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

Accredited

Certificate # 0972-01

Certificate of Calibration

6 May 1999

Issued to:	DARRELL DUNN DIV20 B57
Manufacturer/Model:	ERTCO 76MM 1MM
Description:	THERMOMETER
Serial Number:	F98-393
Asset Number:	007304

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: 75.0 Degrees Fahrenheit Humidity: 57 % RH

Calibration Date: 5 May 99 **Calibration Procedure:** TO33K5-4-42-1 APR97

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor or Walt Hill, Metrologist

Measurements performed by:

Mack Wood, Technician

Certificate # 34364

m:\a2la.rpt Rev date 10 Mar 99

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

Certificate of Calibration

11 July 2002

Issued to:	DARRELL DUNN DIV20 B57
Manufacturer/Model:	ERTCO ASTM 1C
Description:	THERMOMETER
Serial Number:	F98-393
Asset Number:	007304
Work Order Number:	444049282

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: 81.0 Degrees Fahrenheit Humidity: 42 % RH

Calibration Date: 9 Jul 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:

Vince Morales, Technician

Southwest Research Institute
Calibration laboratory
Calibration Sheet.

Work Order:	**444049282**	**Mfr.**	ERTCO	**Technician**	V.Morales
Asset No.	**7304**	**Model**	ASTM-1C	**Procedure**	CL-9 5/99
Serial No.	**F98-393**	**Type.**	THERMOMETER	**Cal Date**	7/9/02

Function/Range	Standard	TI Reading	Difference (1)	Test Limits+/-	Results
Temperature	**Deg. C**	**Deg. C**	**Deg. C**	**Deg. C**	
-20	**-19.83**	**-20.00**	-0.17	1.00	Pass
0	**0.10**	**0.30**	0.20	1.00	Pass
50	**49.99**	**50.00**	0.01	1.00	Pass
100	**99.90**	**100.00**	0.10	1.00	Pass
150	**149.92**	**150.00**	0.08	1.00	Pass
0	**-0.18**	**0.20**	0.38	1.00	Pass

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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	**Work Order:**	444052326
Address:	B57	**Date Issued:**	Feb 12, 2003
Contact:	DARRELL DUNN	**Calibration Date:**	Feb 11, 2003
Manufacturer Model:	ERTCO ASTM 1C	****Calibration Due:**	Aug 11, 2003
Description:	THERMOMETER	**Calibration Location:**	Bldg. 64
Serial No:	F98-393	**Environment:**	Temp. 79.0°F Hum. 45 %RH
Asset No:	007304	***As Found:**	IN TOLERANCE
Procedure:	THERMOMETERS, JAN 03	***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/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.

**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
009414	HART SCIENTIFIC, INC	1502A	TEMPERATURE READOUT	Jul 06, 03
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Jul 06, 03

Approved by: Walt Hill
Metrology Group Leader

Measurements by: Mark Romero
Metrology Technician

Southwest Research Institute
Calibration laboratory
Measurement Record

Work Order:	444052326	Mfr.	Ertco	Technician	Mark Anthony Romero
Asset No.	007304	Model	ASTM 1C		
Serial No.	F98-393	Type.	THERMOMETER	Cal Date.	11-Feb-03
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	-19.86	-20.10	-0.24	1.00	1.2	Pass
0	-0.11	0.10	0.21	1.00	1.2	Pass
50	49.99	49.90	-0.09	1.00	1.2	Pass
100	99.98	100.00	0.02	1.00	1.2	Pass
150	149.93	149.90	-0.03	2.00	1.2	Pass

END OF REPORT

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Institute Quality Systems
Institute Calibration Laboratory
Phone: 210-522-5215 Fax 210-522-3692

Certificate of Calibration

Submitted By:	DIV20	**Work Order:**	444055166
Address:	B57	**Date Issued:**	Sep 5, 2003
Contact:	DARRELL DUNN	**Calibration Date:**	Sep 2, 2003
Manufacturer Model:	ERTCO ASTM 1C	****Calibration Due:**	Mar 2, 2004
Description:	THERMOMETER	**Calibration Location:**	Bldg. 64
Serial No:	F98-393	**Environment:**	Temp. 75.0°F Hum. 48 %RH
Asset No:	007304	***As Found:**	IN TOLERANCE
Procedure:	TEMPERATURE, MAY/03	***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/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.

**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
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Feb 05, 04
008920	HART SCIENTIFIC, INC	17660-A-120-6-W	PLATINUM RTD	Feb 07, 04

Approved by: Walt Hill
Metrology Group Leader

Measurements by: Mark Romero
Metrology Technician

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

Southwest Research Institute
Calibration laboratory
Caibration Report

Work Order:	444055166	Mfr.	Ertco	Technician	Mark Romero
Asset No.	007304	Model	ASTM 1C		
Serial No.	1709	Type.	THERMOMETER	Cal Date.	02-Sep-03
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	0.2	0.1	0.5	0.6	Pass
	49.9	50.0	0.1	0.5	0.6	Pass
	99.9	100.2	0.3	0.5	0.6	Pass
	149.8	150.0	0.2	0.5	0.6	Pass

END OF REPORT

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Certificate #
0972-01

Certificate of Calibration

Submitted By:	DIV20	**Work Order:**	444057980
Address:	B57	**Date Issued:**	Mar 10, 2004
Contact:	DARRELL DUNN	**Calibration Date:**	Mar 10, 2004
Manufacturer Model:	ERTCO ASTM 1C	****Calibration Due:**	Sep 10, 2004
Description:	THERMOMETER	**Calibration Location:**	Bldg. 64
Serial No:	F98-393	**Environment:**	Temp. 80.0°F Hum. 27 %RH
Asset No:	007304	***As Found:**	IN TOLERANCE
Procedure:	TEMPERATURE, MAY/03	***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/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.

**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
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 15, August 02

Measurements by: Mark Romero
Metrology Technician

Southwest Research Institute
Calibration laboratory
Caibration Report

Work Order:	444057980	Mfr.	Ertco	Technician	Mark Romero
Asset No.	007304	Model	ASTM 1C		
Serial No.	F98-393	Type.	THERMOMETER	Cal Date.	10-Mar-04
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	-20.0	-0.1	0.5	0.6	Pass
	0.1	0.0	-0.1	0.5	0.6	Pass
	50.0	49.9	-0.1	0.5	0.6	Pass
	100.0	99.9	-0.1	0.5	0.6	Pass
	150.1	149.8	-0.3	0.5	0.6	Pass

END OF REPORT

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Certificate #
0972-01

Certificate of Calibration

Submitted By:	DIV20	**Work Order:**	444060618
Address:	B57	**Date Issued:**	Sep 10, 2004
Contact:	DARRELL DUNN	**Calibration Date:**	Sep 10, 2004
Manufacturer Model:	ERTCO ASTM 1C	****Calibration Due:**	Mar 10, 2005
Description:	THERMOMETER	**Calibration Location:**	Bldg. 64
Serial No:	F98-393	**Environment:**	Temp. 73.0°F Hum. 40 %RH
Asset No:	007304	***As Found:**	IN TOLERANCE
Procedure:	TEMPERATURE, JAN/04	***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.

**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
009137	HART SCIENTIFIC	1575	THERMOMETER	Sep 25, 04
008920	HART SCIENTIFIC	5614-17660-A-12	PLATINUM RTD	Sep 25, 04

Approved by: Walt Hill
Metrology Group Leader

Measurements by: Bob Trollinger
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	444060618	Mfr.	Fisher-Scientific	Technician	blt
Asset No.	007304	Model	ASTM 1C		
Serial No.	F98-393	Type.	THERMOMETER	Cal Date.	10-Sep-04
Remarks:	Accuracy Referecnce ANSI Z236.1-1983				

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Temperature	Deg C	Deg C	Deg C	Deg C	Deg C	Result
-20	-19.9	-20.0	-0.1	0.5	0.12	Pass
0	0.1	0.0	-0.1	0.5	0.12	Pass
50	50.0	50.0	0.0	0.5	0.12	Pass
100	100.0	100.0	0.0	0.5	0.12	Pass
150	150.0	150.0	0.0	0.5	0.12	Pass

END OF REPORT