

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

WORK ORDER

CERTIFICATE # 26039 ASSET # 001136 DATE 10 July 97

ITEM DATA:

Manufacturer Fisher-Rand Model 14-983/10E
Description Thermometer Serial # 123800E
Accessories _____

ACTION REQUESTED cal

CUSTODIAN D. D. Davis

Turned in by: _____ Phone 6090

CHARGE # 205108-561 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 _____

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) Calibrated Per Procedure
447
-0.00°C 0.0°C
(100.007 inches)

CAL ENVIRONMENT:
Temperature 78°F Humidity 35%RH

CALIBRATED/REPAIRED:
By [Signature] Cal Procedure WI-9-30-7103
Date 16 Jul 97 Accuracy ±0.5°C
Cal Interval 12 mos Reliability Code: 4
Next Cal due 16 Jul 98 Cal Time 1.5 Repair Time _____
Standards used (Asset#) _____

DATE COMPLETED 16 Jul 97
DATE PICKED UP 7/16/97 PICKED UP BY [Signature]

26039

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

WORK ORDER

CERTIFICATE # 30696 ASSET # 001430 DATE 8/3/98

ITEM DATA:
Manufacturer FISHER BRAND Model 14-983-105
Description THERMOMETER Serial # 1238002
Accessories _____

ACTION REQUESTED Cal

CUSTODIAN D. Dunn

Turned in by: Dunn Phone _____

CHARGE # 20-1402-571 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 [Signature] Date 8/3/98

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
 (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 76 °F Humidity 46 %RH

CALIBRATED/REPAIRED:
By W Hill Cal Procedure WI-9-30-TH03
Date 5 Aug 98 Accuracy ± 0.5°C
Cal Interval 12mo Reliability Code: _____
Next Cal due 6 Aug 99 Cal Time 60 Repair Time _____
Standards used (Asset#) 219/328

DATE COMPLETED _____
DATE PICKED UP 8/7/98 PICKED UP BY [Signature]

30696

WORK ORDER HISTORY

DATE	START STOP	CAL	REP	REMARKS:

TOTAL CAL/REPAIR

TOTAL HOURS _____

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

WORK ORDER

CERTIFICATE # 35950 ASSET # 001430 DATE 09 Sept. 99

ITEM DATA:

Manufacturer Fisherbrand Model -10°C - 260°C
Description Thermometer Serial # 1238002
Accessories _____

ACTION REQUESTED cal

CUSTODIAN DU.20, Darrell Dunn

Turned in by: _____ Phone 6090

CHARGE # 20-04 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 MAZ Date 09-09-99

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 calibrated east of beam top.

CAL ENVIRONMENT:
Temperature 79 °F Humidity 40 %RH

CALIBRATED/REPAIRED:
By [Signature] Cal Procedure CC-9 May 99
Date 9-14-99 Accuracy ±0.5°C
Cal Interval 12 mo Reliability Code: _____
Next Cal due 9-14-00 Cal Time 2h Repair Time _____
Standards used (Asset#) 219/328

DATE COMPLETED 9-14-99
DATE PICKED UP 9/16/99 PICKED UP BY [Signature]

35950



WORK ORDER HISTORY

DATE	START	CAL	REP	REMARKS:
	STOP			
				260
				0.03
				0.0
				51.7
				99.0
				149.0
				198 (2" out of liquid)
				250 Tank not deep enough
TOTAL CAL/REPAIR				TOTAL HOURS _____

CALIBRATION WORKSHEET

Date Calibrated 9-14-99 Work Order 35950 Cal By [Signature]

Procedure No./Date CL-9-May 99 Unit Under Test Thermometer

Mfg. Fisherbrand Model 14-983-10E SN 1238002 AN 1450

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
		°C	± 0.5°C		°C		
		0	-0.5	0.5	0.03		P
		51.5	51	52	51.7		P
		99.0	98.5	99.5	99.0		P
		149.2	148.7	149.7	149.0		P
		198.99	198.49	199.49	198 *		P
		200	—		(bath not deep enough)		
* 2" of stem above liquid surface							

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Processed by RCRUZ at 3:56:28PM on 12/14/00

1 0000 0000 0000 0000 0000 0000 0000

Work Order 444041764

Arrived 12/14/00

Asset No. 001430

Manufacturer FISHER SCIENTIFIC

Model 14-983-10E

Instrument Type/Class THERMOMETER

Serial No. 1238002

Accessory No. _____

Calibration Procedure _____

Location B57

Div/Client DIV20

Custodian DARRELL DUNN

Mail Stop B57

Tel. 6090

Charge/Project No. 20.00751.006

Delivered By / Telephone _____

IN4CAL

Special Instructions _____

WORK NOTES

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

REPAIR PARTS

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

WORK SUMMARY

Failure Description _____

Repair Action _____

Calibration Procedure CL9 MAY 99 Temp 69 F Hum. 56 %

Tech QNW Totals Cal Hours 2.5 Repair Hours _____ Parts Cost _____

Standards Used 219 4965

Date Picked Up 1/19/2001

Picked Up By Darrell Dunn

41764

CALIBRATION CHECK FORM

Date Calibrated 10 JAN 2001 41764 Work Order 41764 Cal By JW

Procedure No./Date: CL-9 MPY 99 Unit Under Test: _____

Mfg.: FISHEN Model: 14-983-106 SN 1238002 AN 1430

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/ F
			MIN	MAX	AS FOUND	RELEASED	
	Temp CnL	-10° C			-10.0		
		0°			0.0		
		50			50.0		
		100			100.0		
		150			149.8		
		200 (199.0)			198 + 1.3 = 199.3		
	200°	$\text{CONR} = K_m (T-t)$ $= 0.00016 (60) \left[198 - \frac{198+142}{2} \right] = +1.3^\circ$					
	STANDARD	219					
		4965					



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

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: FISHER SCIENTIFIC 14-983-10E
Description: THERMOMETER
Serial Number: 1238002
Asset Number: 001430
Work Order Number: 444041764

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: 69.0 Degrees Fahrenheit Humidity: 56 % RH

Calibration Date: 10 Jan 01 **Calibration Procedure:** CL-9 MAY 99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Walt Hill, Supervisor
Institute Calibration Laboratory

Measurements performed by:

Jerry White, Technician

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Received by JIBARRA, 1/8/02 11:36:03AM

Arrived 1/8/02

Work Order **444046681**

Asset No. 001430 Manufacturer FISHER SCIENTIFIC

Model 14-983-10E

Equipment Type THERMOMETER

Serial No. 1238002

Accessory No.

Interval 12 M

Calibration Procedure CL-9 MAY 99

Location B57

Div/Client DIV20

Custodian DARRELL DUNN

Mail Stop B57

Tel 6090

IN4CAL

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.

WORK NOTES

Date	Hours	Remarks/Notes
<u>1/14/02</u>	<u>.5</u>	<u>Cal</u>
<u>1/15/02</u>	<u>1.0</u>	<u>Cal</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

Date	Hours	Part Name	Part Number	Failure Description	Cost
<u>n/a</u>	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

WORK SUMMARY

Failure Description n/a

Repair Action n/a

Tech R Dykstra Cal Hrs. 1.5 Repair Hrs _____ Parts Cost _____ Temp 76 F Hum. 29 %

Standards Used 0219

Date Picked Up 1/21/02

Picked Up By Darrell Dunn

444046681



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

Certificate of Calibration

15 January 2002

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: FISHER SCIENTIFIC 14-983-10E
Description: THERMOMETER
Serial Number: 1238002
Asset Number: 001430
Work Order Number: 444046681

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: 76.0 Degrees Fahrenheit Humidity: 29 % RH


Calibration Date: 15 Jan 02 **Calibration Procedure:** CL-9 MAY 99

Condition as Received: IN TOLERANCE

Condition as Returned: IN TOLERANCE

Remarks:

Approved by:



Walt Hill, Supervisor
Institute Calibration Laboratory

Measurements performed by:



Roger Dykstra, Technician

Measurement uncertainty Budget for Fisher Scientific Thermometer model 14-983-10E.

The following are assumptions and estimates used in the measurement uncertainty budget.

	Units	Range	Accuracy +/-	Resolution
	Degree C	-20 to 150	1	1
Source of uncertainty	Value +/- Deg C	Distribution	Divisor	Standard Uncertainty Deg C
Standard	0.03	Rectangular	Sqrt 3	0.02
Repeatability	0	Normal	1	0.00
Instrument Resolution	1	Rectangular	2*Sqrt 3	0.87
Combined Uncertainty	RSS			0.87
Expanded Uncertainty	K=2			1.7
Test Accuracy Ratio	TI Acc. / STD Tol.			
	33.3	to 1		
Test Uncertainty Ratio	TI Acc. / k=2.			
	0.58	to 1		