

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





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

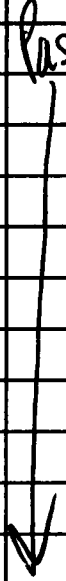
Date Calibrated 6 Mar 98 Work Order 28770  
 Technician KH SHS  
 Unit Under Test EA940 ION ANALYZER  
 Manufacturer ORION Model EA940 SN 2380 ASN 1948

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	<del>1000</del> <sup>Also include</sup> Millivolts						
	CH 1	-1900.0	$\pm .394\text{mV}$		-1899.9		P
		-1500.0	$\pm .394\text{mV}$		-1500.0		P
		-1000.0	$\pm .394\text{mV}$		<del>999.7</del>		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	$\pm .394\text{mV}$		<del>499.7</del>		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



# 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, 6/99 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 1<sup>st</sup> 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



Accredited  
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.

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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

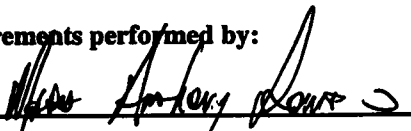
**Remarks:** LIMITED CALIBRATION: CALIBRATE MILLIVOLT USE ONLY.

**Approved by:**

  
\_\_\_\_\_

Walt Hill, Supervisor  
Institute Calibration Laboratory

**Measurements performed by:**

  
\_\_\_\_\_

Mark Romero, Technician



# 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

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



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6220 Culebra Road  
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(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