

Southwest Research Institute 6220 Culebra Road San Antonio, TX 78238 Department of Quality Assurance Calibration Laboratory

Certificate of Calibration

B57

17 April 1997

Issued to: DARRELL DUNN DIV20

Manufacturer/Model: ERTCO 15-166A

Description: THERMOMETER

Serial Number: C96-852 **Asset Number:** 005432

Environmental Conditions

Temperature: 77.0 Deg. F **Humidity:** 27%

Calibration Information

Calibration was in accordance with requirements of MIL-STD-45662A and ANSI/NCSL Z540-1-1994. Measurements are traceable to the National Institute of Standards and Technology (NIST). This report may not be reproduced except in full without written approval of the originator. Inspection and test data are on file and available for inspection.

Calibration Date: 15 Apr 97 Calibration Procedure: WI-9-30-TH03

Interval: 6 months Accuracy: +/-1 DEG.C

Next Calibration Due: 15 Oct 97 Received: In Tolerance

Remarks:

Standards Used

Asset MFR Model **Description** Serial No. **Due Cal** 000106 FLUKE 8506A THERMAL RMS DIGITAL M 31 Jan 98 4180021 005174 **AZONIX** A12001 PRECISION RTD TEMPERA 438295 11 Nov 97

Certificate # 25041

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Signed:

LAST PAGE OF REPORT Total Pages Printed: 1



Southwest Research Institute 6220 Culebra Road San Antonio, TX 78238 **Department of Quality Assurance Calibration Laboratory**

Certificate of Calibration

30 October 1997

Issued to: DARRELL DUNN DIV₂0 Manufacturer/Model:

FISHERBRAND/ERTCO 15-166A

THERMOMETER Description:

Serial Number: C96-852 **Asset Number:** 005432

Environmental Conditions

Temperature: 78.00 Deg. F **Humidity:** % RH 41

Calibration Information

Calibration was in accordance with requirements of MIL-STD-45662A and ANSI/NCSL Z540-1-1994. Measurements are traceable to the National Institute of Standards and Technology (NIST). This report may not be reproduced except in full without written approval of the originator. Inspection and test data are on file and available for inspection.

The uncertainty of the calibration was sufficient to determine that the instrument met the manufacturer's specifications.

Calibration Date: 29 Oct 97

Calibration Procedure:

B57

ASTM E77-92

Interval:

months

Next Calibration Due:

29 Apr 98

Received: In Tolerance

Remarks:

Standards Used

Asset	MFR	Model	Description	Serial No.	Due Cal
000219	AZONIX	A1011	RTD THERMOMETER	T1587-2078	24 Mar 98
000328	AZONIX	A12001	RTD TEMPERATURE PROBE	351477	3 Apr 98

LAST PAGE OF REPORT Total Pages Printed: 1

Certificate # 27263



Southwest Research Institute 6220 Culebra Road San Antonio, TX 78238 **Department of Quality Assurance Calibration Laboratory**



Certificate of Calibration

11 May 1998

Issued to:

DARRELL DUNN

DIV₂₀

B57

Manufacturer/Model:

FISHERBRAND/ERTCO 15-166A

Description: THERMOMETER

Serial Number:

C96-852

Asset Number:

005432

Environmental Conditions

Temperature: 79.00 Deg. F

Humidity:

37

% RH

Calibration Information

Calibration was in accordance with requirements of MIL-STD-45662A and ANSI/NCSL Z540-1-1994. Measurements are traceable to the National Institute of Standards and Technology (NIST). This report may not be reproduced except in full without written approval of the originator. Inspection and test data are on file and available for inspection.

The uncertainty of the calibration was sufficient to determine that the instrument met the manufacturer's specifications.

Calibration Date: 11 May 98

Calibration Procedure:

ASTM E77-89

Interval:

6

months

Next Calibration Due:

11 Nov 98

Received: In Tolerance

Remarks:

Standards Used

Asset	MFR	Model	Description	Serial No.	Due Cal
000219	AZONIX	A1011	RTD THERMOMETER	T1587-2078	16 Apr 99
000328	AZONIX	A12001	RTD TEMPERATURE PROBE	351477	27 Apr 99

LAST PAGE OF REPORT Total Pages Printed: 1

Certificate # 29651



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



Certificate of Calibration

19 January 1999

Issued to: DARRELL DUNN DIV20 B57 Manufacturer/Model: FISHERBRAND 15-166A

Description: THERMOMETER

Serial Number: C96-852 Asset Number: 005432

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: 73. Degrees Fahrenheit Humidity: 48 % RH

Calibration Date: 19 Jan 99 Calibration Procedure: ASTM E77-89

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Certificate # 32913 Page 1 of 1



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



Certificate# 0972-01

Certificate of Calibration

18 August 1999

Issued to:

DARRELL DUNN DIV20 B57 FISHER SCIENTIFIC 15-166A

Manufacturer/Model: Description:

THERMOMETER

Serial Number:

C96-852

Asset Number:

005432

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.

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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:

76.0 Degrees Fahrenheit

Humidity:

Calibration Date: 18 Aug 99

Calibration Procedure: CL-9 MAY 99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Measurements performed by:

Certificate # 35662

1 of 1

m:\a2la.rpt Rev date 10 Mar 99



6220 Culebra Road, P.O. Drawer 28510 Institute Quality Systems Institute Calibration Laboratory Phone: 210-522-5215 Fax 210-522-3692

Certificate of Calibration

Submitted By: DIV20 Address: B57

Contact: DARRELL DUNN

Manufacturer Model: FISHER SCIENTIFIC 15-166A

Description: THERMOMETER

Serial No: C96-852 **Asset No:** 005432

Procedure: CL-9, 5/99

Work Order: 444051361

Date Issued: Dec 18, 2002

Calibration Date: Dec 18, 2002

**Calibration Due: Jun 18, 2003

Calibration Location: N/A

Environment: Temp. 82.0°F Hum. 37 %RH

*As Found: IN TOLERANCE
*As Left: IN TOLERANCE

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 1999 and ANSI/NCSL Z540-1-1994 which are equivalent to relevant requirements of the ISO 9000-1994 series of standards. This certificate may not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. The results of this calibration relate only to the individual instrument described above. This certificate shall not be used to claim product endorsement by the American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government

Uncertainty evaluation includes the item under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor of k=2 to approximate a 95% confidence level. The calibration process provides a Test Uncertainty Ratio (TUR) of less than or equal to 25% (4:1) of the test limit unless otherwise stated in remarks or an attachment

- *The client has sole responsibility for determination of in/out of tolerance or compliance. An in/out of tolerance opinion is provided for your convenience based only on the Test Instrument (TI) reading(s) and limits as reported. The reported uncertainty relates only to the results at the time of calibration and does not imply any short or long term stability of the TI.
- **Calibration interval is determined by the client and does not assure the instrument will remain within tolerance until this date. Any number of factors may cause the instrument to be out of tolerance before the next calibration date.

Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
008920	HART SCIENTIFIC, INC	17660-A-120-6-W	PLATINUM RTD	Dec 31, 02
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Dec 31, 02

Approved by: Walt Hill Metrology Group Leader

m:\Nona2la1.rpt Rev date 15, August 02

Measurements by: Vince Morales

Metrology Technician

Work Order: 444051361 Mfr. FISHER SCIENTIFIC Technician Vmorales Model Asset No. 5432 15-166A Procedure CL-9 5/99 Serial No. C96-852 Туре. THERMOMETER Cal Date. 18-Dec-02 Remarks:

Function/Range	Test Point	TI Reading	Difference	Test Limits+/-	Uncertainty	Found/Left
Temperature	Deg C	Deg C	Deg C	Deg C	Deg C	Results
-20	-19.8	-19.9	-0.1	0.5	1.2	Pass
0	0.1	-0.1	-0.2	0.5	1.2	Pass
50	50.0	49.9	-0.1	0.5	1.2	Pass
100	99.9	99.9	0.0	0.5	1.2	Pass
150	150.0	150.0	0.0	0.5	1.2	Pass



6220 Culebra Road, P.O. Drawer 28510 Institute Quality Systems Institute Calibration Laboratory Phone: 210-522-5215 Fax 210-522-3692

Certificate of Calibration

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: FISHER SCIENTIFIC 15-166A

Description: THERMOMETER

Serial No: C96-852 **Asset No:** 005432

Procedure: TEMPERATURE, MAY/03

Work Order: 444053951

Date Issued: Jun 4, 2003

Calibration Date: Jun 3, 2003

**Calibration Due: Dec 3, 2003 Calibration Location: Bldg. 64

Environment: Temp. 74.0°F Hum. 49 %RH

*As Found: IN TOLERANCE
*As Left: IN TOLERANCE

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 1999 and ANSI/NCSL Z540-1-1994 which are equivalent to relevant requirements of the ISO 9000-1994 series of standards. This certificate may not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. The results of this calibration relate only to the individual instrument described above. This certificate shall not be used to claim product endorsement by the American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government.

Uncertainty evaluation includes the item under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor of k=2 to approximate a 95% confidence level. The calibration process provides a Test Uncertainty Ratio (TUR) of less than or equal to 25% (4:1) of the test limit unless otherwise stated in remarks or an attachment.

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**Calibration interval is determined by the client and does not assure the instrument will remain within tolerance until this date. Any number of factors may cause the instrument to be out of tolerance before the next calibration date.

Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
008920	HART SCIENTIFIC, INC	17660-A-120-6-W	PLATINUM RTD	Jul 06, 03
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Jul 06, 03

Approved by: Walt Hill Metrology Group Leader

m:\Nona2la1.rpt Rev date 15, August 02

11 ho_

Measurements by: Mark Romero

Metrology Technician

Southwest Research Institute Calibration laboratory Caibration Report

	Work Order:	444053951	Mfr.	Fisher Scientific	Technician	Mark Romero
	Asset No.	005432	Model	15-166A		
Pomorko:	Serial No.	C96-852	Туре.	THERMOMETER	Cal Date.	03-Jun-03
Remarks.	Remarks:					

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left_
Temperature	Deg C	Deg C	Deg C	Deg C	Deg C	Results
	-19.9	-20.0	-0.1	0.5	0.6	Pass
	0.1	0.0	-0.1	0.5	0.6	Pass
	50.0	50.0	0.0	0.5	0.6	Pass
	100.0	100.0	0.0	0.5	0.6	Pass
	150.0	149.5	-0.5 END OF REPORT	0.5	0.6	Pass



6220 Culebra Road, P.O. Drawer 28510 Institute Quality Systems Institute Calibration Laboratory Phone: 210-522-5215 Fax 210-522-3692



0972-01

Certificate of Calibration

Submitted By: DIV20

Address: B57
Contact: DARRELL DUNN

Manufacturer Model: FISHER SCIENTIFIC 15-166A

Description: THERMOMETER

Serial No: C96-852 **Asset No:** 005432

Procedure: TEMPERATURE, MAY/03

Work Order: 444056808

Date Issued: Jan 8, 2004

Calibration Date: Jan 7, 2004 **Calibration Due: Jul 7, 2004

Calibration Location: Bldg. 64

Environment: Temp. 76.0°F Hum. 31 %RH

*As Found: IN TOLERANCE *As Left: IN TOLERANCE

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 1999 and ANSI/NCSL Z540-1-1994 which are equivalent to relevant requirements of the ISO 9000-1994 series of standards. This certificate may not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. The results of this calibration relate only to the individual instrument described above. This certificate shall not be used to claim product endorsement by the American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government.

Uncertainty evaluation includes the item under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor of k=2 to approximate a 95% confidence level. The calibration process provides a Test Uncertainty Ratio (TUR) of less than or equal to 25% (4:1) of the test limit unless otherwise stated in remarks or an attachment.

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**Calibration interval is determined by the client and does not assure the instrument will remain within tolerance until this date. Any number of factors may cause the instrument to be out of tolerance before the next calibration date.

Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
008920	HART SCIENTIFIC, INC	5614-17660-A-12	PLATINUM RTD	Feb 07, 04
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Feb 05, 04

Approved by: Walt Hill Metrology Group Leader m\a2la1.rpt Rev date 15, August 02 Measurements by: Mark Romero

Metrology Technician

Southwest Research Institute Calibration laboratory Caibration Report

	Work Order:	444056808	Mfr.	Fisher-Scientific	Technician	Mark Romero
	Asset No.	005432	Model	15-166A		
Domarke	Serial No.	C96-852	Type.	THERMOMETER	Cal Date.	07-Jan-04
Nemarks.	Remarks:					

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Temperature	Deg C	Deg C	Deg C	Deg C	Deg C	Result
	-19.9	-19.8	0.1	0.5	0.6	Pass
	0.1	0.4	0.3	0.5	0.6	Pass
	50.0	50.4	0.4	0.5	0.6	Pass
	100.0	100.3	0.3	0.5	0.6	Pass
	149.9	150.0 END O	0.1 F REPORT	0.5	0.6	Pass



6220 Culebra Road, P.O. Drawer 28510 Institute Quality Systems Institute Calibration Laboratory Phone: 210-522-5215 Fax 210-522-3692



0972-01

Certificate of Calibration

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: FISHER SCIENTIFIC 15-166A

Description: THERMOMETER Serial No: C96-852

Asset No: 005432

Procedure: TEMPERATURE, JAN/04

Work Order: 444059295

Date Issued: Jun 8, 2004

Calibration Date: Jun 8, 2004

**Calibration Due: Dec 8, 2004

Calibration Location: Bldg. 64

Environment: Temp. 74.0°F Hum. 50 %RH

*As Found: IN TOLERANCE

*As Left: IN TOLERANCE

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 1999 and ANSI/NCSL Z540-1-1994 which are equivalent to relevant requirements of the ISO 9000-1994 series of standards. This certificate may not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. The results of this calibration relate only to the individual instrument described above. This certificate shall not be used to claim product endorsement by the American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government.

Uncertainty evaluation includes the item under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor of k=2 to approximate a 95% confidence level. See Remarks or attached Calibration Report with the same Work Order number for calibration data.

- *The client has sole responsibility for determination of in/out of tolerance or compliance/noncompliance. An in/out of tolerance opinion is provided for your convenience based only on the Test Instrument (TI) reading(s) and limits as reported. The reported uncertainty relates only to the results at the time of calibration and does not imply any short or long term stability of the TI.
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Remarks: None

Standards Used

	000			
Asset	Manufacturer	Model	Description	Cal Due
009137	HART SCIENTIFIC	1575	THERMOMETER	Sep 05, 04
008920	HART SCIENTIFIC	5614-17660-A-12	PLATINUM RTD	Sep 09, 04

Approved by: Walt Hill Metrology Group Leader m:\a2la1.rpt Rev date 11, May 04 Measurements by:

Metrology Technician

Southwest Research Institute Calibration Laboratory Caibration Report

Serial No. C96-852 Type. THERMOMETER Cal Date. 08-Ju				Mfr.	444059295	Work Order:
1.750 1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.			15-166A	Model	005432	Asset No.
	8-Jun-04	Cal Date.	THERMOMETER	Туре.	C96-852	Serial No.
Remarks:						Remarks:

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Temperature	Deg C	Deg C	Deg C	Deg C	Deg C	Result
-20	-19.8	-20.0	-0.2	0.5	0.58	Pass
0	0.1	0.2	0.1	0.5	0.58	Pass
50	50.0	50.0	0.0	0.5	0.58	Pass
100	100.0	100.2	0.2	0.5	0.58	Pass
150	150.1	150.1 END O	0.0 F REPORT	0.5	0.58	Pass



6220 Culebra Road, P.O. Drawer 28510 Institute Quality Systems Institute Calibration Laboratory Phone: 210-522-5215 Fax 210-522-3692



0972-01

Certificate of Calibration

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: FISHER SCIENTIFIC 15-166A

Description: THERMOMETER

Serial No: C96-852

Asset No: 005432

Procedure: TEMPERATURE, JAN/04

Work Order: 444062194

Date Issued: Jan 10, 2005

Calibration Date: Jan 10, 2005

**Calibration Due: Jul 10, 2005

Calibration Location: Bldg. 64

Environment: Temp. 73.0°F Hum. 40 %RH

*As Found: IN TOLERANCE
*As Left: IN TOLERANCE

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 1999 and ANSI/NCSL Z540-1-1994 which are equivalent to relevant requirements of the ISO 9000-1994 series of standards. This certificate may not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. The results of this calibration relate only to the individual instrument described above. This certificate shall not be used to claim product endorsement by the American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government

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- *The client has sole responsibility for determination of in/out of tolerance or compliance. An in/out of tolerance opinion is provided for your convenience based only on the Test Instrument (TI) reading(s) and limits as reported. The reported uncertainty relates only to the results at the time of calibration and does not imply any short or long term stability of the TI.
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Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
009414	HART SCIENTIFIC	1502A	TEMPERATURE READOUT	Mar 30, 05
010692	HART SCIENTIFIC	5618	PLATINUM RTD	Feb 16, 05

Approved by: Walt Hill Metrology Group Leader m:\a2la1.rpt Rev date 11, May 04 - Di

Measurements by: Bob Trollinger

Metrology Technician

Southwest Research Institute Calibration Laboratory Measurement Report

Work Order:	444062194	Mfr.	Fisher-Scientific	Technician	blt	
Asset No.	005432	Model	15-166A (ASTM 1C)			
Serial No.	C96-852	Type.	THERMOMETER	Cal Date.	10-Jan-05	
Remarks:	Accuracy Reference ANSI Z236.1-1983					

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Temperature	°C	°C	°C	°C	°C	Result
•	-18.9	-19.0	-0.1	0.5	0.12	Pass
	0.1	0.5	0.4	0.5	0.12	Pass
	50.0	50.3	0.3	0.5	0.12	Pass
	100.0	100.5	0.5	0.5	0.12	Pass
	150.0	150.0	0.0	0.5	0.12	Pass
		END O	F REPORT			