Voltage output to earth ground that typically would not be monitored.

GFI is a circuit that monitors the current between the High Voltage output and earth ground. The GFI's main purpose is to protect the operator from prolonged exposure to High Voltage in the case of an accidental contact with the High Voltage lead and earth ground. If the operator accidentally touches the High Voltage lead and earth ground, the High Voltage will be shut off immediately and the test aborted. If the GFI threshold is exceeded, the display will indicate a GFI Fail.
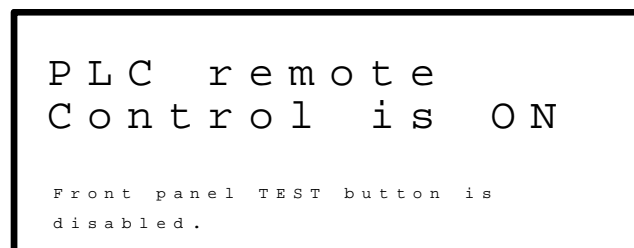
Smart GFI allows the user to automatically configure the instruments return configuration. When the Return lead is earth grounded, the GFI circuit is disabled and the instrument operates in a grounded return mode of operation. Grounded Return allows the user to perform tests on devices that have their chassis earth grounded by the test fixture or test environment. The standard configuration of Omnia is a floating return connection that is not directly connected to Earth ground. The standard configuration allows monitoring of very low level leakage current without internal or external stray earth ground leakage currents being measured and thereby causing errors in the reading. Grounding the return will create some amount of leakage current that is proportional to the High Voltage output and can cause small amounts of error depending on the test voltage and physical environment.

From the Hardware setting screen, you may turn the GFI ON and OFF by pressing the "Smart GFI" soft key. Selecting the Smart GFI = "OFF", will only disable the ground current failure detectors. It does not disable the capability to externally earth ground the return lead.

PLC Remote
From the Hardware setting screen, you may turn the PLC remote ON and OFF by pressing the "PLC Remote" soft key. Refer to the section **7. Connection of Remote I/O** for details.
If you attempt to start a test from the front panel Test button and the PLC remote function is turned "ON", a pop-up message will be displayed. The pop-up message will appear as follows:

```
P L C   r e m o t e
C o n t r o l   i s   O N

Front panel TEST button is
disabled.
```

DUT-HV Setup (8105 and 8106)

The DUT-HV selection activates an additional parameter in the AC Withstand, DC Withstand and IR Tests parameter screens. The additional parameter is called "DUT Output" and its function is to control the high voltage relay at the DUT output.

When the DUT Output parameter is selected ON during an AC Withstand, DC Withstand, or IR test, high voltage will be present at the DUT outputs as well as the front and rear panel HV connectors. When the DUT Output parameter is selected OFF, no high voltage will be present at the DUT connectors, only the front and rear panel HV connectors will have high voltage.

From the Hardware setting screen, you may turn the DUT-HV parameter selection ON and OFF by pressing the "DUT-HV Setup" soft key. Selecting the DUT-HV = "OFF", will prevent the parameter from appearing on the AC Withstand, DC Withstand, and IR test parameter-setting screens.

Please refer to section **4.4 Test Parameters** for additional parameter information and screen appearance.

4.1.4. Security

From the System Setup screen, press the "Security" soft key. One of two possible Security screens will be displayed. The Security screens appear as follows:

```
        S e c u r i t y                          S e c u r i t y
    Create  Password  ▶ ■                                          ■
                        ■                                          ■
                        ■                        Password  xxxxxxxxx ■
    Security    OFF   ▶ ■                                          ■
 File  Recall   OFF   ▶ ■                                          ■
                        ■                                          ■
```
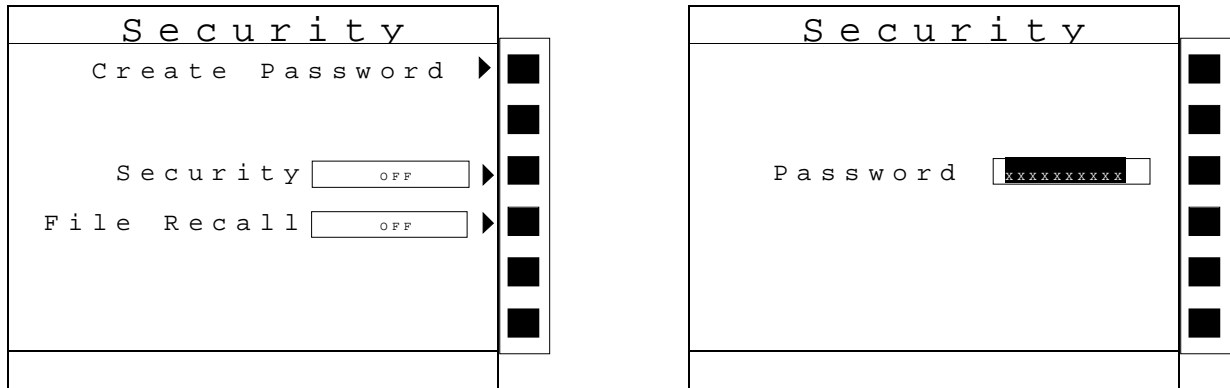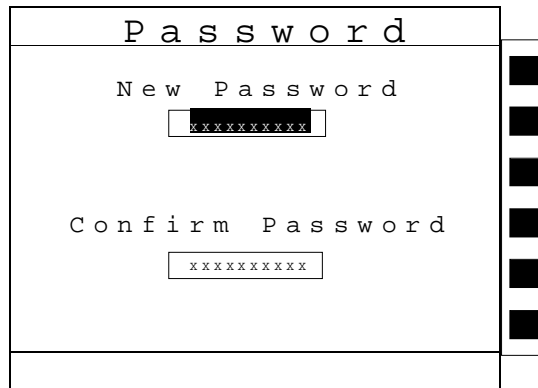
Initially, the instrument will not have a password enabled and the Security setting screen will appear (screen on the left, refer to the above illustrations). You may create a password from this screen so that all security functions will require a password to access. From the Security settings screen, three different parameters may be accessed, Create Password, Security and File Recall.

If a password has already been created then the Security password screen (screen on the right) will appear and typing in the correct password will be required to access the Security setting screen. From the password protected Security settings screen, three different parameters may be accessed, Change Password, Security and File Recall. The Security setting screen that will appear after a password has been created and entered correctly, will appear as follows:

```
            S e c u r i t y
       Change  Password  ▶ ■
                           ■
       Security     OFF  ▶ ■
    File  Recall    OFF  ▶ ■
                           ■
                           ■
```
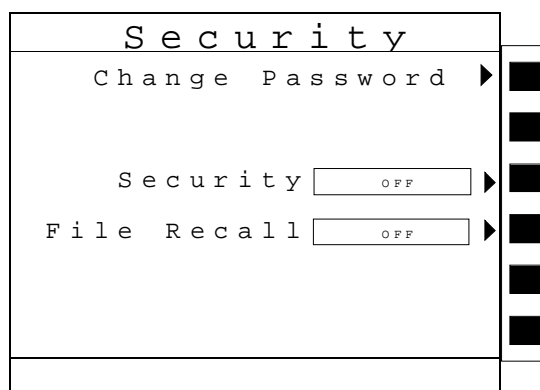
Create Password

From the initial Security setting screen, you may create a password by pressing the "Create Password" soft key. Press the "Create Password" soft key, the Password setting screen will now be displayed. The Password setting screen will appear as follows:

```
┌─────────────────────────────────┐
│         P a s s w o r d         │ ┌──┐
│                                 │ │■ │
│      N e w   P a s s w o r d    │ │■ │
│         [xxxxxxxxx]             │ │■ │
│                                 │ │■ │
│  C o n f i r m   P a s s w o r d│ │■ │
│         [xxxxxxxxx]             │ │■ │
│                                 │ └──┘
│                                 │
└─────────────────────────────────┘
```

You may now type in the new password using the numeric keypad, press the Enter key to accept the new password or press the exit key to escape. After you type in your new password, you will be required to confirm your new password by typing it again into the "Confirm Password" field. Press the Enter key to confirm the new password or press the EXIT key to escape.

Change Password

From the Security setting screen, you may change the security password by pressing the "Change Password" soft key. Once you press the "Change Password" soft key the Password setting screen will appear.

Security

From the Security setting screen, you may turn the Security function ON and OFF by pressing the "Security" soft key. Selecting security "ON" restricts access to parameter settings. The level of security is determined by the File Recall function.

Whenever security is selected "ON", Single Step and Fail Stop soft keys will be disabled at the Perform Test screen.

Whenever security is enabled, you may only start at Test file at Test step 1.

File Recall

File Recall is a sub-function of the security setting. In order for the File Recall function to work, the Security must first be turned "ON". From the Security setting screen, you may turn the File Recall function ON and OFF by pressing the "File Recall" soft key. Selecting the File Recall "ON" will allow the user to access all available test files but still restricts access to file editing capability. Selecting the file recall "OFF" will allow the user to only run the currently loaded test file.

Disabling the password

To disable the password simply change the password to "0". After the password is reset to "0" all security functions may be access without the use of a password.

Forgotten Password

If you have forgotten your password you may access all security functions by typing in the number "8000" into the password field. The old password can not be recovered. A new password should be entered or enter "0" to disable the password.

4.1.5. Power-On Screen

The Power-On screen allows you to select the screen(s) that will be displayed when the instrument is first powered up. From the System Setup screen, press the "Power-On Screens" soft key. The Power-On screen will now be displayed. The Power-On screen will appear as follows:

```
┌─────────────────────────────┐
│      P o w e r ━ O n        │ ┌──┐
│ Verification [    OFF    ]   │ │▓▓│
│    Omnia  Info [  Pause  ]   │ │▓▓│
│    Main  Menu  [    ON    ]  │ │▓▓│
│                             │ │▓▓│
│                             │ │▓▓│
│                             │ │▓▓│
│                             │
└─────────────────────────────┘
```

From the Power-On screen, three different parameters may be accessed, Verification, Omnia Info and Main Menu.

Verification

Setting this to ON will allow you to run instrument verification from the Omnia Information screen. Toggling this to OFF will disable the ability to run Instrument Verification. Setting this to OFF will also disable the words "Press TEST to Verification" from appearing on the Omnia Information screen.

Omnia Info

The Omnia Information screen is the very first screen to appear when the instrument is powered up. You have the option to PAUSE the instrument at this screen after power up or CONTINUE through to the next screen after the Information screen is displayed for four seconds. The option to PAUSE or CONTINUE may be selected by pressing the Omnia Info soft key. When PAUSE is selected the words "Press any key to continue" will appear at the bottom of the Omnia Information screen.

Main Menu

When the Main Menu parameter is ON, the first display to appear after the Omnia Information screen is the Main Menu. When the Main Menu parameter is OFF the first display to appear after the Omnia Information screen is the Perform Test screen.

Configure Omnia to go Directly to the Perform Test screen

Set the Verification selection to OFF, set Omnia Info to CONTINUE, and set the Main Menu selection to OFF. Now when the instrument is powered on it will go directly to the Perform Test screen.

4.1.6. Print Format

Refer to section **8 Options** for Print Format functions.

4.2. Setup Tests Menu

From the Main Menu screen, press the soft key "Setup Tests".

```
┌─────────────────────────────────┐
│  M a i n    M e n u          │ ■
│                              │ ■
│      Setup  System  ▶        │ ■
│        Setup  Tests  ▶       │ ■
│      Perform  Tests  ▶       │ ■
│                              │ ■
│                              │ ■
│                              │
└─────────────────────────────────┘
```
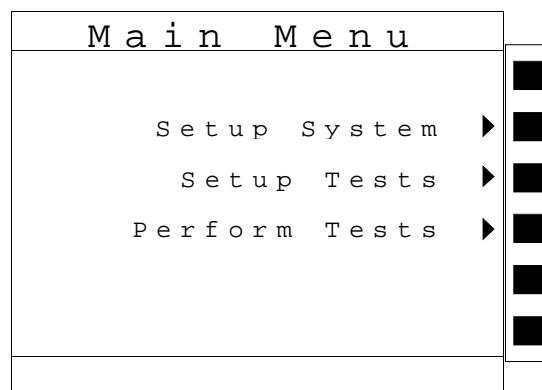
The Setup Tests Menu will now be displayed. From the Setup Tests screen, six different software controls may be accessed: Add, Edit, Delete, Prompt, File, and Fail Stop. The Setup Tests screen will appear as follows:

```
┌─────────────────────────────────┐
│  S e t u p    T e s t s      │
│ 01              ◀       Add ▶│ ■
│                        Edit ▶│ ■
│                      Delete ▶│ ■
│                      Prompt ▶│ ■
│                        File ▶│ ■
│              Fail Stop  OFF ▶│ ■
│ ▲Move up ▼Move down  Press ENTER to
│ ◀Page up ▶Page down  Perform Tests.
└─────────────────────────────────┘
```
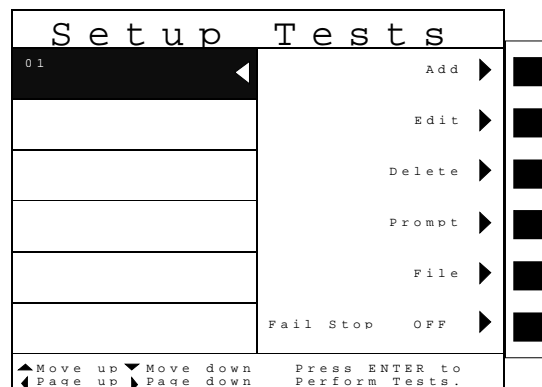
The Setup Tests screen is the central starting point for programming tests into the instrument. From this screen, test parameters are entered and edited, and the order of the test steps are

arranged and then stored to test files. The Omnia is capable of performing a 30 step sequential test from a single test file.

The Setup Tests screen is separated into two main sections. The left half of the screen lists the steps and the parameters contained within each step. The right half of the screen contains the soft key menu. When more than 5 steps are programmed in a test file, the left and right arrow keys will page through the screens of steps. Individual steps may be scrolled to using the up and down arrow keys.

4.2.1. Add

From the Setup Tests screen, press the "Add" soft key. The Setup Tests, Test selection screen will now be displayed. From the this screen you may select what type of test you wish to add to a test sequence, AC Withstand, DC Withstand, Insulation Resistance and Continuity. The Test selection screen will appear as follows:

```
 S e t u p     T e s t s
 01                    ◄        AC Withstand ►   ■

                                DC Withstand ►   ■

                                Insulation
                                Resistance   ►   ■

                                Continuity   ►   ■

                                                 ■

 File Name:NEW FILE                              ■

 Select a test type.
```

For a detailed description of how to set up a test sequence, please refer to section **4.3 Setting Up a Test.**

For a detailed description of the screens and parameters that are associated with Test selection softkeys on this screen please refer to section **4.4 Test Parameters.**

4.2.2. Edit

From the Setup Tests screen, use the up, down arrow keys, and scroll the highlighted area to the step you wish to edit. Press the "Edit" soft key. The Parameter-setting screen, for the type of test that is in that location will now be displayed. The parameters for the test may now be edited.

For a detailed description of the screens and parameters that are associated with the Edit softkey on this screen please refer to section **4.4 Test Parameters.**

4.2.3. Delete

From the Setup Tests screen, use the up, down arrow keys, and scroll the highlighted area to the step you wish to delete. Pressing the "Delete" soft key will remove the step.

4.2.4. Prompt

The prompt function allows you to insert a short line of text in a step. The prompt will appear on the screen before the step is initiated and remain on the screen until the TEST button is pressed. After the TEST button is pressed, the Prompt will clear and the step will initialize. Use the up, down arrow keys to scroll the highlighted area to the step where you would like to insert the text prompt and press the "Prompt" soft key. The Prompt screen will now be displayed. The Prompt screen will appear as follows:

```
                P r o m p t
                                               ▉

      PLEASE TURN ON THE POWER SWITCH          ▉
      OF THE DUT.
                                               ▉

  _____
  A B C D E F G H I                            ▉
  J K L M N O P Q R
  S T U V W X Y Z                              ▉
  . ⁻ _ ~   Space
                              Select  ▶        ▉
  Use arrow keys and alphabetic chart to
  Create message. Use front panel keys for
  numeric entry
```

To enter a text prompt, use the arrow keys to scroll the highlighted area to the character (or enter a number from the numeric keypad) you wish to use and then press the "Select" soft key. At the text prompt edit, the letter or symbol will be inserted at the point where the cursor is flashing. The cursor will then increment to the next position and wait for an additional character insertion. If you make a mistake or want to change the character, press the backspace key in the numeric keypad. The cursor will decrement and erase the character. The maximum number of characters that may be used in a prompt is 32. When you have finished editing the prompt press the ENTER key. After a prompt is inserted in a step, a "P" will appear within the step parameters below the step number.

4.2.5. File

From the Setup Tests screen, press the "File" soft key. The File Setup screen will now be displayed. From the File Setup screen, five different file-handling controls may be accessed: New File, Save, Save As, Delete, and Load. The File Setup screen will appear as follows:

```
        F i l e   S e t u p
                              New File  ▶       ▉

        FILES                     Save  ▶       ▉
     1  ARITEST1
                               Save As  ▶       ▉

                                Delete  ▶       ▉

                                  Load  ▶       ▉

                                                ▉
```

New File

From the File Setup screen, press the "New File" soft key. The Create File screen will now be displayed. For a detailed description of creating a new file, refer to the section **4.3 Setting Up a Test**. The Create File screen will appear as follows:

```
        C r e a t e    F i l e            ┌─┐
                                          │■│
           F i l e   N a m e :            ├─┤
              NEW FILE                    │■│
                                          ├─┤
                                          │■│
                                          ├─┤
 A B C D E F G H I                        │■│
 J K L M N O P Q R                        ├─┤
 S T U V W X Y Z                          │■│
 . ‾ _ ~   Space                          ├─┤
                       Select ▶           │■│
 Use arrow keys and alphabetic chart to   └─┘
 create file name. Use front panel keys
 for numeric entry
```

Save

To save a file with its current name press the "Save" soft key from the File Setup screen.

Save As

To save an edited file without overwriting the original or to give a file a new name, press the "Save As" soft key from the File Setup screen. The Create File screen will now be displayed. For a detailed description of creating a new file, refer to the section **4.3 Setting Up a Test**.

Delete

To delete a file, use the up, down arrow keys and scroll the highlighted area to the file you wish to delete and press the "Delete" soft key. A warning will appear on the screen asking if you want to delete the file. Press the ENTER key to complete the deletion or press the EXIT key to escape.

Load

To load a test file, use the up, down arrow keys and scroll the highlighted area to the file you wish to load and press the "Load" soft key.

4.2.6. Fail Stop

Fail Stop is a function that will stop a sequence of tests at the step if a failure occurs. If this function is turned off, the sequence of tests will continue to the end of the sequence regardless of whether or not a failure has occurred. If the Fail stop is off and a failure occurs during the test sequence, the RESET button will light and a short alarm will sound but the sequence will continue to the end. At the end of the test sequence, the RESET button will light and alarm will sound indicating failure during the sequence. Pressing the RESET button will silence the alarm and reset the instrument. Turn the Fail Stop function ON and OFF by pressing the "Fail Stop" soft key. Fail stop is a parameter that is stored within the test file but may also be turned ON and OFF temporarily from the Perform Tests screen. If security is enabled you may not turn Fail Stop ON and OFF using the "Fail Stop" soft key. Fail Stop automatically defaults to the setting stored in the file when security is activated.

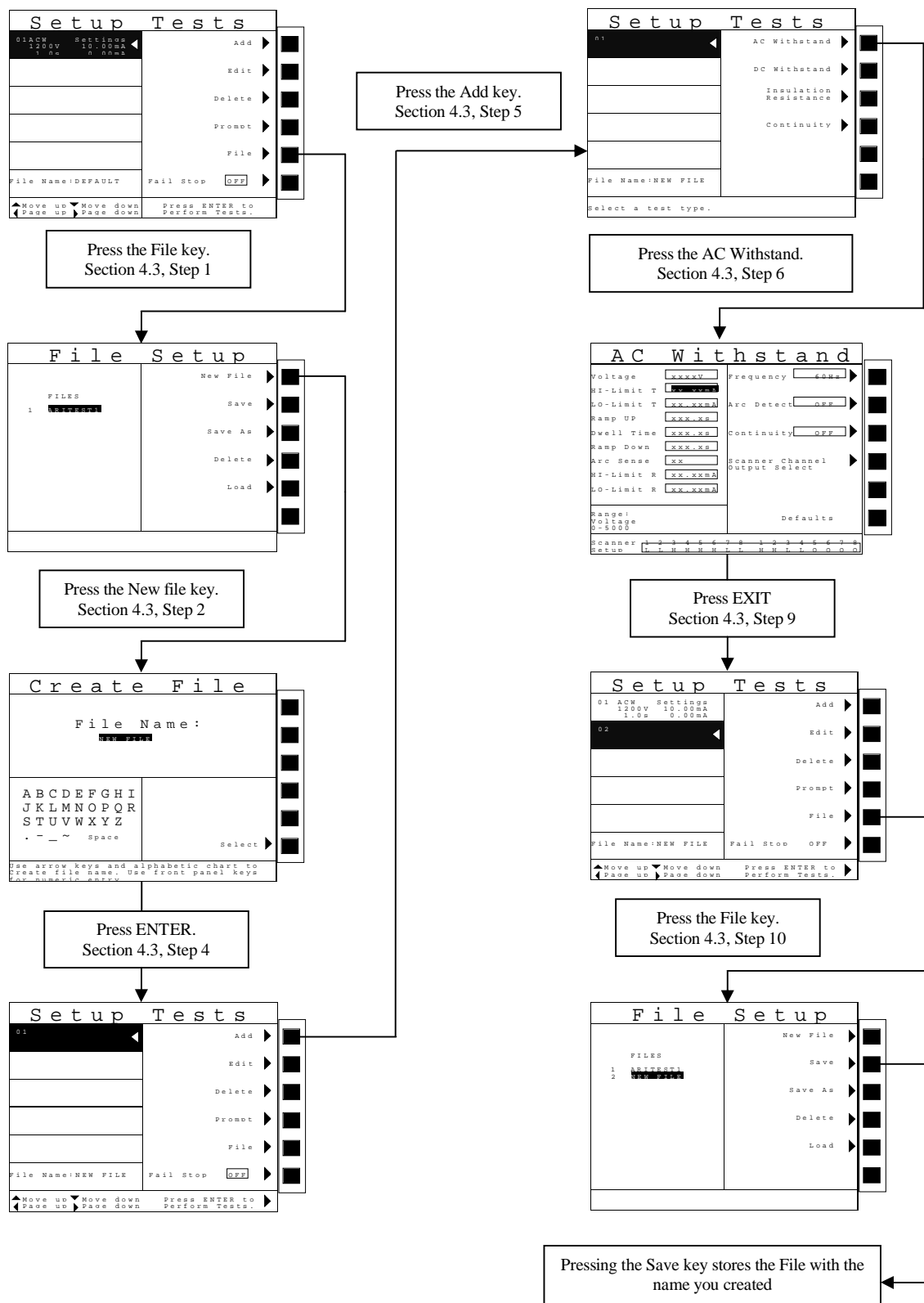**Fail Stop with Run and Line Leakage tests**

Associated Research recommends performing a Hipot test, with the Fail Stop "ON", prior to performing a Run Test or Line Leakage test. Performing a Hipot test first can detect if a DUT is shorted line to ground before applying line power to it.

4.3. Setting Up a Test (Refer to FIG.1).

Upon power up, Omnia will initialize with the test file that was last used before power down. New instruments come loaded with one default file, this is the file that the instrument will "Boot Up" with until it is changed.

1. From the Setup Tests screen, press the "File" soft key, The File Setup screen will now be displayed.

2. From the File Setup screen, press the soft key "New File". The Create File screen will now be displayed.

3. The Create File screen is separated into three main sections, Alphabet and Symbols, File Name edit, and soft key menu.

4. From the Create File screen, you must give your new test file a name. The file name can be a maximum of ten characters in length and may use any combination of the character set plus numbers. To name your file, use the arrow keys to scroll the highlighted area to the character (or enter a number from the numeric keypad) you wish to use and then press the "Select" soft key. At the File Name edit, the letter or symbol will be inserted at the point where the cursor is flashing. The cursor will then increment to the next position and wait for an additional character insertion. If you make a mistake or want to change the character, press the backspace key in the numeric keypad. The cursor will decrement and erase the character. When you have finished editing the file name press the ENTER key.

5. From the Setup Tests screen, press the "Add" soft key. The Setup Test, Tests Selection screen will now be displayed. From this screen you may choose what type of test to perform, AC Withstand, DC Withstand, Insulation Resistance, or Continuity.

6. From the Setup Test, Test Selection screen, press the soft key next to the type of test you wish to add to the test sequence (for the example in FIG.1 AC Withstand will be selected). The Parameter-setting screen for the type of test you have chosen will now be displayed.

7. From Parameter-setting screen, you may set your own custom set of parameters for the test or choose the defaults from the soft key menu. All of the individual parameters for the test may be accessed using the up and down arrow keys, and the ENTER key. As the arrow keys are pressed, the highlighted area will scroll to the different parameters. The ENTER key may also be used to scroll to the different parameters. At the bottom of the screen is the Scanner Setup parameter, for a detailed explanation of how this feature works, refer to the **Scanner Connections** section.

8. Scroll to a parameter you wish to edit. The parameter that is highlighted may now be edited. (Refer to Section 4.3. of this manual for complete parameter entry instructions.) Enter a new number via the numeric keypad. Once you begin typing a new number, the parameter will blank and the cursor will begin blinking. This indicates that the parameter is being edited. Once a parameter is edited, it is necessary to complete the edit either by pressing the ENTER key to accept the new number or the EXIT key to escape from the edit and return to the original number.

9. Press the EXIT key to "Add" this test to the sequence of tests. The Setup Tests screen will now be displayed which will include the parameters for the test you have just added.

FIG.1

Setup Tests

01 ACW   Settings
   1200V   10.00mA
   1.0s   0.00mA

Add
Edit
Delete
Prompt
File

File Name:DEFAULT   Fail Stop   OFF

▲Move up ▼Move down   Press ENTER to
◄Page up ►Page down   Perform Tests.

Press the File key.
Section 4.3, Step 1

File Setup

FILES
1 ARITEST1

New File
Save
Save As
Delete
Load

Press the New file key.
Section 4.3, Step 2

Create File

File Name:
NEW FILE

A B C D E F G H I
J K L M N O P Q R
S T U V W X Y Z
. - _ ~   Space

Select

Use arrow keys and alphabetic chart to
Create file name. Use front panel keys
for numeric entry.

Press ENTER.
Section 4.3, Step 4

Setup Tests

01

Add
Edit
Delete
Prompt
File

File Name:NEW FILE   Fail Stop   OFF

▲Move up ▼Move down   Press ENTER to
◄Page up ►Page down   Perform Tests.

Press the Add key.
Section 4.3, Step 5

Setup Tests

01

AC Withstand
DC Withstand
Insulation Resistance
Continuity

File Name:NEW FILE

Select a test type.

Press the AC Withstand.
Section 4.3, Step 6

AC Withstand

Voltage   xxxxV   Frequency   60Hz
HI-Limit T   xx.xxmA
LO-Limit T   xx.xxmA   Arc Detect   OFF
Ramp UP   xxx.xs
Dwell Time   xxx.xs   Continuity   OFF
Ramp Down   xxx.xs
Arc Sense   xx   Scanner Channel
HI-Limit R   xx.xxmA   Output Select
LO-Limit R   xx.xxmA

Range: Defaults
Voltage
0-5000

Scanner 1 2 3 4 5 6 7 8   1 2 3 4 5 6 7 8
Setup   L L H H H H L L   H H L L O O O O

Press EXIT
Section 4.3, Step 9

Setup Tests

01 ACW   Settings
   1200V   10.00mA
   1.0s   0.00mA
02

Add
Edit
Delete
Prompt
File

File Name:NEW FILE   Fail Stop   OFF

▲Move up ▼Move down   Press ENTER to
◄Page up ►Page down   Perform Tests.

Press the File key.
Section 4.3, Step 10

File Setup

FILES
1 ARITEST1
2 NEW FILE

New File
Save
Save As
Delete
Load

Pressing the Save key stores the File with the
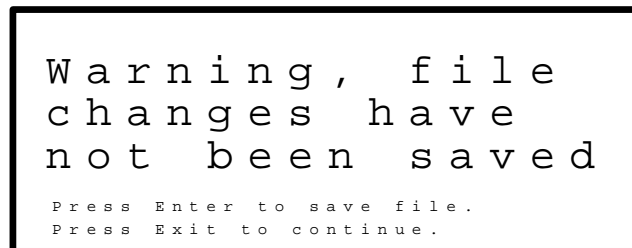name you created

10. At this point, you may add more tests to the sequence, insert tests, insert prompts, perform the test sequence, or store the sequence to the file name you created.

Adding More tests to the Sequence

To add more tests to the sequence simply repeat steps 5-10 of this section.

Performing a Test from the Setup Tests screen

To perform the test you have just created press the ENTER key. The Perform Tests screen will now be displayed along with a pop-up message that appears as follows:

```
Warning,  file
changes  have
not  been  saved
Press Enter to save file.
Press Exit to continue.
```

Pressing the Enter key will store the file with the file name you gave it and go to the Perform Test screen. You may now perform a test (Refer to section **5.2** on Performing Tests).

Pressing the Exit key will return you to the Main Menu and not save the file. Even though the file has not been saved, the file will be retained in RAM until another file is loaded or created, or until the instrument is powered down.

Saving the Test File

From the Setup Tests screen, press the "File" soft key. The File Setup screen will now be displayed.

From the File Setup screen, press the "Save" soft key. The file will save to the name you created and the Setup Tests screen will now be displayed with the new file loaded.

The instrument is now ready to perform tests with the new file. You may now press the ENTER key to go to the Perform Tests screen or press the EXIT key to return to the Main Menu.

Inserting Tests

From the Setup Tests screen, scroll the highlighted area to the step in the sequence where you would like to insert a test.

Press the "Add" soft key. The highlighted area will blank and the test that was originally at this step in the sequence, as well as all of following steps, will increment. Simultaneously, Setup Test, Tests Selection screen will now be displayed.

You may now select the type of test you wish to insert from the soft key menu.

Inserting a Text Prompt
Refer to section **4.2.4 Prompt** for a detailed description of inserting text prompts.

4.4. Test Parameters

From the Setup Tests screen, press the "Add" soft key. The Setup Test, Tests Selection screen will now be displayed. From this screen, you may choose what type of test to perform, AC Withstand, DC Withstand, Insulation Resistance, or Continuity. If you have model 8105, you will also have the Run Test selection. If you have model 8106, you will have Line leakage and Run Test selections. The Setup Test, Tests Selection screen will appear as follows:

```
 S e t u p     T e s t s
 0 1                    ◄        AC Withstand  ▶   ■

                                 DC Withstand  ▶   ■

                                  Insulation
                                  Resistance   ▶   ■

                                  Continuity   ▶   ■

                                 Line Leakaqe  ▶   ■

 File Name:NEW FILE                 Run Test   ▶   ■

 Select a test type.
```

Test Parameter Notes

- Once you begin typing a new number, the parameter will blank and the cursor will begin blinking. This indicates that the parameter is being edited. Once a parameter is edited, it is necessary to complete the edit either by pressing the ENTER key to accept the new number or the EXIT key to escape from the edit and return to the original number. The one exception to this rule is the scanner parameter. The scanner parameter will not blank when being edited.

- When the ENTER key is pressed to accept a parameter change the highlighted area of the display will automatically move to the next parameter.

- The lower left corner of the Test parameter-setting screen displays the "Range" of the parameter that is highlighted. Use this as a guide when setting your parameters.

- All softkey functions in the parameter menus toggle between two conditions and no data entry is required i.e. The frequency softkey toggles between 50Hz and 60Hz.

- Pressing the "Default" soft key will set all of the test parameters to the preset default parameters. Once the default soft key is pressed, it is necessary to complete the edit either by pressing the ENTER key to accept the parameter overwrite or the EXIT key to escape from the edit and return to the original values. Refer to section 4.4.7 for the preset default parameters.

- When multiple screens of steps are programmed into a file, you may use the left and right arrow keys to scroll through pages of screens.

4.4.1. Description of Test Parameters

Voltage: The Voltage that is applied to the High Voltage and Return terminals or the Current and Return terminals during a test.

Current: The Current that is applied between the Current and Return lead during a ground bond test.

Current-HI: The maximum allowable current-flow through the DUT that when exceeded triggers a failure.

Current-LO: The minimum allowable current-flow through the DUT that when not exceeded triggers a failure.

Voltage-HI: The maximum voltage allowable at the DUT Power Input Terminal that when exceeded triggers a failure. This trip limit is not affected by the delay time in Run or LLT mode.

Voltage-LO: The minimum voltage allowable at the DUT Power Input Terminal that when not exceeded triggers a failure. This trip limit is not affected by the delay time in Run or LLT mode.

Leakage-HI: The maximum leakage current allowable through the measuring device that when exceeded triggers a failure.

Leakage-LO: The minimum leakage current allowable through the measuring device that when not exceeded triggers a failure.

Power-HI: The maximum allowable power consumption by the DUT that when exceeded triggers a failure.

Power-LO: The minimum allowable power consumption by the DUT that when not exceeded triggers a failure.

PF-HI: The maximum allowable Power Factor that when exceeded triggers a failure.

PF-HI: The minimum allowable Power Factor that when not exceeded triggers a failure.

HI-Limit: A maximum threshold set point that when exceeded triggers a failure. A "T" or an "R" designator is shown in AC withstand parameters and means, "T" total current or "R" real current.

LO-Limit: A minimum threshold set point that when not exceeded triggers a failure. A "T" or an "R" designator is shown in AC withstand parameters and means, "T" total current or "R" real current.

Ramp Up: A length of time that is allowed for the test voltage to climb from 0 to the voltage set point.

Dwell Time: A length of time that is allowed for all programmed parameters set to be applied.

Delay Time: A length of time needed to ensure the DUT has reached proper operating conditions, during which the HI and LO limit detectors are disabled. The over current judgment is activated at the end of the Delay Time. The instrument will not indicate that an over current limit has been exceeded until the Delay Time period has expired.

Ramp Down: A length of time that is allowed for the test voltage to decay from set point to 0.

Arc Sense: During hipot testing some low current arcing may be allowable. Arc sense is a maximum allowable threshold for arcing.

Arc Detect: If the Arc Fail mode is set to "ON", the program will indicate an arc failure when the arc current is exceeds the setting. Arc Detect may be selected "ON or "OFF" using a softkey.

Ramp-HI: Ramp-HI will allow current higher than the normal HI-Limit current setting of the DC Withstand Voltage test, during the Ramp-Up time period, to avoid false failure due to charging current. Ramp-HI may be selected "ON or "OFF" using a softkey.

Charge–LO: The Charge-LO function is used to check if the cables are connected properly at the beginning of a test. This function is only available in DC Withstand and Insulation resistance testing. A description of how to set up this parameter is given in the **4.4.3. DC Withstand** and **4.4.4. Insulation Resistance** parameter sections of this manual.

Offset: This function allows the instrument to compensate for lead and test fixture resistance during a ground bond or continuity test. A description of how to set up this parameter is given in **the 4.4.5.Continuity** and **4.4.6. Ground Bond** parameter sections of this manual.

Frequency: This parameter is available in AC tests only and is selectable using a softkey between 50 and 60Hz.

Continuity in ACW and DCW: This function checks for a connection between the current and return lead. This is a basic DC continuity check and will not disclose a continuity value. Continuity may be selected "ON or "OFF" using a softkey in the ACW and DCW parameters.

Scanner Setup: (This parameter will only be seen on units equipped with a scanner). This multiple parameter allows for set up of the scanner channels. The individual scanner channel parameters may be accessed using the arrow keys and the state of the scanner channel may be selected using a softkey labeled "Scanner Channel Output Select". The three different selectable scanner states are L (scanner channel set to the return point), H (scanner set to the high voltage point) and O (OFF).

Defaults: Pressing this softkey will default all of the test parameters to the predetermined default values (refer to section **4.4.7 default parameters**). Once the default soft key is pressed, it is necessary to complete the edit either by pressing the ENTER key to accept the parameter overwrite or the EXIT key to escape from the edit and return to the original values.

DUT Output (8105 and 8106): This function enables or disables high voltage at the DUT outputs during an AC Withstand, DC Withstand, or IR test. DUT Output parameter will only be present if the DUT-HV Setup is selected ON at the Hardware screen. The DUT Output parameter will appear on the AC Withstand, DC Withstand, or IR test parameter screens as follows:
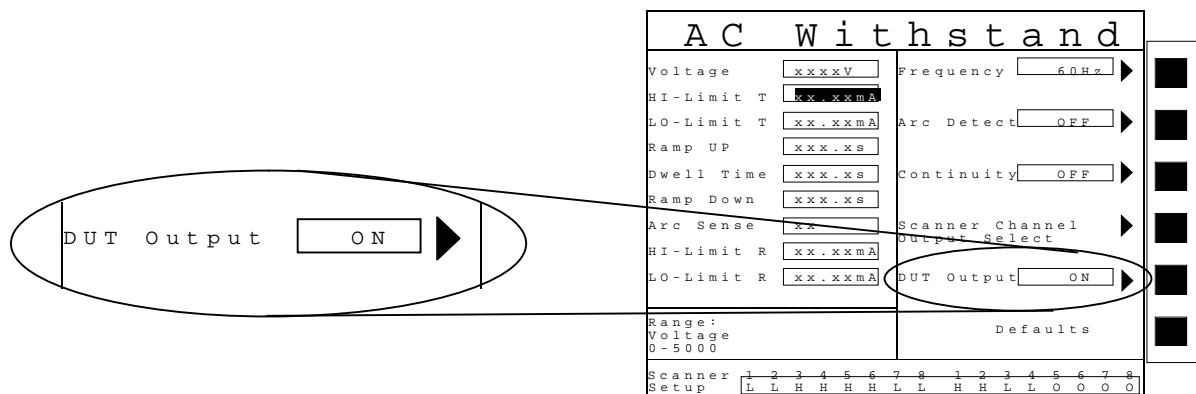
4.4.2. AC Withstand

From the Setup Tests, Tests Selection screen, press the "AC Withstand" soft key. The AC Withstand parameter-setting screen will now be displayed. The AC Withstand parameter-setting screen will appear as follows:

```
        A C   W i t h s t a n d          ┌──┐
                                          │██│
Voltage      ┌─xxxxV─┐   Frequency ┌─60Hz─┐▶
HI-Limit T   │xx.xxmA│                      │██│
LO-Limit T   └xx.xxmA┘   Arc Detect ┌─OFF─┐▶
Ramp UP      └xxx.xs─┘                     │██│
Dwell Time   └xxx.xs─┘   Continuity ┌─OFF─┐▶
Ramp Down    └xxx.xs─┘                     │██│
Arc Sense    └─xx──┘     Scanner Channel  ▶
HI-Limit R   └xx.xxmA┘   Output Select
LO-Limit R   └xx.xxmA┘                     │██│

Range:                         Defaults
Voltage                                   │██│
0-5000
Scanner 1 2 3 4 5 6 7 8  1 2 3 4 5 6 7 8
Setup   L L H H H L L  H H L L O O O O
```

From the AC Withstand setting screen the following parameters may be controlled: Voltage, HI-Limit T, LO-Limit T, Ramp Up, Dwell Time, Ramp Down, Arc Sense, HI-Limit R, LO-Limit R, Frequency, Arc Detect (ON/OFF), Continuity selection (DC continuity or OFF), Scanner Channel Output Select, and Defaults.

An additional parameter exclusive for 8105 and 8106 is DUT Output (DUT Output parameter will only be present if the DUT-HV Setup is selected ON at the Hardware screen).

4.4.3. DC Withstand

From the Setup Tests, Tests Selection screen, press the "DC Withstand" soft key. The DC Withstand parameter-setting screen will now be displayed. The DC Withstand parameter-setting screen will appear as follows:

```
        D C   W i t h s t a n d          ┌──┐
                                          │██│
Voltage      ┌─xxxxV─┐   Ramp-HI  ┌─OFF─┐▶
HI-Limit     │xx.xxmA│                     │██│
LO-Limit     └xx.xxmA┘   Arc Detect ┌─OFF─┐▶
Ramp UP      └xxx.xs─┘                     │██│
Dwell Time   └xxx.xs─┘   Continuity ┌─OFF─┐▶
Ramp Down    └xxx.xs─┘                     │██│
Charge LO    └xxx.xuA┘   Scanner Channel  ▶
Arc Sense    └─xx──┘     Output Select
Press TEST For                             │██│
Automatic Charge-LO
Setting.                                   │██│
RANGE:                         Defaults   ▶
HI-Limit Total
0.00 - 20.00mA                             │██│
Scanner 1 2 3 4 5 6 7 8  1 2 3 4 5 6 7 8
Setup   L L H H H L L  H H L L O O O O
```

From the DC Withstand setting screen the following parameters may be controlled: Voltage, HI-Limit, LO- Limit, Ramp Up, Dwell Time, Ramp Down, Charge-LO, Arc Sense, Ramp-HI, Arc Detect (ON/OFF), Continuity (DC continuity or OFF), Scanner Channel Output Select, and Defaults.

An additional parameter exclusive for 8105 and 8106 is DUT Output (DUT Output parameter will only be present if the DUT-HV Setup is selected ON at the Hardware screen).

Charge–LO

The Charge-LO function is used to check if the cables are connected properly at the beginning of a test. A capacitive DUT will draw charging current on the DC Withstand Voltage test when the Output is activated. If the charging current is lower than the setting, the test cables may not be connected properly. The instrument can set the Charge-LO parameter manually or automatically. To manually set the Charge-LO current, use the up and down arrow keys or the ENTER key and scroll the highlighted area to the Charge-LO current parameter. Enter the new Charge-LO current via the numeric keypad and then press the ENTER key to accept the new parameter or press the EXIT key to escape from the edit. To automatically set the Charge-LO current, use the up and down arrow keys or the ENTER key and scroll the highlighted area to the Charge-LO current parameter. Set the voltage and ramp times to the values that will be used on the DUT and connect the test cables or test fixture between the instrument and DUT. Press the test button.

WARNING	**Please be aware that the program will activate high voltage on the output connector while the Test button is pressed.**

The program will read the charging current of DUT and set the Charge-LO current at approximately one half (1/2) of the reading. The highlighted parameter field will briefly show the word "READING" and then the display the new value. The new value is automatically updated in the field and does not allow an escape to the original value or require that the ENTER key be used to accept the new parameter.

Ramp-HI

The Ramp-HI function is active during the Ramp period only. Ramp-HI will allow current higher than the normal HI-Limit current setting of the DC Withstand Voltage test to avoid false failure due to charging current.

4.4.4. Insulation Resistance

From the Setup Tests, Tests Selection screen, press the "Insulation Resistance" soft key. The Insulation Resistance parameter-setting screen will now be displayed. The Insulation Resistance parameter-setting screen will appear as follows:

```
                 I R   T e s t
Voltage        xxxxV
HI-Limit       xxxxMΩ
LO-Limit       xxxxMΩ
Ramp UP        xxx.xs
Delay Time     xxx.xs
Ramp Down      xxx.xs
Charge-LO      xxx.xuA    Scanner Channel  ▶
                          Output Select
Press TEST For
Automatic Charge-LO
setting.
RANGE:                    Defaults         ▶
HI-Limit
1 - 9999MΩ
Scanner  1 2 3 4 5 6 7 8  1 2 3 4 5 6 7 8
Setup    L L H H H L L    H H L L O O O O
```

From the Insulation Resistance parameter-setting screen the following parameters may be controlled: Voltage, HI-Limit, LO- Limit, Ramp Up, Delay Time, Ramp Down, Charge-LO, Scanner Channel Output Select, and Defaults.

An additional parameter exclusive for 8105 and 8106 is DUT Output (DUT Output parameter will only be present if the DUT-HV Setup is selected ON at the Hardware screen).

Charge–LO

The Charge-LO function is used to check if the cables are connected properly at the beginning of a test. A capacitive DUT will draw charging current on the DC Withstand Voltage test when the Output is activated. If the charging current is lower than the setting, the test cables may not be connected properly. The instrument can set the Charge-LO parameter manually or automatically. To manually set the Charge-LO current, use the up and down arrow keys or the ENTER key and scroll the highlighted area to the Charge-LO current parameter. Enter the new Charge-LO current via the numeric keypad and then press the ENTER key to accept the new parameter or press the EXIT key to escape from the edit. To automatically set the Charge-LO current, use the up and down arrow keys or the ENTER key and scroll the highlighted area to the Charge-LO current parameter. Make sure that the voltage and ramp times are set to the values that will be used on the DUT and connect the test cables or test fixture between the instrument and DUT. Press the test button.

WARNING	**Please be aware that the program will activate high voltage on the output connector while the Test button is pressed.**

The program will read the charging current of DUT and set the Charge-LO current at approximately one half (1/2) of the reading. The highlighted parameter field will briefly show the word "READING" and then the display the new value. The new value is automatically updated in the field and does not allow an escape to the original value or that the ENTER key be used to accept the new parameter.

4.4.5. Continuity

Continuity test is generally used to test the ground conductor of a line cord. If the resistance exceeds Hi-Limit trip point or drops below the LO-Limit trip point the Omnia will signal a continuity failure. When testing products with two prong plugs, do not activate the continuity circuit.

When the Ground Bond test is selected on the Omnia, the High Current will be applied through the Current lead and flow back through the Return lead. The resistance is measured and compared to the HI and LO-Limit trip points stored in memory.

From the Setup Tests, Tests Selection screen, press the "Continuity" soft key. The Continuity Selection screen will now be displayed. The Continuity Selection screen will appear as follows:

```
  S e t u p      T e s t s
 01                         ◄        ■

                                     ■

                    AC  Ground  Bond ▶  ■

                    DC  Continuity   ▶  ■

                                     ■

 File Name:NEW FILE                  ■

 Select a test type.
```

From the Continuity Selection screen, you may select either an AC Ground Bond test or a DC Continuity test.

4.4.6. AC Ground Bond

From the Continuity Selection screen, press the "AC Ground Bond" soft key. The Ground Bond parameter-setting screen will now be displayed. The Ground Bond parameter-setting screen will appear as follows:

```
  G r o u n d      B o n d
 Current      xx.xA    Frequency   60Hz ▶  ■
 Voltage      xxxxV
 Hi-Limit     xxxmΩ                        ■
 Lo-Limit     xxxmΩ
 Dwell Time   xxx.xs                       ■
 Offset       xxxmΩ
 Scanner       x                           ■
 Channel
                                           ■
 Press TEST For
 Automatic Offset
 Setting.
 RANGE:                     Defaults  ▶    ■
 Current
 0 - 30.0A
```

From the Ground Bond parameter-setting screen, the following parameters may be controlled: Current, Voltage, HI-Limit, LO- Limit, Dwell Time, Offset, Scanner Channel, Defaults.

Offset

This function allows the instrument to compensate for lead and test fixture resistance during a ground bond or continuity test. Using the up and down arrow keys or the ENTER key, scroll the highlighted area to the Offset parameter. You may now manually or automatically set an Offset value.

To manually set an Offset value enter a milliohm value via the numeric keypad and then press the ENTER key to accept the new value or press the EXIT key to escape from the edit.

To automatically set an Offset value, set the output voltage, current, and frequency to the values that will be used on the DUT and connect the test cables, test fixture, or scanner channel with fixturing to the instrument. Next, short circuit the ends of the test cables and press the "TEST" button. The highlighted parameter field will briefly show the word "READING" and then the display the new value. The new value is automatically updated in the field and does not allow an escape to the original value or require that the ENTER key be used to accept the new parameter.

4.4.7. DC Continuity

From the Continuity Selection screen, press the "DC Continuity" soft key The Continuity parameter-setting screen will now be displayed. The Continuity parameter-setting screen will appear as follows:

```
          C o n t i n u i t y                  �
                                              ■
 Hi-Limit          xx.xxΩ                     ■
 Lo-Limit          xx.xxΩ                     ■
 Dwell  Time       xxx.xs                     ■
 Offset            xx.xxΩ                      ■
 Scanner                                       ■
 Channel             x                         ■

                                              ■

 Press TEST For
 Automatic Offset
 Setting.
 RANGE:                          Defaults  ▶  ■
 Hi-Limit
 0 - 10.00Ω
```

From the Continuity parameter-setting screen, the following parameters may be controlled: HI-Limit, LO- Limit, Dwell Time, Offset, Scanner Channel, Defaults.

Offset

This function allows the instrument to compensate for lead and test fixture resistance during a ground bond test. Using the up and down arrow keys or the ENTER key, scroll the highlighted area to the Offset parameter. You may now manually or automatically set an Offset value.

To manually set an Offset value enter a milliohm value via the numeric keypad and then press the ENTER key to accept the new value or press the EXIT key to escape from the edit.

To automatically set an Offset value, set the output voltage, current, and frequency to the values that will be used on the DUT and connect the test cables, test fixture, or scanner channel with fixturing to the instrument. Next, short circuit the ends of the test cables and press the "TEST" button. The highlighted parameter field will briefly show the word "READING" and then the display the new value. The new value is automatically updated in the field and does not allow an escape to the original value or require that the ENTER key be used to accept the new parameter.

4.4.8. Run Test (Models 8105 and 8106)

Associated Research recommends performing a Hipot test, with the Fail Stop "ON", prior to performing a Run Test or Line Leakage test. Performing a Hipot test first can detect if a DUT is shorted line to ground before applying line power to it.

From the Setup Tests, Tests Selection screen, press the "Run Test" soft key. The Run Test parameter-setting screen will now be displayed. The Run test parameter-setting screen will appear as follows:

```
            R u n     T e s t
Voltage-HI    xxxxV      Power-HI     xxxxW        ■
Voltage-LO    xxxxV      Power-LO     xxxxW        ■
Current-HI    xxx.xA     PF-HI        x.xxx        ■
Current-LO    xxx.xA     PF-LO        x.xxx        ■
Dwell Time    xxx.xs                               ■
Delay Time    xxx.xs                               ■
Leakage-HI    xxx.xuA                              ■
Leakage-LO    xxx.xuA                              ■

RANGE:                          Defaults    ▶      ■
Volt-HI
0 - 277V
```

From the Run Test parameter-setting screen, the following parameters may be controlled: Voltage-HI, Voltage-LO, Current-HI, Current-LO, Dwell Time, Delay Time, Leakage-HI, Leakage-LO, Power-HI, Power-LO, PF-HI and PF-LO.

Delay Time

A length of time needed to ensure the DUT has reached proper operating conditions, during which the Current- HI and Current- LO limit detectors are disabled. The over current judgment is activated at the end of the Delay Time. The instrument will not indicate that an over current limit has been exceeded until the Delay Time period has expired.

The Delay time has no effect on the Voltage-HI and Voltage-LO detectors.

PF (Power factor)

Power Factor = W/VA where W =Watts (Real Power) and VA =Volts x Amps (apparent power). It is important to note that the closer the power factor is to "1" the more resistive the DUT is. The closer the power factor is to 0 the more reactive (inductive or capacitive) the DUT is.

Leakage (Leakage-HI and Leakage-LO)

Leakage in the Run Test mode refers to the amount of current, which flows from the enclosure (case) of the DUT, to the neutral side of the line input. The Leakage-HI trip limit is used to program the maximum allowable earth leakage current of the DUT before failure. The Leakage-LO trip limit is used to program the minimum allowable earth leakage current of the DUT before failure. The Leak HI trip limit also controls the earth leakage configuration as shown in FIG.1.

Figure 1

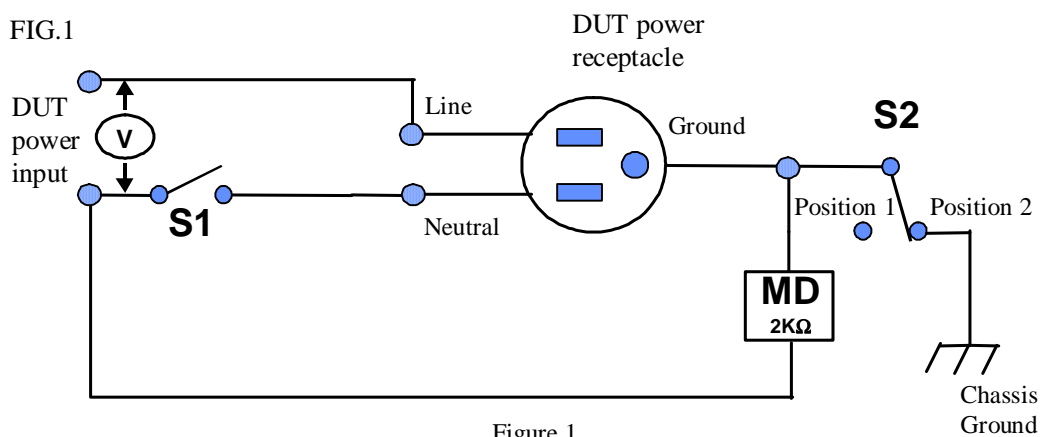When the Leakage-HI trip limit is set to 0.000mA, S2 is placed in position 2 which disables the Leakage-HI trip limit and connects the chassis of the Omnia to the ground of the DUT output. Whenever the Leakage-HI trip limit is set to anything but 0.000mA, S2 is in the open position 1, and leakage current will be monitored between the DUT output ground and the DUT input neutral and the Leakage-HI trip limit is enabled.

4.4.9. Line Leakage (Model 8106)

Associated Research recommends performing a Hipot test, with the Fail Stop "ON", prior to performing a Run Test or Line Leakage test. Performing a Hipot test first can detect if a DUT is shorted line to ground before applying line power to it.

From the Setup Tests, Tests Selection screen, press the "Line Leakage" soft key. The Line Leakage parameter-setting screen will now be displayed. The Line Leakage parameter-setting screen will appear as follows:

```
       L i n e        L e a k a g e

HI-Limit        xxxxuA    Reverse      ON        ▶   ■
                  RMS
LO-Limit        xxxxuA    Neutral      Closed    ▶   ■

Volt- HI        xxx.xV    Ground       Closed    ▶   ■

Volt-LO         xxx.xV    Measuring    UL 544    ▶   ■
                          Device
                                       Ground
Delay  Time     xxx.xs    Probe        to Line   ▶   ■

RANGE:                              Defaults     ▶   ■
HI-Limit
0 - 6000uA
```

From the Line Leakage parameter-setting screen, the following parameters may be controlled: Leakage-HI, Leakage-LO, RMS/Peak, Voltage-HI, Voltage-LO, Delay Time, Reverse, Neutral, Ground, Measuring Device, and probe.

Line Configuration Soft keys

The LINE configuration is determined by the relays S1, S2 and S3 (refer to Figure 2) and is set using the corresponding Line Configuration Soft keys. S1 relay is represented as NEUTRAL and is controlled by the Neutral soft key. S2 relay is represented as REVERSE and is controlled by the Reverse soft key. S3 relay is represented as GROUND and is controlled by the Ground soft key. Pressing the relays corresponding soft key will toggle it between its two available states
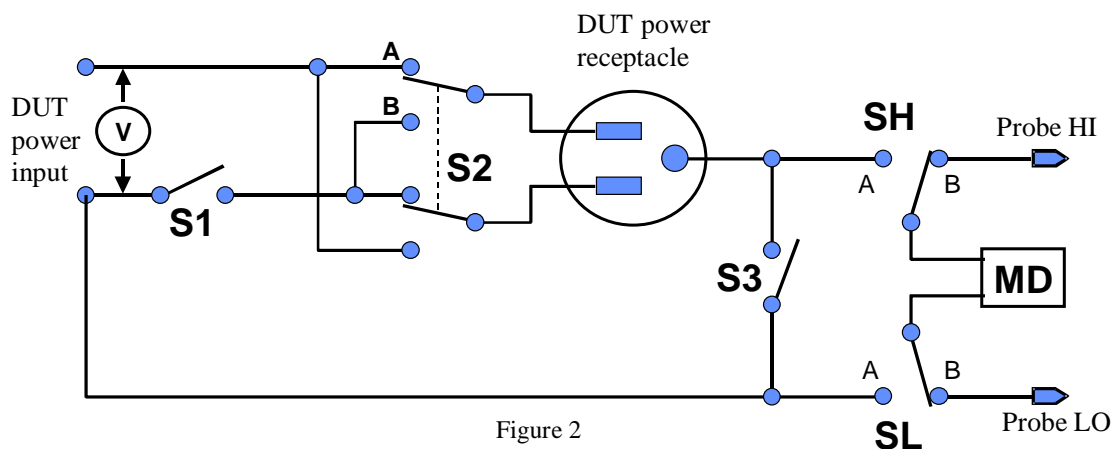
Figure 2

Line Configuration Setting

When the Neutral or Ground relays are set to the CLOSED position they are in a normal operating condition. When the Neutral or Ground relays are set to the OPEN position they are in a fault condition that represents a fault in the line input wiring.

When the REVERSE relay is set to ON, the relay is in position B (refer to Figure 2) and the Line and Neutral conductors are reversed at the DUT power outputs. The power output is represented as the power receptacle in Figure 2.

The three relays may be configured into eight different combinations of Line conditions. The different combinations are represented in the table below (refer to Figure 2).

Line Configuration	Neutral		Reverse			Ground	
	Relay/ Soft key	Fault	Soft key	Relay	Fault	Relay/ Soft key	Fault
1	Open	Yes	OFF	A	No	Open	Yes
2	Open	Yes	ON	B	Yes	Open	Yes
3	Open	Yes	OFF	A	No	Closed	No
4	Open	Yes	ON	B	Yes	Closed	No
5	Closed	No	OFF	A	No	Open	Yes
6	Closed	No	ON	B	Yes	Open	Yes
7	Closed	No	OFF	A	No	Closed	No
8	Closed	No	ON	B	Yes	Closed	No

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Probe Configuration

The Probe configuration is controlled by the relays SH and SL shown in Figure 2 and are set by the Probe soft key. These two relays configure the current measuring device into three possible positions. Repeatedly pressing the Probe soft key allows the selection of the three different states. The three positions are described in the table below.

Measuring Device Position	SH	SL	Display Indication	Agency Test Application
Ground to Line	A	A	Ground to Line	Earth Leakage
Probe HI to Line	B	A	Probe-HI to Line	Enclosure Leakage or Patient Leakage
Probe-HI to Probe-LO	B	B	Probe-HI to Probe-LO	External Applied Part or Surface to Surface Leakage

Ground to Line, indicates the MD is connected to measure the leakage current in the earth ground conductor in the line cord back to the system neutral and is referred to as an EARTH LEAKAGE TEST.

Probe-HI to Line indicates the MD is connected between the PROBE HI terminal on the instrument, which should be connected to the ENCLOSURE of the DUT and the system neutral. This is known as an ENCLOSURE LEAKAGE TEST.

Probe-HI to Probe-LO indicates the MD is connected between the PROBE HI and the PROBE LO terminals on the instrument which allow the operator to connect the MD between applied parts.
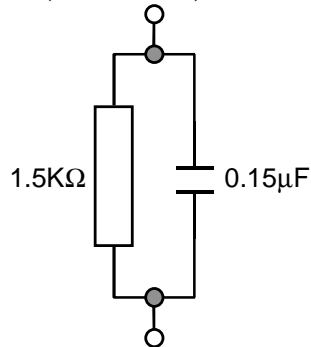
Measuring Device

The Measuring Device is an impedance circuit that simulates the human body. The Measuring device is specified differently for different agencies, applications and specifications. Repeatedly pressing the Measure Device soft key will allow you to select one of the many measuring devices listed in the table below. The table below indicates the available measuring devices and the appropriate agency standard to which it correlates.

Cross Reference Letter	Agency Specification	Application
A	UL544 Non patient equipment	Medical Equipment.
B	UL544 Patient care equipment	Medical Equipment.
C	UL2601-1, UL60601-1, IEC601-1, IEC60601-1, EN60601-1	Medical Equipment.
D	UL1563	Electric Spas, Equipment Assemblies and Associated Equipment.
E	UL1950, UL3101, UL61010, IEC950, IEC1010, IEC60950, IEC61010, IEC60335-1, IEC60990 Fig4-U2	Laboratory Equipment. Information Technology. Weighted Touch Current, Perception / Reaction.
Frequency Check	The Line Leakage test can be configured to verify the bandwidth of the leakage current "voltmeter", by setting the Probe configuration, Probe-HI to Probe-LO, and selecting the medical device "Frequency Check".	The selection is intended to be used for meter verification only and has no application for normal testing.
(G) External	User configurable	User configurable.
H	IEC60990 Fig5-U3	Weighted Touch Current, Let-Go.
I	IEC60990 Fig3-U1	Unweighted Touch Current.
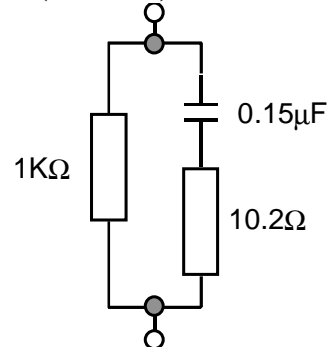
Circuit Diagrams

The following diagrams show the equivalent circuit of the measuring devices. Leakage current readings are generated by measuring the voltage drop across these networks and dividing by the equivalent DC resistance. The voltmeter is placed across the entire network of the measuring devices A, B and D. The voltmeter is placed across the points indicated by the solid black dots on measuring device C, E, H, and I. The points are specified by the agencies that require a particular measuring device to meet their specification.
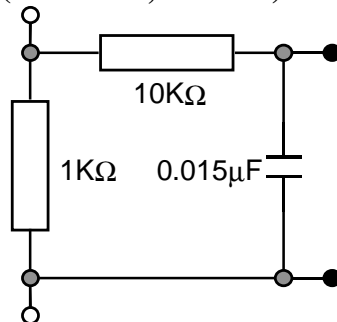
MD =A (UL 544NP)
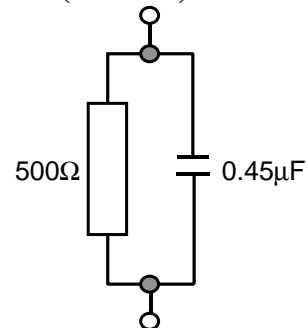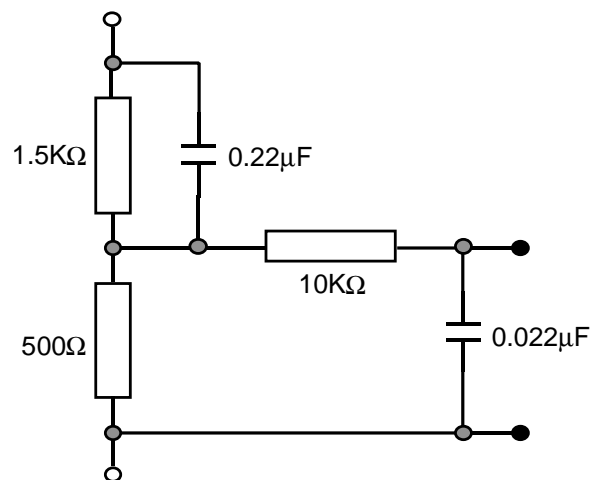
1.5KΩ   0.15µF

MD = B (UL544P)

1KΩ   0.15µF

10.2Ω

MD = C (IEC60601, UL2601)

10KΩ

1KΩ   0.015µF

MD = D (UL1563)

500Ω   0.45µF

MD =E (IEC60990 FIG4-U2, IEC60950)

1.5KΩ   0.22µF

10KΩ

500Ω   0.022µF
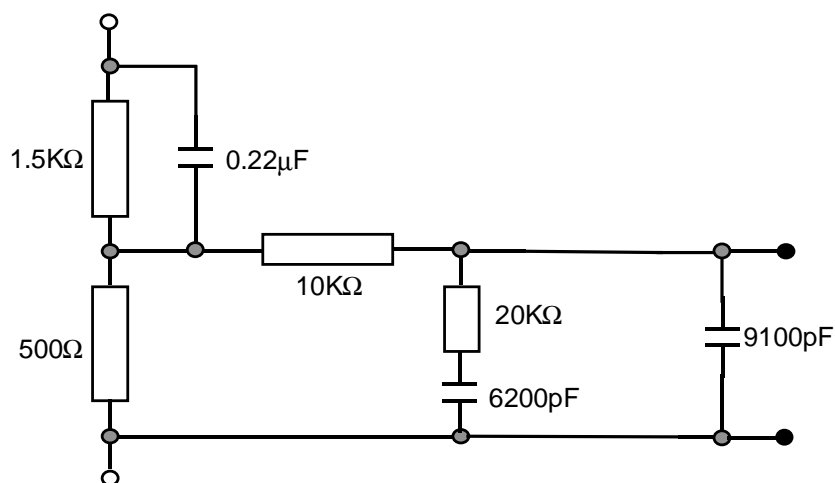
External Measuring Device (MD=F)

The Omnia 8106 has an access panel on the back of the instrument that can be removed to access the MD external PCB. The MD external PCB may be configured for a simple resistive measuring device or a two-pole measuring device similar to MD "E". The PCB comes configured with a 1kΩ measuring device.
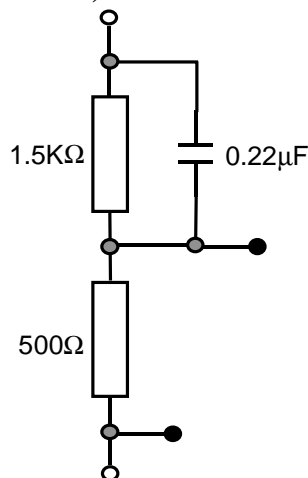
Frequency Check (MD=G)

The Line Leakage test can be configured to verify the bandwidth of the leakage current "voltmeter" by setting the Probe configuration, Probe-HI to Probe-LO, and selecting the medical device "Frequency Check". The selection is intended for meter verification purposes only and has no application for normal testing. The calculation of the displayed leakage current will use 1000 Ω for R in the calculation of V/R=I where I is the leakage current displayed and V is voltage across the measuring device (MD). When an external frequency generator is applied to the probe inputs, the current display will be equal to Voltage generator/1000. The readings can then be correlated to verify the voltmeter bandwidth. Since the voltage is being applied directly across the MD voltmeter amplifier inputs, it is not necessary to actually install a 1KΩ resistor to the external MD input. It is necessary to have the 0Ω resistors installed in position R1 and R3 on the external measuring device PCB to operate in this mode. If the external measuring device has been populated in a different configuration, it will be necessary to create a temporary short on R1 and R3 to operate in this mode. Another option would be to acquire a spare external measuring device PCB for the meter verification purpose.

MD=H (IEC60990 FIG5-U3)

MD=I (IEC60990 FIG3-U1)

RMS and Peak current reading

The Line Leakage test can be configured to meter the leakage current in RMS or Peak. The RMS/Peak configuration is set by the pressing the ">" key while the Leakage-HI or Leakage-LO parameter is highlighted.
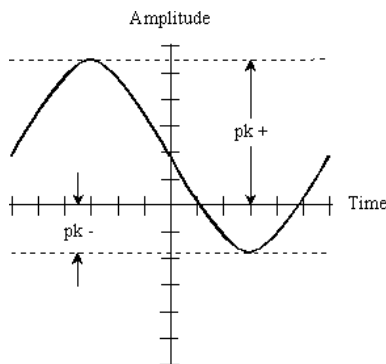
RMS and Peak Definitions

RMS (Root-Mean-Square): To determine RMS value, three mathematical operations are carried out on the function representing the AC waveform.

1. The square of the waveform function (usually a sine wave) is determined.

2. The function resulting from step (1) is averaged over time.

3. The square root of the function resulting from step (2) is found.

For a sine wave, the RMS value is 0.707 times the peak value.

Peak: Peak (pk) is the maximum value, either positive (pk+) or negative (pk-), that the current waveform attains.

For a sine wave without a DC component, the peak amplitude is equal to approximately 1.414 times the root-mean-square amplitude.

Delay Time

A length of time needed to ensure the DUT has reached proper operating conditions, during which the Current- HI and Current- LO limit detectors are disabled. The over current judgment is activated at the end of the Delay Time. The instrument will not indicate that an over current limit has been exceeded until the Delay Time period has expired.

The Delay time has no effect on the Voltage-HI and Voltage-LO detectors.

4.4.10. Default Parameters

In each of the Test Parameter-setting screens there is a "Defaults" soft key. When this key is pressed the test will load with a set of predetermined Default Parameters. The following table is a listing of the Default Parameters for each of the different types of tests that are available in the Omnia. The Default Parameters are as follows:

Default Parameters.

Test Type	Parameter	Value
ACW	Voltage	1240VAC
	HI-Limit T	10.00mA
	LO-Limit T	0.000mA
	Ramp Up	0.1s
	Dwell Time	1.0s
	Ramp Down	0.0s
	Arc Sense	5
	HI-Limit R	10.00mA
	LO-Limit R	0.000mA
	Scanner	OOOOOOOOOOOOOOOO
	Frequency	60Hz
	Arc Detect	OFF
	Continuity	OFF
DCW	Voltage	1200VDC
	HI-Limit	10000µA
	LO-Limit	0.0µA
	Ramp Up	0.4s
	Dwell Time	1.0s
	Ramp Down	1.0s
	Charge-LO	0.0µA
	Arc Sense	5
	Scanner	OOOOOOOOOOOOOOOO
	Ramp-HI	OFF
	Arc Detect	OFF
	Continuity	OFF
IR	Voltage	500VDC
	HI-Limit	0.00MΩ
	LO-Limit	0.05MΩ
	Ramp Up	0.1s
	Delay	1.0s
	Ramp Down	0.0s
	Charge-LO	0.000µA
	Scanner	OOOOOOOOOOOOOOOO

GND	Current	25.00A
	Voltage	8.00V
	HI-Limit	100mΩ
	LO-Limit	0mΩ
	Dwell	1.0s
	Frequency	60Hz
	Offset	0mΩ
	Scanner	00
CONT.	HI-Limit	10.00Ω
	LO-Limit	0.00Ω
	Dwell	1.0s
	Offset	0.00Ω
	Scanner	00
Setup Sys.	PLC Remote	OFF
	Address (GPIB only)	8
	Contrast	5
	Volume	5
	Smart GFI	ON
Security	Password	0
	Security	OFF
	File Recall	OFF
Models 8105 and 8106		
Run Test	Voltage-HI	100.0V
	Voltage-LO	0.0V
	Amp-HI	10.00A
	Amp-LO	0.00A
	Dwell Time	1.0s
	Delay Time	0.1s
	Leakage-HI	10.00mA
	Leakage-LO	0.00mA
	Power-HI	1000W
	Power-LO	0W
	PF-HI	1.000
	PF-LO	0.000
Model 8106		
LLT	Leakage-HI	3000µA
	Leakage-LO	0.0µA
	Voltage-HI	100.0V
	Voltage-LO	0.0V
	Delay Time	1.0s
	Reverse	OFF
	Neutral	CLOSED
	Ground	CLOSED
	Meas. Device	UL544NP
	Probe	Ground to Line

5. Operating Instructions

5.1. Instrument Connections

5.1.1. Adapter Box Connections

The adapter box provides an easy way to connect a DUT to the OMNIA that is terminated in a two or three-prong line cord. The following diagrams show how to connect the adapter box to the Omnia 8104, 8105 and 8106 to the device under test.

Adapter Box Connections Model 8104
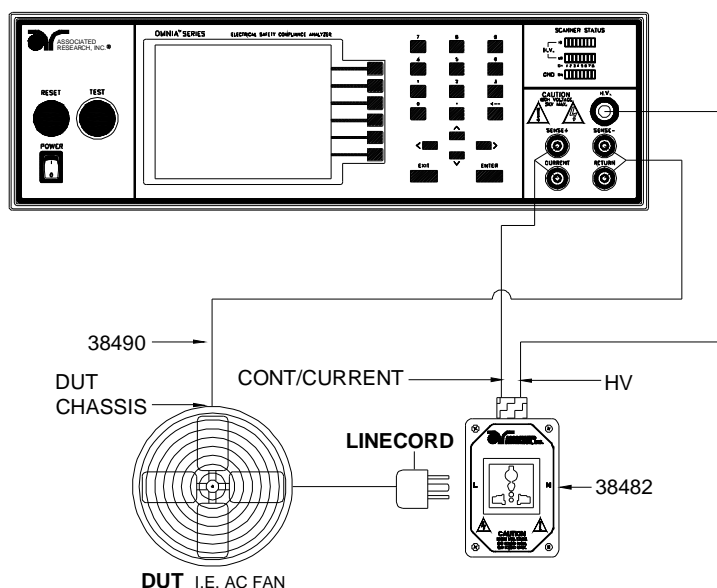
The rear output connections may be used for connecting the adapter box as well.

Adapter Box Connections Model 8105 and 8106
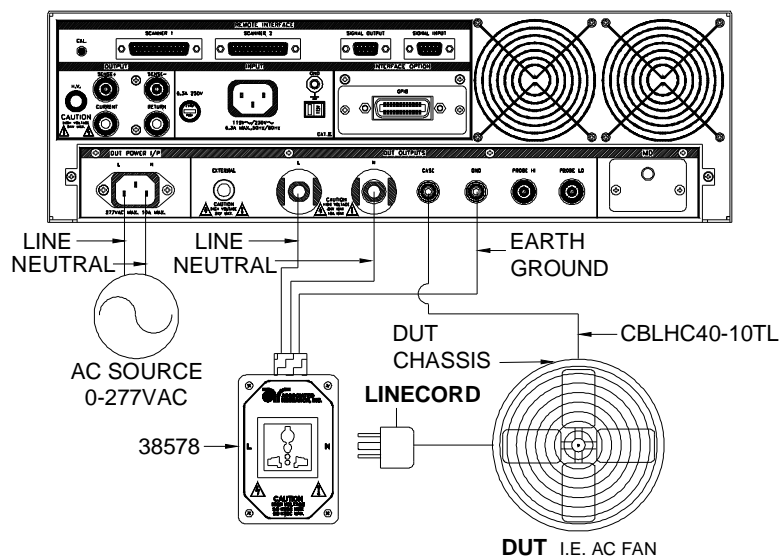
5.1.2. DUT Input Voltage Connections for Models 8105 and 8106

WARNING

The Power Source to the device under test (DUT) inputs must be an unbalanced single-phase supply. This means that there is only one HOT or LINE conductor and the other conductor of the power source must be at a low voltage reference potential. The low voltage reference does not need to be physically earth grounded but should not carry any large voltage potential. The 220 - 240V US style line power **IS NOT** suitable to connect to the DUT inputs. This style of power distribution is a balanced type with two HOT or LINE conductors. Be sure that the hot lead of the power source is connected to pin 1, L (line) terminal of the DUT input connector and the Reference or low voltage lead is connected to pin 2, N (neutral) terminal of the DUT input connector. **DO NOT** connect a line conductor to the N or Neutral terminal of the DUT inputs. This condition can be very dangerous to the LINECHEK user.

If voltage is applied to pin 2, N (neutral) terminal of the DUT input and you attempt to execute a Run Test or Line Leakage test, a warning message will appear in the displayed messages portion of the screen that says **Neutral-V**. If you see this message, you will need to correct the voltage problem before the instrument will allow you to execute Run Tests or Line Leakage tests.

5.1.3. Scanner Connections

The Scanner provides 8 high voltage channels and 8 ground bond/continuity channels on the rear panel. The High Voltage channels can be set to a High or Low level giving the capability to test from one channel to another channel or from any channel to a common Low or Return point. The channels can be connected in parallel if desired but there is only one leakage current measurement for all channels. The ground bond/continuity channels can test only from one channel to the common Return and only one channel may be used for each test.

Instructions for setting the scanner channels are in the section **4.4 Test Parameters** of this manual.

The scanner will provide output to multiple test points and will have the same operation specifications that apply to the standard instrument with the exception of one Ground Bond/Continuity channel limitation. Due to the characteristics of general-purpose High Current relays, some additional contact resistance cannot be prevented. Although this contact resistance can be offset using the milliohm offset feature of the instrument, there will be some variation of the contact resistance because the relay must open and close. Each relay closure may represent a different resistance value. The Ground Bond/Continuity channels will have the following characteristics:

Ground Bond/Continuity Channel Resistance Deviation	
Deviation (Relay Contact)	Test Current
6mΩ maximum	≥10A

5.2. Perform Tests Menu

From the Main Menu screen, press the soft key "Perform Tests".

```
 M a i n    M e n u


            Setup  System    ▶  ■

             Setup  Tests    ▶  ■

          Perform  Tests     ▶  ■

                                ■

                                ■
```
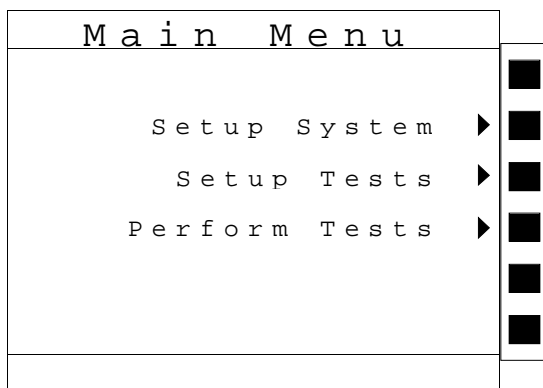
The Perform Tests Menu will now be displayed. From the Perform Tests screen, four different software controls may be accessed, Load File, Single Step (ON/OFF), Fail Stop (ON/OFF), Results. The arrow keys may also be used to scroll the highlighted area to a specific test or page of tests if the file is larger than 5 steps. The Perform Tests screen will appear as follows:

```
P e r f o r m    T e s t s
1 LLT   Settings          Load File  ▶  ■
  120V      500uA
  5.0s      100uA
2 ACW   Settings     ◀Single Step  OFF  ▶  ■
  5000V    10.00mA
  20.0s     2.00mA
3 DCW   Settings       Fail Stop  OFF  ▶  ■
  1000V     500uA
  10.0s     100uA
4 IR    Settings             Results  ▶  ■
  500V     800MΩ
  10.0s    200MΩ
5 GND   Settings                        ■
  25A      150mΩ
  1.0s     100mΩ
                                        ■
File Name:New File
▲Move up ▼Move down   To initiate this
                      test, press the
◀Page up ▶Page down   TEST button.
```
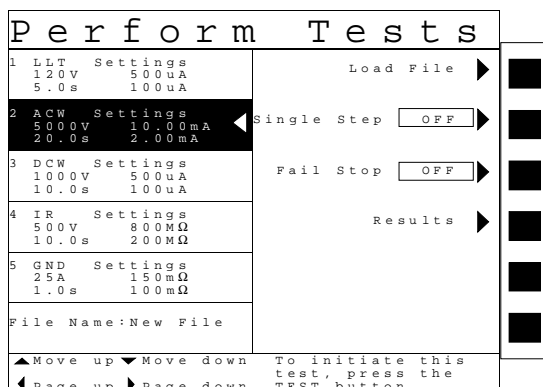
The Perform Tests screen is the main operational screen of instrument. From this screen, individual steps are monitored while the test is being performed. At the end of a sequence of tests, all of the step results may be recalled via the "Results" soft key on this screen. This screen may also be used to debug test files with the use of the single step and fail stop functions.

5.2.1. Load File

From the Perform Tests screen, press the "Load File" soft key. The Load File screen will now be displayed. The Load File screen will appear as follows:
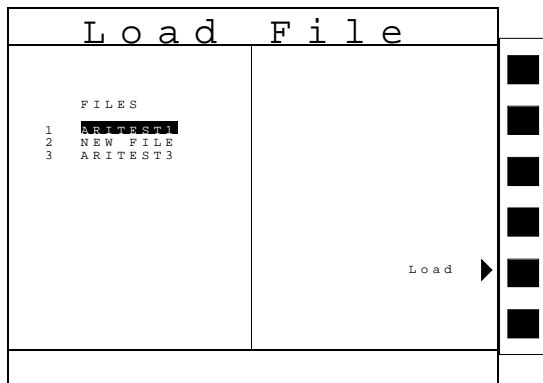
Using the up and down arrow keys, scroll the highlighted area to the File you would like to load and press the "Load" soft key. The file you selected will now load and the screen will revert to the Perform Tests screen.

5.2.2. Single Step

Single step is a function that allows you to run one step at a time from a sequence of tests. At the Perform Tests screen, use the up and down arrow keys or the ENTER key to scroll the highlighted area to the step you wish to perform. Press the TEST button and the instrument will initiate the single step and stop when finished without continuing to the next step. If you press Test again without first pressing Reset, the next step will initiate, run to completion and then stop. If a step fails and you wish to continue to the next step do not press Reset, if you press Reset it will return you to the original starting step. After running a single step test, a prompt will appear below the test file name telling you to Press TEST button to continue. The prompt will appear as follows:
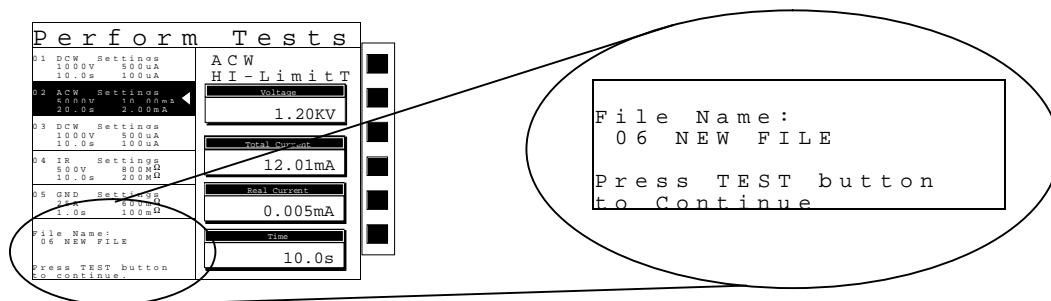
You may single step through an entire sequence in this way as long as you do not press Reset. Once Reset is pressed it will return you to the originally selected step.

Turn the Single Step function ON and OFF by pressing the "Single Step" soft key. However, if Security is enabled, single step may not be turned ON and OFF at the Perform Test screen. Whatever state single step is in at the time security is enabled, is the state at which it shall remain.

5.2.3. Fail Stop

Fail Stop is a function that will stop a sequence of tests at the step if a failure occurs. If the fail stop is turned "ON" and a failure occurs (stopping the test), pressing the Test button again will start the test sequence at the next step. If a step fails and you wish to continue to the next step do not press Reset, if you press Reset it will return you to the original starting step. If this function is turned off, the sequence of tests will continue to the end of the sequence regardless of whether or not a failure has occurred. If the Fail stop is off and a failure occurs during the test sequence, the RESET button will light and a short alarm will sound but the sequence will continue to the end. At the end of the test sequence, the RESET button will light and alarm will sound indicating failure during the sequence. Pressing the RESET button will silence the alarm and reset the instrument. Turn the Fail Stop function ON and OFF by pressing the "Fail Stop" soft key. If security is enabled you may not turn Fail Stop ON and OFF using the "Fail Stop" soft key. Fail Stop automatically defaults to the setting stored in the file when security is activated.

Fail Stop with Run and Line Leakage tests

Associated Research recommends performing a Hipot test, with the Fail Stop "ON", prior to performing a Run Test or Line Leakage test. Performing a Hipot test first can detect if a DUT is shorted line to ground before applying line power to it.

5.2.4. Results

At the end of a test sequence or single step test, you may review the measurements of each test by pressing the "Results" soft key. Results may be accessed from the end of test Summary screen or from the Perform Tests screen. The end of test Summary screen appears as follows:

```
Perform   Tests
01 ACW   Pass
   5000V    19.32mA
   20.0s
02 ACW   Pass
   5000V    35.32mA
   20.0s
03 DCW   Lo-Limit
   1000V    0.0uA              FAIL
   10.0s
04 IR    Pass             STEP TEST FAILURE
   500V     468MΩ
   10.0s                  3    DCW   LO-Limit
05 GND   HI-Limit         5    GND   HI-Limit
   25A      >600mΩ
   1.0s
File Name:ARITEST3                    Results  ▶
   ◀ Page up  ▶ Page down
```

The Results screen will appear as follow:

```
                  R e s u l t s
01 DCW      Settings    ◄  D C W
   1200V       500uA       P a s s
   5.0s        100uA

02 ACW     Pass
   5000V   35.32mA
   20.0s                    ┌──────────────┐
                            │   Voltage    │
                            │   1 . 2 0 K V│
                            └──────────────┘

                            ┌──────────────┐
                            │   Current    │
                            │     0 . 0 u A│
                            └──────────────┘

                            ┌──────────────┐
                            │    Time      │
                            │   5 . 0 s    │
   File Name:ARITEST3        └──────────────┘

  ▲ Move up ▼ Move down
  ◄ Page up ▶ Page down
```

Using the up and down arrow keys, scroll the highlighted area to the step results you wish to review. The left and right arrow keys may be used to page through results if the test contains more than five steps. When the highlighted area is on the step you are reviewing, the test settings will be displayed in the highlighted area and the results will appear on the right in the form of metering screens. The result screens will appear differently for each type of test. The results screens are based on the Performing Tests metering screens and are identical in appearance except for the title. Refer to section 5.3 for the meters that will be displayed.

5.3. Perform Tests Metering

Each test performed by the Omnia contains a unique set of parameters and therefore requires specialized metering for each test. The following table describes what meters will be displayed for each of the different test types. An example of a metering screen is shown below the tables.

Metering Screens 8104/8105/8106					
Test Type	**Current(T)**	**Current(R)**	**Voltage**	**Time**	**Resistance**
AC Withstand	X	X	X	X	
DC Withstand	X		X	X	
IR			X	X	X
Continuity				X	X
Ground Bond	X			X	X
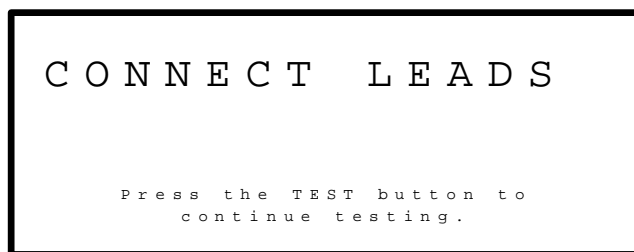
Additional Metering Screens Models 8105					
Test Type	**Voltage**	**Current**	**Power**	**Time**	**PF**	**Leakage**
Run Test	X	X	X	X	X	X

Additional Metering Screens Models 8106					
Test Type	**Voltage**	**Current**	**Time**	**Line Config.**	**Leakage RMS/Peak**
Line Leakage	X	X	X	X	X

```
P e r f o r m     T e s t s
01  DCW    Settings          A C W
    1000V     500uA          R a m p   D o w n
    10.0s     100uA
02  ACW    Settings      ◄      Voltage
    5000V   10.00mA
    20.0s    2.00mA                1.20KV
03  DCW    Settings
    1000V     500uA            Total Current
    10.0s     100uA
                                  0.01mA
04  IR     Settings
    500V     800MΩ             Real Current
    10.0s    200MΩ
                                 0.005mA
05  GND    Settings
    25A      150mΩ                 Time
    1.0s     100mΩ
                                  10.0s
File  Name:NEW  FILE
```

5.4. Performing a Test

1. As instructed in section 5.2.1, load a test file into the instrument.

2. Attach the appropriate load or DUT to the instrument (refer to section 5.1 for instrument connections).

3. Press the TEST button.

4. The instrument will now perform the sequence of tests. The test will always start from step 01 of the test sequence unless the highlighted area of the screen is scrolled to a different step. The test will always initiate from the highlighted area of the Perform Tests screen. If the Test is started from any other step than 01, when you push Reset or Test buttons, it will always return to the originally selected step.

5. If a prompt is embedded within a step, the test will pause at that step and display the prompt as a pop-up message. An example of a prompt will appear as follows:

```
CONNECT  LEADS



     Press the TEST button to
        continue testing.
```

6. In order to clear the prompt and continue the test, push the Test button.

7. The highlighted area of the screen remains on the test that is being performed until it is finished. Simultaneously, on the right half of the screen will be the appropriate metering display for the type of test that is being performed (Refer to section 5.3.). When the step is complete the highlighted area will sequence to the next step and the new metering display will appear (unless there is a prompt embedded within the step). When the highlighted area moves to the next step, the previous step area will now display the results of the test just performed.

8. At the end of the test sequence, the right side of the screen will display a flashing PASS if all the tests have completed successfully or a flashing FAIL if any of the tests did not complete successfully. If a test fails, the right side of the screen will indicate the step that failed and which parameter of the step failed.

![Associated Research, Inc. logo]

5.5. Displayed Messages

Directly above the Metering screens is the Test status display. This portion of the display is active during the test and allows you to view the type of test being performed and status of the test step. At the end of a test, the Test status display will either inform you that the test has passed or give a direct indication of the kind of failure that occurred during the test. The following is an example of the Test status display:
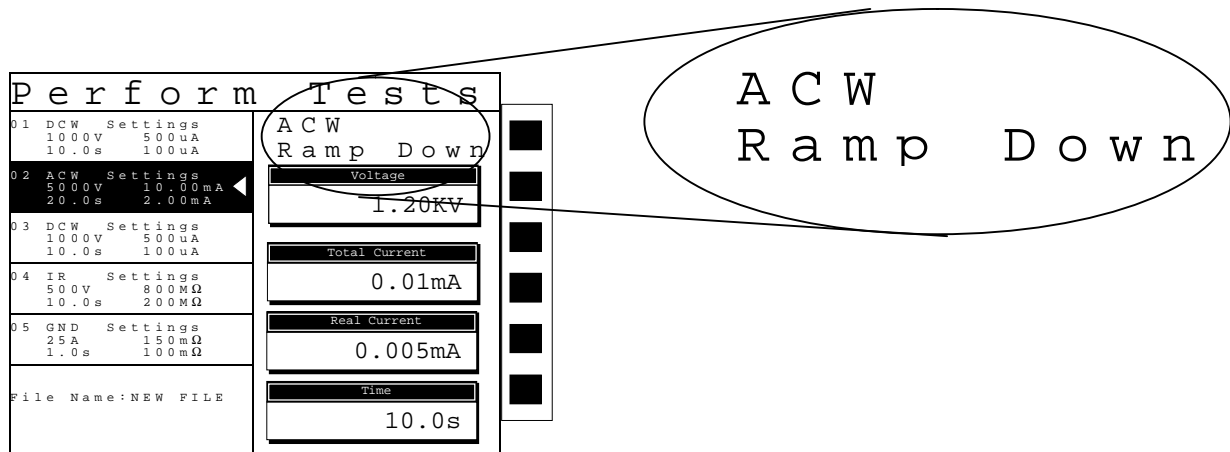
5.5.1. Test Status Messages (all Models)

The following is a complete listing of the messages that appear in the Test status display and an explanation for each.

Dwell

This message appears on the display while a test is in process, the values update in real time.

Delay

This message appears on the display while a test is in process, the values update in real time.

Ramp Up

This message appears on the display at the beginning of the test, when the output voltage is ramping up.

Ramp Down

This message appears on the display at the end of the dwell cycle, when the output voltage is ramping down.

Pass

This message appears on the display when the test process is complete and the DUT passed the test.

Abort

This message appears on the display if the test in process is aborted with the RESET button or remote Reset control.

HI-Limit

This message appears on the display if the DUT measurement exceeds the HI-Limit setting of any parameter (except AC withstand).

LO-Limit

This message appears on the display if the DUT measurement drops below the LO-Limit setting of any parameter (except AC withstand).

HI-Lmt T

This message appears on the display if the DUT leakage current exceeds the HI-Limit setting, of the Total current parameter in AC withstand.

LO-Lmt T

This message appears on the display if the DUT leakage current drops below the LO-Limit setting, of the Total current parameter in AC withstand.

HI-Lmt R

This message appears on the display if the DUT leakage current exceeds the HI-Limit setting, of the Real current parameter in AC withstand.

LO-Lmt R

This message appears on the display if the DUT leakage current drops below the LO-Limit setting, of the Real current parameter in AC withstand.

CONT-Fail

This message appears on the display if the DUT fails the basic continuity check performed during an AC/DC Withstand test (if Continuity is selected "ON").

Arc-Fail

This message appears on the display if the DUT arcing current exceeds the Arc Sense limit and Arc function is active (Arc Sense = 1…9) of the AC/DC Withstand test.

Short

This message appears on the display if the DUT current is well beyond the metering range of the test.

Charge-LO

This message appears on the display if the leakage current during Ramp-up falls below the Charge -LO setting.

Breakdown

This message appears on the display if the DUT current is well beyond the metering range of the test and the arcing condition beyond the arc sense limit.

GND-Fault

This message appears on the display if the GFI threshold is exceeded during the test.

Out-Error

This message appears on the display, if the instruments output reading does not match the setting. This message will only be seen if the Exit key is press at the Output Error screen. If the instrument has an output problem when the TEST button is pressed, the Output Error screen will appear as follows:

```
 O u t p u t     E r r o r

 The Instrument has malfunctioned! The       ■
 output reading does not match the
 setting. Press Exit to continue or          ■
 contact Associated Research.

 Associated Research Inc.                     ■
 13860 W. Laurel Drive
 Lake Forest, IL 60045-4545  Setting =        ■
 U.S.A                       x.xxkv
                             Reading =
 Phone: 1-847-367-4077       x.xxkv           ■
 Toll Free 1-800-858-8378
 Fax: 1-847-367-4080
 email: info@asresearch.com          Exit ▶   ■
 Web: www.asresearch.com
```

The RESET button is not active in this situation. Only the Exit soft key will allow you to return to the Perform Test screen.

OTP-Fail

This message appears on the display if the Power Amplifier has overheated. This is abnormal condition; please call to the factory for assistance.

5.5.2. Test Status Messages (Models 8105 and 8106)

Volt-HI

This message appears on the display if the DUT/IP voltage exceeds the Volt-HI Trip setting.

Volt-LO

This message appears on the display if the DUT/IP voltage drops below the Volt-LO Trip setting.

Amp-HI

This message appears on the display if the current exceeds the Amp-HI Trip setting

Amp-LO

This message appears on the display if the current drops below the Amp-LO Trip setting.

Line-OC

This message appears on the display if the 20 Amp < 1 s, short circuit protection is tripped.

Power-HI

This message appears on the display if the DUT input wattage exceeds the Power-HI Trip setting.

Power-LO

This message appears on the display if the DUT input wattage drops below the Power-LO Trip setting.

PF-HI

This message appears on the display if the Power Factor exceeds the PF-HI Trip setting.

PF-LO

This message appears on the display if the Power Factor drops below the PF-LO Trip setting.

Leak-HI

This message appears on the display if the enclosure to neutral leakage current exceeds the Leak-HI Trip setting.

Leak-LO

This message appears on the display if the enclosure to neutral leakage current drops below the Leak-LO Trip setting.

Neutral-V

This message appears on the display if there is voltage present on the Neutral of the DUT input receptacle.

Fatal Error

All of the buttons and keys are not active in this situation. This type of failure permanently locks the instrument in the "Fatal Error" mode and requires that the instrument be serviced by Associated Research. The customer should contact Associated Research, Inc to receive further instruction.

```
 F a t a l    E r r o r
Internal error checking has determined
that there is a problem with the
hardware or software.  Please contact
Associated Research.

Associated Research Inc.      Error 9002
13860 W. Laurel Drive
Lake Forest, IL 60045-4545
U.S.A

Phone: 1-847-367-4077
Toll Free 1-800-858-8378
Fax: 1-847-367-4080
email: info@asresearch.com
Web: www.asresearch.com
```

The following Fatal Error identification numbers will represent type of the failure that has occurred:

Error Code 9001 will appear on the display, if the instrument has a recognizable internal component failure.

Error Code 9002 will appear on the display, if the instrument's System data or the Model/Option/Serial Number data are corrupted and do not match the settings.

Error Code 9003 will appear on the display, if the instrument's Calibration data is corrupted.

6. Instrument Verification

Verification is a process by which an instruments fail detectors are proven to be functioning properly and thereby "Verifying" the functionality of the electrical safety tester and connected accessories. Verification of failure detect circuitry of the electrical safety tester is required by safety agencies such as CSA, UL, and TÜV.

6.1. Verification Initialization

Turn on the POWER switch located on the lower left-hand side of the front panel. The initialization screen will appear with a message at the bottom indicating VERIFICATION (PRESS TEST). You now have the option to press the TEST button and activate the Verification Menu (Refer to the section **6. Instrument Verification**). The option to activate the Verification expires approximately 4 seconds after power-up. The Initialization screen will appear as follows:

6.2. Verification Menu

From the Initialization screen (First start up screen), press the TEST button.
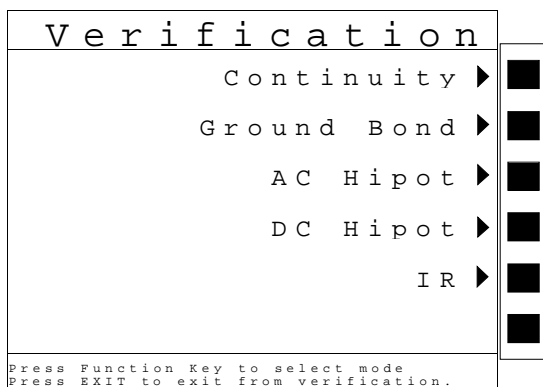
The Verification Menu will now be displayed. From the Verification menu, five different Verification processes may be accessed; Continuity, Ground Bond, AC Hipot, DC Hipot, and IR.

6.2.1. Continuity Verification

From the Verification screen, press the "Continuity" soft key. A pop-up message will now be displayed. The message will appear as follows:

```
Open DUT connection between
Current and Return. Unplug HV
from the Instrument.
Press TEST to begin verification
Press RESET to return to main menu.
```

Follow the instructions given in the pop-up message and then press TEST to begin the verification process. During the Verification process the metering screen for the related process will be displayed, refer to section **5.3 Perform Tests Metering** for the appearance of metering screens.

At the end of the Verification process, a pop-up message will appear indicating the outcome of the process. If the instrument passes the Verification (test failure, indicating the fail detectors are working properly) the RESET button will illuminate, the alarm will sound and the following pop-up message will appear over the metering screen:

```
Verification OK
Continuity failure detected.
Press RESET to return to
main menu.
```

If the instrument fails the Verification (test pass, indicating the fail detectors are not working properly) the TEST button will illuminate and the following pop-up message will appear over the metering screen:

```
Verification
Error
Continuity failure not detected.
Check connections or call
1-800-858-8378 or
1-847-367-4077.
Press RESET to return to
main menu.
```

6.2.2. Ground Bond Verification

From the Verification screen, press the "Ground Bond" soft key. A pop-up message will now be displayed. The message will appear as follows:

```
Open DUT connection between
Current and Return. Unplug HV
from the Instrument.
Press TEST to begin verification
Press RESET to return to main menu.
```

Follow the instructions given in the pop-up message and then press TEST to begin the verification process. During the Verification process the metering screen for the related process will be displayed, refer to section **5.3 Perform Tests Metering** for the appearance of metering screens.

At the end of the Verification process, a pop-up message will appear indicating the outcome of the process. If the instrument passes the Verification (test failure, indicating the fail detectors are working properly) the RESET button will illuminate, the alarm will sound and the following pop-up message will appear over the metering screen:

```
Verification OK
Ground Bond failure detected.
Press RESET to return to
main menu.
```

If the instrument fails the Verification (test pass, indicating the fail detectors are not working properly) the TEST button will illuminate and the following pop-up message will appear over the metering screen:

```
Verification
Error
Ground Bond failure not detected.
Check connections or call
1-800-858-8378 or
1-847-367-4077.
Press RESET to return to
main menu.
```

6.2.3. AC Hipot Verification

From the Verification screen, press the "AC Hipot" soft key. A pop-up message will now be displayed. The message will appear as follows:

```
Short DUT connection between
HV and Return.
Do not touch leads during
test.
Press TEST to begin
verification.
Press RESET to return to
main menu.
```

Follow the instructions given in the pop-up message and then press TEST to begin the verification process. During the Verification process the metering screen for the related process will be displayed, refer to section **5.3 Perform Tests Metering** for the appearance of metering screens.

At the end of the Verification process, a pop-up message will appear indicating the outcome of the process. If the instrument passes the Verification (test failure, indicating the fail detectors are working properly) the RESET button will illuminate, the alarm will sound and the following pop-up message will appear over the metering screen:

```
Verification OK
AC Hipot failure detected.
Press RESET to return to
main menu.
```

If the instrument fails the Verification (test pass, indicating the fail detectors are not working properly) the TEST button will illuminate and the following pop-up message will appear over the metering screen:

```
Verification
Error
AC Hipot failure not detected.
Check connections or call
1-800-858-8378 or
1-847-367-4077.
Press RESET to return to
main menu.
```

6.2.4. DC Hipot Verification

From the Verification screen, press the "DC Hipot" soft key. A pop-up message will now be displayed. The message will appear as follows:

```
Short DUT connection between
HV and Return.
Do not touch leads during
test.
Press TEST to begin
verification.
Press RESET to return to
main menu.
```

Follow the instructions given in the pop-up message and then press TEST to begin the verification process. During the Verification process the metering screen for the related process will be displayed, refer to section **5.3 Perform Tests Metering** for the appearance of metering screens.

At the end of the Verification process, a pop-up message will appear indicating the outcome of the process. If the instrument passes the Verification (test failure, indicating the fail detectors are working properly) the RESET button will illuminate, the alarm will sound and the following pop-up message will appear over the metering screen:

```
Verification OK
DC Hipot failure detected.
Press RESET to return to
main menu.
```

If the instrument fails the Verification (test pass, indicating the fail detectors are not working properly) the TEST button will illuminate and the following pop-up message will appear over the metering screen:

```
Verification
Error
DC Hipot failure not detected.
Check connections or call
1-800-858-8378 or
1-847-367-4077.
Press RESET to return to
main menu.
```

6.2.5. IR Verification

From the Verification screen, press the "IR" soft key. A pop-up message will now be displayed.
The message will appear as follows:

```
Short DUT connection between
HV and Return.
Do not touch leads during
test.
Press TEST to begin
verification.
Press RESET to return to
main menu.
```

Follow the instructions given in the pop-up message and then press TEST to begin the
verification process. During the Verification process the metering screen for the related process
will be displayed, refer to section **5.3 Perform Tests Metering** for the appearance of metering
screens.

At the end of the Verification process, a pop-up message will appear indicating the outcome of
the process. If the instrument passes the Verification (test failure, indicating the fail detectors
are working properly) the RESET button will illuminate, the alarm will sound and the following
pop-up message will appear over the metering screen:

```
Verification OK
IR failure detected.
Press RESET to return to
main menu.
```

If the instrument fails the Verification (test pass, indicating the fail detectors are not working
properly) the TEST button will illuminate and the following pop-up message will appear over
the metering screen:
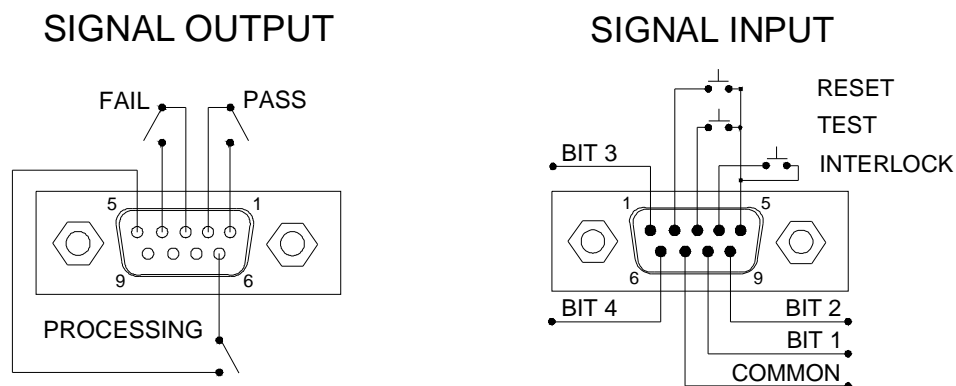
```
Verification
Error
IR failure not detected.
Check connections or call
1-800-858-8378 or
1-847-367-4077.
Press RESET to return to
main menu.
```

7. Remote Control

Two 9-pin "D" type connectors are mounted on the rear panel that provide REMOTE-INPUT-OUTPUT control and information. These connectors mate with standard 9 pin D-sub-miniature connector provided by the user. The output mates to a male (plug) connector while the input mates to a female (receptacle) connector. For best performance, a shielded cable should be used. To avoid ground loops the shield should not be grounded at both ends of the cable. Suggested AMP part numbers for interconnecting to the Remote I/O are shown below:

205204-4   PLUG SHELL WITH GROUND INDENTS
205203-3   RECEPTACLE SHELL
745254-7   CRIMP SNAP-IN PIN CONTACT (for plug)
745253-7   CRIMP SNAP-IN SOCKET CONTACT (for receptacle)
745171-1   SHIELDED CABLE CLAMP (for either plug or receptacle)
747784-3   JACKSCREW SET (2)

Remote Interface Rear Panel:

7.1. Signal Outputs on Remote I/O

The rear panel connector provides three output signals to remotely monitor PASS, FAIL, and PROCESSING conditions. The monitoring signals are provided by three normally open internal relays, that switch on to indicate the current condition of the tester. These are normally open free contacts and will not provide any voltage or current. The ratings of the contacts are 1A / 125 VAC (0.5 ADC). The signal outputs are provided on the 9-pin female D connector. Below is a listing that indicates what conditions activate each pin. When a terminal becomes active the relay closes thereby allowing the external voltage to operate an external device.

Pins 1 and 2 provide the PASS signal.
Pins 3 and 4 provide the FAIL signal.
Pins 5 and 6 provide the PROCESSING signal.
The following describes how the relays operate for each test condition.
PROCESSING - The relay contact closes the connection between pin (5) and pin (6) while the instrument is performing a test. The connection is opened at the end of the test.

PASS - The relay contact closes the connection between pin (1) and pin (2) after detecting that the item under test passed all tests. The connection is opened when the next test is initiated or the reset function is activated.

FAIL - The relay contact closes the connection between pin (3) and pin (4) after detecting that the item under test failed. The connection will open when the next test is initiated or the reset function activated.

7.2. Signal Inputs of Remote I/O and Programmed Test Files

The Omnia remote connector enables remote operation of the TEST, RESET, and REMOTE INTERLOCK functions, and allows the operator to select one of 10 pre-programmed test files.

When the PLC Remote mode is on, the Omnia will respond to simple switch or relay contacts closures. A normally open momentary switch can be wired across pins 3 and 5 to allow remote operation of the TEST function. A minimum pulse width or contact closure of 20mS is required to guarantee a test start. A normally open momentary switch can be wired across pins 2 and 5 to allow remote operation of the RESET function. A minimum pulse width or contact closure of 50mS is required to guarantee that a running test will abort. When the PLC remote function is (ON) the TEST switch on the front panel will be disabled to prevent a test from being activated through this switch. For safety, the front panel RESET switch remains active even when a remote reset switch is connected so that high voltage can be shut down from either location.

The Remote File Select function gives the user the capability to quickly change parameters and initiate a test remotely. Ten pre-programmed test files can be accessed by connecting pins 1,6,8, and 9 to the common pin 7, in different combinations. The memory select bits should be set simultaneously and remain set for a minimum of 20ms to guarantee that the correct memory will be selected. However, the memory select bits may be set in sequential manner, provided that the time delay between each bit is less than 4ms. When the desired bit pattern has been established it should remain set for a minimum of 20ms to guarantee that the correct memory will be selected. The **Remote File Select Truth Table** (binary) shows the different combinations of momentary switch (relay) closures, and which memory programs that will be selected as the result. It may be necessary to "OR" the momentary switches (relay contacts) to prevent incorrect program selection due to timing errors.

REMOTE FILE SELECT TRUTH TABLE				
BIT 4	BIT 3	BIT 2	BIT 1	FILE #
0	**0**	**0**	**1**	01
0	**0**	**1**	**0**	02
0	**0**	**1**	**1**	03
0	**1**	**0**	**0**	04
0	**1**	**0**	**1**	05
0	**1**	**1**	**0**	06
0	**1**	**1**	**1**	07
1	**0**	**0**	**0**	08
1	**0**	**0**	**1**	09
1	**0**	**1**	**0**	10
1= Momentary Contact closure between BIT and COMMON				
0= No Contact closure between BIT and COMMON				

| WARNING | Activating file program functions through the remote connector selects the file and starts the test that is pre-programmed into that file. |

| CAUTION | Do not connect voltage or current to the signal inputs. Applying voltage to the signal input could result in damage to the control circuitry. |

Remote Interlock

Omnia is equipped with a featured referred to as "Remote Interlock". Remote Interlock is a feature that utilizes a set of closed contacts to enable the instruments output. In other words, if the Interlock contacts open, the output of the instrument will be disabled. Remote Interlock could also be referred to as a remote system lockout, utilizing "Fail When Open" logic. If the Interlock contacts are open and the Test button is pushed, a pop-up message will be displayed on the screen for two seconds. The message will appear as follows:

```
Interlock  is
Open

Please check the Remote Interlock
connection.
```

If the Interlock contacts are opened during a test, the pop-up message will be displayed and the test will abort. The hardware and has been configured to provide the interlock connections on pins 4 and 5 of the Remote Interface, Signal Input port. The instrument can still be used without the external interlock device as long as the Interlock Connector (38075 provided with unit) is plugged into the Remote Interface, Signal Input port. If there is nothing connected to the Remote Interface, Signal Input port to provide a connection to the interlock, the instrument will not perform tests.

PLC Remote Pop-up message

If you attempt to start a test from the front panel Test button and the PLC remote function is turned "ON", a pop-up message will be displayed. The pop-up message will appear as follows:

```
PLC  remote
Control  is  ON.

Front panel TEST button is
disabled.
```

8. Bus Remote Interface GPIB / RS-232

This section provides information on the proper use and configuration of bus remote interface. The RS-232 remote interface is standard on model 800X but the GPIB (IEEE-488) interface option can be substituted for the RS-232 interface. Please refer to the Option section of this manual for details on the Omnia options. The RS-232 interface also uses the same command set as the GPIB interface for setting of test parameters. However there are many functions of the GPIB 488.2 interface that are not available through RS-232. The IEEE-488 interface included with Omnia conforms to the requirements of the IEEE-488.2 standard.

8.1. A Brief History of IEEE-488

Hewlett-Packard designed in 1965 the Hewlett-Packard Interface Bus (HP-IB) to connect their line of programmable instruments to computers. This bus had high transfer rates (nominally 1 Mbytes/s), and thus quickly gained acceptance. Later, it was accepted as the IEEE Standard 488-1975 and has then evolved into ANSI/IEEE Standard 488.1-1987. An enhancement to this standard was the IEEE standard 728-1982 and evolved into IEEE Std 488.2-1887. The new standard 488.2 was created and intended to be used with the existing 488.1 standard. The 488.2 standard defines issue related to standard codes, formats, protocols and common commands

IEEE-488 has expanded over the years and is used with many more types of computers and instruments than just HP. Because of this, it is usually referred to as the General Purpose Interface Bus, (GPIB).

8.2. GPIB Messages

There are typically two types of messages that GPIB devices use to communicate with other interconnected GPIB devices;

Interface messages: Often called commands or command messages and Device dependent messages often called data or data messages.

Data Messages: Contain information such as programming instructions or measurement results. Command Messages perform functions such as initializing the bus and addressing and unaddressing devices.

8.3. Functions

A GPIB device can be a Listener, Talker and/or Controller. A Talker sends data messages to one or more Listeners, which receive data. A Controller manages the information flow on the GPIB by sending commands to all devices. The GPIB bus is much like a computer bus except a computer has circuit cards connected via a backplane and the GPIB has stand-alone devices connected via a cable.

8.4. Signals and Lines

The GPIB consists of 16 signal lines and 8 ground-return or shield drain lines. The 16 signal lines are grouped into 8 data lines, 3 handshake lines and 5 interface management lines.

Data Lines: The eight data lines, DI01 through DI08 carry data and command messages. The 7-bit ASCII or ISO code set is used and the eighth bit DI08 is unused.

Handshake Lines: The transfer of message bytes between devices is done via three asynchronously control lines. Referred to as three-wire interlocked handshake. This guarantees that message bytes on the data lines are sent and received without transmission error.

NRFD (not ready for data) indicates when a device is ready or not ready to receive a message byte.

NDAC (not data accepted) indicates when a device has or has not accepted a message byte.

DAV (data valid) tells when the signals on the data lines are stable (valid) and can be accepted safely by devices.

Interface Management Lines: Five lines are used to manage the flow of information across the interface.

ATN (attention) ATN is driven true by the controller when it uses the data lines to send commands, and drivers ATN false when a Talker can send data messages.

IFC (interface clear) IFC is driven by the system controller to initialize the bus and become CIC.

REN (remote enable) The REN line is driven by the controller that is used to place devices in remote or local program mode.

SRQ (service request) The SRQ line can be driven by any device to asynchronously request service from the Controller.

EOI (end or identify) This line has two purposes- the Talker uses this line to mark the end of a message string, and the Controller uses it to tell devices to identify their response in a parallel poll.

8.5. GPIB Connector

Connection is usually accomplished with a 24-conductor cable with a plug on one end and a connector at the other end. Devices may be connected in a linear, star or a combination configuration.

The standard connector is the Amphenol or Cinch Series 57 Microribbon or AMP CHAMP type. The GPIB uses negative logic with standard transistor-transistor logic (TTL) levels. When DAV is true, for example, it is a TTL low level ($\leq 0/8$ V), and when DAV is false, it is a TTL high level (≥ 2.0 V).

Restrictions and Limitations on the GPIB

A maximum separation of 4 m between any two devices and an average separation of 2 m over the entire bus. A maximum total cable length of 20 m.

No more than 15 device loads connected to each bus, with no less than two-thirds powered on. For example 1 GPIB controller and a maximum of 14 GPIB instruments.

Note: A bus extender, which is available from numerous manufacturers, is available to overcome these limitations.

8.6. GPIB Address

This interface is optional on the Omnia. Each device on the GPIB (IEEE-488) interface must have a unique address. You can set the address of the Omnia to any value between 0 and 30. The address is set to 9 when the instrument is shipped from the factory. The address can only be set from the front panel. The address is stored in non-volatile memory and does not change when the power has been off or after a remote reset.

8.7. Interface Functions

The capability of a device connected to the bus is specified by its interface functions. These functions provide the means for a device to receive, process, and send messages over the bus. The interface functions are listed in the chart below.

GPIB 488.1 INTERFACE FUNCTIONS

Interface Function	Subset	Description
Source Handshake	SH1	Complete Source handshake capability
Acceptor Handshake	AH1	Complete Acceptor handshake capability
Talker	T6	Talker functions (unaddress if MLA)
Listener	L4	Listener functions (unaddress if MTA)
Service Request	SR1	Complete Service request capability
Remote Local	RL0	No remote/local capability
Parallel Poll	PP0	No parallel poll capability
Device Clear	DC1	Complete Device clear capability
Device Trigger	DT0	No device trigger capability
Controller	C0	No controller capability
Electrical Interface	E2	Three-state drivers

Controllable Items	Test and Reset control. Setting of test parameters for tests. Reading of instrument status and test results.
Data Codes	ASCII
Delimiter	NL (+ EOI)

8.8. RS-232 Interface

This interface is standard on Omnia. This interface provides all of the control commands and parameter setting commands of the GPIB interface with the exception of the 488.2 Common Command the Status Reporting commands and SRQ capability. All commands can be found in the command list, section 8.9.1 to 8.9.4 of this manual. The identification command *IDN is also available through RS-232.

The RS-232 cabling should be configured as follows for a 9 pin serial port interface:

Instrument RS-232 Port   **PC / Bus Controller**

RD	2	2	RD
TD	3	3	TD
SIG GND	5	5	SIG GND
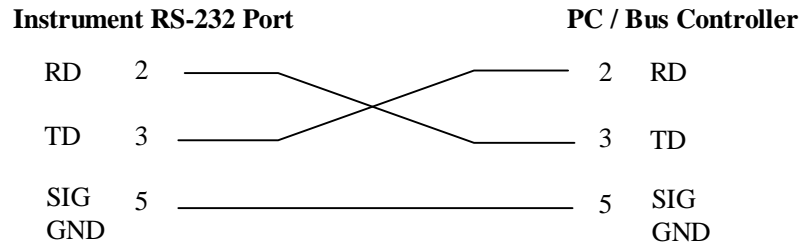
The COM port should have the following configuration. 9600 baud, 8 data bits, 1 stop bit, no parity. This interface does not support XON/XOFF protocol or any hardware handshaking. The controller should be configured to ignore the handshaking lines DTR (pin 4), DSR (pin 6) CTS (pin 8) and RTS (pin 7). If the port can not be configured through software to ignore the lines then the handshake lines should be jumpered together in two different sets. Pins 4 and 6 jumpered together and pins 7 and 8 jumpered together at the controller end of the cable.

When sending command over the RS232 bus the instrument will send a response string of 06 hex or 6 decimal, the Acknowledge (ACK) ASCII control code if the transfer was recognized and completed by the instrument. If there is an error with the command string that is sent, the instrument will respond with 15 hex or 21 decimal, the Not Acknowledge (NAK) ASCII control code. The ACK or NAK response allows for software handshaking, to monitor and control data flow. When requesting data from the instrument, it will automatically send the data back to the controller input buffer. The controller input buffer will accumulate data being sent from the instrument including the ACK and NAK response strings, until it has been read by the controller.

8.9. GPIB / RS-232 Interface Command List

A GPIB read command must be sent after the command strings, to retrieve any data from a query command (?). The Omnia GPIB bus will not send any data to the controller without being queried. The RS-232 bus will automatically send any response back to the controller's input buffer. Each command string should be terminated by the ASCII control code, New Line <NL>, OAh or the end of line EOL message for GPIB.

The following conventions are used to describe the commands syntax for Omnia. Braces ({ })enclose each parameter for a command string. Triangle brackets (< >) indicate that you must substitute a value for the enclosed parameter. The Pipe (|) is used to separate different

parameter options for a command. Do not include any of the above characters when sending the commands. The command and the value should be separated with a space.

All commands that end with a question mark (?) are query commands and required an IEEE-488 read command to retrieve the data from the device's output buffer.

8.9.1. Test Execution Commands

The following commands are used to control actual output voltage and current from the instrument. Please observe all safety precautions.

Command	Description
TEST	Execute a Test
RESET	Abort a test in Process or Reset Failures
SAO	Set Auto-Offset
SACG	Set Auto-Charge-LO

TEST
Starts the test sequence at the selected step loaded into memory (RAM).

RESET
Stop or abort a test. Also used to reset a latched failure condition.

SAO
Set the offset for the Ground bond test or Continuity test. The cables and any test fixture should be connected before executing the command. This command will perform an actual test and all safety precautions should be observed when using this command.

SACG
Set the Charge-LO parameter for the DCW or IR test. The cables and any test fixture should be connected before executing the command. The test parameters that are set for the step will be used when performing the auto setting. This command will perform an actual test and all safety precautions should be observed when using this command.

8.9.2. File Editing Commands

The following commands are used to create or modify Test Setup Files.

Command	Description	Value
FL <file number>	File Load	file number = 1-50
FD	File Delete	Active selected File
FD <file number>	File Delete by Number	file number = 1-50
FS	File Save	Active selected File

Command	Description	Value
FSA {<*file number*>,<*file name*>}	File Save-as	*file number* = 1-50, *file name* = Valid ASCII (1) maximum 11 characters
FN {<*file number*>,<*file name*>}	File New	*file number* = 1-50, *file name* = Valid ASCII (1) maximum 11 characters
SS <*step number*>	Step Select	*step number* = 1-30
ADD <*test,p1,p2,p3…*>	Adds all parameters	
SAA	Step Add ACW test	
SAD	Step Add DCW test	
SAI	Step Add IR test	
SAG	Step Add GND test	
SAC	Step Add CONT test	
SAR	Step Add RUN test	
SAL	Step Add LLT test	
SD	Step Delete	Active selected Step
SD <*step number*>	Step Delete by Number	*step number* = 1-30
SP <*prompt message*>	Step Prompt Create	*prompt message* = Valid ASCII (1) maximum 32 characters
SP	Step Prompt Delete	
SF {1|0}	Step Fail Stop	1=On, 0=Off

(1) "Valid ASCII" is the character set that is available from the front panel LCD user interface. Consisting of upper case alphabet (A-Z), numbers (0-9) and decimal point (.), asteric (*), dash (-), underbar (_), tilde (~) and space (SP).

FL <*file number*>
Load a file from non-volatile memory into random access memory RAM.

FD
Deletes the file loaded into RAM from the non-volatile memory space as well as RAM. A new file must be loaded before and tests can be run.

FD <*file number*>
Deletes a file from non-volatile memory indicated by the file number.

FS
Saves the file from RAM to the non-volatile memory space.

FSA {<*file number*>,<*file name*>}
Saves the current file from RAM into the non-volatile memory space with the indicated file number and file name. The original file will not be modified with this operation. If there is a file already located at the desired number it will be moved to the next higher number and inserted in

its place. New files may be added to the bottom of the file list but there must not be any numbers that do not have a file defined.

FN {*<file number>,<file name>*}
Creates a new file name at the specified file number. If there is a file already located at the desired number it will be moved to the next higher number and inserted in its place. New files can be added to the bottom of the file list but there must not be any numbers that do not have a file defined.

SS *<step number>*
Selects the active selected step to load into RAM. The step must first be selected before any specific parameters can be edited.

ADD *<test,p1,p2,p3…>*
This command inserts or adds a new step to the test sequence. This command will add or insert the test at the step location that has been selected. When a test has already been created at a selected step then the new step will be inserted and the previous step will move down to the next step and all other step will be renumbered accordingly.

The parameter *<test>* indicated the test type. The values ACW, DCW, IR, GND, CONT, RUN or LLT must be used. The parameters *<p1,p2>* etc. indicate the individual settings for each test. All parameters must be included with the command and should appear in the same order that is shown on the actual setting screens. The correct order is shown in the tables below. When the scanner is installed it should be the last parameter for all test types except GND. For the GND test type, the scanner settings should be inserted between offset and frequency. The list of parameters can also be found in the default parameters section of the manual.

The parameter values should use complete text and not use the coded values that are associated with the individual parameter setting commands. Such as "ON" and "OFF" and any toggle field that use words or phrases like "OPEN", "CLOSE". The LS? companion command will also list all parameters in complete text as they appear on the setting screen.

	ACW	DCW	IR
1	Voltage	Voltage	Voltage
2	HI-Limit T	HI-Limit	HI-Limit
3	LO-Limit T	LO-Limit	LO-Limit
4	Ramp Up	Ramp Up	Ramp Up
5	Dwell Time	Dwell Time	Delay Time
6	Ramp Down	Ramp Down	Ramp Down
7	Arc Sense	Charge-LO	Charge-LO
8	HI-Limit Real	Arc Sense	
9	LO-Limit Real	Ramp-HI *(ON/OFF)*	
10	Frequency	Arc Detect *(ON/OFF)*	
11	Arc Detect *(ON/OFF)*	Continuity *(ON/OFF)*	
12	Continuity *(ON/OFF)*	*DUT-OUT *(ON/OFF)*	
13	*DUT-OUT *(ON/OFF)*		

* By default, the DUT-OUT parameter should not be included in the ADD command. Include this parameter only when the System Hardware setting DUT-HV has been enabled.

	GND	CONT	RUN	LLT
1	Current	HI-Limit	Voltage-HI	Leakage-HI
2	Voltage	LO-Limit	Voltage-LO	Leakage-LO
3	HI-Limit	Dwell	Amp-HI	Voltage-HI
4	LO-Limit	Offset	Amp-LO	Voltage-LO
5	Dwell		Dwell Time	Delay Time
6	Offset		Delay Time	Neutral *(OPEN/CLOSED)*
7	Frequency		Leakage-HI	Reverse *(ON/OFF)*
8			Leakage-LO	Ground *(OPEN/CLOSED)*
9			Power-HI	Meas. Device *(UL544NP/UL544P/IEC601UL2601/ UL1563/IEC60990FIG4-U2/ IEC60990FIG5-U3/IEC60990FIG3-U1/ EXTERNAL)*
10			Power-LO	Probe *(Ground To Line/ Probe-HI to Line/Probe-HI To Probe-LO)*
11			PF-HI	Leakage Mode *(Peak/RMS)*
12			PF-LO	

SAA, SAD, SAI, SAG, SAC, SAR, SAL
These commands insert or add a new step to the test sequence. This command will add or insert the test at the step location that has been selected. When a test has already been created at a selected step then the new step will be inserted and the previous step will move down to the next step and all other step will be renumbered accordingly. See the command summary tables to see the specific test type for each of these commands.

SD
Deletes the active step from the setup file sequence. All step after this step will move up and be renumbered accordingly.

SD *<step number>*
Deletes the step indicated by the number from the setup file sequence. All step after this step will move up and be renumbered accordingly.

SP *<prompt message>*
Adds or edits a prompt message for the active step.

SP
Removes or deletes the prompt that had been created for the active step.

SF {1|0}
Sets the Fail Stop function OFF or ON for the active setup file loaded into RAM. 1 sets the Fail Stop = ON, 0 sets the Fail Stop = OFF.

8.9.3. Test Parameter Editing Commands and Companion Queries

These commands are used to modify the test parameter within each step. These commands require a parameter value to be included with the command. The companion query command will read the parameter. The writing of the parameter requires that the unit not be included with the value, only the numeric value should be included with the command. Also when the query commands are used the response will not include the units characters. Many of the commands will function the same way for multiple test types however the input range may be different and therefore used a different possible set of values.

Command	Name	Test Types	Value
EA < *value* > EA?	Edit Arc	ACW DCW	1 - 9
EAD {1|0} EAD?	Edit Arc-Detect	ACW DCW	1= On, 0=Off
ECG < *value* > ECG?	Edit Charge-Lo	IR DCW	0.0 - 350uA 0.000 - 3.5000uA
ECT {1|0} ECT?	Edit Continuity	ACW DCW	1= On, 0=Off
EC < *value* > EC?	Edit Current	GND	1.00 - 40.00A
ECH < *value* > ECH?	Edit Current-HI	RUN	0.00 - 15.00A
ECL < *value* > ECL?	Edit Current-Lo	RUN	0.00 - 15.00A
EDE < *value* > EDE?	Edit Delay	IR RUN LLT	0.0 - 999.9s
EDO {1|0} EDO?	Edit DUT-Output Voltage	ACW DCW IR	1= On, 0=Off
EDOC {1|0} EDOC?	Edit DUT-Output Continuity	GND CONT	1= On, 0=Off
EDW < *value* > EDW?	Edit Dwell	ACW DCW GND CONT RUN	0.0 - 999.9s
EF {1|0} EF?	Edit Frequency	ACW GND	1=60Hz, 0=50Hz
EG {1|0} EG?	Edit Ground	LLT	1=Open, 0=Close

Command	Name	Test Types	Value
EH < *value* > EH?	Edit HI-Limit	DCW IR GND CONT	0.0 - 20000uA 0.05 - 50000MΩ 0 - 600mΩ 0.00 - 10.00Ω
EHR < *value* > EHR?	Edit HI-Limit-R	ACW	0.000 - 10.00mA
EHT < *value* > EHT?	Edit HI-Limit-T	ACW	0.000 - 40.00mA
ELH < *value* > ELH?	Edit Leakage-HI	RUN LLT	0.000 - 10.00mA 0.0 - 6000uA
ELL < *value* > ELL?	Edit Leakage-LO	RUN LLT	0.000 - 10.00mA 0.0 - 6000uA
EL < *value* > EL?	Edit LO-Limit	DCW IR GND CONT	0.0 - 20000uA 0.05 - 50000Ω 0 - 600mΩ 0.00 - 10.00Ω
ELR < *value* > ELR?	Edit LO-Limit-R	ACW	0.000 - 10.00mA
ELT < *value* > ELT?	Edit LO-Limit-T	ACW	0.000 - 40.00mA
ELM {1|0} ELM?	Edit Leakage Mode	LLT	1=Peak, 0=RMS
EM {0|1|2|3|4|5|6|7|8} EM?	Edit Meas-Device	LLT	0=UL544NP 1=UL544P 2=IEC601, UL2601 3=UL1563 4=IEC60990 FIG4-U2 5=External 6=Frequency Check 7=IEC60990 FIG5-U3 8=IEC60990 FIG3-U1
EN {1|0} EN?	Edit Neutral	LLT	1=Open, 0=Close
EO < *value* > EO?	Edit Offset	GND CONT	0 - 200mΩ 0.00 - 2.00Ω
EPFH < *value* > EPFH?	Edit PF-HI	RUN	0.000 - 1.000
EPFL < *value* > EPFL?	Edit PF-LO	RUN	0.000 - 1.000
EPOH < *value* > EPOH?	Edit Power-HI	RUN	0 - 4200W
EPOL < *value* > EPOL?	Edit Power-LO	RUN	0 - 4200W

Command	Name	Test Types	Value
EP {0|1|2} EP?	Edit Probe	LLT	0=Ground to Line 1=Probe-HI to Line 2=Probe-HI to Probe-LO
ERD *\<value >* ERD?	Edit Ramp-Down	ACW DCW IR	0.0 - 999.9s
ERH {1|0} ERH?	Edit Ramp-HI	DCW	1= On, 0=Off
ERU *< value>* ERU?	Edit Ramp-Up	ACW DCW IR	0.0 - 999.9s
ER {1|0} ER?	Edit Reverse	LLT	1= On, 0=Off
ES *<scanner string>* ES?	Edit Scanner High Voltage Muti-port	ACW DCW IR	*scanner string* = 1-16 element ASCII string consisting of H, L, or O. H=HV, L=RETURN, O=OPEN
ESN *<value>* ESN?	Edit Scanner Low Voltage Single-port	GND CONT	*value* = 0 - 16, 0 = ALL OPEN
EV *<value>* EV?	Edit Voltage	ACW DCW IR GND	1 - 5000V 1 - 5000V 1 - 1000V 3.00 - 8.00V
EVH *< value >* EVH?	Edit Voltage-Hi	RUN LLT	0.0 - 277.0V
EVL *< value >* EVL?	Edit Voltage-Lo	RUN LLT	0.0 - 277.0V

EDOC
EDOC?

This command is used to control the Continuity and Ground Bond tests at the DUT outputs of the LLT and RUN test interface. It should only be used when Continuity or Ground Bond tests are routed through the HS-16 external, PC controlled scanner. When the EDOC command is set to 0 the Continuity or Ground Bond test will be disconnected from the GND and Case terminals of the DUT-outputs to eliminate possible parallel paths with the scanner outputs.

8.9.4. System Parameter Editing Commands and Companion Queries

These commands are used to modify the system parameters for the instrument. These commands require a parameter value to be included with the command. The companion query command will read the parameter using the same value that is used for setting the parameter.

Command	Name	Value
SA < *value* > SA?	Alert Date	mm,dd,yy or yy,mm,dd or dd,mm,yy ; same as SDF setting
SAL < *value* > SAL?	Alarm Volume	0-9
SC < *value* > SC?	Contrast	1-9
SCA {1|0} SCA?	Cal Alert	1= On, 0=Off
SCDA < *value* > SCDA?	Cal Date	mm,dd,yy or yy,mm,dd or dd,mm,yy ; same as SDF setting
SCDU < *value* > SCDU?	Cal Due	mm,dd,yy or yy,mm,dd or dd,mm,yy ; same as SDF setting
SD1 < *value* > SD1?	Device ID	0 - 9999999
SD2 {1|0} SD2?	Device ID	1= On, 0=Off
SDAY {6|5|4|3|2|1|0} SDAY?	Day of the week	0,1,2,3,4,5,6= Sun,M,T,W,T,F,Sat
SDF < *value* > SDF?	Date Format	0=yy,mm,dd, 1=mm,dd,yy 2=dd,mm,yy
SDH{1|0} SDH?	DUT-HV	1= On, 0=Off
SDT < *value* > SDT?	Date	mm,dd,yy or yy,mm,dd or dd,mm,yy ; same as SDF setting
SF {1|0} SF?	Fail Stop	1= On, 0=Off
SFF {1|0} SFF?	Form Feed n	1= On, 0=Off
SL {1|0} SL?	Lock	1= On, 0=Off
SML {1|0} SML?	Memory Lock	1= On, 0=Off
SMM {1|0} SMM?	Main Menu page	1= On, 0=Off
SOI {1|0} SOI?	Omnia Info page	1= Pause, 0=Continue

Command	Name	Value
SPM {2|1|0} SPM?	Print Mode	0=AUTO, 1=MANUAL, 2=OFF
SPR {1|0} SPR?	PLC Remote	1= On, 0=Off
SPRE {1|0} SPRE?	Print Result	1=FAIL, 0=ALL
SPS {1|0} SPS?	Print Setting	1= On, 0=Off
SR {2|1|0} SR?	Results	0=ALL, 1=P/F, 2=LAST
SSG {1|0} SSG?	Smart GFI	1= On, 0=Off
SSI {1|0} SSI?	Single Step	1= On, 0=Off
STM < *value* > STM?	Time	hh,mm (24hr) hh,mm,AM or hh,mm,PM (12hr) according to STF setting
STF {1|0} STF?	Time Format	0=12hr, 1=24hr
SV{1|0} SV?	Verification page	1= On, 0=Off

8.9.5. Query Commands

These query commands will retrieve data from the instrument. The GPIB bus application requires an IEEE-488 read command to be sent after the query command. These commands include functions for retrieving test data, test results and remote hardware status as well as setup file information.

Command	Name	Value
TD?	List Testing Data	Test In Process
RD <*step number*>?	List Results Data	*step number* = 1-30
RR?	Read Remote Reset	1=Open, 0=Closed
RI?	Read Remote Interlock	1=Open, 0=Closed
LF?	List File Name	Active selected file
LF <*file number*>?	List File Name by file number	*file number* = 1-50
LP?	List Prompt	Active selected Step
LP <*step number*>?	List Prompt by step number	*step number* = 1-30
FT?	File Total quantity stored	
ST?	Step Total quantity in file	
LS?	List Step Parameters	

Command	Name	Value
LS <step number>?	List Step Parameters by step number	step number = 1-30

TD?

Read the active data being displayed on the LCD display while the test is in process. Will also read the last data taken when the test sequence has completed. Each parameter is separated by commas and includes step number, test type, test status, and metering. The syntax for this command response is {step, test type, status, meter 1, meter 2, meter 3}. ACW test displays 4 meters. Each meter will contain only the value and not the units. In the case of DCW current where both uA and mA are used on the display, the command response will always indicate the current in uA for example 2.0mA will respond with 2000 for 2000uA.

RD <step number>?

Read the results for an individual step. The step number is the actual step number that has been saved within the file, not the order of which the steps were executed. For example if the test was executed starting from step 3 and ending with step 5 then the first step test results will be found in location 3 not in location 1. Each parameter is separated by commas and includes step number, test type, test status, and metering. The syntax for this command response is {step, test type, status, meter 1,meter 2,meter 3}. ACW test displays 4 meters. Each meter will contain only the value and not the units. In the case of DCW current where both uA and mA are used on the display the command response will always indicate the current in uA for example 2.0mA will respond with 2000 for 2000uA.

RR?

Read the remote Reset input signal. When the remote reset has be activated by closing the contacts the query will return a value of 1 to indicate the instrument is being Reset.

RI?

Read the remote Interlock input signal. When the remote Interlock has be activated by opening the contacts the query will return a value of 0 to indicate the instrument is in the Interlock state and will not be able to generate output voltage or current.

LF?

Lists the file name of the file loaded into active memory (RAM).

LF <file number>?

List the file name of any saved file within the directory structure. The file number is given to the file when the file is save into non-volatile memory.

LP?

Lists the prompt that is created for the individual step that has been selected within active memory (RAM).

LP <step number>?

Lists the prompt that has been created for of one of the steps of the file within active memory (RAM).

FT?
Returns the total quantity of files stored in memory.

ST?
Returns the total quantity of step created in the file.

LS?
Lists all the Parameters for the individual step that is currently selected.
The response will be formatted as follows; ***<step, test, p1, p2, p3…>*** Where *<step>* is the step number, *<test>* is the test type and *<p1,p2>* etc., indicates the parameters of the test. Please refer to the ADD command for a list of parameters for each test type.

LS *<step number>*?
Lists all the Parameters for the individual step indicated by *step number* = 1-30.
The response will be formatted as follows; ***<step, test, p1, p2, p3…>*** Where *<step>* is the step number, *<test>* is the test type and *<p1,p2>* etc., indicates the parameters of the test. Please refer to the ADD command for a list of parameters for each test type.

8.9.6. IEEE 488.2 Common Commands

These commands are required by the IEEE-488.2 standard with the exception of *PSC, *PSC?. Most of these commands are not available over the RS-232 bus except for the *IDN? command which can be used to retrieve the instrument identification information, and the four status reporting commands *ESR?, *ESE, *ESE? and *STB?.

Command	Name	Description
*IDN?	Identification Query	ARI, Model Number, Serial Number, Firmware Revision
*RST	Reset Command	Resets OMNIA
*TST?	Self-Test Query	00H=OK 01H=TEST EEPROM ERROR
*CLS	Clear Status Command	Clear Standard Event Status Register Clear Service Request Register
*OPC	Operation Complete Command	When TEST command ok setting ESR BIT0 =1
*OPC?	Operation Complete Query	1 = TEST completed ok 0 = TEST in process
*WAI	Wait-to-Continue Command	
*PSC {1|0}	Power-on Status Clear Command	1 = Power-on clear enable registers 0 = Power-on load previous enable registers
*PSC?	Power-on Status Clear Query	
*ESR?	Standard Event Status Register Query	0 - 255
*ESE *value*	Standard Event Status Enable Command	*value* = 0 - 255
*ESE?	Standard Event Status Enable Query	0 - 255
*STB?	Read Status Byte Query	Read Status Byte
*SRE *value*	Service Request Enable Command	*value* = 0 - 255
*SRE?	Service Request Enable Query	0 - 255

*IDN?
Read the instrument identification string. Company =ARI.

*RST
Reset the instrument to original power on configuration. Does not clear Enable register for Standard Summary Status or Standard Event Registers. Does not clear the output queue. Does not clear the power-on-status-clear flag.

*TST?
Performs a self test of the instrument data memory. Returns 0 if it is successful or 1 if the test fails.

*CLS

Clears the Status Byte summary register and event registers. Does not clear the Enable registers.

*OPC

Sets the operation complete bit (bit 0) in the Standard Event register after a command is completed successfully.

*OPC?

Returns an ASCII "1" after the command is executed.

*WAI

After the command is executed, it prevents the instrument from executing any further query or commands until the no-operation-pending flag is TRUE.

*PSC {1|0}

Sets the power-on status clear bit. When set to 1 the Standard Event Enable register and Status Byte Enable registers will be cleared when power is turned ON. 0 setting indicates the Enable registers will be loaded with Enable register masks from non-volatile memory at power ON.

*PSC?

Queries the power-on status clear setting. Returns 0 or 1.

*ESR?

Queries the Standard Event register. Returns the decimal value of the binary-weighted sum of bits.

*ESE *<value>*

Standard Event enable register controls which bits will be logically ORed together to generate the Event Summary bit 5 (ESB) within the Status Byte.

*ESE?

Queries the Standard Event enable register. Returns the decimal value of the binary-weighted sum of bits.

*STB?

Read the Status Byte. Returns the decimal value of the binary-weighted sum of bits.

*SRE *<value>*

Service Request enable register controls which bits from the Status Byte should be use to generate a service request when the bit value = 1.

*SRE?

Queries the Service Request enable register. Returns the decimal value of binary-weighted sum of bits.

8.9.7. Status Reporting

Status reporting system is configured using two types of registers. An Event Register and a Summary register. The summary register is known as the Status Byte register and records high-level summary information acquired by the event registers.

An Event register report defined conditions or messages at each bit. The bits are latched and remain at an active state until the register is either Read or Cleared. Reading the event register automatically clears the register and sets all bits to inactive state or 0. When querying an event register the information is returned as a decimal number representing the binary-weighted sum of all bits within the register.

The Enable registers bits represent the selection of bits that will be logically-ORed together to form the summary bit in the status byte. The *CLS command will not clear the enable registers and if you wish to clear the register you must set it to a value of 0. Like the event register, the enable register is represented as a decimal number that equals the binary-weighted sum of all bits.

The enable register will clear to value of 0 at power up unless the *PSC 0 command had been executed before power-off. The *PSC command tells the device whether or not it should clear the enable registers at power-on. Using this command will allow SQRs to function immediately after power-on

		Standard Event Register		**Status Byte Register**	
Bit	Binary weight	Event Register	Enable Register	Summary Register	Enable Register
0	1	Operation Complete		ALL PASS	
1	2	not used		FAIL	
2	4	Query Error		ABORT	
3	8	Device Error		TEST IN PROCESS	
4	16	Execution Error		Message Available (MAV)	
5	32	Command Error		Event Summary Bit (ESB)	
6	64	not used		Request Service (RQS) or Master Summary Status (MSS)	not used
7	128	Power On		PROMPT	

*ESR?   *ESE   *STB? | SPOLL   *SRE
             *ESE?   *SRE?

8.9.8. GPIB Service Request

The service request capability is not available with the RS-232 interface. The SRQ line will be activated only after one or more of the service request functions have been enabled using the Status Byte Enable Register command *SRE.

The status byte bit assignments are as described in the previous section for status reporting. When the instrument has requested service, the enabled bit or bits and the RQS bit 6 will be active or 1. Bit 4, 5, and 7 are not used and will be set to false, or 0 for all status byte reads.

After the serial poll (SPOLL) is executed the RQS bit will be cleared to 0, and the remaining bits will remain unchanged. The status byte will not change value until the event register is read and cleared for the corresponding status byte bit.

For example after the All Pass SRQ has been enabled, when the test(s) have finished with pass indications the instrument will set the hardware SRQ line and output the status byte of 41 hex. This means that bit 6 and bit 0 are set to a value of 1. After reading the status byte the status byte value will change to 01 hex.

8.10. Example of Communicating Over the GPIB Bus

To write commands over the IEEE bus you must enter the code that is specific to the software language you are using. Then follow the example below:

To set the output voltage across the IEEE bus at 1240 volts do the following. First select the ACW step for example by sending the string for step one **"SS 1"** then send the string **"EV 1240"**: This tells the instrument to set the AC voltage at 1240 volts. A string is a list of ASCII characters, octal or hex bytes or special symbols, enclosed in double quotes.

If the step has already been selected to ACW mode and you wish to set the Ramp Up time of the ACW test across the IEEE bus at 10 seconds, do the following, send the string **"ERU 10.00"**. This tells the instrument to set the AC Ramp Up time at 10.00 seconds.

To set outputs 1 & 2 of the scanner to High, outputs 3 & 4 to Low and outputs 4-8 to Off type in the following string, **"ES HHLLOOOO"**, after the ACW Test Function has been selected. All channels not being specifically set will automatically be set to "O" open.

To read the live testing data, first send the string **"TD?"** then send the GPIB command to read. For RS-232 the response will be sent automatically to the controller. The instrument will send a string of parameters separated by commas for each meter on the display example the data for an ACW test might be as follows: **"01,ACW,Dwell,3.00,1.25,0.00,2.5"** this represents an ACW test at step 1, 3.00KV output voltage, 1.25mA total current, 0.00mA real current and the elapsed time for Dwell cycle is 2.5 seconds.

8.11. Non Volatile Memory

The instrument saves each parameter in non-volatile memory when the file save "FS" command is used to save the file. The non-volatile memory has a limited write cycle life, therefore for programmers who wish to send all parameters before executing each test the "FS" command should not be used. The parameters will be stored in the CPU's Random Access Memory (RAM) until another memory location is selected. However, settings written to RAM from GPIB/RS-232 mode will be lost when power is shut down. Parameter changes to RAM are unlimited and will not effect the life of the internal non-volatile memory chip.

FOR MORE INFORMATION ON IEEE (GPIB) PLEASE CONTACT

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9. Options

Introduction

This section contains a list and descriptions of available factory installed options at the time of this printing. The list of options contains an option code number that can be referenced on the data plate on the rear panel of the unit.

Option Label

On the rear panel of the instrument, you will find a label that contains the option code.

For example, your options code would appear as follows:
Fitted with option 01 .... OPT: 01
Fitted with option 01 and 05.. OPT: 0105

Omnia Options

Option List

Code	Description
01	Internal Scanner
02	Continuous Output 8105, 8106
03	Dual Remote Test Switch
04	3 Remote Memories Send 8105, 8106
05	7 Remote Memories Send 8105, 8106
06	Cold Resistance 8105, 8106
07	Data Storage Card
08	Printer Card
10	GPIB

01 8 Channel Scanner with Continuity
The Scanner option provides 8 High Voltage/Continuity channels and 8 Ground Bond/Continuity channels on the rear panel. The High Voltage/Continuity channels can be set to a High (Continuity) or Low level giving the capability to test from one channel to another channel or from any channel to a common Low or Return point. The channels can be connected in parallel if desired but there is only one leakage current measurement for all channels. The ground bond/continuity channels can test only from one channel to the common Return and only one channel may be used for each test.

The scanner will provide output to multiple test points and will have the same operation specifications that apply to the standard instrument.

The common (G-COM.) connection of the ground bond/continuity outputs should be used when a ground bond or continuity test requires a different Return point than the high voltage test points require. The ground bond or continuity test will be performed between the output

channel selected and the ground bond common terminal. When an output channel is selected, the Current output terminal is connected to the output channel, and the Return output terminal is connected to the G-COM. terminal. The G-COM. terminal is connected to the main Return output during ground bond or continuity operation, but is disconnected from the main Return during high voltage operation. The Kelvin connection (voltage sensing) point on the ground bond/continuity scanner is connected directly to the ground bond/continuity output channels CH1- CH8 and the G-COM connections at the output terminals. True 4-wire measurement through the scanner is not possible because of the Kelvin lead termination but the milliohm-offset feature should be used to reduce measurement errors of the actual DUT.

Although the G-COM connection of the ground bond/continuity outputs provides separation from the main Return lead output during the high voltage withstand, or insulation resistance tests, the ground bond/continuity channels can be used to perform ground bond or continuity tests referenced directly to the main Return lead without using the G-COM terminal for return separation. However, when using the main Return lead during scanner applications the Return lead Kelvin connection point is not effective. The Return lead Kelvin connection is terminated at the alligator clip of the test lead but the G-COM terminal has an internal Kelvin connection that shorts out the test lead Kelvin connection. Therefore, the resistance of the Return test lead will be measured during the test and should be offset using the milliohm-offset feature to reduce measurement errors of the actual DUT.

Descriptions for operating the scanner are contained within the standard operating and setup procedures. The additional accessories provided come complete with assembly instructions. Please refer to the instructions when installing the scanner channel connections.

The scanner will provide output to multiple test points and will have the same operation specifications that apply to the standard instrument with the exception of one Ground Bond/Continuity channel limitation. Due to the characteristics of general-purpose High Current relays, some additional contact resistance cannot be prevented. Although this contact resistance can be offset using the milliohm-offset feature of the instrument, there will be some variation of the contact resistance because the relay must open and close. Each relay closure may represent a different resistance value. The Ground Bond/Continuity channels will have the following characteristics:

Ground Bond/Continuity Channel Resistance Deviation	
Deviation (Relay Contact)	Test Current
6mΩ maximum	≥10A

02 Continuous Output (Models 8105 and 8106)

This option allows the user to test a DUT that is sensitive to interruption of the input voltage between tests.

When this option is installed, a new soft key selection will appear on the Run Test parameter screen. The new soft key is called "Continuous" and when pressed will toggle between "ON" and "OFF". The new Run Test parameter screen will appear as follows:

```
              R u n    T e s t
Volt-HI      [ xxxxV ]  Power-HI   [ xxxxW ]    ■
Volt-LO      [ xxxxV ]  Power-LO   [ xxxxW ]    ■
Amp-HI       [ xxx.xA]  PF-HI      [ x.xxx ]    ■
Amp-LO       [ xxx.xA]  PF-LO      [ x.xxx ]    ■
Dwell Time   [ xxx.xs]                          ■
Delay Time   [ xxx.xs]
Leakage-HI   [ xxx.xuA]  Continuous [  ON  ]►   ■
Leakage-LO   [ xxx.xuA]

RANGE:                   Defaults       ►       ■
Volt-HI
0 - 277V
```

With the Continuous Output option, the DUT will be connected to the power during and between test steps. The DUT Outputs, Line and Neutral are disconnected from Power source only after multiple tests are completed, the RESET button is pushed, or a failure occurs.

The Single Step function is used to temporarily override the connection between test steps. When the Single Step = ON the instrument will pause after each step. With this option, continuous output voltage will be provided to the DUT during the pause. A warning will flash on the screen informing you that the "DUT Output is Active" during the pause. If the test button is not pushed within ten seconds, the DUT Output voltage will automatically shut off.

It is important to note that no programmed trip points are monitored during the pause of Single Step even though the DUT Output is active. Although the trip points are not monitored during a pause, the short circuit protection is always enabled.

> **WARNING** **DO NOT TOUCH THE DEVICE UNDER TEST BECAUSE POWER REMAINS ON.**

If the trip point failure occurs, then the output voltage to the DUT will be interrupt immediately.

All other specifications remain the same. Refer to the Specifications section of this manual, for a complete list of all specifications.

03 Dual Remote Test Switches

The Dual Remote Test Switch option allows the user to configure dual palm switches for safe production line operation.

To activate the option, you must access the Setup System Menu from the Main Menu screen. This process is described in section 4.1 Setup System Menu in this manual. Once at the Setup System screen press the Hardware softkey. The Hardware screen will appear as follows:

```
         H a r d w a r e
A l a r m   V o l u m e [    5    ]   ■
L C D   C o n t r a s t [    6    ]   ■
G P I B   A d d r e s s [   2 2    ]   ■
      S m a r t   G F I [   O F F  ]▶  ■
      P L C   R e m o t e [   O N   ]▶ ■
  D U T - H V   S e t u p [  O F F  ]▶ ■
      D u a l   T E S T [   O N     ]▶ ■
```

Using the available softkeys set the PLC Remote to **ON** and Dual Test to **ON**.

The rear panel remote interface is reconfigured to allow two test switches instead of the standard reset and test inputs. The two test switches have to be pressed within 0.5 seconds to activate the test process. The two test switches must remain closed to continue the test. If either of the test switches is released, the process will be shut down immediately. The functions of the Test and Reset switches on the front panel will be disabled if the dual test switches are enabled. When the Dual Test parameter is turned OFF, the Test and Reset switches on the front and rear panel behave the same as the standard instrument, and are controlled by the PLC Remote On/Off selection.

04 3 Remote Memories Send (Models 8105 and 8106)

With this option installed, the PLC remote signal output has been reconfigured to provide a 2-Bit digital control signal that is menu selectable from the Run Test or LLT parameter screen. In this configuration, the PLC remote signal output may be used to control a compatible device such as the AC 1000 power supply.

This option is provided with a cable which is designed to interconnect the Omnia PLC output to the AC 1000 Remote I/O input. This cable, part number 38774, is custom and can only be purchased from Associated Research.

When using this option with an AC 1000, be sure to power up the Omnia first and then power up the AC 1000. When powering down the instruments, power down the AC 1000 first and then power down the Omnia. The Omnia is in an undetermined state without power and may cause inadvertent memory activation of the AC 1000. If you would like to operate the AC 1000 independently of the Omnia, either disconnect the interface cable or disable the PLC remote on the AC 1000.

The Remote Memories send signals are provided by two normally open internal relays. These are normally open free contacts and will not provide any voltage or current. The ratings of the contacts are 1A / 125 VAC (0.5 ADC).

With this option, a new soft key selection will appear on the Run Test parameter or LLT parameter screen. In the LLT parameter screen it will be necessary for you to press the "More" softkey to access the PLC control parameter. The new soft key, called PLC Control will toggle between M1, M2, and M3 when pressed.

Setting the PLC control selection to M1, M2, and M3 will create different digital states at Bit 0 and Bit 1 of the PLC Remote Signal Output (refer to the PLC Signal Output drawing below). The different states are described in the truth table below. The "Not used" state is undefined and cannot be programmed for use.

SIGNAL OUTPUT
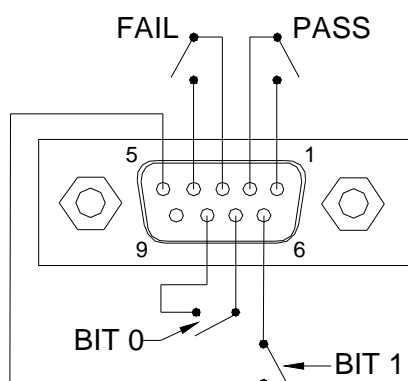
BIT 1	BIT 0	Test Voltage Setting
0	0	Not used
0	1	M1
1	0	M2
1	1	M3
0 = OPEN		**1 = CLOSED**

Because the relay that normally provides the processing signal has been reconfigured for voltage control, the Fail and Pass signals have been reconfigured to provide Pass, Fail, and Processing signals. The different states of the Fail and Pass signals are described in the truth table below.

FAIL	PASS	Condition
0	0	**After RESET is pressed**
0	1	**Pass**
1	0	**Fail**
1	1	**Processing**

0 = OPEN   1 = CLOSED

For questions related to the standard configuration of the PLC remote, please refer to the section titled **Connection of Remote I/O** in the Operations manual.

The following Test Parameter Editing GPIB commands may be used to control the memory send selection.

Command	Name	Test Types	Value
EPM n, n=1-3 EPM?	Edit PLC Memory Send	RUN LLT	1=M1, 2= M2, 3=M3

The ADD command can also be used. The memory selection should be inserted as the last parameter and should use full text as indicated on the LCD screen such as M1 or M2.

05 7 Remote Memories Send (Models 8105 and 8106)
This option provides a dedicated signal output connector that is added to the rear panel of the LLT card. The new signal output connector can be used to control a compatible device such as an AC 1000 power supply. The output is a 3-bit digital control signal that is menu selectable at the Run Test or LLT parameter screen.

This option is provided with a cable which is designed to interconnect the Omnia LLT card 9-pin output to the AC 1000 Remote I/O input. This cable, part number 38772, is a standard 9-pin female to 9-pin male.
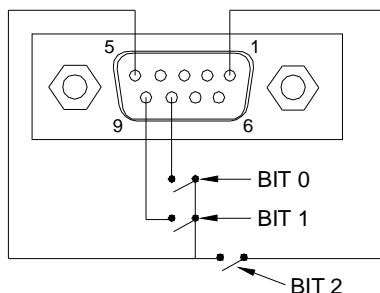
When using this option with an AC 1000, be sure to power up the Omnia first and then power up the AC 1000. When powering down the instruments, power down the AC 1000 first and then power down the Omnia. The Omnia is in an undetermined state without power and may cause inadvertent memory activation of the AC 1000. If you would like to operate the AC 1000 independently of the Omnia, either disconnect the interface cable or disable the PLC remote on the AC 1000.

The Remote Memories send signals are provided by three high voltage, high current Darlington drivers. These are open collector devices capable of sinking 350mA at voltages as high as 95 VDC.

With this option installed, a new soft key selection will appear on the Run Test or LLT parameter screen. In the LLT parameter screen it will be necessary for you to press the "More" softkey to access the PLC control parameter. The new soft key, called PLC Control will toggle between M1 through M7 when pressed.

Setting the PLC Control selection to M1 through M7 will create different digital states at Bit 0, Bit 1, and Bit 2 of the PLC Remote Signal Output (refer to the PLC Signal Output drawing below). The different states are described in the truth table below. The "Not used" state is undefined and cannot be programmed for use.

OMNIA
LLT 9-PIN OUTPUT

BIT 2	BIT 1	BIT 0	Test Voltage Setting
0	0	0	Not used
0	0	1	M1
0	1	0	M2
0	1	1	M3
1	0	0	M4
1	0	1	M5
1	1	0	M6
1	1	1	M7
0 = OPEN		**1 = CLOSED**	

The following Test Parameter Editing GPIB commands may be used to control the memory send selection.

Command	Name	Test Types	Value
EPM n, n=1-7 EPM?	Edit PLC Memory Send	RUN LLT	1=M1, 2= M2, 3=M3, 4=M4, 5=M5, 6=M6, 7=M7

The ADD command can also be used. The memory selection should be inserted as the last parameter and should use full text as indicated on the LCD screen such as M1 or M2.

06 Cold Resistance (Models 8105 and 8106)

This option is only available in the 8105 and 8106 and provides the added ability to measure resistance at the Line and Neutral connectors on the LLT card.

With this option installed, a new soft key selection will appear on the Continuity parameter screen called "Continuity". Please refer to the screen below:

```
              C o n t i n u i t y
Hi-Limit        xx.xxΩ
Lo-Limit        xx.xxΩ
Dwell Time      xxx.xs
Offset          xx.xxΩ
Scanner
Channel            x



Press TEST For          Continuity  MAINS   ▶
Automatic Offset
Setting.
RANGE:                       Defaults       ▶
Hi-Limit
0 - 10.00Ω
```

The "Continuity" selection is short for continuity connection and refers to which connection points may be utilized for the continuity measurement. The new continuity parameter has three toggle selections MAINS, GND, and OFF.

When MAINS is selected, continuity may be measured from the L and N connections of the LLT card or from the front or rear panel current and return. Do not use the front and rear panel connections at the same time as the L and N connections as this will affect the continuity reading.

When GND is selected, continuity may be measured from the LLT card's GND and Case connections or from the front or rear panel current and return connections. Do not use the front or rear panel connections at the same time as GND and CASE connections as this will affect the continuity reading.

When OFF is selected you may only use the front or rear panel current and return connections to connect the continuity DUT. Use the OFF selection when using the 8105 or 8106 with an external scanner, as this will provide isolation between the LLT card and external scanner connections.

As a safety precaution, Cold Resistance testing is not allowed directly after a RUN or LLT test. If you setup a Continuity test directly after a Run or LLT test the MAINS parameter will not be available. If you attempt to insert a Run or LLT test before a Cold Resistance test, the instrument will give an error beep and not allow the insertion of the test step. Not allowing Cold Resistance testing directly after a RUN or LLT test prevents any residual DUT voltage from possibly damaging the instrument.

The following Test Parameter Editing GPIB commands may be used to control the new toggle parameter.

Command	Name	Test Types	Value
ECR n, n=0-2 ECR?	Edit Cold Resistance Connection	RUN LLT	0= GND, 1= OFF, 2=MAINS

The ADD command can also be used. The memory selection should be inserted as the last parameter and should use full text as indicated on the LCD screen such as M1 or M2.

The specifications for the 10k continuity remain the same with this option installed.

07 Data Storage Card
This option gives the user capabilities for serial communication, barcode scanning, and saving test results onto a USB Flash memory drive.

The Data Storage Card has three input/output ports. These ports are shown in Figure 3.
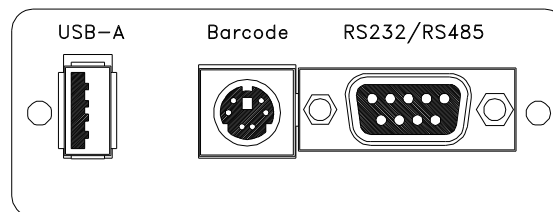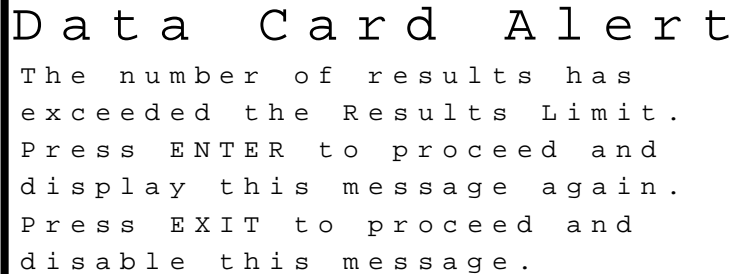

Figure 3.

The USB-A port is used for the connection of the USB Flash memory drive. **Note: Please use the USB Flash memory drive that was supplied with the unit. Proper downloading can only be guaranteed with the use of this drive.** The port labeled "Barcode" is a PS/2-type connector that is used for the connection of a barcode scanner. The 9-pin D-type subminiature connector labeled "RS232/RS485" is for the connection of the Omnia to an RS232 or RS485 communication bus. To configure all of the features of the Data Storage Card, use the Data Card Settings menu as seen below.

To navigate to the Data Card Settings menu, select the Setup System softkey from the Omnia Main Menu and then select the Data Card Settings softkey in the Setup System menu. A brief description of the settings follows:

Results Limit

The Results Limit allows the user to receive an alert message on the display of the Omnia when the total number of results saved on the Data Storage Card's internal Flash memory has exceeded the predefined limit. This value can be set from the default value of "0" (disables the function) to 100,000. At the conclusion of a test file, if the total results on the internal Flash memory exceed the Results Limit, the following message will display:

```
Data Card Alert
The number of results has
exceeded the Results Limit.
Press ENTER to proceed and
display this message again.
Press EXIT to proceed and
disable this message.
```

The message gives two options: Pressing Enter will clear the message and display it again at the end of the next test file execution. Pressing Exit will clear the message and not display it again unless the unit is re-booted, or the user deletes all previous results and the total results are exceeded once more.

Time Limit

The Results Limit allows the user to receive an alert message on the display of the Omnia when any of the results saved on the Data Storage Card's internal Flash memory are older than the predefined setting. The Time Limit can be set to its default value of "0 days" (function is disabled) to 99 days. When the Time Limit is exceeded the following message will appear on the Omnia's display:

```
┌─────────────────────────────────────────────────┐
│                                                 │
│  D a t a   C a r d   A l e r t                  │
│  Test results have exceeded                     │
│  the Time Limit setting.                        │
│                                                 │
│                                                 │
│                                                 │
│  Press EXIT to continue.                        │
│                                                 │
└─────────────────────────────────────────────────┘
```

By pressing the EXIT softkey, the message will be cleared and it won't appear again until the unit is re-booted or the Time Limit setting is set to a different value.

RS485 Address
This setting specifies the RS485 address of the Data Storage Card if the user intends to use the unit in an RS485 network. This address can be set from 1-99. For more information on this interface, see the Serial Port description below.

Test Result
The Test Result setting determines which type of test result is automatically saved to the Data Storage Card. The possible settings are Pass, Fail, All or None. If the Test Result setting is set to Pass, the Data Storage Card will only save results that resulted in a Pass. If the Test Result setting is set to Fail, the Data Storage Card will only save results that resulted in a Fail. Setting the Test Result setting to All will have the Data Storage Card record all results (pass or fail). If the Test Result setting is set to None, no test result (pass or fail) will be saved to the Data Storage Card's internal memory.

Serial Port
The serial port can be set to RS232, RS485, or OFF.

RS232 Interface
When selecting RS232, the protocol for interfacing and communicating with a PC can be found in section **8.8 RS232 Interface** of this manual.

RS485 Interface
The RS485 interface of the Data Storage Card is designed to function on a two-wire (half-duplex) RS485 network, i.e. data is received and transmitted differentially on the same pair of wires. The RS485 cabling should be configured as shown:

Data Card Serial Port		**PC / Bus Controller**
DATA - 6		DATA -
DATA + 8		DATA +
GND 5		GND
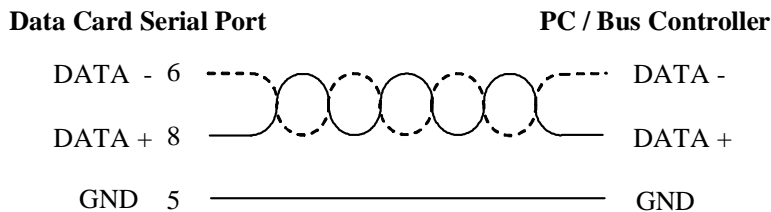
The wire used to connect the DATA signals from the Data Storage Card to the RS-485 network should be twisted pair.

Before sending a command to the RS485 enabled Data Storage Card, the unit that the command is intended for needs to be addressed. To send the address, the following format is used:

X <RS485 Address><line feed>

Note that there should be a character space between "X" and the RS485 address. After addressing the unit, the command can be sent. The instrument that was last addressed will receive all subsequent commands sent on the data bus. If the RS485 address specified is "0", then all RS485 instruments on the bus will receive the command. The command set used for RS485 is the same as the command set for RS232. See section 8.8 for the RS232 command set.

When using the RS485 bus and sending the "0" address, the instruments will not respond with the Acknowledge (06H or 6 decimal) or Not Acknowledge (15H or 21 decimal) strings after a command is sent, and will not respond to any Query Commands.
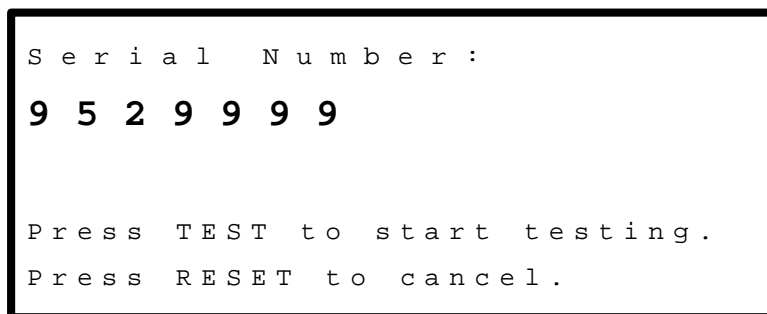
It is also possible to combine the RS485 address and the desired instrument command all in the same string using the following format:

X <RS485 Address>;<Command><line feed>

Important note: When communicating with the Omnia using the RS485/RS232 port, results are not saved to the Data Storage Card.

Barcode Input
The Barcode Input setting can be set to SERIAL#, PRODUCT#, SER/PROD, OFF and RUN FILE. When the setting is SERIAL#, PRODUCT# or SER/PROD the user can scan barcodes in the Perform Tests screen before the test is started. When the barcode is scanned, one of the following messages will appear on the display.

```
Serial  Number:
9 5 2 9 9 9 9



Press  TEST  to  start  testing.
Press  RESET  to  cancel.
```

```
┌─────────────────────────────────────────────┐
│  P r o d u c t    N u m b e r :              │
│  8  1  0  6                                  │
│                                              │
│                                              │
│  P r e s s   T E S T   t o   s t a r t   t e s t i n g . │
│  P r e s s   R E S E T   t o   c a n c e l .  │
└─────────────────────────────────────────────┘
```

```
┌─────────────────────────────────────────────┐
│  S e r i a l    N u m b e r :                │
│  9  5  2  9  9  9  9                          │
│  P r o d u c t    N u m b e r :              │
│  8  1  0  6                                  │
│  P r e s s   T E S T   t o   s t a r t   t e s t i n g . │
│  P r e s s   R E S E T   t o   c a n c e l .  │
└─────────────────────────────────────────────┘
```

After the barcodes are scanned, pressing TEST will initiate the test sequence. Pressing RESET will abort the TEST sequence.

The Data Storage Card allows for the re-scanning of barcodes if the previously scanned barcode was incorrect. Re-scanning is available in the SERIAL#, PRODUCT# and SER/PROD modes. Anytime before a test is initiated, the user can re-scan a barcode. If the user decides to re-scan barcodes when the Barcode I/P setting is set to SER/PROD, the Data Storage Card will first replace the data in the Serial Number field, and if the user re-scans another barcode, the Data Storage Card will replace the data in the Product Number field.

The RUN FILE selection gives the user the ability to automatically load and execute a test file based on what barcode is scanned from the Perform Tests screen. To completely enable this feature, the user must name the desired test file for a particular product the exact alpha-numeric code that is on the product's barcode label. For example, if Product A has barcode "123456789", then the test file that the user would like to run when testing Product A should be named "123456789". Upon scanning the barcode, the Omnia will immediately execute the test associated with that barcode. The test file name is limited to 10 characters. However, if the user names a test file with the maximum 10 characters, this function will still initiate a test when a product's barcode begins with those first 10 characters even if the barcode has more than 10 characters.

When using certain features of barcoding, the Omnia's response to the TD? and RD x? commands will differ slightly to an Omnia with the standard RS232 interface. For all types of tests (ACW, DCW, IR, GND, CONT, LLT, RUN) two fields are added to the end of the standard response when the Barcode I/P setting is set to SERIAL#, PRODUCT# or

SER/PROD. The first field contains the Serial Number information and the second field includes the Product Number information. Both fields are included regardless of which of these three modes are selected. The Data Storage Card will simply substitute a "0" for the field if it is not applicable to the setting. For example, if a user had their Barcode I/P setting set to SERIAL#, and scanned a Serial Number with the value "123456789", the TD? response for an ACW test could be:

$$01,ACW,Pass,1.24,1.000,0.900,1.0,123456789,0$$

Note that there is a "0" in the Product Number field because the Barcode I/P setting is SERIAL#.

When the Barcode I/P setting is RUN FILE or OFF, these fields are not included in the TD? and RD x? responses.

Operation

The Data Storage Card Results menu can be viewed by pressing the Results softkey while in the Perform Tests Screen. After doing so the following menu will be shown:

Pressing the softkey labeled Instrument will display the detailed results from the previously executed test file. Pressing the softkey labeled Data Card will display the Data Storage Card Results menu as shown below:

```
              ┌──────────────────────────────────────┐
              │        C a r d   R e s u l t s        │
              │ ┌──────────────────────┐              │
              │ │01 ACW  Pass        ◄ │ Delete Result▶  ■
              │ │   1200V   4.12mA     │              │
              │ │   5.0s               │              │
              │ ├──────────────────────┤              │
              │ │02 ACW  Pass          │ Delete ALL ▶    ■
              │ │   5000V   1.321mA    │              │
              │ │   20.0s              │              │
              │ ├──────────────────────┤              │
              │ │03 DCW  Lo-Limit      │ Download Results▶  ■
              │ │   1000V   0.0uA      │              │
              │ │   10.0s              │              │
              │ ├──────────────────────┤              │
              │ │04 IR    Pass         │                 ■
              │ │   500V    468MΩ      │              │
              │ │   10.0s              │              │
              │ ├──────────────────────┤              │
              │ │05 GND  HI-Limit      │                 ■
              │ │   25A    >600mΩ      │  Total Results  │
              │ │   1.0s               │ ┌──────────┐    ■
              │ └──────────────────────┘ │ 00000005 │
              │ ▲ Move up ▼ Move down    └──────────┘    ■
              │ ◄ Page up ▶ Page down                 │
              └──────────────────────────────────────┘
```

From this menu, the user can view the stored results, delete results, and download the results to the external USB Flash memory drive. To navigate through the results use the up, down, left and right softkeys on the Omnia front panel. The following message will display if the Delete Result softkey is pressed:

```
┌────────────────────────────────────────┐
│                                        │
│ D e l e t e   R e s u l t ?            │
│                                        │
│                                        │
│                                        │
│                                        │
│ Press ENTER to delete.                 │
│ Press EXIT to cancel.                  │
│                                        │
└────────────────────────────────────────┘
```

Pressing Enter will verify that the user wants to delete all of the results on the Data Storage Card, and pressing Exit will cancel deleting the results.

The following message will appear if the Delete ALL softkey is pressed:

```
┌────────────────────────────────────────┐
│                                        │
│ D e l e t e   A L L                    │
│ R e s u l t s ?                        │
│                                        │
│                                        │
│ Press ENTER to delete.                 │
│ Press EXIT to continue.                │
│                                        │
└────────────────────────────────────────┘
```

The following menu will appear if the Download Results softkey is pressed:

```
   C r e a t e     F i l e

A B C D E F G H I
J K L M N O P Q R                Select ▶
S T U V W X Y Z
.  ¯  _  ~     S p a c e


F i l e   N a m e
NEW  FILE

Use  arrow  keys  and  alphabetic  chart  to
Create  file  names.  Use  front  panel  keys
for  numeric  entry.
```

Follow the instructions on the screen in order to create a name for the file you wish to download. There is a limit of 8 characters for the name of the results file. Press the Enter softkey when you have finished entering the file name. After pressing Enter, you will see the following message:

```
D o w n l o a d i n g
D a t a . . .




T i m e   R e m a i n i n g :   0 0 : 0 0
```

This message will appear on the screen until the Time Remaining reaches 00:00. For each download, the Data Storage Card will transfer all results in the internal Flash memory regardless if some or all of the results have been downloaded before. During each download, the Data Storage Card will create a .txt file that will contain the information for all of the results. To view this .txt file, remove the USB Flash memory disk from the Data Storage Card and connect it to a PC with a USB port.

Contents of Results File
The following is an example entry in the Data Storage Card results file for an arbitrary ACW test:

00000001,06/14/06,08:26,TEST1,8106,0120013,M01,S01,ACW,Pass,1.24KV,0.004mA,0.000mA,1.0s

The following table gives a description of each field for the above ACW test.

Field Contents	Description
00000001	Test Entry in Results File
06/14/06	Date of Test
08:26	Time of Test
TEST1	Test File Name

8106	Model Number of Testing Unit
0120013	Serial Number of Testing Unit
M01	Memory Number of Test File
S01	Step Number
ACW	Test Type
Pass	Test Result
1.24KV	Test Voltage
0.004mA	DUT Leakage Current (Total)
0.000mA	DUT Leakage Current (Real)
1.0s	Test Dwell Time

The first ten fields of the test result shown above are included in each test result regardless of the test type. The remaining entries are specific to each test type. The following table shows, in order, the information that will be included in each test type's result entry.

DCW	IR	CONT	GND	RUN	LLT
Test Voltage	Test Voltage	DUT Resistance	Test Current	DUT Voltage	DUT Voltage
DUT Leakage Current	DUT Resistance	Test Dwell Time	DUT Resistance	DUT Current	DUT Leakage Current
Test Dwell Time	Test Delay Time		Test Dwell Time	DUT Power	Test Delay Time
				Test Dwell Time	
				DUT Leakage Current	
				DUT Power Factor	

Note: If barcoding is used, the barcoding information will be the final entries in the results file with Serial Number being first and Product Number being second.

Other Displayed Messages

```
+------------------------------------------+
|  Data   Card   Alert                     |
|  The  data  card's  internal             |
|  memory  is  full.  To  continue         |
|  saving  results  to  the  card,         |
|  please  delete  old  results  or        |
|  change  the  card's  settings.          |
|  Press  EXIT  to  continue.              |
+------------------------------------------+
```

The above message occurs when the user attempts to download results from the Data Storage Card onto the USB Flash memory drive, but there is not enough empty space on the drive to save the file. To save the results file, the user needs to create some empty space on the USB Flash memory drive.

```
+------------------------------------------+
|  Data   Card   Alert                     |
|  The  external  memory  drive  is        |
|  not  connected  to  the  Data           |
|  Card.  To  download  results,           |
|  please  connect  the  external          |
|  memory  drive.                          |
|  Press  EXIT  to  continue.              |
+------------------------------------------+
```

The above message occurs when the total results accumulated on the Data Storage Card exceeds 100,000. The Omnia will not allow any more tests to be run unless the user deletes the results currently on the Data Storage Card or changes the Test Result setting in the Data Card Settings menu to NONE. If the Test Result setting is set to NONE, the Data Storage Card will not record test results.

```
+------------------------------------------+
|  Data   Card   Alert                     |
|  The  external  memory  drive  is        |
|  full,  or  does  not  have  enough      |
|  empty  space  to  save  this            |
|  file.                                   |
|                                          |
|  Press  EXIT  to  continue.              |
+------------------------------------------+
```

The above message occurs when the user tries to download results from the Data Storage Card without the USB Flash memory drive connected. To download results, the user needs to have the Flash memory drive connected to the Data Storage Card.

```
D a t a   C a r d   A l e r t
This file name already exists
in the external memory drive.
Please use a different file
name.


Press EXIT to continue.
```

The above message appears when the user attempts to give a name to a results file that already exists on the Data Storage Card.

```
D a t a   C a r d   A l e r t
The internal memory of the
Data Card is nearing
capacity. Download and delete
old results, or change the
Test Result setting to None.
Press EXIT to continue.
```

The above message appears when the total results accumulated by the Data Storage Card exceeds 99,900. This is a warning to the user that the total results are nearing the capacity of the Data Storage Card (100,000). When the total results on the Data Storage Card exceed 100,000, the Data Storage Card will cease saving results. To avoid this, the user can download and delete the old test results, or change the Test Result setting in the Data Card Settings menu to NONE. When the Test Result setting is set to NONE, the Data Storage Card will not record test results.

```
D a t a   C a r d   A l e r t
Cannot download results:
The external memory drive is
write-protected.


Press EXIT to continue.
```

The above message appears when the USB Flash memory drive is write-protected. There are two ways to configure the memory drive as write-protected. One is to set the switch on the

side of the memory drive up (towards the drive's connector). The other is to configure it through the drive's properties in Windows.

08 Printer Port Option

This option allows the instrument to generate hardcopy printout of the test results. The printout can be configured to print automatically with each test, or manually by pressing a front panel key. There is also capability to enter a device ID number to each test, that increments automatically after each test is performed. The test can be further configured to print only results from tests that have failed or to print all test results from every test performed.

The Printer Port is a parallel interface and should be compatible with most parallel printers. The printer port output uses simple ASCII characters and control codes. Simply connect the printer to the Omnia and configure the printer output using the Setup Systems menu. From the System Setup screen, press the "Print Format" soft key. The Print Format setting screen will now be displayed. From the Print Format setting screen, six different parameters may be accessed; Device ID number, Mode, Test Result, Test Setting, Device ID, and Form Feed. The Print Format setting screen will appear as follows:

Mode

From the Print Format setting screen, press the "Mode" soft key. As the soft key is pressed, the mode will change between three available print modes Auto, Manual and OFF.

In the Auto mode, the Omnia will automatically send the test results to the printer at the end of every complete test. The Enter key may also be used from the end of test summary screen or the results screen to create additional printouts as needed.

```
Print   Format
    Device  ID xxxxxxxx    ■
           Mode    Manual  ▶ ■
  Test  Result   Fail only ▶ ■
 Test  Setting     OFF     ▶ ■
    Device  ID      OFF    ▶ ■
  Form  Feed        OFF    ▶ ■
```

In the manual mode, there are three different ways to create a printout. The first method is to press the Enter key at the end of a test. The second method is to press the Enter key from the Results screen. The third way is to press the Print Results softkey from the Perform test screen. In the OFF mode, the printer card and printer menuing are disabled.

Test Result

From the Print Format setting screen, press the "Test Result" soft key. As the soft key is pressed, the display will toggle between the words "All" and "Fail only". This command selects which test results will be printed, "All", selects printing all test results and "Fail only", selects printing only failed test results.

Test Setting

From the Print Format setting screen, you may turn the Test Setting print enable ON and OFF by pressing the "Test Setting" soft key. This command selects printing the test parameters as well as the test results.

Device ID

The Device ID number is a counter that increments once every time a test is performed. The number can be set to match the exact serial number or some portion of actual serial number of the item under test or just used as an identifier or tracking number. From the Print Format setting screen, use the numeric keypad to select the initial Device ID. Finish by pressing the ENTER key. This number is not saved as part of the non-volatile system parameters, therefore each time the power to the instrument is turned off the number will be reset to 1.

Form Feed

From the Print Format setting screen, you may turn the Form Feed ON and OFF by pressing the "Form Feed" soft key. This command forces a form feed after each complete test sequence. When the form feed is turned off, the signature line will not appear. When the form feed is turned off the pages will break whenever the page is determined to be full by the printer.

Sample Printer Outputs

The following is a sample print of a two step test with the Print Format settings as follows:

Test Results: All, Test Setting: ON, Device ID: ON, Form Feed: ON

==

Model: OMNIA 4   Serial Number: 9991006   Time: 14:23:18   Date: 03/30/01

Device ID: 0123456789   Test File: ARTEST1

==

TEST 01 Setting: ACW

Voltage xxxxV	HI-Limit T xx.xxmA	LO-Limit T xx.xxmA
Ramp UP xxx.xs	Dwell Time xxx.xs	Ramp Down xxx.xs
Arc Sense xx	HI-Limit R xx.xxmA	LO-Limit R xx.xxmA
Frequency 60Hz	Arc Detect ON Continuity ON	

Scanner HHHLLLHLHL

TEST 01 Result: Pass

Voltage xxxxV	Total I xx.xxmA	Real I xx.xxmA
Time xxx.xs		

- -

TEST 02 Setting: GND

Current xx.xxA	Voltage x.xxV	HI-Limit xxxmohms
LO-Limit xxxmohms	Dwell Time xxx.xs	Offset xxxmohms
Scanner-CH 0	Frequency 60Hz	

TEST 02 Result: Fail   Fail Type: HI-Limit

Current xx.xxA	Resistance >600mohms
Time xxx.xs	

- -

Tested By:_____

The following is a sample print of a two-step test with the Print Format settings as follows:
Test Results: Fail Only, Test Setting: OFF, Device ID: OFF, Form Feed: ON
The Test file and results are the same as the first example.

==

Model: OMNIA 4   Serial Number: 99910006   Time: 14:23:18   Date: 03/30/01

                                                          Test File: ARTEST1

==

TEST 02 Result: Fail   Fail Type: HI-Limit

Current   xx.xxA   Resistance   >600mohms

Time   xxx.xs

- -

Tested By:_____

The following is a sample print of a single step test (performed repeatedly) with the Print Format settings as follows:

Mode: Auto, Test Results: All, Test Setting: OFF, Device ID: ON, Form Feed: OFF

==

Model: OMNIA 4   Serial Number: 9991006   Time: 14:23:18   Date: 03/30/01

Device ID: 0100000001   Test File: ARTEST1

==

TEST 01 Result: Pass

Voltage   xxxxV   Total I   xx.xxmA   Real I   xx.xxmA

Time   xxx.xs

- -

==

Model: OMNIA 4   Serial Number: 9991006   Time: 14:23:18   Date: 03/30/01

Device ID: 0100000002   Test File: ARTEST1

==

TEST 01 Result: Pass

Voltage   xxxxV   Total I   xx.xxmA   Real I   xx.xxmA

Time   xxx.xs

- -

==

Model: OMNIA 4   Serial Number: 9991006   Time: 14:23:18   Date: 03/30/01

Device ID: 0100000003   Test File: ARTEST1

==

TEST 01 Result: Pass

Voltage   xxxxV   Total I   xx.xxmA   Real I   xx.xxmA

Time   xxx.xs

- -

The page will break whenever the printer determines the page is full and will not display a signature line. The device ID will continue to increment every time the test is performed until the instrument is powered down.

10 GPIB Interface

This option may be substituted for the RS232 interface. This option provides all of the function control of the RS232 interface with the addition of SRQ functions. All commands can be found in section **7. Bus Remote Interface GPIB/RS-232** of this manual.

10. Calibration Procedure

This instrument has been fully calibrated at the factory in accordance to our published specifications. It has been calibrated with standards traceable to the National Institute Standards & Technology (NIST). You will find in this manual a copy of the "Certificate of Calibration". It is recommended that you have this instrument re-calibrated and a safety check done at least once per year. AR recommends you use "Calibration Standards" that are NIST traceable, or traceable to agencies recognized by NIST to keep this instrument within published specifications.

End user metrology standards or practices may vary. These metrology standards determine the measurement uncertainty ratio of the calibration standards being used. Calibration adjustments can only be made in the Calibration mode and calibration checks or verifications can only be made while operating in Test mode.

10.1. Warranty Requirements

AR offers a standard one-year manufacture's warranty. This warranty can be extended an additional four years provided that the instrument is returned each year to Associated Research, Inc. for it's annual calibration. In order to be eligible for the extended warranty instruments must be returned to Associated Research, Inc. for calibration service at least once every twelve months.

A return material authorization number (RMA) must be obtained from AR before returning this instrument for calibration. To obtain an RMA number or for information regarding our warranty please contact our Customer Support Representatives at 800-858-TEST.

Required Calibration Equipment
- 0 - 5 KV AC/DC Metered Voltage Divider.
- 40 mA AC, 20 mA DC Ammeter.
- 0 - 40 mV AC Millivoltmeter.
- 40 AAC Current Shunt.
- 10Ω, 0.25 watt resistor, 250 volt.
- 50MΩ, 0.25 watt resistor, 1000 volt.
- 500MΩ, 0.25 watt resistor, 1000 volt.
- 100KΩ, 175 watt resistor, 5000 volt.
- 1MΩ, 20 watt resistor, 5000 volt.
- Adjustable DC power supply, 0.032 volts to 20 volts.
- Adjustable AC power supply 0-277 volts, 5KVA.
- Low impedance adjustable load 10Ω-30Ω, 4000 watts.

10.2. Calibration Initialization

Press and hold the calibration key on the rear panel with a pen, pencil, or small screwdriver while powering ON the Omnia. The Omnia enters calibration mode after the power on sequence is complete. The Initial Calibration screen will appear as follows:

```
 C a l i b r a t i o n
_____

1  AC Hipot Voltage   ok  Connect the
2  DC Hipot Voltage   ok  100KΩ load in
3  IR DC Voltage      ok  series with the
4  AC 40.00mA range       40mAAC standard
5  AC 3.500mA range       current meter.
6  DC 20.00mA range
7  DC 3.500mA range
8  DC 350.0uA range
9  IR  999.9M range
10 IR  9.999G range
11 IR  50.00G range
12 GND Bond Voltage
13 GND Bond Current        When the load is
14 AC Real 200W,40mA       connected, press
15 AC Real 20W,40mA        TEST to start the
16 AC Real 20W,3.5mA       calibration
17 AC Real 2W,3.5mA        process.

 ▲Move up  ▼Move down
```

The Calibration screen is separated into three sections. The left half of the screen lists all of the calibration points necessary for an accurate calibration of the instrument. The right half of the screen is split into two smaller screens. The upper right section of the screen displays meter and load information required to perform the selected calibration. The lower right section of the screen contains prompts that will help guide you through the calibration process.

10.3. Selecting Specific Calibration points

When the calibration is initialized, the first calibration point is automatically selected. The calibration is set up so that as each calibration point is completed the highlighted area will automatically scroll to the next calibration point.

To manually select calibration points, use the up and down arrows to scroll the highlighted area to the desired calibration point. The load/meter screen and prompt screens will automatically update for the calibration point selected.

10.4. Calibration points

Each calibration point requires different loads, standards and process. As each point is selected, the load/meter screen and prompt screens will display the meter, load and process information required to complete the calibration process for the selected point.

10.4.1. Calibration of AC Hipot Voltage

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the standard 5KVAC kilovolt meter from H.V. to Return.	When the standard voltmeter is connected, press TEST to start the calibration process.	Enter Standard Voltage Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.2. Calibration of DC Hipot Voltage

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the standard 5KVDC kilovolt meter from H.V. to Return.	When the standard voltmeter is connected, press TEST to start the calibration process.	Enter Standard Voltage Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.3. Calibration of IR DC Voltage

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the standard 1KVDC kilovolt meter from H.V. to Return.	When the standard voltmeter is connected, press TEST to start the calibration process.	Enter Standard Voltage Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the

measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.4. Calibration of AC 40mA Range

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the 100KΩ load in series with the 40mAAC standard current meter.	When the load is connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.5. Calibration of AC 3.5mA Range

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the 100KΩ load in series with the 3.5mAAC standard current meter.	When the load is connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.6. Calibration of DC 20mA Range

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the 100KΩ load in series with the 20mADC standard current meter from H.V. to Return.	When the load is connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.7. Calibration of DC 3.5mA Range

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the 100KΩ load in series with the 3.5mADC standard current meter from H.V. to Return.	When the load is connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.8. Calibration of DC 350.0μA Range

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the 100KΩ load in series with the 350.0μADC standard current meter from H.V. to Return.	When the load is connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.9. Calibration of IR 999.99M Range

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the standard 50MΩ load from H.V. to Return.	When the standard load is connected, press TEST to start the calibration process.	Automatic Calibration Processing.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). This calibration is automatic and does not require data entry.

10.4.10. Calibration of IR 999.9M Range

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the standard 50MΩ load from H.V. to Return.	When the standard load is connected, press TEST to start the calibration process.	Automatic Calibration Processing.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). This calibration is automatic and does not require data entry.

10.4.11. Calibration of IR 50000M Range

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the standard 500MΩ load from H.V. to Return.	When the standard load is connected, press TEST to start the calibration process.	Automatic Calibration Processing.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). This calibration is automatic and does not require data entry.

10.4.12. Calibration of GND Bond Voltage

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the standard 12VAC voltmeter from Current to Return.	When the standard voltmeter is connected, press TEST to start the calibration process.	Enter Standard Voltage Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.13. Calibration of GND Bond Current

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the standard 40AAC current meter from Current to Return.	When the standard current meter is connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.14. Calibration of AC Real 200W, 40mA

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the 100KΩ load in series with the 40mAAC standard current meter from H.V. to Return.	When the load is connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.15. Calibration of AC Real 20W, 40mA

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the 100KΩ load in series with the 40mAAC standard current meter from H.V. to Return.	When the load is connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.16. Calibration of AC Real 20W, 3.5mA

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the 1MΩ load in series with the 3.5mAAC standard current meter from H.V. to Return.	When the load is connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.17. Calibration of AC Real 2W, 3.5mA
The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect the 1MΩ load in series with the 3.5mAAC standard current meter from H.V. to Return.	When the load is connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.18. Calibration of DC Continuity 10Ω
The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Step 1: Short the Current and Return leads together.	When the leads are shorted, press TEST to start the calibration process.	Automatic Calibration Processing.
Step 2: Connect the standard 10Ω load from Current to Return.	When the load is connected, press TEST to start the calibration process.	Automatic Calibration Processing.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). This calibration is automatic and does not require data entry.

10.4.19. Calibration of Run Test Voltage
The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Step 1: Disconnect power to the DUT I/P input.	With the DUT I/P input open, press TEST to start the calibration process.	Automatic Calibration Processing.
Step 2: Connect 250VAC and a standard voltmeter to the DUT I/P input.	Press TEST to start the calibration process.	Enter Standard Voltage Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.20. Calibration of Run Test Current
The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Set DUT I/P 120-277VAC. Connect a 15 Amp load at DUT output in series with current meter.	When the load is connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.21. Calibration of Run Test Power
The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Set DUT I/P voltage to 225VAC. Connect a 25 ohm load. Connect power meter in series with the DUT.	When the load is connected, press TEST to start the calibration process.	Enter Standard Power Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.22. Calibration of Run Test Leakage
The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 18 VAC to the DUT I/P input. Connect a standard current meter to the DUT outputs from L to G.	When the power supply and meter are connected, press TEST to start the calibration process.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.23. Calibration of LLT MD V-Offset
The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Disconnect power to the DUT I/P input. Short Probe-HI and Probe-LO	When the leads are shorted, press TEST to start the calibration process.	Automatic Calibration Processing.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). This calibration is automatic and does not require data entry.

10.4.24. Calibration of LLT MD Volts x 1

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 8.0VDC and a voltmeter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Voltage Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.25. Calibration of LLT MD Volts x 4

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 2.0VDC and a voltmeter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Voltage Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.26. Calibration of LLT MD Volts x 16

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 0.5VDC and a voltmeter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Voltage Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the

measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.27. Calibration of LLT MD Volts x 64
The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 0.125VDC and a voltmeter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Voltage Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.28. Calibration of LLT MD Volts x 256
The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 0.032VDC and a voltmeter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Voltage Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.29. Calibration of LLT MD: UL 544NP measuring device
The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.30. Calibration of LLT MD: UL 544P measuring device

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.31. Calibration of LLT MD: IEC601-1 measuring device

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.32. Calibration of LLT MD: UL1563 measuring device

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.33. Calibration of LLT MD: IEC60990 FIG4 measuring device

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.34. Calibration of the External measuring device

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the

measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.35. Calibration of LLT MD: IEC 60990 FIG5 measuring device

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

10.4.36. Calibration of LLT MD: IEC 60990 FIG3 measuring device

The load/meter screen and prompt screens will contain the following text for this calibration point:

Upper Right Screen Load/Meter	Lower Right Screen Prompt	Lower Right Screen Prompt (Cal. Active)
Connect 2.2VDC in series with a current meter to Probe-HI + and Probe-LO -.	When the power supply and meter are connected, press TEST to start the calibration.	Enter Standard Current Reading.

Press the TEST button to activate the calibration. After the calibration is activated, the lower right screen will change to the text indicated in the table above (**Cal. Active**). Read the measurement from your standard and enter it using the numeric keypad. You may now store the new calibration number by pressing the ENTER key or escape by pressing the EXIT key or the RESET button.

11. Replacement Parts List

Rev: G 6/27/2006 ECO 5201

Part Number	Qty.	Ref. Designator	Description
Supplied Accessories			
38788	2	-	3U Rack Mount Bracket
38787	2	-	3U Rack Mount Handle
38549	4	-	Screw for Rack Mount Handle
38503	1	-	Fuse 10A 250V Slow-Blow 20mm
04040A-08	1	-	High Voltage Cable
37863	1	-	RS232 Cable
33189	1	-	Cable Input Cordset USA
38071	1	-(8105 and 8106)	Cable Input Cordset USA 15A
38075	1	-	Interlock Connector
38482	1	-	Adapter Box (8104)
38578	1	-	Adapter Box (8105 and 8106)
02100A-13	2	-(8105 and 8106)	Cable Assembly Return
CBLHC40-10TL	1	-(8105 and 8106)	Cable Assembly High Current Lead
38489	1	-	Cable Assembly High Current Output
38490	1	-	Cable Assembly High Current Return
Panel Components			
37781	1	-	Fuse Holder 20mm
37478	2	-	High Voltage Connector
37555	1	-	Power Switch 2P 10A/250V
37571	1	-	Earth Connector
37806	1	TEST	Test Switch Green Lighted
37807	1	RESET	Reset Switch Red Lighted
37854	1	TEST	Replacement Bulb 28V
37605	1	RESET	Replacement Bulb 33V
38101	1	-	Feet Kit w/o Rubber Inserts
38102	4	-	Rubber Insert for Feet
38225	1	-	Graphic LCD Display
38487	2	-	Socket 80 Amp Red
38488	2	-	Socket 80 Amp Black
PCB Assemblies			
38600	1	ANG7742	Analog Board (8104)
38791	1	ANG7742	Analog Board (8105 and 8106)
38194	1	REA7500	Real Current Board
38195	1	HV7500	High Voltage Control Board
38197	1	KEY7500	Key Board
38198	1	PWR7500	Input Protection Board
37862	1	RS232	RS232 Interface Board
38305	1	CGP-03	GPIB Interface Board
38308	1	MD7500	Measuring Device Board
38311	1	CPR-01	Printer Card
38528	1	AMP7742	Amplifier Board

Part Number	Qty.	Ref. Designator	Description
38543	1	CSU7500	Scanner Control Board
38547	1	LLT7742	Run/LLT Board (8105 and 8106)
38551	1	CON7500	Main Control Board
LLT Module (Includes 38547 and all replacement cables)			
38548	1	2LLT7742	LLT Kit (8105 and 8106)
Part Number	**Qty.**	**Ref. Designator**	**Description**
Internal Components			
37374	1	IC 36	IC 27512 EEPROM
38533	1	T1	Input Transformer
38534	1	T2	High Voltage Output Transformer
38812	1	IC 26	IC W29C020 EEPROM
38245	1	IC 40	IC W78E516B

- For safety tester interconnect cables, refer to INSTRUMENT CONNECTIONS; section 1.3 Specific Integrated System Connections

12. Schematic Index

Drawing Number	Description	Reference Designator	Pages
S08104	Wiring Diagram 8104, 8105, 8106	-	2
S38551	Main Control Board	CON7500	4
S38600	Analog Board	ANG7742	2
S38194	Real Current Board	REA7500	1
S38195	HV Control Board	HV7500	1
S38528	Amplifier Board	AMP7742	1
S38495	Keypad Board	KEY7540	1
S38198	Input Voltage Selection Board	PWR7500	1
S38543	Scanner Board	CSU7742	2
S38547	Run/LLT Board (8105 and 8106)	LLT7742	8
S38308	External Measuring Device Board	MD7500	1
S37745	GPIB Interface Board	CGP-03	1
S37814	RS-232 Interface Board	RS232	1
S38311	Printer Card	CPR-01	1
S38801	Data Card	USB	2

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