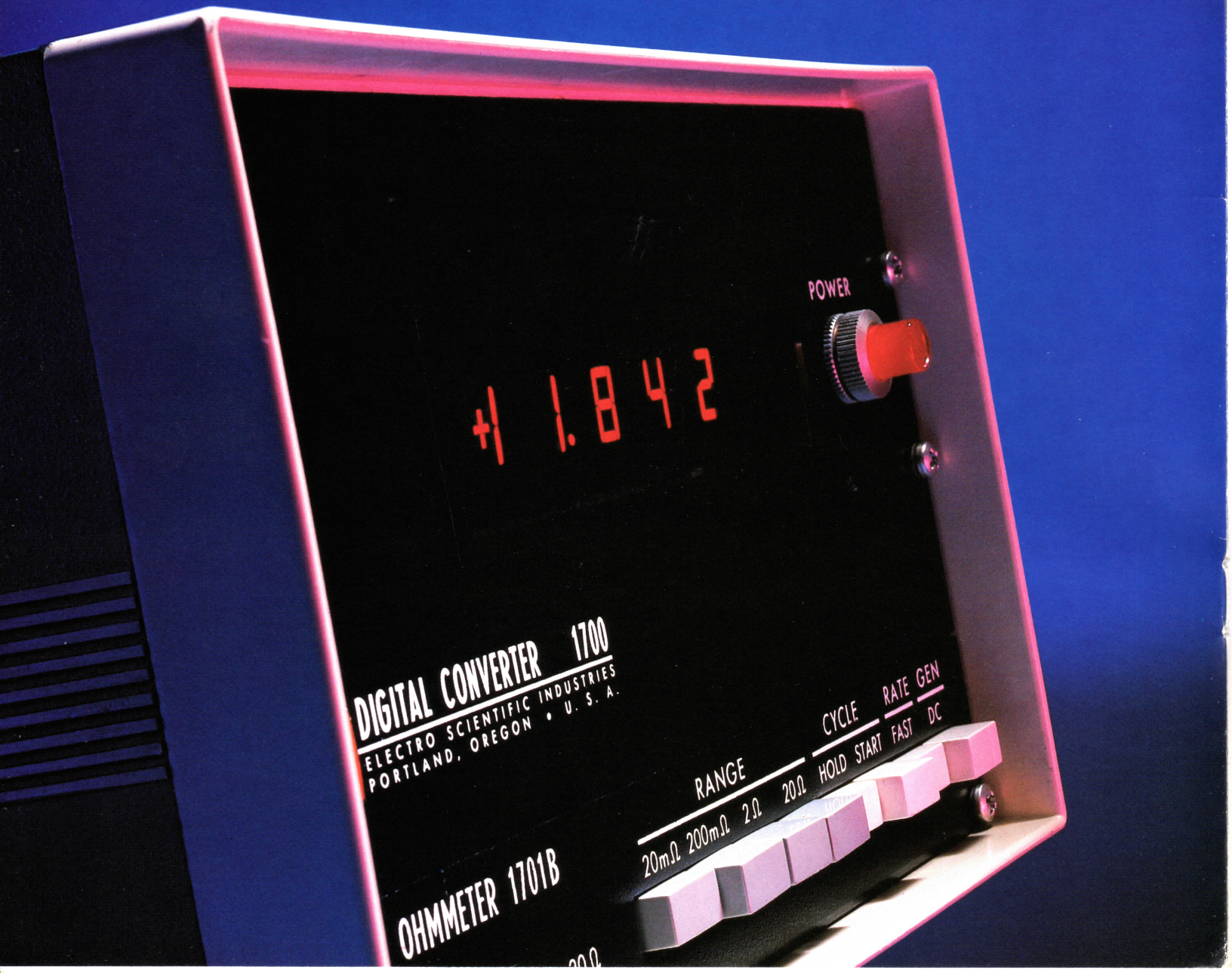
RESISTANCE MEASUREMENT INSTRUMENTS AND RESISTANCE STANDARDS

esi

Putting Precision To The Test.


PRECISION RESISTANCE MEASURING SYSTEM 2420
electro scientific industries


POWER
+1.842
DIGITAL CONVERTER 1700
ELECTRO SCIENTIFIC INDUSTRIES
PORTLAND, OREGON • U.S.A.
OHMMETER 1701B
RANGE
20mΩ 200mΩ 2Ω 20Ω
CYCLE
HOLD START
RATE GEN
FAST DC

INSTRUMENTS FOR RESISTANCE MEASUREMENT

Today, ESI offers three types of resistance instrumentation. Each one is designed to meet your specific requirements for precise resistance measurements. Every one is built with the same commitment to precision, speed and reliability that has become an ESI tradition.

For general purpose applications, ESI's direct reading, automatic, digital ohmmeters are unsurpassed.

If your business involves resistor production, ESI deviation bridges represent the leading edge of technology.

And for fast, accurate calibration in the laboratory, ESI high-precision measuring systems deliver.

Resistance Measurement Instruments

Model	Best Resolution	Ranges	Display	Basic Accuracy	Options and Features
1700/ 1701B	1μΩ	20mΩ-20Ω	4½ Digit LED	0.02%	All Models: ESI exclusive Switched DC measurement technique, continuous DC mode, BCD output, optional Limits Comparator, fixtures for leaded, unleaded components and PCB's.
1700/ 1705B	10μΩ	200mΩ-20MΩ	4½ Digit LED	0.02%	1705: Autoranging, single cycle mode.
1700/ SP3779B	0.1μΩ	2mΩ-2Ω	4½ Digit LED	0.02%	SP3779B: 1A test current.
SP2522B	100μΩ	2Ω-200MΩ	4½ Digit LED	0.02%	Options: IEEE-488, RS-232C, handler interface.
262	1mΩ	1mΩ-100MΩ	Analog Meter	0.01%	6 deviation ranges: 0.1%, 0.3%, 1%, 3%, 10%, 30%. Low cost, fast response.
263	1Ω	1Ω-111.11111MΩ	Analog Meter	0.02%	4 deviation ranges: 0.1%, 1%, 10%, 100%. Built-in GO/NO-GO, fast response, built-in resistance standard.
242D	10mΩ	20μΩ-120MΩ	Manual Balance	10ppm	1ppm comparison accuracy.

Model 1700 Digital Ohmmeter

- Exceptional low ohm resolution at low test currents
- 0.02% Basic accuracy
- ESI exclusive switched DC measurement technique
- Fast warmup, low drift
- Up to 13 measurements per second
- Model 1715 Limits Comparator, optional

For accurate low ohm measurement with low current test levels, you just can't beat the Model 1700 Digital Ohmmeter. It not only measures resistors, but most any component exhibiting resistance such as PCB stripes, thermistors, motor windings, fuses, explosive primers, welds, busbars and wire.

4-terminal technique maintains high accuracy. Three plug-in pre-amplifiers provide wide-range capability—from 0.1μΩ resolution to 20MΩ.

Low test current and single cycle mode reduce heating of components for increased accuracy. Buffered BCD output standard. Limits Comparator provides LEDs for results and relay closures for handler operation.

Model SP2522B Digital Resistance Meter

- 0.02% Basic accuracy
- 10 Programmable limits
- Component handler interface options
- IEEE-488 and RS-232C options

The SP2522B is built for high speed production applications as part of a resistor testing system. Interfaces are available for all popular parts handlers. 100$\mu\Omega$ resolution on the lowest scale and an upper range of 200MΩ give you extreme measurement flexibility.

Low ohm accuracy is enhanced by ESI's exclusive Switched DC feature. Sorting by either percent or absolute deviation into 11 bins is easily programmed. Other features include autoranging and remote programmability and data logging through IEEE-488 and RS-232C interfaces.

Models 262, 263 Resistance Deviation Bridges

- Fast response for accurate cutoff
- Built-in, 8-decade standard (Model 263)
- Filters virtually all AC noise
- Accuracy: 0.01% - 262; 0.02% - 263
- Guarded, 4-terminal connections

The Model 262 Resistance Comparator and Model 263 Resistance Deviation Bridge are designed for accurately determining the cutoff for wirewound resistors, trimming metal film resistors or testing and sorting any type of discrete resistors.

Exceptionally fast response—a few milliseconds—permits operation of a winding jig at maximum speed without loss of accuracy. Virtually all AC noise is filtered out, even in a congested production environment.

Model 242D Precision Resistance Measuring System

- 10 ppm direct reading accuracy, 5 ppm optional
- 1 ppm comparison accuracy with 0.1 ppm resolution
- Absolute or percent deviation read-out
- Matched generator-detector
- Complete guarding and shielding

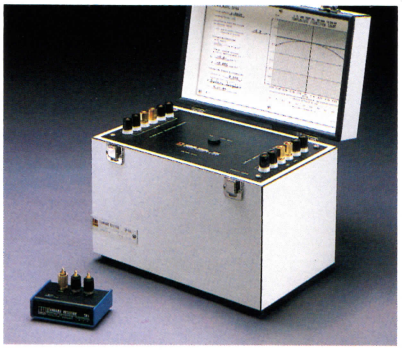
The 242D system provides the ultimate in resistance measurement from 10mΩ to 120MΩ. It has been carefully designed for use in standards laboratories and quality control, where precision is a vital concern. Direct reading accuracy of 10 ppm is maintained over a wide range without the need for correction tables or computations of any kind. Optional direct reading accuracy of 5 ppm is available.

Complete guarding and shielding reduce noise in both high and low resistance measurements. In fact, yoke balance and lead compensation in the bridge circuit allow low-resistance measurements previously unattainable in systems of this type.

STANDARDS AND COMPONENTS

It all started here. For 30 years, ESI has been setting precedents in state-of-the-art technology resulting in accurate and stable resistance standards. Standards developed to meet the requirements unique to calibration and reference work in both quality control and laboratory applications.

ESI standards and components can be divided into two areas: Those suitable for applications requiring the flexibility that comes with General Purpose Standards and areas requiring Precision Standards.



Models SR1, SR104

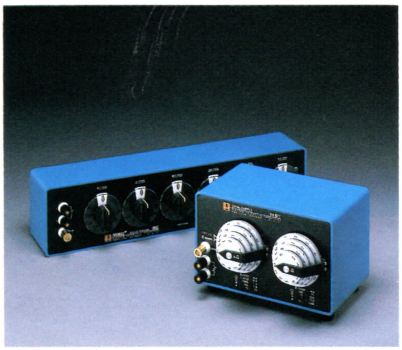
The Model SR1 is a single-value "working" standard, with 50 ppm long-term accuracy for most values. Eight decade values are available from 1.0 Ω to 10MΩ.

The Model SR104 is a 5-terminal resistor (10kΩ) plus an internal temperature sensor, both hermetically sealed inside a thermally lagged, oil-filled container. Includes temperature coefficient data and calibration traceable to the NBS. Long term stability is 0.5 ppm per year. Accuracy is 3 ppm initial with 1 ppm calibration accuracy.

Models SR1010 and SR1050

Model SR1010 resistance transfer standard is for transferring precision resistance measurements from a standard of one value to a resistance at a different value. Accuracy within 50 ppm of nominal. Stability suitable for 1 ppm comparisons. Standard values: 1Ω, 10Ω, 100Ω, 1kΩ, 10kΩ, 100kΩ.

Model SR1050 is designed for precise transfer measurements up to 110MΩ relative to a single 10kΩ resistance standard. 1MΩ and 10MΩ resistance standards are available. Short term stability is suitable for comparisons repeatable within 2 ppm.



Models DB62 and DB877

The DB62 Dekabox® has six, dual in-line decades with resolution from 10mΩ per step. Nominal accuracy of the decades is 0.02%. Four values are available: 11.1111kΩ (0.01Ω/step), 111.111kΩ (0.1Ω/step), 1.11111MΩ (1Ω/step) and 11.1111MΩ (10Ω/step).

The DB877 Dekabox® decade resistor provides long-term dependable service in precision DC and audio frequency applications. Eight decades of precision fixed resistors provide a total resistance of 12MΩ with 0.1Ω as the smallest step. Initial accuracy of resistance increments is 0.02%.

Models DS1463 and DS1464

The DS1463 and DS1464 Dekastat® contain three and four decades of precision resistors respectively. Total resistances of 1.2kΩ, 12kΩ, and 120kΩ are available. Initial incremental accuracy is 0.02%. Panel mounting only. Ruggedized and sealed units for military applications are available on request.

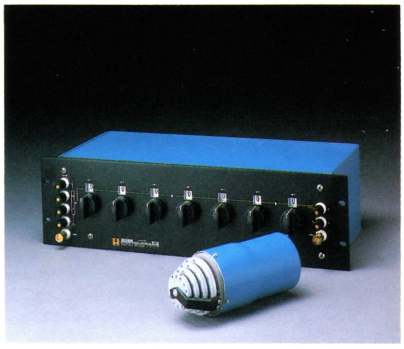
Model RS925D

The RS925D is a switchable, rack-mounted resistance standard providing 10 significant figures of resolution. Total value, 1.2MΩ, achieved in 8 decades plus a 105 division rheostat (0.0001Ω per division). Initial adjustment of decades is ±20 ppm. Stability is ±(20 ppm + 1mΩ) from initial value for 1 year.

Models RV722, DP1211 and DP1311

The RV722 Dekavider® is a precision resistance divider employing the Kelvin Varley voltage divider circuit. Long-term linearity is 1 ppm with 0.1 ppm resolution.

The DP1211 and DP1311 are 2 and 3 decade respectively, Dekapot® coaxial-dial Kelvin Varley voltage dividers. 1kΩ and 10kΩ units with ±0.01% input resistance accuracy are available. Linearity is ±15 ppm. Panel mounting only.



Models DT72A and DT1145

The Model DT72A Dekatran decade transformer is an AC voltage divider with linearity of 0.5 ppm at larger dial settings and 0.01 ppm at smaller settings. Resolution is 0.1 ppm. All units are provided with a calibration certificate traceable to the National Bureau of Standards. Fully shielded.

The Model DT1145 Dekatran is a panel-mounted, coaxial dial, rapid setting voltage divider. 3 decades plus a 100 division interpolating potentiometer. Linearity is ±10 ppm; resolution is 0.001% per dial division.

PUTTING PRECISION TO THE TEST WORLDWIDE

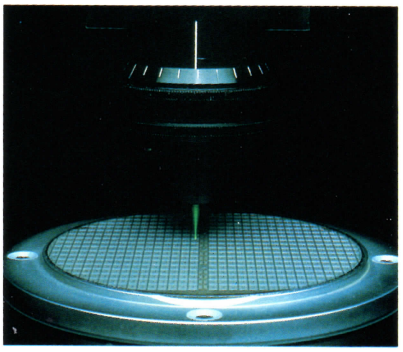
Since 1953, ESI has been working with impedance. The bridges, instruments, systems and standards described in this catalog are the direct result of our more than 30 years of experience in precision impedance measurement. Early in our history, ESI earned a reputation for precision, repeatability and reliability. Today our products continue to improve upon it.

We have incorporated the best of new technology into our instrument designs, resulting in a constant increase in cost-effectiveness and ease of use. We are designing instrumentation to allow precision measurements even in unfriendly environments. We are simplifying the use of complex instrumentation and providing improved data collection with the introduction of microprocessor controlled instrumentation. We are taking measurement speed and accuracy to their limits. Our standards and components are traceable to the U.S. National Bureau of Standards.

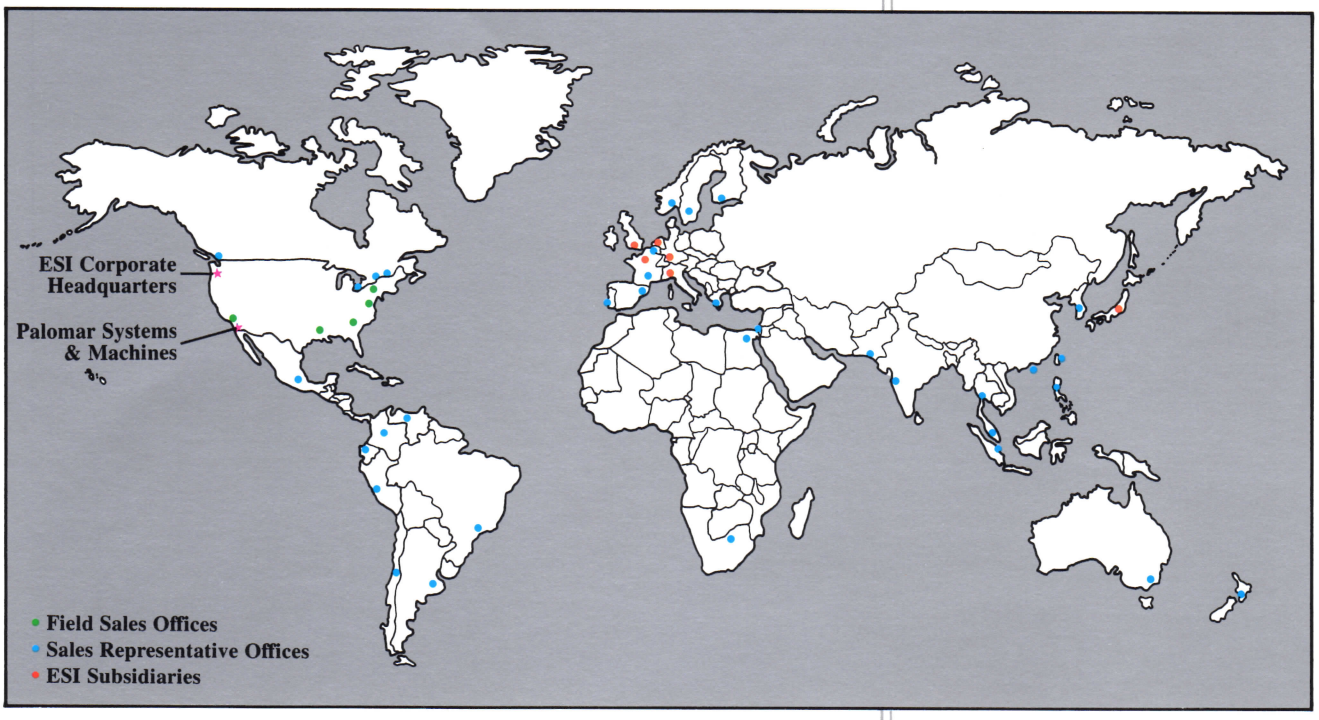
In addition to impedance instruments, our technical expertise has lead ESI to the development of laser trimming systems and chip fabrication and handling equipment, making us a leading supplier of high-speed production equipment to hybrid and semiconductor processes as well as passive component manufacturers.

In the field and at the factory, customer satisfaction is highest on our priority list. You will find ESI sales, service and application support around the world. Complete training programs on many of our instruments are also available.

When you purchase an ESI product, you are backed by a worldwide network of service support and a 30-year tradition of precision, quality and reliability. ESI—putting precision to the test.



ESI frequency doubled, "green" laser is shown hitting a target on a semiconductor wafer.



TERMS AND CONDITIONS*

Terms

Terms are net 30 days. Minimum billing is $50.00. This also applies to spare parts, but excludes instruction manuals. ESI reserves the right to change the price, design, specifications, or appearance of its products at any time without notice or incurring the obligation either to modify units previously manufactured or to furnish products with previously published specifications.

Delivery

Most standard items and their spare parts are off-the-shelf to 60-day delivery. When custom assemblies or special products requiring engineering are ordered, we will include in our quotation a statement on delivery. Improved delivery can be had by ordering standard catalog items. When ordering spare parts, please identify instrument model and serial number.

Shipment

Please specify method of shipment. If air freight is requested, specify airlines, otherwise air freight forwarders are used. If no instructions are given, ESI will determine bestway surface route. Unless otherwise requested, shipments will be insured for minimum value with carrier.

Damage or Breakage

If a shipment is received damaged or broken, file a report at once with the agent of the transportation company and make a claim to them. Then notify us here at the factory, and we will give you instructions for returning the equipment.

Order Cancellation Charge

Any order for standard catalog items listed in this price list (excluding model numbers starting with SP) which has been accepted by ESI may be cancelled by the customer subject to a cancellation and restocking charge equal to 15% of the purchase price.

Any discount quantity order or an order for product designated "Special Product—SP" or "Special Order Items," which is cancelled by the customer will be subject to special engineering charges incurred before receipt of the cancellation notice and a minimum cancellation charge as follows:

Written cancellation notice received by ESI prior to original shipment date	Percentage of product price, excluding quantity discount
over 151 days	10%
121—150 days	15%
91—120 days	20%
61—90 days	25%
31—60 days	30%
0—30 days	50%

ESI may accept delivery delay requests to the original shipping schedule; however, this change request must be received in writing by ESI at least sixty (60) days before the scheduled shipment date. Delay requests shall be subject to payment of ESI's then current delay charges. If an order is subsequently cancelled, the buyer shall be subject to cancellation charges based upon the original shipment date.

Initial Calibration

All ESI equipment is calibrated prior to shipment using ESI reference standards, and when applicable, a certificate of traceability of calibration accompanies each instrument. Calibration data is furnished (as noted in price list) with many ESI products classified as standards.

Warranties

Warranted Accuracy

Initial Accuracy

The specifications stated in this catalog are intended as acceptance specifications and are guaranteed for 60 days from the date of shipment. They are typically maintained for a much longer period of time.

Long-Term Accuracy:

These specifications are guaranteed for the standard warranty period, and are typically maintained for the life of the instrument. Long-term accuracy is implied when not otherwise stated.

Calibration Accuracy:

Calibration accuracy is the accuracy of ESI calibration data relative to the legal units maintained by the U.S. National Bureau of Standards.

Standard Test Conditions:

All accuracy specifications are quoted for calibration laboratory conditions, at 23° C and at low power unless otherwise specified. Maximum power ratings apply to typical measurement applications in which power is applied for short periods of time with cooling periods between.

Warranty of Quality

Electro Scientific Industries, Inc., warrants its products to be free from defects in material and workmanship. Rigorous quality control permits the following standard new equipment warranties:

1. Two years on components and instruments exclusively utilizing passive circuitry.
2. One year on components and instruments utilizing active circuitry. One year on test fixtures. During the in-warranty periods, we will service or, at our option, replace, at the factory, any device that fails in normal use to meet its published specifications. Batteries, tubes and relays that have given normal service are excepted. Special systems will have warranty periods as listed in their quotation.

Certificates Available

Warranty of Quality and Warranty of Traceability:

Whenever applicable, both standard printed forms are enclosed in the back section of Instrument Manuals at no charge.

Signed Warranty of Traceability:

Same form as in above statement with signature, date of test, model and serial numbers. There will be no charge for requests accompanying the order—$10.00 will be charged for requests received after shipment of the instrument.

Certificate of Calibration:

Includes model and serial numbers, date of test, signature and set of readings. (The fee for this service will be listed in the current Price Schedule for Calibration and Readings.) If you ask for this service after the unit has been shipped, you must return the unit to the factory for recalibration, transportation prepaid. Records on most instruments do not include all readings and may not satisfy your requirements. (Copies of rough checkout sheets are not available.)

Certificate of Conformance:

Certifies that the item or items being shipped conform to the published (or quoted) specifications. If this certificate is required, it must be specifically requested. There is no charge if request accompanies the original order—$10.00 will be charged for certificate requests received after shipment of the item or items.

Warranty of Traceability

The reference standards of measurement of Electro Scientific Industries, Inc., are compared with the U.S. National Standards through frequent tests by the U.S. National Bureau of Standards. The ESI working standards and testing apparatus used are calibrated against the reference standards in a rigorously maintained program of measurement control.

The manufacture and final calibration of all ESI instruments are controlled by the use of ESI referenced and working standards and testing apparatus in accordance with established procedures and with documented results.

(Reference MIL-C45662)

Disclaimer of Implied Warranties

THE FOREGOING WARRANTIES OF ESI ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. ESI SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. In no event will ESI be liable for special or consequential damages. Purchaser's sole and exclusive remedy in the event any item fails to comply with the foregoing express warranties of ESI shall be to return the item to ESI, shipping charges prepaid, and at the option of ESI obtain a replacement item or a refund of the purchase price.

Where ESI product will interconnect with components not supplied by ESI, ESI does not warrant the ESI product against failures caused by mismatch of the non-ESI component to the ESI product nor will ESI be liable for damages to the non-ESI component resulting from mismatch.

Unless specifically requested by the customer, ESI does not inspect or test an instrument for compliance with applicable safety standards of the Bureau of Radiological Health or with any other governmental or industry standard. Customers who desire an inspection or test for conformity to a standard should specify the standard with particularity. Not all instruments can be modified to conform with standards adopted after the instrument was manufactured, and such modifications are not repairs, nor is failure to comply with a standard adopted after the date of manufacture a defect.

*Valid for sales in USA only. ESI subsidiaries and representatives in other countries may have different terms and conditions. Please contact your local ESI representative for more details.

Putting Precision To The Test.

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