Southwest Research Institute
6220 Culebra Road
San Antonio, TX 78238
Department of Quality Assurance
Calibration Laboratory

Certificate of Calibration

27 February 1998

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: ORION EA 920
Description: EXPANDABLE IONANALYZER
Serial Number: TV64A
Asset Number: 005352

Environmental Conditions

Temperature: 72.00 Deg. F **Humidity:** 32 % RH

Calibration Information

Calibration was in accordance with requirements of MIL-STD-45662A and ANSI/NCSL Z540-1-1994. Measurements are traceable to the National Institute of Standards and Technology (NIST). This report may not be reproduced except in full without written approval of the originator. Inspection and test data are on file and available for inspection.

The uncertainty of the calibration was sufficient to determine that the instrument met the manufacturer's specifications.

Calibration Date: 27 Feb 98 **Calibration Procedure:** CLCP-PH-001

Interval: 12 months

Next Calibration Due: 27 Feb 99 **Received:** In Tolerance

Remarks:

Standards Used

Asset	MFR	Model	Description	Serial No.	Due Cal
000182	FLUKE	5700A	CALIBRATOR	5200003	2 Jul 99

Signed:

Title:

LAST PAGE OF REPORT
Total Pages Printed: 1

Certificate # 28771

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

Accredited

Certificate # 0972-01

Certificate of Calibration

24 March 1999

Issued to:	DARRELL DUNN DIV20 B57
Manufacturer/Model:	ORION EA 920
Description:	EXPANDABLE IONANALYZER
Serial Number:	TV64A
Asset Number:	005352

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NCSL 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.

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: 73.0 Degrees Fahrenheit Humidity: 40 % RH

Calibration Date: 24 Mar 99 **Calibration Procedure:** CLCP-PH-001 4/96

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks: LIMITED: CAL MV USE ONLY

Approved by:

Jim Patterson, Supervisor or Walt Hill, Metrologist

Measurements performed by:

Vince Morales, Technician

Certificate # 33575

m:\a2la.rpt Rev date 10 Mar 99

SOUTHWEST RESEARCH INSTITUTE™

6220 Culebra Road, P.O. Drawer 28510
Institute Quality Systems
Institute Calibration Laboratory
Phone: 210-522-5215 Fax 210-522-3692

Certificate of Calibration

Submitted By:	DIV20	**Work Order:**	444054475
Address:	B57	**Date Issued:**	Jul 15, 2003
Contact:	DARRELL DUNN	**Calibration Date:**	Jul 15, 2003
Manufacturer Model:	ORION EA 920	****Calibration Due:**	Jul 15, 2004
Description:	EXPANDABLE IONANALYZER	**Calibration Location:**	Bldg. 64
Serial No:	TV64A	**Environment:**	Temp. 72.0°F Hum. 36 %RH
Asset No:	005352	***As Found:**	LIMITED CALIBRATION
Procedure:	CL-79, 6/99	***As Left:**	LIMITED CALIBRATION

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 1999 and ANSI/NCSL Z540-1-1994 which are equivalent to relevant requirements of the ISO 9000-1994 series of standards. This certificate may not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. The results of this calibration relate only to the individual instrument described above. This certificate shall not be used to claim product endorsement by the American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government.

Uncertainty evaluation includes the item under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor of k=2 to approximate a 95% confidence level. The calibration process provides a Test Uncertainty Ratio (TUR) of less than or equal to 25% (4:1) of the test limit unless otherwise stated in remarks or an attachment.

*The client has sole responsibility for determination of in/out of tolerance or compliance/noncompliance. An in/out of tolerance opinion is provided for your convenience based only on the Test Instrument (TI) reading(s) and limits as reported. The reported uncertainty relates only to the results at the time of calibration and does not imply any short or long term stability of the TI.

**Calibration interval is determined by the client and does not assure the instrument will remain within tolerance until this date. Any number of factors may cause the instrument to be out of tolerance before the next calibration date.

Remarks: Limited Calibration: Millivolt Use Only

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
000182	FLUKE	5700A/EP	CALIBRATOR	Aug 19, 03

Approved by: Walt Hill
Metrology Group Leader

Measurements by: Tom Hannon
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Calibration Report

Work Order:	444054475	Mfr.	ORION	Technician	TJH
Asset No.	005352	Model			
Serial No.	TV64A	Type.	ION ANALYZER	Cal Date.	15-Jul-03
Remarks:					

LIMITED CAL: mVolts Only

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Ch 1	mVolts	mVolts	mVolts	mVolts	mVolts	Result
	1000.0	999.1	-0.9	1.0	0.12	Pass
	-1000.0	-1000.2	-0.2	1.0	0.12	Pass
Ch 2	mVolts	mVolts	mVolts	mVolts	mVolts	
	1000.0	999.4	-0.6	1.0	0.12	Pass
	-1000.0	-999.9	0.1	1.0	0.12	Pass

END OF REPORT

SOUTHWEST RESEARCH INSTITUTE

6220 CULEBRA ROAD • POST OFFICE DRAWER 28510 • SAN ANTONIO, TEXAS, 78228-0510 • TEL (210) 522-5215 • FAX (210) 522-3692

To: Darrell Dunn, Div. 20, B57

From: Walt Hill, Metrology Group Leader
Institute Calibration Laboratory

Date: Jul. 13, 2004

Subject: Out-of-tolerance Notice

The purpose of this notice is to alert you of a condition, which may have caused erroneous measurements affecting safety or the quality of products or services your organization provides. The attached as-found readings are provided for your evaluation to determine if the instrument listed below had an impact and if further action is required.

When the as-found results are near the specification limit, +/- a margin less than the measurement uncertainty, it is not possible to state in-tolerance or out-of-tolerance with a 95% level of confidence. It is the Institute Calibration Laboratory policy that the client is made aware of this situation because the end-user is taking some of the risk that the instrument listed below may not meet the end-user measurement requirements.

Your review/evaluation should be conducted in accordance with your organizational quality policy and procedural requirements. If we can be of further assistance, please contact the Calibration Laboratory at 522-5215.

Manufacturer: Orion **Model:** EA 920

Description: Expandable Ion Analyzer **Serial Number:** TV64A

Asset Number: 5352 **User ID Number:**

Last Calibration: 7/15/2003

Date Received for Service: Jul. 12, 2004 Work Order Number: 444059852

Service Requested: Scheduled calibration

Remarks: Unit out of tolerance on Channel 2.
See attached data.

Southwest Research Institute
Calibration Laboratory
Calibration Report

Work Order:	444059852	Mfr.	ORION	Technician	TJH
Asset No.	005352	Model	EA 920		
Serial No.	TV64A	Type.	ION ANALYZER	Cal Date.	13-Jul-04
Remarks:					
		LIMITED CAL: mVolts Only			

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	As Found
Ch 1	mVolts	mVolts	mVolts	mVolts	mVolts	Result
	1000.0	999.6	-0.4	1.0	0.12	Pass
	-1000.0	-999.8	0.2	1.0	0.12	Pass
Ch 2	mVolts	mVolts	mVolts	mVolts	mVolts	
	1000.0	754.7	-245.3	1.0	0.12	Fail
	-1000.0	-1243.3	-243.3	1.0	0.12	Fail

END OF REPORT

SOUTHWEST RESEARCH INSTITUTE™

6220 Culebra Road, P.O. Drawer 28510
Institute Quality Systems
Institute Calibration Laboratory
Phone: 210-522-5215 Fax 210-522-3692

Certificate of Calibration

Submitted By:	DIV20	**Work Order:**	444059852
Address:	B57	**Date Issued:**	Aug 11, 2004
Contact:	DARRELL DUNN	**Calibration Date:**	Aug 11, 2004
Manufacturer Model:	ORION EA 920	****Calibration Due:**	Aug 11, 2005
Description:	EXPANDABLE IONANALYZER	**Calibration Location:**	Bldg. 64
Serial No:	TV64A	**Environment:**	Temp. 73.0°F Hum. 40 %RH
Asset No:	005352	***As Found:**	OUT OF TOLERANCE
Procedure:	CL-79, Jun/99	***As Left:**	IN TOLERANCE

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 1999 and ANSI/NCSL Z540-1-1994 which are equivalent to relevant requirements of the ISO 9000-1994 series of standards. This certificate may not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. The results of this calibration relate only to the individual instrument described above. This certificate shall not be used to claim product endorsement by the American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government.

Uncertainty evaluation includes the item under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor of k=2 to approximate a 95% confidence level. See Remarks or attached Calibration Report with the same Work Order number for calibration data.

*The client has sole responsibility for determination of in/out of tolerance or compliance/noncompliance. An in/out of tolerance opinion is provided for your convenience based only on the Test Instrument (TI) reading(s) and limits as reported. The reported uncertainty relates only to the results at the time of calibration and does not imply any short or long term stability of the TI.

**Calibration interval is determined by the client and does not assure the instrument will remain within tolerance until this date. Any number of factors may cause the instrument to be out of tolerance before the next calibration date.

Remarks: Limited Cal: Millivolt Use Only

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
000182	FLUKE	5700A/EP	CALIBRATOR	Sep 08, 04

Approved by: Walt Hill
Metrology Group Leader

Measurements by: Scott Kester
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Calibration Report

Work Order:	444059852	Mfr.	ORION	Technician	SRK
Asset No.	005352	Model	EA 920		
Serial No.	TV64A	Type.	ION ANALYZER	Cal Date.	11-Aug-04
Remarks:					

LIMITED CAL: mVolts Only

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Left
Ch 1	mVolts	mVolts	mVolts	mVolts	mVolts	Result
	1000.0	999.9	-0.1	1.0	0.12	Pass
	-1000.0	-1000.2	-0.2	1.0	0.12	Pass
Ch 2	mVolts	mVolts	mVolts	mVolts	mVolts	
	1000.0	999.9	-0.1	1.0	0.12	Pass
	-1000.0	-1000.3	-0.3	1.0	0.12	Pass

END OF REPORT