

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

WORK ORDER

CERTIFICATE # 22384 ASSET # 3242 DATE 11 Aug 96

ITEM DATA:

Manufacturer Kessler Model ASTMTC 76MM
Description Thermometer Serial # 115858
Accessories _____

ACTION REQUESTED cal

CUSTODIAN Darrell Dunn DIV 20

Turned in by: _____ Phone _____

CHARGE # 20-5708-573 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.
all out
0.0°C 0°

CAL ENVIRONMENT:
Temperature 80 °F Humidity 33 %RH

CALIBRATED/REPAIRED:
By [Signature] Cal Procedure 21-9-30-7103
Date 19 Aug 96 Accuracy ±0.1
Cal Interval 12 mo Time to complete: _____
Next Cal due 19 Aug 97 Cal 2.0 Repair _____
Standards used (Asset#) 4965

DATE COMPLETED 19 Aug 96
DATE PICKED UP 8/21/96 PICKED UP BY [Signature]

22384

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

WORK ORDER

CERTIFICATE # 24342 ASSET # 003242 DATE 17 Feb-97

ITEM DATA:
Manufacturer Kassidy Model 760001 / 1100
Description Ther Monitor Serial # 115858
Accessories _____

ACTION REQUESTED cal

CUSTODIAN D. D. Donald Dina

Turned in by: _____ Phone _____

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 internal
 - _____ Reliability code

ACTION TAKEN: (Calibration/Repair/Parts) Calibrated per procedure.
0.03°C 0.0°C

CAL ENVIRONMENT:
Temperature 80°F Humidity 36%RH

CALIBRATED/REPAIRED:
By [Signature] Cal Procedure 411-9-50-FAB3
Date 21 Feb 97 Accuracy ± 1°C
Cal Interval 6 12 mos Time to complete:
Next Cal due 21 Feb 98 Cal 2.0 Repair _____
Standards used (Asset#) 219, 328

DATE COMPLETED 21 Feb 97
DATE PICKED UP 2/26/97 PICKED UP BY [Signature]

24342

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

WORK ORDER

CERTIFICATE # 28937 ASSET # 003242 DATE 09 Mar 98

ITEM DATA:

Manufacturer Kasslor Model ASTM 10 76 mm
Description Thermometer Serial # 115858
Accessories _____

ACTION REQUESTED Cal

CUSTODIAN W. D. Darr

Turned in by: _____ Phone 609

CHARGE # 701400-571 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 _____ 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) _____

Cal at 0°C with 0°C

CAL ENVIRONMENT: Temperature 74 °F Humidity 24 %RH

CALIBRATED/REPAIRED:

By K. S. S. S. Cal Procedure WIA-30-T#03
Date 9 Mar 98 Accuracy to NIST
Cal Interval 12 Reliability Code: 5
Next Cal due 9 Mar 99 Cal Time 1.5 Repair Time _____
Standards used (Asset#) 219, 328

DATE COMPLETED 9 Mar 98
DATE PICKED UP 3/18/98 PICKED UP BY [Signature]

28937

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

WORK ORDER

CERTIFICATE # 33561 ASSET # 003442 DATE 05 MAR 99

ITEM DATA:

Manufacturer Kossler Model ASTM 1C
Description Thermometer Serial # 115852
Accessories _____

ACTION REQUESTED CVI

CUSTODIAN DUNN, Damon Dunn

Turned in by: OH Phone 6090

CHARGE # 20-400-5A 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 MAD 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

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

Part 15h, WI9-30-TH03
28937
219 328

CAL ENVIRONMENT:
Temperature 74 °F Humidity 49 %RH

CALIBRATED/REPAIRED: M Wood
By _____ Cal Procedure T033K5-4-42-1 APR97
Date 3-16-99 Accuracy ± 1.0°C
Cal Interval 12mo Reliability Code: _____
Next Cal due 3-16-00 Cal Time 1h Repair Time _____
Standards used (Asset#) 000219

DATE COMPLETED 3-17-99
DATE PICKED UP 3/18/99 PICKED UP BY [Signature]

33561



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: KESSLER ASTM 76MM IMM
Description: THERMOMETER
Serial Number: 115858
Asset Number: 003242

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

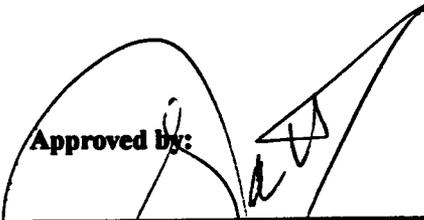
Calibration Date: 18 Apr 00 **Calibration Procedure:** CL-9, 5/99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

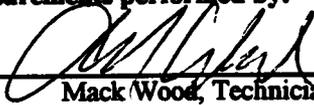


Jim Patterson, Supervisor, or Walt Hill, Metrologist

Certificate # 38588

m:\a2la.rpt Rev date 14 Dec 99

Measurements performed by:



Mack Wood, Technician

Page 1 of 1

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

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

1 10001 0001 0001 1001 1001 1001 1001

Work Order 444043355

Arrived 4/26/01

Asset No. 003242 Manufacturer KESSLER

Model ASTM 76MM 1MM

Instrument Type/Class THERMOMETER

Serial No. 115858

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 DARRELL DUNN

IN4CAL

Special Instructions _____

WORK NOTES

Date	Hours	Remarks/Notes
<u>5-3-01</u>	<u>1.5</u>	
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

REPAIR PARTS

Date	Hours	Part Name	Part Number	Failure Description	Cost
<u>5-3-01</u>	<u>.5</u>	<u>N/A</u>	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

WORK SUMMARY

Failure Description Separation of mercury column

Repair Action Had to re-unit mercury later column

Calibration Procedure CL-9, 5/99

Temp 70 F

Hum. 40 %

Tech R Dykster

Totals Cal Hours 1.5

Repair Hours .5

Parts Cost _____

Standards Used 517A, 5243

Date Picked Up 5/8/01

Picked Up By Darrell Dunn

43355

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



Certificate #
0972-01

Certificate of Calibration

3 May 2001

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: KESSLER ASTM 76MM 1MM
Description: THERMOMETER
Serial Number: 115858
Asset Number: 003242
Work Order Number: 444043355

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: 42 % RH

Calibration Date: 3 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 **444048234**

Asset No. 003242 Manufacturer KESSLER

Model ASTM 76MM 1MM

Equipment Type THERMOMETER

Serial No. 115858

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.

WORK NOTES

Date	Hours	Remarks/Notes
<u>4/22/02</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 RDKsa 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 5/9/02

Picked Up By Darrell Dunn

444048234

Southwest Research Institute
 Calibration Laboratory
 Calibration Data Sheet

As found / left data

Workorder 444048234	Mfr. Kessler	Technician	R Dykstra
Asset #. 003242	Model ASTM 76MM 1MM	Procedure	CL-9, 5/99
Serial #. 115858	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 T1 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	Test point	T1 Reading	Difference	Tolerance	Uncertainty	Results
Degree C	Degree C	Degree C	Degree C	Degree C	Degree C	
0 to 150	-19.94	-19.8	0.14	1	0.35	Pass
	0.10	0.4	0.30	1	0.35	Pass
	49.99	50.2	0.21	1	0.35	Pass
	99.95	100.0	0.05	1	0.35	Pass
	149.90	150.0	0.10	1	0.35	Pass

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

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

- a.) Resolution is based upon reading the scale with magnifier. (1/5 the scale of 1 degree C.)
- b.) Repeatability is not significant.

	Units	Range	Accuracy +/-	Resolution
	Degree C	-20 to 150	1	0.2
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	0.2	Rectangular	2*sqrt 3	0.17
Combined Uncertainty			RSS	0.17
Expanded Uncertainty			K=2	0.3
Test Accuracy Ratio	TI Acc. / STD Tol.			
	33.3	to 1		
Test Uncertainty Ratio	TI Acc. / k=2.			
	2.87	to 1		



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

Certificate of Calibration

22 April 2002

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: KESSLER ASTM 76MM 1MM
Description: THERMOMETER
Serial Number: 115858
Asset Number: 003242
Work Order Number: 444048234

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: IN TOLERANCE

Condition as Returned: IN TOLERANCE

Remarks:

Approved by:

Walt Hill, Metrology Group Leader
Institute Calibration Laboratory

Measurements performed by:

Roger Dykstra, Technician