

S O U T H W E S T R E S E A R C H I N S T I T U T E

Department of Quality Assurance
Calibration Laboratory

CERTIFICATE OF CALIBRATION

Issued to: DIV20 B168 NARASI SRIDHAR

Device No: 1441

Manufacturer: ORION

Model: 720A

Nomenclature: PH/ISE METER

Serial Number: 003368

SwRI No:

Remarks

Accuracy: MFGR SPECS

Procedure: MFGR

ENVIRONMENT

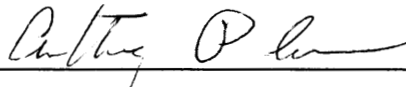
Temperature: 70 Humidity: 48 Location: ROOM A11 B68 SWRI

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



Calibration Date: 02/15/93

Record Number: 00010657

Next Calibration Due: 08/15/93

SOUTHWEST RESEARCH INSTITUTE

POST OFFICE DRAWER 28610 • 6220 CULEBRA ROAD • SAN ANTONIO, TEXAS, USA 78284 • (512) 684-6111 • TELEX 76-7357

Division 05 - Instrument Repair and Calibration Laboratory

Calibration Record

ITEM ORION PH/ISE METER
MODEL 720A S/N 003368 SWRI NO. _____
PLUG-INS, ETC. none

TOLERANCE limited calibration, checked in MV function only, readings were within $\pm 0.05\%$

STANDARDS

Standard No.	MPGR Model	Description	S/N	Cal. Due	Cal. Rec. No.
	<u>JAN 720A</u>	<u>8526A D.C. METER</u>		<u>13 Apr 91</u>	<u>05354</u>

ENVIRONMENT: Temperature _____ Humidity _____
Location Room 111, Bldg 68 SWRI

PROCEDURE

- Essentially as outlined in MPGRS Service Manual _____
 applied MV from standard to channel 1 & 2
readings were within $\pm 0.05\%$
accuracy of standard $\pm 50 \text{ ppm}$

CONCLUSION

- Item within tolerance _____
 Item out of tolerance _____
 Item ADJ/repared to tolerance _____

Calibration was in accord with requirements of MIL-STD-45662A, MIL-Q-9858A, and MIL-I-45208A. Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.

SIGNED [Signature]

DATE 20 Feb 91

RECORD NUMBER: 0007468

NEXT CALIBRATION DUE: 20 Aug 91

SOUTHWEST RESEARCH INSTITUTE

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Division 05 - Instrument Repair and Calibration Laboratory CERTIFICATE OF CALIBRATION

ISSUED TO: DIV 20 CNWRA
MFGR/MODEL CRION 720A
ITEM DESCRIPTION PHIISE METER
S/N 003368 SWRI NO. NONE
PLUG-INS, ETC. NONE

TOLERANCE Limited Calibration. Checked in MV Function ONLY,
Readings were within .05%

STANDARDS

Standard No.	MFGR Model	Description	S/N	Cal. Due	Cal. Rec. No.
		JOHN FLUKE 8506 A Digital VOLT METER	9180021	24 APR 92	08633

ENVIRONMENT: Temperature 74°F Humidity 45%
Location Room A11 BLDG 68 SWRI

PROCEDURE

- Essentially as outlined in MFGRS Service Manual _____
 Applied MV FROM STANDARD TO CHANNEL 1 & 2.
Reading were within $\pm 0.5\%$
Accuracy of STANDARD $\pm 50 \mu\text{mV}$

CONCLUSION

- Item within tolerance _____
 Item out of tolerance _____
 Item ADJ/repared to tolerance _____

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 Arthur P. [Signature]
DATE 10 FEB 92

RECORD NUMBER: 0008843 NEXT CALIBRATION DUE: 10 FEB 92

August 30, 1993

MEMORANDUM

TO: Narasi Sridhar
FROM: Jim Patterson
SUBJECT: Calibration Intervals

The calibration intervals for the following items have been changed as per request from division 20. The calibration interval for Orion pH/ISE Meter 720A S/N 003368 has been lengthened from six to twelve months. The calibration interval for Sartorius Electronic Balance RC210P S/N 10704379 has been shortened from six months to three months.

cc: B. Mabrito
R. Brient
T. Trbovich

Danell:
Please file this
~~along~~ in the calibration
file.

- N S

S O U T H W E S T R E S E A R C H I N S T I T U T E

Department of Quality Assurance
Calibration Laboratory

Device Serial No: 003368

Calibration Date: 02/15/93

STANDARDS

Standard No: 106 Manufacturer: JOHN FLUKE Model: 8506A
Nomenclature: THERMAL TRUE RMS DIGITAL MULTIMETER
Serial No: 4180021 Cal.Due: 05/06/93 Cal.Rec.No: 00009154

Standard No: 132 Manufacturer: JOHN FLUKE Model: 5100B
Nomenclature: CALIBRATOR
Serial No: 2730017 Cal.Due: 04/08/93 Cal.Rec.No: 00009975

S O U T H W E S T R E S E A R C H I N S T I T U T E

Department of Quality Assurance
Calibration Laboratory

CERTIFICATE OF CALIBRATION

Issued to: DIV20 B57 NARASI SRIDHAR

Device No: 1441

Manufacturer: ORION

Model: 720A

Nomenclature: PH/ISE METER

Serial Number: 003368

SwRI No: NONE

Cal interval 6 Mo.

Remarks

Accuracy: MFGR SPECS $-1600.0\text{mV} + 1600.0$
 $\pm 12\text{mV}$ or $\pm 0.05\%$ of ΔE

Procedure: MFGR

ENVIRONMENT

Temperature: 70 Humidity: 46 Location: ROOM A11 B68 SWRI

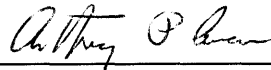
CONCLUSION

Tolerance/Remarks: Received in tolerance, no adjustments made

LIMITED CALIBRATION- to millivolts only.

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



Calibration Date: 08/09/93

Cal interval: 6 Months

Record Number: 00011943

Next Calibration Due: 02/09/94

S O U T H W E S T R E S E A R C H I N S T I T U T E

Department of Quality Assurance
Calibration Laboratory

Device Serial No: 003368

Calibration Date: 08/09/93

STANDARDS

Standard No: 132 Manufacturer: JOHN FLUKE

Model: 5100B

Nomenclature: CALIBRATOR

Serial No: 2730017

Cal.Due: 10/23/93

Cal.Rec.No: 00010981

S O U T H W E S T R E S E A R C H I N S T I T U T E

Department of Quality Assurance
Calibration Laboratory

CERTIFICATE OF CALIBRATION

Issued to: DIV20 B57 NARASI SRIDHAR

Device No: 1441

Manufacturer: ORION

Model: 720A

Nomenclature: PH/ISE METER

Serial Number: 003368

SwRI No: NONE

Cal interval 6 Mo.

Remarks

Accuracy: MFGR SPECS $-1600.0\% + 1600.0$
 $\pm 12mV \text{ or } \pm 0.05\% \text{ of } \Delta E$

Procedure: MFGR

ENVIRONMENT

Temperature: 70 Humidity: 46 Location: ROOM A11 B68 SWRI

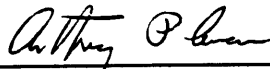
CONCLUSION

Tolerance/Remarks: Received in tolerance, no adjustments made

LIMITED CALIBRATION- to millivolts only.

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



Calibration Date: 08/09/93

Cal interval: 6 Months

Record Number: 00011943

Next Calibration Due: 02/09/94

S O U T H W E S T R E S E A R C H I N S T I T U T E

Department of Quality Assurance
Calibration Laboratory

CERTIFICATE OF CALIBRATION

Issued to: DIV20 B168 NARASI SRIDHAR

Device No: 1441

Manufacturer: ORION

Model: 720A

Nomenclature: PH/ISE METER

Serial Number: 003368

SwRI No:

Remarks

Accuracy: MFGR SPECS

Procedure: MFGR

ENVIRONMENT

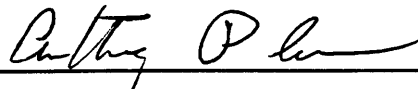
Temperature: 70 Humidity: 48 Location: ROOM A11 B68 SWRI

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



Calibration Date: 02/15/93

Record Number: 00010657

Next Calibration Due: 08/15/93

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Division 05 - Instrument Repair and Calibration Laboratory CERTIFICATE OF CALIBRATION

ISSUED TO: DIV 20 CNWRA
MFR/MODEL ORION 720A
ITEM DESCRIPTION PHIISE METER
S/N 003368 SWRI NO. NONE
PLUG-INS, ETC. NONE

TOLERANCE Limited Calibration. Checked in MV Function only,
Reading were within .05%

STANDARDS

Standard No.	MFR Model	Description	S/N	Cal. Due	Cal. Rec. No.
		JOHNFLUKE 8506 A Digital VOLT METER	9180021	24 APR 92	08633

ENVIRONMENT: Temperature 74°F Humidity 45%
Location Room A11 BLDG 68 SWRI

PROCEDURE

- Essentially as outlined in MFRS Service Manual _____
 Applied MV FROM STANDARD TO CHANNEL 1 & 2.
Reading were within $\pm 0.5\%$
Accuracy of STANDARD $\pm 50ppm$

CONCLUSION

- Item within tolerance _____
 Item out of tolerance _____
 Item ADJ/repared to tolerance _____

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 Arthur D. [Signature]

DATE 10 FEB 92

RECORD NUMBER: 0008843 NEXT CALIBRATION DUE: 10 FEB 93

SOUTHWEST RESEARCH INSTITUTE

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Division 05 - Instrument Repair and Calibration Laboratory

Calibration Record

ITEM ORION PH/ISE METER
MODEL 720A SN 003368 SWRI NO. _____
PLUG-INS, ETC. none

TOLERANCE limited calibration, checked in MV function only, reading were within $\pm 0.05\%$

STANDARDS

Standard No.	MFG Model	Description	S/N	Cal. Due	Cal. Rec. No.
	<u>JOHN FLUKE</u>	<u>8508A DMM/VOLTCOM</u>		<u>13 Apr 91</u>	<u>05354</u>

ENVIRONMENT: Temperature _____ Humidity _____
Location Room 111, Bldg 68, SWRI

PROCEDURE

- Essentially as outlined in MFGRS Service Manual _____
 applied MV from standard to channel 1 + 2
reading were within $\pm 0.05\%$
accuracy of standard ± 50 PPM

CONCLUSION

- Item within tolerance _____
 Item out of tolerance _____
 Item ADI/repair to tolerance _____

Calibration was in accord with requirements of MIL-STD-45662A, MIL-Q-9858A, and MIL-I-45208A. Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.

SIGNED [Signature]

DATE 20 Feb 91

RECORD NUMBER: 0007468 NEXT CALIBRATION DUE: 20 Aug 91

S O U T H W E S T R E S E A R C H I N S T I T U T E

Department of Quality Assurance
Calibration Laboratory

CERTIFICATE OF CALIBRATION

Issued to: DIV20 B57 NARASI SRIDHAR Device No: 1441

Manufacturer: ORION Model: 720A

Nomenclature: PH/ISE METER

Serial Number: 003368 SwRI No: NONE Cal interval 12 Mo.

Remarks

Accuracy: MFGR SPECS

Procedure: MFGR

ENVIRONMENT

Temperature: 70 Humidity: 46 Location: ROOM A11 B68 SWRI

CONCLUSION

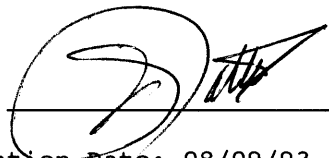
Tolerance/Remarks: Received in tolerance, no adjustments made

Calibration cycle extended to twelve months with new cal due date of August 8, 1994. Per memorandum from division 20 Narasi Sridhar, dated August 16, 1993.

LIMITED CALIBRATION- to millivolts only.

Certificate revised Aug 30, 1993. S

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 

Calibration Date: 08/09/93

Cal interval: 12 Months

Record Number: 00011943 *R*

Next Calibration Due: 08/09/94

S O U T H W E S T R E S E A R C H I N S T I T U T E

Department of Quality Assurance
Calibration Laboratory

Device Serial No: 003368

Calibration Date: 08/09/93

STANDARDS

Standard No: 132 Manufacturer: JOHN FLUKE Model: 5100B

Nomenclature: CALIBRATOR

Serial No: 2730017

Cal.Due: 10/23/93

Cal.Rec.No: 00010981

S O U T H W E S T R E S E A R C H I N S T I T U T E

Department of Quality Assurance
Calibration Laboratory

CERTIFICATE OF CALIBRATION

Issued to: DIV20 B57 NARASI SRIDHAR

Device No: 1441

Manufacturer: ORION

Model: 720A

Nomenclature: PH/ISE METER

Serial Number: 003368

SwRI No: NONE

Cal interval 12 Mo.

Remarks

*Accuracy: +/-0.2mV or +/-0.05% whichever is greater.

Accuracy: *

Procedure: MFGR

ENVIRONMENT

Temperature: 70 Humidity: 35 Location: SWRI ROOM B4 BLDG. 64

CONCLUSION

Tolerance/Remarks: Received in tolerance, no adjustments made

Limited Calibration- millivolts only.

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



Calibration Date: 08/09/94

Cal interval: 12 Months

Record Number: 00014836

Next Calibration Due: 08/09/95

S O U T H W E S T R E S E A R C H I N S T I T U T E

Department of Quality Assurance
Calibration Laboratory

Device Serial No: 003368

Calibration Date: 08/09/94

STANDARDS

Standard No: 182 Manufacturer: JOHN FLUKE Model: 5700A

Nomenclature: CALIBRATOR

Serial No: 5200003

Cal.Due: 09/17/94

Cal.Rec.No: 00014563

SOUTHWEST RESEARCH INSTITUTE
 Department of Quality Assurance
 Calibration Laboratory

CERTIFICATE OF CALIBRATION
 08/22/95

Issued to: DARRELL DUNN DIV20 ,B57 Asset Number: 001441
 Manufacturer: ORION Model Number: 720A
 Nomenclature: PH/ISE METER
 Serial Number: 003368 SwRI/Div. I.D. #: NONE
 Notes:

ENVIRONMENTAL CONDITIONS

Temperature: 74.0F Relative Humidity: 35%

CALIBRATION INFORMATION

Procedure Number: MFGR Accuracy: MFGR SPECS
 Remarks: LIMITED CALIBRATION MV ONLY Received IN Tolerance

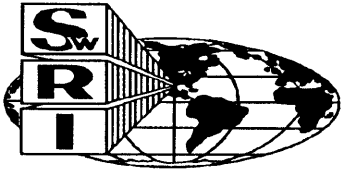
Calibration was in accordance with requirements of MIL-STD-45662A.
 Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.

STANDARDS USED FOR CERTIFICATION

Asset #	Serial #	Mfg	Model #	Nomenclature	Cal Date	Int.	Cal Due
000132	2730017	FLUKE	5100B	CALIBRATOR	05/18/95	6	11/18/95

Certified by : *Anthony Plummer*

Certificate#: 18272 Calibration Date: 08/22/95
 Interval: 12 months
 Next Calibration Due: 08/22/96



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

Certificate of Calibration

16 August 1996

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: ORION 720A
Description: PH/ISE METER
Serial Number: 003368
Asset Number: 001441

Environmental Conditions

Temperature: 74.0 Humidity: 45%

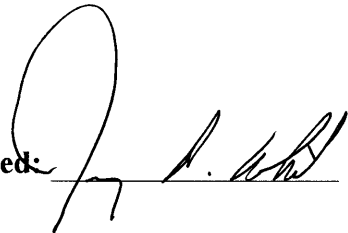
Calibration Information

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: 16 Aug 96 Calibration Procedure: MFGR
Interval: 12 months Accuracy: MFGR SPECS
Next Calibration Due: 16 Aug 97 Received: In Tolerance

Remarks: LIMITED CALIBRATION TO MILLIVOLTS

Certificate # 22387

Signed: 

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

25 September 1997

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: ORION 720A
Description: PH/ISE METER
Serial Number: 003368
Asset Number: 001441

Environmental Conditions

Temperature: 72.0 Deg. F Humidity: 39%

Calibration Information

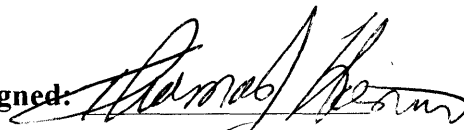

Calibration was in accordance with requirements of MIL-STD-45662A and ANSI/NC SL Z540-1-1994. Measurements are traceable to the National Institute of Standards and Technology (NIST). This report may not be reproduced except in full without written approval of the originator. Inspection and test data 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: 25 Sep 97 Calibration Procedure: CLCP-PH-001
Interval: 12 months Uncertainty: MFG SPECS
Next Calibration Due: 25 Sep 98 Received: In Tolerance
Remarks: LIMITED CALIBRATION PER 97-CD-35

Standards Used

Asset	MFR	Model	Description	Serial No.	Due Cal
000182	FLUKE	5700A	CALIBRATOR	5200003	2 Oct 97

Signed: 
Title: 

LAST PAGE OF REPORT
Total Pages Printed: 1

Certificate # 26575



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 #

0972-01

Certificate of Calibration

Submitted By: DIV20
Address: B57
Contact: DARRELL DUNN
Manufacturer Model: ORION 720A
Description: PH/ION METER
Serial No: 003368
Asset No: 001441
Procedure: CL-79, Jun/99

Work Order: 444056988
Date Issued: Jan 22, 2004
Calibration Date: Jan 22, 2004
****Calibration Due:** Jan 22, 2005
Calibration Location: Bldg. 64
Environment: Temp. 72.0°F Hum. 36 %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/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 calibrated only.

Standards Used

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

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

Measurements by: Mark Romero
Metrology Technician

Southwest Research Institute
 Calibration Laboratory
 Calibration Report

Work Order:	444056988	Mfr.	Orion	Technician	Mark Romero
Asset No.	001441	Model	720A	Cal Date.	22-Jan-04
Serial No.	003368	Type.	pH Meter		
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	-0.1	-0.1	0.5	0.12	Pass
	1000.0	999.8	-0.2	1.0	0.12	Pass
	-1000.0	-1000.2	-0.2	1.0	0.12	Pass
mVolts	mVolts	mVolts	mVolts	mVolts	mVolts	
Input 2	0.0	-0.1	-0.1	0.5	0.12	Pass
	1000.0	1000.0	0.0	1.0	0.12	Pass
	-1000.0	-1000.2	-0.2	1.0	0.12	Pass

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 #

0972-01

Certificate of Calibration

Submitted By: DIV20
Address: B57
Contact: DARRELL DUNN
Manufacturer Model: ORION 720A
Description: PH/ION METER
Serial No: 005885
Asset No: 001869
Procedure: CL-79, Jun/99

Work Order: 444059853
Date Issued: Jul 13, 2004
Calibration Date: Jul 13, 2004
****Calibration Due:** Jul 13, 2005
Calibration Location: Bldg. 64
Environment: Temp. 73.0°F Hum. 40 %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: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
006413	FLUKE	5520A/SC1100	MULTI-PRODUCT CALIBRATOR	Feb 19, 05

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

Measurements by: Scott Kester
Metrology Technician

Southwest Research Institute
 Calibration Laboratory
 Calibration Report

Work Order:	444059853	Mfr.	Orion	Technician	SRK
Asset No.	001869	Model	720A		
Serial No.	005885	Type.	pH Meter	Cal Date.	13-Jul-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	-0.5	-0.5	0.5	0.12	Pass
	1000.0	999.3	-0.7	1.0	0.12	Pass
	-1000.0	-1000.3	-0.3	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	999.4	-0.6	1.0	0.12	Pass
	-1000.0	-1000.0	0.0	1.0	0.12	Pass

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
Address: B57
Contact: DARRELL DUNN
Manufacturer Model: ORION 720A
Description: PH/ION METER
Serial No: 003368
Asset No: 001441
Procedure: CL-79, Jun/99

Work Order: 444062505
Date Issued: Jan 21, 2005
Calibration Date: Jan 21, 2005
****Calibration Due:** Jan 21, 2006
Calibration Location: Bldg. 64
Environment: Temp. 73.0°F Hum. 42 %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/NC SL 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: Cal'd for Millivolts only

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
006413	FLUKE	5520A/SC1100	MULTI-PRODUCT CALIBRATOR	Feb 19, 05

Approved by: Walt Hill
Metrology Group Leader
m:\Nona21a1.rpt Rev date 11, May 04

Measurements by: Curtis Laurence
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	444062505	Mfr.	Orion	Technician	WCL
Asset No.	001441	Model	720A	Cal Date.	21-Jan-05
Serial No.	003368	Type.	pH Meter		

Remarks:

LIMITED CAL: Millivolts Only

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Relative	m Volts	m Volts	m Volts	m Volts	m Volts	Result
Input 1	0.0	-0.1	-0.1	0.2	0.13	Pass
	1000.0	999.9	-0.1	0.5	0.13	Pass
	-1000.0	-1000.1	-0.1	0.5	0.13	Pass
m Volts	m Volts	m Volts	m Volts	m Volts	m Volts	
Input 2	0.0	-0.1	-0.1	0.2	0.13	Pass
	1000.0	999.9	-0.1	0.5	0.13	Pass
	-1000.0	-1000.2	-0.2	0.5	0.13	Pass
Absolute	m Volts	m Volts	m Volts	m Volts	m Volts	
Input 1	0.0	-0.1	-0.1	0.2	0.13	Pass
	1000.0	1000.1	0.1	0.5	0.13	Pass
	-1000.0	-1000.2	-0.2	0.5	0.13	Pass
m Volts	m Volts	m Volts	m Volts	m Volts	m Volts	
Input 2	0.0	-0.1	-0.1	0.2	0.13	Pass
	1000.0	1000.1	0.1	0.5	0.13	Pass
	-1000.0	-1000.2	-0.2	0.5	0.13	Pass

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
Address: B57
Contact: DARRELL DUNN
Manufacturer Model: ORION 720A
Description: PH/ION METER
Serial No: 003368
Asset No: 001441
Procedure: CL-79, 6/99

Work Order: 444051757
Date Issued: Jan 21, 2003
Calibration Date: Jan 21, 2003
****Calibration Due:** Jan 21, 2004
Calibration Location: N/A
Environment: Temp. 72.0°F Hum. 37 %RH
***As Found:** IN TOLERANCE
***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/NC SL 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: MILLIVOLT CALIBRATION 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:\Non21a1.rpt Rev date 15, August 02

Measurements by: Tom Hannon
Metrology Technician

Southwest Research Institute
Calibration laboratory
Calibration Sheet.

Work Order:	444051757	Mfr.	Orion	Technician	Thomas Hannon
Asset No.	001441	Model	720A and EA920	Procedure	CL-79 7/99
Serial No.	003368	Type.	pH Meter	Cal Date.	21-Jan-03
Remarks:					
LIMITED CAL: Millivolts 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	0.0	0.0	0.5	0.0	Pass
	1000.0	1000.0	0.0	1.0	0.0	Pass
	-1000.0	-1000.0	0.0	1.0	0.0	Pass

Function/Range	Test Point	TI Reading	Difference	Test Limits+/-	Uncertainty	Results
m Volts	m Volts	m Volts	m Volts	m Volts	m Volts	Results
Input 2	0.0	-0.1	-0.1	0.5	0.0	Pass
	1000.0	999.9	-0.1	1.0	0.0	Pass
	-1000.0	-1000.3	-0.3	1.0	0.0	Pass

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

0972-01

Submitted By: DIV20
Address: B57
Contact: DARRELL DUNN
Manufacturer Model: ORION 720A
Description: PH/ION METER
Serial No: 005885
Asset No: 001869
Procedure: CL-79, 6/99

Work Order: 444054459
Date Issued: Jul 15, 2003
Calibration Date: Jul 15, 2003
****Calibration Due:** Jul 15, 2004
Calibration Location: Bldg. 64
Environment: Temp. 72.0°F Hum. 36 %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/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.

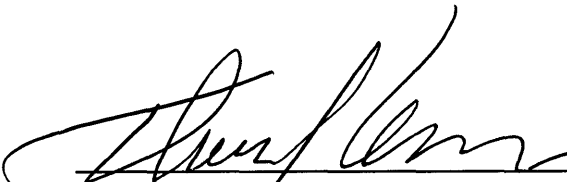
**Calibration interval is determined by the client and does not assure the instrument will remain within tolerance until this date. Any number of factors may cause the instrument to be out of tolerance before the next calibration date.

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
m:\a2la1.rpt Rev date 15, August 02


Measurements by: Tom Hannon
Metrology Technician

Southwest Research Institute
 Calibration Laboratory
 Calibration Report

Work Order:	444054459	Mfr.	Orion	Technician	TJH
Asset No.	001869	Model	720A	Cal Date.	15-Jul-03
Serial No.	005885	Type.	pH Meter		
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	0.3	0.3	0.5	0.12	Pass
	1000.0	999.1	-0.9	1.0	0.12	Pass
	-1000.0	-1000.4	-0.4	1.0	0.12	Pass
END OF REPORT						
mVolts	mVolts	mVolts	mVolts	mVolts	mVolts	
Input 2	0.0	-0.2	-0.2	0.5	0.12	Pass
	1000.0	999.5	-0.5	1.0	0.12	Pass
	-1000.0	-999.9	0.1	1.0	0.12	Pass
END OF REPORT						