OPERATION AND SERVICE MANUAL

Model 1305, 2503, 2510, 2550

MODEL 1305 (AC ONLY HIPOT)
MODEL 2503 (DC ONLY HIPOT WITH OPTIONAL GROUND CONTINUITY CHECK)
MODEL 2510 (AC ONLY HIPOT WITH OPTIONAL GROUND CONTINUITY CHECK)
MODEL 2550 (AC/DC HIPOT WITH OPTIONAL GROUND CONTINUITY CHECK)

SERIAL NUMBER

Models
1305/2503
2510/2550

Item 99-10136-01 Ver 1.07

28105 N. Keith Drive
Lake Forest, Illinois, 60045-4546
U.S.A.

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Warranty Policy

Slaughter Company, 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 return the "Owners Registration Card" provided within (15) days from receipt of your instrument.

Slaughter Company recommends that your instrument be calibrated on a twelve-month cycle. A return material authorization (RMA) must be obtained from Slaughter Company. Please contact our Customer Support Center at 1-800-504-0055 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. Slaughter Company will assume the return freight costs when returning the instrument to the customer. The return method will be at the discretion of Slaughter Company.

Except as provided herein, Slaughter Company 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 Slaughter Company manufacture. Parts used must be parts that are recommended by Slaughter Company as an acceptable specified part. Use of non-authorized parts in the repair of this instrument will void the warranty.

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INTRODUCTION

This section is prepared to assist the user of Slaughter manually operated bench type test equipment with the use, installation, inspection and maintenance of the equipment.

Since any electrical equipment can be hazardous, all procedures described should be conducted by qualified personnel familiar with safety rules applying to electrical equipment and who have been thoroughly instructed as to the nature of the procedure, the hazards involved, and the necessary safety precautions.

Defects and weaknesses in the electrical insulation system must be detected to insure that the product is safe for use by the consumer. In most windings there are two basic types of insulation systems. The **ground insulation** separates the windings from a magnetic core material or an exposed conductive frame or exterior. The second insulation system is the **wire insulation**, which in lower voltage windings is typically a thin film coating the wire. These two insulation systems perform different functions in the winding and require different tests to evaluate their integrity. **The Dielectric Withstand Test** is used to evaluate the ground insulation system.

This test has been described by many names; Hi-pot Test, Dielectric Withstand Test, Insulation Leakage and Breakdown Test, Shorts Check, Ground Check and others. What ever the name, the purpose is to detect failure of the insulation system that separates the current carrying portions of an electrical device from any exposed conductive components.

WARNING **For operator safety reasons, and to avoid possible tester damage, the product under test SHOULD NOT BE CONNECTED in any way to the AC power lines.**

Typically, it is the responsibility of the manufacturer to establish the proper tests needed for a particular product to insure they comply with all agency requirements.

INSTALLATION AND SAFETY

CAUTION **For operator safety reasons, and to avoid possible tester damage, the product under test SHOULD NOT BE CONNECTED in any way to the AC power lines.**

When first received, unpack the equipment carefully and inspect for any hidden damage. If damage is evident, keep the carton and file a claim with the carrier.

Packed with all Slaughter equipment is a certificate of conformance, operator's manual, test leads and any required interface connectors.

To check the unit quickly, install any interface connectors, plug the unit into the proper voltage and follow the steps outlined under operating instructions.

If the unit does not operate, contact the factory for instructions.

Of prime consideration and importance in the layout and installation of a test station is to insure the safety both to the operator and any visitors or casual bystanders, invited or otherwise. As a general rule it is suggested that each test area be in a location with minimum distractions and not subject to extremes of temperature and moisture.

One of the more important ways to promote safety is through operator training. Benefits of training are twofold. First, thorough training promotes safety which may significantly reduce injuries on the job. Second, it ensures adequate testing of the product which helps increase product reliability. Both of these can have a positive impact on profits.

An additional consideration in any test station is operator comfort. This is affected by the operator's position, which includes the chair, table, test equipment, the object under test and the test procedure itself. The chair and work bench or table should be nonconductive and the table as large as possible to allow sufficient room for the test equipment and the object under test. Studies should be made of the test requirements and work habits and steps taken to ensure that any unusual or unnatural motion is not required and to eliminate any repetitive motions that may produce injuries such as carpel tunnel syndrome.

After the equipment has been installed, a careful study should be made of the test station to determine what, if any, safeguards are needed. It is suggested that any electrical test station involving voltages in excess of 42.4 volts peak (approximately 30 volts RMS) should be equipped with safeguards. These should operate both for the protection of the operating personnel and for the protection of casual bystanders. At the minimum, safeguards should prevent the operating personnel or casual bystanders from coming into contact with the test circuit. In the event electrical interlocks of any sort are required, either to insure that guards are in place, or to insure that the operator's hands are in a safe location, the installer should refer to the proper schematic drawing and install these interlocks in series with the external interlock terminals provided in the tester. All testers may be safety interlocked with series manual or automatic safety switches, relays, etc. as desired. In the simpler units, this is done by inserting such interlocks in the AC supply ahead of the tester. In some units adapter plugs with remote interface controls are provided for this purpose. We will be happy to provide suggestions and schematics for safety interlocking our test equipment.

Any electrical power receptacle utilized to operate this equipment must be a properly grounded three wire receptacle that has been checked for proper polarity.

The test procedure should be well thought out to ensure that it adequately tests the product to the desired criteria but, that the procedure does not require the operator to perform tasks that are unsafe. The product should never be touched during a test and in

the case of a grounded part the conductive table or conveyor should not be touched during a test.

Several models of high voltage test equipment are designed with the high voltage output "floating". There is no ground on either the High side or the Low side of the high voltage transformer. One of the test leads of the HV transformer is considered the Low side due to the winding pattern of the transformer, but it is NOT grounded. This arrangement provides a one type of safety margin to the operator because someone must come in contact with both leads to receive a shock.

Some models of test equipment have one lead of the output grounded or production requirements are such that it is impossible or impractical to test a product in an "ungrounded" configuration. When the tester and the product are grounded, it is important to remember that the operator is also grounded and need only touch the ungrounded lead to receive a shock.

A major consideration in testing products that are "grounded" (touching a conductive conveyor or table) is to insure that the operator or bystanders cannot or will not come in contact with the table or conveyor during a test. Under some product failure conditions, the table or conveyor may become "live" and present a high voltage potential to true earth ground if the table or conveyor is not properly grounded.

It should never be assumed that a conveyor or conductive table is "grounded" just because it is bolted to the floor. A proper ground is one that has been verified to return to the input power line ground (earth ground) with a resistance of less than ½ ohm. This will help eliminate "floating" grounds, ground loops and "phantom" voltages between the object under test and the tester case which is grounded to the power line ground.

The testing of very large items such as recreational vehicles and mobile homes poses special problems because the safety hazards involved are considerably greater than those involved in testing smaller objects.

This is because it is possible under fault conditions for the entire outer skin of the object being tested to become charged to a high voltage. This is particularly bad because these units are so large that the person conducting the test is in no position to observe whether or not any other people are in a potentially dangerous position during the test.

If proper precautions are taken, there will be no hazard, but even so, it is highly desirable that care be taken to isolate the test object when a test is being conducted. Suggested methods of doing this are the use of rope barriers, warning signs, and fully enclosed test areas.

Before conducting a test on these units, care should be taken to see that the frame and skin of the unit are connected to a solid ground, and also that the ground conductor of the electrical system is connected to a solid ground. This will eliminate most test hazards, but

bear in mind it is possible for some sections of the skin to have poor electrical connection and that they thereby, can become a potential safety hazard in the event of a fault. This is why isolation of the vehicle during the test is recommended.

Once these safety precautions have been taken and it has been established that the frame and skin are properly grounded, the operator can proceed with the dielectric test.

Good safety practice dictates labeling of hazards properly. Since high voltage testing can be hazardous, the work station should be labeled. Naturally, the location of the label should be carefully selected so that it can be placed in a location that will do the most good.

In some cases, this may be on the test instrument itself, and in others, it may be in a location directly in front of the operator, somewhat removed from the instrument.

A final word about high voltage testers. Generally, commercial high voltage test equipment is not in itself hazardous. The hazards come about when the equipment is improperly used. These testers, when used properly and in a safe manner, can be a check on the quality and reliability of your product. If used incorrectly and without proper consideration for safety, they represent a hazard for both operating personnel and casual bystanders. We strongly recommend proper training for all personnel involved in testing.

High Voltage Testing

High Voltage Testing has historically been the most mis-understood, mis-applied, mis-interpreted inspection function in the average factory. Some manufacturers have looked upon the High Voltage Dielectric Withstand test or Hipot test as it is more commonly known, as an extra operation that must be performed to satisfy some agency requirement. Though many times the high voltage test is simply a safety measure, its value in quality control should not be overlooked.

First and foremost, the hipot test is done to ensure the safety of customers by detecting “grounded” or “shorted” products. By applying a high voltage between “live” current carrying parts of the product and the framework which is normally supposed to be “dead,” or well insulated from the “live” parts, the product is “proof tested” against grounds or shorts which at the least might cause inconvenience and at the most can cause fire or injury. During the hipot test, all insulation is abnormally stressed for the duration of the test. Additionally, it is possible to detect “potential” shorts. Consider there is a bare conductor about .015” from the frame. In the factory, the product is clean and new, but after a year or two of service, contaminants, dust, and moisture may cause this gap to bridge at line voltage resulting in a shock hazard to the consumer.

Secondly, hipot testing is done as a quality control measure. Incipient failures in the insulation of any portion of the product, whether due to workmanship, components or

materials are detected by the hipot test before the product is shipped out to cause inconvenience, dissatisfaction and expense in the field.

The most often asked questions are, “Is hipot testing destructive?” and “Should I use AC or DC for the hipot test?”

Today’s modern, commercially available high voltage production line testing equipment is generally not destructive. For most consumer product testing, testers have sufficient sensitivity and response time that short circuit currents can be held to non-destructive levels.

The question of AC or DC is best answered by the question, “What do the specs say?” For the production hipot test, agency requirements almost invariably specify an AC test. Generally, AC hipot testing is considered by many to be more stressful to the insulation than DC hipot testing because of the periodic polarity reversal. Some believe AC testing tends to accelerate breakdown due to material flaws. During use, products are more likely to experience AC voltage transients than to experience DC voltage transients. Therefore, AC hipot tests provide more realistic conditions than DC hipot tests.

The next most common question about hipot testing is, “How much voltage should I use?” Again, “What do the specs say?” As a rule-of-thumb, many applications will require 1000 volts plus twice the normal operating voltage for one minute. Increasing the test voltage by 20% usually allows the test time to be reduced to one second. Automotive products will generally specify 500 volts.

Armatures are produced in both a “single insulated” and a “double insulated” configuration. With **single insulated** armatures, the commutator and windings are insulated from the iron stack and the shaft which, electrically speaking, are common. Double insulated armatures additionally have the iron stack insulated from the shaft. This provides “double insulation” between the current carrying components, the commutator and the windings, and any exposed dead metal components, normally the shaft.

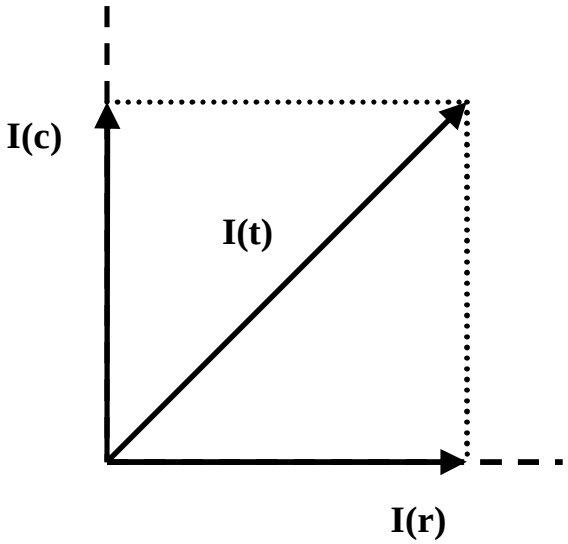
On single insulated armatures, the dielectric withstand test voltage is normally applied between the commutator and the shaft.

Double insulated armatures, however, will normally have a dielectric withstand voltage applied between the commutator and the iron stack and another dielectric withstand voltage between the iron stack and the shaft. If these two voltages are applied simultaneously and the voltage sources are properly phased, a consequential voltage equal to their sum will be applied between the commutator and the shaft.

A hipot test attempts to detect or measure phenomena that indicate electrical problems such as leakage, breakdown and arcing.

Leakage is a flow of current. Leakage becomes significant under two conditions. Any increase in resistive leakage is a "red flag" indication that quality in insulating materials used in the device has in some manner deteriorated. Total leakage becomes significant if it reaches such a level that it becomes perceptible to the user of the equipment. UL extensively researched the area of perception threshold and electrical shock. They found that, generally, "women are more sensitive to leakage current than men and a current flow of 0.5 milliamperes or less at 60 hertz does not produce a reaction which is considered to be hazardous to the individual or to those nearby."

Some leakage exists in any product, though, in many cases, it will be so minute to defy measurement. It exists for two reasons; first leakage current exists simply because no insulating materials are perfect and have infinite resistance. This is generally referred to as **resistive leakage** and can be calculated from Ohms Law, E=IR where E is the applied voltage, I is current flow in amperes and R is the resistance in ohms. Second, any electrical device, by virtue of the fact that it is made of conductive material with electrical circuits in close proximity, exhibits what can be called an "inherent capacity effect." This is actually a capacity and, if we apply AC voltage, current will flow. This is generally referred to as **capacitive leakage**. The equivalent resistive value of the capacitance (Xc) may be calculated from the formula, $Xc=1/(2\pi fC)$ where Xc is the equivalent resistance in ohms, f is frequency of the applied voltage in hertz and C is the capacitance in farads. The combination of these two components of leakage (figure 1.) is referred to as the **total or complex leakage**.



I(c) = CAPACITIVE CURRENT
I(r) = RESISTIVE CURRENT
I(t) = TOTAL CURRENT

Current Vector
figure 1.

The capacitive leakage is an inherent characteristic of the device controlled primarily by design details. The resistive leakage is a characteristic of insulating materials used and the amount of resistive leakage is generally an indication of the quality of the insulation. This is particularly true when identical devices are being comparatively tested. Both capacitive and resistive leakage vary, almost linearly, with the applied test voltage.

In the average electrical device during AC hipot tests, the resistive current flow is normally much smaller than the capacitive current flow, so changes in the resistive current do not have a significant effect on the total current. The capacitive current, however, is out of phase with the resistive current and can be cancelled in the measurement (figure 2.). With this type of test arrangement, the masking effect of the capacitive current is greatly reduced or eliminated and small variations in insulation resistance become detectable.

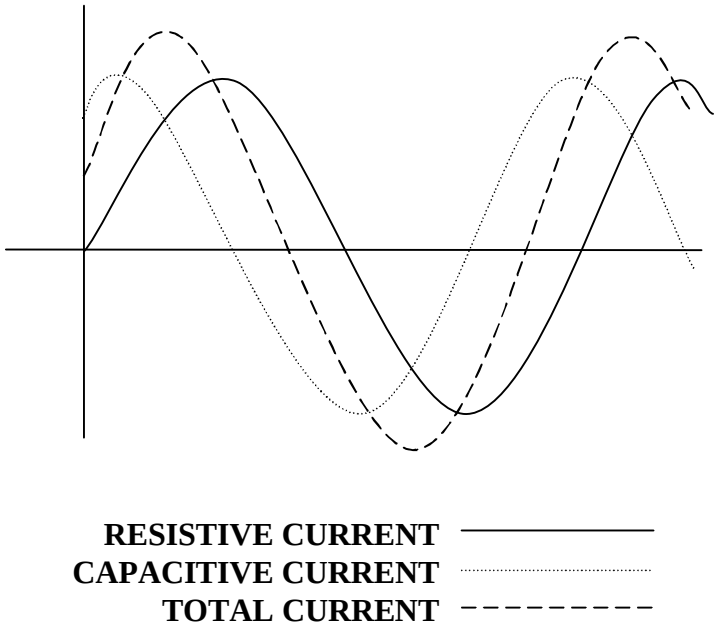


figure 2.

Breakdown is also a flow of current. However the term is usually used to denote an actual insulation failure. It is readily distinguishable from leakage because the current does not vary linearly with the applied voltage, but instead rises suddenly when the critical or breakdown voltage is reached. Often, but not always, arcing is associated with breakdown.

Arcing occurs in solids and liquids as well as gases. Arcing typically involves currents on the order of 0.4 amperes or more and indicates a potentially dangerous breakdown of insulation or abnormal current flows inside a device.

The ability of high voltage test equipment to react to the excessive current flow or failure of the product under test is often referred to as "**sensitivity**."

For many years, users of high potential (hipot) dielectric testers tolerated considerable sensitivity differences between individual testers. Products rejected by one tester might be accepted by another. If the two testers were distinctly different models or were made by different manufactures, the question of which tester to rely upon was a difficult one. Unfortunately, the tester chosen was sometimes the one that would accept the products.

In a majority of these situations, the real problem was a lack of an acceptable standard for tester sensitivity. Many low cost production line testers in the past were essentially designed as "go/no-go" testers and sensitivity was often whatever was convenient for the manufacturer.

The variance of the sensitivity curves between different manufacturers and different models was a major factor in U.L.'s (Underwriters Laboratories) move to try and standardize production line hipot test equipment sensitivity. These tester performance requirements have come to be commonly known as the **"120 K requirement."**

Unless the hipot tester was designed to meet the "120 K" specifications, it is unlikely that it will meet all of the requirements. The tester's suitability must be verified.

In general, the original U.L. "120 K" specifications require the tester to reject within .5 seconds when connected to an impedance of 120,000 (120 K) ohms at the specified testing voltage. Additionally, the output voltage sign wave tolerance is specified and the output voltage regulation is required to be -0%, +20%.

Various agencies other than U.L. have their own versions of the "120 K" type specifications. As with all testing specifications, the manufacturer must ensure that they are in compliance with the latest testing requirements for their particular product.

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. Any external cleaning should be done with a clean dry or slightly damp cloth. Avoid the use of cleaning agents or chemicals to prevent any foreign liquid from entering the cabinet through ventilation holes or damaging controls and switches, also some chemicals may damage plastic parts or lettering. Schematics, when provided, are for reference only. Any replacement cables and high voltage components should be acquired directly from Slaughter Company. Refer servicing to a Slaughter Company authorized service center.

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

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

Packaging
Original Packaging: Please retain all original packaging materials if you do not have an alternate method of repackaging. If you are returning your instrument to us for servicing please repackage the instrument in its original container or use an alternate packaging solution. Please do not reuse the original packing material if there appears to be damage or missing packing material. Contact our customer support department (1-800-504-0055) for an RMA (return materials authorization) number. Please enclose the instrument with all options, 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.

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

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

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

3). 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.

4). Seal the container securely.

5). Mark the container "FRAGILE" to insure proper handling.

6). Please ship models 1305, 2503, 2510 and 2550 via Federal Express or UPS air.

7). Please refer in all correspondence to your RMA number.

GLOSSARY OF TERMS

ACCURACY is the condition or quality of conforming exactly to a standard. The accuracy of an instrument is the extent to which the average of many measurements made by the instrument agrees with the true value or standard being measured. The difference between the average and the true value is the error. When this condition is a result of the measuring instrument, it is known as *out of calibration*. An instruments measuring accuracy must be considered over the whole range of the measuring instrument. This is often expressed as *linearity*.

AVERAGE VOLTAGE is the sum of the instantaneous voltages in a half cycle wave shape divided by the number of instantaneous voltages. In a sine wave, the average voltage is equal to .637 times the peak voltage.

EMF (electromotive force) is the energy per unit charge supplied by a source of electricity. Normally expressed in volts.

The **FULL SCALE VALUE** is equal to the largest value of the actuating electrical quantity which can be indicated on the scale or, in the case of instruments having their zero between the ends of the scale, the full scale value is the arithmetic sum of the values of the two ends of the scale.

IMPEDANCE is the apparent resistance, expressed in ohms, offered by an alternating current circuit to the passage of electrical energy. Since frequency is one of the factors affecting impedance, the frequency of applied energy must be specified.

INDUCTANCE is the property of an electric circuit by which a varying current induces an emf in that circuit or a neighboring circuit.

$L = a^2n^2/(9a + 10b)$

a = coil radius in inches
b = coil length in inches
n = number of turns

LOADED TEST(ing) VOLTAGE is the actual testing voltage developed across the load (product under test). This voltage will be lower than the open circuit voltage because of the internal impedance of the H.V. transformer and any series limit resistance of the tester.

OPEN CIRCUIT VOLTAGE is the output voltage of the tester prior to the connection of a load (product under test).

PEAK VOLTAGE is the maximum value present in a varying or alternating voltage. This value may be either positive or negative. The peak value is equal to 1.414 ($\sqrt{2}$) times the R.M.S. value.

PRECISION or REPEATABILITY is the variation in readings obtained when repeating exactly the same measurement. The precision of an instrument is the ability to repeat a series of measurements on the same piece and obtain the same results for each measured value. The variation in the measured values can be expressed in terms of a standard deviation of the measuring error. The smaller the standard deviation, the more precise the instrument.

Accuracy versus Precision: Confusion often exists between the terms accuracy and precision because the terms are often interchanged in their usage, but they are *two different concepts*. The accuracy of an instrument can be improved by recalibrating to reduce its error, but recalibrating generally does not improve an instrument's precision.

R.M.S. (ROOT MEAN SQUARE) is the square root of the mean of the instantaneous values squared.

R.M.S. VOLTAGE is the effective value of a varying or alternating voltage. The effective value is that value which would produce the same power loss as if a continuous voltage were applied to a pure resistance. In sine wave voltages, the R.M.S. voltage is equal to .707 times the peak voltage.

SENSITIVITY is the impedance through which a tester will detect a fault. Sensitivity is usually expressed in Ohms. One of the most common examples is the UL 120K ohm minimum sensitivity requirement.

VOLT AMPERE (VA) is the product of the R.M.S. voltage applied to a circuit and the R.M.S. current, in amperes, flowing through it.

SPECIFICATIONS

Key Features and Benefits

1. No load setup of trip current and output voltage.
   This provides the operator with an easy and safe way to set trip currents and output voltages since parameters are set without the high voltage activated.

2. Automatic storage of test program.
   The instruments will power up with the parameters that were used during the last test to avoid operator set-up errors.

3. All parameters for the setups can be adjusted through a simple menu driven program.
   The easy to follow setup screens ensure that the operator correctly sets up all test parameters.

4. Line and load regulation.
   This system maintains the output voltage to within 1% from no load to full load and over the line voltage range to ensure that test results remain consistent and within safety agency requirements.

5. PLC remote inputs and outputs.
   The standard 9 pin interfaces provide outputs for Pass, Fail, and Test in Process. Inputs include Test, Reset and Interlock. This gives the user all the basic remotes required to configure the instrument through simple PLC relay control. (Note: Model 1305 has ONLY the TEST input and no outputs).

6. Output voltage fine adjustment.
   To make the instruments usable in different types of applications, the operator can manually bring the voltage up or down in 10 volt increments by simply pressing the up and down arrow keys. This makes it very easy to adjust the output voltage even while the tester is in the dwell mode so you can analyze test results at different voltages. This will <u>not</u> affect the programmed test voltage. Subsequent tests will be at the programmed voltage.

7. Flashing high voltage indicator.
   A flashing LED located to the right of the display clearly indicates when high voltage is active to provide maximum operator safety.

8. User selectable input voltage.
   The instruments can be switched for either 115 or 230 volt input operation through an easy access rear panel mounted switch to allow it to be used in any country.

Model 1305 Functional Specifications

3KV AC Hipot

Descriptions	Specifications
INPUT VOLTAGE	115 / 230V selectable, ± 15 % variation; 47 – 63 Hz
FUSE	115 VAC, 230VAC – 2A fast acting 250VAC
OUTPUT	Rating : 0 – 3000V, 5mA Regulation : ± (1 % of output + 5V)
VOLTAGE SETTING	0.01KV – 3.00KV, 10 volts/step Accuracy : ± (2 % of Setting + 5V) (relative to displayed output). Can be adjusted during operation via UP & DOWN arrow keys.
DWELL SETTING	On, HV remains on after "TEST" button is pushed Off, HV present only when "TEST" button is pushed
PULSE MODE	On, Automatic reset after failure for continuous testing. *Not for compliance testing*.
FAILURE SETTINGS	High limit : 0.00 – 5.00 mA, 0.01 mA / step Accuracy : ± (2 % of setting + 0.02 mA)
METERING	Voltmeter (3 digits) Range : 0.00 – 3.00 KV Resolution : .01 KV Accuracy : ± (2 % of reading + 10 V)
REMOTE CONTROL	Test start input through a 9 pin D type connector.
LINE CORD	Detachable 7 ft. (2.13m) power cable terminated in a three-prong grounding plug.
TERMINATIONS	6ft.(1.82m) high voltage safety retracting probe and 6ft.(1.82m) return clip lead.
MECHANICAL	Dimensions: (W x H x D) 4.75 x 5.75 x 14.50 in. (120 x 146 x 370 mm) Weight: 16.0 lbs (7.25 kgs)

Models 2503 & 2550 DC Mode Functional Specifications

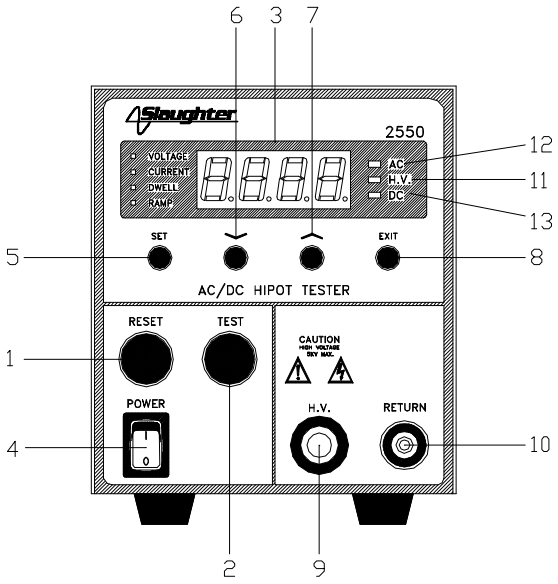
Descriptions	Specifications
INPUT VOLTAGE	115 / 230V selectable, ± 15 % variation; 47 – 63 Hz
FUSE	115 VAC, 230VAC – 2A fast acting 250VAC
OUTPUT	Rating : DC 0 – 5000V, 3 mA Regulation : ± (1 % of output + 5V)
VOLTAGE SETTING	0.01kV – 5kV, 10 volts/step Accuracy : ± (2 % of Setting + 5V) (relative to displayed output). Can be adjusted during operation via Up & Down Arrow keys.
RIPPLE	< 5 % at 5KVDC / 3 mA
DWELL TIME SETTING	0, 1 or 60 "0" for continuous running
RAMP TIMER	0 and 0.2 – 999.9 seconds, 0.1 second / step 0 ramp setting = 0.1 seconds fixed ramp
FAILURE SETTINGS	High limit : 0.02 – 3.00 mA, 0.01 mA / step Accuracy : ± (2 % of setting + 0.02 mA)
METERING Soft key used to Toggle between KV And mA.	Voltmeter (4 digits) Range : DC 0.00 – 5.00 KV Resolution : 0.01 KV Accuracy : ± (2 % of reading + 10 V) Ammeter (4 digits) Range : DC 0.00 – 3.00 mA Resolution : 0.01 mA Accuracy : ± (2% of reading + 0.02 mA)
TIMER DISPLAY	Range : 0.0 – 999.9 seconds Resolution : 0.1 second Accuracy : ± (0.1% of reading + 0.05 seconds)
Discharge Time	≤ 300 ms
Maximum Capacitive Load	1 uF < 1 kV 0.08 uF < 4 kV 0.75 uF < 2 kV 0.04 uF < 5 kV 0.5 uF < 3 kV
OPTIONAL Ground Continuity Check	Current : DC 0.1 A ± 0.01A, fixed Max ground resistance : 1ohm ± 0.1 ohm, fixed Included with this option is a U.S. style (NEMA 5-15) remote receptacle box for testing items terminated with a line cord.
REMOTE CONTROL AND SIGNAL OUTPUT	The following input and output signals are provided through the 9 pin D type connector; 1. Remote control: test, reset and interlock 2. Outputs: pass, fail and test in process
LINE CORD	Detachable 7 ft. (2.13m) power cable terminated in a three prong grounding plug.
TERMINATIONS	6ft. (1.52m) high voltage safety retracting probe, 6ft. (1.52m) high voltage clip probe and 6ft. (1.82m) return clip lead.
MECHANICAL	Dimensions: (W x H x D) (4.75 x 5.75 x 14.50) (120 x 146 x 370 mm) Weight: 16.5 lbs (7.5 kgs)

Models 2510 & 2550 AC Mode Functional Specifications

Descriptions	Specifications
INPUT VOLTAGE	115 / 230V selectable, ± 15 % variation; 47 – 63 Hz
FUSE	115 VAC, 230VAC – 2A fast acting 250VAC
OUTPUT	Rating : AC 0 – 5000V, 10 mA Regulation : ± (1 % of output + 5V)
VOLTAGE SETTING	0.01kV – 5kV, 10 volts/step Accuracy: ± (2 % of Setting + 5V) (relative to displayed output). Can be adjusted during operation via Up & Down Arrow keys.
DWELL TIME SETTING	0, 1 or 60 "0" for continuous running
RAMP TIMER	0 and 0.2 – 999.9 seconds, 0.1 second / step 0 ramp setting = 0.1 seconds fixed ramp
FAILURE SETTINGS	High limit : 0.10 – 10.00 mA, 0.01 mA / step Accuracy : ± (2 % of setting + 0.02 mA)
METERING Soft key used to Toggle between KV And mA.	Voltmeter (4 digits) Range : AC 0.00 – 5.00 KV Resolution : 0.01 KV Accuracy : ± (2 % of reading + 10 V) Ammeter (4 digits) Range : AC 0.10 – 10.00 mA Resolution : 0.01 mA Accuracy : ± (2% of reading + 0.02 mA)
TIMER DISPLAY	Range : 0.0 – 999.9 seconds Resolution : 0.1 second Accuracy : ± (0.1% of reading + 0.05 seconds)
OPTIONAL Ground Continuity Check	Current : DC 0.1 A ± 0.01A, fixed Max ground resistance : 1ohm ± 0.1 ohm, fixed Included with this option is a U.S. style (NEMA 5-15) remote receptacle box for testing items terminated with a line cord.
REMOTE CONTROL AND SIGNAL OUTPUT	The following input and output signals are provided through the 9 pin D type connector; 1. Remote control: test, reset and interlock 2. Outputs: pass, fail and test in process
LINE CORD	Detachable 7 ft. (2.13m) power cable terminated in a three prong grounding plug.
TERMINATIONS	6ft. (1.52m) high voltage safety retracting probe, 6ft. (1.52m) high voltage clip probe and 6ft. (1.82m) return clip lead.
MECHANICAL	Dimensions: (W x H x D) (4.75 x 5.75 x 14.50) (120 x 146 x 370 mm) Weight: 16.5 lbs (7.5 kgs)

CONTROLS

FRONT PANEL CONTROLS



1. **RESET SWITCH:** This is a momentary contact switch. If a failure is detected during the hipot test, the red Failure lamp within the switch will light. To reset the system for the next test, press and release this switch. This switch may also be used to abort a test in progress.

2. **TEST SWITCH:** This is a momentary contact switch. Press the green switch to energize the high voltage output. When the dwell function is "0," high voltage will remain ON until a reject occurs or the RESET button is pushed. If the dwell function is "1" or "60," the high voltage will be present only for the programmed time.

3. **DISPLAY:** The Display is the main readout for the operator and programmer of the test settings and test results. Scalar values are indicated via a digital display.

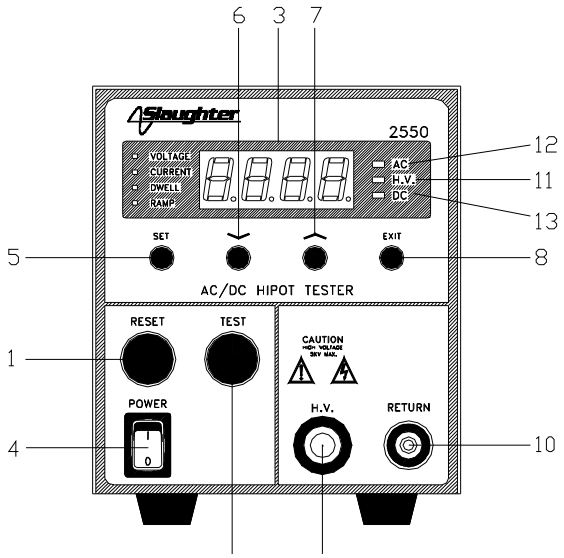
4. **POWER SWITCH:** Rocker-style switch with international ON (|) and OFF (0) markings.

5. **SET KEY:** Use this key to advance forward through the setup menus.

6. **DOWN ARROW (∨):** Use this key to decrement numeric values in the setup mode. This key is also used to toggle between AC/DC mode (2550 only), toggle the DWELL function ON/OFF, the RAMP function ON/OFF (2503/2510/2550 only), and the PULSE function ON/OFF (1305 only). It also may be used to decrease output voltage during a test in 10 volt increments.

7. **UP ARROW (∧):** Use this key to increment numeric values in the setup mode. This key is also used to toggle between AC/DC mode (2550 only), toggle the DWELL

FRONT PANEL CONTROLS



function ON/OFF, the RAMP function ON/OFF (2503/2510/2550 only), and the PULSE function ON/OFF (1305 only). It also may be used to increase the output voltage during a test in 10 volt increments.

8. EXIT KEY: Use this key when you desire to enter the **Run Mode** to initiate a test. Also the key is used to toggle VOLTAGE, CURRENT, or DWELL screens before a test is initiated or during the test in process (2503/2510/2550 only). After the test expires the EXIT key is used to toggle results of the test (2503/2510/2550 only).

9. HIGH VOLTAGE OUTPUT JACK: For the connection of the detachable 6 foot (1.82 m) red high voltage test lead. The jack is recessed for safety when this lead is not being used.

10. RETURN OUTPUT JACK: For the connection of the detachable 6 foot (1.82 m) black return test lead. This lead is always used when performing a test.

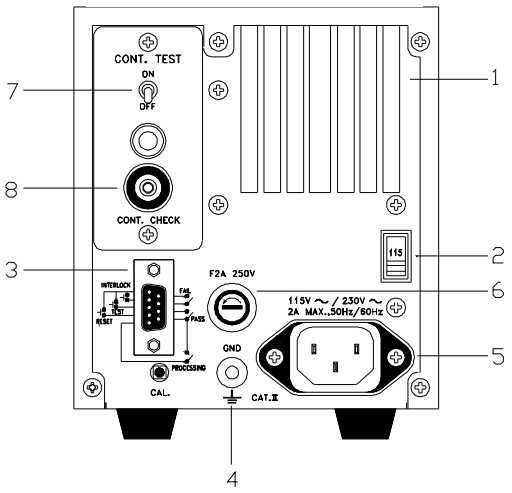
11. HIGH VOLTAGE LED INDICATOR: This indicator flashes to warn the operator that high voltage is present at the high voltage output terminal.

12. AC INDICATOR: This indicator is illuminated during testing to indicate the instrument is in the AC mode (2550 only).

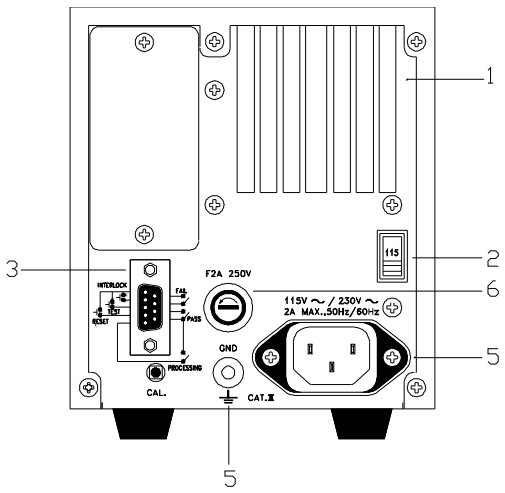
13. DC INDICATOR: This indicator is illuminated during testing to indicate the instrument is in the DC mode (2550 only).

REAR PANEL CONTROLS

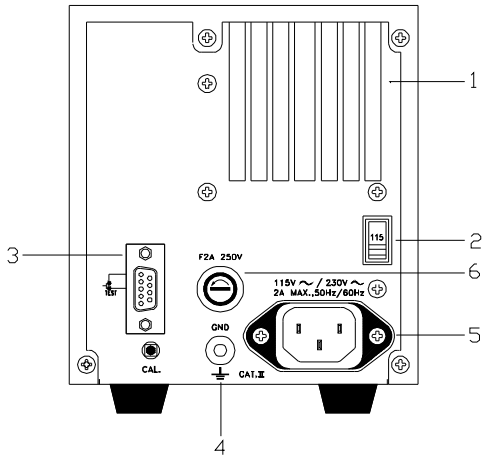
2503/2510/2550
With Continuity Option



2503/2510/2550
Without Continuity Option



1305



1. **VENTILATION:** To cool the instrument.

2. **INPUT VOLTAGE SWITCH:** Line voltage selection is set by the position of the switch. In the down position it is set for 115 volt operation, in the up position it is set for 230 volt operation.

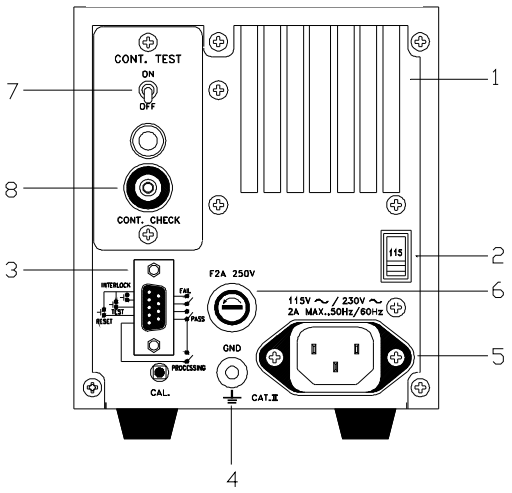
3. **REMOTE INPUT:** 9 pin D subminiature male connector for remote interfacing.

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

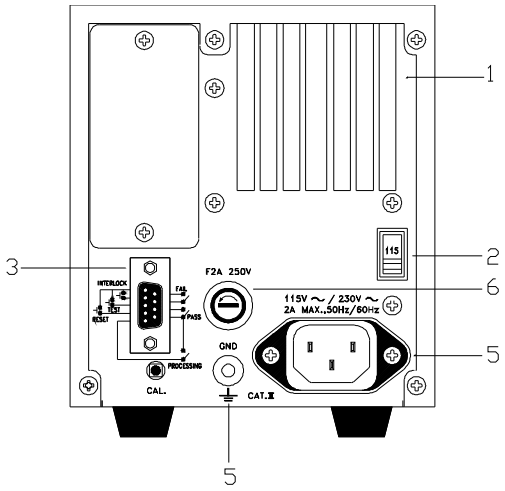
5. **INPUT POWER RECEPTACLE:** Standard IEC 320 connector for connection to a standard NEMA style line power (mains) cord.

REAR PANEL CONTROLS

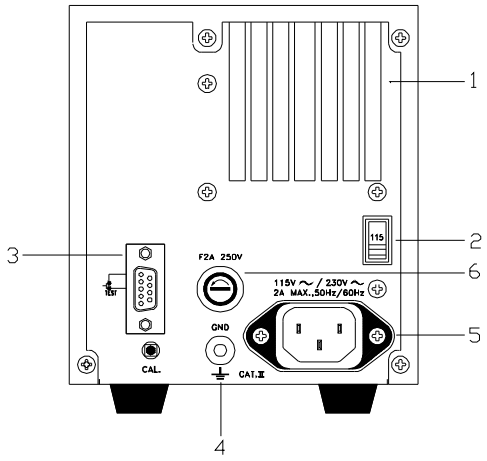
2503/2510/2550
With Continuity Option



2503/2510/2550
Without Continuity Option



1305



6. FUSE RECEPTACLE: To change the fuse unplug the power (mains) cord and turn the fuse cap counter clockwise to remove the fuse.

7. OPTIONAL GROUND CONTINUITY SENSING CIRCUIT: Used with the optional Remote Receptacle Box to verify continuity of the ground wire in line cord connected devices.

8. CONTINUITY RETURN JACK: For connection of the detachable black return test lead when performing a continuity test.

QUICK START

This quick start guide presumes the operator has some familiarity with hipot testing and desires to use the **"default"** settings on the instrument. The default settings shown will remain in memory unless you choose to override them with your own test program. The instrument default settings are as follows:

DEFAULTS

- **Input Voltage:** 115 or 230 volts AC, country specific (rear-panel switch selectable)
- **Voltage Output:** 1.50 kV DC (2503/2550 DC mode)
  1.24 kV AC (1305/2510/2550 AC mode)
- **Current Trip:** HI-LMT: 5.00 mA
  HI-LMT: 3.00 mA (2503/2550 DC mode)
- **Dwell:** 1 (1 second) (2503/2510/2550)
  OFF (1305)
- **Ramp:** 0 (0.1 second) (2503/2510/2550)
- **Pulse:** OFF (1305)

A). Unpack this instrument from its special shipping container. Be sure to save all packaging materials in case you need to return it to the factory for service.

B). 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 of this manual. Locate a three prong grounded outlet. Be sure the outlet has been tested for proper wiring before connecting the instrument to it.

WARNING

C). Check to be sure 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.

D). Turn on the POWER switch located on the lower left hand side of the front panel. Upon powering the instrument up a POWER ON SELF TEST (POST) will automatically be performed. This test will check for the condition of all critical components. You will see the model number briefly appear on the LED readout and then clear itself.

E). If the instrument **DEFAULTS** are acceptable, then be sure to connect the appropriate test leads to the device under test (DUT) or test fixture. Be sure to connect this safety

ground to a suitable known good ground before energizing this instrument, then connect the return lead first (black) to the test fixture or item followed by the high voltage output lead (red).

F). 2503/2510/2550 are 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 are 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, the instrument will not conduct a test if the Test button is pressed.**

If the Interlock contacts are opened during a test, the test will abort. The hardware has been configured to provide the interlock connections on pins 4 and 5 of the 9-pin, d-sub input connector located on the back of the unit. The instrument can still be used without the external interlock device as long as the Interlock Connector (99-10040-01 provided with unit) is plugged into the input connector. If there is nothing connected to the input port to provide a connection to the interlock, the instrument will not perform tests. **Note: Model 1305 is not equipped with the Remote Interlock feature.**

WARNING

G). Please check your connections to be sure they are making good contact and that the test station or area is clear of debris and other personnel. DO NOT TOUCH THE DEVICE UNDER TEST ONCE THE TEST HAS BEEN STARTED. To initiate the test press the GREEN test button on the front panel. This is a momentary button and must be held in the pressed position during the test. The instrument will then cycle ON and begin the automated test using the defaults. If a failure occurs you will HEAR an audible alarm go off. To stop the alarm you must depress the RED button marked RESET. This will silence the alarm and reset the instrument to begin another test. This RESET button must also be used when the dwell mode is set to "ON" to ABORT a test and cut off the HIGH VOLTAGE.

When HIGH VOLTAGE is present a RED flashing indicator located to the right of the display will remain flashing until the HIGH VOLTAGE is OFF. If the device under test PASSED the test then no audible alarm will sound. In the case of a FAIL condition the instrument will provide a visual and audible alarm. Depressing the reset button will reset the instrument alarm.

SETUP

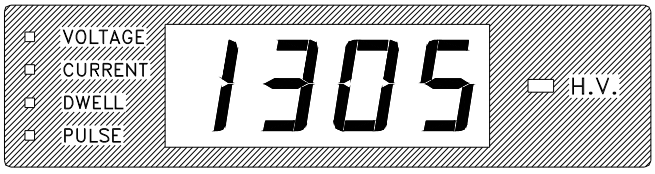
SETUP INSTRUCTIONS FOR MODEL 1305

Check to be sure 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.

CAUTION

Please be sure that the safety ground on the power line cord is not defeated and that you are connected to a grounded power source. Also connect the rear panel chassis ground for additional safety.

Turn on the POWER switch located on the lower left hand side of the front panel. Upon powering the instrument up a POWER ON SELF TEST (POST) will be automatically performed. This test will check for the condition of all critical components. In addition the display will briefly flash the model number.



The instrument will recall the last setup that was active. The digital display will show 0.00 and the Voltage LED will be illuminated. To view the last settings, press the set button once and the Voltage LED will flash and the display will show the programmed voltage. Pressing the Set button again will cause the Current LED to flash and the display will show the programmed trip current. Pressing the Set button a third time will cause the Dwell LED to flash and the display will indicate whether the dwell is On or Off. Pressing the Set button a fourth time will cause the Pulse LED to flash and the display to indicate whether the pulse function on On or Off.

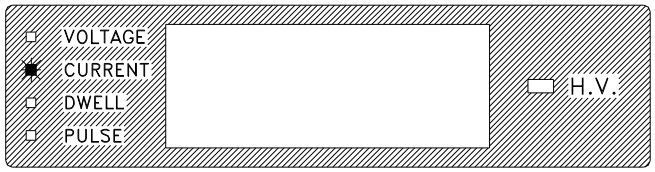
1. To set the Output Test Voltage

Press the SET key until the Voltage LED is illuminated and flashing.

Use the Up/Down Arrow keys to enter the desired test voltage, then press the EXIT key to exit to the test mode or toggle to another setting using the SET key. The maximum voltage that may be entered is 3.00KV.

2. To set the High Leakage Current Limit

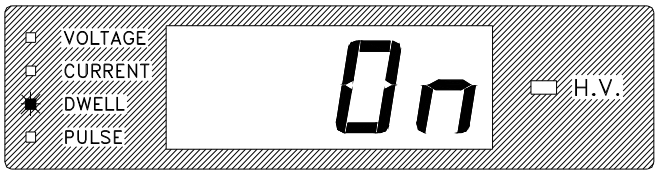
Press the SET key until the Current LED is illuminated and flashing.



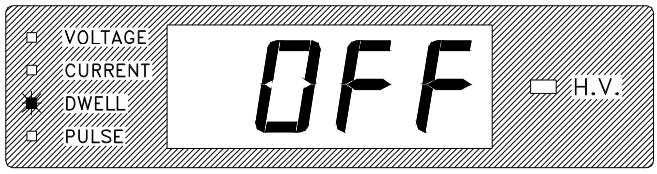
Use the Up/Down Arrow keys to enter the leakage current high limit setting, then press the EXIT key to exit to the test mode or toggle to another setting using the SET key. The unit of measure is in milliamperes with 5.00 mA as the maximum setting.

3. To set the Dwell function

Press the SET key until the Dwell LED is illuminated and flashing.



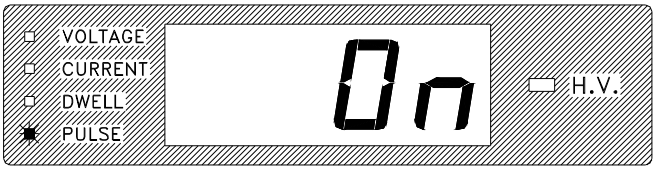
OR



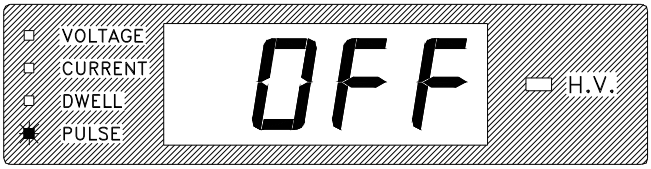
Use the Up/Down Arrow keys to toggle the dwell function, then press the EXIT key to exit to the test mode or toggle to another setting using the SET key. If the dwell is set to "ON," the instrument will operate in a continuous ON mode when the TEST button is depressed and released. It will stop when the DUT (Device Under Test) goes into failure or the manual reset button is pressed. If the dwell is set to "OFF," the instrument will operate only while the TEST button is pressed.

4. To set the Pulse function

Press the SET key until the Pulse LED is illuminated and flashing.



OR



Use the Up/Down Arrow keys to toggle the Pulse function, then press the EXIT key to exit to the test mode or toggle to another setting using the SET key. When set to "ON" the failure condition will be reset automatically and will be ready for another test. If the Pulse function is set to "OFF," when a failure occurs the reset button must be pressed to clear the failure condition and enable the unit for another test.

WARNING If the Pulse function is set to "ON" and the Dwell function is set to "ON" or the "Test" button is pressed, the instrument will automatically reset after a failure condition and immediately reactivate high voltage. This combined function is useful for troubleshooting visual or audible arcing conditions.

WARNING When the Pulse function is set to ON, the auto-reset feature will ***NOT*** meet most UL or other agency requirements for *manual* testing.

SETUP for 120KΩ Testing Requirements

Set Dwell to OFF
Set Pulse to OFF

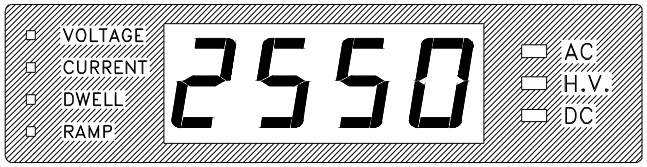
1. First clip Ground Lead to the DUT, and then place the extended tip of the Safety Retracting Probe in contact with the DUT.
2. Press Test Switch for One (1) second minimum and release.

SETUP INSTRUCTIONS FOR MODELS 2503/2510/2550

Check to be sure 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.

CAUTION Please be sure that the safety ground on the power line cord is not defeated and that you are connected to a grounded power source. Also connect the rear panel chassis ground for additional safety.

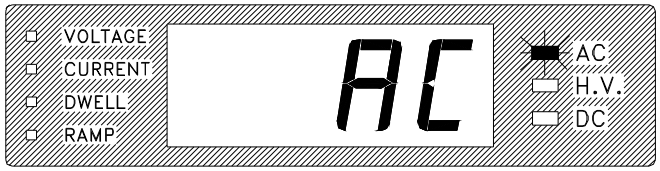
Turn on the POWER switch located on the lower left hand side of the front panel. Upon powering the instrument up a POWER ON SELF TEST (POST) will be automatically performed. This test will check for the condition of all critical components. In addition the display will briefly flash the model number.

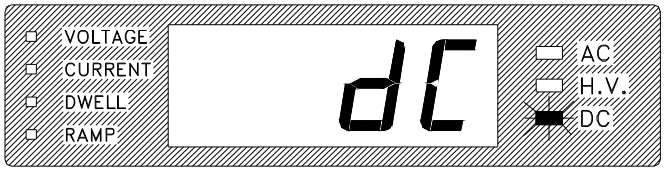


The instrument will recall the last setup that was active. The digital display will show 0.00, the Voltage LED will be illuminated, and the AC or DC LED (2550 only) will be illuminated depending upon the programmed setting. On Model 2550, to view the last settings, press the set button once and the AC or DC LED will flash and AC or DC will be displayed on the digital display. Pressing the Set button again will cause the Voltage LED to flash and the display will show the programmed voltage. On Models 2503 and 2510 the voltage LED will flash and the display will show the programmed voltage on the initial pressing of the Set button. Pressing the Set button again will cause the Current LED to flash and the display will show the programmed trip current. Pressing the Set button another time will cause the Dwell LED to flash and the display will indicate whether the dwell is “0”, “1” or “60”. Pressing the Set button a final time will cause the Ramp LED to flash and the display will indicate the programmed ramp time. Press the Exit button to ready the instrument for testing.

1. To set the AC or DC Testing Mode (Model 2550 only)

Press the SET key and the AC or the DC LED will illuminate and flash.



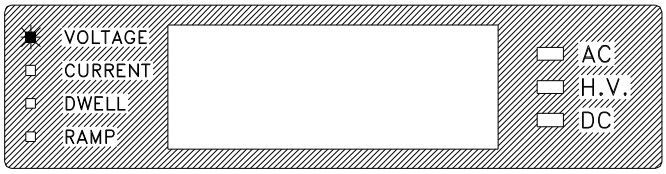


Use the Up/Down Arrow keys to toggle between the AC mode and the DC mode. The LED indicator will flash and the digital display will display AC or DC.

Note: When switching between AC and DC modes, always check ALL setting for voltage, current, ramp and dwell. The instrument DOES NOT retain separate settings for the AC mode and the DC mode.

2. To set the Output Test Voltage

Press the SET key until the Voltage LED is illuminated and flashing



Please use the Up/Down Arrow keys to enter the desired test voltage, then press the EXIT key to exit to the test mode or toggle to another setting using the SET key. The maximum voltage, which may be entered, is 5.00KV.

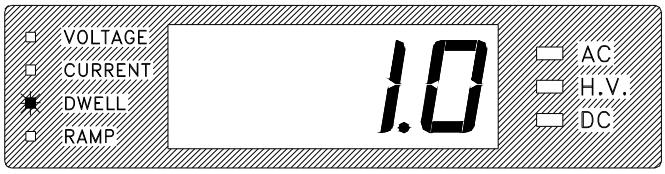
3. To set the High Leakage Current Limit

Press the SET key until the Current LED is illuminated and flashing.

Use the Up/Down Arrow keys to enter the leakage current high limit setting, then press the EXIT key to exit to the test mode or toggle to another setting using the SET key. The unit of measure is in milliamperes with 10.00 mA as the maximum setting.

4. To set the Dwell function

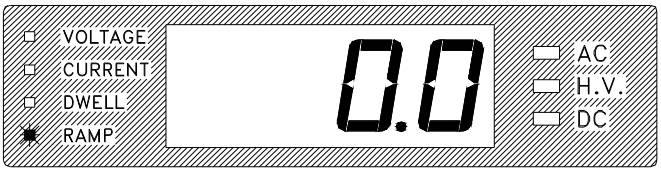
Press the SET key until the Dwell LED is illuminated and flashing. Dwell time is the length of time the instrument will apply the programmed test voltage.



Use the Up/Down Arrow keys to set the dwell time, then press the EXIT key to exit to the test mode or toggle to another setting using the SET key. If the dwell is set to "0," the instrument will operate in a continuous ON mode when the TEST button is depressed and released. It will stop when the DUT (Device Under Test) goes into failure or the manual reset button is pressed. If the dwell is set to "1," the instrument will test for one (1) second only when the Test button is pressed. If the dwell is set to "60," the instrument will test for sixty (60) seconds only when the Test button is pressed. The instrument will 'beep' at the end of a timed test. Pressing the red Reset button will terminate the test in progress.

5. To set the Ramp function

Press the SET key until the Ramp LED is illuminated and flashing. The ramp time is the time the instrument will take to reach the full programmed test voltage.



Use the Up/Down Arrow keys to increase or decrease the Ramp time, then press the EXIT key to exit to the test mode or toggle to another setting using the SET key. When set to "0.0," the ramp time is fixed at 0.1 seconds to reach full test voltage. Ramp time may be set up to 999.9 seconds. The red Reset button may be used to terminate test at any time.

SETUP for 120KΩ Testing Requirements (AC ONLY)

Set dwell for 1 or 60.

1. First clip Ground Lead to the DUT, and then clip the High Voltage clip lead to the DUT.
2. Press Test Switch and release.

SETUP for Optional Ground Continuity Testing

1. Switch the instrument to Off.

2. Plug the black ground-lead's banana plug into the "CONT. CHECK" socket on the back panel and switch the "CONT. TEST" switch to ON.

3. Plug the leads from the Remote Receptacle Box into the H.V. socket and the RETURN socket on the front panel of the instrument.

FIELD INSTALLATION OF OPTIONS

Ground Continuity Sensing

1. Installation is simple and requires only a number 1 Phillips screwdriver.

2. Switch the instrument OFF and unplug the line-cord from the wall outlet.

3. Remove the test probes and the line cord from the instrument.

4. Remove and save the two (2) screws holding the blanking plate onto the rear of the instrument.

5. Please observe the upper and lower card guides inside the opening.

6. Grasp the handle on the continuity board assembly and align the PC board into the card guides. Slide the card straight in until resistance is felt approximately 1/8 inch before the metal plate on the continuity assembly reaches the back panel. A firm push will seat the card. The screw holes should be aligned.

7. Install the screws from the blanking plate.

The installation is complete.

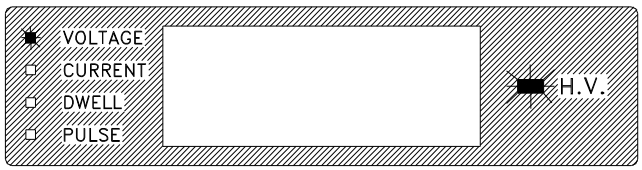
OPERATION

OPERATING INSTRUCTIONS FOR MODEL 1305

1. After the instrument's test parameters are programmed, connect the appropriate test leads to the device under test (DUT) or test fixture. Connect the safety ground (on the rear panel) to a suitable known good ground before energizing this instrument. Then connect the return lead first to the test fixture or the DUT followed by the high voltage lead.

WARNING Check your connections to be sure they are making good contact and that the test station or area is clear of debris or other personnel.
DO NOT TOUCH THE DEVICE UNDER TEST ONCE THE TEST HAS BEEN STARTED.

2. To initiate a test press the TEST switch on the front panel. The red High Voltage LED indicator will flash and the display will show the testing voltage.



The instrument will continue to output voltage when the switch is released, if dwell is set to ON.
If dwell is set to OFF, the voltage will discontinue when the switch is released.

3. To stop the test, please press the RESET switch if Dwell is ON, or release the TEST switch if Dwell is OFF.

If the DUT passed the test, no response from the tester will be seen or heard.
The instrument is now ready to perform another test.

4. If there is a failure in the DUT during the test, the red indicator light will illuminate on the RESET switch and an alarm will sound.

5. To stop the alarm, please press the RESET switch once. The alarm will stop. The instrument is now ready for the next test. If the RESET switch is pressed again, the data on the display screen will be cleared.

6. If a fault occurs in the DUT during the test and the Dwell function was ON and the PULSE function was set to ON, the instrument will reset and start the test again until the operator elects to abort the test in progress. This can be accomplished by pressing the RESET switch at any time. The instrument will stop the test process.

Please press the TEST switch to initiate another test

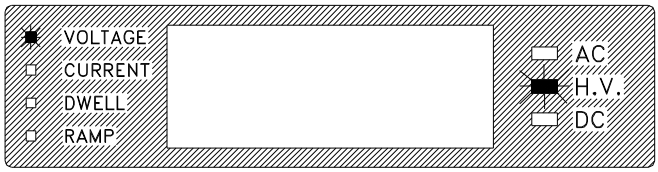
OPERATING INSTRUCTIONS FOR MODELS 2503/2510/2550

1. After the instrument's test parameters are programmed, connect the appropriate test leads to the device under test (DUT) or test fixture. Connect the safety ground (on the rear panel) to a suitable known good ground before energizing this instrument. Then connect the return lead first to the test fixture or the DUT followed by the high voltage lead.

   Check your connections to be sure they are making good contact and that the test station or area is clear of debris or other personnel.

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

2. To initiate a test, press the TEST switch on the front panel. The red High Voltage LED indicator will flash and the display will show the test voltage, or current, or dwell time, dependent upon the setting. If the ramp function is set and voltage meter is selected, the voltage will begin at 0 and step up to the programmed voltage. The rate at which the voltage increases is dependent upon the ramp time.



3. If dwell is set to "0," the instrument will continue to output voltage indefinitely or until a failure occurs or the manual RESET switch is pressed. If dwell is set to "1" or "60," the voltage will continue only until the dwell time has elapsed, then shut off.

4. To stop the test at any time, please press the RESET switch.

5. If the DUT passed the test a short audible beep tone will be activated.
   The instrument is now ready to perform another test.

6. If there is a failure in the DUT during the test, the voltage will shut off, the red indicator light will illuminate on the RESET switch and an alarm will sound.

7. To stop the alarm, please press the RESET switch once. The alarm will stop. The instrument is now ready for the next test. If the RESET switch is pressed again, the data on the display screen will be cleared.

8. To see the results parameters after the test has expired, please press the EXIT key. Voltage, current or dwell parameters will be toggled when EXIT key is pressed. Results data will be lost if the RESET switch is pressed or SET menu is entered. Please press the EXIT key to select the desired parameter that the display will indicate during the next test.

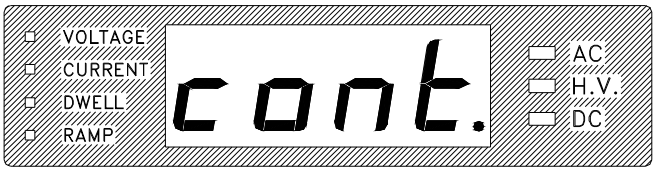
Continuity

The continuity test is a passive test.

Set the Continuity Test switch to On.

Plug the DUT's line cord into the remote receptacle box and connect the Continuity Check lead from the rear panel to the exposed 'dead metal' parts of the DUT.

If ground continuity is made, the green light in the Test switch will illuminate. Pressing the Test switch will initiate the high voltage test. If continuity is not made or is lost during the test, a reject will occur and the display will show "**cont.**".



Press the Reset button to ready the instrument for another test.

REMOTE INTERFACE FOR MODEL 1305

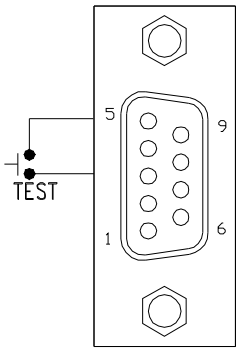
The TEST input is connected through the 9-pin "D" type connector mounted on the back panel of the unit. This connector mates with a standard 9-pin "D" type subminiature connector provided by the user. For best performance, a shielded cable should be used. To avoid ground loops, the shield should not be grounded at both ends of the cable.

The interface allows remote operation of the TEST function only. A normally open momentary switch across pins 3 and 5 allows remote operation of the TEST function. The TEST and RESET switches on the front panel remain active during remote operation.

Suggested AMP part numbers for interconnecting to the Remote I/O are shown below.

205203-3	RECEPTACLE SHELL
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



CAUTION DO NOT CONNECT VOLTAGE OR CURRENT TO THE SIGNAL INPUT, THIS COULD RESULT IN DAMAGE TO THE CONTROL CIRCUITRY.

REMOTE INTERFACE FOR MODEL 2503/2510/2550

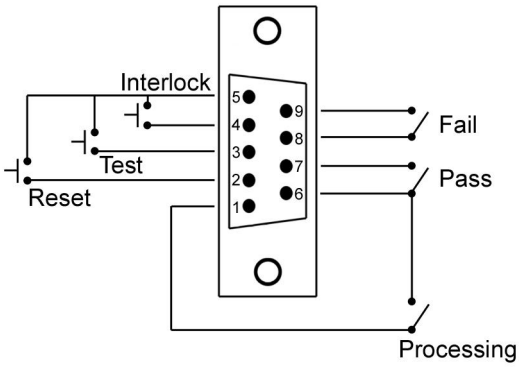
All inputs are connected through the 9-pin "D" type connector mounted on the back panel of the unit. This connector mates with the standard 9-pin "D" type subminiature connector included with the unit. For best performance, a shielded cable should be used. To avoid ground loops, the shield should not be grounded at both ends of the cable.

The remote interface includes a SAFETY INTERLOCK. This interlock must be closed to allow a test to start. The SAFETY INTERLOCK is wired between pins 4 and 5 of the interface connector. For manual operation, the provided 9-pin "D" type connector has a jumper between pins 4 and 5. ***This mating connector must be in place for manual operation.*** For remote operation, the interlock can be appropriately connected to test station guarding.

The interface allows remote operation of the TEST and RESET functions. A normally open momentary switch across pins 3 and 5 allows remote operation of the TEST function. A normally open momentary switch can also be wired across pins 2 and 5 to allow remote operation of the RESET function. The TEST and RESET switches on the front panel remain active during remote operation.

The remote interface also provides signals to remotely monitor the PASS, FAIL, and PROCESSING conditions. These 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 do not provide any voltage or current. The ratings of these contacts are 1Amp/120VAC
(1Amp/24VDC). The outputs are as follows:

Pins 1 and 6 provide the PROCESSING signal.
Pins 6 and 7 provide the PASS signal.
Pins 8 and 9 provide the FAIL signal.



A description of the output relay operation follows:

PROCESSING – The relay contact closes the connection between pin 1 and pin 6 while the instrument is performing a test. The connection is opened at the end of a test.

PASS – The relay contact closes the connection between pin 6 and pin 7 after detecting that the device under test passed the test. 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 8 and pin 9 after detecting that the device under test failed the test. The connection is opened when the next test is initiated or the reset function is activated.

MODEL 2503/2510/2550 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 which can be referenced on the model option label on the rear panel of the unit when options are present.

Model 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 03 ..... OPT: 0103

2503/2510/2550 Options

Option List

Code	Description
01	Ground Continuity

CALIBRATION PROCEDURE

Calibration Equipment Required
High Impedance Direct Reading High Voltage Voltmeter
Small Plastic Probe
Set of HV Clip Leads

- **Step 1**. Plug instrument into a properly grounded receptacle and switch instrument "OFF."
- **Step 2**. Attach HV clip leads to instrument and external Voltmeter.
- **Step 3**. Press and hold "Cal" button on rear of instrument and then switch instrument "ON." Release cal button. The display will read "Cal."
- **Step 4**. Press the "SET" button on the front panel. The voltage will be displayed.
- **Step 5**. Observe the voltage displayed on the external direct reading voltmeter.
- **Step 6**. Use the $\wedge$ (up) button or the $\vee$ (down) button to adjust the voltage shown on the instrument display to match the voltage shown on the external voltmeter.
- **Step 7**. Press the "SET" button.
- **Step 8A**. (2503, 2510 & 2550) Turn instrument "OFF" and repeat Step 3. Then press $\vee$ (down) button on the front panel. The current will be displayed. The instrument puts out a fixed voltage of 1000V in the current calibration mode.
- **Step 8B**. (2503, 2510 & 2550) With the appropriate load resistor 200k (2510 & 2550) or 1Meg (2503), observe the current displayed on the external direct reading current meter.
- **Step 8C**. (2503, 2510 & 2550) Use the $\wedge$ (up) button or the $\vee$ (down) button to adjust the current shown on the instrument display to match the current shown on the external current meter.
- **Step 8D**. (2503, 2510 & 2550) Press the "SET" button.
- **Step 9**. Switch the instrument "OFF" disconnect the Clip Leads.
- **Step 10**. Seal "Cal" button.

PARTS LIST

Rev: A 11/11/2004 ECO 5040-6

Part Number	Qty.	Reference Designator	Description
Models 1305, 2503, 2510, 2550			
102-050-913	1		High Voltage Probe (6ft.)
102-069-904	1		Return Lead (6ft.)
125-013-001	1		Input Power Cable (6ft.)
150-135-003	1		Fuse Holder (20mm)
175-974-003	1		Tilt Up Leg Kit
99-10312-01	1		Power Switch
330-113-001	1		Test Switch
330-113-002	1		Reset Switch
575-701-001	1	AMP-2510	Power Amplifier Board
575-703-001	1	CSW-06	Input Protection Board
575-704-001	1	DSP-11	Display Board
575-705-001	1		Red LED
99-10016-01	1		Earth Connector
99-10017-01	1		Return Connector
99-10018-01	1		High Voltage Connector
99-10184-01	1		Microcontroller, 8-bit (W78E516BP)
99-10097-01	1		Fuse, 2A, 250V, 5x20mm, Fast Blow
Models 2503, 2510, 2550 only			
102-055-913	1	-	High Voltage Clip (6ft.)
575-691-004	1	CGC-04	Ground Continuity Check Board
99-10040-01	1	-	Interlock Connector
99-10124-02	1	2510	Main Control Board
Model 1305 only			
200-057-001	1	T2	High Voltage Transformer, 3.3kV, 5mA
240-061-001	1	T1	Input Transformer
99-10289-01	1	2510	Main Control Board
Model 2503 only			
200-057-002	1	T2	High Voltage Transformer, 4kV, 8mA
240-061-002	1	T1	Input Transformer
575-702-001	1	HV-2503	High Voltage Control Board
Model 2510 only			
200-057-003	1	T2	High Voltage Transformer, 5.5kV, 10mA
240-061-003	1	T1	Input Transformer
Model 2550 only			
200-057-003	1	T2	High Voltage Transformer, 5.5kV, 10mA
240-061-003	1	T1	Input Transformer
99-10098-01	1	HV-2550	High Voltage Control Board

SCHEMATIC INDEX

Drawing Number	Description	Reference Designator	Pages
S01305	Wiring Diagram 1305, 2510	-	1
S02503	Wiring Diagram 2503	-	1
S02550	Wiring Diagram 2550	-	1
S99-10124	Main Control Board 1305, 2503, 2510, 2550	2510B	3
S575-702-001	High Voltage Relay Board 2503	HV-2503	1
S99-10098	High Voltage Relay Board 2550	HV-2550	1
S575-701-001	Power Amplifier Board	AMP-2510	1
S575-703-001	Input Protection Board	CSW-06	1
S575-704-001	Display Board	DSP-11	1
S575-691-004	Ground Continuity Check Board	CGC-04	1