

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

WORK ORDER

CERTIFICATE # 24981 ASSET # 001869 DATE 04 Apr 97

ITEM DATA:

Manufacturer Orion Model 70A

Description \_\_\_\_\_ Serial # 005885

Accessories AC adapter

ACTION REQUESTED Cal

CUSTODIAN DV. D. Donnell Dunn

Turned in by: \_\_\_\_\_ Phone 6090

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

24981

CAL ENVIRONMENT:  
Temperature 75 °F Humidity 43 %RH

CALIBRATED/REPAIRED:  
By [Signature] Cal Procedure CLCP-PH-001  
Date 18 APR 97 Accuracy \_\_\_\_\_  
Cal Interval \_\_\_\_\_ Time to complete:  
Next Cal due 17 APR 98 Cal 3 Repair \_\_\_\_\_  
Standards used (Asset#) 168

DATE COMPLETED 18 APR 97  
DATE PICKED UP 4/22/97 PICKED UP BY [Signature]

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

WORK ORDER

CERTIFICATE # 29638 ASSET # 001869 DATE 07 May 98

ITEM DATA:

Manufacturer Orion Model 120A  
Description PH Motor Serial # 005885  
Accessories AC adaptor

ACTION REQUESTED cal

CUSTODIAN Dr. Bob D'Amico

Turned in by: Walt Machowski Phone 6090

CHARGE # 20-100571 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 Walt Date 05-01-98

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  
500 Commings catr \_\_\_\_\_ (J) In tolerance, no adjustments/repairs  
Beverly MA.  (K) Out of tolerance, adjusted to specifications  
01915 \_\_\_\_\_ (S) Received into system, introduced or reactivated

ACTION TAKEN: (Calibration/Repair/Parts) allowed 51 hr warm up  
20 MAY 98 - Bottom case 225509-A01 # 82.68

CAL ENVIRONMENT: Temperature 78 °F Humidity 42 %RH

CALIBRATED/REPAIRED:  
By V. L. L. L. Cal Procedure CLCP-IA-001 CLCP-PH-001  
Date 20 MAY 98 Accuracy MEG  
Cal Interval 120 Reliability Code -1  
Next Cal due 20 MAY 99 Cal Time 1.0 Repair Time \_\_\_\_\_  
Standards used (Asset#) 182

DATE COMPLETED 13 MAY 98  
DATE PICKED UP 6/3/98 PICKED UP BY Walt Machowski

29638

# CALIBRATION CHECK FORM

Date Calibrated 20 MAR 98 Work Order 29638  
 Technician V. Uterch  
 Unit Under Test pH Meter  
 Manufacturer Orion Model 520A/720A/920A SN 005885 ASN 1869

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
1	<b>Absolute Millivolts</b>						
	Channel 1	-1500.0 mV	-1499.2 mV	-1500.8 mV	-1499.5mV	-1499.9mV	
		-1000.0 mV	-999.5 mV	-1000.5 mV	-999.8mV	-1000.0mV	
		-500.0 mV	-499.7 mV	-500.3 mV	-500.0mV	-499.9mV	
		000.0 mV	-000.2 mV	+000.2 mV	-.3mV	0.0mV	Fail
		+500.0 mV	499.7 mV	500.3 mV	499.4mV	500.0mV	Fail
		+1000.0 mV	999.5 mV	1000.5 mV	999.1mV	1000.0mV	Fail
		+1500.0 mV	1499.2 mV	1500.8 mV	1499.0mV	1500.1mV	Fail
	Channel 2	-1500.0 mV	-1499.2 mV	-1500.8 mV	-1499.2mV	-1500.1mV	
		-1000.0 mV	-999.5 mV	-1000.5 mV	-999.6mV	-1000.0mV	
		-500.0 mV	-499.7 mV	-500.3 mV	-499.8mV	-500.0mV	
		000.0 mV	-000.2 mV	+000.2 mV	-.2mV	0.0mV	
		+500.0 mV	499.7 mV	500.3 mV	499.5mV	500.0mV	Fail
		+1000.0 mV	999.5 mV	1000.5 mV	999.2mV	1000.0mV	Fail
		+1500.0 mV	1499.2 mV	1500.8 mV	1499.0mV	1500.1mV	Fail
2	<b>Relative Millivolts</b>						
	Channel 1	1500 mV	1499.1 mV	1500.9 mV	1499.2mV	1499.9mV	
	Channel 2	1500 mV	1499.1 mV	1500.9 mV	1499.1mV	1499.9mV	

SOUTHWEST RESEARCH INSTITUTE  
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WORK ORDER

CERTIFICATE # 34807 ASSET # 001869 DATE 07 June 99

ITEM DATA:

Manufacturer ORION Model 720A

Description PH meter Serial # 005885

Accessories \_\_\_\_\_

ACTION REQUESTED cal

CUSTODIAN Div. 20, Darrell Dunn

Turned in by: \_\_\_\_\_ Phone 6090

CHARGE # 20-OH Date Required 7

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 [Signature] Date 06/07/99

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

ACTION TAKEN: (Calibration/Repair/Parts) \_\_\_\_\_

CAL ENVIRONMENT:  
Temperature 75 °F Humidity 42 %RH

CALIBRATED/REPAIRED:  
By [Signature] Cal Procedure CL-78, June 99  
Date 15 June 99 Accuracy MFS  
Cal Interval 12 Reliability Code: 1  
Next Cal due 15 June 00 Cal Time 1.0 Repair Time \_\_\_\_\_  
Standards used (Asset#) 7198

DATE COMPLETED 15 June 99  
DATE PICKED UP 6/22/99 PICKED UP BY [Signature]

34807

**CALIBRATION CHECK FORM**

Date Calibrated 15 June 99      Work Order 34807      Cal By V. Mueh

Procedure No./Date: CL-78, JUNE 99      Unit Under Test: PH METER

Mfg.: ORION      Model: 720A      SN 005885 AN 1869

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
2.2	MILLIVOLTS						
	INPUT 1	0.000mV	-0.5	+0.5mV	<del>-0.5</del> <sup>0.1mV</sup> -0.3mV		Pass
		1000.0mV	999	1001mV	999.6mV		
		-1000.0mV	-999	-1001mV	-1000.4mV		
	MILLIVOLTS						
	INPUT 2	0.000mV	-0.5	+0.5mV	-0.1mV <sup>0.1mV</sup>		
		1000.0mV	999	1001mV	999.8mV		
		-1000.0mV	-999	-1001mV	-1000.1mV		

# WORK ORDER 39646

Date Received 7/6/00

Asset No. 001869 Manufacturer ORION Model 720A  
 Description PH/ION METER Serial Number 005885  
 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 OK  
 Delivered By DARRELL DUNN Tel. 6090

### WORK HISTORY

Date	Start Time	Stop Time	Notes

### PARTS

Part Name	Part Number	Cost	Failure Description

39646

### WORK SUMMARY

Failure Description \_\_\_\_\_

Repair Action \_\_\_\_\_

Cal Procedure CL-79, 6/99 ORION 720A 5520A 14R July 2000 Temp 74 F Hum 42 %

Tech Vincent Morales Cal Hrs. 1.0 hr Repair Hrs. \_\_\_\_\_ Part Cost \_\_\_\_\_

Action Taken Calibrated

Standards Used 0415

Date Cal July 20, 2000 Int. 12 Mo. Date Due July 20, 2001 Reliability Code 2

Date Picked Up 7/31/2000 Picked Up By [Signature]

# Calibration Results

## SwRI Calibration Laboratory

UUT: ORION 720A  
 PH/ION METER  
 Serial No: 005885  
 Asset No. 001869

Result: **PASS**  
 Performed on: 7/20/00 at 13:59:41  
 Performed by: Vince Morales  
 Environment: Temp. 74.0°F Humid. 42 %  
 Condition F/L: FOUND-LEFT  
 Procedure Completed: YES

Notes: LIMITED CALIBRATION: MV USE ONLY.

### Standards Used

Asset	Mfg	Model	Description	Cal. Date	Due Date
006413	FLUKE	5520A	MULTI-PRODUCT CALIBRATOR	14-Oct-99	14-Oct-00

### Test Data

TEST#	STD PARAMETER	TRUE VALUE	UNIT UNDER TEST			ERROR in (% of Tol)	NOTIFY TUR USER
			READING	TOLERANCE	UUT ERROR		
DC millivolts INPUT 1							
1	0.0mV		-0.3	500uV	-300uV	60	
2	1000.0mV		999.6	1mV	-400uV	40	
3	-1000.0mV		-1000.3	1mV	-300uV	30	
DC millivolts INPUT 2							
4	0.0mV		-0.1	500uV	-100uV	20	
5	1000.0mV		999.8	1mV	-200uV	20	
6	-1000.0mV		-1000.0	1mV	0V	0	

**End of Test Data**



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

20 July 2000

**Issued to:** DARRELL DUNN DIV20 B57  
**Manufacturer/Model:** ORION 720A  
**Description:** PH/ION METER  
**Serial Number:** 005885  
**Asset Number:** 001869

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NC SL 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: 42 % RH

**Calibration Date:** 20 Jul 00 **Calibration Procedure:** ORION 720A 5520A 1YR JULY 2000

**Condition as Received:** WITHIN LIMITED CALIBRATIONS REQUIREMENTS

**Remarks:** LIMITED CALIBRATION: MV USE ONLY.

Approved by:

Jim Patterson, Supervisor, or Walt Hill, Metrologist

Certificate # 39646

m\A2la.rpt Rev date 22 May 00

Measurements performed by:

Vince Morales, Technician

Page 1 of 1



# SOUTHWEST RESEARCH INSTITUTE

## Calibration Laboratory

### WORK ORDER

Processed by RCRUZ at 3:14:42PM on 7/20/01

1 10001 0010 0001 0001 0010 0010 0010 0010

Work Order **444044499**

Arrived 7/20/01

Asset No. 001869 Manufacturer ORION

Model 720A

Instrument Type/Class PH/ION METER

Serial No. 005885

Accessory No. Calibration Procedure CL-79, 6/99

Location B57

Div/Client DIV20

Custodian DARRELL DUNN

Mail Stop B57

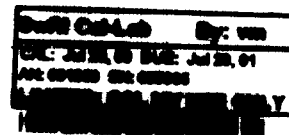
Tel. 6090

Charge/Project No. 00751.006

Delivered By / Telephone

IN4CAL

Special Instructions \_\_\_\_\_



### WORK NOTES

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

### REPAIR PARTS

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

**44499**

### WORK SUMMARY

Failure Description \_\_\_\_\_

Repair Action \_\_\_\_\_

Calibration Procedure 11-99, JUNE 99 Temp 72 F Hum. 38 %

Tech Mike Anthony Romero Totals Cal Hours 1.0 Repair Hours \_\_\_\_\_ Parts Cost \_\_\_\_\_

Standards Used 102

Date Picked Up 7/31/01

Picked Up By [Signature]



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 720A  
**Description:** PH/ION METER  
**Serial Number:** 005885  
**Asset Number:** 001869  
**Work Order Number:** 444044499

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-79, 6/99

**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**

<b>Work Order</b> 4404499	<b>Mfg.</b> Orion	<b>Tech</b> <i>[Signature]</i>
<b>Asset No.</b> 001809	<b>Model</b> 720A and EA920	<b>Procedure</b> CL-79, Jun 99
<b>Serial No.</b> 005885	<b>Type</b> pH Meter	<b>Cal Date</b> 24 July 2001

**Calibration As Found/As Released Data**

Parameter	Standard Reading	UUT As Found	Tolerance	UUT As Released
2.2				
Millivolts				
Input 1	0.000 mV	-0.4 mV ✓	-0.5 to +0.5 mV	/
	1000.0 mV	999.4 mV ✓	999 to 1001 mV	
	-1000.0 mV	-1000.2 mV ✓	-999 to -1001 mV	
Millivolts				
Input 2	0.000 mV	-0.4 mV ✓	-0.5 to +0.5 mV	
	1000.0 mV	999.6 mV ✓	999 to 1001 mV	
	-1000.0 mV	-1000.0 mV ✓	-999 to -1001 mV	

# SOUTHWEST RESEARCH INSTITUTE

## Calibration Laboratory

### WORK ORDER

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

Arrived 7/3/02

Work Order **444049292**

Asset No. 001869 Manufacturer ORION

Model 720A

Equipment Type PH/ION METER

Serial No. 005885

Accessory No.

Interval 12 M

Calibration Procedure CL-79, 6/99

Location B57

Div/Client DIV20

Custodian DARRELL DUNN

Mail Stop B57

Tel 6090

**IN LINE**

Special Instructions LIMITED: MV USE ONLY.

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. 1 Repair Hrs \_\_\_\_\_ Parts Cost \_\_\_\_\_ Temp 72 F Hum. 40 %

Standards Used 182

Date Picked Up 7/17/02

Picked Up By Darrell Dunn

444049292

Southwest Research Institute  
Calibration laboratory  
Calibration Sheet.

Found/Left

<b>Work Order:</b>	444049292	<b>Mfr.</b>	Orion	<b>Technician</b>	8216
<b>Asset No.</b>	001869	<b>Model</b>	720A and EA920	<b>Procedure</b>	CL-79 7/99
<b>Serial No.</b>	005885	<b>Type.</b>	pH Meter	<b>Cal Date.</b>	10-Jul-02
<b>Remarks:</b>					
(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.					
<b>LIMITED CAL: Millivolts Only</b>					

Function/Range	Test Point	TI Reading	Difference (1)	Test Limits+/-	Uncertainty (2)	Results
m Volts	m Volts	m Volts	m Volts	m Volts	m Volts	
Input 1	0.0	-0.5	-0.5	0.5	0.0	Pass
	1000.0	999.2	-0.8	1.0	0.0	Pass
	-1000.0	-1000.2	-0.2	1.0	0.0	Pass

Function/Range	Test Point	TI Reading	Difference (1)	Test Limits+/-	Uncertainty (2)	Results
m Volts	m Volts	m Volts	m Volts	m Volts	m Volts	
Input 2	0.0	-0.2	-0.2	0.5	0.0	Pass
	1000.0	999.5	-0.5	1.0	0.0	Pass
	-1000.0	-999.9	0.1	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

10 July 2002

**Issued to:** DARRELL DUNN DIV20 B57  
**Manufacturer/Model:** ORION 720A  
**Description:** PH/ION METER  
**Serial Number:** 005885  
**Asset Number:** 001869  
**Work Order Number:** 444049292

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.

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: 40 % RH


**Calibration Date:** 10 Jul 02 **Calibration Procedure:** CL-79, 6/99

**Condition as Received:** LIMITED CALIBRATION

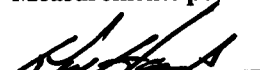
**Condition as Returned:** LIMITED CALIBRATION

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

**Approved by:**

  
\_\_\_\_\_  
Walt Hill, Metrology Group Leader  
Institute Calibration Laboratory

**Measurements performed by:**

  
\_\_\_\_\_  
Ken Harp, Technician