

SOUTHWEST RESEARCH INSTITUTE
Department of Quality Assurance
Calibration Laboratory • 522-5215

WORK ORDER

CERTIFICATE # 24751 ASSET # 001948 DATE 18 Mar 97

ITEM DATA:
Manufacturer Orion Model 71946
Description expandable RM Analyser Serial # 238
Accessories _____

ACTION REQUESTED cal

CUSTODIAN Div. 20, Daniel Dunn

Turned in by: _____ Phone 609c

CHARGE # 20-5708-561 Date Required _____

INSTRUMENT USED ON: NUCLEAR DOD NASA GLP SPPE
 OTHER _____

COPY OF CALIBRATION CERTIFICATE Yes No

CONDITION RECEIVED: _____ Out of tolerance, repaired to specifications
_____ In tolerance, minor adjustments/repairs made
 In tolerance, no adjustments/repairs
_____ Out of tolerance, adjusted to specifications
 Received into system, introduced or reactivated
_____ Calibration interval
_____ Reliability code

ACTION TAKEN: (Calibration/Repair/Parts) Calibrate

CAL ENVIRONMENT:
Temperature 74 °F Humidity 48 %RH

CALIBRATED/REPAIRED:
By Car Pan Cal Procedure 5352
Date 2 APR 97 Accuracy _____
Cal Interval 12 Time to complete:
Next Cal due 2 APR 98 Cal Repair _____
Standards used (Asset#) _____

115, 168
DATE COMPLETED 2 APR 97
DATE PICKED UP 4/4/97 PICKED UP BY [Signature]

24751

WORK ORDER HISTORY

DATE	START STOP	CAL	REP	REMARKS:
2 APR 97	8 AM			<i>found no gas to pump</i>
TOTAL CAL/REPAIR				TOTAL HOURS _____

CALIBRATION CHECK FORM

Date Calibrated 2 APR 97 Work Order 24751
 Technician [Signature]
 Unit Under Test _____
 Manufacturer _____ Model _____ SN 2330 ASN 1948

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
		<u>1.9000</u>	<u>1.89914</u>	<u>1.9009</u>			
	<u>1</u> <u>Record and</u>				<u>1.8999</u>	<u>1.8986</u>	
					<u>1.8986</u>		
	<u>2</u> <u>Retest and</u>	<u>1.90000</u>			<u>1.8998</u>		
					<u>1.8985</u>		

SOUTHWEST RESEARCH INSTITUTE
Department of Quality Assurance
Calibration Laboratory • 522-5215

WORK ORDER

CERTIFICATE # 28770 ASSET # 001948 DATE 25 Feb 98

ITEM DATA:

Manufacturer Orion Model TA940
Description Iron Analyser Serial # 2330
Accessories _____

ACTION REQUESTED Cal

CUSTODIAN Dr. P. D. Dunn

Turned in by: _____ Phone 6070

CHARGE # 201402-571 Date Required _____

INSTRUMENT USED ON: DOD/NASA NUCLEAR GLP SPPE ISO
OTHER _____

COPY OF CALIBRATION CERTIFICATE Yes No

NEW WORK Yes No If yes, an evaluation shall be made to verify capabilities.
By _____ Date _____

CONDITION RECEIVED: _____ (F) Out of tolerance, repaired to specifications
_____ (G) In tolerance, minor adjustments/repairs made
_____ (J) In tolerance, no adjustments/repairs
_____ (K) Out of tolerance, adjusted to specifications
_____ (S) Received into system, introduced or reactivated

ACTION TAKEN: (Calibration/Repair/Parts) Limited cal. mV function only
tech trouble shot and adjusted, however unit was found in-
plane

CAL ENVIRONMENT:
Temperature 75 °F Humidity 35 %RH

CALIBRATED/REPAIRED:
By K. Hughes Cal Procedure CCCP-1A-001
Date 6 Mar 98 Accuracy ~~±~~ ± 2mV + 50µV/°C @ 20°C
Cal Interval 12mos Reliability Code: 5
Next Cal due 6 Mar 99 Cal Time 2.0 Repair Time 5.5
Standards used (Asset#) 182, #

DATE COMPLETED 6 Mar 98
DATE PICKED UP 3/9/98 PICKED UP BY [Signature]

28770

CALIBRATION CHECK FORM

Date Calibrated 6 Mar 98 Work Order 28770
 Technician KH SHS
 Unit Under Test EA940 ION ANALYZER
 Manufacturer ORION Model EA940 SN 2380 ASN 1948

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
	(tolerances include temp. coefficient drift)		($\pm .2\text{mV} + .194\mu\text{V}$ for temp drift)				
1	1000 Millivolts						
	CH 1	-1900.0	$\pm .394\text{mV}$		-1899.9		P
		-1500.0	$\pm .394\text{mV}$		-1500.0		P
		-1000.0	$\pm .394\text{mV}$		999.7		P
		-500.0	$\pm .394\text{mV}$		-499.7		P
		0mV	$\pm .394\text{mV}$		0.0		P
		500mV	$\pm .394\text{mV}$		499.9		P
		1000mV	$\pm .394\text{mV}$		999.9		P
		1500mV	$\pm .394\text{mV}$		1500.0		P
		1900mV	$\pm .394\text{mV}$		1900.1		P
	CH 2	-1900.0mV	$\pm .394\text{mV}$		-1900.0		P
		-1500.0mV	$\pm .394\text{mV}$		-1500.0		P
		-1000.0mV	$\pm .394\text{mV}$		-999.9		P
		-500.0mV	$\pm .394\text{mV}$		-499.8		P
		0.0mV	$\pm .394\text{mV}$		0.0		P
		500mV	$\pm .394\text{mV}$		499.7		P
		1000.0mV	$\pm .394\text{mV}$		999.8		P
		1500.0mV	$\pm .394\text{mV}$		1499.9		P
		1900.0mV	$\pm .394\text{mV}$		1899.9		P

SOUTHWEST RESEARCH INSTITUTE
Department of Quality Assurance
Calibration Laboratory • 522-5215

WORK ORDER

CERTIFICATE # 33576 ASSET # 001948 DATE 05 MARCH 99

ITEM DATA:

Manufacturer Orion Model EA940
Description expandable ion Analyser Serial # 2330
Accessories _____

ACTION REQUESTED Cal

CUSTODIAN Dr. D. J. Dunn

Turned in by: _____ Phone 6090

CHARGE # 20-442-571 OH Date Required _____

INSTRUMENT USED ON: (DOD/NASA) (NUCLEAR) (GLP) (SPPE) (ISO)
 OTHER _____

COPY OF CALIBRATION CERTIFICATE (Yes) (No)

NEW WORK Yes No If yes, an evaluation shall be made to verify capabilities.

By MMJ Date 03-05-99

Work involves proprietary/confidential information or equipment (Yes) (No)

- CONDITION RECEIVED:
- (F) Out of tolerance, repaired to specifications
 - (G) In tolerance, minor adjustments/repairs made
 - (J) In tolerance, no adjustments/repairs
 - (K) Out of tolerance, adjusted to specifications
 - (S) Received into system, introduced or reactivated

33576

ACTION TAKEN: (Calibration/Repair/Parts) Mar 24 99 - cal'd out cal - 500ml
both input channels 1/11

Limited Cal - DC multivolt ONLY

CAL ENVIRONMENT:
Temperature 74 °F Humidity 40 %RH

CALIBRATED/REPAIRED:
By MMJ Cal Procedure Mfg Manual ^{v/m} CLCP-EL-001
Date 25 Mar 99 Accuracy Mfg MAR 99
Cal Interval 12 Reliability Code: 6
Next Cal due 25 Mar 00 Cal Time 2.0 Repair Time _____
Standards used (Asset#) 6413

DATE COMPLETED 25 Mar 99
DATE PICKED UP 25 Mar 99 PICKED UP BY Walter J. Machowski
SwRI Form QA-174-0

CALIBRATION CHECK FORM

Date Calibrated 25 Mar 99 Work Order 33576
 Technician Vincent Morales
 Unit Under Test EXPANDABLE Ion Analyzer
 Manufacturer ORION Model EAG40 SN 2330 ASN 1948

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
	Absolute mV CH 1	0.0 mV	± .2 mV		0.0 mV		PAS ↓
		1000.0 mV	999.5	1000.5	1000.0 mV		
		1900.0 mV	1899.5	1900.5	1900.2 mV		
		-1000.0 mV	-999.5	-1000.5	-999.8 mV		
		-1900.0 mV	-1899.5	-1900.5	-1900.0 mV		
	Absolute mV CH 2	0.0 mV	± .2 mV		0.0 mV		
		1000.0 mV	999.5	1000.5	1000.1 mV		
		1900.0 mV	1899.5	1900.5	1900.3 mV		
		-1000.0 mV	-999.5	-1000.5	-999.9 mV		
		-1900.0 mV	-1899.5	-1900.5	-1899.9 mV		

WORK ORDER 39373

Date Received 6/7/00

Asset No. 001948 Manufacturer ORION Model EA 940
Description EXPANDABLE IONANALYZER Serial Number 2330
Accessory Received/Required NONE
Div/CC ID NONE Accessory to Asset No. N/A
Div/CC DIV20 Location B57 Custodian DARRELL DUNN Tel. 6090
Charge/Project No. 20.00751.006 Proprietary/Confidential N Date Required ROUTINE
Work Requested CALIBRATION
Receiving Inspection O.K.
Delivered By MELISSA NUGENT Tel. 6090

WORK HISTORY

Date	Start Time	Stop Time	Notes

PARTS

Part Name	Part Number	Cost	Failure Description

WORK SUMMARY

Failure Description _____

Repair Action _____

Cal Procedure CL-79, 8/99 CL-363, Dec 99 Temp 72 F Hum 42 %

Tech V. Morala Cal Hrs. .5 Repair Hrs. _____ Part Cost _____

Action Taken Calibration

Standards Used 182

Date Cal 1st Jun 00 Int. 12 Mo. Date Due 14 Jun 01 Reliability Code 7

Date Picked Up 6/28/2000 Picked Up By Melissa Nugent

39373



Southwest Research Institute
6220 Culebra Road
San Antonio, TX 78238
(210) 522-5215
Department of Quality Assurance
Calibration Laboratory



Certificate #
0972-01

Certificate of Calibration

14 June 2000

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: ORION EA 940
Description: EXPANDABLE IONANALYZER
Serial Number: 2330
Asset Number: 001948

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NCSL Z540-1-1994. The results of this calibration relate only to the individual item as described above. Standards used in this calibration, described in the referenced calibration procedure with associated uncertainties or tolerances, are traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and available for examination upon request. This certificate is not to be reproduced, except in full, without the written approval of the Southwest Research Institute Department of Quality Assurance Calibration Laboratory.

This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results of this calibration certificate were determined in accordance with the terms of accreditation unless stated otherwise below.

The uncertainty of the calibration was sufficient to determine that the item met the manufacturer's published specifications unless stated otherwise below.


Ambient Conditions: Temperature: 72.0 Degrees Fahrenheit Humidity: 42 % RH

Calibration Date: 14 Jun 00 **Calibration Procedure:** CL-363, 12/99

Condition as Received: In Tolerance

Remarks: MV USE ONLY

Approved by:



Jim Patterson, Supervisor, or Walt Hill, Metrologist

Certificate # 39373

m:\a2la.rpt-Rev date 22-May 00

Measurements performed by:



Vince Morales, Technician

Page 1 of 1



Southwest Research Institute
6220 Culebra Road
San Antonio, TX 78238
(210) 522-5215
Department of Quality Assurance
Calibration Laboratory



Certificate #
0972-01

Certificate of Calibration

24 July 2001

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: ORION EA 940
Description: EXPANDABLE IONANALYZER
Serial Number: 2330
Asset Number: 001948
Work Order Number: 444044495

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NCSL Z540-1-1994. The results of this calibration relate only to the individual item as described above. Standards used in this calibration, described in the referenced calibration procedure with associated uncertainties or tolerances, are traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and available for examination upon request. This certificate is not to be reproduced, except in full, without the written approval of the Southwest Research Institute Department of Quality Assurance Calibration Laboratory.

This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results of this calibration certificate were determined in accordance with the terms of accreditation unless stated otherwise below.

The uncertainty of the calibration was sufficient to determine that the item met the manufacturer's published specifications unless stated otherwise below.

Ambient Conditions: Temperature: 72.0 Degrees Fahrenheit Humidity: 38 % RH

Calibration Date: 24 Jul 01 **Calibration Procedure:** CL-363, 12/99

Condition as Received: LIMITED CALIBRATION

Condition as Released: LIMITED CALIBRATION

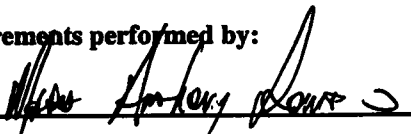
Remarks: LIMITED CALIBRATION: CALIBRATE MILLIVOLT USE ONLY.

Approved by:



Walt Hill, Supervisor
Institute Calibration Laboratory

Measurements performed by:



Mark Romero, Technician

CALIBRATION CHECK FORM

Date Calibrated 24 July 2001 Work Order 444044495 Cal By Mark Anthony Romero

Procedure No./Date: CL-263, DEC 99 Unit Under Test: EXPANDABLE ION ANALYZER

Mfg: ORION Model: EA940 SN 2330 AN 001948

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
E	CH.2	1900.0mV	1899.5	1900.5mV	1900.0 mV		
		-1900.0mV	-1899.5	-1900.5mV	-1900.2 mV		
	CH.1	1900.0mV	1899.5	1900.5mV	1900.1 mV		
		-1900.0mV	-1899.5	-1900.5mV	-1900.0 mV		

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Received by AANDERSON, 7/3/02 10:42:34AM

Arrived 7/3/02

Work Order **444049296**

Asset No. 001948 Manufacturer ORION

Model EA 940

Equipment Type EXPANDABLE IONANALYZER

Serial No. 2330

Accessory No.

Interval 12 M

Calibration Procedure CL-363, 12/99

Location B57

Div/Client DIV20

Custodian DARRELL DUNN

Mail Stop B57

Tel 6090

IN LINE

Special Instructions _____

Notify before adjustments or repairs. () Provide data with certificate () Certificate Typ. _____

Charge/Project No. 00751.006 1.20

Requester / Telephone _____

This information is correct for the work requested. _____

WORK NOTES

Date	Hours	Remarks/Notes
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Date	Hours	Part Name	Part Number	Failure Description	Cost
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

WORK SUMMARY

Failure Description _____

Repair Action _____

Tech 8216 Cal Hrs. _____ Repair Hrs 1 Parts Cost _____ Temp 72 F Hum. 41 %

Standards Used 182

Date Picked Up 7/10/2002

Picked Up By Darrell Dunn

444049296

Southwest Research Institute
Calibration laboratory
Calibration Sheet.

Found/Left

Work Order:	444049296	Mfr.	ORION	Technician	8216
Asset No.	001948	Model	EA940	Procedure	CL-263 12/99
Serial No.	2330	Type.	ION ANALYZER	Cal Date.	July 9, 2002

Remarks: (1) The Difference is equal to TI reading - Test Point reading.
(2) If no value is listed the uncertainty is >4/1

The results can be Pass, Fail, or if blank "not determinable". If "not determinable" it is up to the end user to determine if results meet their needs.

LIMITED CAL: mVolts Only

Function/Range	Test Point	TI Reading	Difference (1)	Test Limits+/-	Uncertainty (2)	Results
Ch 1	mVolts	mVolts	mVolts	mVolts	mVolts	
	1000.0	999.8	-0.2	1.0	0.0	Pass
	-1000.0	-999.8	0.2	1.0	0.0	Pass

Function/Range	Test Point	TI Reading	Difference (1)	Test Limits+/-	Uncertainty (2)	Results
Ch 2	mVolts	mVolts	mVolts	mVolts	mVolts	
	1000.0	999.6	-0.4	1.0	0.0	Pass
	-1000.0	-1000.0	0.0	1.0	0.0	Pass



Southwest Research Institute
6220 Culebra Road
San Antonio, TX 78238
(210) 522-5215
Department of Quality Assurance
Calibration Laboratory

Certificate of Calibration

9 July 2002

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: ORION EA 940
Description: EXPANDABLE IONANALYZER
Serial Number: 2330
Asset Number: 001948
Work Order Number: 444049296

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NC SL Z540-1-1994. Standards used in this calibration, described in the referenced calibration procedure with associated uncertainties or tolerances, are traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request. This certificate is not to be reproduced, except in full, without the written approval of the Southwest Research Institute Department of Quality Assurance Calibration Laboratory.

The uncertainty of the calibration was sufficient to determine that the item met the manufacturer's published specifications unless stated otherwise below.

Ambient Conditions: Temperature: 72.0 Degrees Fahrenheit Humidity: 41 % RH

Calibration Date: 9 Jul 02 **Calibration Procedure:** CL-363, 12/99

Condition as Received: LIMITED CALIBRATION


Condition as Returned: LIMITED CALIBRATION

Remarks: LIMITED CALIBRATION: MILLIVOLT USE ONLY.

Approved by:


Walt Hill, Metrology Group Leader
Institute Calibration Laboratory

Measurements performed by:


Ken Harp, Technician