

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. Samell 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

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]

24981

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 David Dana

Turned in by: Walt Macchowski 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 Macchowski

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	Absolute Millivolts						
	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	Relative Millivolts						
	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
Department of Quality Assurance
Calibration Laboratory • 522-5215

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	-0.5 ^{+1mV} -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 ^{+1mV}		
		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	
			READING	TOLERANCE	UUT ERROR		TUR	USER
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

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

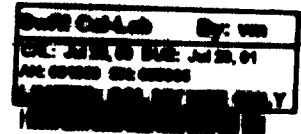
Tel. 6090

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

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 _____

444049292

Southwest Research Institute
Calibration laboratory
Calibration Sheet.

Found/Left

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

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

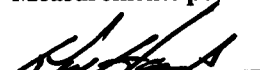
Remarks: LIMITED CALIBRATION: MILLIVOLT USE ONLY.

Approved by:



Walt Hill, Metrology Group Leader
Institute Calibration Laboratory

Measurements performed by:



Ken Harp, Technician