# Department of Quality Assurance Calibration Laboratory

#### CERTIFICATE OF CALIBRATION

S001A

Device No:

1880

Issued to: DIV20 B168 NARASI SRIDAR

Manufacturer: ORION Model: EA920

Nomenclature: PH METER

Serial Number: S001A SwRI No: NONE

Remarks

Accuracy: MFG SPEC Procedure: MFG

**ENVIRONMENT** 

Temperature: 74 Humidity: 40 Location: ROOM All B68 SWRI

CONCLUSION

Tolerance/Remarks: Received in tolerance, no adjustments made

Calibration was in accord with requirements of MIL-STD-45662A. Measurements are traceable to the National Institute of Standards and Technology.

Inspection and test data are on file and available for inspection.

7

Calibration Date: 10/05/92

Record Number: 00009875 Next Calibration Due: 04/05/93 T)

10-5-93

## Department of Quality Assurance Calibration Laboratory

Device Serial No: S001A Calibration Date: 10/05/92

#### STANDARDS

Standard No: 115 Manufacturer: HEWLETT PACKARD Model: 3456A

Nomenclature: DIGITAL VOLTMETER

Serial No: 2201A08306 Cal.Due: 11/06/92 Cal.Rec.No: 00009125

## Department of Quality Assurance Calibration Laboratory

#### CERTIFICATE OF CALIBRATION

Issued to: DIV20 B57 NARASI SRIDHAR

Device No: 1880

Manufacturer: ORION

Model: EA920

Nomenclature: PH METER

Serial Number: S001A

SwRI No: NONE

Cal interval 12 Mo.

Remarks

Accuracy: SEE ATTACH

Procedure: MFG

ENVIRONMENT

Temperature: 70 Humidity: 51 Location: ROOM All B68 SWRI

CONCLUSION

Tolerance/Remarks: Received in tolerance, no adjustments made

Calibration was in accord with requirements of MIL-STD-45662A. Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.

Signed Onthey Olona

Calibration Date: 10/13/93

Cal interval: 12 Months

Record Number: 00012500

Next Calibration Due: 10/13/94

## Department of Quality Assurance Calibration Laboratory

Device Serial No: S001A Calibration Date: 10/13/93

STANDARDS

Standard No: 132 Manufacturer: JOHN FLUKE

Model: 5100B

Nomenclature: CALIBRATOR

Serial No: 2730017 Cal.Due: 10/23/93 Cal.Rec.No: 00010981

# **SPECIFICATIONS**

ORION ER920

Ranges

pH: -2.000 to + 19.999

Concentration: .00001 to 99900 with three significant

digits

Absolute mV: -1999.9 to +1999.9 Relative mV: -1999.9 to +1999.9 Temperature: -10.0 to +110.0°C O<sub>2</sub>: -2.000 to +19.999 ppm

**Relative Accuracy** 

 $pH: \pm 0.002$ 

Concentration: ±1 significant digit

mV: ±0.1 or 0.05% of ΔE whichever is greater

Temperature:  $\pm 0.4$  °C O<sub>2</sub>:  $\pm 0.002$  ppm

Repeatability

pH: ±0.002

Concentration: ±1 significant digit

mV:  $\pm 0.1$  mV or 0.05% of  $\Delta E$  whichever is greater

Temperature: ±0.4°C

 $O_2$ :  $\pm 0.002$ 

**Temperature Compensation** 

Automatic with ATC probe or manual over the range of -10.0°C to +110.0°C

Autocalibration

pH buffers 4.01, 7.00, 10.01

**Autocalibration Span** 

±0.5 pH for autocalibration values

Display

Custom LCD, 5 digit with floating decimal, selection of display resolution, .1, .01, .001 in pH mode or 1, 2, or 3, significant digits in concentration mode

Keypad

7 keys with 6 secondary functions. Audible key feedback

Stability Indication

**READY** displays when electrode input potential is stable

Inputs

Two sensing electrode inputs: BNC connector

Two reference: Standard pin-tip Temperature: Banana plugs

Auxiliary power: For future expansion

**Outputs** 

RS-232C for interfacing with digital printers and computers Recorder: 0-1999.9 mV (1 to 1 ratio of the Absolute mV

measured)

Karl Fischer: - 10µA polarizing current

Input Impedance

> 10<sup>13</sup> ohms

**Power Requirements** 

100/120/220/240V ( $\pm 10\%$ ) user selectable, 50/60 Hz,

20 watts

**Ambient Temperature/Humidity** 

10° to 35°C, 5% to 80% maximum relative humidity,

noncondensing

Instrument Drift

 $< 50\mu V/^{\circ}C$  change in the temperature of the instrument

Case

Splash resistant, chemical resistant housing

## Department of Quality Assurance Calibration Laboratory

### CERTIFICATE OF CALIBRATION 01/10/95

Issued to:

NARASI SRIDHAR

DIV20 ,B57

Asset Number: 001880

Manufacturer: ORION

Model Number: EA920

Nomenclature: PH METER

Serial Number: S001A

SwRI Capital Number: NONE

ENVIRONMENTAL CONDITIONS

Temperature: 69.0F

Relative Humidity: 39 %

CALIBRATION INFORMATION

Location:

CAL1

Technician: 5952

Procedure Number: MFGR

Accuracy: MFGR

Remarks:

Received IN Tolerance

Calibration was in accordance with requirements of MIL-STD-45662A. Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.

#### STANDARDS USED FOR CERTIFICATION

	et#	Serial #		Model #	Nomenclature	Cal Date		Cal Due
000		775024	FLUKE		DC VOLTAGE STANDARD/DIFFERENTIAL VO	11/01/94	6	05/01/95

Certified by :

Calibration Date: 01/10/95

Interval: 12 months

Next Calibration Due: 01/10/96

Certificate#: 15965

### Department of Quality Assurance Calibration Laboratory

## CERTIFICATE OF CALIBRATION 01/15/96

Issued to:

DARRELL DUNN

DIV20

,B57

Manufacturer/Model: ORION/EA920

Nomenclature: PH METER Serial Number: S001A

Asset Number: 001880

Notes:

ENVIRONMENTAL CONDITIONS

Temperature: 75.0F

Relative Humidity: 32%

CALIBRATION INFORMATION

Procedure Number: MFGR

Remarks:

Accuracy: MFGR Received IN Tolerance

Calibration was in accordance with requirements of MIL-STD-45662A. Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.

### STANDARDS USED FOR CERTIFICATION

Asset #		Mfg	Model #	Nomenclature			Cal Due
000132	2730017	FLUKE	5100B	CALIBRATOR	12/05/95	6	06/05/96

Certified by : \_\_\_\_ Curthey Olim

Calibration Date: 01/15/96

Interval: 12 months

Next Calibration Due: 01/15/97

Certificate#: 19794



# 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 **EXPANDABLE IONANALYZER** Description:

S001A Serial Number: **Asset Number:** 001880

### **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

Signed: Style Styl

LAST PAGE OF REPORT Total Pages Printed: 1

Certificate # 28772



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

# **Certificate of Calibration**

2 April 1997

Issued to: DARRELL DUNN

DIV20

**B57** 

Manufacturer/Model:

ORION EA 920

**Description:** 

**EXPANDABLE IONANALYZER** 

Serial Number:

S001A

**Asset Number:** 

001880

#### **Environmental Conditions**

Temperature:

74.0 Deg. F

**Humidity:** 

48%

#### **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.

Calibration Date:

2 Apr 97

Calibration Procedure: 5352

Interval:

12 months

Accuracy:

MFGR

Next Calibration Due: 2 Apr 98

Received: In Tolerance

Remarks:

## Standards Used

Asset MFR 000115 000168 **FLUKE** 

Model **HEWLETT-PA 3456A** 335A

Description

DIGITAL VOLTMETER DC VOLTAGE STANDARD/D Serial No.

**Due Cal** 2201A08306 9 Jul 97 775024 4 Aug 97

Certificate # 24750

Signed: Lathy Hom

LAST PAGE OF REPORT Total Pages Printed: 1



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

# **Certificate of Calibration**

2 April 1997

Issued to: DARRELL DUNN

DIV20

**B57** 

Manufacturer/Model:

ORION EA 920

**Description:** 

**EXPANDABLE IONANALYZER** 

Serial Number: **Asset Number:**  TV64A 005352

## **Environmental Conditions**

Temperature:

74.0 Deg. F

**Humidity:** 

48%

#### 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.

**Calibration Date:** 

2 Apr 97

Calibration Procedure: 5352

Interval:

12 months

**Accuracy:** 

Next Calibration Due: 2 Apr 98

Received: In Tolerance

Remarks:

#### Standards Used

Asset 000115 MFR

Model

Description

Serial No.

**Due Cal** 

000168

**HEWLETT-PA 3456A FLUKE** 

335A

**DIGITAL VOLTMETER** 

2201A08306

9 Jul 97

DC VOLTAGE STANDARD/D

775024

4 Aug 97

Certificate # 24749

Signed: Conthy Plann

LAST PAGE OF REPORT **Total Pages Printed:** 



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



0972-01

# **Certificate of Calibration**

24 March 1999

Issued to:

**DARRELL DUNN DIV20 B57** 

Manufacturer/Model:

ORION EA 920

**Description:** 

EXPANDABLE IONANALYZER

Serial Number: Asset Number:

S001A 001880

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

Certificate # 33577

m:\a2la.rpt Rev date 10/Mar 99

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**

7 June 2000

Issued to:

DARRELL DUNN DIV20 B57

Manufacturer/Model:

ORION EA 920

**Description:** 

EXPANDABLE IONANALYZER

Serial Number: **Asset Number:** 

S001A 001880

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: 74.0 Degrees Fahrenheit

Humidity: 40 % RH

Calibration Date: 7 Jun 00

Calibration Procedure: CL-79, 6/99

Condition as Received: See Remarks

Remarks: FOUND WITHIN TOLERANCE FOR LIMITED CALIBRATION OF MILLIVOLTS ONLY

Approved by:

Certificate # 38599 m:\a2la.rpt Rev date 22 May 00 Measurements performed by:

Page 1 of 1





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

Address: B57
Contact: DARRELL DUNN

Manufacturer Model: ORION EA 920

**Description:** EXPANDABLE IONANALYZER

**Serial No:** S001A **Asset No:** 001880 **Procedure:** CL-79, 6/99 Work Order: 444051754

Date Issued: Jan 13, 2003 Calibration Date: Jan 9, 2003 \*\*Calibration Due: Jan 9, 2004

Calibration Location: N/A

Environment: Temp. 72.0°F Hum. 38 %RH

\*As Found: LIMITED CALIBRATION

\*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. 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: MILLIVOLTS CAL ONLY

#### Standards Used

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

Approved by: Walt Hill
Metrology Group Leader
m:\Nona2la1.rpt Rev date 15, August 02

Measurements by: Tom Han Metrology Technician

1 of 1

## Southwest Research Institute Calibration laboratory Calibration Sheet.

Work Order:	444051754	Mfr.	Orion	Technician	Thomas Hannon
Asset No.	001880	Model	720A and EA920	Procedure	CL-79 7/99
Serial No.	S001A	Туре.	pH Meter	Cal Date.	09-Jan-03
Remarks:					
			LIMITED CAL: Milliv	olts Only	

Function/Range	Test Point	TI Reading	Difference	Test Limits+/-	Uncertainty	Found/Left
m Volts	m Volts	m Volts	m Volts	m Volts	m Volts	Results
Input 1	0.0	0.2	0.2	0.5	0.1	Pass
·	1000.0	1000.1	0.1	1.0	0.1	Pass
	-1000.0	-1000.5	-0.5	1.0	0.1	Pass
			FND OF REPORT			



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



0972-01

#### Certificate of Calibration

Submitted By: DIV20 Address: B57

Contact: DARRELL DUNN

Manufacturer Model: ORION EA 920

Description: EXPANDABLE IONANALYZER

Serial No: S001A Asset No: 001880 Procedure: CL-79, Jun/99 Work Order: 444056978

Date Issued: Jan 22, 2004

Calibration Date: Jan 22, 2004
\*\*Calibration Due: Jan 22, 2005

Calibration Location: Bldg. 64

\*As Found: LIMITED CALIBRATION

\*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. 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: Millivolts calibrated only.

#### Standards Used

ı	Asset	Manufacturer	Model	Description	Cal Due
l	000182	FLUKE	5700A/EP	CALIBRATOR	Mar 04, 04

Approved by: Walt Hill Metrology Group Leader m\a2la1.rpt Rev date 15, August 02 bha/

Measurements by: Mark Romero

Metrology Technician

1 of 1

# Southwest Research Institute Calibration Laboratory Calibration Report

Work Order:	444056978	Mfr.	Orion	Technician	Mark Romero			
Asset No.	001880	Model	EA920					
Serial No.	S001A	Type.	pH Meter	Cal Date.	22-Jan-04			
Remarks:								
LIMITED CAL: Millivolts Only								

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left		
mVolts	mVolts	mVolts	mVolts	mVolts	mVolts	Result		
Input 1	0.0	0.2	0.2	0.5	0.12	Pass		
	1000.0	1000.0	0.0	1.0	0.12	Pass		
	-1000.0	-1000.6	-0.6	1.0	0.12	Pass		
mVolts	mVolts	mVolts	mVolts	mVolts	mVolts			
Input 2	0.0	-0.2	-0.2	0.5	0.12	Pass		
	1000.0	1000.0	0.0	1.0	0.12	Pass		
	-1000.0	-1000.5	-0.5	1.0	0.12	Pass		
END OF REPORT								



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



0972-01

#### Certificate of Calibration

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: ORION EA 920

**Description:** EXPANDABLE IONANALYZER

un

**Serial No:** S001A **Asset No:** 001880

Procedure: CL-79, Jun/99

Work Order: 444062745

Date Issued: Feb 10, 2005

Calibration Date: Feb 10, 2005

\*\*Calibration Due: Feb 10, 2006

Calibration Location: Bldg. 64

**Environment:** Temp. 72.0°F Hum. 44 %RH
\*As Found: LIMITED CALIBRATION

\*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. 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: Millivolts cal'd only

#### Standards Used

Standar us .	CHANGES US COCK									
Asset	Manufacturer	Model	Description	Cal Due						
004164	FLUKE	5500A/SC300	CALIBRATOR	Aug 03, 05						

Approved by: Walt Hill Metrology Group Leader m:\a2la1.rpt Rev date 11, May 04

Measurements by: Curtis Laurence

Metrology Technician

Page 1 of 1

## Southwest Research Institute Calibration Laboratory Calibration Report

Work Order:	444062745	Mfr.	ORION	Technician	WCL					
Asset No.	001880	Model	EA 920							
Serial No.	S001A	Туре.	ION ANALYZER	Cal Date.	10-Feb-05					
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	1000.2	0.2	1.0	0.12	Pass		
	-1000.0	-1000.5	-0.5	1.0	0.12	Pass		
Ch 2	mVolts	mVolts	mVolts	mVolts	mVolts			
	1000.0	1000.2	0.2	1.0	0.12	Pass		
	-1000.0	-1000.5	-0.5	1.0	0.12	Pass		
END OF REPORT								