The RS-703A is a totally automated laboratory calibration system that provides automated testing of field and laboratory standards as well as qualification testing of new solid state meter designs. The RS-703A will calibrate these devices with a typical accuracy of ±0.005% (50 PPM).

The Radian RD-22 Dytronic Primary Transfer Standard works seamlessly with the RS-703A to complete an AC metrology laboratory system unequalled in accuracy and functionality. Due to Radian innovations in the areas of active transformer design and advanced signal processing, accuracy and precision are intrinsic characteristics of the RD-22. The typical accuracy of the RD-22 is within traceability uncertainties. The addition of both the RS-703A Automated Calibration System and the RD-22 Primary Transfer Standard to the metrology laboratory creates an unprecedented check and balance system between sourcing and sensing standards.

The RS-703A can automatically test up to 16 standards simultaneously. This testing capability effectively reduces test times to hours from what previously required days. And, the RS-703A is unexcelled in the ability to do evaluation testing of meters, particularly the multiple function solid state meters now becoming widely used. Problems with meters such as crosstalk between elements, temperature influences, drift, harmonic distortion sensitivity and three phase versus single phase calibration are readily detected.

All common calibration functions are available including: Watthour, Kilowatt, Volt-ampere Hour RMS, Volts RMS, Kilo-volt-ampere RMS, Millivolt Hour RMS, Amps RMS, Milliamp Hour RMS, VARhour, Qhour, Volt-ampere Hour Average, Volts Average, Kilovolt-ampere Average, Millivolt Hour Average, Amps Average, Milliamp Hour Average, kiloVAR. With these parameters, the RS-703A can easily test multifunction standards and multifunction solid state meters.

The RS-703A has the ability to create operator defined arbitrary waveforms. Within the software, the operator specifies the harmonic (1 through 23), the axis (voltage and/or current), the magnitude (% distortion up to 30% of fundamental), and the phase (angle difference between each harmonic and the fundamental). The arbitrary waveform capability allows electric utilities to effectively evaluate the performance of solid state meter designs under various harmonic conditions.

The RS-703A software consists of a Microsoft® Windows™ based Control Program with multitasking capability for increased flexibility and efficiency. The Control Program contains enhanced graphically oriented operations to increase user-friendliness and simplify test program creations. The Control Program provides direction to the RS-703A hardware for automated testing, as specified by the operator and is located on the hard disk of the System Computer.

The System Computer controls the RS-703A and collects the data. All communications between the computer and the various modules is conducted exclusively with glass fiber optics. Powerful commercial software packages will run on the computer and transferring data to them is straightforward. Permanent hard disk storage is used to maintain test records and other data within the RS-703A.
The RS-703A Syntron Automated Calibration System

The RS-703A provides metrology laboratories with accuracy, precision, stability and efficiency previously unattainable. The RS-703A features an array of functionality and a level of measurement second to none. These core system attributes uniquely combine to make the RS-703A Syntron Automated Calibration System the foundation of today’s modern metrology laboratory.

Optimum Testing Efficiency

The increased productivity resulting from optimum testing efficiency make the RS-703A the definitive approach to watthour reference standard testing. Automated results calculation, automated saving of data, unattended testing capabilities, and the ability to test up to 16 standards at one time can reduce test times from days to hours. Efficiency is further enhanced by the Test Group feature of the RS-703A. This feature allows multiple test sheets to be run sequentially on the same device(s). Test Groups can also run unattended allowing for greater testing productivity even during non-working hours.

Simple Operation

While sophisticated in its internal functioning, the RS-703A system is very simple to operate. The system was designed so that a new user could be up and running after a brief training session. The intuitive Windows based RS-703A Control Program was developed with ease of use as a primary objective. A software driven help system provides guidance to the operator and the illustrated operations manual further details the system’s application.

Testing Standardization

At the pinnacle of the RS-703A’s operating characteristics are the system’s accuracy, precision and stability of measurement. Utilizing Radian’s patented Syntron technology, the RS-703A serves as a sourcing standard by synthesizing voltage and current waveforms of extreme precision and accuracy. These waveforms are then amplified and applied to devices under test. This state of the art approach to watthour reference standardization allows for unsurpassed accuracy and linearity across the system’s entire operating range making it ideally suited as a working primary reference system. Traceability of the RS-703A’s measurement accuracy is maintained directly through Radian’s NIST traceable calibration laboratory. Several recertification options are available for the RS-703A.

Expansive Testing Capabilities

The RS-703A will test a myriad of AC products generally found at electric utility companies. The system not only has the ability to run accuracy certifications on watthour standards and evaluation testing of solid state meter designs, but it will also test various other devices such as AC voltimeters, ammeters and phase angle meters with extreme accuracy and precision. The RS-703A’s expansive set of measurement functions streamlines the workings of electric utility laboratories. The ability for personnel to test many instruments on one central system allows for optimization of test data storage, personnel resources and training times.

The RS-703A with RD-22 Provide a Complete Automated Reference System

For a complete automated AC reference test system, it is recommended that three RD-22 Dytronic Primary Transfer Standards be used in conjunction with the RS-703A Automated Calibration System.

The RS-703A coupled with the RD-22 provides arguably the most accurate, stable, repeatable and flexible automated AC reference system in the world. The RS-703A’s system computer will be serially connected to the RD-22 and will receive processed measurement information from the RD-22. The portable standards being tested will have their pulse outputs connected to the Data Collection Module of the RD-703A.

At the conclusion of the test, the RS-703A Control Program will display test results (in percent error or percent registration) comparing the RD-22 to the unit being tested, as well as results comparing the RS-703A to the RD-22.

In this manner, the RS-703A and RD-22 working together effectively serve as a check and balance to the proper functioning of the test sequence. The typical accuracy of the RS-703A is +/- 0.005%, and the typical accuracy of the RD-22 is within traceability uncertainties. If there are three RD-22s being used, then the RS-703A Control Program has the ability to average the three references as though they were one unit thus increasing the measurement integrity. In addition, primary references of DC Voltage, Resistance and Time can be tested against the RD-22. This is a useful feature for those laboratories that desire to perform a DC to AC transfer.
- System accuracy (includes stability) 
  +/- 0.005% typical 
  +/- 0.005% to 0.05% typical with 
  arbitrary waveforms up to 30% THD

- Single phase and three phase configurations

- Expansive set of measurement functions

- Test voltage: 63 to 630 V at 60Hz, 63 to 525 V at 50Hz

- Test current: 0.2 to 50 A, optional 0.2 to 67 A

- Test phase angle: 0 to 360°

Test up to 16 standards at a time

Unattended testing allows overnight production

Reduce test times from days to hours

Eliminate manual calculations and record keeping

Easily store, find, view and print test results

Two year warranty, extended available

Accuracy recertification services available
RS-703A BASE SYSTEM CONTENTS
Pedestal-Base Work Desk including:
RS-710 System Power Supply, Fan blower module, Intel Pentium System Computer with 17” Super VGA Color Monitor, Keyboard, Mouse, MS Windows Operating System, Radian Control Program with Arbitrary Waveform Editor (1-23rd harmonic; 30% THD).

Rack-Mount Tower including:
RS-711/1 Single-Phase Syntron Signal Source, RS-733/1 Single-Phase Voltage/Current Connection Panel, RS-740 Data Collection Module
All appropriate potential, current and data collection cables.

RS-703A SYSTEM CONFIGURATIONS

<table>
<thead>
<tr>
<th>Model Number</th>
<th>System Configuration Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>RS-703A/1P/4C/50A</td>
<td>Singlephase, 4 channel data collection, 50amp</td>
<td>RS-703A/3P/4C/50A</td>
<td>Threephase, 4 channel data collection, 50amp</td>
</tr>
<tr>
<td>RS-703A/1P/8C/50A</td>
<td>Singlephase, 8 channel data collection, 50amp</td>
<td>RS-703A/3P/8C/50A</td>
<td>Threephase, 8 channel data collection, 50amp</td>
</tr>
<tr>
<td>RS-703A/1P/16C/50A</td>
<td>Singlephase, 16 channel data collection, 50amp</td>
<td>RS-703A/3P/16C/50A</td>
<td>Threephase, 16 channel data collection, 50amp</td>
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<tr>
<td>RS-703A/1P/4C/67A</td>
<td>Singlephase, 4 channel data collection, 67amp</td>
<td>RS-703A/3P/4C/67A</td>
<td>Threephase, 4 channel data collection, 67amp</td>
</tr>
<tr>
<td>RS-703A/1P/8C/67A</td>
<td>Singlephase, 8 channel data collection, 67amp</td>
<td>RS-703A/3P/8C/67A</td>
<td>Threephase, 8 channel data collection, 67amp</td>
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<tr>
<td>RS-703A/1P/16C/67A</td>
<td>Singlephase, 16 channel data collection, 67amp</td>
<td>RS-703A/3P/16C/67A</td>
<td>Threephase, 16 channel data collection, 67amp</td>
</tr>
</tbody>
</table>

OPTIONAL SYSTEM ACCESSORIES

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RD-22</td>
<td>Primary Transfer Standard</td>
</tr>
<tr>
<td>RS-735</td>
<td>Current Tap Changer for non-autoranging standards</td>
</tr>
<tr>
<td>RS-770</td>
<td>Meter Adapter for testing ANSI socket based meters</td>
</tr>
<tr>
<td>RM-Ds/s</td>
<td>Meter Disk Sensor + Shop Mount to test meters</td>
</tr>
<tr>
<td>RM-Ds/sm</td>
<td>Meter Disk Sensor + Suction Mount to test meters</td>
</tr>
<tr>
<td>RM-Ds/f</td>
<td>Meter Disk Sensor + Field Mount to test meters</td>
</tr>
<tr>
<td>RM-1H</td>
<td>Infrared Optical Pickup to test electronic meters</td>
</tr>
<tr>
<td>RM-0A</td>
<td>Optical Adapter for use with RM-1H to attach to meter com port</td>
</tr>
<tr>
<td>RM-KYZ</td>
<td>Pulse Input Adapter (form C contact) to test meters</td>
</tr>
<tr>
<td>RM-1B</td>
<td>Signal Converter (converts open collector to driven and driven to open collector – used to make TTL outputs compatible with RS-740)</td>
</tr>
<tr>
<td>Laser Printer</td>
<td>Laser Printer for print outs</td>
</tr>
<tr>
<td>Table Stand</td>
<td>Table Stand to place RD-22 Transfer Standards</td>
</tr>
<tr>
<td>Test Cart</td>
<td>Mobile Test Equipment Cart to place devices under test</td>
</tr>
</tbody>
</table>

SYSTEM SPECIFICATIONS

MAXIMUM ACCURACY: 
+0.005% + traceability to NIST with fundamental waveforms
+0.005% to 0.05% typical with arbitrary waveforms up to 30% THD
This accuracy specification is listed as Percent of Reading and applies across the entire voltage and current operating range. It also includes the variables of stability, power factor and test system errors.

POWER REQUIREMENTS: 240 VAC, 30 A
SUPPLY FREQUENCY: 48-62 Hz
TEST VOLTAGE: 63-630 V at 60Hz, 63-525 V at 50 Hz ([10.5] x (F) not to exceed 630V) (0.001 volt increments) (V < 63 V is at linearly derated accuracy)
Vout is 150 VA per phase at 120V or higher.
TEST CURRENT: 0.2-50 A (67 A optional) (I < .2 A is at linearly derated accuracy) 0.00001 amp increments, I out is 50 VA per phase at 50 A.
TEST FREQUENCY: 47-68 Hz (Fundamental)
TEST PHASE ANGLE: 0-360 degrees (0.00001 degree increments)
STABILITY: Included within system accuracy specification
RECALIBRATION INTERVAL: 365 days

TESTING CAPABILITY

REFERENCE STANDARDS: Up to four (4) Induction Standards
Up to four (4) non-Radian Electronic Standards
Up to sixteen (16) Radian Standards

WATTHOUR METERS: Up to four (4) Induction Meters (typical)
Up to four (4) Electronic Meters (typical)

NORMAL OPERATING CONDITIONS

AMBIENT TEMPERATURE: 15° to 35° C (Optimum = 22° to 25° C)
RELATIVE HUMIDITY: 0 to 95%
WARMUP TIME: 30 minutes

PHYSICAL DESCRIPTION

SIZE: Tower-160 cm (63") H x 59.7cm (23.5") W x 64.8 cm (25.5") D
Desk-81.3 cm (32") H x 182.9 cm (72") W x 81.3 cm (32") D
BASE SYSTEM WEIGHT: 281.3 kg (625 lbs)
SHIPPING DIMENSIONS: Same as overall Tower & Desk dimensions (ground shipment)

RADIANT
Radian Research, Inc.
3852 Fortune Drive
Lafayette, IN 47905

WARRANTY

Radian Research warrants the RS-703A Syntron Automated Calibration System to be free from defects in material and workmanship. Radian’s obligation under this warranty is to repair or replace any instrument or component therein which, within two years after shipment, proves to be defective upon examination. The RS-703A is warranted to be substantially stable in calibration over time. If within one year after factory calibration the RS-703A does not meet its specifications, Radian will repair and recalibrate the unit at no charge. This warranty is made void by disassembly of any of the individual modules from the system. Radian will pay local domestic surface freight costs for return of product from Radian to Customer. If service is required, contact your local Radian Research representative or the Radian headquarters in Lafayette, Indiana.

Radian Research reserves the right to change any information provided within this document without notice.