OPERATION AND SERVICE MANUAL

Model 1305, 1340

MODEL 1305 (AC ONLY HIPOT)
MODEL 1340 (100VA AC ONLY HIPOT WITH OPTIONAL GROUND CONTINUITY CHECK)

SERIAL NUMBER

Models
1305/1340

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

Item* 99-10682-01 *Ver 1.01

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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. 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.

Contents of the Carton

Inside the carton should be the following:

Description	SLA Part Number
SLA Series Instrument	1305/1340
High Voltage Cable	102-055-913
Return Cable	102-069-904
Fuse	99-10097-01, 3.15 Amp, fast acting 250VAC
Interlock Connector	99-10040-01
Line Cord*	125-013-001 Standard

*The Line Cord listed is American. Other combinations of the Line Cord are available upon request.

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.

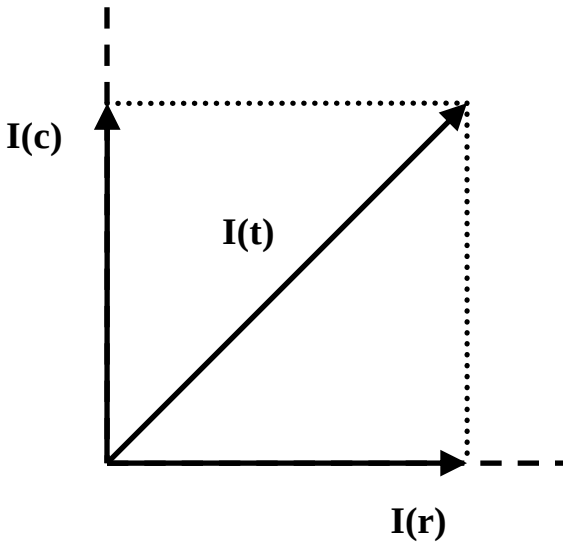
On single insulated armatures, the dielectric withstand test voltage is normally applied between the commutator and the shaft.

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**.

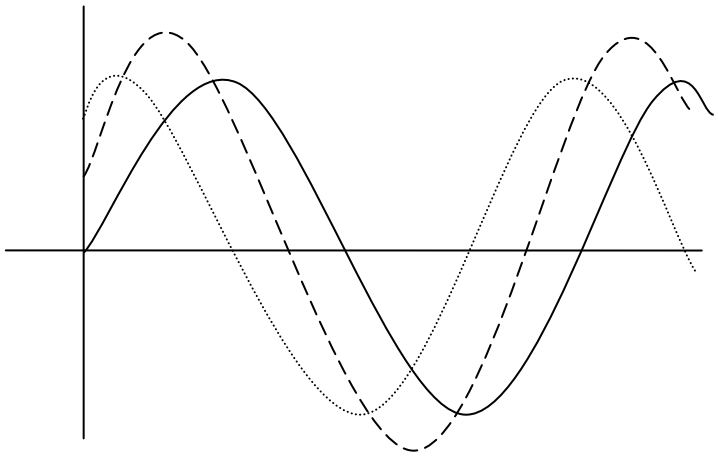


I(c) = CAPACITIVE CURRENT
I(r) = RESISTIVE CURRENT
I(t) = TOTAL CURRENT

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.



RESISTIVE CURRENT ————————
CAPACITIVE CURRENT ……
TOTAL CURRENT – – – – – – – – –

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.

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.

OFL failure occurs when there is a short circuit in the DUT during the test. The red RESET button will illuminate and an alarm will activate.

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 many others countries.

Model 1305 Functional Specifications
3KV AC Hipot

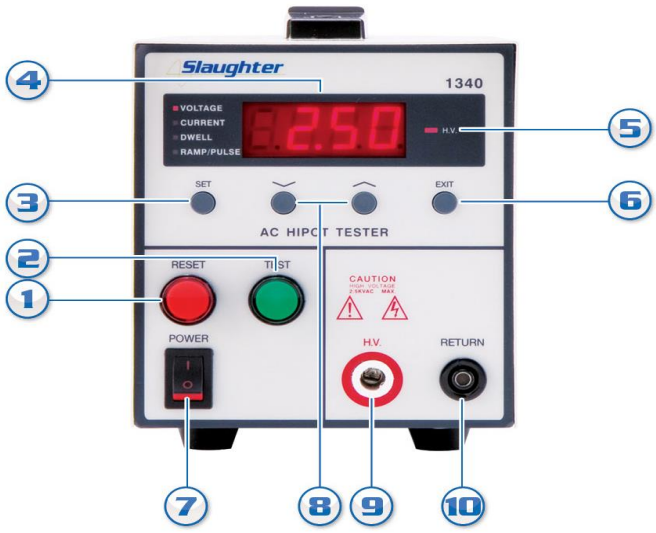
Descriptions	Specifications
INPUT VOLTAGE	115 / 230 V selectable, ± 15 % variation; 47 – 63 Hz
FUSE	115 VAC, 230 VAC – 2 A fast acting 250 VAC
OUTPUT	Rating : 3.00 kV AC, 5 mA Regulation: ± (1 % of output + 5 V) from no load to full load Frequency: 60 Hz fixed
VOLTAGE SETTING	0.00kV – 3.00 kV, 10 volts/step Accuracy: ± (2 % of setting + 5 V) 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 presents only when "TEST" button is pushed
PULSE MODE	ON, Automatic reset after failure for continuous testing. *Not for compliance testing*.
FAILURE SETTING	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 : 0.01 kV Accuracy : ± (2 % of reading + 10 V)
REMOTE CONTROL	Test start input through a 9 pin D type connector.
LINE CORD	Detachable 7 ft. (2.13 m) power cable terminated in a three-prong grounding plug.
TERMINATIONS	6ft.(1.82 m) high voltage safety retracting probe and 6 ft.(1.82 m) return clip lead.
MECHANICAL	Dimensions: (WxHxD) (4.75x5.75x14.50 in.) (120x146x370 mm) Weight: 16.0 lbs (7.25 kgs)

Model 1340 Functional Specifications, 100VA AC Hipot

Descriptions	Specifications
INPUT VOLTAGE	115 / 230 V selectable, ± 15 % variation; 47 – 63 Hz
FUSE	115 VAC, 230 VAC – 3.15 A slow blow 250 VAC
OUTPUT	Rating : 2.50 kV AC, 40 mA Rating : 2.50 kV AC, 10 mA, when PULSE mode is activated Regulation: ± (1 % of setting + 5 V) from no load to full load Frequency: 60 Hz fixed
VOLTAGE SETTING	0.00kV – 2.50 kV, 10 Volts/step Accuracy: ± (2 % of Setting + 5 V) relative to displayed output. Can be adjusted during operation via UP & DOWN arrow keys.
DWELL SETTING	0.0, 1.0 s, 60.0 s, OFF 0.0 - for continuous running OFF - HV presents only when "TEST" button is pushed
RAMP/PULSE SETTING	PULSE and 0.1- 999.9 seconds, 0.1 second /step PULSE - Automatic reset after failure for continuous testing. *Not for compliance testing*.
FAILURE SETTING	High limit: 0.00 – 40.00 mA, High limit: 0.00 – 10.00 mA, when PULSE mode is activated Resolution: 0.01 mA / step Accuracy: ± (2 % of setting + 0.02 mA)
METERING (4 digits) Soft key used to toggle between Voltmeter, Ammeter, and Timer	Voltmeter: Range : 0.00 – 2.50 kV Resolution : 0.01 kV Accuracy : ± (2 % of reading + 10 V) Ammeter: Range : 0.00 – 40.00 mA Range : 0.00 – 10.00 mA when PULSE is activated Resolution : 0.01 mA Accuracy : ± (2% of reading + 0.02 mA) Timer: Range : 0. 0 – 999.9 seconds Resolution : 0.1 seconds Accuracy : ± (0.1% of reading + 0.05 second)
OPTIONAL Ground Continuity Check	Current: DC 0.1 A ± 0.01 A, fixed Max ground resistance: 1 Ohm ± 0.1 Ohm, fixed
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. (2.13 m) power cable terminated in a three-prong grounding plug.
TERMINATIONS	6ft. (1.82 m) high voltage safety retracting probe, 6 ft. (1.82 m) high voltage clip probe and 6 ft. (1.82m) return clip lead.
MECHANICAL	Dimensions: (WxHxD) (4.75x5.75x14.50 in.) (120x146x370 mm) Weight: 20.0 lbs (9.0 kgs)

CONTROLS

FRONT PANEL CONTROLS



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

2. **TEST BUTTON:** This is a momentary contact button. Press the green button to energize the high voltage output. When the Dwell function is "0.0", high voltage will remain ON until a reject occurs or the RESET button is pushed. If the Dwell function is "1.0" or "60.0," the high voltage will be present only for the programmed time.

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

4. **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.

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

6. **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

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

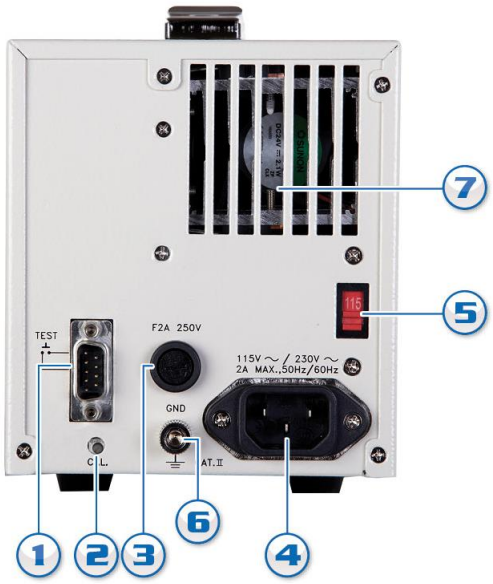
8. **UP ARROW (∧) & DOWN ARROW (∨):** Use these keys to increment or decrement numeric values in the setup mode. These keys are also used toggle the DWELL function parameters. These keys are used to toggle between VOLTAGE, CURRENT, and DWELL in Results mode. It also may be used to increase or decrease output voltage during a test in 10 volt increments.

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.

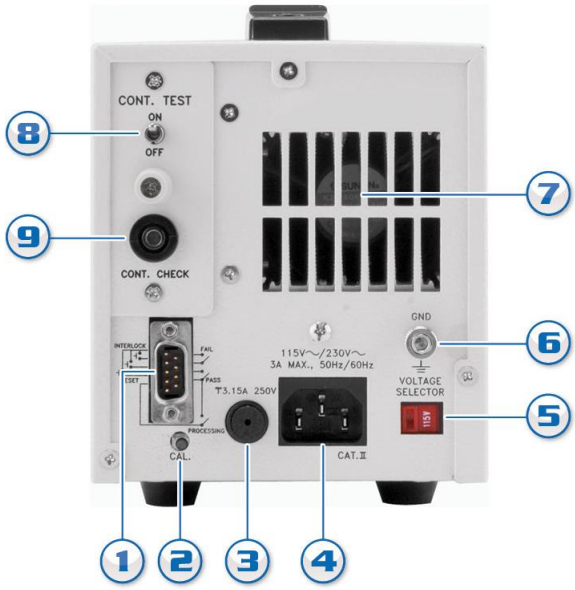
10. **RETURN JACK:** For the connection of the detachable 6 foot (1.82 m) black return test lead. This lead is always used when performing a test.

REAR PANEL CONTROLS

1305



1340



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

2. **CALIBRATION ENABLE KEY:** To enter the calibration mode press this key while the instrument is being powered ON.

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

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

5. **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.

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

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

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

9. **CONTINUITY RETURN JACK (OPTIONAL):** 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:** 1.24 kV AC (1305/1340)
- **Current Trip:** HI-LMT: 5.00 mA
- **Dwell:** 1.0 (1 second) (1340) OFF (1305)
- **Ramp:** (0.1 second) (1340)
- **Pulse:** OFF (1305/1340)

A). Unpack this instrument from its special shipping container.

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 and then firmware version 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). Model 1340 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 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.**

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.

WARNING 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 for model 1305 only (by defaults Dwell is set to OFF). 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" or "0.0" 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 short beep 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

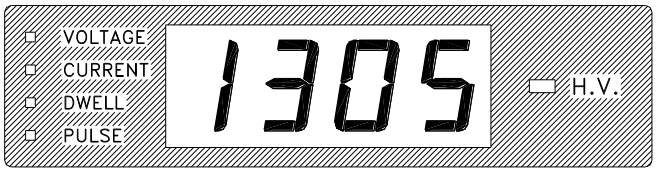
SETUP INSTRUCTIONS MODELS 1305/1340

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.

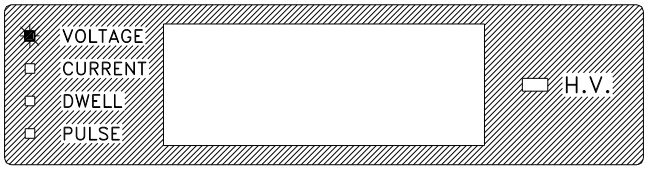
Turn on the POWER switch located on the lower left hand side of the front panel. Upon powering the instrument up a POWER ON SELF TEST (POST) will be automatically performed. This test will check for the condition of all critical components. In addition the display will briefly flash the model number and then firmware version 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 key once and the Voltage LED will flash and the display will show the programmed voltage. Pressing the SET key again will cause the Current LED to flash and the display will show the programmed trip current. Pressing the SET key 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 key 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

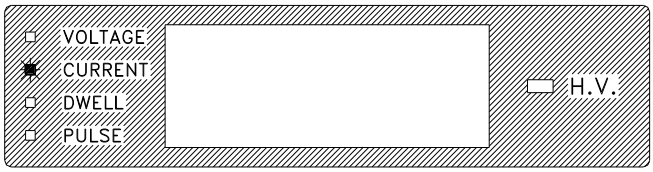
Press the SET key until the Voltage LED is illuminated and flashing.



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

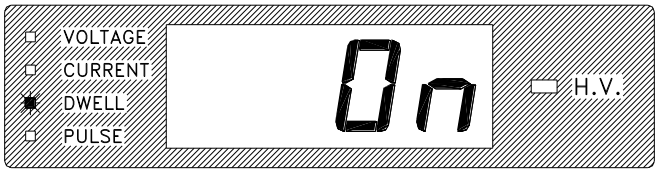
Press the SET key until the Current LED is illuminated and flashing.



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 milliamps 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.

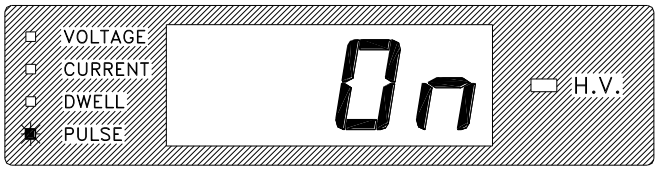


OR

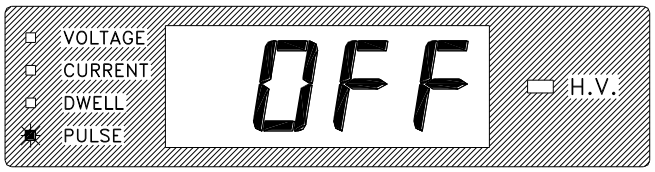
Use the Up/Down Arrow keys to toggle the dwell function, then press the EXIT key to exit to the test mode or toggle to another setting using the SET key. If the Dwell is set to "ON," the instrument will operate in a continuous ON mode when the TEST button is depressed and released. It will stop when 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 and 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 button for one second minimum and release.

SETUP for Optional Ground Continuity Testing (1340 only)

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

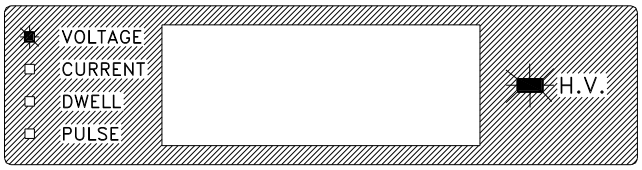
OPERATING INSTRUCTIONS FOR MODEL 1305

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.

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 button 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 TEST button is released, if Dwell is set to ON. If Dwell is set to OFF, the voltage will discontinue when the TEST button is released.

3. To stop the test, please press the RESET button if Dwell is ON, or release the TEST button 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 button and an alarm will sound.

5. To stop the alarm, please press the RESET button once. The alarm will stop. The instrument is now ready for the next test. If the RESET button 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 button at any time. The instrument will stop the test process.

Please press the TEST button to initiate another test.

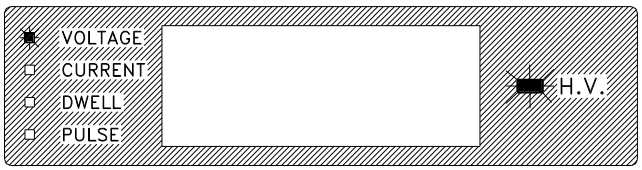
OPERATING INSTRUCTIONS FOR MODEL 1340

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 button on the front panel. The red High Voltage LED indicator will flash and the display will show the test voltage, or current, or time, dependent upon the setting.



3. If Dwell is set to 0.0, the instrument will continue to output voltage indefinitely or until a failure occurs or the manual RESET button is pressed. If Dwell is set to 1.0 or 60.0, the voltage will continue only until the dwell time has elapsed, then shut off. If Dwell is set to OFF the output voltage will continue only while the TEST button is pushed.

4. To stop the test at any time, please press the RESET button, or release the TEST button if Dwell is OFF.

5. If the DUT passed the test a short audible beep will be activated. There is no audible response from the instrument when the test ends in DWELL=OFF mode.
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 button and an alarm will sound.

If Ramp/Pulse is set to Pulse and failure occurs during the test, the output voltage will be shut off and then immediately restart. The red light will illuminate and alarm will sound when the failure occurs and will be reset automatically when the test restarts. That process may repeat many times until the dwell time has elapsed. An operator can elect to abort the test at any time by pressing the RESET button.

7. To stop the alarm, please press the RESET button once. The alarm will stop. The instrument is now ready for the next test. If the RESET button 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 Up/Down Arrow keys. Results of Voltage, Current, and Dwell parameters will be toggled when Up or Down key are pressed. Results data will be lost only when TEST button is pressed to initiate next test.

9. To select the desired parameter that the display will indicate during the next test, please press the EXIT key. The EXIT key will toggle the display between the voltmeter, current meter, and timer. The EXIT key is active also during the test, so the desired parameters can be changed at any time while the test in process.

CONTINUITY

The continuity test is a passive test.

Set the CONT. TEST switch on the rear panel to ON position.

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 button will illuminate. Pressing the TEST button 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

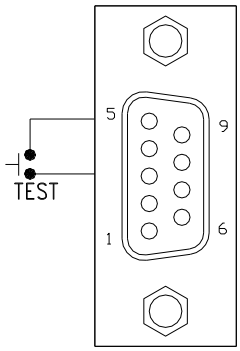
The TEST input is connected through the 9-pin "D" type connector mounted on the back panel of the unit. This connector mates with a standard 9-pin "D" type subminiature connector provided by the user. For best performance, a shielded cable should be used. To avoid ground loops, the shield should not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

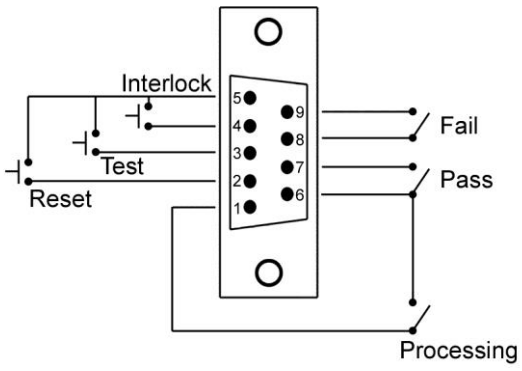
REMOTE INTERFACE FOR MODEL 1340

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 buttons 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.

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

1340 Options

Option List

Code	Description
01	Ground Continuity

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 NIST. You will find in this manual a copy of the "Certificate of Calibration". It is recommended that you have this instrument recalibrated and a safety check done at least once per year. Slaughter 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 verification can only be made while operation in Test mode.

Calibration Equipment Required:
The following standard equipment will be needed to properly calibrate your instrument.

A Standard AC Voltmeter with 2,500 Volts range (model 1340 only)
A Standard AC Voltmeter with 5,000 Volts range (models 1305 only)
A Standard AC Milliammeter with 10 mA range (models 1305,1340)

1. Calibration Initialization

To enter the calibration mode the instrument must be in the OFF position. Using a pen or small screwdriver, press and hold the recessed calibration key on the rear panel, then turn on the input POWER switch. The display will show: **CAL.**

2. To calibrate AC Voltage (models 1305, 1340)

Please connect a standard 5000V AC Voltmeter (2500V AC Voltmeter for the model 1340) to the HV and RETURN connectors. Then press the SET key on the front panel. The instrument will provide around 5000VAC (2500VAC for the model 1340) on the output connectors. The display will show a voltage around 5000 V (around 2500 V for the model 1340).

Press the Up (∧) or Down (∨) arrow keys to enter the reading of the standard AC Voltmeter into the instrument. Then press SET key to store the voltage setting or press the RESET button or EXIT key to return to the calibration menu without changing the calibration setting. Press the EXIT key again to exit from the calibration mode and to return to the test mode.

3. To calibrate AC Current (models 1305,1340)

Please connect a load resistor (100 kΩ for 1340, 200 kΩ for 1305) in series with the standard 10mA AC Milliammeter and connect these across the HV and RETURN connectors of the instrument.

Press the Down (∨) arrow key to initiate the calibration process. The instrument will provide around 1000V on the output connectors. The display will show some current.

Press the Up (∧) or Down (∨) arrow keys to enter the reading of the standard AC Milliammeter into the instrument. Then press SET key to store the current setting or press the RESET button or EXIT key to return to the calibration menu without changing the calibration setting. Press the EXIT key again to exit from the calibration mode and to return to the test mode.

PARTS LIST

Rev: C, 12/18/2013 ECO 5671

Part Number	Qty	Reference Designator	Description
Models 1305, 1340			
102-050-913	1		High Voltage Probe (6ft.)
102-069-904	1		Return Lead (6ft.)
125-013-001	1		Input Power Cable (6ft.)
175-974-003	4		Leg
99-10312-01	1		Power Switch
330-113-001	1		Test Switch
330-113-002	1		Reset Switch
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
99-10681-01	1		Microcontroller, 8-bit (89516AC25J)
Model 1305 only			
575-701-001	1	AMP-2510	Power Amplifier Board
575-703-001	1	CSW-06	Input Protection Board
99-10097-01	1		Fuse, 2A, 250V, 5x20mm, Fast Blow
150-135-003	1		Fuse Holder (20mm)
Model 1340 only			
102-055-913	1	-	High Voltage Clip (6ft.)
99-10040-01	1	-	Interlock Connector
Model 1305 only			
99-10289-01	1	2510	Main Control Board
240-061-001	1	T1	Input Transformer
200-057-001	1	T2	High Voltage Transformer, 3.3kV, 5mA
Model 1340 only			
99-10396-01	1	2510	Main Control Board
99-10394-01	1	AMP-1340	Amplifier Board
99-10395-01	1	PWR-1340	Input Voltage Select Board
99-10413-01	1	CGC-04	Ground Continuity Check Board
99-10402-01	1	T1	Input Transformer
99-10403-01	1	T2	High Voltage Transformer, 2.5kV, 40mA
99-10398-01	1		Fuse, 3.15A, 250V, 5x20mm, Slow Blow
99-10297-01	1		Fuse Holder (20mm)