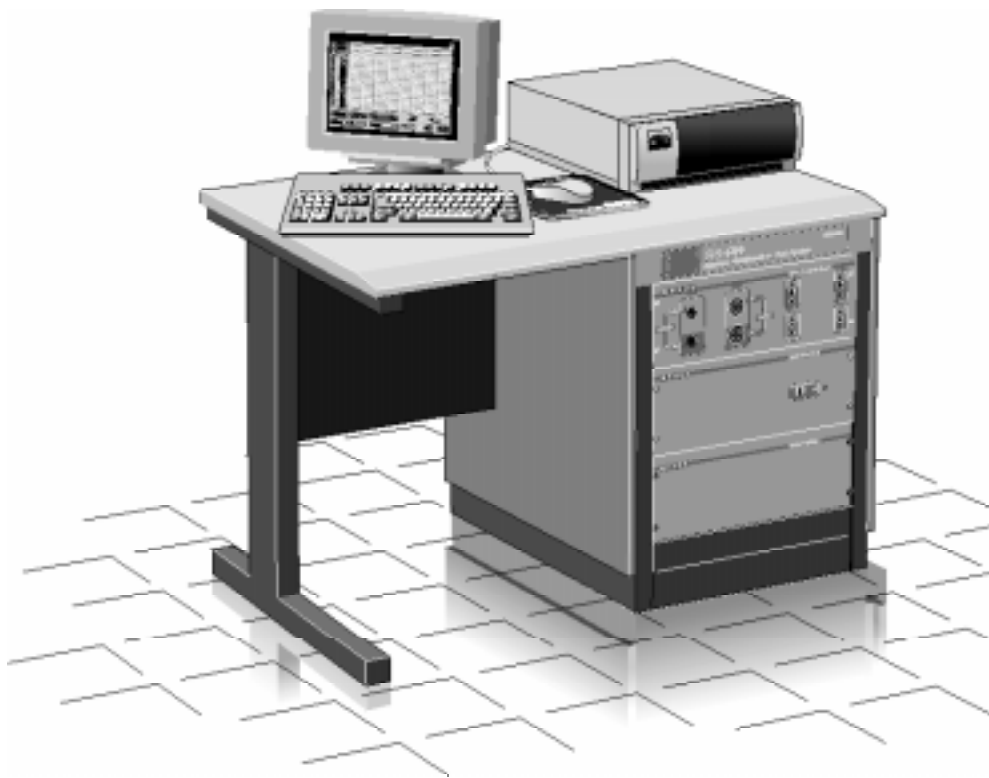


# RS-600 Syntron™ Automated Multifunction Test System

**Product Bulletin 6000**



*Superior accuracy*

*Test up to 4 standards  
at a time*

*Eliminate manual calculation  
and record keeping*

*Reduce test times from  
days to hours*

*Flexible upgrade options*

*Harmonic response evaluation*

*Efficient, cost effective testing*

*Simple to operate*

## OVERVIEW

The Radian RS-600 Syntron™ Multifunction Test System provides automated testing of portable and primary watt-hour standards. Typical accuracy is 0.008% across its entire operating range with a conservative maximum accuracy specification of 0.02% including stability. The RS-600 combines exceptional accuracy, efficiency, simple operation and flexible upgrade options to provide a cost effective solution to a multifunction primary reference test system.

The RS-600 effectively eliminates manual calculations and record keeping of test results. The RS-600's automated capability reduces test times to hours from what previously required days. To further enhance efficiency tests may be set up to run unattended during non-business hours. The RS-600 can test up to 4 standards at one time while supporting the most common calibration functions consisting of watt-hours, VAR-hours and Q-hours. Additional measurement functions are optionally available.

The RS-600 Control Program is Windows™ based to simplify learning. Multiple device configurations and test spreadsheets may be created and saved for future use as needed. To perform a test the operator simply selects from a menu the devices to be tested and the appropriate test sheet. All test results are automatically calculated and saved to the system hard drive according to each device's serial number. As a backup, results may also be saved automatically to the 3.5" drive of the system computer.

A flexible array of upgrade options and accessories are available to further enhance and expand the testing capabilities of the RS-600. The RS-ACF Advanced Calibration Function software/firmware module enables testing of voltmeters, ammeters, wattmeters and phase angle meters along with providing additional calibration functions. The RS-AWG Arbitrary Waveform Generation software/firmware module allows for the creation of arbitrary waveforms with 2nd to 11th harmonic components. These waveforms can then be independently applied as voltage and/or current signals to test for the effects of harmonics on the measurement accuracy of the device under test. The RS-735 Current Tap Changer automates testing of older generation non-autoranging watt-hour standards that have individual current taps. The RS-770 Meter Test Adapter allows for general testing and evaluation of watt-hour meters when the system is not being used to test other devices.

The RS-600 is the most cost-effective automated reference system available to replace outdated manual primary watt-hour reference standards and related loading systems. These manual reference systems are labor intensive, expend valuable personnel resources, have limited functionality and they don't provide the flexibility needed in today's standards laboratory. Optional upgrades and specifications for the RS-600 are detailed on the following pages.

# **The RS-600 Syntron™ Automated Multifunction Test System**

*The RS-600 provides a simple, cost effective approach to the automated testing of watt-hour reference standards while offering flexible system expansion to enable additional testing capabilities. The RS-600 features an array of functionality and a level of measurement accuracy, precision and stability second only to that of the Radian RS-703A system. These core system attributes uniquely combine to make the RS-600 Syntron™ Automated Multifunction Test System an invaluable cost effective tool for the standards laboratory of today's electric utility company.*

## **Optimum Testing Efficiency**

The increased productivity resulting from optimum testing efficiency make the RS-600 the definitive, cost effective approach to watt-hour reference standard testing. Automated results calculation, automated saving of data, unattended testing capabilities, and the ability to test multiple standards at one time can reduce test times from days to hours. Efficiency is further enhanced by the Test Group feature of the RS-600. 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-600 system is very simple to operate. The system was designed so that a new user could be up and running within several minutes without any training required. The intuitive Windows™ based RS-600 Control Program was developed with ease of use as a primary objective. A step-by-step start up screen guides the first time user through a typical testing scenario. A detailed on-line help system offers instant answers to most questions an operator would encounter. The completely illustrated operations manual further details every aspect of the system's application.

## **Primary Standardization**

At the pinnacle of the RS-600's operating characteristics are the system's accuracy, precision and stability of measurement. Utilizing Radian's patented Syntron™ technology, the RS-600 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 watt-hour reference standardization allows for unsurpassed accuracy and linearity across the system's entire operating range making it ideally suited as a primary reference system. Traceability of the RS-600's measurement accuracy is maintained directly through Radian's NIST traceable calibration laboratory. Several recertification options are available for the RS-600.

## **Flexible System Expansion**

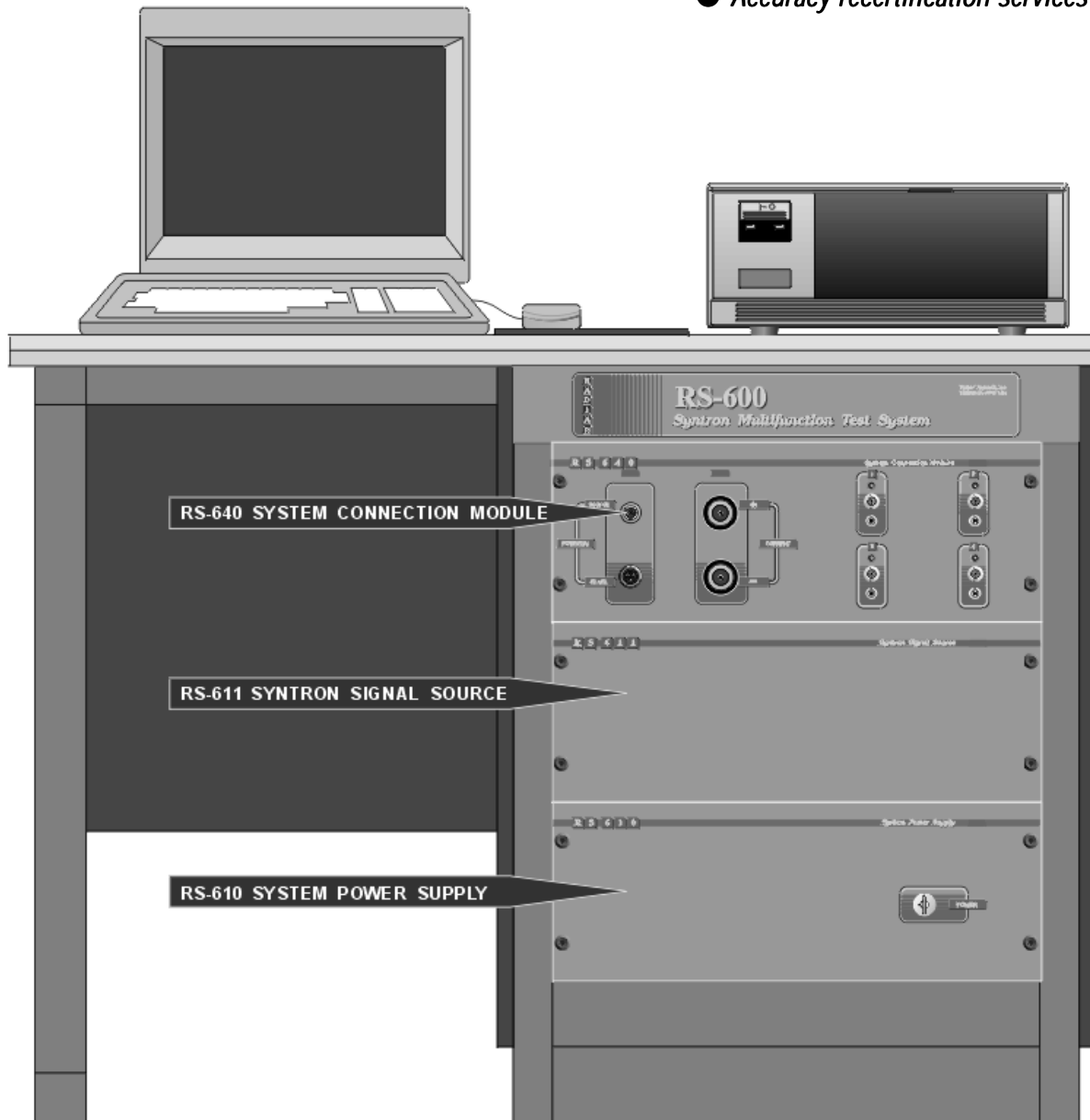
### **RS-ACF Advanced Calibration Function Software Module**

This software/firmware option adds kW, VAh, kVA, kVAR, mVH, mAH, V<sup>2</sup>H, A<sup>2</sup>H, volts, amps and phase angle functions. The RS-ACF option enables testing of voltmeters, ammeters, watt meters and phase angle meters. It also enables complete testing of Radian RM-15 Multifunction Standards and multifunction solid state meters. The RS-ACF option is a cost effective way of immediately making a significant impact on an electric utility's testing capabilities.

### **RS-AWG Arbitrary Waveform Generation Software Module**

This software option allows the creation of arbitrary waveforms consisting of 2nd to 11th harmonic components. These waveforms are easily created by filling out a table of harmonic component values while simultaneously viewing the resulting waveform being created. Once created these waveforms can be saved and later applied as the current and/or voltage test signals. Because the amplifier configurations are independent, different harmonic waveforms may be applied to the current and voltage axes. The RS-AWG software module is a powerful analysis tool for experimenting with the effects of harmonic distortion on the measurement accuracy of watt-hour billing meters. The RS-AWG enables the RS-600 to effectively perform qualification testing of new watt-hour meter designs.

- *System accuracy (includes stability)*
  - +/- 0.008% typical*
  - +/- 0.02% worst case, traceable to NIST*
- *Standard Functions: wathours, VARhours and Qhours*
- *Test voltage: 60 to 600V, 1 volt increments*
- *Test current: 0.2-50 A, 0.25 amp increments*
- *Test phase angle: 0° to 360°, 1° increments*
- *Test up to 4 standards at a time*
- *Unattended testing allows overnight productivity*
- *Reduce test times from days to hours*
- *Eliminate manual calculations and record keeping*
- *Easily store, find, view, and print test results*
- *Two year standard warranty, extended available*
- *Accuracy recertification services available*



# RS-600 Syntron™ Automated Multifunction Test System

## BASE SYSTEM CONTENTS

- Pedestal-Base Work Desk
- RS-610 System Power Supply
- RS-611 Syntron Signal Source (Single Phase Voltage and Current signal source)
- RS-686 System Computer (includes monitor, keyboard, mouse, Windows™, Radian RS-600 Control Software)
- RS-640 System Connection Module (voltage/current amplifier panel and data collection module)
- All appropriate potential and current cables

## SYSTEM SPECIFICATIONS

ACCURACY	Typical +/- 0.008%, Worst Case +/- 0.02%
STABILITY	Included within accuracy specification above
POWER REQUIREMENTS	120 VAC, 15 A, singlephase
SUPPLY FREQUENCY	48-62 Hz
RECALIBRATION INTERVAL	365 days
MEASUREMENT FUNCTIONS	Watthours, VARhours, Ohours
TEST VOLTAGE	60V to 600V (1 V increments)
TEST CURRENT	0.25 - 50A (0.25 amp increments)
TEST FREQUENCY	47 to 63 Hz
TEST PHASE ANGLE	0° to 360° (1° increments)

## SYSTEM CONFIGURATIONS

- RS-600 / 2C: Two channel base system
- RS-600 / 4C: Four channel base system

## OPTIONAL SYSTEMS UPGRADES

- RS-600 /UPG/ 2C: Two channel data collection upgrade
- RS-ACF Advanced Calibration Function Software
- RS-AWG Arbitrary Waveform Generation Software

## OPTIONAL SYSTEM ACCESSORIES

- RS-735 Tap Changer
- RS-771 Meter Adapter
- Meter Adapter/ Laser Printer Stand
- Flexible Monitor Armature
- RM-1H Optical Pulse Pickup
- RM-KYZ Pulse Input Adapter
- RS-770 Meter Test Socket
- Hewlett Packard LaserJet Printer
- Mobile Test Equipment Cart
- 17" Computer Monitor Upgrade
- RM-DS/f, RM-DS/sm, or RM-DS/s Meter Disk Sensor

## TESTING CAPABILITY

REFERENCE STANDARDS	Up to four (4) Radian Standards with RS-600 /UPG/ 2C option Up to four (4) SC-10 Standards with RS-600 /UPG/ 2C option Up to four (4) IB-10 Standards with RS-600 /UPG/ 2C option
WATTHOUR METERS	One (1) with the RS-770 or RS-771 option
INSTRUMENTS	One (1) Voltmeter with RS-ACF option One (1) Ammeter with RS-ACF option One (1) Watt Meter with RS-ACF option One (1) Phase Angle Meter with RS-ACF option

## NORMAL OPERATING CONDITIONS

AMBIENT TEMPERATURE	15° to 35°C (Optimum 22° to 25°C)
RELATIVE HUMIDITY	0 to 95%
WARM-UP TIME	30 minutes

## PHYSICAL DESCRIPTION

SIZE	Desk-81.3 cm (32") H x 115.6 cm (42.5") W x 81.3 cm (32") D
BASE SYSTEM WEIGHT	148 kg (325 lbs)
SHIPPING DIMENSIONS	Same as overall Desk dimensions (ground shipment)

## WARRANTY

Radian Research warrants the RS-600 Syntron™ Automated Reference Test 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-600 is warranted to be substantially stable in calibration over time. If within one year after factory calibration the RS-600 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. If service is required, contact your local Radian Research representative or the Radian headquarters in Lafayette, Indiana.

