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

WORK ORDER

CERTIFICATE # 33562 ASSET # 001191 DATE 05 11/10/99

ITEM DATA:

Manufacturer Fisherbrand Model 15-166A

Description Thermometer Serial # 498-162

Accessories tube

ACTION REQUESTED Cal

CUSTODIAN Dr. 20, Darrell Dunn

Turned in by: _____ Phone 6090

CHARGE # 20-1102-541 04 03/12 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 _____ Date 03-05-99

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

33562

ACTION TAKEN: (Calibration/Repair/Parts) 6 Point Cal

CAL ENVIRONMENT:
Temperature 74 °F Humidity 49 %RH

CALIBRATED/REPAIRED:
By _____ Cal Procedure TO33K5-4-42-1 APR97
Date 3-16-99 Accuracy ±1.0°C
Cal Interval 12 mo Reliability Code: _____
Next Cal due 3-16-00 Cal Time 1 h Repair Time _____
Standards used (Asset#) 000219

DATE COMPLETED 3-17-99
DATE PICKED UP 3/18/99 PICKED UP BY _____

SwRI Form QA-174-0

CALIBRATION CHECK FORM

Date Calibrated 3-16-99 Work Order 33562 Rev ____ Chg ____

Technician C.M. Wood Page ____ of ____

Unit Under Test Thermometer

Manufacturer Fisher Model 15-166A SN H98-162 ASN 7171

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE	MEASURED VALUES		P/F
	0-150°C	°C	MIN - MAX	AS FOUND	RELEASED	
			(±1°C)			
1		0.012	-0.987 - 1.012	-0.2	Same	P
					↓	
2		29.92	28.92 - 30.92	30.0		P
3		59.10	58.10 - 60.10	59.0		P
4		90.00	89.00 - 91.00	90.5		P
5		119.93	118.93 - 120.93	121.0		P
6		147.88	146.88 - 148.88	148.5		P

I.n TOL

WORK ORDER 38589

Date Received 4/10/00

Asset No. 007171 **Manufacturer** FISHER SCIENTIFIC **Model** 15-166A
Description THERMOMETER **Serial Number** H98-162
Accessory Received/Required CONTAINER
Div/CC ID NONE **Accessory to Asset No.** N/A **Accuracy** Mfg. Tol.
Div/CC DIV20 **Location** B57 **Custodian** DARRELL DUNN **Tel.** 6090
Charge/Project No. 20.00751.006 **Proprietary/Confidental** N **Date Required** ROUTINE
Work Requested CALIBRATION
Receiving Inspection O.K.
Delivered By DARRELL DUNN **Tel.** 6090

WORK HISTORY

Date	Start Time	Stop Time	Notes

PARTS

Part Name	Part Number	Cost	Failure Description

WORK SUMMARY

Failure Description _____

Repair Action _____

Cal Procedure CL-9 5/99 **Temp** 76 F **Hum** 48 %

Tech _____ **Cal Hrs.** 1 **Repair Hrs.** _____ **Part Cost** _____

Action Taken Cal

Standards Used 0210 5174

Date Cal 4-18-00 **Int.** 12 **Mo. Date Due** 4-18-01 **Reliability Code** 2

Date Picked Up 5/2/00 **Picked Up By** _____

workreq.rpt Rev 30 Jan 00

38589

CALIBRATION CHECK FORM

Date Calibrated 4-18-00 Work Order 38589 Cal By [signature]

Procedure No./Date CL-9 5/99 Unit Under Test ASTM 1C Thermometer

Mfg. Fisher Model 15-166A SN H98-162 AN 7171

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE	MEASURED VALUES		P/F
			MIN - MAX	AS FOUND	RELEASED	
	Temp °C		± 1°C			
	Nom					
1	-20		-17.67	-18.0		
2	0	0		0.0		
3	50	51.93		52.0		
4	100	99.90		100.3		
5	150	140.45		140.8		

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

18 April 2000

Issued to:	DARRELL DUNN DIV20 B57
Manufacturer/Model:	FISHER SCIENTIFIC 15-166A
Description:	THERMOMETER
Serial Number:	H98-162
Asset Number:	007171

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: 76.0 Degrees Fahrenheit Humidity: 48 % RH

Calibration Date: 18 Apr 00 **Calibration Procedure:** CL-9 5/99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor, or Walt Hill, Metrologist

Certificate # 38589

Measurements performed by:

Mack Wood, Technician

m:\a2la.rpt Rev date.14 Dec 99

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Processed by RCRUZ at 2:38:38PM on 4/26/01

Work Order 444043354 **Arrived** 4/26/01

Asset No. 007171 **Manufacturer** FISHER SCIENTIFIC **Model** 15-166A

Instrument Type/Class THERMOMETER **Serial No.** H98-162

Accessory No. **Calibration Procedure** ~~CL-557 12,000 RO~~ ~~CL-9 5/99~~ CL-9, 5/99 **Location** B57

Div/Client DIV20 **Custodian** DARRELL DUNN **Mail Stop** B57 **Tel.** 6090

Charge/Project No. 20.00751.006 **Delivered By / Telephone** DARRELL DUNN

IN4CAL **Special Instructions** _____

WORK NOTES

Date	Hours	Remarks/Notes
5.1.01	1.0	Calibrate

REPAIR PARTS

Date	Hours	Part Name	Part Number	Failure Description	Cost

WORK SUMMARY

Failure Description None

Repair Action None

Calibration Procedure CL-9 5/99 **Temp** 72 F **Hum.** 42 %

Tech R Dykstra **Totals** **Cal Hours** 1.0 **Repair Hours** _____ **Parts Cost** _____

Standards Used 5174, 5243

Date Picked Up 5/2/01 **Picked Up By** _____

Southwest Research Institute
Calibration Laboratory
Calibration Data Sheet

Work Order 444043352	**Mfr.** Fisher Scientific	**Technician** R Dykstra
Asset No. 7171	**Model** 15-166A	**Procedure** CL-9 5/99
Serial No. H96-162	**Type** Thermometer	**Cal Date** May. 1, 01
Remarks: Partial-Immersion 76 mm		

Parameter	Applied Value	Found/Left	Instrument Error	Limits	Result
Temperature	-19.880 Deg C	-20.4 Deg C	0.52 Deg C	+/- 1 Deg C	**Passed**
	0.000 Deg C	-0.7 Deg C	0.7 Deg C	+/- 1 Deg C	**Passed**
	50.000 Deg C	49.4 Deg C	0.6 Deg C	+/- 1 Deg C	**Passed**
	100.000 Deg C	99.2 Deg C	0.8 Deg C	+/- 1 Deg C	**Passed**
	149.966 Deg C	149.5 Deg C	0.46 Deg C	+/- 1 Deg C	**Passed**

To: rdykstra@qacal@swri30
From: "Darrell Dunn" <ddunn@swri.edu>
Cc:
Subject: RE: Thermometers
Attachment: Headers.822
Date: 5/1/01 11:59 AM

+/- 1 degree is sufficient for our needs. I see no reason to change what we have done in the past.

-----Original Message-----
From: rdykstra@swri.edu (mailto:rdykstra@swri.edu)
Sent: Tuesday, May 01, 2001 10:51 AM
To: ddunn@swri.edu
Cc: WHill@swri.edu
Subject: Thermometers

Darrel, you have 11 Partial-Immersion thermometers in for calibration.

In the past they have been calibrated with an accuracy of +/- 1 Deg C. (Range is -20 to 150 Deg C). Is this accuracy sufficient for your needs?

The reason I am asking is the thermometers are labelled as ASTM 1C thermometers and according to the ASTM the scale error accuracy is +/- 0.5 Deg C.

I do not have all the data collected as of now. I will tell you so far all meet the +/- 1 deg C, not all are meeting the +/- 0.5 deg C spec.

The asset numbers are as follows: 007164, 005434, 007167, 007165, 007169, 005432, 007166, 007168, 003242, 005433, and 007171.

Let me know what accuracy will fit your needs.

Roger Dykstra
Cal Lab. X5076

Southwest Research Institute
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Department of Quality Assurance
Calibration Laboratory

Certificate #
0972-01

Certificate of Calibration

2 May 2001

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: FISHER SCIENTIFIC 15-166A
Description: THERMOMETER
Serial Number: H98-162
Asset Number: 007171
Work Order Number: 444043354

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.

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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: 42 % RH

Calibration Date: 1 May 01 **Calibration Procedure:** CL-9 5/99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Walt Hill, Supervisor
Institute Calibration Laboratory

Measurements performed by:

Roger Dykstra, Technician

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Received by RCRUZ,4/17/02 4:03:18PM

Arrived 4/17/02 Work Order **444048237**

Asset No. 007171 Manufacturer FISHER SCIENTIFIC Model 15-166A

Equipment Type THERMOMETER Serial No. H98-162 Accessory No.

Interval 12 M Calibration Procedure CL-9 5/99 Location B57

Div/Client DIV20 Custodian DARRELL DUNN Mail Stop B57 Tel 6090

IN LINE Special Instructions

Notify before adjustments or repairs. ( ) Provide data with certificate (✓) Certificate Typ

Charge/Project No. 00751.006 1.20 Requester / Telephone DARRELL DUNN X6090

This information is correct for the work requested. Darrell Dunn

WORK NOTES

Date	Hours	Remarks/Notes
4/22/02	1.0	Cal

Date	Hours	Part Name	Part Number	Failure Description	Cost
n/a					

48237

WORK SUMMARY

Failure Description n/a

Repair Action n/a

Tech RDykes Cal Hrs. 1.0 Repair Hrs Parts Cost Temp 74 F Hum. 55 %

Standards Used 5243 due 12/3/02

5174 due 2/18/03

Date Picked Up 5/3/02 Picked Up By Darrell Dunn

Southwest Research Institute
Calibration Laboritory
Calibration Data Sheet

As found / left data

Workorder 444048237	**Mfr.** Fisher Scientific	**Technician**	R Dykstra
Asset #. 007171	**Model** 15-166A	**Procedure**	CL-9, 5/99
Serial #. H98-162	**Type** Thermometer	**Cal Date**	4/22/02

Remarks: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor (k=2) providing a level of confidence of approximately 95%.
The Difference is equal to TI reading - Std reading.
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.

Range Degree C	Test point Degree C	TI Reading Degree C	Difference Degree C	Tolerance Degree C	Uncertainty Degree C	Results
0 to 150	-19.88	-20.6	**-0.72**	**1**	**0.35**	
	0.09	-0.4	**-0.49**	**1**	**0.35**	**Pass**
	50.02	49.6	**-0.42**	**1**	**0.35**	**Pass**
	99.94	99.4	**-0.54**	**1**	**0.35**	**Pass**
	149.90	149.6	**-0.30**	**1**	**0.35**	**Pass**

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Department of Quality Assurance
Calibration Laboratory

Certificate of Calibration

22 April 2002

Issued to:	DARRELL DUNN DIV20 B57
Manufacturer/Model:	FISHER SCIENTIFIC 15-166A
Description:	THERMOMETER
Serial Number:	H98-162
Asset Number:	007171
Work Order Number:	444048237

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: 74.0 Degrees Fahrenheit Humidity: 55 % RH

Calibration Date: 22 Apr 02 **Calibration Procedure:** CL-9 5/99

Condition as Received: SEE ATTACHED DATA

Condition as Returned: SEE ATTACHED DATA

Remarks:

Approved by:

Walt Hill, Metrology Group Leader
Institute Calibration Laboratory

Measurements performed by:

Roger Dykstra, Technician