

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

WORK ORDER

CERTIFICATE # 27653 ASSET # 001997 DATE 20 Nov 97

ITEM DATA:

Manufacturer Omega Model AA 22  
Description Miniprocessor, thermometer Serial # 7-91146  
Accessories Logic & thermocouple adapter, Brown hp/ste

ACTION REQUESTED cal

CUSTODIAN Div. 20, Donald Dune

Turned in by: \_\_\_\_\_ Phone 6090

CHARGE # PO. 1402.511 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 as received

CAL ENVIRONMENT:  
Temperature 25 °F Humidity 40 ± 1 %RH

CALIBRATED/REPAIRED:  
By Donald Dune Cal Procedure 49 hrs. 14739A/0789  
Date 5 Dec 97 9 Dec 97 Accuracy 1% full scale  
Cal Interval 6 mos Reliability Code: 2  
Next Cal due 5 Jun 98 9 Dec 98 Cal Time 4.0 Repair Time \_\_\_\_\_  
Standards used (Asset#) 183, 2868

DATE COMPLETED 5 Dec 97 9 Dec 97  
DATE PICKED UP 12/16/97 PICKED UP BY Donald Dune

27653

CALIBRATION CHECK FORM 92297

WI-9-30-\_\_\_\_\_

Date Calibrated 5 DEC 97

Work Order 27653

Rev Chg

Technician SZK

CAL. PROCEDURE: INSTRUM # 4757A/0789

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Unit Under Test Microprocessor Thermometer

Manufacture Omega

Model H H 22

SN T-9440 ASN 1997

Step	Function or Range	Applied	Tolerance		Measured Values		P/F
			Min	Max	As Found	Released	
1.	Type K Thermocouple						
	$^{\circ}\text{F}$ , 0.1 $^{\circ}$ Resolution, Input T1						
	-5.822	-5.866 mV	-320 $^{\circ}\text{F} \pm 1.40$	1.40	<del>-318.0</del> -324.8	-318.6	F $\rightarrow$
		-4.381 mV	-200 $^{\circ}\text{F} \pm 1.28$	1.28	-200.3	-199.7	P
		-2.699 mV	-100 $^{\circ}\text{F} \pm 1.18$	1.18	-100.4	-99.9	P
		-0.909 mV	-10 $^{\circ}\text{F} \pm 1.09$	1.09	-10.4	-10.0	P
		-0.478 mV	+10 $^{\circ}\text{F} \pm 1.09$	1.09	9.6	10.1	P
		1.520 mV	100 $^{\circ}\text{F} \pm 1.18$	1.18	-99.4	99.9	P
		10.560 mV	500 $^{\circ}\text{F} \pm 1.58$	1.58	499.5	500.0	P
		22.257 mV	1000 $^{\circ}\text{F} \pm 2.08$	2.08	999.0	1000.5	P
		33.913 mV	1500 $^{\circ}\text{F} \pm 2.58$	2.58	1499.0	1499.9	P
		44.856 mV	2000 $^{\circ}\text{F} \pm 3.08$	3.08	1998.0	1999.2	P
		54.372 mV	2475 $^{\circ}\text{F} \pm 3.55$	3.55	2472.3	2473.9	P
	$^{\circ}\text{C}$ , 0.1 $^{\circ}$ Resolution, Input T1						
		-5.815 mV	-195 $^{\circ}\text{C} \pm 0.79$	0.79	-195.1	-194.4	P
		-4.912 mV	-150 $^{\circ}\text{C} \pm 0.75$	0.75	-149.8	-149.5	P
		-3.553 mV	-100 $^{\circ}\text{C} \pm 0.70$	0.70	-100.1	-99.7	P
		-0.392 mV	-10 $^{\circ}\text{C} \pm 0.61$	0.61	-10.3	-9.9	P
		+0.397 mV	+10 $^{\circ}\text{C} \pm 0.61$	0.61	9.5	9.8	P
		+4.095 mV	100 $^{\circ}\text{C} \pm 0.70$	0.70	99.6	99.8	P
		20.640 mV	500 $^{\circ}\text{C} \pm 1.10$	1.10	499.5	499.8	P
		41.269 mV	1000 $^{\circ}\text{C} \pm 1.40$	1.40	999.1	999.7	P
		54.637	1365 $^{\circ}\text{C} \pm 1.96$	1.96	1363.6	1364.2	P

CALIBRATION CHECK FORM 9 DEC 97

WI-9-30-          
Rev          Chg         

Date Calibrated 5 DEC 97 Work Order 27653

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Technician 8214 CAL. PERSONNEL: MRS. ANN #173940789

Unit Under Test MICROPROCESSOR 7701104662

Manufacture OMEGA Model HA22 SN 194140 ASN 1997

Step	Function or Range	Applied	Tolerance		Measured Values		P/F
			Min	Max	As Found	Released	
2	Type J Thermo couple						
	<sup>°F</sup> , 0.1° Resolution, Input T1						
		-8.030mv	-340°F ± 1.42		-342.1	-341.3	F
		-7.519mv	-300°F ± 1.38		-301.8	-300.6	F
		-5.760mv	-200°F ± 1.28		-201.5	-200.7	F
		-3.492mv	-100°F ± 1.18		-101.3	-100.5	F
		-1.158mv	-10°F ± 1.09		-11.1	-10.6	F
		-0.611mv	+10°F ± 1.09		8.9	9.9	F
		1.942mv	100°F ± 1.18		98.9	99.7	P
		4.906mv	200°F ± 1.28		199.1	200.0	P
		7.947mv	300°F ± 1.38		298.9	299.7	P
		11.023mv	400°F ± 1.48		398.7	399.8	P
		14.108mv	500°F ± 1.58		499.0	499.8	P
		17.186mv	600°F ± 1.68		598.7	599.7	P
		20.253mv	700°F ± 1.78		698.8	699.7	P
		21.985mv	750°F ± 1.83		748.7	749.6	P
	<sup>°C</sup> , 0.1° Resolution, Input T1						
		-7.890mv	-200°C ± 0.80		-201.2	-200.2	F
		-4.632mv	-100°C ± 0.70		-100.7	-100.2	P
		-0.501mv	-10°C ± 0.61		-10.6	-10.1	P
		0.507mv	+10°C ± 0.61		9.3	9.7	F
		5.268mv	100°C ± 0.70		99.3	99.8	P
		27.388mv	500°C ± 1.10		499.2	499.8	P
		33.096mv	600°C ± 1.20		598.9	599.6	P
		42.602mv	755°C ± 1.35		754.2	754.6	P

**CALIBRATION CHECK FORM**

WI-9-30-\_\_\_\_\_

Date Calibrated 9 DEC 97

Work Order 27653

Rev \_\_\_\_\_ Chg \_\_\_\_\_

Technician 8216 CAL Procedure: NIB, Rev #478946789

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Unit Under Test MICRO PROCESSOR THERMOMETER

Manufacture OMEGA Model HH22 SN 794140 ASN 1997

Step	Function or Range	Applied	Tolerance		Measured Values		P/F
			Min	Max	As Found	Released	
2	Type J Thermocouple						
	<sup>°F</sup> , 0.1° Resolution, Input T2						
		-8.030mv	-340°F ± 1.42		-341.4	-340.9	P
		-7.519mv	-300°F ± 1.38		-301.1	-300.8	P
		-5.760mv	-200°F ± 1.28		-250.9	-200.9	P
		-3.492mv	-100°F ± 1.18		-100.6	-100.7	P
		-1.158mv	-10°F ± 1.09		-10.6	-10.4	P
		-0.611mv	+10°F ± 1.09		9.7	9.7	P
		1.942mv	100°F ± 1.18		99.6	99.6	P
		4.906mv	200°F ± 1.28		199.8	199.7	P
		7.947mv	300°F ± 1.38		299.6	299.5	P
		11.023mv	400°F ± 1.48		399.6	399.7	P
		14.108mv	500°F ± 1.58		499.7	499.8	P
		17.186mv	600°F ± 1.68		599.6	599.8	P
		20.253mv	700°F ± 1.78		699.6	699.7	P
		21.785mv	750°F ± 1.83		749.5	749.7	P
	<sup>°C</sup> , 0.1° Resolution, Input T2						
		-7.890mv	-200°C ± 0.80		-200.2	-200.4	P
		-4.632mv	-100°C ± 0.70		-100.2	-100.2	P
		-0.501mv	-10°C ± 0.61		-10.1	-10.2	P
		0.507mv	+10°C ± 0.61		9.6	9.7	P
		5.268mv	100°C ± 0.70		99.7	99.8	P
		27.388mv	500°C ± 1.10		499.7	499.7	P
		33.096mv	600°C ± 1.20		599.3	599.7	P
		42.602mv	755°C ± 1.35		754.3	754.7	P

CALIBRATION CHECK FORM

WI-9-30-

Date Calibrated 9 Dec 97

Work Order 27653

Rev      Chg     

Technician 8216

Cal. Procedure: NIST Manual 1010A

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Unit Under Test Microprocessor Thermometer

Manufacture Omega

Model H 6 22

SN 79140 ASN 1997

Step	Function or Range	Applied	Tolerance		Measured Values		P/F
			Min	Max	As Found	Released	
1.	Type K Thermocouple						
	$^{\circ}\text{F}$ , 0.1 $^{\circ}$ Resolution, Input T2						
		-5.822mV	-320 $^{\circ}\text{F} \pm 1.40$	-318.8	-319.1		P
		-4.381mV	-200 $^{\circ}\text{F} \pm 1.28$	-199.6	-199.4		P
		-2.699mV	-100 $^{\circ}\text{F} \pm 1.18$	-100.2	-99.7		P
		-0.909mV	-10 $^{\circ}\text{F} \pm 1.09$	-10.1	-10.2		P
		-0.478mV	+10 $^{\circ}\text{F} \pm 1.09$	9.9	9.7		P
		1.520mV	100 $^{\circ}\text{F} \pm 1.18$	99.5	99.8		P
		10.560mV	500 $^{\circ}\text{F} \pm 1.58$	499.9	500.0		P
		22.251mV	1000 $^{\circ}\text{F} \pm 2.08$	999.2	999.7		P
		33.913mV	1500 $^{\circ}\text{F} \pm 2.58$	1499.3	1499.1		P
		44.856mV	2000 $^{\circ}\text{F} \pm 3.08$	1998.3	1998.6		P
		54.372mV	2475 $^{\circ}\text{F} \pm 3.56$	2472.8	2472.8		P
	$^{\circ}\text{C}$ , 0.1 $^{\circ}$ Resolution, Input T2						
		-5.818mV	-195 $^{\circ}\text{C} \pm 0.79$	-194.5	-194.5		P
		-4.912mV	-150 $^{\circ}\text{C} \pm 0.75$	-149.8	-149.5		P
		-3.553mV	-100 $^{\circ}\text{C} \pm 0.70$	-99.9	-99.7		P
		-0.392mV	-10 $^{\circ}\text{C} \pm 0.61$	-10.1	-10.1		P
		+0.597mV	+10 $^{\circ}\text{C} \pm 0.61$	9.6	9.7		P
		+4.095mV	100 $^{\circ}\text{C} \pm 0.70$	99.6	99.8		P
		20.640mV	500 $^{\circ}\text{C} \pm 1.10$	499.7	499.9		P
		41.269mV	1000 $^{\circ}\text{C} \pm 1.40$	999.3	999.3		P
		54.637	1365 $^{\circ}\text{C} \pm 1.96$	1363.5	1364.0		P

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

WORK ORDER

CERTIFICATE # 33572 ASSET # 001997 DATE 05 MARCH 99

ITEM DATA:

Manufacturer Omron Model H422  
Description microprocessor + honometer Serial # T-99140  
Accessories tip & plug  
ACTION REQUESTED cal

CUSTODIAN Dr. D. Daniel Dunn

Turned in by: \_\_\_\_\_ Phone 6040

CHARGE # 20-440571 OH 03/2 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 MCS Date 13-05-99

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) See Reverse side

CAL ENVIRONMENT: Temperature 74 °F Humidity 30 %RH

CALIBRATED/REPAIRED:  
By Mirale Cal Procedure I.O. 33KS-4-282-1 30 OCT 97  
Date 31 MAR 99 Accuracy MFG  
Cal Interval 6 Reliability Code: -3  
Next Cal due 30 Sep 00 Cal Time 1.0 Repair Time 2.0  
Standards used (Asset#) 4164, 2868

DATE COMPLETED \_\_\_\_\_  
DATE PICKED UP 5/4/99 PICKED UP BY [Signature]

33572

## WORK ORDER HISTORY

DATE	START	CAL	REP	REMARKS:
	STOP			
3/30/99		✓		Adjustment Required failed at -200°C 2 hr.
4/13/99				Spoke with D. Dunn about the out of tolerance condition. Provided him with information for repair of the item and or replacement cost. Because of where the out of tolerance existed, he did not have a problem with the UUT AND therefore has suggested to continue calibrating the UUT every six mo.
TOTAL CAL/REPAIR				TOTAL HOURS _____

CALIBRATION CHECK FORM

Date Calibrated 31 MAR 99 Work Order 33572  
 Technician Vincent Morales Calibration Procedure T.O. 33KS-4-282-1  
 Unit Under Test Microprocessor Thermometer  
 Manufacturer FLUKE-OMEGA Model HH22 SN T-94140 ASN 1997

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
4.1	Temperature Calibration						
	Type "K" Thermocouple						
	T1 °C -5.891mV	-200°C	-199.2	-200.8	-199.0	-199.6	F
	-1.889mV	-50°C	-49.3	-50.6	-49.8	-50.1	P
	4.096mV	100°C	99.3	100.3	100.0	99.7	P
	12.209mV	300°C	299.1	300.9	300.1	299.8	P
	29.129mV	700°C	+698.7	+701.3	700.0	699.6	P
	52.410mV	1300°C	1298.1	1301.9	1299.6	1299.1	P
4.1.6	Ambient room Temperature °F	(74°F)	±.1% of Rdg + 1°F		73.9	73.6	P
4.1.11	Temperature Calibration						
	Type "K" Thermocouple						
	T2 °C -5.891mV	-200°C	-199.2	-200.8	-199.0	-199.6	F
	-1.889mV	-50°C	-49.3	-50.6	-49.9	-50.0	P
	4.096mV	100°C	99.3	100.3	100.0	99.7	P
	12.209mV	300°C	299.1	300.9	300.2	299.8	P
	29.129mV	700°C	+698.7	+701.3	700.0	699.6	P
	52.410mV	1300°C	1298.1	1301.9	1299.6	1298.9	P
	Ambient room Temperature °F	(74)	±.1% of Rdg + 1°F		73.9	73.6	P



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

WORK ORDER

WORK ORDER # 37102 ASSET # 001997 DATE 09 Dec. 99

ITEM DATA:

Manufacturer Omni Model 1H 99  
Description Microprocessor Ther Memory Serial # T-94140  
Accessories holster

ACTION REQUESTED Cal

CUSTODIAN M. J. O. 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 MAD Date 12-09-99

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) Checked battery

CAL ENVIRONMENT:  
Temperature 71 °F Humidity 28 %RH

CALIBRATED/REPAIRED:  
By U. Morlock Cal Procedure CL-26, MAY 99  
Date 15 Dec 99 Accuracy Mfg  
Cal Interval 6 Reliability Code 1  
Next Cal Due 15 Jun 00 Cal Time 2.0 Repair Time \_\_\_\_\_  
Standards used (Asset #) 182, 4528, 4965

DATE COMPLETED 15 Dec 99  
DATE PICKED UP 12/31/99 PICKED UP BY Darrell D

37102

CALIBRATION CHECK FORM

Date Calibrated 15 Dec 99 Work Order 37102 Cal By UMoral

Procedure No./Date: CL-26, MAY 99 Unit Under Test: MICROPROCESSOR THERMOMETER

Mfg: OMEGA Model: HH22 SN T-94140 AN 1997

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
4.1	TEMPERATURE						
	CALIBRATION						
	TYPE J-TC	T1	°C				
	-210 TO 760 DEG.C						
	-7.890mV	-200°C	-199.2	-200.8°C	-200.4°C		Pass
	-2.431mV	-50°C	-49.3	-50.7°C	-50.2°C		
	5.269mV	100°C	99.3	100.7°C	99.8°C		
	16.327mV	300°C	299.1	300.9°C	299.7°C		
	39.132mV	700°C	698.7	701.3°C	699.6°C		
4.1.8	AMBIENT ROOM						
	TEMPERATURE						
		(74.6)°F	+/- (1% + 1 °F)		<sup>NIM</sup> 23.5° 74.3°F		
	TEMPERATURE						
	CALIBRATION						
	TYPE J-TC	T2	°C				
	-210 TO 760 DEG.C						
	-7.890mV	-200°C	-199.2	-200.8°C	-200.4°C		V
	-2.431mV	-50°C	-49.3	-50.7°C	-50.1°C		
	5.269mV	100°C	99.3	100.7°C	99.8°C		
	16.327mV	300°C	299.1	300.9°C	299.7°C		
	39.132mV	700°C	698.7	701.3°C	699.6°C		

CALIBRATION CHECK FORM

Date Calibrated 15 Dec 99 Work Order 37102 Cal By UMorab

Procedure No./Date: CL-26, MAY 99 Unit Under Test: **MICROPROCESSOR THERMOMETER**

Mfg: OMEGA Model: HH22 SN T-94140 AN 1997

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE	MEASURED VALUES		P/F
			MIN - MAX	AS FOUND	RELEASED	
	AMBIENT ROOM					
	TEMPERATURE					
		(74.8)°F	+/- (1% + 1 °F)	75.2		Pass



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

15 December 1999

**Issued to:** DARRELL DUNN DIV20 B57  
**Manufacturer/Model:** OMEGA HH22  
**Description:** MICROPROCESSOR THERMOMETER  
**Serial Number:** T-94140  
**Asset Number:** 001997

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NC SL 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: 71.0 Degrees Fahrenheit Humidity: 28 % RH

**Calibration Date:** 15 Dec 99 **Calibration Procedure:** CL-26, MAY 99

**Condition as Received:** IN TOLERANCE

**Condition as Released:** IN TOLERANCE

**Remarks:**

**Approved by:**

Jim Patterson, Supervisor, or Walt Hill, Metrologist

**Certificate # 37102**

m:\a2la.rpt Rev date 14 Dec 99

**Measurements performed by:**

Vince Morales, Technician

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# SOUTHWEST RESEARCH INSTITUTE

## Calibration Laboratory

### WORK ORDER

Processed by JIBARRA at 8:35:03AM on 1/12/01



Work Order **444042030**

Arrived 1/12/01

Asset No. 001997 Manufacturer OMEGA

Model HH22

Instrument Type/Class MICROPROCESSOR THERMOMETER

Serial No. T-94140

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 DARRELL DUNN/ X6090

**IN4CAL**

Special Instructions \_\_\_\_\_

### WORK NOTES

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

### REPAIR PARTS

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

444042030

### WORK SUMMARY

Failure Description \_\_\_\_\_

Repair Action \_\_\_\_\_

Calibration Procedure CL 26, MAY 99 Temp 72 F Hum. 36 %

Tech UMoral Totals Cal Hours 1.0 Repair Hours \_\_\_\_\_ Parts Cost \_\_\_\_\_  
1.8

Standards Used 4164, 4528, 1505, 8209

Date Picked Up 2/23/01 Picked Up By [Signature]

**CALIBRATION CHECK FORM**

Date Calibrated 15 JAN 01

Work Order 444042030

Cal By V. Morale

Procedure No./Date: CL-26, MAY 99

Unit Under Test: MICROPROCESSOR THERMOMETER

Mfg: OMEGA

Model: HH22

SN T-94140 AN 1997

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
4.1	TEMPERATURE						
	CALIBRATION						
	TYPE J-TC	T1	°C				
	-210 TO 760 DEG.C						
	-7.890mV	-200°C	-199.2	-200.8°C	-199.0°C	-200.1°C	F
	-2.431mV	-50°C	-49.3	-50.7°C	-49.5°C	-50.0°C	
	5.269mV	100°C	99.3	100.7°C	100.4°C	100.0°C	
	16.327mV	300°C	299.1	300.9°C	300.3°C	299.9°C	
	39.132mV	700°C	698.7	701.3°C	700.2°C	699.8°C	
4.1.8	AMBIENT ROOM						
	TEMPERATURE	<u>77/78</u> <u>(25)°F</u>	+/- (1% + 1 °F)		<u>76.5</u>	<u>78.1</u>	
	TEMPERATURE						
	CALIBRATION						
	TYPE J-TC	T2	°C				
	-210 TO 760 DEG.C						
	-7.890mV	-200°C	-199.2	-200.8°C	-199.1°C	-199.9°C	F
	-2.431mV	-50°C	-49.3	-50.7°C	-49.5°C	-49.9°C	
	5.269mV	100°C	99.3	100.7°C	100.4°C	100.1°C	
	16.327mV	300°C	299.1	300.9°C	300.3°C	299.9°C	
	39.132mV	700°C	698.7	701.3°C	700.1°C	699.8°C	

CALIBRATION CHECK FORM

Date Calibrated 15 JAN 00 Work Order 444042036 Cal By UMaeb

Procedure No./Date: CL-26, MAY 99 Unit Under Test: MICROPROCESSOR THERMOMETER

Mfg: OMEGA Model: HH22 SN F94140 AN 1997

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE	MEASURED VALUES		P/F
			MIN - MAX	AS FOUND	RELEASED	
	AMBIENT ROOM					
	TEMPERATURE					
		( <u>77</u> ) <sup>78</sup> °F	+/- (1% + 1 °F)	76.3	78.1	

# SOUTHWEST RESEARCH INSTITUTE

6220 CULEBRA ROAD • POST OFFICE DRAWER 28510 • SAN ANTONIO, TEXAS, 78228-0510 • TEL (210) 522-5215 • FAX (210) 522-3692

**To:** Darrell Dunn, Div.20, Bldg. 57  
**From:** Walt Hill, Institute Calibration Laboratory Supervisor  
**CC:** Rodney Weber, Institute Quality Assurance Manager  
**Date:** Jan. 15, 01  
**Subject:** Out-of-tolerance Notice

The purpose of this notice is to alert you of a condition, which could have caused erroneous measurements. The as-found readings are provided for your evaluation to determine if the instrument had any impact on your operations and if further action is required. If we can be of assistance, please contact the Calibration Laboratory at 522-5215.

**Manufacturer:** Omega                      **Model:** HH22

**Description:** Microprocessor Thermometer                      **Serial Number:** T-94140

**Asset Number:** 1997                      **User ID Number:** None

**Last Calibration:** Dec. 15, 99

**Date Received for Service:** Jan. 12, 01                      **Work Order Number:** 444042030

**Service Requested:** Scheduled calibration

**Remarks:** None

## AS-FOUND DATA

PARAMETER OR FUNCTION	APPLIED OR NOMINAL VALUE	INSTRUMENT READING	INSTRUMENT ERROR	INSTRUMENT TOLERANCE
Temperature				
T1	-200 Deg.C.	-199.0Deg.C.	-1.0Deg.C.	0.8Deg.C.
T2	-200Deg.C.	-199.1Deg.C.	-0.9Deg.C.	0.8Deg.C.





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

15 January 2001

**Issued to:** DARRELL DUNN DIV20 B57  
**Manufacturer/Model:** OMEGA HH22  
**Description:** MICROPROCESSOR THERMOMETER  
**Serial Number:** T-94140  
**Asset Number:** 001997  
**Work Order Number:** 444042030

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: 36 % RH

**Calibration Date:** 15 Jan 01 **Calibration Procedure:** CL-26, MAY 99

**Condition as Received:** OUT OF 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 RCRUZ, 8/22/01 8:35:28AM



Arrived 8/22/01

Work Order **444044939**

Asset No. 001997 Manufacturer OMEGA

Model HH22

Instrument Type/Class DIGITAL THERMOMETER

Serial No. T-94140

Accessory No. Calibration Procedure CL-26, MAY 99

Location B57

Div/Client DIV20

Custodian DARRELL DUNN

Mail Stop B57

Tel. 6090

**IN4CAL**

Special Instructions \_\_\_\_\_

Notify before making adjustments or repairs.  Provide measurement readings

Charge/Project No. 00751.006 1.20

Requested By / Telephone

The above is correct for the work requested.

### WORK NOTES

SwRI Cal-Lab	By: vm
CAL: Jan 15, 01 DUE: Jul 15, 01	
AN: 001997 SN: T-94140	

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

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

**44939**

### WORK SUMMARY

Failure Description \_\_\_\_\_

Repair Action \_\_\_\_\_

Calibration Procedure N-26, May 99 Temp 72 F Hum. 38 %

Tech Mark Anthony Remora Totals Cal Hours \_\_\_\_\_ Repair Hours \_\_\_\_\_ Parts Cost \_\_\_\_\_

Standards Used 4905, 6413, 4528

Date Picked Up \_\_\_\_\_ Picked Up By \_\_\_\_\_



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

23 August 2001

**Issued to:** DARRELL DUNN DIV20 B57  
**Manufacturer/Model:** OMEGA HH22  
**Description:** DIGITAL THERMOMETER  
**Serial Number:** T-94140  
**Asset Number:** 001997  
**Work Order Number:** 444044939

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: 38 % RH

**Calibration Date:** 23 Aug 01 **Calibration Procedure:** CL-26, MAY 99

**Condition as Received:** IN TOLERANCE

**Condition as Released:** IN TOLERANCE

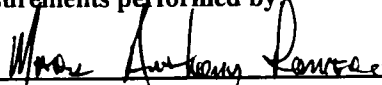
**Remarks:**

**Approved by:**

  
\_\_\_\_\_

Walt Hill, Supervisor  
Institute Calibration Laboratory

**Measurements performed by:**

  
\_\_\_\_\_

Mark Romero, Technician

## CALIBRATION CHECK FORM

Date Calibrated 23 August 2001 Work Order 444044939 Cal By Mark Anthony Romero

Procedure No./Date: CL-26, MAY 99 Unit Under Test: MICROPROCESSOR THERMOMETER

Mfg: OMEGA Model: HH22 SN T-94140 AN 001997

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
4.1	TEMPERATURE						
	CALIBRATION						
	TYPE J-TC	T1	°C				
	-210 TO 760 DEG.C						
	-7.890mV	-200°C	-199.2	-200.8°C	-200.3° C		P
	-2.431mV	-50°C	-49.3	-50.7°C	-50.1		P
	5.269mV	100°C	99.3	100.7°C	99.9		P
	16.327mV	300°C	299.1	300.9°C	299.8		P
	39.132mV	700°C	698.7	701.3°C	699.8		P
4.1.8	AMBIENT ROOM						
	TEMPERATURE						
		(75.7)°F	+/- (1% + 1 °F)		74.9° F		P
	TEMPERATURE						
	CALIBRATION						
	TYPE J-TC	T2	°C				
	-210 TO 760 DEG.C						
	-7.890mV	-200°C	-199.2	-200.8°C	-200.1° C		P
	-2.431mV	-50°C	-49.3	-50.7°C	-50.1		P
	5.269mV	100°C	99.3	100.7°C	99.9		P
	16.327mV	300°C	299.1	300.9°C	299.9		P
	39.132mV	700°C	698.7	701.3°C	699.8		P

# CALIBRATION CHECK FORM

Date Calibrated 23 August 2001 Work Order 444044939 Cal By Mark Anthony Romero

Procedure No./Date: CL-26, MAY 99 Unit Under Test: MICROPROCESSOR THERMOMETER

Mfg: OMEGA Model: HH22 SN T-94140 AN 001997

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
	AMBIENT ROOM						
	TEMPERATURE						
		( 75.6 )°F		+/(1% + 1 °F)	75.1		P

# SOUTHWEST RESEARCH INSTITUTE

## Calibration Laboratory

### WORK ORDER

Received by RCRUZ,3/18/02 11:22:36AM

1 10011 0011 0011 1001 1001 1001 1001 1001

Arrived 3/18/02

Work Order **444047711**

Asset No. 001997 Manufacturer OMEGA

Model HH22

Equipment Type DIGITAL THERMOMETER

Serial No. T-94140

Accessory No.

Interval 6 M

Calibration Procedure CL-26, MAY 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 \_\_\_\_\_

This information is correct for the work requested.

### WORK NOTES

Date	Hours	Remarks/Notes
<u>3/22/02</u>	<u>2.0</u>	<u>cal</u>

Date	Hours	Part Name	Part Number	Failure Description	Cost

### WORK SUMMARY

Failure Description OOT,

Repair Action recal

Tech RJk Cal Hrs. 2.0 Repair Hrs \_\_\_\_\_ Parts Cost \_\_\_\_\_ Temp 72 F Hum. 40 %

Standards Used GA13

Date Picked Up 4/16/02

Picked Up By Darrell Dunn

47711



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

## Certificate of Calibration

28 March 2002

**Issued to:** DARRELL DUNN DIV20 B57  
**Manufacturer/Model:** OMEGA HH22  
**Description:** DIGITAL THERMOMETER  
**Serial Number:** T-94140  
**Asset Number:** 001997  
**Work Order Number:** 444047711

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: 72.0 Degrees Fahrenheit Humidity: 40 % RH

**Calibration Date:** 22 Mar 02 **Calibration Procedure:** CL-26, MAY 99

**Condition as Received:** OUT OF TOLERANCE

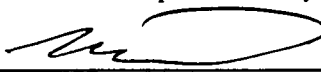
**Condition as Returned:** SEE ATTACHED DATA

**Remarks:** SEE AS LEFT DATA SHEET FOR DATA AND UNCERTAINTY.

Approved by:

  
Walt Hill, Metrology Group Leader  
Institute Calibration Laboratory

Measurements performed by:

  
Roger Dykstra, Technician

### CALIBRATION CHECK FORM

Date Calibrated 3/22/02 Work Order 444047711 Cal By R. Decker

Procedure No./Date: CL-26, MAY 99 Unit Under Test: MICROPROCESSOR THERMOMETER

Mfg: OMEGA Model: HH22 SN T 94140 AN 1997

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
4.1	TEMPERATURE						
	CALIBRATION						
	TYPE J-TC	T1	°C				
	-210 TO 760 DEG.C						
	-7.890mV	-200°C	-199.2	-200.8°C	-202.1	-200.4	F/P
	-2.431mV	-50°C	-49.3	-50.7°C	-51.0	-50.2	F/P
	5.269mV	100°C	99.3	100.7°C	99.3	99.8	P/P
	16.327mV	300°C	299.1	300.9°C	299.2	299.9	P/P
	39.132mV	700°C	698.7	701.3°C	699.0	699.9	P/P
4.1.8	AMBIENT ROOM						
	TEMPERATURE						
		( )°F	+/(1% + 1°F)		N/A	N/A	
	TEMPERATURE						
	CALIBRATION						
	TYPE J-TC	T2	°C				
	-210 TO 760 DEG.C						
	-7.890mV	-200°C	-199.2	-200.8°C	-202.1	-200.3	F/P
	-2.431mV	-50°C	-49.3	-50.7°C	-51.0	-50.1	F/P
	5.269mV	100°C	99.3	100.7°C	99.3	99.9	P/P
	16.327mV	300°C	299.1	300.9°C	299.2	299.9	P/P
	39.132mV	700°C	698.7	701.3°C	699.0	699.8	P/P



**CALIBRATION CHECK FORM**

Date Calibrated 3/22/02      Work Order AAA047711      Cal By R DeKor

Procedure No./Date: CL-26, MAY 99      Unit Under Test: MICROPROCESSOR THERMOMETER

Mfg: OMEGA      Model: HH22      SN T 941A0 AN 1999

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE	MEASURED VALUES		P/F
			MIN - MAX	AS FOUND	RELEASED	
	AMBIENT ROOM					
	TEMPERATURE					
		(     )°F	+/- (1% + 1 °F)		N/A	