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

WORK ORDER

CERTIFICATE # 22383 ASSET # 3247 DATE 14 Aug 96

ITEM DATA:

Manufacturer Kessler Model ASTM E 76 MM

Description thermometer Serial # 115749

Accessories

ACTION REQUESTED cal

CUSTODIAN Darrell Duna D1120

Turned in by: Phone

CHARGE # 20-5708573 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) Calibrated per procedure.
0.0°C 0°C

CAL ENVIRONMENT:
Temperature 80 °F Humidity 33 %RH

CALIBRATED/REPAIRED:
By
Date 19 Aug 96
Cal Interval 12 Mos
Next Cal due 19 Aug 97
Cal Procedure W1-9-30-T463
Accuracy +/- 1 deg.
Time to complete:
Cal 2.0 Repair
Standards used (Asset#) 4165

DATE COMPLETED 19 Aug 96
DATE PICKED UP 8/24/96 PICKED UP BY

SwRI Form QA-169-2

22383

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

WORK ORDER

CERTIFICATE # 2658Z ASSET # 003247 DATE 25 Aug. 97

ITEM DATA:

Manufacturer Kaye Model ASTM IP 76/88

Description Thermometer, Serial # 115419

Accessories _____

ACTION REQUESTED Cal

CUSTODIAN D10.20, Darrell Chun

Turned in by: _____ Phone 6111

CHARGE # 20.5709.561 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
Std used
0.012°C 0.0

CAL ENVIRONMENT:
Temperature 70 °F Humidity 48 %RH

CALIBRATED/REPAIRED:
By _____ Cal Procedure W-I-9-30-TH03
Date 4 Sep 97 Accuracy +/- 1°C
Cal Interval 12 Mos Reliability Code: 4
Next Cal due 4 Sep 98 Cal Time 1.5 Repair Time _____
Standards used (Asset#) 219,328

DATE COMPLETED 4 Sep 97
DATE PICKED UP 9/10/97 PICKED UP BY _____

SwRI Form QA-174-0

2658Z

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

WORK ORDER

CERTIFICATE # 3649 ASSET # 003247 DATE 19 OCT 98

ITEM DATA:

Manufacturer Kessler Model ASTM 1C 76mm

Description thermometer Serial # 115749

Accessories

ACTION REQUESTED cal

CUSTODIAN DW.20, Darrell Dunn

Turned in by: Phone 6090

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 mael Date 10-19-98

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

blank

ACTION TAKEN: (Calibration/Repair/Parts) Calibrated per procedure

CAL ENVIRONMENT:

Temperature 74 °F Humidity 56 %RH

CALIBRATED/REPAIRED:

By [illegible] Cal Procedure ASTM E77-92

Date 20 OCT 98 Accuracy [illegible]

Cal Interval 12 Mos Reliability Code: 5

Next Cal due 20 OCT 99 Cal Time 1.0 Repair Time

Standards used (Asset#) 219, 328

DATE COMPLETED 20 OCT 98

DATE PICKED UP 10/22/98 PICKED UP BY [signature]

SwRI Form QA-174-0

CALIBRATION CHECK FORM

Date Calibrated 20 Oct 98 Work Order 31649

Technician 8216 Cal. Procedure: ASTM E77-92 Rev ____ Chg ____

Unit Under Test Thermometer Page 1 of 1

Manufacturer Kessler Model ASTM 1C 76mm SN 115749 ASN 3247

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN - MAX		AS FOUND	RELEASED	
		°C					
		0.00	+/- 1.0°C		-0.5°C		P

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

WORK ORDER

WORK ORDER # 37056 ASSET # 003247 DATE 08 Dec 99

ITEM DATA:

Manufacturer Kessler Model ASTM 1C

Description Thermometer Serial # 115749

Accessories

ACTION REQUESTED Cal

CUSTODIAN Lt. Jo, 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 Date 12.08.99

Work involves proprietary/confidential information or equipment ☐ (Yes) ☑ (No)

CONDITION RECEIVED:
- ___ Out of tolerance
- ✓ In tolerance
- ___ Damaged (Contact customer)
- ___ Contact ___ Date ___
- ___ Received into system, introduced or reactivated

ACTION TAKEN: (Calibration/Repair/Parts) Cal

CAL ENVIRONMENT:

Temperature 70 °F Humidity 30 %RH

CALIBRATED/REPAIRED:

By Cal Procedure QL-9 May 99

Date 10 Dec 99 Accuracy +/- 1 Dg

Cal Interval 6 Reliability Code b

Next Cal Due 10 Jun 00 Cal Time 1.3 Repair Time

Standards used (Asset #) 5174 5243

DATE COMPLETED 10 Dec 99

DATE PICKED UP PICKED UP BY

SwRI Form QA-174-0

37056

CALIBRATION WORKSHEET

Date Calibrated 9 Dec 98 Work Order 37056 Cal By DW

Procedure No./Date _____ Unit Under Test _____

Mfg. _____ Model _____ SN 115748 AN _____

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE	MEASURED VALUES		P/F
			MIN - MAX	AS FOUND	RELEASED	
	Temp	Deg C	+/- 1 Deg C			
		-20		-20.1		P
		+30		15.7		P
		+40		35.9		P
		+60		59.5		P
		+80		79.6		P
		+110		110.1		P
		+150		150.5		P

Page _____ of _____

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

10 December 1999

Issued to:	DARRELL DUNN DIV20 B57
Manufacturer/Model:	KESSLER ASTM 1C
Description:	THERMOMETER
Serial Number:	115749
Asset Number:	003247

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.

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: 70.0 Degrees Fahrenheit Humidity: 30 % RH

Calibration Date: 10 Dec 99 **Calibration Procedure:** CL-9 MAY 99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor or Walt Hill, Metrologist

Certificate # 37056

Measurements performed by:

Jerry White, Technician

m:\a2la.rpt Rev date 10 Mar 99

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Processed by RCRUZ at 3:52:24PM on 1/19/01

Work Order 444042125 Arrived 1/19/01

Asset No. 003247 Manufacturer KESSLER Model ASTM 1C

Instrument Type/Class THERMOMETER Serial No. 115749

Accessory No. Calibration Procedure 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

IN4CAL Special Instructions _____

WORK NOTES

Date	Hours	Remarks/Notes

REPAIR PARTS

Date	Hours	Part Name	Part Number	Failure Description	Cost

4125

WORK SUMMARY

Failure Description _____

Repair Action _____

Calibration Procedure CL-9, 5/99 Temp 74 F Hum. 36 %

Tech VMorales Totals Cal Hours 1.0 Repair Hours _____ Parts Cost _____

Standards Used 219

Date Picked Up 1/31/2001 Picked Up By _____

Southwest Research Institute
Calibration Laboratory

Work Order 44404212[illegible]	Mfg. Kessler	Tech [illegible]
Asset No. 3247	Model ASTM 1C	Procedure CL-9, 5/99
Serial No. A2000-123	Type Thermometer	Cal Date 29JAN01

Calibration As Found/As Released Data

Parameter	Standard Reading	UUT As Found	Tolerance	UUT As Released
Temperature	Actual			
-20Deg.C.	-20.00°C	-19.5°C	+/-0.5DegC	
0.0Deg.C.	.02°C	0.3°C	+/-0.5DegC	
50Deg.C.	50.08°C	50.5°C	+/-0.5DegC	
100Deg.C.	100.07°C	100.4°C	+/-0.5DegC	
150Deg.C.	149.99°C	150.0°C	+/-0.5DegC	

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San Antonio, TX 78238
(210) 522-5215
Department of Quality Assurance
Calibration Laboratory

Certificate #
0972-01

Certificate of Calibration

29 January 2001

Issued to:	DARRELL DUNN DIV20 B57
Manufacturer/Model:	KESSLER ASTM 1C
Description:	THERMOMETER
Serial Number:	115749
Asset Number:	003247
Work Order Number:	444042125

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: 74.0 Degrees Fahrenheit Humidity: 36 % RH

Calibration Date: 29 Jan 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:

Vince Morales, Technician

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

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

Arrived 1/8/02 Work Order **444046684**

Asset No. 003247 Manufacturer KESSLER Model ASTM 1C

Equipment Type THERMOMETER Serial No. 115749 Accessory No.

Interval 12 M Calibration Procedure CL-9, 5/99 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 Type

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
1/10/02	1.0	Cal

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

WORK SUMMARY

Failure Description n/a

Repair Action n/a

Tech R Dyka Cal Hrs. 1.0 Repair Hrs ___ Parts Cost ___ Temp 76 F Hum. 42 %

Standards Used 0215

Date Picked Up 1/11/02 Picked Up By Darrell Dunn

Southwest Research Institute
Calibration Laboratory
Calibration Data Sheet Z 540

Workorder	444046684	**Mfr.**	Kessler.	**Technician**	R Dykstra
Asset #.	003247	**Model**	ASTM 1C	**Procedure**	CL-9, 5/99
Serial #.	115749	**Type**	Thermometer	**Cal Date**	1/10/02

Remarks: The Test accuracy ratio meets the 4 to 1 or greater between the standard and TI under test.

Parameter	Degree C	Degree C	Degree C	Degree C	Degree C	
		As Found				
	Standard Reading	TI Reading	Error	Test Limits	Uncertainty	Results
	-19.89	-19.6	0.29	1		Pass
	0.10	0.2	0.10	1		Pass
	50.01	50.2	0.19	1		Pass
	99.95	100.2	0.25	1		Pass
	149.92	150.0	0.08	1		Pass

Measurement uncertainty Budget for Fisher Scientific Thermometer model 15-166A.

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

	TI Acc. / STD Tol.	
Test Accuracy Ratio	33.3	to 1
	TI Acc. / k=2.	
Test Uncertainty Ratio	0.58	to 1

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Department of Quality Assurance
Calibration Laboratory

Certificate of Calibration

10 January 2002

Issued to:	DARRELL DUNN DIV20 B57
Manufacturer/Model:	KESSLER ASTM 1C
Description:	THERMOMETER
Serial Number:	115749
Asset Number:	003247
Work Order Number:	444046684

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: 42 % RH

Calibration Date: 10 Jan 02 **Calibration Procedure:** CL-9, 5/99

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