Contract No:

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Subject: SRNL Coulometer for LANL - SRNL-Testing 2020

Authors: J. V. Cordaro, M. E. Morales-Arteaga

Scope:

SRNL fabricated two coulometers that have been delivered to LANL. All testing for electrical components is performed by R&D engineering and the results are attached to this report. Instrument testing for the first instrument was completed on August 2018 and installation at LANL was completed February 2019. This report addresses testing performed at FH Analytical Laboratory for the second instrument that arrived at LANL on June 5th, 2020. The testing is performed using Plutonium working standards. The instrument was kept in a radiologically clean area. The component calibration of the second LANL coulometer was completed in SRNL Building 723-A.

Summary:

The instrument was moved to FH analytical Laboratory and left for several days to perform electrical calibrations. The evaluation of electrical calibrations and other factors presented in more detail indicate that the performance of the instrument matches the typical performance for SRNL Coulometers.

Plutonium working standard measurements were also performed, a total of 10 measurements were performed using the SRNL cell setup and SRNL Coulometer for LANL. A total of 10 measurements were also performed with SRNL cell setup and SRNL Coulometer. A Grubs test was performed and indicated an outlier on each set of measurements. The outlier was not included in calculations. The sample aliquots each contained nominally 15 mg Pu and were measured using the SRNL method (ISO 12183, ASTM C1165)

Instrument	Average Recovery	RSD	%RD	Number of determinations
LANL-2	100.0057	0.0005	0.05%	10
SRNL	100.0962	0.0005	0.05%	10

Table 1. Summary of results for LANL instrument testing (does not include outliers)

Results:

Electrical calibration data generated at the FH Laboratory before the SRNL coulometer system was delivery to LANL were evaluated.

Precision estimates calculated from sets of routine electrical calibration results were a maximum of 0.0016% RSD, 1-sigma, when laboratory temperatures were stable. A relative standard deviation of 0.0040% RSD was found for a total of 650 values. This performance matches the typical performance for SRNL Coulometers.

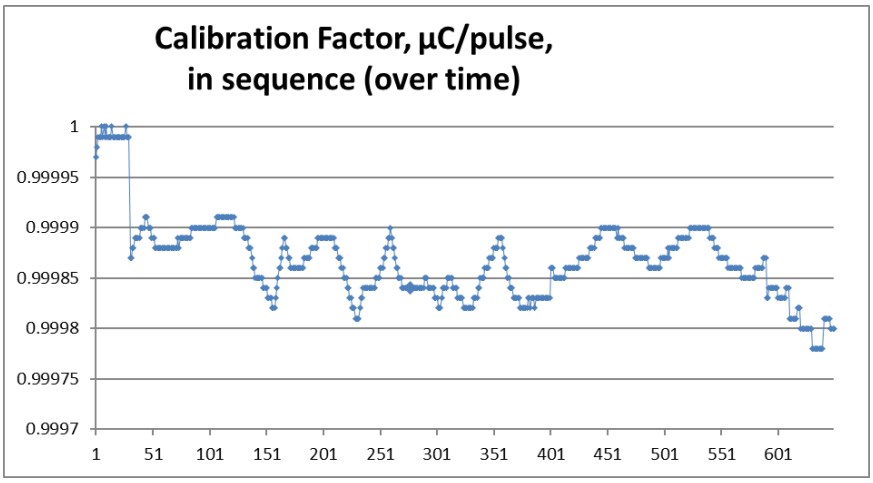

Figure 1. Results of Calibration Factor over time.

The integrator response test data, the comparison of the 20-Ohm load resistor versus the 50-Ohm electrical calibration resistor data, and the integrator linearity test from 100 uA to 150 mA data, were all converted into graphs for ease of inspection. The graphs all have similar features. These tests were performed separately, but they are interrelated because the components being measured are interconnected in the potentiostat and integrator circuits. A typical set of graphs are shown below for linearity testing, integrator response testing, and load resistor testing:

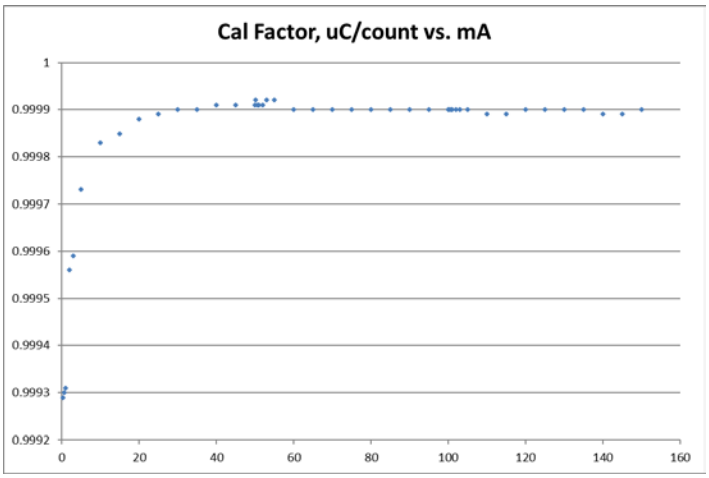

Figure 2. Typical results from linearity testing

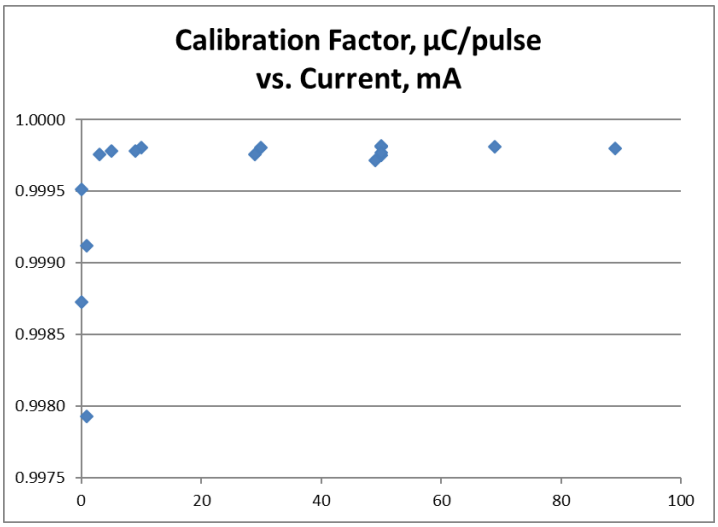

Figure 3. Typical results for Integrator Response testing.

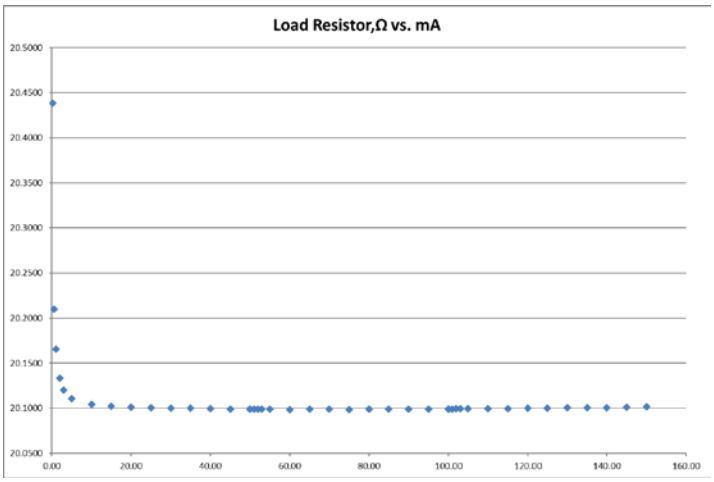

Figure 4. Typical results for load resistor testing

The graph of the Load resistor vs. Electrical calibration resistor is expected to be a mirror image of the integrator response and electrical calibration graphs.

In all three tests, the constant current levels generated by the potentiostat circuit covered the range from 0.2 to 150 mA. In all test, this current flows through both the load and electrical calibration resistors. At higher currents these two resistors are heated more than at lower currents. The shape of the three curves at currents above 5 mA may be dictated more by the minor differences in the thermal properties of the 50-Ohm calibration resistance (two 100-Ohm resistors in parallel) versus the 20-Ohm load resistance (five 100-Ohm resistors in parallel) then by all other potential contributors combined. At the lower constant current levels, the shape of the curves from the three tests may be driven more by the systematic uncertainty in the measuring of the relatively small voltage drops across the load and calibration resistors at low currents than the actual non-linearity of the integration circuit.

A total of 10 Plutonium measurements were performed using the SRNL cell setup and SRNL Coulometer for LANL. Plutonium measurements were also performed with SRNL cell setup and SRNL Coulometer. A Grubs test was performed and indicated an outlier on each set of measurements. The outlier was not included in calculations. An ANOVA single factor test was performed and indicated no statistical difference between groups. Results are presented in Table 2 and Table 3. The sample aliquots each contained nominally 15 mg Pu and were measured using the SRNL method (ISO 12183, ASTM C1165).

Analysis Date	% RD	Recovery, %
5/6/2020	0.0818	100.08
5/7/2020	0.0679	100.07
5/7/2020	0.0733	100.07
5/18/2020	-0.0128	99.99
5/18/2020	0.0044	100.00
5/19/2020	-0.0374	99.96
5/19/2020	-0.0419	99.96
5/19/2020	-0.0554	99.94
5/20/2020	-0.0026	100.00
5/20/2020	-0.0206	99.98

Average:	0.0057	100.0057
Std Deviation:	0.0005	0.0005

Table 2. Summary of results using LANL coulometer.

Based upon these test results the system was assessed by SRNL staff as having met the performance and design criteria used to determine proper functionality of the system.

Attached to this report are the following:

Attachment 1. Component Calibration Results
Attachment 2. Calib file documenting the calibration factor
Attachment 3. Linear file documenting the linearity of the instrument
Attachment 4. Instrument Par file that documents the value of the load impedance and calibration resistor.

Attachment 1. Component Calibration Results

LANL3 New Coulometer System, Calibrated on 2020-04-30-2020				
Lab Temperature 21 °C				
Aglient 34980A System Voltmeter Calibration				
HP3458 Std	**Mux 2001**	**Mux 2003**	**Slope**	**Diff Percent**
	Cal Resistor Volts	Load Volts		
2.4805000	2.4804900		0.9992600	0.000
0.9969400		0.996950	0.9938600	-0.001
Condition of System prior to aligning the Digital Integrator				
K17 Relay Energized				
DAC 3001 = 2.5 V				
DAC 3002 = 2.5 V				

As Found Load Impedance and System Calibration Resistor Measurement				
R_{Std} resistor				
SRNL Calibration	Temp / °C	Resistance / Ω		
	20	99.998448		
	23	99.998211		
Temperature coefficient / Ω °C^{-1}			-0.00008	
Actual Temperature / °C	21			
Temperature Δ from 20 °C	1.00000			
Change in Resistance / ΔΩ		-0.00008		
Corrected Resistance / Ω		**99.99837**		

R_{Load} Measurement				
V_{Std} / V	2.486240			
V_{Load} / V	0.499640			
I_{Load} / A	0.0248628			
R_{Load} / Ω	**20.0959**			
R_{Cal} Measurement				
V_{Cal} / V	2.48062			
V_{Load} / V	0.996980			
I_{Cal} / A	0.0496112			
R_{Cal} / Ω	**50.0013**			
Entered new R_{Load} and R_{Cal} into CPCInstr.par file on:		**4/30/2020**		

Voltage-to-Frequency Convertor Alignment Check 04-30-2020				
Readout	999.8	Hz	999.8	
Offset	1000.5	Hz	1000.5	
Clock	9,999.95	Hz		

3458 Load Voltage / V	HP53132A / Hz	With offset subtracted / Hz	Theoretical (without offset) / Hz	% Non Linearity
0.0000	999.8	0.000	0.000	
0.5	6000.2	5000.400	5000.000	0.008
1.00000	11000.6	10000.800	10000.000	0.008
2.00000	21000.5	20000.700	20000.000	0.004

Savannah River National Laboratory Measurement & Test Equipment

1) ASL Standard Resistor Model RR100, SRNL M&TE# 3-3110, Exp 06/26/2020
At 20 °C, R_{Std} = 99.9984482 Ω; At 23 °C, R_{Std} = 99.998211 Ω At 22Deg C 99.99829 Ω

2) Agilent 3458 Digital Volt Meter, SRNL M&TE# 3-4680, Exp 5/9/2020

3) Agilent 3458 Digital Volt Meter, SRNL M&TE# 3-6103, Exp 8/14/2020

4) Agilent 53132A Universal Counter, SRNL M&TE# 3-6106, Expires 4/29/2020
Cross Checked performed to validate perfomance, calibration expired less than 24 hours before cal expired due to COVID-19

5)Temperature Sensor, M&TE# 3-4430, Exp 8/20/2020

Attachment 2. Calib file documenting the calibration factor

```
**********************************************************************************
********************
JVC COMPONENT CALIBRATION OF LANL3 INSTRUMEMNT 04-30-2020
**********************************************************************************
********************


T&E Option       3
Date for Cal:   30 Apr 2020
Time for Cal:   12:44:06        Duration=        50      seconds
  .99997          .99998          .99999          .99999          .99999
1.00000   .99999         1.00000          .99999         1.00000
 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999990
 RSD:   0.0008  %        AT 13:03:21 ON 30 Apr 2020

  .99999          .99999          .99999          .99999         1.00000
.99999    .99999          .99999          .99999          .99999
 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999993
 RSD:   0.0002  %        AT 13:22:36 ON 30 Apr 2020

  .99999          .99999          .99999          .99999          .99999
.99999   1.00000          .99999          .99999          .99999
 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999992
 RSD:   0.0003  %        AT 13:41:51 ON 30 Apr 2020

  .99999          .99999          .99999

         .99987          .99987          .99988          .99988          .99989
  .99989          .99989          .99989          .99989          .99990
 LENGTH OF TIME FOR: CALIBRATION=         200.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999885
 RSD:   0.0009  %        AT 18:21:24 ON 30 Apr 2020

  .99990          .99990          .99990          .99991          .99991
.99991    .99990          .99990          .99990          .99989
 LENGTH OF TIME FOR: CALIBRATION=         225.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999900
 RSD:   0.0005  %        AT 19:39:53 ON 30 Apr 2020

  .99989          .99989          .99988          .99988          .99988
.99988    .99988          .99988          .99988          .99988
 LENGTH OF TIME FOR: CALIBRATION=         250.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999881
 RSD:   0.0004  %        AT 21:06:17 ON 30 Apr 2020

  .99988          .99988          .99988          .99988          .99988
```

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.99988    .99988          .99988          .99988          .99988
 LENGTH OF TIME FOR: CALIBRATION=         275.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999880
 RSD:   0.0002  %        AT 22:40:34 ON 30 Apr 2020

  .99988          .99988          .99989          .99988          .99989
.99989    .99989          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         300.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999886
 RSD:   0.0002  %        AT 00:23:45 ON  1 May 2020

  .99989          .99989          .99989          .99989          .99990
.99990    .99990          .99990          .99990          .99990
 LENGTH OF TIME FOR: CALIBRATION=         325.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999896
 RSD:   0.0003  %        AT 02:15:49 ON  1 May 2020

  .99990          .99990          .99990          .99990          .99990
.99990    .99990          .99990          .99990          .99990
 LENGTH OF TIME FOR: CALIBRATION=         350.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999902
 RSD:   0.0001  %        AT 04:15:46 ON  1 May 2020

  .99990          .99990          .99990          .99990          .99990
.99990    .99991          .99991          .99991          .99991
 LENGTH OF TIME FOR: CALIBRATION=         375.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999905
 RSD:   0.0004  %        AT 06:23:38 ON  1 May 2020

  .99991          .99991          .99991          .99991          .99991
.99991    .99991          .99991          .99991          .99991
 LENGTH OF TIME FOR: CALIBRATION=         400.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999911
 RSD:   0.0002  %        AT 08:40:23 ON  1 May 2020

  .99991          .99991          .99990          .99990          .99990
.99990    .99990          .99990          .99990          .99990
 LENGTH OF TIME FOR: CALIBRATION=         425.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999901
 RSD:   0.0003  %        AT 11:05:02 ON  1 May 2020

  .99989          .99989          .99989          .99989          .99988
.99988    .99988          .99987          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         450.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999879
 RSD:   0.0013  %        AT 13:38:34 ON  1 May 2020

  .99985          .99985          .99985          .99985          .99985
.99985    .99985          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         475.0  SEC.
```

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 723A  AVERAGE CALIBRATION FACTOR:        .999846
 RSD:   0.0004  %        AT 16:19:59 ON  1 May 2020

  .99984          .99983          .99983          .99983          .99983
.99982    .99982          .99982          .99983          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999829
 RSD:   0.0006  %        AT 19:09:19 ON  1 May 2020

  .99985          .99986          .99986          .99987          .99988
.99989    .99989          .99988          .99988          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999873
 RSD:   0.0013  %        AT 21:58:39 ON  1 May 2020

  .99987          .99986          .99986          .99986          .99986
.99986    .99986          .99986          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999861
 RSD:   0.0003  %        AT 00:47:59 ON  2 May 2020

  .99986          .99986          .99986          .99987          .99987
.99987    .99987          .99987          .99987          .99988
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999868
 RSD:   0.0004  %        AT 03:37:18 ON  2 May 2020

  .99988          .99988          .99988          .99988          .99988
.99989    .99989          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999883
 RSD:   0.0005  %        AT 06:26:38 ON  2 May 2020

  .99989          .99989          .99989          .99989          .99989
.99989    .99989          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999890
 RSD:   0.0002  %        AT 09:15:58 ON  2 May 2020

  .99988          .99988          .99988          .99987          .99987
.99987    .99986          .99986          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999868
 RSD:   0.0012  %        AT 12:05:17 ON  2 May 2020

  .99985          .99984          .99984          .99983          .99983
.99982    .99982          .99982          .99981          .99981
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999827
 RSD:   0.0013  %        AT 14:54:37 ON  2 May 2020
```

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  .99981          .99981          .99982          .99983          .99983
.99984    .99984          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999831
 RSD:   0.0012  %        AT 17:43:57 ON  2 May 2020

  .99984          .99984          .99984          .99984          .99984
.99984    .99985          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999846
 RSD:   0.0003  %        AT 20:33:17 ON  2 May 2020

  .99986          .99986          .99986          .99987          .99987
.99988    .99988          .99989          .99989          .99990
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999876
 RSD:   0.0013  %        AT 23:22:36 ON  2 May 2020

  .99989          .99988          .99988          .99987          .99986
.99986    .99985          .99985          .99985          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999863
 RSD:   0.0016  %        AT 02:11:56 ON  3 May 2020

  .99984          .99984          .99984          .99984          .99984
.99984    .99984          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999839
 RSD:   0.0001  %        AT 05:01:16 ON  3 May 2020

  .99984          .99984          .99984          .99984          .99984
.99984    .99984          .99984          .99984          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999843
 RSD:   0.0002  %        AT 07:50:36 ON  3 May 2020

  .99985          .99985          .99984          .99984          .99984
.99984    .99984          .99984          .99983          .99983
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999840
 RSD:   0.0005  %        AT 10:39:56 ON  3 May 2020

  .99983          .99982          .99982          .99982          .99983
.99984    .99984          .99984          .99984          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999834
 RSD:   0.0010  %        AT 13:29:15 ON  3 May 2020

  .99985          .99985          .99985          .99985          .99984
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.99984    .99984          .99984          .99983          .99983
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999840
 RSD:   0.0005  %        AT 16:18:35 ON  3 May 2020

  .99983          .99983          .99983          .99982          .99982
.99982    .99982          .99982          .99982          .99982
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999825
 RSD:   0.0003  %        AT 19:07:55 ON  3 May 2020

  .99982          .99982          .99983          .99983          .99983
.99983    .99984          .99984          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999834
 RSD:   0.0010  %        AT 21:57:15 ON  3 May 2020

  .99985          .99985          .99986          .99986          .99986
.99986    .99987          .99987          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999863
 RSD:   0.0007  %        AT 00:46:35 ON  4 May 2020

  .99988          .99988          .99988          .99988          .99989
.99989    .99989          .99989          .99988          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999884
 RSD:   0.0006  %        AT 03:35:54 ON  4 May 2020

  .99986          .99986          .99985          .99985          .99984
.99984    .99984          .99983          .99983          .99983
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999844
 RSD:   0.0010  %        AT 06:25:14 ON  4 May 2020

  .99983          .99983          .99983          .99982          .99982
.99982    .99982          .99982          .99982          .99982          .99982
  .99982          .99982
 LENGTH OF TIME FOR: CALIBRATION=         200.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999822
 RSD:   0.0002  %        AT 18:39:10 ON  4 May 2020

  .99983          .99983          .99982          .99983          .99983
.99983    .99982          .99983          .99983          .99983
 LENGTH OF TIME FOR: CALIBRATION=         225.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999825
 RSD:   0.0001  %        AT 19:57:40 ON  4 May 2020

  .99983          .99983          .99983          .99983          .99983
.99983    .99983          .99983          .99983          .99983
```

```
 LENGTH OF TIME FOR: CALIBRATION=         250.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999828
 RSD:   0.0002  %        AT 21:24:03 ON  4 May 2020

  .99983          .99983          .99983          .99983          .99983
.99983    .99983          .99983          .99983          .99984
 LENGTH OF TIME FOR: CALIBRATION=         275.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999833
 RSD:   0.0002  %        AT 22:58:21 ON  4 May 2020

  .99984          .99984          .99984          .99984          .99984
.99984    .99984          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         300.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999838
 RSD:   0.0001  %        AT 00:41:32 ON  5 May 2020

  .99984          .99984          .99984          .99984          .99984
.99984    .99984          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         325.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999842
 RSD:   0.0001  %        AT 02:33:35 ON  5 May 2020

  .99984          .99985          .99985          .99985          .99985
.99985    .99985          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         350.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999846
 RSD:   0.0001  %        AT 04:33:33 ON  5 May 2020

  .99985          .99985          .99985          .99985          .99985
.99985    .99985          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         375.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999852
 RSD:   0.0002  %        AT 06:41:25 ON  5 May 2020

  .99986          .99986          .99986          .99986          .99979
.99979    .99979          .99979          .99979          .99979          .99979
  .99979          .99979          .99979
 LENGTH OF TIME FOR: CALIBRATION=         200.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999791
 RSD:   0.0002  %        AT 20:28:37 ON  5 May 2020

  .99979          .99980          .99980          .99980          .99980
.99980    .99980          .99980          .99980          .99980
 LENGTH OF TIME FOR: CALIBRATION=         225.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999797
 RSD:   0.0001  %        AT 21:47:07 ON  5 May 2020

  .99980          .99980          .99980          .99980          .99980
.99980    .99980          .99980          .99980          .99980
 LENGTH OF TIME FOR: CALIBRATION=         250.0  SEC.
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 723A  AVERAGE CALIBRATION FACTOR:        .999802
 RSD:   0.0002  %        AT 23:13:30 ON  5 May 2020

  .99980          .99980          .99981          .99980          .99981
.99981    .99981          .99981          .99981          .99981
 LENGTH OF TIME FOR: CALIBRATION=         275.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999805
 RSD:   0.0001  %        AT 00:47:47 ON  6 May 2020

  .99981          .99981          .99981          .99981          .99981
.99981    .99981          .99981          .99981          .99981
 LENGTH OF TIME FOR: CALIBRATION=         300.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999809
 RSD:   0.0001  %        AT 02:30:58 ON  6 May 2020

  .99981          .99981          .99981          .99981          .99981
.99981    .99981          .99981          .99981          .99981
 LENGTH OF TIME FOR: CALIBRATION=         325.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999812
 RSD:   0.0001  %        AT 04:23:02 ON  6 May 2020

  .99981          .99981          .99981          .99982          .99982
.99982    .99982          .99982          .99982          .99982
 LENGTH OF TIME FOR: CALIBRATION=         350.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999817
 RSD:   0.0003  %        AT 06:23:00 ON  6 May 2020

  .99982          .99982          .99983          .99983          .99983
.99983    .99983          .99982          .99983          .99983          .99983
  .99983          .99983          .99983          .99984          .99984
.99984
 LENGTH OF TIME FOR: CALIBRATION=         200.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999833
 RSD:   0.0005  %        AT 20:49:06 ON  6 May 2020

  .99984          .99984          .99984          .99984          .99984
.99984    .99985          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         225.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999844
 RSD:   0.0003  %        AT 22:07:35 ON  6 May 2020

  .99985          .99985          .99985          .99985          .99985
.99986    .99986          .99986          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         250.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999855
 RSD:   0.0005  %        AT 23:33:59 ON  6 May 2020

  .99986          .99986          .99986          .99987          .99987
.99987    .99987          .99987          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         275.0  SEC.
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 723A  AVERAGE CALIBRATION FACTOR:        .999868
 RSD:   0.0003  %        AT 01:08:16 ON  7 May 2020

  .99987          .99987          .99988          .99988          .99988
.99988    .99988          .99988          .99988          .99988
 LENGTH OF TIME FOR: CALIBRATION=         300.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999876
 RSD:   0.0002  %        AT 02:51:27 ON  7 May 2020

  .99988          .99988          .99988          .99988          .99988
.99988    .99988          .99988          .99988          .99988
 LENGTH OF TIME FOR: CALIBRATION=         325.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999880
 RSD:   0.0001  %        AT 04:43:31 ON  7 May 2020

  .99988          .99988          .99988          .99988          .99988
.99988    .99988          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         350.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999883
 RSD:   0.0002  %        AT 06:43:28 ON  7 May 2020

  .99989          .99989          .99989          .99989          .99989
.99989    .99989          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         375.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999890
 RSD:   0.0001  %        AT 08:51:20 ON  7 May 2020

  .99989          .99985          .99985          .99985          .99985
.99985    .99985          .99985          .99985          .99986          .99985

 LENGTH OF TIME FOR: CALIBRATION=         200.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999852
 RSD:   0.0003  %        AT 20:08:57 ON  7 May 2020

  .99986          .99986          .99986          .99986          .99986
.99986    .99986          .99986          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         225.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999857
 RSD:   0.0001  %        AT 21:27:26 ON  7 May 2020

  .99986          .99986          .99986          .99986          .99986
.99986    .99986          .99986          .99986          .99987
 LENGTH OF TIME FOR: CALIBRATION=         250.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999862
 RSD:   0.0002  %        AT 22:53:50 ON  7 May 2020

  .99987          .99987          .99987          .99987          .99987
.99987    .99987          .99987          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         275.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999868
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 RSD:   0.0002  %        AT 00:28:07 ON  8 May 2020

  .99987          .99987          .99987          .99987          .99988
.99987    .99988          .99988          .99988          .99988
 LENGTH OF TIME FOR: CALIBRATION=         300.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999875
 RSD:   0.0002  %        AT 02:11:18 ON  8 May 2020

  .99988          .99988          .99988          .99988          .99988
.99988    .99988          .99988          .99988          .99988
 LENGTH OF TIME FOR: CALIBRATION=         325.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999881
 RSD:   0.0002  %        AT 04:03:16 ON  8 May 2020

  .99989          .99988          .99989          .99989          .99989
.99989    .99989          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         350.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999887
 RSD:   0.0002  %        AT 06:03:13 ON  8 May 2020

  .99989          .99989          .99989          .99989          .99989
.99989    .99989          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         375.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999893
 RSD:   0.0001  %        AT 08:11:05 ON  8 May 2020

  .99990          .99989          .99989          .99989          .99989
.99989    .99989          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         400.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999892
 RSD:   0.0003  %        AT 10:27:50 ON  8 May 2020

  .99988          .99988          .99988          .99988          .99988
.99987    .99987          .99987          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         425.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999874
 RSD:   0.0006  %        AT 12:52:28 ON  8 May 2020

  .99986          .99986          .99986          .99986          .99986
.99986    .99986          .99986          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         450.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999862
 RSD:   0.0001  %        AT 15:26:00 ON  8 May 2020

  .99986          .99986          .99986          .99986          .99986
.99986    .99986          .99986          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         475.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999859
 RSD:   0.0001  %        AT 18:07:25 ON  8 May 2020
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  .99986          .99986          .99986          .99985          .99985
.99985    .99985          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999854
 RSD:   0.0002  %        AT 20:56:45 ON  8 May 2020

  .99985          .99985          .99985          .99986          .99986
.99986    .99986          .99986          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999856
 RSD:   0.0002  %        AT 23:46:04 ON  8 May 2020

  .99986          .99986          .99986          .99986          .99986
.99987    .99987          .99987          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999866
 RSD:   0.0003  %        AT 02:35:24 ON  9 May 2020

  .99987          .99987          .99987          .99987          .99988
.99988    .99988          .99988          .99988          .99989
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999877
 RSD:   0.0006  %        AT 05:24:43 ON  9 May 2020

  .99989          .99989          .99989          .99989          .99990
.99990    .99990          .99990          .99990          .99990
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999896
 RSD:   0.0003  %        AT 08:14:03 ON  9 May 2020

  .99990          .99990          .99990          .99990          .99990
.99990    .99990          .99990          .99989          .99990
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999897
 RSD:   0.0002  %        AT 11:03:23 ON  9 May 2020

  .99989          .99989          .99989          .99989          .99989
.99988    .99988          .99988          .99988          .99988
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999887
 RSD:   0.0005  %        AT 13:52:42 ON  9 May 2020

  .99988          .99988          .99988          .99988          .99987
.99987    .99987          .99987          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:         .999873
 RSD:   0.0004  %        AT 16:42:02 ON  9 May 2020

  .99987          .99987          .99987          .99987          .99987
.99987    .99986          .99986          .99986          .99986
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 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999865
 RSD:   0.0002  %        AT 19:31:21 ON  9 May 2020

  .99986          .99986          .99986          .99986          .99986
.99986    .99986          .99987          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999864
 RSD:   0.0002  %        AT 22:20:41 ON  9 May 2020

  .99987          .99987          .99987          .99988          .99987
.99988    .99988          .99988          .99988          .99988
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999876
 RSD:   0.0004  %        AT 01:10:01 ON 10 May 2020

  .99988          .99988          .99989          .99989          .99989
.99989    .99989          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999889
 RSD:   0.0004  %        AT 03:59:20 ON 10 May 2020

  .99989          .99989          .99990          .99990          .99990
.99990    .99990          .99990          .99990          .99990
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999898
 RSD:   0.0003  %        AT 06:48:40 ON 10 May 2020

  .99990          .99990          .99990          .99990          .99990
.99990    .99990          .99990          .99990          .99990
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999902
 RSD:   0.0002  %        AT 09:38:00 ON 10 May 2020

  .99989          .99989          .99989          .99989          .99988
.99988    .99988          .99988          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999883
 RSD:   0.0008  %        AT 12:27:19 ON 10 May 2020

  .99987          .99987          .99987          .99987          .99987
.99987    .99986          .99986          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999866
 RSD:   0.0003  %        AT 15:16:39 ON 10 May 2020

  .99986          .99986          .99986          .99986          .99986
.99986    .99986          .99986          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999857
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 RSD:   0.0003  %        AT 18:05:58 ON 10 May 2020

  .99985          .99985          .99985          .99985          .99985
.99985    .99985          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999852
 RSD:   0.0001  %        AT 20:55:18 ON 10 May 2020

  .99985          .99985          .99985          .99985          .99985
.99985    .99986          .99986          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999853
 RSD:   0.0003  %        AT 23:44:37 ON 10 May 2020

  .99986          .99986          .99986          .99986          .99986
.99986    .99986          .99987          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999863
 RSD:   0.0003  %        AT 02:33:57 ON 11 May 2020

  .99987          .99987          .99987          .99987          .99987
.99987    .99988          .99988          .99988          .99988
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999874
 RSD:   0.0003  %        AT 05:23:16 ON 11 May 2020

  .99988          .99988          .99988          .99988          .99988
.99988    .99989          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999884
 RSD:   0.0002  %        AT 08:12:36 ON 11 May 2020

  .99989          .99989          .99988          .99988          .99988
.99988    .99987          .99987          .99987          .99986
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999877
 RSD:   0.0009  %        AT 11:01:56 ON 11 May 2020

  .99986          .99986          .99985          .99985          .99985
.99985    .99985          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999849
 RSD:   0.0005  %        AT 13:51:15 ON 11 May 2020

  .99984          .99984          .99984          .99984          .99984
.99984    .99984          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999839
 RSD:   0.0003  %        AT 16:40:35 ON 11 May 2020
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  .99984          .99983          .99983          .99983          .99983
.99983    .99983          .99983          .99983          .99983
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999833
 RSD:   0.0001  %        AT 19:29:54 ON 11 May 2020

  .99983          .99983          .99983          .99983          .99983
.99983    .99983          .99983          .99983          .99983
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999831
 RSD:   0.0001  %        AT 22:19:14 ON 11 May 2020

  .99983          .99983          .99984          .99984          .99984
.99984    .99984          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999838
 RSD:   0.0003  %        AT 01:08:33 ON 12 May 2020

  .99984          .99984          .99984          .99985          .99985
.99985    .99985          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999848
 RSD:   0.0003  %        AT 03:57:53 ON 12 May 2020

  .99985          .99985          .99985          .99986          .99986
.99986    .99986          .99986          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999857
 RSD:   0.0003  %        AT 06:47:12 ON 12 May 2020

  .99986          .99986          .99986          .99986          .99987
.99987    .99986          .99986          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999864
 RSD:   0.0001  %        AT 09:36:32 ON 12 May 2020

  .99986          .99986          .99986          .99986          .99986
.99986    .99986          .99986          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999862
 RSD:   0.0002  %        AT 12:25:51 ON 12 May 2020

  .99986          .99985          .99985          .99985          .99985
.99985    .99984          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999848
 RSD:   0.0006  %        AT 15:15:11 ON 12 May 2020

  .99984          .99984          .99983          .99983          .99983
.99983    .99983          .99983          .99983          .99983
```

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 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999831
 RSD:   0.0004  %        AT 18:04:30 ON 12 May 2020

  .99982          .99982          .99982          .99982          .99982
.99982    .99982          .99982          .99982          .99982
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999822
 RSD:   0.0001  %        AT 20:53:50 ON 12 May 2020

  .99982          .99982          .99982          .99982          .99982
.99983    .99982          .99982          .99983          .99983
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999824
 RSD:   0.0002  %        AT 23:43:09 ON 12 May 2020

  .99983          .99983          .99983          .99983          .99983
.99983    .99983          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999833
 RSD:   0.0003  %        AT 02:32:29 ON 13 May 2020

  .99984          .99984          .99984          .99984          .99984
.99984    .99984          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999843
 RSD:   0.0004  %        AT 05:21:49 ON 13 May 2020

  .99985          .99985          .99985          .99985          .99985
.99985    .99985          .99985          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999852
 RSD:   0.0003  %        AT 08:11:08 ON 13 May 2020

  .99985          .99986          .99985          .99985          .99985
.99985    .99985          .99985          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999850
 RSD:   0.0004  %        AT 11:00:28 ON 13 May 2020

  .99984          .99984          .99984          .99984          .99984
.99984    .99983          .99983          .99983          .99983
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999837
 RSD:   0.0005  %        AT 13:49:47 ON 13 May 2020

  .99983          .99983          .99982          .99982          .99982
.99982    .99982          .99982          .99982          .99982
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999820
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 RSD:   0.0004  %        AT 16:39:07 ON 13 May 2020

  .99981          .99981          .99981          .99981          .99981
.99981    .99981          .99981          .99981          .99981
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999811
 RSD:   0.0002  %        AT 19:28:26 ON 13 May 2020

  .99981          .99981          .99981          .99981          .99981
.99981    .99981          .99981          .99981          .99981
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999807
 RSD:   0.0001  %        AT 22:17:46 ON 13 May 2020

  .99981          .99981          .99981          .99981          .99981
.99981    .99981          .99982          .99982          .99982
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999813
 RSD:   0.0002  %        AT 01:07:06 ON 14 May 2020

  .99982          .99982          .99982          .99982          .99982
.99982    .99982          .99982          .99982          .99983
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999822
 RSD:   0.0003  %        AT 03:56:25 ON 14 May 2020

  .99983          .99983          .99983          .99983          .99983
.99983    .99983          .99983          .99983          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999831
 RSD:   0.0003  %        AT 06:45:45 ON 14 May 2020

  .99984          .99984          .99984          .99984          .99984
.99984    .99984          .99987          .99987          .99987          .99987
  .99988          .99988          .99988          .99988          .99988
.99988
 LENGTH OF TIME FOR: CALIBRATION=         200.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999876
 RSD:   0.0005  %        AT 21:44:53 ON 26 May 2020

  .99988          .99988          .99988          .99988          .99989
.99989    .99989          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         225.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999886
 RSD:   0.0002  %        AT 23:03:38 ON 26 May 2020

  .99989          .99989          .99989          .99989          .99989
.99989    .99989          .99989          .99989          .99989
 LENGTH OF TIME FOR: CALIBRATION=         250.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999888
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```
 RSD:   0.0001  %        AT 00:30:18 ON 27 May 2020

  .99989          .99989          .99989          .99989          .99989
.99989    .99990          .99990          .99989          .99990
 LENGTH OF TIME FOR: CALIBRATION=         275.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999894
 RSD:   0.0002  %        AT 02:04:53 ON 27 May 2020

  .99990          .99990          .99990          .99990          .99990
.99990    .99990          .99990          .99990          .99990
 LENGTH OF TIME FOR: CALIBRATION=         300.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999899
 RSD:   0.0002  %        AT 03:47:24 ON 27 May 2020

  .99990          .99990          .99990          .99990          .99990
.99990    .99990          .99990          .99990          .99990
 LENGTH OF TIME FOR: CALIBRATION=         325.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999902
 RSD:   0.0001  %        AT 05:38:49 ON 27 May 2020

  .99990          .99990          .99990          .99990          .99990
.99990    .99990          .99990          .99990          .99991
 LENGTH OF TIME FOR: CALIBRATION=         350.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999904
 RSD:   0.0001  %        AT 07:39:10 ON 27 May 2020

  .99990          .99989          .99988          .99987          .99986
.99986    .99985          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         375.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999867
 RSD:   0.0018  %        AT 09:47:26 ON 27 May 2020

  .99985          .99986          .99986

T&E Option       3
Date for Cal:   29 May 2020
Time for Cal:   15:43:23        Duration=        50      seconds
  .99992          .99990          .99989          .99988          .99987
.99986    .99986          .99985          .99985          .99984
 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.

Cal Temperatures:
  30.6    30.6    30.6    30.6    30.6
  30.6    30.6    30.6    30.6    30.6
 723A  AVERAGE CALIBRATION FACTOR:        .999873
  Temperature=   30.6
 RSD:   0.0025  %        AT 16:02:45 ON 29 May 2020
```

```
T&E Option       1
Date for Cal:   29 May 2020
Time for Cal:   16:03:12        Duration=        500     seconds
  .99981          .99979          .99978          .99977          .99977
.99977    .99977          .99977          .99977          .99977
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  30.8    31.1    31.3    31.4    31.5
  31.5    31.6    31.5    31.5    31.5
 723A  AVERAGE CALIBRATION FACTOR:        .999779
  Temperature=   31.4
 RSD:   0.0012  %        AT 18:53:09 ON 29 May 2020

  .99978          .99978          .99978          .99978          .99979
.99979    .99979          .99979          .99980          .99980
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  31.5    31.5    31.4    31.4    31.3
  31.2    31.2    31.1    31.0    30.9
 723A  AVERAGE CALIBRATION FACTOR:        .999787
  Temperature=   31.2
 RSD:   0.0009  %        AT 21:43:07 ON 29 May 2020

  .99980          .99980          .99981          .99981          .99981
.99982    .99981          .99982          .99982          .99982
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  30.9    30.9    30.8    30.7    30.7
  30.6    30.7    30.7    30.6    30.6
 723A  AVERAGE CALIBRATION FACTOR:        .999812
  Temperature=   30.7
 RSD:   0.0006  %        AT 00:33:05 ON 30 May 2020

  .99982          .99982          .99983          .99983          .99983
.99983    .99983          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  30.5    30.4    30.4    30.4    30.3
  30.3    30.2    30.2    30.2    30.2
 723A  AVERAGE CALIBRATION FACTOR:        .999831
  Temperature=   30.3
 RSD:   0.0006  %        AT 03:23:03 ON 30 May 2020

  .99984          .99984          .99985          .99985          .99985
.99985    .99985          .99985          .99985          .99986
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
```

```
Cal Temperatures:
  30.1    30.1    30.1    30.0    30.0
  30.0    29.9    29.9    29.8    29.8
 723A  AVERAGE CALIBRATION FACTOR:        .999849
  Temperature=   30.0
 RSD:   0.0005  %        AT 06:13:01 ON 30 May 2020

  .99986          .99986          .99986          .99986          .99986
.99986    .99986          .99986          .99986          .99986
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  29.8    29.8    29.7    29.7    29.7
  29.6    29.6    29.6    29.6    29.6
 723A  AVERAGE CALIBRATION FACTOR:        .999861
  Temperature=   29.7
 RSD:   0.0002  %        AT 09:02:59 ON 30 May 2020

  .99986          .99986          .99986          .99986          .99986
.99986    .99985          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  29.6    29.6    29.7    29.7    29.7
  29.7    29.8    29.8    29.9    29.9
 723A  AVERAGE CALIBRATION FACTOR:        .999855
  Temperature=   29.7
 RSD:   0.0005  %        AT 11:52:57 ON 30 May 2020

  .99984          .99984          .99984          .99983          .99983
.99983    .99982          .99982          .99982          .99982
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  30.0    30.1    30.2    30.2    30.3
  30.3    30.4    30.5    30.5    30.6
 723A  AVERAGE CALIBRATION FACTOR:        .999829
  Temperature=   30.3
 RSD:   0.0008  %        AT 14:42:55 ON 30 May 2020

  .99981          .99981          .99981          .99981          .99981
.99980    .99980          .99980          .99980          .99980
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  30.7    30.7    30.8    30.8    30.8
  30.8    30.8    30.9    31.0    31.0
 723A  AVERAGE CALIBRATION FACTOR:        .999806
  Temperature=   30.8
```

```
 RSD:   0.0005  %        AT 17:32:52 ON 30 May 2020

  .99979          .99979          .99979          .99979          .99979
.99978    .99978          .99978          .99978          .99978
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  31.1    31.1    31.2    31.2    31.3
  31.2    31.3    31.3    31.3    31.3
 723A  AVERAGE CALIBRATION FACTOR:        .999787
  Temperature=   31.2
 RSD:   0.0004  %        AT 20:22:50 ON 30 May 2020

  .99979          .99979          .99979          .99979          .99980
.99980    .99980          .99981          .99981          .99981
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  31.3    31.2    31.2    31.1    31.0
  31.0    30.8    30.8    30.7    30.6
 723A  AVERAGE CALIBRATION FACTOR:        .999798
  Temperature=   31.0
 RSD:   0.0010  %        AT 23:12:48 ON 30 May 2020

  .99982          .99982          .99982          .99982          .99982
.99983    .99983          .99983          .99983          .99983
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  30.5    30.5    30.5    30.4    30.4
  30.3    30.3    30.2    30.2    30.2
 723A  AVERAGE CALIBRATION FACTOR:        .999825
  Temperature=   30.4
 RSD:   0.0006  %        AT 02:02:46 ON 31 May 2020

  .99984          .99984          .99984          .99984          .99984
.99984    .99985          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  30.1    30.1    30.0    30.0    30.0
  29.9    29.9    29.8    29.8    29.8
 723A  AVERAGE CALIBRATION FACTOR:        .999845
  Temperature=   29.9
 RSD:   0.0006  %        AT 04:52:43 ON 31 May 2020

  .99986          .99986          .99986          .99986          .99986
.99987    .99987          .99987          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.
```

```
Cal Temperatures:
  29.7    29.7    29.7    29.6    29.6
  29.6    29.5    29.4    29.4    29.4
 723A  AVERAGE CALIBRATION FACTOR:        .999865
  Temperature=   29.6
 RSD:   0.0006  %        AT 07:42:41 ON 31 May 2020

  .99987          .99987          .99987          .99987          .99987
.99987    .99987          .99987          .99987          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  29.4    29.4    29.4    29.4    29.4
  29.3    29.4    29.4    29.4    29.4
 723A  AVERAGE CALIBRATION FACTOR:        .999871
  Temperature=   29.4
 RSD:   0.0001  %        AT 10:32:40 ON 31 May 2020

  .99987          .99986          .99986          .99986          .99986
.99986    .99985          .99985          .99985          .99985
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  29.5    29.5    29.5    29.6    29.6
  29.7    29.7    29.8    29.8    29.9
 723A  AVERAGE CALIBRATION FACTOR:        .999857
  Temperature=   29.6
 RSD:   0.0007  %        AT 13:22:38 ON 31 May 2020

  .99984          .99984          .99984          .99984          .99983
.99983    .99983          .99983          .99982          .99982
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  30.0    30.0    30.1    30.1    30.2
  30.3    30.3    30.3    30.4    30.4
 723A  AVERAGE CALIBRATION FACTOR:        .999832
  Temperature=   30.2
 RSD:   0.0007  %        AT 16:12:35 ON 31 May 2020

  .99982          .99982          .99982          .99981          .99981
.99981    .99981          .99980          .99980          .99980
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  30.4    30.5    30.6    30.6    30.6
  30.7    30.8    30.8    30.8    30.8
 723A  AVERAGE CALIBRATION FACTOR:        .999810
  Temperature=   30.7
 RSD:   0.0006  %        AT 19:02:33 ON 31 May 2020
```

```
  .99980          .99980          .99980          .99980          .99980
.99981    .99981          .99981          .99981          .99982
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  30.8    30.8    30.8    30.8    30.8
  30.8    30.8    30.7    30.6    30.5
 723A  AVERAGE CALIBRATION FACTOR:        .999806
  Temperature=   30.7
 RSD:   0.0005  %        AT 21:52:31 ON 31 May 2020

  .99982          .99982          .99983          .99983          .99983
.99983    .99983          .99984          .99984          .99984
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  30.5    30.4    30.3    30.2    30.2
  30.1    30.2    30.1    30.1    30.0
 723A  AVERAGE CALIBRATION FACTOR:        .999831
  Temperature=   30.2
 RSD:   0.0007  %        AT 00:42:29 ON  1 Jun 2020

  .99984          .99985          .99985          .99985          .99985
.99986    .99986          .99986          .99986          .99987
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  29.9    29.9    29.8    29.8    29.7
  29.7    29.6    29.6    29.5    29.5
 723A  AVERAGE CALIBRATION FACTOR:        .999856
  Temperature=   29.7
 RSD:   0.0007  %        AT 03:32:27 ON  1 Jun 2020

  .99987          .99987          .99987          .99987          .99988
.99988    .99988          .99988          .99988          .99988
 LENGTH OF TIME FOR: CALIBRATION=         500.0  SEC.

Cal Temperatures:
  29.5    29.4    29.4    29.4    29.3
  29.3    29.2    29.2    29.2    29.1
 723A  AVERAGE CALIBRATION FACTOR:        .999877
  Temperature=   29.3
 RSD:   0.0006  %        AT 06:22:24 ON  1 Jun 2020

  .99989          .99989          .99989          .99990          .99990
.99990    .99990          .99990          .99990
```

Attachment 3. Linear file documenting the linearity of the instrument

LANL3 DIGITAL INTEGRATOR RESPONSE TEST
MEASURE Hz/VOLT AND THEORETICAL uCOULOMBS/COUNT AT SPECIFIED CURRENT LEVELS

		Calculated Hz/V	Actual Hz/V	Cal Factor uC/count
OFFSET RATE OF VFC1, Hz:	4972.0	999.2		
CURRENT,mA: .2	INTEGRATOR RESPONSE RATE:	49797.0	10007.1	.99929
CURRENT,mA: .6	INTEGRATOR RESPONSE RATE:	49796.4	10007.0	.99930
CURRENT,mA: 1.0	INTEGRATOR RESPONSE RATE:	49795.7	10006.9	.99931
CURRENT,mA: 2.0	INTEGRATOR RESPONSE RATE:	49783.3	10004.4	.99956
CURRENT,mA: 3.0	INTEGRATOR RESPONSE RATE:	49782.0	10004.1	.99959
CURRENT,mA: 5.0	INTEGRATOR RESPONSE RATE:	49775.0	10002.7	.99973
CURRENT,mA: 10.0	INTEGRATOR RESPONSE RATE:	49770.0	10001.7	.99983
CURRENT,mA: 15.0	INTEGRATOR RESPONSE RATE:	49768.7	10001.5	.99985
CURRENT,mA: 20.0	INTEGRATOR RESPONSE RATE:	49767.2	10001.2	.99988
CURRENT,mA: 25.0	INTEGRATOR RESPONSE RATE:	49766.7	10001.1	.99989
CURRENT,mA: 30.0	INTEGRATOR RESPONSE RATE:	49766.4	10001.0	.99990
CURRENT,mA: 35.0	INTEGRATOR RESPONSE RATE:	49766.6	10001.0	.99990
CURRENT,mA: 40.0	INTEGRATOR RESPONSE RATE:	49765.8	10000.9	.99991
CURRENT,mA: 45.0	INTEGRATOR RESPONSE RATE:	49766.0	10000.9	.99991
CURRENT,mA: 50.0	INTEGRATOR RESPONSE RATE:	49765.8	10000.9	.99991
CURRENT,mA: 50.2	INTEGRATOR RESPONSE RATE:	49765.6	10000.8	.99992
CURRENT,mA: 50.6	INTEGRATOR RESPONSE RATE:	49765.7	10000.9	.99991
CURRENT,mA: 51.0	INTEGRATOR RESPONSE RATE:	49765.8	10000.9	.99991
CURRENT,mA: 52.0	INTEGRATOR RESPONSE RATE:	49765.7	10000.9	.99991
CURRENT,mA: 53.0	INTEGRATOR RESPONSE RATE:	49765.4	10000.8	.99992
CURRENT,mA: 55.0	INTEGRATOR RESPONSE RATE:	49765.6	10000.8	.99992
CURRENT,mA: 60.0	INTEGRATOR RESPONSE RATE:	49766.6	10001.0	.99990
CURRENT,mA: 65.0	INTEGRATOR RESPONSE RATE:	49766.6	10001.0	.99990
CURRENT,mA: 70.0	INTEGRATOR RESPONSE RATE:	49766.2	10001.0	.99990
CURRENT,mA: 75.0	INTEGRATOR RESPONSE RATE:	49766.5	10001.0	.99990
CURRENT,mA: 80.0	INTEGRATOR RESPONSE RATE:	49766.4	10001.0	.99990
CURRENT,mA: 85.0	INTEGRATOR RESPONSE RATE:	49766.4	10001.0	.99990
CURRENT,mA: 90.0	INTEGRATOR RESPONSE RATE:	49766.4	10001.0	.99990
CURRENT,mA: 95.0	INTEGRATOR RESPONSE RATE:	49766.6	10001.0	.99990
CURRENT,mA: 100.0	INTEGRATOR RESPONSE RATE:	49766.5	10001.0	.99990
CURRENT,mA: 100.2	INTEGRATOR RESPONSE RATE:	49766.6	10001.0	.99990
CURRENT,mA: 100.6	INTEGRATOR RESPONSE RATE:	49766.6	10001.0	.99990
CURRENT,mA: 101.0	INTEGRATOR RESPONSE RATE:	49766.4	10001.0	.99990
CURRENT,mA: 102.0	INTEGRATOR RESPONSE RATE:	49766.6	10001.0	.99990
CURRENT,mA: 103.0	INTEGRATOR RESPONSE RATE:	49766.4	10001.0	.99990
CURRENT,mA: 105.0	INTEGRATOR RESPONSE RATE:	49766.6	10001.0	.99990
CURRENT,mA: 110.0	INTEGRATOR RESPONSE RATE:	49766.7	10001.1	.99989
CURRENT,mA: 115.0	INTEGRATOR RESPONSE RATE:	49766.9	10001.1	.99989
CURRENT,mA: 120.0	INTEGRATOR RESPONSE RATE:	49766.6	10001.0	.99990
CURRENT,mA: 125.0	INTEGRATOR RESPONSE RATE:	49766.5	10001.0	.99990

```
CURRENT,mA:  130.0   INTEGRATOR RESPONSE RATE:   49766.6   10001.0    .99990
CURRENT,mA:  135.0   INTEGRATOR RESPONSE RATE:   49766.6   10001.0    .99990
CURRENT,mA:  140.0   INTEGRATOR RESPONSE RATE:   49766.7   10001.1    .99989
CURRENT,mA:  145.0   INTEGRATOR RESPONSE RATE:   49766.7   10001.1    .99989
CURRENT,mA:  150.0   INTEGRATOR RESPONSE RATE:   49766.6   10001.0    .99990

Calibration Resistor, value in PAR, Ohms:         50.0012
Load Impedance, value in PAR, Ohms:               20.0959


723A  LOAD RESISTOR vs CALIBRATION RESISTOR
Load Vs Cal measured with K17 Energized

CURRENT,mA:          .2 mA      LOAD RESISTOR,ohms:          20.4426   ohms
1.7254   %
CURRENT,mA:          .6 mA      LOAD RESISTOR,ohms:          20.2136   ohms
.5860    %
CURRENT,mA:         1.0 mA      LOAD RESISTOR,ohms:          20.1681   ohms
.3594    %
CURRENT,mA:         2.0 mA      LOAD RESISTOR,ohms:          20.1322   ohms
.1808    %
CURRENT,mA:         3.0 mA      LOAD RESISTOR,ohms:          20.1209   ohms
.1246    %
CURRENT,mA:         5.0 mA      LOAD RESISTOR,ohms:          20.1115   ohms
.0778    %
CURRENT,mA:        10.0 mA      LOAD RESISTOR,ohms:          20.1034   ohms
.0373    %
CURRENT,mA:        15.0 mA      LOAD RESISTOR,ohms:          20.1009   ohms
.0249    %
CURRENT,mA:        20.0 mA      LOAD RESISTOR,ohms:          20.0997   ohms
.0192    %
CURRENT,mA:        25.0 mA      LOAD RESISTOR,ohms:          20.0993   ohms
.0172    %
CURRENT,mA:        30.0 mA      LOAD RESISTOR,ohms:          20.0989   ohms
.0148    %
CURRENT,mA:        35.0 mA      LOAD RESISTOR,ohms:          20.0985   ohms
.0131    %
CURRENT,mA:        40.0 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0115    %
CURRENT,mA:        45.0 mA      LOAD RESISTOR,ohms:          20.0979   ohms
.0102    %
CURRENT,mA:        50.0 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0094    %
CURRENT,mA:        50.2 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0096    %
CURRENT,mA:        50.6 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0097    %
CURRENT,mA:        51.0 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0095    %
CURRENT,mA:        52.0 mA      LOAD RESISTOR,ohms:          20.0977   ohms
```

```
.0092    %
CURRENT,mA:        53.0 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0096    %
CURRENT,mA:        55.0 mA      LOAD RESISTOR,ohms:          20.0977   ohms
.0093    %
CURRENT,mA:        60.0 mA      LOAD RESISTOR,ohms:          20.0972   ohms
.0067    %
CURRENT,mA:        65.0 mA      LOAD RESISTOR,ohms:          20.0971   ohms
.0063    %
CURRENT,mA:        70.0 mA      LOAD RESISTOR,ohms:          20.0972   ohms
.0063    %
CURRENT,mA:        75.0 mA      LOAD RESISTOR,ohms:          20.0972   ohms
.0064    %
CURRENT,mA:        80.0 mA      LOAD RESISTOR,ohms:          20.0972   ohms
.0065    %
CURRENT,mA:        85.0 mA      LOAD RESISTOR,ohms:          20.0972   ohms
.0064    %
CURRENT,mA:        90.0 mA      LOAD RESISTOR,ohms:          20.0973   ohms
.0070    %
CURRENT,mA:        95.0 mA      LOAD RESISTOR,ohms:          20.0974   ohms
.0075    %
CURRENT,mA:       100.0 mA      LOAD RESISTOR,ohms:          20.0975   ohms
.0079    %
CURRENT,mA:       100.2 mA      LOAD RESISTOR,ohms:          20.0976   ohms
.0084    %
CURRENT,mA:       100.6 mA      LOAD RESISTOR,ohms:          20.0977   ohms
.0091    %
CURRENT,mA:       101.0 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0094    %
CURRENT,mA:       102.0 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0096    %
CURRENT,mA:       103.0 mA      LOAD RESISTOR,ohms:          20.0979   ohms
.0101    %
CURRENT,mA:       105.0 mA      LOAD RESISTOR,ohms:          20.0980   ohms
.0104    %
CURRENT,mA:       110.0 mA      LOAD RESISTOR,ohms:          20.0981   ohms
.0110    %
CURRENT,mA:       115.0 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0116    %
CURRENT,mA:       120.0 mA      LOAD RESISTOR,ohms:          20.0984   ohms
.0125    %
CURRENT,mA:       125.0 mA      LOAD RESISTOR,ohms:          20.0986   ohms
.0135    %
CURRENT,mA:       130.0 mA      LOAD RESISTOR,ohms:          20.0988   ohms
.0146    %
CURRENT,mA:       135.0 mA      LOAD RESISTOR,ohms:          20.0991   ohms
.0160    %
CURRENT,mA:       140.0 mA      LOAD RESISTOR,ohms:          20.0994   ohms
.0174    %
CURRENT,mA:       145.0 mA      LOAD RESISTOR,ohms:          20.0997   ohms
```

```
.0188    %
CURRENT,mA:       150.0 mA      LOAD RESISTOR,ohms:           20.1000   ohms
.0205    %


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99981          .99983          .99984          .99985          .99985

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999836
 RSD:   0.0016  %        AT 15:01:07 ON 30 Apr 2020

LINEARITY TEST:    99uA

     .99958          .99618          .99760          .99685          .99767

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .997573
 RSD:   0.1278  %        AT 15:10:46 ON 30 Apr 2020

LINEARITY TEST:   298uA

     .99866          .99901          .99898          .99857          .99879

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .998803
 RSD:   0.0193  %        AT 15:20:24 ON 30 Apr 2020

LINEARITY TEST:   496uA

     .99904          .99922          .99918          .99914          .99943

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999200
 RSD:   0.0143  %        AT 15:30:03 ON 30 Apr 2020

LINEARITY TEST:   993uA

     .99962          .99974          .99955          .99958          .99954

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999607
 RSD:   0.0079  %        AT 15:39:41 ON 30 Apr 2020

LINEARITY TEST:     3mA

     .99977          .99977          .99980          .99981          .99980
```

```
 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999793
 RSD:   0.0018  %        AT 15:49:20 ON 30 Apr 2020

LINEARITY TEST:     5mA

     .99984          .99987          .99984          .99987          .99985

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999853
 RSD:   0.0017  %        AT 15:58:59 ON 30 Apr 2020

LINEARITY TEST:    10mA

     .99987          .99987          .99987          .99987          .99987

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999871
 RSD:   0.0001  %        AT 16:08:37 ON 30 Apr 2020

LINEARITY TEST:    30mA

     .99988          .99988          .99988          .99988          .99987

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999878
 RSD:   0.0004  %        AT 16:18:16 ON 30 Apr 2020

LINEARITY TEST:    50mA

     .99988          .99988          .99987          .99988          .99988

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999879
 RSD:   0.0003  %        AT 16:27:55 ON 30 Apr 2020

LINEARITY TEST:    50mA

     .99989          .99989          .99989          .99988          .99989

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999889
 RSD:   0.0003  %        AT 16:33:37 ON 30 Apr 2020

LINEARITY TEST:    69mA

     .99989          .99989          .99989          .99988          .99989

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999886
```

```
 RSD:   0.0003  %        AT 16:39:18 ON 30 Apr 2020

LINEARITY TEST:    89mA

     .99988          .99988          .99988          .99987          .99987

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999876
 RSD:   0.0004  %        AT 16:45:00 ON 30 Apr 2020

LINEARITY TEST:   109mA

     .99986          .99986          .99986          .99985          .99986

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999859
 RSD:   0.0004  %        AT 16:50:42 ON 30 Apr 2020

LINEARITY TEST:   129mA

     .99984          .99983          .99983          .99983          .99983

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999833
 RSD:   0.0007  %        AT 16:56:23 ON 30 Apr 2020

LINEARITY TEST:   149mA

     .99981          .99980          .99979          .99979          .99979

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999797
 RSD:   0.0008  %        AT 17:02:05 ON 30 Apr 2020


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99984          .99985          .99986          .99986          .99987

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999858
 RSD:   0.0012  %        AT 17:11:44 ON 30 Apr 2020


723A  DIGITAL INTEGRATOR RESPONSE TEST
MEASURE Hz/VOLT AND THEORETICAL uCOULOMBS/COUNT AT SPECIFIED CURRENT LEVELS

                                        Calculated     Actual   Cal Factor
                                              Hz/V       Hz/V     uC/count
```

OFFSET RATE OF VFC1, Hz: 4973.2 999.4

CURRENT,mA:	.2	INTEGRATOR RESPONSE RATE:	49825.1	10012.8	.99872
CURRENT,mA:	.6	INTEGRATOR RESPONSE RATE:	49797.6	10007.3	.99927
CURRENT,mA:	1.0	INTEGRATOR RESPONSE RATE:	49797.9	10007.3	.99927
CURRENT,mA:	2.0	INTEGRATOR RESPONSE RATE:	49784.6	10004.7	.99953
CURRENT,mA:	3.0	INTEGRATOR RESPONSE RATE:	49777.6	10003.3	.99967
CURRENT,mA:	5.0	INTEGRATOR RESPONSE RATE:	49773.8	10002.5	.99975
CURRENT,mA:	10.0	INTEGRATOR RESPONSE RATE:	49771.3	10002.0	.99980
CURRENT,mA:	15.0	INTEGRATOR RESPONSE RATE:	49769.0	10001.5	.99985
CURRENT,mA:	20.0	INTEGRATOR RESPONSE RATE:	49768.0	10001.3	.99987
CURRENT,mA:	25.0	INTEGRATOR RESPONSE RATE:	49767.9	10001.3	.99987
CURRENT,mA:	30.0	INTEGRATOR RESPONSE RATE:	49767.4	10001.2	.99988
CURRENT,mA:	35.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989
CURRENT,mA:	40.0	INTEGRATOR RESPONSE RATE:	49766.4	10001.0	.99990
CURRENT,mA:	45.0	INTEGRATOR RESPONSE RATE:	49766.8	10001.1	.99989
CURRENT,mA:	50.0	INTEGRATOR RESPONSE RATE:	49766.4	10001.0	.99990
CURRENT,mA:	50.2	INTEGRATOR RESPONSE RATE:	49766.3	10001.0	.99990
CURRENT,mA:	50.6	INTEGRATOR RESPONSE RATE:	49766.0	10000.9	.99991
CURRENT,mA:	51.0	INTEGRATOR RESPONSE RATE:	49766.3	10001.0	.99990
CURRENT,mA:	52.0	INTEGRATOR RESPONSE RATE:	49766.4	10001.0	.99990
CURRENT,mA:	53.0	INTEGRATOR RESPONSE RATE:	49766.6	10001.0	.99990
CURRENT,mA:	55.0	INTEGRATOR RESPONSE RATE:	49766.4	10001.0	.99990
CURRENT,mA:	60.0	INTEGRATOR RESPONSE RATE:	49767.2	10001.2	.99988
CURRENT,mA:	65.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	70.0	INTEGRATOR RESPONSE RATE:	49767.3	10001.2	.99988
CURRENT,mA:	75.0	INTEGRATOR RESPONSE RATE:	49767.2	10001.2	.99988
CURRENT,mA:	80.0	INTEGRATOR RESPONSE RATE:	49766.8	10001.1	.99989
CURRENT,mA:	85.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	90.0	INTEGRATOR RESPONSE RATE:	49766.8	10001.1	.99989
CURRENT,mA:	95.0	INTEGRATOR RESPONSE RATE:	49766.8	10001.1	.99989
CURRENT,mA:	100.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989
CURRENT,mA:	100.2	INTEGRATOR RESPONSE RATE:	49766.9	10001.1	.99989
CURRENT,mA:	100.6	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	101.0	INTEGRATOR RESPONSE RATE:	49766.9	10001.1	.99989
CURRENT,mA:	102.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	103.0	INTEGRATOR RESPONSE RATE:	49766.8	10001.1	.99989
CURRENT,mA:	105.0	INTEGRATOR RESPONSE RATE:	49766.9	10001.1	.99989
CURRENT,mA:	110.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	115.0	INTEGRATOR RESPONSE RATE:	49766.8	10001.1	.99989
CURRENT,mA:	120.0	INTEGRATOR RESPONSE RATE:	49767.2	10001.1	.99989
CURRENT,mA:	125.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	130.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989
CURRENT,mA:	135.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	140.0	INTEGRATOR RESPONSE RATE:	49766.9	10001.1	.99989
CURRENT,mA:	145.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989
CURRENT,mA:	150.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989

Calibration Resistor, value in PAR, Ohms: 50.0012
Load Impedance, value in PAR, Ohms: 20.0959

723A LOAD RESISTOR vs CALIBRATION RESISTOR
Load Vs Cal measured with K17 Energized

CURRENT,mA:	.2 mA	LOAD RESISTOR,ohms:	20.4496	ohms	1.7603 %
CURRENT,mA:	.6 mA	LOAD RESISTOR,ohms:	20.2203	ohms	.6192 %
CURRENT,mA:	1.0 mA	LOAD RESISTOR,ohms:	20.1696	ohms	.3670 %
CURRENT,mA:	2.0 mA	LOAD RESISTOR,ohms:	20.1328	ohms	.1836 %
CURRENT,mA:	3.0 mA	LOAD RESISTOR,ohms:	20.1220	ohms	.1300 %
CURRENT,mA:	5.0 mA	LOAD RESISTOR,ohms:	20.1120	ohms	.0801 %
CURRENT,mA:	10.0 mA	LOAD RESISTOR,ohms:	20.1045	ohms	.0431 %
CURRENT,mA:	15.0 mA	LOAD RESISTOR,ohms:	20.1022	ohms	.0316 %
CURRENT,mA:	20.0 mA	LOAD RESISTOR,ohms:	20.1011	ohms	.0259 %
CURRENT,mA:	25.0 mA	LOAD RESISTOR,ohms:	20.1005	ohms	.0228 %
CURRENT,mA:	30.0 mA	LOAD RESISTOR,ohms:	20.0999	ohms	.0200 %
CURRENT,mA:	35.0 mA	LOAD RESISTOR,ohms:	20.0996	ohms	.0184 %
CURRENT,mA:	40.0 mA	LOAD RESISTOR,ohms:	20.0993	ohms	.0171 %
CURRENT,mA:	45.0 mA	LOAD RESISTOR,ohms:	20.0990	ohms	.0157 %
CURRENT,mA:	50.0 mA	LOAD RESISTOR,ohms:	20.0989	ohms	.0148 %
CURRENT,mA:	50.2 mA	LOAD RESISTOR,ohms:	20.0989	ohms	.0152 %
CURRENT,mA:	50.6 mA	LOAD RESISTOR,ohms:	20.0989	ohms	.0151 %
CURRENT,mA:	51.0 mA	LOAD RESISTOR,ohms:	20.0989	ohms	.0153 %
CURRENT,mA:	52.0 mA	LOAD RESISTOR,ohms:	20.0988	ohms	.0147 %
CURRENT,mA:	53.0 mA	LOAD RESISTOR,ohms:	20.0989	ohms	.0149 %
CURRENT,mA:	55.0 mA	LOAD RESISTOR,ohms:	20.0988	ohms	.0146 %
CURRENT,mA:	60.0 mA	LOAD RESISTOR,ohms:	20.0983	ohms	

```
.0122    %
CURRENT,mA:        65.0 mA      LOAD RESISTOR,ohms:          20.0983   ohms
.0120    %
CURRENT,mA:        70.0 mA      LOAD RESISTOR,ohms:          20.0983   ohms
.0118    %
CURRENT,mA:        75.0 mA      LOAD RESISTOR,ohms:          20.0983   ohms
.0119    %
CURRENT,mA:        80.0 mA      LOAD RESISTOR,ohms:          20.0983   ohms
.0119    %
CURRENT,mA:        85.0 mA      LOAD RESISTOR,ohms:          20.0983   ohms
.0120    %
CURRENT,mA:        90.0 mA      LOAD RESISTOR,ohms:          20.0984   ohms
.0124    %
CURRENT,mA:        95.0 mA      LOAD RESISTOR,ohms:          20.0985   ohms
.0131    %
CURRENT,mA:       100.0 mA      LOAD RESISTOR,ohms:          20.0986   ohms
.0133    %
CURRENT,mA:       100.2 mA      LOAD RESISTOR,ohms:          20.0986   ohms
.0137    %
CURRENT,mA:       100.6 mA      LOAD RESISTOR,ohms:          20.0988   ohms
.0144    %
CURRENT,mA:       101.0 mA      LOAD RESISTOR,ohms:          20.0988   ohms
.0147    %
CURRENT,mA:       102.0 mA      LOAD RESISTOR,ohms:          20.0989   ohms
.0150    %
CURRENT,mA:       103.0 mA      LOAD RESISTOR,ohms:          20.0989   ohms
.0151    %
CURRENT,mA:       105.0 mA      LOAD RESISTOR,ohms:          20.0990   ohms
.0155    %
CURRENT,mA:       110.0 mA      LOAD RESISTOR,ohms:          20.0991   ohms
.0160    %
CURRENT,mA:       115.0 mA      LOAD RESISTOR,ohms:          20.0993   ohms
.0168    %
CURRENT,mA:       120.0 mA      LOAD RESISTOR,ohms:          20.0994   ohms
.0175    %
CURRENT,mA:       125.0 mA      LOAD RESISTOR,ohms:          20.0996   ohms
.0186    %
CURRENT,mA:       130.0 mA      LOAD RESISTOR,ohms:          20.0998   ohms
.0196    %
CURRENT,mA:       135.0 mA      LOAD RESISTOR,ohms:          20.1001   ohms
.0210    %
CURRENT,mA:       140.0 mA      LOAD RESISTOR,ohms:          20.1004   ohms
.0224    %
CURRENT,mA:       145.0 mA      LOAD RESISTOR,ohms:          20.1007   ohms
.0238    %
CURRENT,mA:       150.0 mA      LOAD RESISTOR,ohms:          20.1010   ohms
.0254    %


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
```

```
LINEARITY TEST:    50mA

     .99976          .99979          .99979          .99980          .99981

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999790
 RSD:   0.0017  %        AT 15:18:52 ON  4 May 2020

LINEARITY TEST:    97uA

     .99741          .99684          .99729          .99730          .99489

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .996747
 RSD:   0.1064  %        AT 15:28:31 ON  4 May 2020

LINEARITY TEST:   297uA

     .99919          .99853          .99839          .99873          .99892

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .998752
 RSD:   0.0317  %        AT 15:38:10 ON  4 May 2020

LINEARITY TEST:   495uA

     .99942          .99891          .99924          .99908          .99942

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999213
 RSD:   0.0223  %        AT 15:47:48 ON  4 May 2020

LINEARITY TEST:   991uA

     .99963          .99960          .99969          .99967          .99945

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999607
 RSD:   0.0096  %        AT 15:57:27 ON  4 May 2020

LINEARITY TEST:     3mA

     .99975          .99979          .99978          .99974          .99978

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999768
 RSD:   0.0024  %        AT 16:07:06 ON  4 May 2020

LINEARITY TEST:     5mA
```

```
     .99980          .99983          .99982          .99981          .99980

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999812
 RSD:   0.0012  %        AT 16:16:44 ON  4 May 2020

LINEARITY TEST:    10mA

     .99984          .99984          .99983          .99983          .99984

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999838
 RSD:   0.0007  %        AT 16:26:23 ON  4 May 2020

LINEARITY TEST:    30mA

     .99984          .99984          .99984          .99984          .99984

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999841
 RSD:   0.0002  %        AT 16:36:02 ON  4 May 2020

LINEARITY TEST:    50mA

     .99985          .99984          .99984          .99984          .99984

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999843
 RSD:   0.0002  %        AT 16:45:40 ON  4 May 2020

LINEARITY TEST:    50mA

     .99985          .99985          .99984          .99985          .99985

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999849
 RSD:   0.0004  %        AT 16:51:22 ON  4 May 2020

LINEARITY TEST:    69mA

     .99985          .99985          .99984          .99984          .99985

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999846
 RSD:   0.0002  %        AT 16:57:04 ON  4 May 2020

LINEARITY TEST:    89mA

     .99984          .99983          .99983          .99983          .99983
```

```
 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999833
 RSD:   0.0005  %        AT 17:02:46 ON  4 May 2020

LINEARITY TEST:   109mA

     .99982          .99982          .99981          .99981          .99981

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999816
 RSD:   0.0007  %        AT 17:08:28 ON  4 May 2020

LINEARITY TEST:   129mA

     .99980          .99979          .99979          .99979          .99978

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999789
 RSD:   0.0006  %        AT 17:14:09 ON  4 May 2020

LINEARITY TEST:   149mA

     .99976          .99975          .99975          .99974          .99974

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999749
 RSD:   0.0008  %        AT 17:19:51 ON  4 May 2020


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99980          .99981          .99981          .99981          .99982

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999809
 RSD:   0.0009  %        AT 17:29:30 ON  4 May 2020


723A  DIGITAL INTEGRATOR RESPONSE TEST
MEASURE Hz/VOLT AND THEORETICAL uCOULOMBS/COUNT AT SPECIFIED CURRENT LEVELS

                                        Calculated     Actual   Cal Factor
                                              Hz/V       Hz/V     uC/count


     OFFSET RATE OF VFC1, Hz:    4975.5     999.9

CURRENT,mA:     .2   INTEGRATOR RESPONSE RATE:   49759.7    9999.7   1.00003
CURRENT,mA:     .6   INTEGRATOR RESPONSE RATE:   49782.6   10004.2    .99958
```

CURRENT,mA:	1.0	INTEGRATOR RESPONSE RATE:	49768.2	10001.3	.99987
CURRENT,mA:	2.0	INTEGRATOR RESPONSE RATE:	49772.8	10002.3	.99977
CURRENT,mA:	3.0	INTEGRATOR RESPONSE RATE:	49766.4	10001.0	.99990
CURRENT,mA:	5.0	INTEGRATOR RESPONSE RATE:	49767.9	10001.3	.99987
CURRENT,mA:	10.0	INTEGRATOR RESPONSE RATE:	49766.9	10001.1	.99989
CURRENT,mA:	15.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989
CURRENT,mA:	20.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	25.0	INTEGRATOR RESPONSE RATE:	49767.5	10001.2	.99988
CURRENT,mA:	30.0	INTEGRATOR RESPONSE RATE:	49766.6	10001.0	.99990
CURRENT,mA:	35.0	INTEGRATOR RESPONSE RATE:	49767.7	10001.2	.99988
CURRENT,mA:	40.0	INTEGRATOR RESPONSE RATE:	49767.3	10001.2	.99988
CURRENT,mA:	45.0	INTEGRATOR RESPONSE RATE:	49767.2	10001.1	.99989
CURRENT,mA:	50.0	INTEGRATOR RESPONSE RATE:	49767.3	10001.2	.99988
CURRENT,mA:	50.2	INTEGRATOR RESPONSE RATE:	49766.8	10001.1	.99989
CURRENT,mA:	50.6	INTEGRATOR RESPONSE RATE:	49767.4	10001.2	.99988
CURRENT,mA:	51.0	INTEGRATOR RESPONSE RATE:	49767.4	10001.2	.99988
CURRENT,mA:	52.0	INTEGRATOR RESPONSE RATE:	49767.3	10001.2	.99988
CURRENT,mA:	53.0	INTEGRATOR RESPONSE RATE:	49767.4	10001.2	.99988
CURRENT,mA:	55.0	INTEGRATOR RESPONSE RATE:	49767.2	10001.1	.99989
CURRENT,mA:	60.0	INTEGRATOR RESPONSE RATE:	49767.2	10001.2	.99988
CURRENT,mA:	65.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	70.0	INTEGRATOR RESPONSE RATE:	49767.3	10001.2	.99988
CURRENT,mA:	75.0	INTEGRATOR RESPONSE RATE:	49767.3	10001.2	.99988
CURRENT,mA:	80.0	INTEGRATOR RESPONSE RATE:	49767.2	10001.2	.99988
CURRENT,mA:	85.0	INTEGRATOR RESPONSE RATE:	49766.9	10001.1	.99989
CURRENT,mA:	90.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989
CURRENT,mA:	95.0	INTEGRATOR RESPONSE RATE:	49767.4	10001.2	.99988
CURRENT,mA:	100.0	INTEGRATOR RESPONSE RATE:	49767.3	10001.2	.99988
CURRENT,mA:	100.2	INTEGRATOR RESPONSE RATE:	49767.2	10001.2	.99988
CURRENT,mA:	100.6	INTEGRATOR RESPONSE RATE:	49766.8	10001.1	.99989
CURRENT,mA:	101.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989
CURRENT,mA:	102.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	103.0	INTEGRATOR RESPONSE RATE:	49766.8	10001.1	.99989
CURRENT,mA:	105.0	INTEGRATOR RESPONSE RATE:	49766.9	10001.1	.99989
CURRENT,mA:	110.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	115.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989
CURRENT,mA:	120.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	125.0	INTEGRATOR RESPONSE RATE:	49766.9	10001.1	.99989
CURRENT,mA:	130.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	135.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989
CURRENT,mA:	140.0	INTEGRATOR RESPONSE RATE:	49767.0	10001.1	.99989
CURRENT,mA:	145.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989
CURRENT,mA:	150.0	INTEGRATOR RESPONSE RATE:	49767.1	10001.1	.99989

Calibration Resistor, value in PAR, Ohms: 50.0012
Load Impedance, value in PAR, Ohms: 20.0959

723A LOAD RESISTOR vs CALIBRATION RESISTOR
Load Vs Cal measured with K17 Energized

```
CURRENT,mA:          .2 mA      LOAD RESISTOR,ohms:          20.4387   ohms
1.7058   %
CURRENT,mA:          .6 mA      LOAD RESISTOR,ohms:          20.2097   ohms
.5664    %
CURRENT,mA:         1.0 mA      LOAD RESISTOR,ohms:          20.1653   ohms
.3456    %
CURRENT,mA:         2.0 mA      LOAD RESISTOR,ohms:          20.1335   ohms
.1874    %
CURRENT,mA:         3.0 mA      LOAD RESISTOR,ohms:          20.1203   ohms
.1215    %
CURRENT,mA:         5.0 mA      LOAD RESISTOR,ohms:          20.1107   ohms
.0738    %
CURRENT,mA:        10.0 mA      LOAD RESISTOR,ohms:          20.1044   ohms
.0425    %
CURRENT,mA:        15.0 mA      LOAD RESISTOR,ohms:          20.1021   ohms
.0308    %
CURRENT,mA:        20.0 mA      LOAD RESISTOR,ohms:          20.1009   ohms
.0249    %
CURRENT,mA:        25.0 mA      LOAD RESISTOR,ohms:          20.1007   ohms
.0239    %
CURRENT,mA:        30.0 mA      LOAD RESISTOR,ohms:          20.1002   ohms
.0214    %
CURRENT,mA:        35.0 mA      LOAD RESISTOR,ohms:          20.0998   ohms
.0194    %
CURRENT,mA:        40.0 mA      LOAD RESISTOR,ohms:          20.0993   ohms
.0170    %
CURRENT,mA:        45.0 mA      LOAD RESISTOR,ohms:          20.0992   ohms
.0165    %
CURRENT,mA:        50.0 mA      LOAD RESISTOR,ohms:          20.0990   ohms
.0157    %
CURRENT,mA:        50.2 mA      LOAD RESISTOR,ohms:          20.0991   ohms
.0159    %
CURRENT,mA:        50.6 mA      LOAD RESISTOR,ohms:          20.0990   ohms
.0155    %
CURRENT,mA:        51.0 mA      LOAD RESISTOR,ohms:          20.0989   ohms
.0150    %
CURRENT,mA:        52.0 mA      LOAD RESISTOR,ohms:          20.0991   ohms
.0159    %
CURRENT,mA:        53.0 mA      LOAD RESISTOR,ohms:          20.0989   ohms
.0148    %
CURRENT,mA:        55.0 mA      LOAD RESISTOR,ohms:          20.0990   ohms
.0154    %
CURRENT,mA:        60.0 mA      LOAD RESISTOR,ohms:          20.0987   ohms
.0141    %
CURRENT,mA:        65.0 mA      LOAD RESISTOR,ohms:          20.0988   ohms
.0147    %
CURRENT,mA:        70.0 mA      LOAD RESISTOR,ohms:          20.0988   ohms
.0147    %
CURRENT,mA:        75.0 mA      LOAD RESISTOR,ohms:          20.0987   ohms
```

```
.0141    %
CURRENT,mA:        80.0 mA      LOAD RESISTOR,ohms:           20.0988   ohms
.0145    %
CURRENT,mA:        85.0 mA      LOAD RESISTOR,ohms:           20.0988   ohms
.0146    %
CURRENT,mA:        90.0 mA      LOAD RESISTOR,ohms:           20.0989   ohms
.0148    %
CURRENT,mA:        95.0 mA      LOAD RESISTOR,ohms:           20.0989   ohms
.0152    %
CURRENT,mA:       100.0 mA      LOAD RESISTOR,ohms:           20.0990   ohms
.0157    %
CURRENT,mA:       100.2 mA      LOAD RESISTOR,ohms:           20.0992   ohms
.0164    %
CURRENT,mA:       100.6 mA      LOAD RESISTOR,ohms:           20.0992   ohms
.0165    %
CURRENT,mA:       101.0 mA      LOAD RESISTOR,ohms:           20.0992   ohms
.0167    %
CURRENT,mA:       102.0 mA      LOAD RESISTOR,ohms:           20.0993   ohms
.0171    %
CURRENT,mA:       103.0 mA      LOAD RESISTOR,ohms:           20.0994   ohms
.0175    %
CURRENT,mA:       105.0 mA      LOAD RESISTOR,ohms:           20.0995   ohms
.0178    %
CURRENT,mA:       110.0 mA      LOAD RESISTOR,ohms:           20.0996   ohms
.0184    %
CURRENT,mA:       115.0 mA      LOAD RESISTOR,ohms:           20.0997   ohms
.0189    %
CURRENT,mA:       120.0 mA      LOAD RESISTOR,ohms:           20.0999   ohms
.0198    %
CURRENT,mA:       125.0 mA      LOAD RESISTOR,ohms:           20.1001   ohms
.0208    %
CURRENT,mA:       130.0 mA      LOAD RESISTOR,ohms:           20.1003   ohms
.0218    %
CURRENT,mA:       135.0 mA      LOAD RESISTOR,ohms:           20.1005   ohms
.0231    %
CURRENT,mA:       140.0 mA      LOAD RESISTOR,ohms:           20.1008   ohms
.0244    %
CURRENT,mA:       145.0 mA      LOAD RESISTOR,ohms:           20.1011   ohms
.0260    %
CURRENT,mA:       150.0 mA      LOAD RESISTOR,ohms:           20.1014   ohms
.0274    %


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99973          .99975          .99976          .99977          .99978

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999758
```

```
 RSD:   0.0017  %        AT 17:08:20 ON  5 May 2020

LINEARITY TEST:    97uA

     .99742          .99866          .99787          .99776          .99649

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .997640
 RSD:   0.0788  %        AT 17:17:58 ON  5 May 2020

LINEARITY TEST:   296uA

     .99855          .99881          .99904          .99850          .99865

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .998709
 RSD:   0.0219  %        AT 17:27:37 ON  5 May 2020

LINEARITY TEST:   495uA

     .99926          .99902          .99893          .99927          .99933

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999161
 RSD:   0.0176  %        AT 17:37:16 ON  5 May 2020

LINEARITY TEST:   991uA

     .99952          .99952          .99946          .99955          .99963

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999535
 RSD:   0.0064  %        AT 17:46:54 ON  5 May 2020

LINEARITY TEST:     3mA

     .99976          .99974          .99979          .99973          .99969

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999743
 RSD:   0.0037  %        AT 17:56:33 ON  5 May 2020

LINEARITY TEST:     5mA

     .99978          .99975          .99981          .99978          .99979

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999780
 RSD:   0.0021  %        AT 18:06:12 ON  5 May 2020
```

```
LINEARITY TEST:    10mA

     .99982          .99980          .99981          .99980          .99982

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999811
 RSD:   0.0009  %        AT 18:15:50 ON  5 May 2020

LINEARITY TEST:    30mA

     .99981          .99980          .99981          .99981          .99981

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999808
 RSD:   0.0003  %        AT 18:25:29 ON  5 May 2020

LINEARITY TEST:    50mA

     .99981          .99981          .99981          .99981          .99981

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999810
 RSD:   0.0002  %        AT 18:35:08 ON  5 May 2020

LINEARITY TEST:    50mA

     .99982          .99982          .99981          .99981          .99982

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999816
 RSD:   0.0003  %        AT 18:40:49 ON  5 May 2020

LINEARITY TEST:    69mA

     .99981          .99981          .99981          .99981          .99981

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999809
 RSD:   0.0003  %        AT 18:46:31 ON  5 May 2020

LINEARITY TEST:    89mA

     .99980          .99980          .99980          .99980          .99980

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999801
 RSD:   0.0003  %        AT 18:52:13 ON  5 May 2020

LINEARITY TEST:   109mA
```

```
     .99979          .99978          .99978          .99978          .99977

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999780
 RSD:   0.0004  %        AT 18:57:55 ON  5 May 2020

LINEARITY TEST:   129mA

     .99976          .99976          .99975          .99975          .99975

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999755
 RSD:   0.0007  %        AT 19:03:36 ON  5 May 2020

LINEARITY TEST:   149mA

     .99973          .99972          .99971          .99971          .99971

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999715
 RSD:   0.0010  %        AT 19:09:18 ON  5 May 2020


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99976          .99977          .99978          .99978          .99979

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999776
 RSD:   0.0011  %        AT 19:18:57 ON  5 May 2020


723A  DIGITAL INTEGRATOR RESPONSE TEST
MEASURE Hz/VOLT AND THEORETICAL uCOULOMBS/COUNT AT SPECIFIED CURRENT LEVELS

                                        Calculated     Actual   Cal Factor
                                              Hz/V       Hz/V     uC/count


     OFFSET RATE OF VFC1, Hz:    4975.6     999.9

CURRENT,mA:     .2   INTEGRATOR RESPONSE RATE:   49750.1    9997.7   1.00023
CURRENT,mA:     .6   INTEGRATOR RESPONSE RATE:   49735.0    9994.7   1.00053
CURRENT,mA:    1.0   INTEGRATOR RESPONSE RATE:   49744.6    9996.6   1.00034
CURRENT,mA:    2.0   INTEGRATOR RESPONSE RATE:   49758.8    9999.5   1.00005
CURRENT,mA:    3.0   INTEGRATOR RESPONSE RATE:   49764.5   10000.6    .99994
CURRENT,mA:    5.0   INTEGRATOR RESPONSE RATE:   49768.5   10001.4    .99986
CURRENT,mA:   10.0   INTEGRATOR RESPONSE RATE:   49765.7   10000.9    .99991
CURRENT,mA:   15.0   INTEGRATOR RESPONSE RATE:   49766.5   10001.0    .99990
```

```
CURRENT,mA:    20.0   INTEGRATOR RESPONSE RATE:   49766.1   10000.9    .99991
CURRENT,mA:    25.0   INTEGRATOR RESPONSE RATE:   49766.4   10001.0    .99990
CURRENT,mA:    30.0   INTEGRATOR RESPONSE RATE:   49766.9   10001.1    .99989
CURRENT,mA:    35.0   INTEGRATOR RESPONSE RATE:   49767.1   10001.1    .99989
CURRENT,mA:    40.0   INTEGRATOR RESPONSE RATE:   49766.6   10001.0    .99990
CURRENT,mA:    45.0   INTEGRATOR RESPONSE RATE:   49767.3   10001.2    .99988
CURRENT,mA:    50.0   INTEGRATOR RESPONSE RATE:   49767.3   10001.2    .99988
CURRENT,mA:    50.2   INTEGRATOR RESPONSE RATE:   49766.9   10001.1    .99989
CURRENT,mA:    50.6   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:    51.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:    52.0   INTEGRATOR RESPONSE RATE:   49767.1   10001.1    .99989
CURRENT,mA:    53.0   INTEGRATOR RESPONSE RATE:   49766.9   10001.1    .99989
CURRENT,mA:    55.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:    60.0   INTEGRATOR RESPONSE RATE:   49766.9   10001.1    .99989
CURRENT,mA:    65.0   INTEGRATOR RESPONSE RATE:   49766.9   10001.1    .99989
CURRENT,mA:    70.0   INTEGRATOR RESPONSE RATE:   49767.2   10001.2    .99988
CURRENT,mA:    75.0   INTEGRATOR RESPONSE RATE:   49767.0   10001.1    .99989
CURRENT,mA:    80.0   INTEGRATOR RESPONSE RATE:   49767.1   10001.1    .99989
CURRENT,mA:    85.0   INTEGRATOR RESPONSE RATE:   49767.0   10001.1    .99989
CURRENT,mA:    90.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:    95.0   INTEGRATOR RESPONSE RATE:   49766.7   10001.1    .99989
CURRENT,mA:   100.0   INTEGRATOR RESPONSE RATE:   49766.9   10001.1    .99989
CURRENT,mA:   100.2   INTEGRATOR RESPONSE RATE:   49766.7   10001.1    .99989
CURRENT,mA:   100.6   INTEGRATOR RESPONSE RATE:   49766.9   10001.1    .99989
CURRENT,mA:   101.0   INTEGRATOR RESPONSE RATE:   49766.6   10001.0    .99990
CURRENT,mA:   102.0   INTEGRATOR RESPONSE RATE:   49766.6   10001.0    .99990
CURRENT,mA:   103.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:   105.0   INTEGRATOR RESPONSE RATE:   49766.5   10001.0    .99990
CURRENT,mA:   110.0   INTEGRATOR RESPONSE RATE:   49766.9   10001.1    .99989
CURRENT,mA:   115.0   INTEGRATOR RESPONSE RATE:   49766.9   10001.1    .99989
CURRENT,mA:   120.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:   125.0   INTEGRATOR RESPONSE RATE:   49766.6   10001.0    .99990
CURRENT,mA:   130.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:   135.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:   140.0   INTEGRATOR RESPONSE RATE:   49766.9   10001.1    .99989
CURRENT,mA:   145.0   INTEGRATOR RESPONSE RATE:   49767.0   10001.1    .99989
CURRENT,mA:   150.0   INTEGRATOR RESPONSE RATE:   49767.0   10001.1    .99989

Calibration Resistor, value in PAR, Ohms:         50.0012
Load Impedance, value in PAR, Ohms:               20.0959


723A  LOAD RESISTOR vs CALIBRATION RESISTOR
Load Vs Cal measured with K17 Energized

CURRENT,mA:          .2 mA      LOAD RESISTOR,ohms:          20.4181   ohms
1.6032   %
CURRENT,mA:          .6 mA      LOAD RESISTOR,ohms:          20.2139   ohms
.5875    %
CURRENT,mA:         1.0 mA      LOAD RESISTOR,ohms:          20.1670   ohms
```

```
.3537    %
CURRENT,mA:          2.0 mA      LOAD RESISTOR,ohms:          20.1326   ohms
.1829    %
CURRENT,mA:          3.0 mA      LOAD RESISTOR,ohms:          20.1198   ohms
.1190    %
CURRENT,mA:          5.0 mA      LOAD RESISTOR,ohms:          20.1118   ohms
.0793    %
CURRENT,mA:         10.0 mA      LOAD RESISTOR,ohms:          20.1043   ohms
.0420    %
CURRENT,mA:         15.0 mA      LOAD RESISTOR,ohms:          20.1021   ohms
.0308    %
CURRENT,mA:         20.0 mA      LOAD RESISTOR,ohms:          20.1006   ohms
.0235    %
CURRENT,mA:         25.0 mA      LOAD RESISTOR,ohms:          20.1004   ohms
.0224    %
CURRENT,mA:         30.0 mA      LOAD RESISTOR,ohms:          20.0998   ohms
.0194    %
CURRENT,mA:         35.0 mA      LOAD RESISTOR,ohms:          20.0994   ohms
.0174    %
CURRENT,mA:         40.0 mA      LOAD RESISTOR,ohms:          20.0992   ohms
.0163    %
CURRENT,mA:         45.0 mA      LOAD RESISTOR,ohms:          20.0989   ohms
.0150    %
CURRENT,mA:         50.0 mA      LOAD RESISTOR,ohms:          20.0988   ohms
.0145    %
CURRENT,mA:         50.2 mA      LOAD RESISTOR,ohms:          20.0988   ohms
.0146    %
CURRENT,mA:         50.6 mA      LOAD RESISTOR,ohms:          20.0987   ohms
.0139    %
CURRENT,mA:         51.0 mA      LOAD RESISTOR,ohms:          20.0988   ohms
.0144    %
CURRENT,mA:         52.0 mA      LOAD RESISTOR,ohms:          20.0986   ohms
.0136    %
CURRENT,mA:         53.0 mA      LOAD RESISTOR,ohms:          20.0986   ohms
.0137    %
CURRENT,mA:         55.0 mA      LOAD RESISTOR,ohms:          20.0985   ohms
.0131    %
CURRENT,mA:         60.0 mA      LOAD RESISTOR,ohms:          20.0986   ohms
.0134    %
CURRENT,mA:         65.0 mA      LOAD RESISTOR,ohms:          20.0985   ohms
.0129    %
CURRENT,mA:         70.0 mA      LOAD RESISTOR,ohms:          20.0984   ohms
.0128    %
CURRENT,mA:         75.0 mA      LOAD RESISTOR,ohms:          20.0984   ohms
.0127    %
CURRENT,mA:         80.0 mA      LOAD RESISTOR,ohms:          20.0984   ohms
.0126    %
CURRENT,mA:         85.0 mA      LOAD RESISTOR,ohms:          20.0985   ohms
.0128    %
CURRENT,mA:         90.0 mA      LOAD RESISTOR,ohms:          20.0985   ohms
```

```
.0130    %
CURRENT,mA:        95.0 mA      LOAD RESISTOR,ohms:           20.0986   ohms
.0133    %
CURRENT,mA:       100.0 mA      LOAD RESISTOR,ohms:           20.0986   ohms
.0135    %
CURRENT,mA:       100.2 mA      LOAD RESISTOR,ohms:           20.0988   ohms
.0143    %
CURRENT,mA:       100.6 mA      LOAD RESISTOR,ohms:           20.0989   ohms
.0152    %
CURRENT,mA:       101.0 mA      LOAD RESISTOR,ohms:           20.0989   ohms
.0149    %
CURRENT,mA:       102.0 mA      LOAD RESISTOR,ohms:           20.0990   ohms
.0155    %
CURRENT,mA:       103.0 mA      LOAD RESISTOR,ohms:           20.0990   ohms
.0155    %
CURRENT,mA:       105.0 mA      LOAD RESISTOR,ohms:           20.0991   ohms
.0159    %
CURRENT,mA:       110.0 mA      LOAD RESISTOR,ohms:           20.0992   ohms
.0164    %
CURRENT,mA:       115.0 mA      LOAD RESISTOR,ohms:           20.0993   ohms
.0172    %
CURRENT,mA:       120.0 mA      LOAD RESISTOR,ohms:           20.0995   ohms
.0179    %
CURRENT,mA:       125.0 mA      LOAD RESISTOR,ohms:           20.0996   ohms
.0187    %
CURRENT,mA:       130.0 mA      LOAD RESISTOR,ohms:           20.0998   ohms
.0196    %
CURRENT,mA:       135.0 mA      LOAD RESISTOR,ohms:           20.1002   ohms
.0213    %
CURRENT,mA:       140.0 mA      LOAD RESISTOR,ohms:           20.1004   ohms
.0225    %
CURRENT,mA:       145.0 mA      LOAD RESISTOR,ohms:           20.1007   ohms
.0239    %
CURRENT,mA:       150.0 mA      LOAD RESISTOR,ohms:           20.1010   ohms
.0256    %


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99976          .99978          .99979          .99979          .99980

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999784
 RSD:   0.0017  %        AT 17:28:48 ON  6 May 2020

LINEARITY TEST:    97uA

     .99747          .99687          .99675          .99548          .99793
```

```
 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .996901
 RSD:   0.0928  %        AT 17:38:27 ON  6 May 2020

LINEARITY TEST:   296uA

     .99805          .99894          .99965          .99945          .99916

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999050
 RSD:   0.0625  %        AT 17:48:06 ON  6 May 2020

LINEARITY TEST:   494uA

     .99921          .99955          .99953          .99931          .99917

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999351
 RSD:   0.0179  %        AT 17:57:44 ON  6 May 2020

LINEARITY TEST:   991uA

     .99966          .99963          .99955          .99940          .99964

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999574
 RSD:   0.0109  %        AT 18:07:23 ON  6 May 2020

LINEARITY TEST:     3mA

     .99974          .99977          .99976          .99975          .99976

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999755
 RSD:   0.0010  %        AT 18:17:02 ON  6 May 2020

LINEARITY TEST:     5mA

     .99982          .99981          .99981          .99981          .99980

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999808
 RSD:   0.0005  %        AT 18:26:40 ON  6 May 2020

LINEARITY TEST:    10mA

     .99985          .99984          .99985          .99983          .99984

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999841
```

```
 RSD:   0.0009  %        AT 18:36:19 ON  6 May 2020

LINEARITY TEST:    30mA

     .99985          .99984          .99985          .99984          .99984

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999844
 RSD:   0.0003  %        AT 18:45:58 ON  6 May 2020

LINEARITY TEST:    50mA

     .99985          .99984          .99984          .99984          .99984

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999843
 RSD:   0.0001  %        AT 18:55:36 ON  6 May 2020

LINEARITY TEST:    50mA

     .99985          .99985          .99985          .99985          .99985

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999852
 RSD:   0.0002  %        AT 19:01:18 ON  6 May 2020

LINEARITY TEST:    69mA

     .99985          .99984          .99984          .99985          .99985

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999847
 RSD:   0.0003  %        AT 19:07:00 ON  6 May 2020

LINEARITY TEST:    89mA

     .99984          .99984          .99983          .99983          .99984

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999837
 RSD:   0.0003  %        AT 19:12:42 ON  6 May 2020

LINEARITY TEST:   109mA

     .99982          .99982          .99982          .99982          .99982

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999820
 RSD:   0.0004  %        AT 19:18:23 ON  6 May 2020
```

```
LINEARITY TEST:   129mA

     .99980          .99979          .99979          .99979          .99979

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999791
 RSD:   0.0006  %        AT 19:24:05 ON  6 May 2020

LINEARITY TEST:   149mA

     .99976          .99975          .99975          .99975          .99974

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999752
 RSD:   0.0008  %        AT 19:29:47 ON  6 May 2020


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99980          .99981          .99982          .99982          .99983

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999816
 RSD:   0.0011  %        AT 19:39:26 ON  6 May 2020


723A  DIGITAL INTEGRATOR RESPONSE TEST
MEASURE Hz/VOLT AND THEORETICAL uCOULOMBS/COUNT AT SPECIFIED CURRENT LEVELS

                                        Calculated     Actual   Cal Factor
                                              Hz/V       Hz/V     uC/count


     OFFSET RATE OF VFC1, Hz:    4975.0     999.8

CURRENT,mA:     .2   INTEGRATOR RESPONSE RATE:   49820.9   10011.9    .99881
CURRENT,mA:     .6   INTEGRATOR RESPONSE RATE:   49783.1   10004.4    .99956
CURRENT,mA:    1.0   INTEGRATOR RESPONSE RATE:   49764.6   10000.6    .99994
CURRENT,mA:    2.0   INTEGRATOR RESPONSE RATE:   49764.2   10000.6    .99994
CURRENT,mA:    3.0   INTEGRATOR RESPONSE RATE:   49767.0   10001.1    .99989
CURRENT,mA:    5.0   INTEGRATOR RESPONSE RATE:   49769.8   10001.7    .99983
CURRENT,mA:   10.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:   15.0   INTEGRATOR RESPONSE RATE:   49766.4   10001.0    .99990
CURRENT,mA:   20.0   INTEGRATOR RESPONSE RATE:   49767.1   10001.1    .99989
CURRENT,mA:   25.0   INTEGRATOR RESPONSE RATE:   49767.0   10001.1    .99989
CURRENT,mA:   30.0   INTEGRATOR RESPONSE RATE:   49766.7   10001.0    .99990
CURRENT,mA:   35.0   INTEGRATOR RESPONSE RATE:   49767.1   10001.1    .99989
CURRENT,mA:   40.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:   45.0   INTEGRATOR RESPONSE RATE:   49766.7   10001.1    .99989
```

```
CURRENT,mA:    50.0   INTEGRATOR RESPONSE RATE:   49766.9   10001.1    .99989
CURRENT,mA:    50.2   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:    50.6   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:    51.0   INTEGRATOR RESPONSE RATE:   49766.6   10001.0    .99990
CURRENT,mA:    52.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:    53.0   INTEGRATOR RESPONSE RATE:   49766.7   10001.1    .99989
CURRENT,mA:    55.0   INTEGRATOR RESPONSE RATE:   49766.5   10001.0    .99990
CURRENT,mA:    60.0   INTEGRATOR RESPONSE RATE:   49766.4   10001.0    .99990
CURRENT,mA:    65.0   INTEGRATOR RESPONSE RATE:   49766.4   10001.0    .99990
CURRENT,mA:    70.0   INTEGRATOR RESPONSE RATE:   49766.7   10001.1    .99989
CURRENT,mA:    75.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:    80.0   INTEGRATOR RESPONSE RATE:   49766.7   10001.1    .99989
CURRENT,mA:    85.0   INTEGRATOR RESPONSE RATE:   49766.6   10001.0    .99990
CURRENT,mA:    90.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:    95.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:   100.0   INTEGRATOR RESPONSE RATE:   49766.8   10001.1    .99989
CURRENT,mA:   100.2   INTEGRATOR RESPONSE RATE:   49766.2   10001.0    .99990
CURRENT,mA:   100.6   INTEGRATOR RESPONSE RATE:   49766.4   10001.0    .99990
CURRENT,mA:   101.0   INTEGRATOR RESPONSE RATE:   49766.7   10001.1    .99989
CURRENT,mA:   102.0   INTEGRATOR RESPONSE RATE:   49766.2   10001.0    .99990
CURRENT,mA:   103.0   INTEGRATOR RESPONSE RATE:   49766.3   10001.0    .99990
CURRENT,mA:   105.0   INTEGRATOR RESPONSE RATE:   49766.2   10001.0    .99990
CURRENT,mA:   110.0   INTEGRATOR RESPONSE RATE:   49766.5   10001.0    .99990
CURRENT,mA:   115.0   INTEGRATOR RESPONSE RATE:   49766.1   10000.9    .99991
CURRENT,mA:   120.0   INTEGRATOR RESPONSE RATE:   49766.7   10001.1    .99989
CURRENT,mA:   125.0   INTEGRATOR RESPONSE RATE:   49766.4   10001.0    .99990
CURRENT,mA:   130.0   INTEGRATOR RESPONSE RATE:   49766.4   10001.0    .99990
CURRENT,mA:   135.0   INTEGRATOR RESPONSE RATE:   49766.3   10001.0    .99990
CURRENT,mA:   140.0   INTEGRATOR RESPONSE RATE:   49766.4   10001.0    .99990
CURRENT,mA:   145.0   INTEGRATOR RESPONSE RATE:   49766.6   10001.0    .99990
CURRENT,mA:   150.0   INTEGRATOR RESPONSE RATE:   49766.2   10001.0    .99990

Calibration Resistor, value in PAR, Ohms:         50.0012
Load Impedance, value in PAR, Ohms:               20.0959


723A  LOAD RESISTOR vs CALIBRATION RESISTOR
Load Vs Cal measured with K17 Energized

CURRENT,mA:          .2 mA      LOAD RESISTOR,ohms:          20.4129   ohms
1.5777   %
CURRENT,mA:          .6 mA      LOAD RESISTOR,ohms:          20.2160   ohms
.5975    %
CURRENT,mA:         1.0 mA      LOAD RESISTOR,ohms:          20.1686   ohms
.3616    %
CURRENT,mA:         2.0 mA      LOAD RESISTOR,ohms:          20.1315   ohms
.1773    %
CURRENT,mA:         3.0 mA      LOAD RESISTOR,ohms:          20.1193   ohms
.1164    %
CURRENT,mA:         5.0 mA      LOAD RESISTOR,ohms:          20.1105   ohms
```

```
.0729    %
CURRENT,mA:        10.0 mA      LOAD RESISTOR,ohms:          20.1037   ohms
.0389    %
CURRENT,mA:        15.0 mA      LOAD RESISTOR,ohms:          20.1015   ohms
.0280    %
CURRENT,mA:        20.0 mA      LOAD RESISTOR,ohms:          20.0998   ohms
.0195    %
CURRENT,mA:        25.0 mA      LOAD RESISTOR,ohms:          20.0998   ohms
.0194    %
CURRENT,mA:        30.0 mA      LOAD RESISTOR,ohms:          20.0991   ohms
.0159    %
CURRENT,mA:        35.0 mA      LOAD RESISTOR,ohms:          20.0989   ohms
.0151    %
CURRENT,mA:        40.0 mA      LOAD RESISTOR,ohms:          20.0984   ohms
.0127    %
CURRENT,mA:        45.0 mA      LOAD RESISTOR,ohms:          20.0983   ohms
.0120    %
CURRENT,mA:        50.0 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0118    %
CURRENT,mA:        50.2 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0113    %
CURRENT,mA:        50.6 mA      LOAD RESISTOR,ohms:          20.0983   ohms
.0122    %
CURRENT,mA:        51.0 mA      LOAD RESISTOR,ohms:          20.0981   ohms
.0111    %
CURRENT,mA:        52.0 mA      LOAD RESISTOR,ohms:          20.0981   ohms
.0111    %
CURRENT,mA:        53.0 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0115    %
CURRENT,mA:        55.0 mA      LOAD RESISTOR,ohms:          20.0980   ohms
.0106    %
CURRENT,mA:        60.0 mA      LOAD RESISTOR,ohms:          20.0981   ohms
.0108    %
CURRENT,mA:        65.0 mA      LOAD RESISTOR,ohms:          20.0980   ohms
.0106    %
CURRENT,mA:        70.0 mA      LOAD RESISTOR,ohms:          20.0979   ohms
.0101    %
CURRENT,mA:        75.0 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0097    %
CURRENT,mA:        80.0 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0096    %
CURRENT,mA:        85.0 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0095    %
CURRENT,mA:        90.0 mA      LOAD RESISTOR,ohms:          20.0979   ohms
.0099    %
CURRENT,mA:        95.0 mA      LOAD RESISTOR,ohms:          20.0981   ohms
.0108    %
CURRENT,mA:       100.0 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0114    %
CURRENT,mA:       100.2 mA      LOAD RESISTOR,ohms:          20.0983   ohms
```

```
.0118    %
CURRENT,mA:       100.6 mA      LOAD RESISTOR,ohms:           20.0983   ohms
.0121    %
CURRENT,mA:       101.0 mA      LOAD RESISTOR,ohms:           20.0983   ohms
.0122    %
CURRENT,mA:       102.0 mA      LOAD RESISTOR,ohms:           20.0985   ohms
.0128    %
CURRENT,mA:       103.0 mA      LOAD RESISTOR,ohms:           20.0985   ohms
.0128    %
CURRENT,mA:       105.0 mA      LOAD RESISTOR,ohms:           20.0985   ohms
.0130    %
CURRENT,mA:       110.0 mA      LOAD RESISTOR,ohms:           20.0987   ohms
.0139    %
CURRENT,mA:       115.0 mA      LOAD RESISTOR,ohms:           20.0988   ohms
.0145    %
CURRENT,mA:       120.0 mA      LOAD RESISTOR,ohms:           20.0989   ohms
.0153    %
CURRENT,mA:       125.0 mA      LOAD RESISTOR,ohms:           20.0991   ohms
.0161    %
CURRENT,mA:       130.0 mA      LOAD RESISTOR,ohms:           20.0993   ohms
.0171    %
CURRENT,mA:       135.0 mA      LOAD RESISTOR,ohms:           20.0996   ohms
.0185    %
CURRENT,mA:       140.0 mA      LOAD RESISTOR,ohms:           20.0998   ohms
.0197    %
CURRENT,mA:       145.0 mA      LOAD RESISTOR,ohms:           20.1001   ohms
.0210    %
CURRENT,mA:       150.0 mA      LOAD RESISTOR,ohms:           20.1004   ohms
.0226    %


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99979          .99981          .99982          .99983          .99983

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999817
 RSD:   0.0015  %        AT 16:48:40 ON  7 May 2020

LINEARITY TEST:    96uA

     .99838          .99692          .99630          .99724          .99678

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .997124
 RSD:   0.0780  %        AT 16:58:18 ON  7 May 2020

LINEARITY TEST:   296uA
```

```
     .99874          .99920          .99866          .99897          .99894

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .998902
 RSD:   0.0213  %        AT 17:07:57 ON  7 May 2020

LINEARITY TEST:   494uA

     .99891          .99921          .99948          .99942          .99961

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999323
 RSD:   0.0275  %        AT 17:17:36 ON  7 May 2020

LINEARITY TEST:   991uA

     .99962          .99951          .99947          .99969          .99949

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999557
 RSD:   0.0095  %        AT 17:27:14 ON  7 May 2020

LINEARITY TEST:     3mA

     .99979          .99985          .99983          .99983          .99982

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999822
 RSD:   0.0022  %        AT 17:36:53 ON  7 May 2020

LINEARITY TEST:     5mA

     .99984          .99984          .99986          .99985          .99985

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999848
 RSD:   0.0007  %        AT 17:46:32 ON  7 May 2020

LINEARITY TEST:    10mA

     .99986          .99988          .99987          .99987          .99986

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999871
 RSD:   0.0008  %        AT 17:56:10 ON  7 May 2020

LINEARITY TEST:    30mA

     .99987          .99987          .99987          .99987          .99987
```

```
 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999871
 RSD:   0.0003  %        AT 18:05:49 ON  7 May 2020

LINEARITY TEST:    50mA

     .99987          .99987          .99987          .99987          .99987

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999873
 RSD:   0.0001  %        AT 18:15:28 ON  7 May 2020

LINEARITY TEST:    50mA

     .99988          .99987          .99988          .99987          .99987

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999874
 RSD:   0.0002  %        AT 18:21:09 ON  7 May 2020

LINEARITY TEST:    69mA

     .99987          .99988          .99987          .99987          .99987

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999874
 RSD:   0.0002  %        AT 18:26:51 ON  7 May 2020

LINEARITY TEST:    89mA

     .99987          .99987          .99986          .99986          .99986

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999863
 RSD:   0.0005  %        AT 18:32:33 ON  7 May 2020

LINEARITY TEST:   109mA

     .99985          .99985          .99985          .99985          .99984

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999848
 RSD:   0.0006  %        AT 18:38:15 ON  7 May 2020

LINEARITY TEST:   129mA

     .99983          .99982          .99982          .99982          .99981

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999817
```

```
 RSD:   0.0007  %        AT 18:43:56 ON  7 May 2020

LINEARITY TEST:   149mA

     .99979          .99978          .99978          .99978          .99977

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999780
 RSD:   0.0007  %        AT 18:49:38 ON  7 May 2020


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99982          .99983          .99984          .99985          .99985

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999838
 RSD:   0.0011  %        AT 18:59:17 ON  7 May 2020


723A  DIGITAL INTEGRATOR RESPONSE TEST
MEASURE Hz/VOLT AND THEORETICAL uCOULOMBS/COUNT AT SPECIFIED CURRENT LEVELS

                                          Calculated     Actual   Cal Factor
                                                Hz/V       Hz/V     uC/count


     OFFSET RATE OF VFC1, Hz:    4974.5     999.7

CURRENT,mA:     .2   INTEGRATOR RESPONSE RATE:   49717.8    9991.2   1.00088
CURRENT,mA:     .6   INTEGRATOR RESPONSE RATE:   49747.1    9997.1   1.00029
CURRENT,mA:    1.0   INTEGRATOR RESPONSE RATE:   49745.6    9996.8   1.00032
CURRENT,mA:    2.0   INTEGRATOR RESPONSE RATE:   49764.1   10000.5    .99995
CURRENT,mA:    3.0   INTEGRATOR RESPONSE RATE:   49769.2   10001.6    .99984
CURRENT,mA:    5.0   INTEGRATOR RESPONSE RATE:   49766.5   10001.0    .99990
CURRENT,mA:   10.0   INTEGRATOR RESPONSE RATE:   49766.3   10001.0    .99990
CURRENT,mA:   15.0   INTEGRATOR RESPONSE RATE:   49767.2   10001.2    .99988
CURRENT,mA:   20.0   INTEGRATOR RESPONSE RATE:   49767.8   10001.3    .99987
CURRENT,mA:   25.0   INTEGRATOR RESPONSE RATE:   49767.1   10001.1    .99989
CURRENT,mA:   30.0   INTEGRATOR RESPONSE RATE:   49767.7   10001.3    .99987
CURRENT,mA:   35.0   INTEGRATOR RESPONSE RATE:   49767.8   10001.3    .99987
CURRENT,mA:   40.0   INTEGRATOR RESPONSE RATE:   49767.9   10001.3    .99987
CURRENT,mA:   45.0   INTEGRATOR RESPONSE RATE:   49767.6   10001.2    .99988
CURRENT,mA:   50.0   INTEGRATOR RESPONSE RATE:   49767.8   10001.3    .99987
CURRENT,mA:   50.2   INTEGRATOR RESPONSE RATE:   49767.9   10001.3    .99987
CURRENT,mA:   50.6   INTEGRATOR RESPONSE RATE:   49767.7   10001.3    .99987
CURRENT,mA:   51.0   INTEGRATOR RESPONSE RATE:   49767.4   10001.2    .99988
CURRENT,mA:   52.0   INTEGRATOR RESPONSE RATE:   49767.5   10001.2    .99988
CURRENT,mA:   53.0   INTEGRATOR RESPONSE RATE:   49767.8   10001.3    .99987
```

```
CURRENT,mA:    55.0   INTEGRATOR RESPONSE RATE:   49768.1   10001.3    .99987
CURRENT,mA:    60.0   INTEGRATOR RESPONSE RATE:   49767.8   10001.3    .99987
CURRENT,mA:    65.0   INTEGRATOR RESPONSE RATE:   49767.4   10001.2    .99988
CURRENT,mA:    70.0   INTEGRATOR RESPONSE RATE:   49767.7   10001.3    .99987
CURRENT,mA:    75.0   INTEGRATOR RESPONSE RATE:   49768.1   10001.3    .99987
CURRENT,mA:    80.0   INTEGRATOR RESPONSE RATE:   49767.6   10001.2    .99988
CURRENT,mA:    85.0   INTEGRATOR RESPONSE RATE:   49768.0   10001.3    .99987
CURRENT,mA:    90.0   INTEGRATOR RESPONSE RATE:   49767.8   10001.3    .99987
CURRENT,mA:    95.0   INTEGRATOR RESPONSE RATE:   49767.8   10001.3    .99987
CURRENT,mA:   100.0   INTEGRATOR RESPONSE RATE:   49767.8   10001.3    .99987
CURRENT,mA:   100.2   INTEGRATOR RESPONSE RATE:   49767.4   10001.2    .99988
CURRENT,mA:   100.6   INTEGRATOR RESPONSE RATE:   49767.4   10001.2    .99988
CURRENT,mA:   101.0   INTEGRATOR RESPONSE RATE:   49767.4   10001.2    .99988
CURRENT,mA:   102.0   INTEGRATOR RESPONSE RATE:   49767.5   10001.2    .99988
CURRENT,mA:   103.0   INTEGRATOR RESPONSE RATE:   49767.4   10001.2    .99988
CURRENT,mA:   105.0   INTEGRATOR RESPONSE RATE:   49767.5   10001.2    .99988
CURRENT,mA:   110.0   INTEGRATOR RESPONSE RATE:   49767.3   10001.2    .99988
CURRENT,mA:   115.0   INTEGRATOR RESPONSE RATE:   49767.4   10001.2    .99988
CURRENT,mA:   120.0   INTEGRATOR RESPONSE RATE:   49767.4   10001.2    .99988
CURRENT,mA:   125.0   INTEGRATOR RESPONSE RATE:   49767.7   10001.3    .99987
CURRENT,mA:   130.0   INTEGRATOR RESPONSE RATE:   49768.8   10001.5    .99985
CURRENT,mA:   135.0   INTEGRATOR RESPONSE RATE:   49767.7   10001.3    .99987
CURRENT,mA:   140.0   INTEGRATOR RESPONSE RATE:   49767.7   10001.2    .99988
CURRENT,mA:   145.0   INTEGRATOR RESPONSE RATE:   49767.6   10001.2    .99988
CURRENT,mA:   150.0   INTEGRATOR RESPONSE RATE:   49767.4   10001.2    .99988

Calibration Resistor, value in PAR, Ohms:         50.0012
Load Impedance, value in PAR, Ohms:               20.0959


723A  LOAD RESISTOR vs CALIBRATION RESISTOR
Load Vs Cal measured with K17 Energized

CURRENT,mA:          .2 mA      LOAD RESISTOR,ohms:          20.4532   ohms
1.7782   %
CURRENT,mA:          .6 mA      LOAD RESISTOR,ohms:          20.2076   ohms
.5559    %
CURRENT,mA:         1.0 mA      LOAD RESISTOR,ohms:          20.1699   ohms
.3682    %
CURRENT,mA:         2.0 mA      LOAD RESISTOR,ohms:          20.1328   ohms
.1836    %
CURRENT,mA:         3.0 mA      LOAD RESISTOR,ohms:          20.1198   ohms
.1189    %
CURRENT,mA:         5.0 mA      LOAD RESISTOR,ohms:          20.1110   ohms
.0750    %
CURRENT,mA:        10.0 mA      LOAD RESISTOR,ohms:          20.1035   ohms
.0378    %
CURRENT,mA:        15.0 mA      LOAD RESISTOR,ohms:          20.1014   ohms
.0275    %
CURRENT,mA:        20.0 mA      LOAD RESISTOR,ohms:          20.1002   ohms
```

```
.0215    %
CURRENT,mA:        25.0 mA      LOAD RESISTOR,ohms:          20.0999   ohms
.0202    %
CURRENT,mA:        30.0 mA      LOAD RESISTOR,ohms:          20.0991   ohms
.0163    %
CURRENT,mA:        35.0 mA      LOAD RESISTOR,ohms:          20.0989   ohms
.0148    %
CURRENT,mA:        40.0 mA      LOAD RESISTOR,ohms:          20.0985   ohms
.0132    %
CURRENT,mA:        45.0 mA      LOAD RESISTOR,ohms:          20.0983   ohms
.0120    %
CURRENT,mA:        50.0 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0117    %
CURRENT,mA:        50.2 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0115    %
CURRENT,mA:        50.6 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0114    %
CURRENT,mA:        51.0 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0114    %
CURRENT,mA:        52.0 mA      LOAD RESISTOR,ohms:          20.0981   ohms
.0112    %
CURRENT,mA:        53.0 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0115    %
CURRENT,mA:        55.0 mA      LOAD RESISTOR,ohms:          20.0981   ohms
.0111    %
CURRENT,mA:        60.0 mA      LOAD RESISTOR,ohms:          20.0979   ohms
.0103    %
CURRENT,mA:        65.0 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0098    %
CURRENT,mA:        70.0 mA      LOAD RESISTOR,ohms:          20.0979   ohms
.0101    %
CURRENT,mA:        75.0 mA      LOAD RESISTOR,ohms:          20.0978   ohms
.0095    %
CURRENT,mA:        80.0 mA      LOAD RESISTOR,ohms:          20.0980   ohms
.0105    %
CURRENT,mA:        85.0 mA      LOAD RESISTOR,ohms:          20.0979   ohms
.0100    %
CURRENT,mA:        90.0 mA      LOAD RESISTOR,ohms:          20.0980   ohms
.0106    %
CURRENT,mA:        95.0 mA      LOAD RESISTOR,ohms:          20.0981   ohms
.0110    %
CURRENT,mA:       100.0 mA      LOAD RESISTOR,ohms:          20.0982   ohms
.0113    %
CURRENT,mA:       100.2 mA      LOAD RESISTOR,ohms:          20.0983   ohms
.0119    %
CURRENT,mA:       100.6 mA      LOAD RESISTOR,ohms:          20.0984   ohms
.0123    %
CURRENT,mA:       101.0 mA      LOAD RESISTOR,ohms:          20.0983   ohms
.0122    %
CURRENT,mA:       102.0 mA      LOAD RESISTOR,ohms:          20.0985   ohms
```

```
.0131    %
CURRENT,mA:       103.0 mA      LOAD RESISTOR,ohms:           20.0985   ohms
.0130    %
CURRENT,mA:       105.0 mA      LOAD RESISTOR,ohms:           20.0986   ohms
.0134    %
CURRENT,mA:       110.0 mA      LOAD RESISTOR,ohms:           20.0987   ohms
.0139    %
CURRENT,mA:       115.0 mA      LOAD RESISTOR,ohms:           20.0988   ohms
.0145    %
CURRENT,mA:       120.0 mA      LOAD RESISTOR,ohms:           20.0990   ohms
.0156    %
CURRENT,mA:       125.0 mA      LOAD RESISTOR,ohms:           20.0992   ohms
.0165    %
CURRENT,mA:       130.0 mA      LOAD RESISTOR,ohms:           20.0993   ohms
.0172    %
CURRENT,mA:       135.0 mA      LOAD RESISTOR,ohms:           20.0996   ohms
.0185    %
CURRENT,mA:       140.0 mA      LOAD RESISTOR,ohms:           20.0999   ohms
.0199    %
CURRENT,mA:       145.0 mA      LOAD RESISTOR,ohms:           20.1002   ohms
.0214    %
CURRENT,mA:       150.0 mA      LOAD RESISTOR,ohms:           20.1005   ohms
.0232    %


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99976          .99978          .99979          .99979          .99981

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999788
 RSD:   0.0018  %        AT 12:44:54 ON 20 May 2020

LINEARITY TEST:    97uA

     .99723          .99746          .99762          .99683          .99700

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .997228
 RSD:   0.0325  %        AT 12:54:35 ON 20 May 2020

LINEARITY TEST:   296uA

     .99916          .99885          .99907          .99860          .99826

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .998786
 RSD:   0.0366  %        AT 13:04:15 ON 20 May 2020
```

```
LINEARITY TEST:   494uA

     .99919          .99951          .99938          .99931          .99875

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999227
 RSD:   0.0291  %        AT 13:13:56 ON 20 May 2020

LINEARITY TEST:   991uA

     .99956          .99948          .99955          .99960          .99966

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999571
 RSD:   0.0069  %        AT 13:23:37 ON 20 May 2020

LINEARITY TEST:     3mA

     .99980          .99976          .99981          .99976          .99979

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999782
 RSD:   0.0022  %        AT 13:33:17 ON 20 May 2020

LINEARITY TEST:     5mA

     .99981          .99981          .99981          .99982          .99983

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999816
 RSD:   0.0011  %        AT 13:42:58 ON 20 May 2020

LINEARITY TEST:    10mA

     .99987          .99985          .99985          .99985          .99985

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999853
 RSD:   0.0011  %        AT 13:52:38 ON 20 May 2020

LINEARITY TEST:    30mA

     .99986          .99985          .99986          .99986          .99985

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999855
 RSD:   0.0003  %        AT 14:02:19 ON 20 May 2020

LINEARITY TEST:    50mA
```

```
     .99986          .99986          .99986          .99985          .99986

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999857
 RSD:   0.0004  %        AT 14:12:00 ON 20 May 2020

LINEARITY TEST:    50mA

     .99987          .99986          .99987          .99986          .99987

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999866
 RSD:   0.0003  %        AT 14:17:42 ON 20 May 2020

LINEARITY TEST:    69mA

     .99986          .99986          .99986          .99986          .99987

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999863
 RSD:   0.0003  %        AT 14:23:25 ON 20 May 2020

LINEARITY TEST:    89mA


723A  DIGITAL INTEGRATOR RESPONSE TEST
MEASURE Hz/VOLT AND THEORETICAL uCOULOMBS/COUNT AT SPECIFIED CURRENT LEVELS

                                          Calculated     Actual   Cal Factor
                                                Hz/V       Hz/V     uC/count


     OFFSET RATE OF VFC1, Hz:    4970.4     998.8

CURRENT,mA:     .2   INTEGRATOR RESPONSE RATE:   49807.2   10009.2    .99908
CURRENT,mA:     .6   INTEGRATOR RESPONSE RATE:   49792.4   10006.2    .99938
CURRENT,mA:    1.0   INTEGRATOR RESPONSE RATE:   49789.5   10005.6    .99944
CURRENT,mA:    2.0   INTEGRATOR RESPONSE RATE:   49777.5   10003.2    .99968
CURRENT,mA:    3.0   INTEGRATOR RESPONSE RATE:   49775.0   10002.7    .99973
CURRENT,mA:    5.0   INTEGRATOR RESPONSE RATE:   49772.2   10002.2    .99978
CURRENT,mA:   10.0   INTEGRATOR RESPONSE RATE:   49767.8   10001.3    .99987
CURRENT,mA:   15.0   INTEGRATOR RESPONSE RATE:   49766.4   10001.0    .99990
CURRENT,mA:   20.0   INTEGRATOR RESPONSE RATE:   49766.1   10000.9    .99991
CURRENT,mA:   25.0   INTEGRATOR RESPONSE RATE:   49765.6   10000.8    .99992
CURRENT,mA:   30.0   INTEGRATOR RESPONSE RATE:   49765.0   10000.7    .99993
CURRENT,mA:   35.0   INTEGRATOR RESPONSE RATE:   49764.7   10000.6    .99994
CURRENT,mA:   40.0   INTEGRATOR RESPONSE RATE:   49764.8   10000.7    .99993
CURRENT,mA:   45.0   INTEGRATOR RESPONSE RATE:   49764.6   10000.6    .99994
CURRENT,mA:   50.0   INTEGRATOR RESPONSE RATE:   49764.7   10000.7    .99993
CURRENT,mA:   50.2   INTEGRATOR RESPONSE RATE:   49764.3   10000.6    .99994
```

```
CURRENT,mA:   50.6   INTEGRATOR RESPONSE RATE:   49764.3   10000.6    .99994
CURRENT,mA:   51.0   INTEGRATOR RESPONSE RATE:   49764.4   10000.6    .99994
CURRENT,mA:   52.0   INTEGRATOR RESPONSE RATE:   49764.4   10000.6    .99994
CURRENT,mA:   53.0   INTEGRATOR RESPONSE RATE:   49764.3   10000.6    .99994
CURRENT,mA:   55.0   INTEGRATOR RESPONSE RATE:   49764.4   10000.6    .99994
CURRENT,mA:   60.0   INTEGRATOR RESPONSE RATE:   49765.1   10000.7    .99993
CURRENT,mA:   65.0   INTEGRATOR RESPONSE RATE:   49765.3   10000.8    .99992
CURRENT,mA:   70.0   INTEGRATOR RESPONSE RATE:   49765.4   10000.8    .99992
CURRENT,mA:   75.0   INTEGRATOR RESPONSE RATE:   49765.3   10000.8    .99992
CURRENT,mA:   80.0   INTEGRATOR RESPONSE RATE:   49765.4   10000.8    .99992
CURRENT,mA:   85.0   INTEGRATOR RESPONSE RATE:   49765.5   10000.8    .99992
CURRENT,mA:   90.0   INTEGRATOR RESPONSE RATE:   49765.2   10000.7    .99993
CURRENT,mA:   95.0   INTEGRATOR RESPONSE RATE:   49765.3   10000.8    .99992
CURRENT,mA:  100.0   INTEGRATOR RESPONSE RATE:   49765.4   10000.8    .99992
CURRENT,mA:  100.2   INTEGRATOR RESPONSE RATE:   49765.4   10000.8    .99992
CURRENT,mA:  100.6   INTEGRATOR RESPONSE RATE:   49765.6   10000.8    .99992
CURRENT,mA:  101.0   INTEGRATOR RESPONSE RATE:   49765.5   10000.8    .99992
CURRENT,mA:  102.0   INTEGRATOR RESPONSE RATE:   49765.6   10000.8    .99992
CURRENT,mA:  103.0   INTEGRATOR RESPONSE RATE:   49765.7   10000.9    .99991
CURRENT,mA:  105.0   INTEGRATOR RESPONSE RATE:   49765.6   10000.8    .99992
CURRENT,mA:  110.0   INTEGRATOR RESPONSE RATE:   49765.6   10000.8    .99992
CURRENT,mA:  115.0   INTEGRATOR RESPONSE RATE:   49765.8   10000.9    .99991
CURRENT,mA:  120.0   INTEGRATOR RESPONSE RATE:   49765.5   10000.8    .99992
CURRENT,mA:  125.0   INTEGRATOR RESPONSE RATE:   49765.9   10000.9    .99991
CURRENT,mA:  130.0   INTEGRATOR RESPONSE RATE:   49765.8   10000.9    .99991
CURRENT,mA:  135.0   INTEGRATOR RESPONSE RATE:   49765.9   10000.9    .99991
CURRENT,mA:  140.0   INTEGRATOR RESPONSE RATE:   49765.8   10000.9    .99991
CURRENT,mA:  145.0   INTEGRATOR RESPONSE RATE:   49765.7   10000.9    .99991
CURRENT,mA:  150.0   INTEGRATOR RESPONSE RATE:   49765.9   10000.9    .99991

Calibration Resistor, value in PAR, Ohms:         50.0012
Load Impedance, value in PAR, Ohms:               20.0959


723A  LOAD RESISTOR vs CALIBRATION RESISTOR
Load Vs Cal measured with K17 Energized

CURRENT,mA:          .2 mA      LOAD RESISTOR,ohms:          20.4453   ohms
1.7386   %
CURRENT,mA:          .6 mA      LOAD RESISTOR,ohms:          20.2159   ohms
.5971    %
CURRENT,mA:         1.0 mA      LOAD RESISTOR,ohms:          20.1677   ohms
.3575    %
CURRENT,mA:         2.0 mA      LOAD RESISTOR,ohms:          20.1312   ohms
.1757    %
CURRENT,mA:         3.0 mA      LOAD RESISTOR,ohms:          20.1207   ohms
.1233    %
CURRENT,mA:         5.0 mA      LOAD RESISTOR,ohms:          20.1101   ohms
.0708    %
CURRENT,mA:        10.0 mA      LOAD RESISTOR,ohms:          20.1024   ohms
```

```
.0325    %
CURRENT,mA:        15.0 mA      LOAD RESISTOR,ohms:          20.1003   ohms
.0220    %
CURRENT,mA:        20.0 mA      LOAD RESISTOR,ohms:          20.0991   ohms
.0160    %
CURRENT,mA:        25.0 mA      LOAD RESISTOR,ohms:          20.0985   ohms
.0129    %
CURRENT,mA:        30.0 mA      LOAD RESISTOR,ohms:          20.0980   ohms
.0107    %
CURRENT,mA:        35.0 mA      LOAD RESISTOR,ohms:          20.0976   ohms
.0087    %
CURRENT,mA:        40.0 mA      LOAD RESISTOR,ohms:          20.0973   ohms
.0072    %
CURRENT,mA:        45.0 mA      LOAD RESISTOR,ohms:          20.0971   ohms
.0063    %
CURRENT,mA:        50.0 mA      LOAD RESISTOR,ohms:          20.0970   ohms
.0055    %
CURRENT,mA:        50.2 mA      LOAD RESISTOR,ohms:          20.0970   ohms
.0056    %
CURRENT,mA:        50.6 mA      LOAD RESISTOR,ohms:          20.0970   ohms
.0057    %
CURRENT,mA:        51.0 mA      LOAD RESISTOR,ohms:          20.0971   ohms
.0058    %
CURRENT,mA:        52.0 mA      LOAD RESISTOR,ohms:          20.0970   ohms
.0058    %
CURRENT,mA:        53.0 mA      LOAD RESISTOR,ohms:          20.0970   ohms
.0058    %
CURRENT,mA:        55.0 mA      LOAD RESISTOR,ohms:          20.0970   ohms
.0055    %
CURRENT,mA:        60.0 mA      LOAD RESISTOR,ohms:          20.0966   ohms
.0036    %
CURRENT,mA:        65.0 mA      LOAD RESISTOR,ohms:          20.0965   ohms
.0032    %
CURRENT,mA:        70.0 mA      LOAD RESISTOR,ohms:          20.0965   ohms
.0031    %
CURRENT,mA:        75.0 mA      LOAD RESISTOR,ohms:          20.0965   ohms
.0033    %
CURRENT,mA:        80.0 mA      LOAD RESISTOR,ohms:          20.0966   ohms
.0035    %
CURRENT,mA:        85.0 mA      LOAD RESISTOR,ohms:          20.0967   ohms
.0039    %
CURRENT,mA:        90.0 mA      LOAD RESISTOR,ohms:          20.0967   ohms
.0041    %
CURRENT,mA:        95.0 mA      LOAD RESISTOR,ohms:          20.0968   ohms
.0045    %
CURRENT,mA:       100.0 mA      LOAD RESISTOR,ohms:          20.0970   ohms
.0054    %
CURRENT,mA:       100.2 mA      LOAD RESISTOR,ohms:          20.0971   ohms
.0059    %
CURRENT,mA:       100.6 mA      LOAD RESISTOR,ohms:          20.0971   ohms
```

```
.0062    %
CURRENT,mA:       101.0 mA      LOAD RESISTOR,ohms:           20.0973   ohms
.0069    %
CURRENT,mA:       102.0 mA      LOAD RESISTOR,ohms:           20.0973   ohms
.0071    %
CURRENT,mA:       103.0 mA      LOAD RESISTOR,ohms:           20.0974   ohms
.0075    %
CURRENT,mA:       105.0 mA      LOAD RESISTOR,ohms:           20.0974   ohms
.0078    %
CURRENT,mA:       110.0 mA      LOAD RESISTOR,ohms:           20.0976   ohms
.0084    %
CURRENT,mA:       115.0 mA      LOAD RESISTOR,ohms:           20.0978   ohms
.0093    %
CURRENT,mA:       120.0 mA      LOAD RESISTOR,ohms:           20.0979   ohms
.0101    %
CURRENT,mA:       125.0 mA      LOAD RESISTOR,ohms:           20.0981   ohms
.0111    %
CURRENT,mA:       130.0 mA      LOAD RESISTOR,ohms:           20.0983   ohms
.0121    %
CURRENT,mA:       135.0 mA      LOAD RESISTOR,ohms:           20.0986   ohms
.0136    %
CURRENT,mA:       140.0 mA      LOAD RESISTOR,ohms:           20.0989   ohms
.0150    %
CURRENT,mA:       145.0 mA      LOAD RESISTOR,ohms:           20.0992   ohms
.0166    %
CURRENT,mA:       150.0 mA      LOAD RESISTOR,ohms:           20.0995   ohms
.0181    %


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99984          .99985          .99987          .99987          .99987

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999860
 RSD:   0.0014  %        AT 18:23:56 ON 26 May 2020

LINEARITY TEST:    98uA

     .99664          .99822          .99607          .99557          .99643

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .996587
 RSD:   0.1000  %        AT 18:33:37 ON 26 May 2020

LINEARITY TEST:   298uA

     .99895          .99941          .99902          .99876          .99875
```

```
 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .998980
 RSD:   0.0270  %        AT 18:43:17 ON 26 May 2020

LINEARITY TEST:   496uA

     .99925          .99942          .99921          .99932          .99934

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999309
 RSD:   0.0084  %        AT 18:52:58 ON 26 May 2020

LINEARITY TEST:   992uA

     .99955          .99964          .99975          .99966          .99963

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999645
 RSD:   0.0070  %        AT 19:02:39 ON 26 May 2020

LINEARITY TEST:     3mA

     .99979          .99977          .99983          .99974          .99981

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999788
 RSD:   0.0034  %        AT 19:12:19 ON 26 May 2020

LINEARITY TEST:     5mA

     .99986          .99986          .99984          .99985          .99985

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999852
 RSD:   0.0007  %        AT 19:22:00 ON 26 May 2020

LINEARITY TEST:    10mA

     .99989          .99989          .99988          .99989          .99990

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999888
 RSD:   0.0007  %        AT 19:31:40 ON 26 May 2020

LINEARITY TEST:    30mA

     .99989          .99989          .99989          .99989          .99989

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999889
```

```
 RSD:   0.0003  %        AT 19:41:21 ON 26 May 2020

LINEARITY TEST:    50mA

     .99989          .99989          .99989          .99988          .99989

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999888
 RSD:   0.0003  %        AT 19:51:02 ON 26 May 2020

LINEARITY TEST:    50mA

     .99990          .99990          .99989          .99989          .99990

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999895
 RSD:   0.0005  %        AT 19:56:45 ON 26 May 2020

LINEARITY TEST:    69mA

     .99989          .99989          .99989          .99989          .99989

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999890
 RSD:   0.0002  %        AT 20:02:28 ON 26 May 2020

LINEARITY TEST:    89mA

     .99988          .99988          .99988          .99988          .99987

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999878
 RSD:   0.0004  %        AT 20:08:10 ON 26 May 2020

LINEARITY TEST:   109mA

     .99987          .99986          .99986          .99985          .99986

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999860
 RSD:   0.0006  %        AT 20:13:53 ON 26 May 2020

LINEARITY TEST:   129mA

     .99984          .99983          .99983          .99983          .99983

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999830
 RSD:   0.0005  %        AT 20:19:36 ON 26 May 2020
```

```
LINEARITY TEST:   149mA

     .99980          .99980          .99979          .99979          .99978

 LENGTH OF TIME FOR: CALIBRATION=          25.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999793
 RSD:   0.0008  %        AT 20:25:19 ON 26 May 2020


723A  MCP DIGITAL INTEGRATOR LINEARITY TEST
LINEARITY TEST:    50mA

     .99984          .99985          .99986          .99986          .99987

 LENGTH OF TIME FOR: CALIBRATION=          50.0  SEC.
 723A  AVERAGE CALIBRATION FACTOR:        .999854
 RSD:   0.0010  %        AT 20:35:00 ON 26 May 2020
```

Attachment 4. Instrument Par file that documents the value of the load impedance and calibration resistor.

```
LANL3
2        !Analog Out Device: 1=NI board(Mayak Russia Only); 2=HP34970A
50.05    !Calr Maximum Value
49.95    !Calr Minimum value
50.00125 !Calr (723-A Mockup value) 10mA, JVC 4-30-2020
20.09588 !Lm5:Loadr [ w.K17 energized]  JVC 4-30-2020
1.0005   !Mcp Max 1.0005
0.9995   !Mcp Min 0.9995
1        !0=Ask 1=not secret don't ask  2=secret (aliquot weight not entered)
10       !Time_between_i  seconds used in Timer_b4_next_i
1        !Print_icc_flag  1=Yes; 0=No
0        !Fe_preox_flag   1=Yes; 0=No
500      !Default Calibration Time in Seconds
0.0002   !Calibration Adjustment Tolerance
0.002    !Calibration out-of-control Tolerance
24       !# Months before LINEARITY warning
12       !# Months before Formal Potential warning
600      !# Months before Noise check warning
1200     !# Months before next automatic Relay Exercise
2.5      !Battery or External Supply  baseline 2.5
0        !use DVM Temperature:  0=Not Use;  otherwise, use
1.00     !DVM Temperature Coefficient
0        !DVM offset to be set
1.0      !DVM gain to be set
1        !1=Long Log format; otherwise short log format required by MHI
974      !Password, 3-8 Characters, no leading or internal spaces. Needs space at
end before !Comment
0        !Stirrer motor RPM and Temperature connected when = 1
0        !Machine baseline current (uA) to subtract from Cell current


!Site     SRS      SRS      IAEA     JNC      JNC     MHI#1    MHI#2    MHI#3
Russia
!        772-1F   723-A     SAL     Sys#1    Sys#2    AH-530   AH-325   AH-505
Mayak
!------ -------- -------- -------- -------- -------- -------- -------- --------
--------
!Analog   2=HP     2=HP     2=HP     2=HP     2=HP     2=HP     2=HP     2=HP
1=NI
!Cal R  100.0066 100.0081 100.0139 100.0116 100.0172 100.0106 100.0115 100.0139
100.????   <---- Values ??
!LoadR   49.989   49.9663  49.7047  49.9466  49.7723  49.8835  49.8634  49.8133
49.????   <---- Values ??
!       2001-Jan                   2002-Apr 2002-Apr 2002-Apr 2002-Apr 2002-Apr
!MCPMax   1.0002   1.0002   1.0005   1.0005   1.0005   1.0005   1.0005   1.0005
1.0005
!MCPMin   0.9998   0.9998   0.9995   0.9995   0.9995   0.9995   0.9995   0.9995
0.9995
!Time     10       10       10       10       10       10       10       10
10
```

```
!Secret   1=Not    1=Not    1=Not    1=Not    1=Not    1=Not    1=Not    1=Not
1=Not
!Prt_icc  1=Yes    1=Yes    0=No     1=Yes    1=Yes    0=No     0=No     0=No
0=No
!Fe_preox 0=No     0=No     0=No     0=No     0=No     0=No     0=No     0=No
0=No
!


! Password Requirements:
!   o 3-8 Alpha-Numeric Characters,
!   o No leading blank spaces
!   o No internal blank spaces.
! Add a blank space at the end of the password in the parameter file, before
providing !Comments...
! This trailing space is NOT part of the password, but is used by the software to
define the end.
! Software password default: SRSCOUL
```