



Steven L. Beshear
Governor

Leonard K. Peters
Secretary
Energy and Environment Cabinet

Commonwealth of Kentucky
Public Service Commission
211 Sower Blvd.
P.O. Box 615
Frankfort, Kentucky 40602-0615
Telephone: (502) 564-3940
Fax: (502) 564-3460
psc.ky.gov

David L. Armstrong
Chairman

James W. Gardner
Vice Chairman

Charles R. Borders
Commissioner

January 21, 2010

TO: DIVISION OF FILINGS

RE: Case No. 2009-00333
Teresa Lyn Cunningham v. Duke Energy Kentucky, Inc.

Please file in the administrative record of the above-referenced case the enclosed report dated December 14, 2009, on the results of electric meter testing performed at Specialized Technical Services, Inc. (a/k/a TEAMsTs), in Richmond, Kentucky on December 1, 2009, on the three electric meters installed by Duke Energy Kentucky, Inc. at Teresa Lyn Cunningham's residence since September 20, 2007.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeff Derouen".

Jeff Derouen
Executive Director

Enclosures

cc: Parties of Record



Commonwealth of Kentucky
Public Service Commission
211 Sower Blvd.
P.O. Box 615
Frankfort, Kentucky 40602-0615
Telephone: (502) 564-3940
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METER STANDARDS LABRATORY COMPLAINT METER TEST REPORT ELECTRIC

REPORT DATE: 12/14/2009

Utility: Duke Energy Kentucky
Customer: Teresa Cunningham

Complaint #: 2009-00333, See Attachment A

MANUFACTURE: Landis & Gry
SERIAL #: 12866788
VOLTAGE: 240 volts
Kh: 0.5
CLASS: 200 3 wire
TPYE: ALF
CREEP TEST: OK
REGISTER RATIO:

COMPANY #: 97081813
TEST AMPS: 2.5 single phase
AS FOUND: 00000
AS LEFT READING: 00000
Seal: No, out of service
FORM: 4S
REGISTER TYPE: Solid State
MULTIPLIER: 60

FIRST TEST: Specialized Technical Services (STS)
DATE: 12/1/2009

AS FOUND:

LIGHT LOAD: 99.97 FULL LOAD: 99.91 50% POWER FACTOR: 99.95
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.94%

AS LEFT:

LIGHT LOAD: 99.98 FULL LOAD: 99.96 50% POWER FACTOR: 99.96
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.97%

SECOND TEST: Specialized Technical Services
DATE: 12/1/2009

AS FOUND:

LIGHT LOAD: 99.97 FULL LOAD: 100.01 50% POWER FACTOR: 99.97
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.99%

AS LEFT:

LIGHT LOAD: 99.97 FULL LOAD: 100.01 50% POWER FACTOR: 99.97
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.99%

THIRD TEST: Specialized Technical Services

Date: 12/1/2009

AS FOUND:

LIGHT LOAD: 99.96 FULL LOAD: 99.89 50% POWER FACTOR: 99.72
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.92%

AS LEFT:

LIGHT LOAD: 99.96 FULL LOAD: 99.91 50% POWER FACTOR: 99.72
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.93%

OVERALL AVERAGE ACCURACY OF FULL LOAD AND LIGHT LOAD = 99.95%
(Considering all three test)

Attachment A: Includes the test results from Duke Energy Kentucky field test on meter # 97081778 on 11/23/2009, and test results on meter # 97081770, and # 97081813 after being removed from service, along with certification documents on the equipment and tester.

Attachment B: Includes photos of the Duke Energy Kentucky field testing of meter 97081778, and all meters tested at STS, along with results and certification documents on the equipment and tester for STS.

Complaint test were performed in accordance with the Public Service Commission's Regulations: 807 KAR 5:006, Section 18 (2), and 807 KAR 5:041, Section 17.

Results:

The accuracy of meter # 97081813, # 97081770, and # 97081778 met the allowable accuracy requirements of the Public Service Commission regulations of +/- 2%.



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METER STANDARDS LABRATORY COMPLAINT METER TEST REPORT ELECTRIC

REPORT DATE: 12/14/2009

Utility: Duke Energy Kentucky
Customer: Teresa Cunningham

Complaint #: 2009-00333, See Attachment A

MANUFACTURE: Landis & Gry
SERIAL #: 12866711
VOLTAGE: 240 volts
Kh: 0.5
CLASS: 200 3 wire
TPYE: ALF
CREEP TEST: OK
REGISTER RATIO:

COMPANY #: 97081770
TEST AMPS: 2.5 single phase
AS FOUND: 00000
AS LEFT READING: 00000
Seal: No, out of service
FORM: 4S
REGISTER TYPE: Solid State
MULTIPLIER: 60

FIRST TEST: Specialized Technical Services (STS)
DATE: 12/1/2009

AS FOUND:
LIGHT LOAD: 99.93 FULL LOAD: 99.98 50% POWER FACTOR: 99.92
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.95%

AS LEFT:
LIGHT LOAD: 99.94 FULL LOAD: 99.99 50% POWER FACTOR: 99.92
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.96%

SECOND TEST: Specialized Technical Services
DATE: 12/1/2009

AS FOUND:
LIGHT LOAD: 99.94 FULL LOAD: 99.91 50% POWER FACTOR: 99.85
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.92%

AS LEFT:

LIGHT LOAD: 99.93 FULL LOAD: 99.78 50% POWER FACTOR: 99.79
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.85%

THIRD TEST: Specialized Technical Services

Date: 12/1/2009

AS FOUND:

LIGHT LOAD: 99.94 FULL LOAD: 99.92 50% POWER FACTOR: 99.73
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.93%

AS LEFT:

LIGHT LOAD: 99.94 FULL LOAD: 99.93 50% POWER FACTOR: 99.87
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.93%

OVERALL AVERAGE ACCURACY OF FULL LOAD AND LIGHT LOAD = 99.91%
(Considering all three test)

Attachment A: Includes the test results from Duke Energy Kentucky field test on meter # 97081778 on 11/23/2009, and test results on meter # 97081770, and # 97081813 after being removed from service, along with certification documents on the equipment and tester.

Attachment B: Includes photos of the Duke Energy Kentucky field testing of meter 97081778, and all meters tested at STS, along with results and certification documents on the equipment and tester for STS.

Complaint test were performed in accordance with the Public Service Commission's Regulations: 807 KAR 5:006, Section 18 (2), and 807 KAR 5:041, Section 17.

Results:

The accuracy of meter # 97081813, # 97081770, and # 97081778 met the allowable accuracy requirements of the Public Service Commission regulations of +/- 2%.



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METER STANDARDS LABRATORY COMPLAINT METER TEST REPORT ELECTRIC

REPORT DATE: 12/14/2009

Utility: Duke Energy Kentucky
Customer: Teresa Cunningham

Complaint #: 2009-00333, See Attachment A

MANUFACTURE: Landis & Gry
SERIAL #: 12866736
VOLTAGE: 240 volts
Kh: 0.5
CLASS: 200 3 wire
TPYE: ALF
CREEP TEST: OK
REGISTER RATIO:

COMPANY #: 97081778
TEST AMPS: 2.5 single phase
AS FOUND: 00000
AS LEFT READING: 00000
Seal: No, out of service
FORM: 4S
REGISTER TYPE: Solid State
MULTIPLIER: 60

FIRST TEST: Specialized Technical Services (STS)
DATE: 12/1/2009

AS FOUND:
LIGHT LOAD: 99.90 FULL LOAD: 100.01 50% POWER FACTOR: 99.88
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.95%

AS LEFT:
LIGHT LOAD: 99.94 FULL LOAD: 99.89 50% POWER FACTOR: 99.88
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.91%

SECOND TEST: Specialized Technical Services
DATE: 12/1/2009

AS FOUND:
LIGHT LOAD: 99.93 FULL LOAD: 100.02 50% POWER FACTOR: 99.91
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.97%

AS LEFT:

LIGHT LOAD: 99.93 FULL LOAD: 100.02 50% POWER FACTOR: 99.85
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.97%

THIRD TEST: Specialized Technical Services

Date: 12/1/2009

AS FOUND:

LIGHT LOAD: 99.83 FULL LOAD: 99.88 50% POWER FACTOR: 99.85
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.93%

AS LEFT:

LIGHT LOAD: 99.94 FULL LOAD: 99.89 50% POWER FACTOR: 100.00
AVERAGE OF FULL LOAD AND LIGHT LOAD RESULTS: 99.96%

OVERALL AVERAGE ACCURACY OF FULL LOAD AND LIGHT LOAD = 99.95%
(Considering all three test)

Attachment A: Includes the test results from Duke Energy Kentucky field test on meter # 97081778 on 11/23/2009, and test results on meter # 97081770, and # 97081813 after being removed from service, along with certification documents on the equipment and tester.

Attachment B: Includes photos of the Duke Energy Kentucky field testing of meter 97081778, and all meters tested at STS, along with results and certification documents on the equipment and tester for STS.

Complaint test were performed in accordance with the Public Service Commission's Regulations: 807 KAR 5:006, Section 18 (2), and 807 KAR 5:041, Section 17.

Results:

The accuracy of meter # 97081813, # 97081770, and # 97081778 met the allowable accuracy requirements of the Public Service Commission regulations of +/- 2%.

Attachment A:



NO. E0818

COMMONWEALTH OF KENTUCKY

PUBLIC SERVICE COMMISSION

This is to certify that Doug Monday, having

met the requirements of the Public Service Commission, and demonstrated competency in the theory and practice of Electric Meter Testing, and having satisfactorily passed the examination therefore, is hereby designated a Certified Meter Tester, for Union Light Heat & Power/Chenery

By virtue of this certificate the above designated individual is authorized to act as a licensee of the Public Service Commission in regard to the metering of Electricity to public consumers, and is bound by his oath to faithfully discharge his duties in conformity with the rules of this Commission.

This certificate is valid until suspended, surrendered, or revoked, or until individual leaves the employ of the above named utilities.

Given in Frankfort, Kentucky, this the 11th day of June, 19 2001.



Moss
Chairman, P.S.C.

Robert D. Amato
Director of Engineering
Tom Fildbrand
Director Meter Standards Laboratory

| | | | |
|--------------------------|----------------------------|---------------------|--------------------|
| SRFR | SERV REQ FIELD REPORT INFO | 10:48 A 11/23/09 | M35SRFR |
| ACCT: 41600284 24 | CS: GOOD | STATUS/DATE: ACTIVE | 04/01/99 PG: 1 |
| DIV : 90 | CYC: 06 ZIP: 41005 | CUST SIC : PRIVATE | HOUSEHOLDS |
| NAME: TERESA CUNNINGHAM | PENDING : ANIN | SPCD WKFL | |
| ADDR: 4590 BURLINGTON PK | APT: | FL: | SUBURB: BURLINGTON |

INVESTIGATE SERV REQ NO: 9324 01608 CLOSED 11/23/09 METER TEST
 FLD RP: Field tested mtr, ran 99.97 FL and 99.96 LL. Changed meter per PSC Jeff Moore.
 11/20 INV RS: WILL MEET PUBLIC UTILITY COMMISSIONER ON 11/23 AT 9AM TO TEST
 ELEC METER - PLEASE DONT BE LATE

00089

NEXT TRAN CODE: _____ SRIN SRCI SRMI SRBI

POUg
Monday
58133

Control Panel > Administration > Inventory > History Report

Done Device | History Report

Model: **97081813LA** Register: Activity | Solid State | Comm | PI | Comments | Miscellaneous

Altimate ID: **97081813**

Status: **Stocked** Receive: **2/20/2009 9:22:25 AM** T07744

Type Code: **RJADT0** Prod: **10/22/2009 9:47:01 AM** T51399

Usage Code: **RJ** Stock: **10/22/2009**

Location Code: **BDC** Relive: _____

Company Code: **LJHSP** Connect: _____

Period: **12** Discomp: _____

Sample Group: _____ Change: **10/22/2009**

Temp Code: _____ Renew: **2/11/2009**

Serial ID: **2233638** Install: **6/12/2008**

Shower ID: _____ Manufacture Date: **8/23/2008**

Line Item ID: _____ Retire Reason Code: _____

Serial: _____ Remove Reason Code: _____

Part: **P1009-010960** Hold: Obsolete:

Box: **91009-7409**

Purchase Group: **000869**

Meter: **97081813LA** Results | Comments

Create Date: **10/7/2009 12:04:22 PM** At Found

Test Type: **WH** SE: **99.850** SI: **99.850** SF: **99.910** Date: **10/7/2009 12:04:0**

Reason Code: **RTNT** SA: _____ SA: _____ SA: _____ By: **T29055**

Pass: Total Passed: **1** SB: _____ SB: _____ SB: _____ Board: **TESTDESK 2**

Total Failed: **0** SC: _____ SC: _____ SC: _____

Sample Group: _____ SW: **99.850** SW: **99.850** SW: **99.910** Date: **10/7/2009 12:04:0**

Creep Direction: **None** SA: _____ SA: _____ SA: _____ By: **T29055**

Creep Note: _____ SB: _____ SB: _____ SB: _____ Board: **TESTDESK 2**

Duration: _____ SC: _____ SC: _____ SC: _____

SW: **99.850**

MISEROD-1

Start | Stop | Refresh | Print | Home | Help | Search | Admin | 9:35 AM

PowerMax **PowerMax**

Display Device History Report

Meter: **97081770LA** Register: **ACB/DN** | Sold State: | Connect: | Comments: | Miscellaneous:

Alternate ID: **97081770**

Units: **1**

Stocked: | Receive: **7/8/2008 9:20:11 AM** | SPCONNL
 Type Code: **RJAOTD** | Pack: **10/22/2009 9:47:01 AM** | T51399
 Usage Code: **RJ** | Stock: **10/22/2009**
 Location Code: **BDC** | Repair: | M:
 Company Code: **ULHEP** | Connect:
 Period Interval: **12** | Disconnect:
 Sample Group: | Change: **10/22/2009**
 Jamper Code: | Remove: **6/12/2008**
 Service ID: **2233638** | Install: **9/20/2007**
 Shipment ID: | Manufacture Date: **9/23/2007**
 One Item ID: | Retire Reason Code:
 Batch: | Remove Reason Code:
 Part: | Hold: | Obsolete:

Part: **P1009-010960**
 Box: **P1009-7409**
 Purchase Group: **000869**

Meta: **97081770LA**
 Create Date: **10/7/2009 12:34:48 PM**
 Test type: **WH**
 Reason Code: **RTNT1**
 Pass:
 Total Passed: **1**
 Total Failed: **0**
 Sample Group:
 Clean Direction: **None**
 Creep Rate:
 Duration:

| As Found | As Found | As Found | As Found | Date |
|------------|------------|-----------|----------------------|------|
| SE 100.040 | ES 100.020 | SP 99.940 | DA 10/7/2009 12:12:4 | |
| AP | AL | AP | By T29055 | |
| BP | BL | BP | Board TESTDESK 2 | |
| CP | CL | CP | | |
| WA 100.040 | | | | |

As Found:

| | | | |
|------------|------------|-----------|------------------------|
| SE 100.040 | ES 100.020 | SP 99.940 | Date 10/7/2009 12:12:4 |
| AP | AL | AP | By T29055 |
| BP | BL | BP | Board TESTDESK 2 |
| CP | CL | CP | |
| WA 100.040 | | | |

MYSPROD-E1

Attachment B:

TEAMSTS

PO Box 237
Richmond, KY 40476-0237
www.teamsts.com

800-455-5578
859-624-4256
Fax: 859-626-5616

Request Test / Suspected Tamper Report

Utility Duke ENERGY Fax _____

Attention: _____ Telephone _____

Company # _____ Mfg. SS # 97081813 Read 00000

Form 4 Mfg. LG Type ALF Class 20 Voltage 240

3 Wire Phase, Delta Wye TA 2.5 RR _____ Kh. 0.6

| | Test 1 | Test Amps | Test 4 |
|--------|------------------|----------------------------------|---------------------------------------|
| 100.03 | FL <u>99.91</u> | WTG. AVG. <u>2.5</u> | FL <u>99.96</u> WTG. AVG. |
| 99.96 | PF <u>99.95</u> | WTG. AVG. <u>2.5</u> | PF <u>99.96</u> |
| 99.99 | LL <u>99.97</u> | WTG. AVG. <u>.25</u> | LL <u>99.98</u> |
| | Test 2 | Test Amps | Test 5 |
| | FL <u>100.01</u> | WTG. AVG. <u>5.0</u> | FL <u>100.01</u> WTG. AVG. |
| | PF <u>99.97</u> | WTG. AVG. <u>5.0</u> | PF <u>99.97</u> |
| | LL <u>99.97</u> | WTG. AVG. <u>.50</u> | LL <u>99.97</u> |
| | Test 3 | Test Amps | Test 6 |
| | FL <u>99.89</u> | WTG. AVG. <u>10.0</u> | FL <u>99.91</u> WTG. AVG. |
| | PF <u>99.72</u> | WTG. AVG. <u>5.0</u> | PF <u>99.72</u> |
| | LL <u>99.96</u> | WTG. AVG. <u>5.0</u> | LL <u>99.96</u> |

SO # _____ Comments: _____

Note: sTs Standards are traceable to the National Institute of Standards and Technology, Washington, DC.

Tested By: [Signature] # E0865 Date: 12/1/09

TEAMSTS

PO Box 237
Richmond, KY 40476-0237
www.teamsts.com

800-455-5578
859-624-4256
Fax: 859-626-5616

Request Test / Suspected Tamper Report

Utility _____ Fax _____

Attention: _____ Telephone _____

Company # _____ Mfg. SS # 97681770 Read 00000

Form 4S Mfg. LG Type ALF Class 20 Voltage 240

3 Wire Phase, Delta Wye TA 2.5 RR _____ Kh. 0.6

| | Test 1 | Test Amps | Test 4 |
|-------|-----------------|-------------------------------------|----------------------------------|
| 99.97 | FL <u>99.98</u> | <u>WTG. AVG.</u> 15 2.5 | FL <u>99.99</u> <u>WTG. AVG.</u> |
| 99.84 | PF <u>99.92</u> | 15 2.5 | PF <u>99.92</u> |
| 99.97 | LL <u>99.93</u> | 15 0.25 | LL <u>99.94</u> |
| | Test 2 | Test 5 | Test 6 |
| | FL <u>99.91</u> | <u>WTG. AVG.</u> 30 5.0 | FL <u>99.78</u> <u>WTG. AVG.</u> |
| | PF <u>99.85</u> | 30 5.0 | PF <u>99.79</u> |
| | LL <u>99.94</u> | 2 0.50 | LL <u>99.93</u> |
| | FL <u>99.92</u> | <u>WTG. AVG.</u> 50 10.0 | FL <u>99.93</u> <u>WTG. AVG.</u> |
| | PF <u>99.73</u> | 50 10.0 | PF <u>99.87</u> |
| | LL <u>99.94</u> | 2 1.0 | LL <u>99.94</u> |

SO # _____ Comments: _____

Note: sTs Standards are traceable to the National Institute of Standards and Technology, Washington, DC.

Tested By: [Signature] # E0865 Date: 12/01/09

TEAMSTS

PO Box 237
Richmond, KY 40476-0237
www.teamsts.com

800-455-5578
859-624-4256
Fax: 859-626-5616

Request Test / Suspected Tamper Report

Utility Duke Energy Fax _____

Attention: _____ Telephone _____

Company # _____ Mfg. SS # 97081778 Read 00089

Form 4S Mfg. LG Type ALF Class 20 Voltage 240

3 Wire Phase, Delta Wye TA 2.5 RR _____ Kh. 0.6

99.94
99.95
99.91

| Test 1 | Test Amps | Test 4 |
|------------------|-------------------------------------|----------------------------------|
| FL <u>100.01</u> | <u>WTG. AVG.</u> 1.5 2.5 | FL <u>99.89</u> <u>WTG. AVG.</u> |
| PF <u>99.88</u> | 1.5 2.5 | PF <u>99.88</u> |
| LL <u>99.90</u> | 1.5 0.25 | LL <u>99.94</u> |

| Test 2 | Test 5 |
|------------------|-------------------------------------|
| FL <u>100.02</u> | <u>WTG. AVG.</u> 3.0 5.0 |
| PF <u>99.91</u> | 3.0 5.0 |
| LL <u>99.93</u> | 2 0.50 |

| Test 3 | Test 6 |
|-----------------|--------------------------------------|
| FL <u>99.88</u> | <u>WTG. AVG.</u> 5.0 10.0 |
| PF <u>99.85</u> | 5.0 10.0 |
| LL <u>99.93</u> | 2 1.0 |

SO # _____ Comments: _____

Note: sTs Standards are traceable to the National Institute of Standards and Technology, Washington, DC.

Tested By: [Signature] # E0865 Date: 12/01/09

Radian Research, Inc.

Power and Energy Measurement Specialists

Page: 1

R
A
D
I
A
N

SPE100

RMA

Order No.: **RO20443**
Order Date: 02/19/09
Repair by: 03/21/09
Received Date: 02/24/09

S SPECIALIZED TECHNICAL SERVICES
H WANDA RICHARDSON
I 500 RECYCLE DRIVE
P RICHMOND, KY 40475
T USA
O

ATTN: ACCOUNTS PAYABLE
859-624-4256

| | | | |
|------------|------------------------------|--------------------------|-----------------------|
| Reference: | Ship Via: 73 UPS - Ground | F.O.B.: Lafayette, IN | Terms: Net 30 days |
|------------|------------------------------|--------------------------|-----------------------|

| Line | Product Code/Description | Qty Ordered |
|------|---|-------------|
| 1 | Non-Warranty Recalibration Recalibrati 101007 8007 RM-10-07 Portable Watthour/VA Rhour/Qhour S | 1 EACH |

Return Reason:

Special Instructions:

Arriving Condition: Intact Received in brown case with RO20444 & 20445

Technician:

As Found Data: In Tolerance

| Item No. | Assembly | Component | Cause | Action |
|----------|----------|-----------|---------------|---------------|
| 101007 | | | AS FOUND TEST | TEST |
| 101007 | | | RE-CALIBRATE | CERTIFICATION |



COMMONWEALTH OF KENTUCKY

PUBLIC SERVICE COMMISSION

NO. E0865

This is to certify that Thomas Roy Land, having met the requirements of the Public Service Commission, and demonstrated competency in the theory and practice of Electric Meter Testing, and having satisfactorily passed the examination therefore, is hereby designated a Certified Meter Tester, for Specialized Technical Services/STS.

By virtue of this certificate the above designated individual is authorized to act as a licensee of the Public Service Commission in regard to the metering of Electricity to public consumers, and is bound by his oath to faithfully discharge his duties in conformity with the rules of this Commission.

This certificate is valid until suspended, surrendered, or revoked, or until individual leaves the employ of the above named utilities.

Given in Frankfort, Kentucky, this the 25th day of February, 19 2003.

Miss [Signature]
George M. P.S.C.

Robert A. [Signature]
Director of Engineering

[Signature]
Director Meter Standards Laboratory



METER

UTEC/SPC/METER/METER.DAT v2.00
KY PSC MO. STANDARDS TEST=
MASTER STANDARD #=8007
WORKING STANDARD #=2212
UTEC #=230
TEST DATE=NOV 24, 2009
TESTED BY=E0865
UserID=
SystemID=UTEC
SystemSN=C0230
StdType=Radian RM-10-01
StdSN=0000
StdCorrFactEnabled=No
StdCorrFactFLwh=0.000
StdCorrFactFLvarh=0.000
StdCorrFactFLQh=0.000
StdCorrFactFLVAh=0.000
StdCorrFactFLV=0.000
StdCorrFactFLA=0.000
StdCorrFactFLV2=0.000
StdCorrFactFLA2=0.000
StdCorrFactPFLeadwh=0.000
StdCorrFactPFLeadvarh=0.000
StdCorrFactPFLeadQh=0.000
StdCorrFactPFLeadVAh=0.000
StdCorrFactPFLeadV=0.000
StdCorrFactPFLeadA=0.000
StdCorrFactPFLeadV2=0.000
StdCorrFactPFLeadA2=0.000
StdCorrFactPFLagwh=0.000
StdCorrFactPFLagvarh=0.000
StdCorrFactPFLagQh=0.000
StdCorrFactPFLagVAh=0.000
StdCorrFactPFLagV=0.000
StdCorrFactPFLagA=0.000
StdCorrFactPFLagV2=0.000
StdCorrFactPFLagA2=0.000
StdCorrFactLLwh=0.000
StdCorrFactLLvarh=0.000
StdCorrFactLLQh=0.000
StdCorrFactLLVAh=0.000
StdCorrFactLLV=0.000
StdCorrFactLLA=0.000
StdCorrFactLLV2=0.000
StdCorrFactLLA2=0.000
SwVer=2.04
StnType=209
BeginDate=Tue, Nov 24, 2009
BeginTime=06:22:35
EndDate=Tue, Nov 24, 2009
EndTime=06:29:24
TestType=Sequence
TestResultFormat=Percent Registration
MeterTrueForm=9
MeterForm=9
MeterFormDesc=Three-Stator, 4-Wire Wye Transformer-Rated
MeterTest=STAND00A
MeterTestDesc=AF 240 V 120 V
MeterKh=7.2
SubTest=wh del 1
Desc=AF 120V
TestV=120.0
TestISerFL=30.00
TestIElemAFL=30.00
TestIElemBFL=30.00
TestIElemCFL=30.00

METER

TestISerLL=3.00
TestIElemALL=3.00
TestIElemBLL=3.00
TestIElemCLL=3.00
PhaseAngle=0.0
PhaseShiftPFLead=30.0
PhaseShiftPFLag=60.0
InputDevice=Frequency
InputPulseValue=0.000010
TestForBy=Time
TestForValSerFL=0:00.15
TestForValSerPF=0:00.15
TestForValSerLL=0:00.15
TestForValElemFL=0:01.00
TestForValElemPF=0:00.15
TestForValElemLL=0:01.00
StabilizationDelay=5
LimitChecksEnabled=Yes
LimitFLHigh=101.00
LimitFLLow=99.00
LimitPFHigh=101.00
LimitPFLow=99.00
LimitLLHigh=101.00
LimitLLLow=99.00
BalChecksEnabled=No
BalFLHigh=100.00
BalFLLow=100.00
BalPFHigh=100.00
BalPFLow=100.00
BalLLHigh=100.00
BalLLLow=100.00
AsFound:
 AF=99.99
 AL=100.00
 WtAvgLead=
 WtAvgLag=
AsLeft:
 AF=99.99
 AL=100.00
 WtAvgLead=
 WtAvgLag=
SubTest=wh del 2
Desc=AF 240V
TestV=240.0
TestISerFL=0.00
TestIElemAFL=30.00
TestIElemBFL=0.00
TestIElemCFL=0.00
TestISerLL=0.00
TestIElemALL=3.00
TestIElemBLL=0.00
TestIElemCLL=0.00
PhaseAngle=0.0
PhaseShiftPFLead=30.0
PhaseShiftPFLag=60.0
InputDevice=Frequency
InputPulseValue=0.000010
TestForBy=Time
TestForValSerFL=0:00.15
TestForValSerPF=0:00.15
TestForValSerLL=0:00.15
TestForValElemFL=0:01.00
TestForValElemPF=0:00.15
TestForValElemLL=0:01.00
StabilizationDelay=15
LimitChecksEnabled=Yes

METER

LimitFLHigh=101.00
LimitFLLow=99.00
LimitPFHigh=101.00
LimitPFLow=99.00
LimitLLHigh=101.00
LimitLLLow=99.00
BalChecksEnabled=No
BalFLHigh=100.00
BalFLLow=100.00
BalPFHigh=100.00
BalPFLow=100.00
BalLLHigh=100.00
BalLLLow=100.00
ASFound:
 AF=99.99
 AL=100.00
 WtAvgLead=
 WtAvgLag=
ASLeft:
 AF=99.99
 AL=100.00
 WtAvgLead=
 WtAvgLag=
#EndOfRecord

Serial #: 2380
 Type: RM-30
 Date: Aug 27 17:48:52
 File Version: 2.0
 Result Separator: Space
 Test Name: FULL TEST A
 Configured Variable Cols: 2
 Configured Variable Rows: 2
 Result Cols: 6
 Result Rows: 26
 Variables: CURRENT TAP: ANPS
 Variables: PHASE: VOLTS
 Chamber: No
 DC Volts: No
 DC Amps: No
 Active Phases: 1
 Phase A Serial: 154
 Min Pulse Count: 10000
 Point Order: default

VOLTAGE TAP: A
 FREQUENCY: 60.0
 STAB TIME: 5
 TEST TIME: 15
 DEVICE FUNCTION: Wh
 DEVICE ANPS: 0
 ENV TEMP: 0.00
 ENV HUM: 1
 ENV SOAK: 1
 OVER TEMP: -403
 OVER SOAK: 0
 RAMP UP SPEED: 0
 RAMP DN SPEED: 0
 K FACTOR: 0.0000000000000000
 TOLERANCE: 1000.0
 VIEW: Xregis

Phase: A
 PHASE OFFSET: 0.000
 VOLTAGE WAVE: Pure
 CURRENT WAVE: Pure
 DC VOLTS:
 DC ANPS:

Results

| Phase A | Phase (°) | 0.000 | -50.000 | 0.000 | -50.000 | 0.000 | -50.000 | 0.000 | -50.000 | |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Phase A | Volts | 120.000 | 120.000 | 240.000 | 240.000 | 277.000 | 277.000 | 440.000 | 440.000 | |
| Phase A | Current | Average | 77.776 | 100.000 | 77.777 | 100.016 | 77.775 | 100.013 | 77.770 | 100.004 |
| A | 0.000 | 100.005 | 100.000 | 100.004 | 77.776 | 100.025 | 77.776 | 100.017 | 77.770 | 100.008 |
| A | 1.000 | 100.002 | 77.778 | 100.000 | 77.778 | 100.017 | 77.772 | 100.013 | 77.770 | 100.003 |
| A | 2.000 | 100.005 | 77.777 | 100.004 | 77.777 | 100.024 | 77.777 | 100.017 | 77.772 | 100.006 |
| A | 3.000 | 100.000 | 77.776 | 100.003 | 100.001 | 100.020 | 77.776 | 100.016 | 77.770 | 100.005 |
| A | 4.000 | 100.000 | 77.775 | 77.778 | 77.777 | 100.010 | 77.775 | 100.009 | 77.769 | 100.004 |
| A | 5.000 | 77.777 | 77.777 | 77.776 | 77.776 | 100.009 | 77.773 | 100.010 | 77.768 | 100.003 |
| A | 6.000 | 77.777 | 77.775 | 77.775 | 77.774 | 100.007 | 77.772 | 100.004 | 77.768 | 77.777 |
| A | 10.000 | 100.003 | 77.777 | 100.003 | 100.000 | 100.016 | 77.776 | 100.015 | 77.770 | 100.006 |
| A | 15.000 | 100.003 | 77.776 | 77.777 | 77.777 | 100.017 | 77.775 | 100.015 | 77.770 | 100.004 |
| A | 20.000 | 77.777 | 77.776 | 77.776 | 77.775 | 100.013 | 77.773 | 100.009 | 77.769 | 100.001 |
| A | 25.000 | 77.777 | 77.773 | 77.775 | 77.773 | 100.007 | 77.773 | 100.006 | 77.767 | 100.000 |
| A | 30.000 | 100.004 | 77.776 | 100.003 | 77.779 | 100.017 | 77.777 | 100.023 | 77.771 | 100.001 |
| A | 35.000 | 100.002 | 77.776 | 100.003 | 77.776 | 100.017 | 77.776 | 100.013 | 77.770 | 100.005 |
| A | 40.000 | 100.002 | 77.775 | 77.777 | 77.778 | 100.016 | 77.775 | 100.017 | 77.771 | 100.005 |
| A | 45.000 | 100.002 | 77.775 | 77.776 | 77.777 | 100.016 | 77.775 | 100.016 | 77.770 | 100.007 |
| A | 50.000 | 100.003 | 77.773 | 77.777 | 77.776 | 100.015 | 77.774 | 100.014 | 77.769 | 100.004 |

Certificate of Calibration

INSTRUMENT MODEL: RS-711
 MANUFACTURER: Radian Research, Inc.
 SERIAL NUMBER: 703154
 CUSTOMER NAME:
 P.O. NUMBER:
 CE NUMBER: none
 RMA NUMBER:
 CALIBRATION DATE: 17-Mar-09
 CALIBRATION DUE DATE: 17-Mar-10
 ERROR SPECIFICATION: +/-0.005% +/- traceability using fundamental waveforms
 ACCURACY CONFIDENCE LEVE 99%



ISO 9001 Certified

Radian Research's As-Found Test Results showed this Instrument to be:
 New In Tolerance Out of Tolerance Inoperative Limited Calibration
 For Out of Tolerance conditions, As-Found Data Reports are furnished.

Radian Research recommends a 12 month Calibration interval for RS-711 modules.

This certifies the above listed instrument was calibrated in compliance with ISO 9001:2000 and ANSI/NCSL Z540-1 using applicable Radian Research procedures. Radian Research certifies this instrument meets or exceeds all published specifications. For reference to watt-hours the RS-711 was calibrated to a bank of custom RD-22-RTS Dytronic Primary Transfer Standards that are traceable to the National Institute of Standards and Technology, or by accuracies derived from accepted values of natural physical constants, or by accuracies derived from accepted ratio type calibration techniques. Calibration is then confirmed across all ranges with RD-22-RTS Dytronic Transfer Standards. A complete calibration report is provided that illustrates the various test results.

For reference to volts the RS-711 was calibrated by a bank of custom RD-22-RTS Dytronic Primary Transfer Standards that is traceable to the National Institute of Standards and Technology.

For reference to frequency, Radian Research uses a Hewlett Packard 100 MHz Universal Counter calibrated using the Arbiter Systems Model 1083B listed below. No measurements or adjustments were made referencing frequency for this calibration because there are no time references located within the RS-711 Syntron Signal Source. The frequency reference for the RS-703A system is located within the RS-740 Data Collection Module and our records indicate that it was last tested by Radian Research at time of original shipment. This frequency is a High Stability Quartz Crystal with an output frequency of 2.097120 MHz for 60Hz systems and 2.097000 MHz for 50Hz systems. Therefore, this calibration is predicted on the RS-740's frequency reference being within +/-0.0003%. All other measurement functions are mathematical calculations derived from known variables.

Applicable Traceability & Report Numbers for Primary References used by Radian Research's Metrology Laboratory:

Watt-hour, VA-hour, VAR-hour, Q-hour, Amp-hour

Volt-hour, Volt Squared-hour, AC Volt

Radian Dytronic Primary Transfer Standards Consisting of (3) RD-22-RTS
 Serial Numbers: 200717, 200718, 200719
 NIST Test Report Numbers: 817/274198-07, 817/275854-08; Calibration Due Date 1-April-09.

Time Base (Frequency)

Arbiter Systems Model 1083B Satellite-Controlled Frequency Standard s/n B1057. GPS controlled system with an uncertainty of 0.000002ppm. No calibration required.

DC Volts

Fluke Model 732B DC Volt Standard s/n 7703004 with an uncertainty of ± .4ppm.
 Fluke Test Report Number D5460; Calibration Due Date: 12-Apr-09.

Resistance

Guildline Standard Resistor Model 9330/10K s/n 62623, 62624. Guildline Test Report Numbers R82026A & B; with an Expanded Uncertainty of ± .333ppm. Calibration Due Date 6-Apr-09.

Other

Radian Dytronic Transfer Standards Consisting of (3) RD-22-RTS
 Serial Numbers: 201973, 201974, 202101. Calibration Due Date 6-Oct-09
 Hewlett Packard 8 Digit Multi-Meter Model 3458A s/n 2823A02816. Agilent Technologies
 Test Certificate Number 48872; Calibration Due Date 06-Mar-10.

Metrology Laboratory Technician Signature

Document Id. 9903091.D

Page 1 of 2



Calibration Report

RS-711 Syntron Signal Source

Function..... Watt-hour 60 Hz

Date..... 17-Mar-09

Serial Number..... 703154

The following data was collected by a bank of three RD-22-RTS Dytronic Transfer Standards. The RS-711 was first calibrated to the RD-22-RTS Dytronic Primary Transfer Standards. The RD-22-RTS Dytronic Primary Transfer Standards were certified in Vhr mode by the National Institute of Standards and Technology (NIST) to an uncertainty of $\pm 0.0008\%$. The RD-22-RTS Dytronic Primary Transfer Standards were certified in Watthour mode by the National Institute of Standards and Technology (NIST) to an uncertainty of $\pm 0.0014\%$ @ unity Power Factor and 0.003% @ lagging Power Factor. Calibration temperature is 23 degrees Centigrade. The test time is 15 seconds and the stabilization time between points is 5 seconds. For lagging power factors the current lags the voltage. All results are listed in Parts Per Million (PPM).

Voltage & Phase Angle

| AMPS | 120 | 120 | 240 | 240 | 480 | 480 | 600 | 600 |
|-------|--------|---------|-------|---------|-------|---------|--------|---------|
| | UNITY | 60° LAG | UNITY | 60° LAG | UNITY | 60° LAG | UNITY | 60° LAG |
| 0.20 | 08.39 | 06.77 | 14.16 | 07.25 | 12.86 | 04.42 | 10.78 | 06.49 |
| 0.25 | 10.66 | 05.71 | 11.53 | 06.88 | 09.98 | 03.27 | 10.53 | 06.45 |
| 0.30 | 10.64 | 01.96 | 11.90 | 03.72 | 10.09 | 00.20 | 11.41 | 04.32 |
| 0.50 | 05.45 | 03.30 | 06.88 | 04.08 | 05.60 | 00.35 | 06.07 | 03.19 |
| 1.00 | 06.19 | 07.35 | 07.65 | 08.75 | 06.07 | 05.57 | 06.31 | 08.15 |
| 2.00 | 07.38 | 10.01 | 09.05 | 10.78 | 07.44 | 07.83 | 07.71 | 10.24 |
| 2.50 | 07.07 | 07.86 | 08.62 | 09.08 | 07.21 | 05.69 | 07.70 | 08.66 |
| 3.00 | 09.50 | 11.79 | 11.01 | 13.19 | 09.66 | 09.89 | 07.55 | 10.98 |
| 4.00 | 01.22 | 05.39 | 02.77 | 06.82 | 01.36 | 03.69 | 01.44 | 06.02 |
| 5.00 | 00.15 | 04.69 | 01.61 | 05.40 | 00.13 | 02.40 | 00.56 | 05.23 |
| 7.00 | 09.13 | 09.26 | 10.76 | 10.04 | 10.08 | 07.35 | 08.99 | 09.52 |
| 10.00 | 09.64 | 09.55 | 11.36 | 10.75 | 10.17 | 08.29 | 10.18 | 10.95 |
| 15.00 | 09.55 | 12.79 | 11.68 | 13.81 | 10.41 | 11.26 | 10.10 | 13.49 |
| 20.00 | 08.50 | 09.77 | 10.93 | 10.94 | 09.55 | 08.10 | 09.72 | 10.76 |
| 25.00 | 09.03 | 10.57 | 11.51 | 11.98 | 10.22 | 09.31 | 07.37 | 09.90 |
| 30.00 | 01.66 | 05.44 | 05.13 | 07.99 | 03.76 | 04.97 | 03.06 | 07.57 |
| 35.00 | -00.30 | 02.41 | 03.19 | 05.33 | 01.80 | 02.11 | 01.59 | 05.58 |
| 40.00 | -02.11 | 00.02 | 01.94 | 03.12 | 00.37 | -00.08 | 00.68 | 03.32 |
| 45.00 | -01.93 | -02.38 | 01.61 | 01.10 | 00.17 | -02.10 | -02.06 | -00.16 |
| 50.00 | -02.14 | -07.51 | 01.52 | -04.46 | 00.15 | -07.55 | -02.15 | -06.52 |
| AVE | 5.38 | 5.74 | 7.74 | 7.33 | 6.35 | 4.25 | 5.88 | 6.71 |
| MAX | 10.66 | 12.79 | 14.16 | 13.81 | 12.86 | 11.26 | 11.41 | 13.49 |
| MIN | -02.14 | -07.51 | 01.52 | -04.46 | 00.13 | -07.55 | -02.15 | -06.52 |

All data in Parts per Million

OVERALL

All data in Parts per Million

| | UNITY | 60° LAG |
|---------|--------|---------|
| AVERAGE | 06.34 | 06.01 |
| MAXIMUM | 14.16 | 13.81 |
| MINIMUM | -02.15 | -07.55 |

Example
(7.1ppm=0.00071% error)



Certificate of Calibration

Manufacturer: **Radian Research, Inc.**
 Instrument: **Metronic Portable Standard**
 Model: **RM-10-07**
 Serial Number: **8007**
 Error Specification: **+/- .05% Watthour, +/- .1% Other**



**Quality Management System
 ISO 9001 Certified**

Customer Name: **Specialized Technical Services**
 Address: **500 Recycle Drive
 Richmond, KY 40475**

Environmental Conditions
 Temperature: **23°C +/- 1°C**
 Humidity: **between 35% and 60%**

P.O. Number: **73**
 CE Number: **N/A**
 RMA / Certificate Number: **20443**
 Calibration Date: **17-Mar-09**

Based on the recommended calibration interval, the next calibration is due on: **17-Mar-10**

Radian Research's As-Found Test Results showed this Instrument to be:
 New In Tolerance Out of Tolerance Inoperative Limited Calibration
 For Out of Tolerance conditions, As-Found Data Reports are furnished.

Radian Research Inc. certifies the instrument listed above meets or exceeds all published specifications and was calibrated in compliance with ANSI/NCSL Z540-1 using applicable Radian Research procedures which meet the requirements of ISO 9001:2000. This instrument was calibrated by a Radian Research RS-703A Syntron Automated Calibration System which is traceable to the National Institute of Standards and Technology (NIST). The RS-703A Calibration System is traceable within the limitations of NIST's services, by accuracies derived from accepted values of natural physical constants, or by accuracies derived from accepted ratio type calibration techniques. The RS-703A Calibration System is cross checked and calibrated on a schedule which is adjusted to maintain required accuracies and traceability.

Software used for Calibration: **RS-703A Control Program Rel.04.20.02 May 30, 2006**
 RS-703A serial numbers: **703194**

Applicable Traceability & Report Numbers for References used by Radian's Metrology Lab:

**Watt-hour, VA-hour, VAR-hour, Q-hour, Amp-hour,
 Volt-hour, Volt-Squared hour, AC Volt**

Radian Dytronic Transfer Standards consisting of (3) RD-22-RTS,
 Serial Numbers: 200717, 200718, 200719
 NIST Test Report Number: 817/274198-07, 817/275854-08; Calibration Due Date 1-April-09.

Time Base (Frequency)

Arbiter Systems Model 1083B Satellite-Controlled Frequency Standard s/n B1057. GPS controlled system with an uncertainty of 0.000002ppm. No calibration required.

DC Volts

Fluke Model 732B DC Volt Standard s/n 7703004 with an uncertainty of ± .4ppm.
 Fluke Test Report Number D5460; Calibration Due Date: 12-April-09.

Resistance

Guildline Standard Resistor Model 9330/10K s/n 62623, 62624. Guildline Test Report Numbers R82026A & B; with an Expanded Uncertainty of ± .333ppm. Calibration Due Date 6-April-09.

Other

Hewlett Packard 8 Digit Multi-Meter Model 3458A s/n 2823A02816. Agilent Technologies
 Test Certificate Number 48872; Calibration Due Date 6-Mar-10.

Metrology Laboratory Technician Signature

Jeffrey E. Kerstle

LAB
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 in full, without prior written approval of the
 Calibration Facility*



Calibration Report

RM-10-07 Metronic Portable Standard

Mode..... Watthour 60 Hertz

Date..... 17-Mar-09

Serial Number..... 8007

The following data was collected by a Radian Research RS-703A Automated Calibration System. The RS-703A watt-hour calibration is derived directly from (3) Radian RD-22-RTS Dytronic Transfer Standards certified by the National Institute of Standards and Technology (NIST) to an uncertainty of 0.002% @ unity and 0.003% @ 60 degrees lagging Power Factor. Calibration temperature is 23 degrees Centigrade. The test time is 15 seconds and the stabilization time in between points is 5 seconds. For lagging power factors the current lags the voltage. All results are listed as Percent Error. The RS-703A has at least a 4 times greater accuracy than the Instrument under test.

Voltage & Phase Angle

| Amps | 120 | 120 | 240 | 240 | 480 | 480 | 600 | 600 |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | Unity | 60°Lag | Unity | 60°Lag | Unity | 60°Lag | Unity | 60°Lag |
| 0.25 | 0.008 | 0.005 | 0.004 | 0.002 | 0.001 | 0.001 | 0.001 | 0.002 |
| 0.5 | 0.007 | 0.000 | 0.001 | 0.001 | -0.001 | 0.000 | -0.001 | 0.002 |
| 1.0 | 0.007 | 0.003 | 0.003 | 0.003 | 0.000 | 0.003 | -0.001 | 0.003 |
| 2.0 | 0.005 | 0.001 | 0.000 | 0.000 | -0.001 | 0.000 | -0.001 | 0.002 |
| 2.5 | 0.005 | 0.001 | 0.001 | 0.002 | 0.000 | 0.002 | -0.002 | 0.003 |
| 3.0 | 0.005 | 0.005 | 0.003 | 0.003 | 0.000 | 0.003 | 0.000 | 0.003 |
| 5.0 | 0.006 | 0.004 | 0.001 | 0.005 | 0.000 | 0.005 | 0.001 | 0.006 |
| 10.0 | 0.003 | 0.001 | 0.001 | -0.001 | -0.001 | 0.002 | -0.002 | 0.002 |
| 12.0 | 0.005 | 0.002 | 0.001 | 0.000 | -0.002 | 0.001 | 0.000 | 0.003 |
| 15.0 | 0.004 | 0.001 | 0.001 | 0.003 | 0.001 | 0.002 | -0.001 | 0.004 |
| 20.0 | 0.005 | 0.004 | 0.002 | 0.004 | 0.000 | 0.006 | 0.000 | 0.004 |
| 25.0 | 0.006 | 0.005 | 0.002 | 0.004 | 0.002 | 0.005 | 0.001 | 0.006 |
| 30.0 | 0.005 | 0.002 | 0.001 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 |
| 40.0 | 0.003 | 0.003 | 0.001 | 0.001 | -0.002 | 0.003 | 0.000 | 0.004 |
| 45.0 | 0.004 | 0.002 | 0.000 | 0.002 | 0.000 | 0.002 | 0.000 | 0.004 |
| 50.0 | 0.004 | 0.001 | 0.001 | 0.004 | -0.001 | 0.004 | 0.000 | 0.005 |
| Average | 0.005 | 0.003 | 0.001 | 0.002 | 0.000 | 0.003 | 0.000 | 0.003 |
| Minimum | 0.003 | 0.000 | 0.000 | -0.001 | -0.002 | 0.000 | -0.002 | 0.001 |
| Maximum | 0.008 | 0.005 | 0.004 | 0.005 | 0.002 | 0.006 | 0.001 | 0.006 |

| Overall | Unity | 60°Lag |
|----------------|--------------|---------------|
| Average | 0.002 | 0.003 |
| Minimum | -0.002 | -0.001 |
| Maximum | 0.008 | 0.006 |



Calibration Report

RM-10-07 Metronic Portable Standard

Mode.....Varhour 60 Hertz

Date..... 17-Mar-09

Serial Number..... 8007

The following data was collected by a Radian Research RS-703A Automated Calibration System. The RS-703A VAR-hour calibration is derived directly from (3) Radian RD-22-RTS Dytronic Transfer Standards certified by the National Institute of Standards and Technology (NIST) with the use of an ultra low distortion synthesis and digital delay. Uncertainty is 0.005% for VAR-hour. Calibration temperature is 23 degrees Centigrade. Test time is 15 seconds and the stabilization time in between points is 5 seconds. For lagging power factors the current lags the voltage. All results are listed as Percent Error. The RS-703A has at least a 4 times greater accuracy than the Instrument under test.

Voltage & Phase Angle

| Amps | 120 | 120 | 240 | 240 | 480 | 480 | 600 | 600 |
|----------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|
| | 90°Lag | 30°Lag | 90°Lag | 30°Lag | 90°Lag | 30°Lag | 90°Lag | 30°Lag |
| 0.25 | 0.009 | 0.015 | 0.003 | -0.001 | -0.008 | -0.021 | -0.013 | -0.031 |
| 0.5 | 0.010 | 0.013 | 0.005 | 0.006 | -0.002 | -0.005 | -0.005 | -0.012 |
| 1.0 | 0.012 | 0.020 | 0.009 | 0.014 | 0.005 | 0.008 | 0.003 | 0.003 |
| 2.0 | 0.012 | 0.014 | 0.008 | 0.011 | 0.006 | 0.008 | 0.004 | 0.007 |
| 2.5 | 0.011 | 0.019 | 0.009 | 0.012 | 0.007 | 0.011 | 0.006 | 0.008 |
| 3.0 | 0.013 | 0.021 | 0.011 | 0.015 | 0.008 | 0.013 | 0.007 | 0.013 |
| 5.0 | 0.015 | 0.022 | 0.011 | 0.019 | 0.010 | 0.019 | 0.009 | 0.015 |
| 10.0 | 0.011 | 0.017 | 0.009 | 0.016 | 0.008 | 0.013 | 0.008 | 0.014 |
| 12.0 | 0.014 | 0.018 | 0.010 | 0.015 | 0.009 | 0.015 | 0.009 | 0.013 |
| 15.0 | 0.013 | 0.022 | 0.010 | 0.016 | 0.010 | 0.017 | 0.009 | 0.015 |
| 20.0 | 0.014 | 0.022 | 0.013 | 0.018 | 0.010 | 0.019 | 0.009 | 0.017 |
| 25.0 | 0.013 | 0.022 | 0.013 | 0.019 | 0.011 | 0.018 | 0.010 | 0.016 |
| 30.0 | 0.010 | 0.012 | 0.009 | 0.013 | 0.008 | 0.009 | 0.007 | 0.011 |
| 40.0 | 0.011 | 0.014 | 0.008 | 0.010 | 0.008 | 0.012 | 0.008 | 0.012 |
| 45.0 | 0.010 | 0.014 | 0.008 | 0.013 | 0.009 | 0.011 | 0.008 | 0.013 |
| 50.0 | 0.010 | 0.014 | 0.010 | 0.013 | 0.008 | 0.012 | 0.007 | 0.012 |
| Average | 0.012 | 0.017 | 0.009 | 0.013 | 0.007 | 0.010 | 0.005 | 0.008 |
| Minimum | 0.009 | 0.012 | 0.003 | -0.001 | -0.008 | -0.021 | -0.013 | -0.031 |
| Maximum | 0.015 | 0.022 | 0.013 | 0.019 | 0.011 | 0.019 | 0.010 | 0.017 |

| Overall | 90°Lag | 30°Lag |
|----------------|---------------|---------------|
| Average | 0.008 | 0.012 |
| Minimum | -0.013 | -0.031 |
| Maximum | 0.015 | 0.022 |



Calibration Report

RM-10-07 Metronix Portable Standard

Mode.....Qhour 60 Hertz

Date..... 17-Mar-09

Serial Number..... 8007

The following data was collected by a Radian Research RS-703A Automated Calibration System. The RS-703A Q-hour calibration is derived directly from (3) Radian RD-22-RTS Dytronic Transfer Standards certified by the National Institute of Standards and Technology (NIST) with the use of an ultra low distortion synthesis and digital delay. Uncertainty is 0.005% for Q-hour. Calibration temperature is 23 degrees Centigrade. Test time is 15 seconds and the stabilization time in between points is 5 seconds. For lagging power factors the current lags the voltage. All results are listed as Percent Error. The RS-703A has at least a 4 times greater accuracy than the Instrument under test.

Voltage & Phase Angle

| Amps | 120 | 120 | 240 | 240 | 480 | 480 | 600 | 600 |
|----------------|---------------|--------------|---------------|--------------|---------------|---------------|---------------|---------------|
| | 60°Lag | Unity | 60°Lag | Unity | 60°Lag | Unity | 60°Lag | Unity |
| 0.25 | 0.000 | 0.013 | -0.006 | 0.001 | -0.015 | -0.012 | -0.020 | -0.023 |
| 0.5 | -0.001 | 0.011 | -0.004 | 0.006 | -0.010 | -0.002 | -0.011 | -0.009 |
| 1.0 | 0.002 | 0.017 | -0.001 | 0.014 | -0.002 | 0.010 | -0.003 | 0.007 |
| 2.0 | 0.001 | 0.013 | -0.002 | 0.013 | -0.003 | 0.010 | -0.004 | 0.008 |
| 2.5 | 0.003 | 0.015 | 0.000 | 0.013 | -0.002 | 0.012 | -0.002 | 0.012 |
| 3.0 | 0.002 | 0.017 | 0.000 | 0.015 | 0.000 | 0.013 | -0.001 | 0.013 |
| 5.0 | 0.003 | 0.017 | 0.001 | 0.017 | -0.001 | 0.018 | -0.001 | 0.015 |
| 10.0 | 0.001 | 0.015 | 0.000 | 0.014 | 0.000 | 0.015 | -0.001 | 0.014 |
| 12.0 | 0.002 | 0.017 | 0.001 | 0.015 | 0.000 | 0.018 | -0.001 | 0.015 |
| 15.0 | 0.003 | 0.017 | 0.001 | 0.017 | 0.000 | 0.019 | 0.000 | 0.017 |
| 20.0 | 0.003 | 0.019 | 0.001 | 0.017 | 0.002 | 0.019 | 0.001 | 0.019 |
| 25.0 | 0.004 | 0.018 | 0.002 | 0.019 | 0.002 | 0.021 | 0.002 | 0.019 |
| 30.0 | 0.002 | 0.014 | 0.000 | 0.012 | 0.001 | 0.014 | 0.000 | 0.013 |
| 40.0 | 0.002 | 0.013 | 0.001 | 0.014 | -0.001 | 0.015 | 0.000 | 0.014 |
| 45.0 | 0.003 | 0.014 | 0.001 | 0.013 | 0.000 | 0.018 | 0.001 | 0.015 |
| 50.0 | 0.002 | 0.014 | 0.001 | 0.013 | 0.001 | 0.016 | 0.001 | 0.016 |
| Average | 0.002 | 0.015 | 0.000 | 0.013 | -0.002 | 0.013 | -0.002 | 0.010 |
| Minimum | -0.001 | 0.011 | -0.006 | 0.001 | -0.015 | -0.012 | -0.020 | -0.023 |
| Maximum | 0.004 | 0.019 | 0.002 | 0.019 | 0.002 | 0.021 | 0.002 | 0.019 |

| | 60°Lag | Unity |
|----------------|---------------|---------------|
| Average | -0.001 | 0.013 |
| Minimum | -0.020 | -0.023 |
| Maximum | 0.004 | 0.021 |

















