

SOUTHWEST RESEARCH INSTITUTE

Department of Quality Assurance
Calibration Laboratory

CERTIFICATE OF CALIBRATION
07/24/95

Issued to: RON GREEN DIV20 ,B57
Manufacturer: PAROS
Nomenclature: PORTABLE PRESSURE GAUGE
Serial Number: 60999
Notes:

Asset Number: 003972
Model Number: 740
SwRI/Div. I.D. #:

ENVIRONMENTAL CONDITIONS

Temperature: 69.0F

Relative Humidity: 60%

CALIBRATION INFORMATION

Procedure Number: MFGR
Remarks: 40PSIA-40.0019, 20PSIA-20.0006, 10PSIA-9.99850
AND 0.0PSIA READ -0.00270PSIA(TOL+/-0.0045)

Accuracy: MFG
Received IN Tolerance

Calibration was in accordance with requirements of MIL-STD-45662A.
Measurements are traceable to the National Institute of Standards and Tech-
nology. Inspection and test data are on file and available for inspection.

STANDARDS USED FOR CERTIFICATION

Asset #	Serial #	Mfg	Model #	Nomenclature	Cal Date	Int.	Cal Due
004020	39955	RUSKA	6220	PRESSURE GAUGE	05/31/95	12	05/31/96

Certified by : 

Certificate#: 17762

Calibration Date: 07/21/95
Interval: 6 months
Next Calibration Due: 01/21/96

15 30# 7 1- + .01% FS

SPECIFICATION CONTROL DRAWING

STANDARD PRODUCT

DOC. NO. 7268-001

MODEL NO.	PART NO.	PRESSURE RANGE
215A-10X	1200-00X	0 TO 15 PSIA (0.10 MPa)
223A-10X	1201-00X	0 TO 23 PSIA (0.16 MPa)
230A-10X	1202-00X-0	0 TO 30 PSIA (0.21 MPa)
245A-10X	1203-00X-0	0 TO 45 PSIA (0.31 MPa)
2100A-10X	1204-00X-0	0 TO 100 PSIA (0.69 MPa)
2200A-10X	1205-00X-0	0 TO 200 PSIA (1.38 MPa)
2300A-10X	1206-00X-0	0 TO 300 PSIA (2.07 MPa)
2400A-10X	1207-00X-0	0 TO 400 PSIA (2.76 MPa)

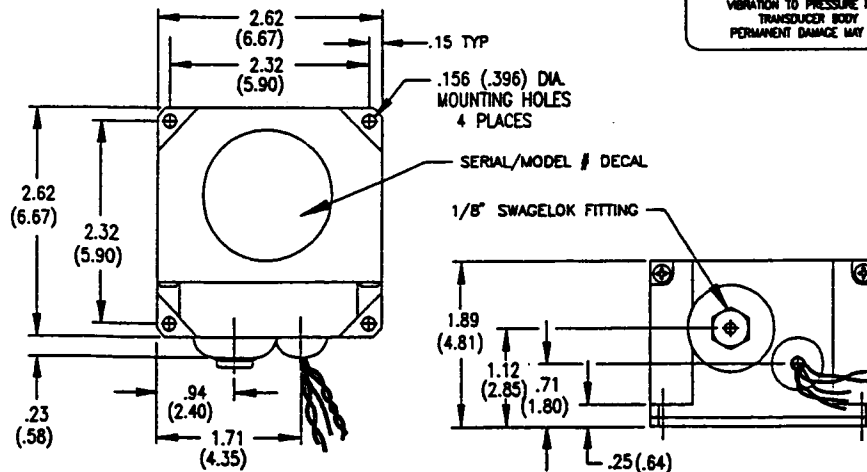
ADD '-0' FOR OIL FILLED
(EXCEPT 215A AND 223A)

-101 -001 FOR STAINLESS STEEL BUFFER TUBE
-102 -002 FOR NYLON BUFFER TUBE

PERFORMANCE

REPEATABILITY	≤ ±0.005% OF FULL SCALE
HYSTERESIS	≤ ±0.005% OF FULL SCALE
ACCELERATION SENSITIVITY	≤ ±0.0038% OF FULL SCALE/g
UNDER FULL SCALE PNEUMATIC PRESSURE LOAD:	≤ ±0.008% OF FULL SCALE/g WORST AXES
RESIDUAL TEMPERATURE SENSITIVITY USING COMPENSATION EQUATION PROVIDED	0.0008% FULL SCALE/DEG C
SUPPLY VOLTAGE SENSITIVITY	LESS THAN 0.001% FULL SCALE/V

CAUTION
DO NOT REMOVE FROM SHOCK MOUNT
HANDLE WITH EXTREME CARE
DO NOT TRANSMIT SHOCK OR EXCESSIVE
VIBRATION TO PRESSURE PORT OR
TRANSDUCER BODY
PERMANENT DAMAGE MAY RESULT



CHARACTERISTICS

PRESSURE SIGNAL IS A NOMINAL 10% FREQUENCY CHANGE WITHIN THE BAND 30 KHz TO 42 KHz
TEMPERATURE SIGNAL IS A NOMINAL 45 ppm/°C SENSITIVITY WITHIN THE BAND 168 KHz TO 172 KHz
WEIGHT 15 OUNCES (430 grams)
OPERATES FROM +8 Vdc MIN TO +25 Vdc MAX
RECOMMENDED INPUT VOLTAGE +8 Vdc
TYPICAL CURRENT CONSUMPTION AT +8 Vdc 1 mA
OUTPUT SIGNAL IS A NOMINAL SQUARE WAVE OF 4 VOLTS AMPLITUDE PEAK TO PEAK, CAPACITIVELY COUPLED WITH SOURCE IMPEDANCE LESS THAN 1000 OHMS.

ENVIRONMENTAL

OVERPRESSURE 1.2 TIMES FULL SCALE
CALIBRATED TEMPERATURE RANGE -54°C TO +107°C (-65°F TO 225°F)
IF TRANSDUCER IS OIL FILLED BY MANUFACTURER, MINIMUM OPERATING TEMPERATURE WILL BE -40°C (-40°F)
-0 UNIT BELLOWS AND INTERNAL TUBING ARE OIL FILLED UNDER VACUUM WITH DOW-CORNING FS 1285 FLUID. (SPECIFIC GRAVITY AT 25 DEG C = 1.25) (VISCOSITY AT 25 DEG C = 300 CENTISTOKES)
CAUTION: IF UNIT IS OIL FILLED, DO NOT APPLY VACUUM TO PRESSURE PORT. OIL COULD BE WITHDRAWN PERMITTING PRESSURE MEDIUM TO COME INTO CONTACT WITH SENSING ELEMENTS.

NOTES

- POWER GROUND AND SIGNAL GROUND ARE CONNECTED TO THE TRANSDUCER HOUSING THROUGH A .10 uF 50V CAPACITOR.
WIRING: POWER = RED
PRESSURE SIGNAL = BLUE/BLACK TW PR (BLK=GND)
TEMPERATURE SIGNAL = WHITE/BLACK TW PR (BLK=GND)
- IF THE TEMP SIGNAL IS NOT REQUIRED, CUT AND INSULATE BOTH WIRES OF THE BLACK/WHITE TWISTED PAIR.
- MAXIMUM TORQUE ON THE PRESSURE FITTING WHEN USING STAINLESS STEEL BUFFER TUBE TO BE 75 IN-LB (86 KG-CM). MAXIMUM TORQUE WHEN USING NYLON BUFFER TUBE TO BE 30 IN-LBS (34.5 KG-CM)
- DIMENSIONS ARE IN INCHES. (PARENTHEZIZED DIMENSIONS ARE IN CM)
- FOR PRESSURE RANGES UP TO 45 PSIA, PRESSURE MEDIUM MAY BE IN CONTACT WITH STAINLESS STEEL AND NICKEL. FOR REMAINING PRESSURE RANGES, PRESSURE MEDIUM MAY BE IN CONTACT WITH STAINLESS STEEL, GOLD, SOLDER AND NICKEL. IN OIL FILLED UNITS, THE PRESSURE MEDIUM MAY BE IN CONTACT WITH NYLON OR STAINLESS STEEL AND OIL.
- SEE SCD 7374-001 FOR STAINLESS STEEL BUFFER TUBE SPECIFICATION. SEE SCD 7373-001 FOR NYLON BUFFER TUBE SPECIFICATION.

DATE 8/91	ENG <i>[Signature]</i>	DATE 8/91	REV/DATE	DWN ML 6/94	ENG <i>[Signature]</i>	PAROSCIENTIFIC, INC.	TITLE: DIGIQUARTZ®	FILE:
CHK <i>[Signature]</i>	DATE 8/91	MFG	K	CHK	MFG <i>[Signature]</i>	4500 148th AVE NE REDMOND, WA 98052 206-883-8700 FAX: 206-867-5407	PRESSURE TRANSDUCER 2000 SERIES ABSOLUTE	\SCD\7268-001.DWG
QA	DATE	APPV	EO 4208	QA <i>[Signature]</i>	APP			SH. 1 OF 1

SPECIFICATION CONTROL DRAWING

STANDARD PRODUCT

DOC. NO. 7314-002

REFER TO APPROPRIATE SPECIFICATION CONTROL DRAWING BELOW FOR INTERNAL PRESSURE TRANSDUCER SPECIFICATIONS.

MODEL TYPES

MODEL NO.	PART NO.	PRESSURE RANGE
ABSOLUTE		
740-15A	1111-001	0 TO 15 PSIA (0.10 MPa)
740-23A	1111-002	0 TO 23 PSIA (0.16 MPa)
740-30A	1111-003*	0 TP 30 PSIA (0.21 MPa)
740-45A	1111-004*	0 TO 45 PSIA (0.31 MPa)
740-100A	1111-005*	0 TO 100 PSIA (0.69 MPa)
740-200A	1111-006*	0 TO 200 PSIA (1.38 MPa)
740-300A	1111-007*	0 TO 300 PSIA (2.07 MPa)
740-400A	1111-008*	0 TO 400 PSIA (2.76 MPa)
GAUGE		
740-15G	1111-010	0 TO 15 PSIG (0.10 MPa)
740-22G	1111-026	0 TO 22 PSIG (0.15 MPa)
740-30G	1111-011*	0 TO 30 PSIG (0.21 MPa)
740-100G	1111-012*	0 TO 100 PSIG (0.69 MPa)
740-150G	1111-027*	0 TO 150 PSIG (1.03 MPa)
740-200G	1111-013*	0 TO 200 PSIG (1.38 MPa)
HIGH PRESSURE		
740-1K	1111-024*	0 TO 1000 PSIA (6.900 MPa)
740-2K	1111-017*	0 TO 2000 PSIA (13.79 MPa)
740-3K	1111-018*	0 TP 3000 PSIA (20.68 MPa)
740-6K	1111-019*	0 TO 6000 PSIA (41.36 MPa)
740-10K	1111-020*	0 TO 10,000 PSIA (68.94 MPa)
740-15K	1111-021	0 TO 15,000 PSIA (103.0 MPa)
740-20K	1111-022	0 TO 20,000 PSIA (138.0 MPa)
740-30K	1111-023	0 TO 30,000 PSIA (207.0 MPa)
740-40K	1111-046	0 TO 40,000 PSIA (274.7 MPa)

* SUPPLIED WITH HIP FITTING
PN 60-21HF4

ADD "0" FOR OIL FILLED (SEE NOTE 7)
(EXCEPT 15A, 23A, 15G AND GAUGE UNITS)

PRESSURE RANGE	DOCUMENT NO.
15 TO 400 PSIA	7268-001
15 TO 200 PSIG	7239-001
1000 PSIA	7385-001
2000 TO 10,000 PSIA	7271-001
15,000 & 40,000 PSIA	7817-002

PERFORMANCE

SEE APPROPRIATE TRANSDUCER SPECIFICATION CONTROL DRAWING

CHARACTERISTICS

- WEIGHT 2 LBS (907 GM)
- Ⓢ POWER REQUIREMENTS (EXTERNAL) +6 TO +25 VDC Ⓢ 25 MA MAX
(OPERATES UP TO 76 HOURS ON 4 AA INTERNAL ALKALINE BATTERIES)
- THE DISPLAY IS A 6 DIGIT LCD WITH .5" HIGH CHARACTERS.

ENVIRONMENTAL

- OVERPRESSURE 1.2 TIMES FULL SCALE
- OPERATING TEMPERATURE RANGE 0°C TO 40°C
(32°F TO 104°F)

NOTES

- MAXIMUM TORQUE ON SWAGelok PRESSURE FITTINGS TO BE 75 IN-LB (86 KG-CM)
- SEE DOCUMENT NO. 8107-001 FOR PROGRAM COMMAND INSTRUCTIONS AND CONFIGURATION SELECTION.
- CAUTION: HANDLE STANDARD WITH CARE. EXCESSIVE SHOCK OR VIBRATION MAY CAUSE PERMANENT DAMAGE.
- DIMENSIONS ARE IN INCHES (PARENTHEZIZED DIMENSIONS ARE IN CM).
- SEE INDIVIDUAL PRESSURE TRANSDUCER SCD FOR PRESSURE MEDIUM CONTACT MATERIALS.
- CARRYING CASE, INTERFACE CABLE, MANUAL AND AC ADAPTOR INCLUDED.
- OIL FILLED UNITS ARE FILLED UNDER VACUUM BY THE MANUFACTURER WITH DOW-CORNING FS 1265 FLUID. (AT 25°C, SPECIFIC GRAVITY = 1.25 AND VISCOSITY = 300 CENTISTOKES).
CAUTION: DO NOT APPLY VACUUM TO OIL FILLED PRESSURE PORTS. OIL COULD BE WITHDRAWN PERMITTING PRESSURE MEDIUM TO COME INTO CONTACT WITH THE SENSING ELEMENTS.
- DIGITAL OUTPUT LEVELS ARE ±5 VDC.
- DE9 S PIN OUT:

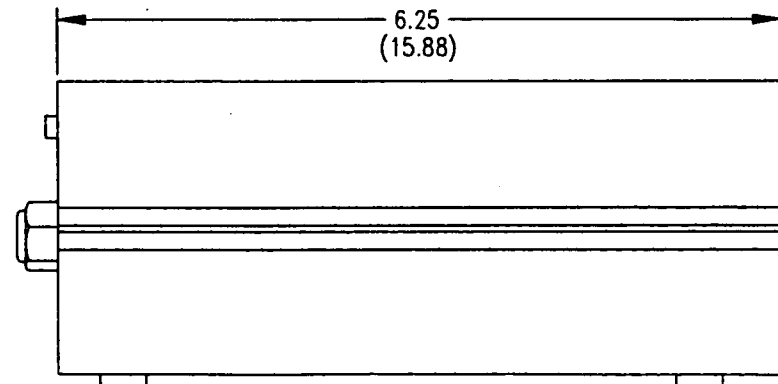
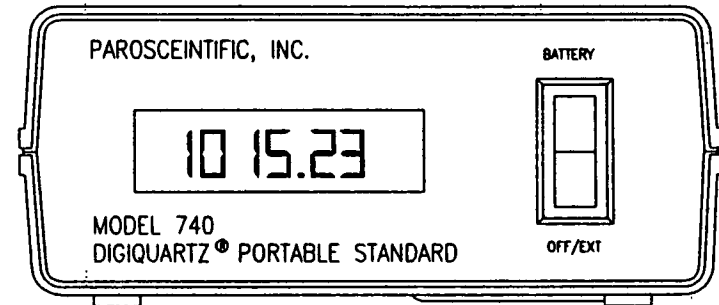
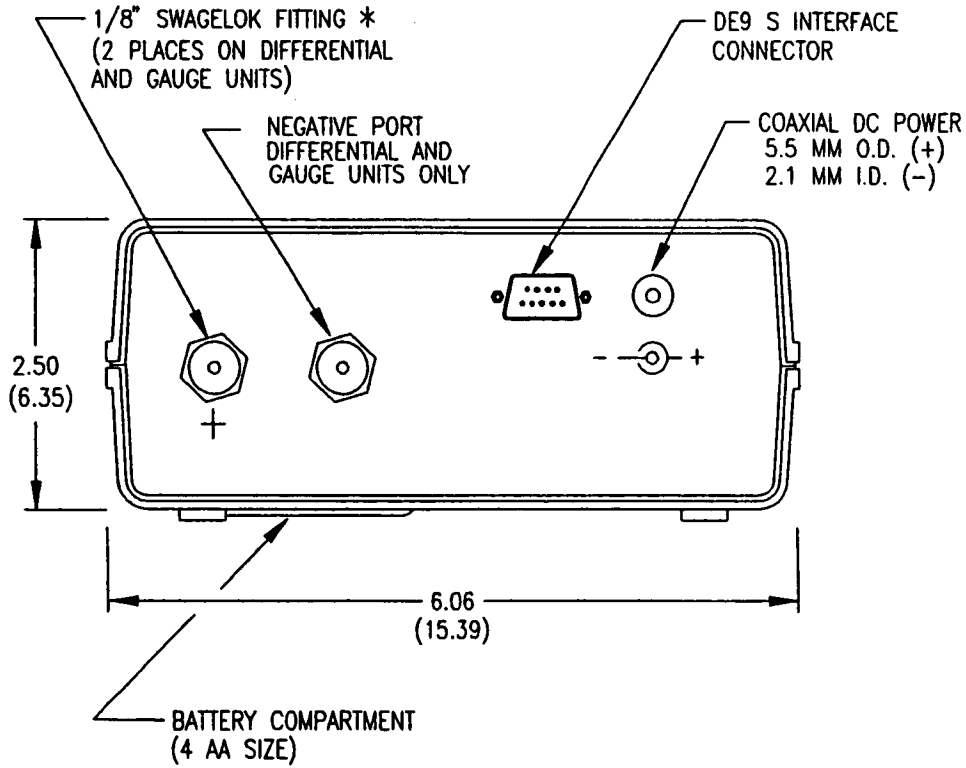
PIN 1 = CHASSIS GROUND	PIN 6 = DISPLAY CLOCK
PIN 2 = DATA TO COMPUTER	PIN 7 = NOT USED
PIN 3 = DATA FROM COMPUTER	PIN 8 = DISPLAY DATA
PIN 4 = NOT USED	PIN 9 = EXTERNAL POWER INPUT
PIN 5 = SIGNAL/POWER GROUND	

DWN <i>[Signature]</i>	DATE 1/92	ENG	DATE	REV/DATE	DWNML 12/94	ENG <i>[Signature]</i>	PAROSCIENTIFIC, INC. 4500 148th AVE NE REDMOND, WA 98052 206-883-8700 FAX: 206-867-5407	TITLE: DIGIQUARTZ Ⓢ PORTABLE PRESSURE STANDARD MODEL 740	FILE: \SCD\ 7314-2-1.DWG SH 1 OF 2
CHK <i>[Signature]</i>	DATE 1/92	MFG	DATE	G	CHK <i>[Signature]</i>	MFG <i>[Signature]</i>			
QA	DATE	APPV	DATE	EO 4379	QA <i>[Signature]</i>	APP			

SPECIFICATION CONTROL DRAWING

STANDARD PRODUCT

DOC. NO. 7314-002



DWN	DATE	ENG	DATE	REV/DATE	DWN	ENG	PAROSCIENTIFIC, INC. 4500 148th AVE NE REDMOND, WA 98052 206-883-8700 FAX: 206-867-5407	TITLE: DIGIQUARTZ PORTABLE PRESSURE STANDARD MODEL 740	FILE: \SCD\ 7314-2-2.DWG SH. 2 OF 2
CHK	DATE	MFG	DATE	CHK	MEG				
QA	DATE	APPV	DATE	QA	APP				

© REGISTERED TRF

OF PAROSCIENTIFIC, INC.

CERTIFICATE OF CALIBRATION

TRANSDUCER MODEL: 740-45A
SERIAL NUMBER: 60999.

The Paroscientific transducer(s) identified above has been calibrated and tested with one or more of the following primary pressure standards. All have traceability to the National Institute of Standards and Technology.

Bell and Howell Primary Pressure Standard

Pneumatic Absolute Or Gauge Dead Weight Tester
Part Number: 6-201-0001, S/N 4034 and S/N 1014

- Piston/Cylinder: 6-001-0002, P2-919/C2-1523
Weight Set 1: 6-002-0002
Range: 1.5 to 50 psi
Accuracy: 0.010 percent of reading
- ✓ Piston/Cylinder: 6-001-0002, P2-652/C2-1378
Weight Set 2: 6-002-0002
Range: 1.5 to 50 psi
Accuracy: 0.010 percent of reading
- Piston/Cylinder: 6-001-0001, P1-231/C1-384
Weight Set 2: 6-002-0002
Range: 0.3 to 5 psi
Accuracy: 0.015 percent of reading

DH Primary Pressure Standard

Pneumatic Gauge Dead Weight Tester, Model 5203, S/N 5557

- Piston/Cylinder: S/N 4845
Mass Sets: S/N 2032, S/N 3293
Range: 20 to 1,600 psi
Accuracy: 0.005 percent of reading

DH Primary Pressure Standard

Oil Operated Gauge Dead Weight Tester, Model 5306, S/N 3505

- Piston/Cylinder: S/N 3375
Mass Set: S/N 2032
Range: 40 to 20,000 psi
Accuracy: 0.01 percent of reading above 200 psi
or 0.02 psi at lower pressure
- Piston/Cylinder: S/N 3511
Mass Set: S/N 2032
Range: 145 to 72,500 psi
Accuracy: 0.02 percent of reading above 725 psi
or 0.145 psi at lower pressure

Tested By: _____

Val Chau



Date: _____

5-31-95

Document No. 8145-001, Rev. D 3/12/93

CERTIFICATE OF COMPLIANCE

CUSTOMER: SW RESEARCH INSTITUTE

PURCHASE ORDER: 58370

TRANSDUCER MODEL: 740-45A

SERIAL NUMBER: 60999

PAROSCIENTIFIC INCORPORATED certifies that the part(s) identified above complies with the requirements of the above order and has been manufactured in accordance with engineering drawings, material and process specifications, testing procedures, and applicable specification drawing of Paroscientific Incorporated. The transducer(s) identified has been calibrated and tested over the specified pressure and temperature range and meets the requirements of the applicable specification drawing. Primary pressure standards and transfer standards used at Paroscientific Incorporated for calibration and testing have traceability to the National Institute of Standards and Technology and are regularly checked and calibrated according to Paroscientific QA Procedure Q8521, Inspection Test and Measurement Equipment, in accordance with the requirements of ISO 9001.

M. Miller [↑] PARO
CAL

MAY 31 1995

AUTHORIZED SIGNATURE **DATE**

CERTIFICATION OF TRACEABILITY
TO
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Primary pressure standards used in the calibration and testing of Paroscientific pressure transducers have traceability to the National Institute of Standards and Technology through the following documentation.

Bell and Howell Primary Pressure Standard:

Bell and Howell, Model 6-201-0001, Piston/Cylinder P2-919/C2-1523 via DH Calibration Report No. 12474, traceable to NIST via test report numbers TN-249770-92, TN-250722-92, TN-251820-93, MS17/MS23. Weight Set 1, P/N 6-002-0002, via DH Calibration Report No. 10332, traceable to NIST. Weight Set 2, P/N 6-002-0002, via DH Calibration Report No. 10754, traceable to NIST. Piston/Cylinder P2-652/C2-1378 via National Bureau of Standards Report No. 13143, traceable to NIST. Piston/Cylinder P1-231/C1-384 via DH Instruments Report No. 13170, traceable to NIST.

DH Primary Pressure Standard, Oil Operated Gauge:

DH Instruments, Model 5306, Piston/Cylinder S/N 3375, via DH Calibration Certificate No. 3086 via National Bureau of Standards Reports TN-249770-92, TN-250722-92, TN-246108-90 and MS17/MS23. Piston/Cylinder 3511 via DH Calibration Certificate No. 1377 and via NIST reports TN-243399-89, T/N-244408-89, TN-240898, 731/243089, and 523/242160.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH Instruments, Model 5203, Piston/Cylinder S/N 4845, via DH Calibration Certificate No. 4473, via National Bureau of Standards Reports TN-249770-92, TN-250722-92, TN-251820-93, and MS 17/MS23. Mass Set S/N 2032/3293 via DH Calibration Certificate Nos. 1029, 1030, 1932, 2871 and via National Bureau of Standards Reports 731/236729-86, SP-8099, P-8218X, 737/23584, 523/242160, TN-249770-92, TN-250722-92, TN-246108-90, and MS 17/MS 23.

PAROSCIENTIFIC, INC.
4500 148th Ave. N.E.
Redmond, WA 98052
Tel: (206) 883-8700
Fax: (206) 867-5407

Customer: SW RESEARCH INSTITUTE
6220 CULEBRA ROAD
SAN ANTONIO, TX 78228

Date: 05-31-1995

Sales Order: 9528

STATUS REPORT OF INTELLIGENT TRANSMITTER

Serial Number: 60999
Model: 740-45A
Pressure Range: 0 to 45 psia

Configuration

Calibration Coefficients

VR: 42.02
SN: 60999
ID: 01
BR: 9600
PT: N

DP: 6

MD: 1
MC: Y

UN: 1
UF: 1.000000
PR: 00238
TR: 00952

OP: 46.00000
ZS: 0
ZV: .0000000

PA: .0000000
PM: 1.000000
TC: .6890857

U0: 5.849691
Y1: -3981.106
Y2: -13017.42
Y3: -76706.31

C1: 228.9461
C2: 8.886149
C3: -247.9520

D1: .0338249
D2: .0000000

T1: 27.70973
T2: .9014231
T3: 18.72654
T4: -63.47902
T5: 117.0334

Prepared by: T.C.



SOUTHWEST RESEARCH INSTITUTE
Department of Quality Assurance
Calibration Laboratory

OUT OF TOLERANCE NOTICE

03/12/96

The following asset was found to be out of tolerance when submitted for calibration. Please be aware measurements made with this may be inaccurate.

INSTRUMENT INFORMATION

Issued to: RON GREEN DIV20 B57 Asset Number: 003972
Manufacturer: PAROS Model Number: 740
Nomenclature: PORTABLE PRESSURE GAUGE
Serial Number: 60999 SwRI Capital Number:
Accuracy: ± 0.00450 psia Calibration Interval: 6 months

DEVIATION

Out of Tolerance Date: 02/29/96 Last Valid Calibration Date: 07/21/95

REMARKS

Standard pressure (psia)	As received	As released
40.0029	40.0003	40.0026
20.0019	19.9997	20.0012
14.2067	14.2049	14.2069
10.00193	9.99923	10.00123
5.00193	4.99893	5.00093
0.00193	-0.00498*	-0.00298

* Notes out of tolerance. Tolerance is ± 0.00450 psia.

Signed 

Checked by 

OUT OF TOLERANCE

SOUTHWEST RESEARCH INSTITUTE
Department of Quality Assurance
Calibration Laboratory

CERTIFICATE OF CALIBRATION
03/12/96

Issued to: **RON GREEN** **DIV20** **, B57**
Manufacturer/Model: **PAROS/740**
Nomenclature: **PORTABLE PRESSURE GAUGE**
Serial Number: **60999**
Asset Number: **003972**
Notes:

ENVIRONMENTAL CONDITIONS

Temperature: **69.0F**

Relative Humidity: **35%**

CALIBRATION INFORMATION

Procedure Number: **MFGR**
Remarks: **SEE ATTACHED DATA SHEET.**

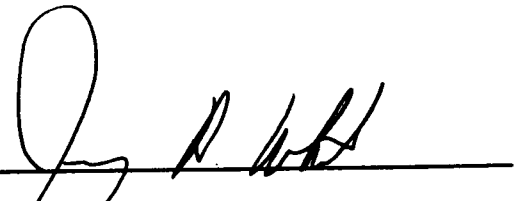
Accuracy: **MFG**
Received **OUT** Tolerance

Calibration was in accordance with requirements of MIL-STD-45662A. Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.

STANDARDS USED FOR CERTIFICATION

Asset #	Serial #	Mfg	Model #	Nomenclature	Cal Date	Int.	Cal Due
003048	TL-1261	RUSKA	2468-758	DEADWEIGHT GAGE PISTON	02/09/93	60	02/09/98
002856	38935	RUSKA	2468-714-6990	DEADWEIGHT GAGE MASSES	01/31/94	60	01/31/99
003216	2582	HASTI	VT-68	VACCUUM CONTROLLER WITH GAGE TUBE	05/25/95	12	05/25/96
003949	3949	TROEN	5MG-100G	CLASS "1" WEIGHTS	06/29/95	12	06/29/96

Certified by :



Calibration Date: **03/04/96**
Interval: **6 months**
Next Calibration Due: **09/04/96**

Certificate#: **20214**

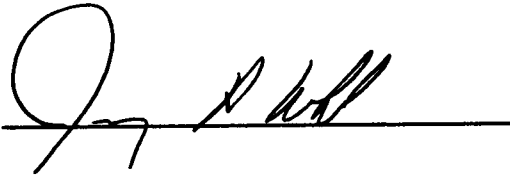
Cert# 20214

REMARKS

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20.0019	19.9997	20.0012
14.2067	14.2049	14.2069
10.00193	9.99923	10.00123
5.00193	4.99893	5.00093
0.00193	-0.00498*	-0.00298

* Notes out of tolerance. Tolerance is ± 0.00450 psia.

Signed

A handwritten signature in black ink, appearing to be "J. P. Will", is written over a horizontal line.

SOUTHWEST RESEARCH INSTITUTE

Department of Quality Assurance
Calibration Laboratory

OUT OF TOLERANCE

OUT OF TOLERANCE NOTICE

03/12/96

The following asset was found to be out of tolerance when submitted for calibration. Please be aware measurements made with this may be inaccurate.

INSTRUMENT INFORMATION

Issued to: **RON GREEN** **DIV20** **B57 Asset Number: 003972**
 Manufacturer: **PAROS** **Model Number: 740**
 Nomenclature: **PORTABLE PRESSURE GAUGE**
 Serial Number: **60999** **SwRI Capital Number:**
 Accuracy: **+|-0.00450psia** **Calibration Interval: 6 months**

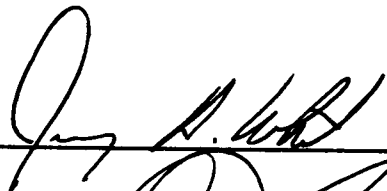
DEVIATION

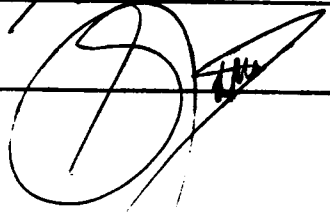
Out of Tolerance Date: 02/29/96 Last Valid Calibration Date: 07/21/95

REMARKS

Standard pressure (psia)	As received	As released
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20.0019	19.9997	20.0012
14.2067	14.2049	14.2069
10.00193	9.99923	10.00123
5.00193	4.99893	5.00093
0.00193	-0.00498*	-0.00298

* Notes out of tolerance. Tolerance is +|-0.00450psia.

Signed 

Checked by 

OUT OF TOLERANCE

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

WORK ORDER

CERTIFICATE # 24351 ASSET # 003972 DATE 17 FEB 97

ITEM DATA:

Manufacturer Precision, Inc Model 740
Description digital quartz portable standard Serial # 00099
Accessories power supply

ACTION REQUESTED _____

CUSTODIAN Ron Brown, D10120

Turned in by: Melissa Hill Phone 2012

CHARGE # 20-500-661 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

SWRI CALIBRATION LAB
(210) 522-5215
CAL BY Melissa Hill
DUE DATE 2-18-97 ID 3572
S/N 60299

ACTION TAKEN: (Calibration/Repair/Parts) 5 point Cal

Limited Cal: UUT unc was increased to include unc of Cal std ie. From 0.01 to 0.0106

CAL ENVIRONMENT:
Temperature 71°F Humidity 45%RH

CALIBRATED/REPAIRED:
By Melissa Hill Cal Procedure MFR
Date 2-18-97 Accuracy ±0.0106% limited Cal
Cal Interval 6mo Time to complete:
Next Cal due 8-18-97 Cal 3 hr Repair _____
Standards used (Asset#) 3048 5242

DATE COMPLETED 2-19-97
DATE PICKED UP 2/21/97 PICKED UP BY Melissa Hill

24351

PRESSURE CALIBRATION CHECK FORM

Date 2-18-97 Work Order 24351 Technician OM Wood
MHI 2012 3m 20-5708-661

A) Unit Under Test Dig Ind
 Manufacturer Paroscientific Model 740 Serial No. 60999
 Asset No. 3972 Range 0-40 psia Uncertainty $\pm 0.01\% FS$ (rect) comb unc $\pm 0.0106\% FS$
 Std(Unc) $\pm 0.00577\% FS$

B) Calibration Standard (1) DWT
 Manufacturer Ruska Model 2465 Serial No. TL1261
 Asset No(s). 3048 Uncertainty $\pm 0.004\% RD$ (20)

C) Calibration Standard (2) N/A Std unc $0.002\% RD$ *
TUR: $2.885/1$ vs 0.0061
 Manufacturer _____ Model _____ Serial No. _____
 Asset No. _____ Uncertainty _____

Env: Room Temp. 71°F Humidity 45% Baro Press. 29.27" Hg
 Conversion Factor(s) N/A

STANDARD	INCREASING	DECREASING	TOLERANCE $\pm 0.01\% FS$	
	UNITS: PSIA	UNITS: PSIA	UNITS: PSIA	UNITS: PSIA
AS FOUND			MIN	MAX
Atm (Ruska)	<u>14.3888</u>	<u>14.2966/14.2965</u>	$\pm 0.004 PSIA$	\leftarrow
10	<u>10.0017/10.0012</u>	<u>10.0017/9.9988</u>	9.996	10.004
20	<u>20.0018/19.9999</u>	<u>20.0024/19.9995</u>	19.996	20.004
30	<u>30.0015/29.9986</u>	<u>30.0018/29.9989</u>	29.996	30.004
40	<u>40.0021/39.9992</u>	<u>↑</u>	39.996	40.004
	raw / corrected	raw / corrected		
AS DELIVERED				

NOTES: Ball jar Pressure was $100 \mu m Hg$ for each reading
 $100 \mu = 0.00193 psi$ (subtracted from each reading)

* TUR < 4:1 so. stated unc is Comb unc of std $\pm 0.0106\% FS$

R
14.3889

22°C 71°F 45% 29.27"Hg (no matter - Abs Press)

10 22, 23, 24, 25, 26, 27, 28, 30 3.441 gm

20 18, 22, 23, 24, 25, 26, 27, 28, 30 6.921 gm

30 18, 19, 22, 23, 24, 25, 26, 27, 28, 30 10.417 gm

40 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 30, 31 2.150 gm

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

WORK ORDER

CERTIFICATE # 29545 ASSET # 003972 DATE 30 Apr. 98

ITEM DATA:
Manufacturer PAROScientific Inc Model 740
Description portable Standard Serial # 60999
Accessories power supply

ACTION REQUESTED _____

CUSTODIAN Dr. R. Kon Green

Turned in by: Melissa Hill Phone 2012

CHARGE # 70.04 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 MH Date 04-30-98

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

ACTION TAKEN: (Calibration/Repair/Parts) 5 Point Cal

SwRI CALIBRATION LAB
(210) 522-5215
CAL 2-18-97 BY CMW
DUE 8-18-97 NO 3972
SN 60999

CAL ENVIRONMENT:
Temperature 70 °F Humidity 62 %RH

CALIBRATED/REPAIRED: CMW
By _____ Cal Procedure CLCP-77-001
Date 5-4-98 Accuracy ±0.01% FS
Cal Interval 6m Reliability Code: _____
Next Cal due 11-4-98 Cal Time 13 Repair Time _____
Standards used (Asset#) 3048 2856 3949 3A16

DATE COMPLETED 5-4-98
DATE PICKED UP 5/7/98 PICKED UP BY Melissa E Hill

29545

PRESSURE CALIBRATION CHECK FORM

Date 5-4-98 Work Order 29545 Technician AM Wood
 Inst Cust. M Hill Ext 2012 Charge # 20-0751-006 time 3hr

A) Unit Under Test Parascientific Dig Press Ind
 Model 740 Serial No. 60999 Asset No. 3972
 Range 0-40 psia Uncertainty ±0.01% FS Std Unc _____

B) Calibration Standard (1) Ruska DWT
 Model 2465 Serial No. TL1261 Asset No. 3048 (2856, 3249, 3216)
 Uncertainty ±0.0042 Rd Std Unc _____

C) Calibration Standard (2) N/A
 Model _____ Serial No. _____ Asset No. _____
 Uncertainty _____ Std Unc _____
 Comb Unc (rss B&C) 0.0042 TUR (A Unc/Comb Unc) 2.5/1

$GB = 0.01 - 0.004 = 0.006\% FS = \pm 0.0029 \text{ psia}$

If less than 4:1, Total combined calibration Unc (kXrss) _____

k= _____ Explanation _____

Env: Room Temp. 70°F Humidity 62% Baro Press. 29.01" Hg

Conversion Factor(s) N/A

STANDARD	INCREASING	DECREASING	TOLERANCE: ±0.004	
UNITS: PSIA	UNITS: PSIA	UNITS: PSIA	UNITS: PSIA	
AS FOUND			MIN	MAX
.00029	-.00445	-.00445	-0.004	0.004
10.0029	10.0004	10.0007	9.996	10.004
20.0019	20.0007	20.0009	19.996	20.004
30.0025	30.0009	30.0009	29.996	30.004
40.0028	40.0017	↑	39.996	40.004
AS DELIVERED	INTD			

NOTES:

225°C

- 10 22, 23, 24, 25, 26, 27, 28, 30, 3.460 gm
- 20 18, 22, 23, 24, 25, 26, 27, 28, 30, 6.955 gm
- 30 18, 19, 22, 23, 24, 25, 26, 27, 28, 30 10.470 gm
- 40 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 30, 31 2.220 gm



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



Certificate of Calibration

4 May 1998

Issued to: RON GREEN DIV20 B57
 Manufacturer/Model: PAROSCIENTIFIC, INC 740
 Description: DIGIQUARTZ PORTABLE STANDARD
 Serial Number: 60999
 Asset Number: 003972

Environmental Conditions

Temperature: 70.00 Deg. F Humidity: 62 % 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: 4 May 98 Calibration Procedure: CLCP-PI-001
 Interval: 6 months
 Next Calibration Due: 4 Nov 98 Received: In Tolerance

Remarks:

Standards Used

Asset	MFR	Model	Description	Serial No.	Due Cal
002856	RUSKA	2468-714-69900	DEADWEIGHT GAGE MASSES	38935(18-31)	31 Jan 99
003048	RUSKA	2465	DEADWEIGHT GAGE PISTON	TL1261	13 Oct 00
003216	HASTINGS	VT-6B	VACCUM CONTROLLER WITH G	2582	16 Oct 98
003949	TROEMNER	5MG-100G	WEIGHT SET	3949	20 Aug 98

Signed:

Title:

LAST PAGE OF REPORT
 Total Pages Printed: 1

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

WORK ORDER

WORK ORDER # 35459 ASSET # 003972 DATE 30 July 99

ITEM DATA:

Manufacturer Paroscientific Model 740-45A
Description Digiquartz Portable Standard Serial # 60999
Accessories _____

ACTION REQUESTED cal

CUSTODIAN Div. 20, Troy Maxwell

Turned in by: _____ Phone 3492

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 J. J. J. Date 30 July 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) 5 Point Cal

SwRI CALIBRATION LAB
(210) 522-5215
CAL 5-4-98 BY AMW
DUE 11-4-98 ID 3972
SN 60999

CAL ENVIRONMENT:
Temperature 68 °F Humidity 44 %RH

CALIBRATED/REPAIRED: AMW
By _____ Cal Procedure CCCP-PI-001 Mar 97
Date 8-3-99 Accuracy ± 0.01% FS
Cal Interval 6 mo Reliability Code _____
Next Cal Due 2-3-00 Cal Time 3h Repair Time _____
Standards used (Asset #) 2048, 2856, 3949, 3216

DATE COMPLETED 8-3-99

DATE PICKED UP 8-10-99 PICKED UP BY Troy Maxwell

35459

PRESSURE CALIBRATION CHECK FORM

Date 8-3-99 Work Order 35459 Technician M. Wood
 Inst Cust. Maxwell Ext 3492 Charge # 20-0751-006 time 3 h

A) Unit Under Test Paroscientific
 Model 740 Serial No. 60999 Asset No. 3972
 Range 40 PSIA Uncertainty ±0.01% FS Std Unc _____

B) Calibration Standard (1) Ruska DWT
 Model 2465 Serial No. TL261 Asset No. 3048
 Uncertainty ±0.004% Rd Std Unc _____

C) Calibration Standard (2) N/A
 Model _____ Serial No. _____ Asset No. _____
 Uncertainty _____ Std Unc _____

Comb Unc (rss B&C) 0.004% TUR (A Unc/Comb Unc) 2.5/1

$CB = 0.01 \frac{0.0016 \text{ PSI}}{0.004} = 0.00625 = \text{unc} \pm 0.0024 \text{ PSI @ FS}$
 If less than 4:1, Total combined calibration Unc (kXrss) _____
 k= _____ Explanation _____

Env: Room Temp. 68 Humidity 46% Baro Press. 29.15" Hg
 Conversion Factor(s) N/A

$100 \mu\text{Hg} = 0.01934 \text{ PSI}$

STANDARD	INCREASING	DECREASING	TOLERANCE: ±0.004	
	UNITS: PSI	UNITS: PSI	UNITS: PSI	
AS FOUND			MIN	MAX
0.0001	-0.0033	-0.0028	-0.004	0.004
10	9.9983	9.9985	9.996	10.004
20	19.999	19.999	19.996	20.004
30	29.998	29.999	29.996	30.004
40	39.998 →		39.996	40.004
AS DELIVERED				

NOTES: Ruska 14.3186 Post 14.3111
 Pan 14.3181 14.3098
 .0005 .0017
 Page 1 of 1



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

Accredited



Certificate #
0972-01

Certificate of Calibration

3 August 1999

Issued to: TROY MAXWELL DIV20 B57
Manufacturer/Model: PAROSCIENTIFIC 740
Description: DIGIQUARTZ PORTABLE STANDARD
Serial Number: 60999
Asset Number: 003972

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: 68.0 Degrees Fahrenheit Humidity: 44 % RH

Calibration Date: 3 Aug 99

Calibration Procedure: CLCP-PI-001 MAR97

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:


Jim Patterson, Supervisor or Walt Hill, Metrologist

Certificate # 35459

m:\a2la.rpt Rev date 10 Mar 99

Measurements performed by:


Mack Wood, Technician

Page 1 of 1

WORK ORDER 39537

Date Received 6/21/00

Asset No. 003972 Manufacturer PAROSCIENTIFIC Model 740-45A
Description DIGIQUARTZ PORTABLE STANDARD Serial Number 60999
Accessory Received/Required NONE
Div/CC ID NONE Accessory to Asset No. N/A
Div/CC DIV20 Location B57 Custodian TROY MAXWELL Tel. 2012
Charge/Project No. 20.00751.006 Proprietary/Confidential N Date Required ROUTINE
Work Requested CALIBRATION
Receiving Inspection O.K.
Delivered By TROY MAXWELL Tel. 2012

WORK HISTORY

Date	Start Time	Stop Time	Notes

Paril Cal Lab By: mmw
CAL: 08/03/99 DUE: 02/03/00
AN: 003972 SN: 60999

39537

PARTS

Part Name	Part Number	Cost	Failure Description

OUT OF CALIBRATION
DO NOT USE

WORK SUMMARY

Failure Description _____
Repair Action _____
Cal Procedure CCCP-P1-001 6/99 Temp 68 F Hum 46 %
Tech [Signature] Cal Hrs. 2.5 Repair Hrs. _____ Part Cost _____
Action Taken Cal
Standards Used 3048, 2856, 2949, 3216
Date Cal _____ Int. 6 Mo. Date Due _____ Reliability Code _____
Date Picked Up 6-30-00 Picked Up By [Signature]

PRESSURE CALIBRATION DATA SHEET

Date _____ Work Order 39537 Technician [Signature]
 Inst Cust. Maxwell Ext 2012 Charge # 20-00751-006 time 25

A) Unit Under Test Paroscientific
 Model 740 Serial No. 60999 Asset No. 3972
 Range 40 PSIA Uncertainty ±0.012 FS Std Unc 0.0058

B) Calibration Standard (1) Rusk DWT
 Model 2465 Serial No. TL1261 Asset No. 3048, 2856, 3947, 3211
 Uncertainty ±0.0026 PSIA Std Unc 0.0017

C) Calibration Standard (2) N/A
 Model _____ Serial No. _____ Asset No. _____
 Uncertainty _____ Std Unc _____
 Comb Unc (rss B&C) 0.0013 PSIA TUR (A Unc/Comb Unc) (4.5/1)

If less than 4:1, Total combined calibration Unc (kXrss) _____

k= _____ Explanation _____

Env: Room Temp. 63°F Humidity 46% Baro Press. 29.17" Hg

Conversion Factor(s) N/A

STANDARD	INCREASING	DECREASING	TOLERANCE: ±	
			MIN	MAX
UNITS: PSIA	UNITS: PSIA	UNITS: PSIA	UNITS: 0.004 PSIA	
AS FOUND	PSIA *			
0	-0.0036	-0.0039	-0.004	0.004
10	9.99964	9.99965	9.996	10.004
20	19.99975	19.99975	19.996	20.004
30	29.99975	29.99975	29.996	30.004
40	39.99985	-x	39.996	40.004
AS DELIVERED				

NOTES: * includes bell jar correction - 0.002 PSI for 150 mm Hg
 Page 1 of 1



Southwest Research Institute
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Department of Quality Assurance
Calibration Laboratory



Certificate #
0972-01

Certificate of Calibration

28 June 2000

Issued to: TROY MAXWELL DIV20 B57
Manufacturer/Model: PAROSCIENTIFIC 740-45A
Description: DIGIQUARTZ PORTABLE STANDARD
Serial Number: 60999
Asset Number: 003972

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: 68.0 Degrees Fahrenheit Humidity: 46 % RH

Calibration Date: 28 Jun 00 **Calibration Procedure:** CLCP-PI-001 6/99

Condition as Received: In Tolerance

Remarks:

Approved by:

Jim Patterson, Supervisor, or Walt Hill, Metrologist

Certificate # 39837

m:\a2la.rpt Rev date 22 May 00

Measurements performed by:

Mack Wood, Technician

Page 1 of 1

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Processed by RCRUZ at 11:12:16AM on 5/14/01

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Work Order 444043576

Arrived 5/14/01

Asset No. 003972

Manufacturer PAROSCIENTIFIC

Model 740-45A

Instrument Type/Class DIGIQUARTZ PORTABLE STANDARD

Serial No. 60999

Accessory No.

Calibration Procedure CLCP-PI-001 6/99

Location B57

Div/Client DIV20

Custodian TROY MAXWELL

Mail Stop B57

Tel. 2012

Charge/Project No. 20.00751.006

Delivered By / Telephone TROY MAXWELL X2012

IN4CAL

Special Instructions _____

WORK NOTES

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

SwRI Cal-Lab By: cmw
CAL: Jan 20, 00 DUE: Dec 20, 00
Art: 003972 SN: 60999

REPAIR PARTS

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

WORK SUMMARY

Failure Description _____

Repair Action _____

Calibration Procedure _____

Temp 68 F

Hum. 38 %

Tech CMW

Totals

Cal Hours 4

Repair Hours _____

Parts Cost _____

Standards Used 3048, 2856, 7385, 3211

Date Picked Up 6-4-01

Picked Up By CMW

444043576

PRESSURE CALIBRATION WORK SHEET

INPUT	LRP	0	URP	40	R Span	40
-------	-----	---	-----	----	--------	----

OUTPUT	LEP	0	UEP	40	EP Span	40
--------	-----	---	-----	----	---------	----

ANSI grade?	n/a	Or	Tol (% FS)	0.01
-------------	-----	----	------------	------

Zero?	y	(y or n)
-------	---	----------

Tol in Engr units 0.004

Jar = 150 μ Hg (0.0029 PSI)

INPUT	Found		Tolerance			P/F
	Found	Corrected	Min Value	Ideal Out	Max value	
0	0.0003		-0.004	0	0.004	P
10 *	10.0021	9.9992	9.996	10	10.004	P
20 *	20.0028	19.9999	19.996	20	20.004	P
30 *	30.0033	30.0004	29.996	30	30.004	P
40 *	40.0042	40.0013	39.996	40	40.004	P
30 *	30.0031	30.0002	29.996	30	30.004	P
20 *	20.0027	19.9998	19.996	20	20.004	P
10 *	10.0022	9.9993	9.996	10	10.004	P
0	0.0002		-0.004	0	0.004	D

Asset number 3977

Calibration Standard 3048, 2856, 3249, 3216, 7385 *OHV*

Serial number 60999

Calibration Standard N/A

Date 5-16-01

Stability of Std —

Work Order # 444043576

Resolution 0.00001

Notes: * Data has been corrected for Ball Jar Pressure (-0.0029 PSI)

- 10 22-28, 30, 3.380 gm
- 20 18, 22-28, 30, 6.805 gm
- 30 18, 19, 22-28, 30, 10.250 gm
- 40 18, 19, 20, 22-28, 30, 31, 1.931 gm

m= 1
b= 0

0.01 0.01



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Department of Quality Assurance
Calibration Laboratory



Certificate #
0972-01

Certificate of Calibration

16 May 2001

Issued to: TROY MAXWELL DIV20 B57
Manufacturer/Model: PAROSCIENTIFIC 740-45A
Description: DIGIQUARTZ PORTABLE STANDARD
Serial Number: 60999
Asset Number: 003972
Work Order Number: 444043576

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: 68.0 Degrees Fahrenheit Humidity: 38 % RH

Calibration Date: 16 May 01 **Calibration Procedure:** CLCP-PI-001 6/99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Walt Hill, Supervisor
Institute Calibration Laboratory

Measurements performed by:

Mack Wood, Technician

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Received by AANDERSON, 5/22/02 11:24:23AM

|||||

Arrived 5/22/02

Work Order **444048707**

Asset No. 003972 Manufacturer PAROSCIENTIFIC

Model 740-45A

Equipment Type DIGIQUARTZ PORTABLE STANDAR Serial No. 60999

Accessory No.

Interval 6 M

Calibration Procedure CLCP-PI-001 6/99

Location B57

Div/Client DIV20

Custodian TROY MAXWELL

Mail Stop B57

Tel 3492

IN LINE

Special Instructions _____

Notify before adjustments or repairs. () Provide data with certificate () Certificate Typ _____

Charge/Project No. 00751.006 1.20

Requester / Telephone CYNTHIA

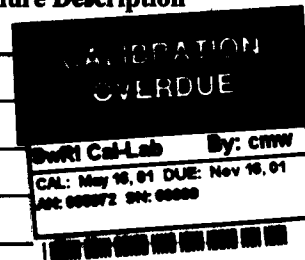
This information is correct for the work requested.

Cynthia L. Dinwiddie

WORK NOTES

Date	Hours	Remarks/Notes
_____	_____	<u>Battery Compartment Door found missing</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

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



48707

WORK SUMMARY

Failure Description _____

Repair Action CMW

Tech _____ Cal Hrs. 3 Repair Hrs _____ Parts Cost _____ Temp 68 F Hum. 39 %

Standards Used 3018, 2856, 3949, 3216

Date Picked Up 05/30/02

Picked Up By Cynthia Dinwiddie

PRESSURE INDICATOR CALIBRATION DATA SHEET *

WORK ORDER #: 444048707 **DATE:** 5/24/02 **TECH.** C. M. Wood

UUT: **Mfr:** Paroscientific **Model:** 740-45A **Serial No.** 60999 **Units Code** 1
ASN: 3972 **LRP:** 0 **URP:** 40 **UNITS:** PSIA 1
RESOLUTION: 0.0001 **REPEATABILITY:** 0 **Grade** n/a
TOLERANCE +/-%: 0.01 **zero (y/n)** y **SPAN:** 40 40
Grade tol 0.01 0.01

CALIBRATION STANDARD **Setability:** 0

ASSET #: 3048 **TYPE:** dwt **tolerance** 0.004 %Rdg

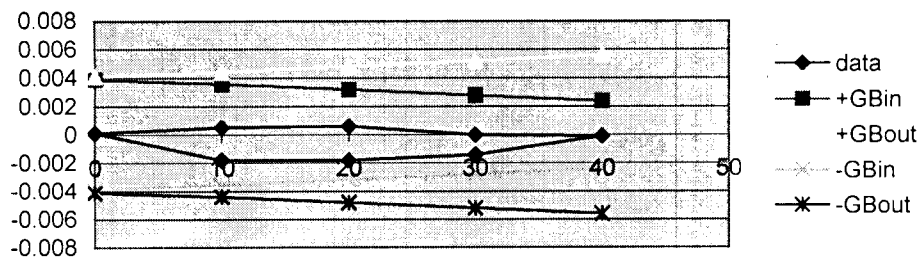
UNCERTAINTY BUDGET @ F.S.			
description	value	divisor	std unc
UUT resolution	0.0001	1.73205	5.77E-05
UUT repeatability	0	1	0
Calibration standard	0.0016	2	0.0008
Cal Std Setability	0	1.73205	0
combined uncertainty			8.0E-04
expanded uncertainty	k = 2		1.6E-03

TAR= 2.5

TUR= 2.5

DATA **tolerance 0.004**

INPUT	READING	ERROR	UNCERT	GBin	GBout	PASS	FAIL
0	0.00013	0.00013	0.000115	0.003885	0.004115	P	
10	9.9982	-0.0018	0.000416	0.003584	0.004416	P	
20	19.9982	-0.0018	0.000808	0.003192	0.004808	P	
30	29.9986	-0.0014	0.001206	0.002794	0.005206	P	
40	39.9999	-0.0001	0.001604	0.002396	0.005604	P	
30	30	0	0.001206	0.002794	0.005206	P	
20	20.0006	0.0006	0.000808	0.003192	0.004808	P	
10	10.0005	0.0005	0.000416	0.003584	0.004416	P	
0	0.0001	0.0001	0.000115	0.003885	0.004115	P	



*Instructions on Sheet 3



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

Certificate of Calibration

24 May 2002

Issued to: TROY MAXWELL DIV20 B57
Manufacturer/Model: PAROSCIENTIFIC 740-45A
Description: DIGIQUARTZ PORTABLE STANDARD
Serial Number: 60999
Asset Number: 003972
Work Order Number: 444048707

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: 68.0 Degrees Fahrenheit Humidity: 39 % RH

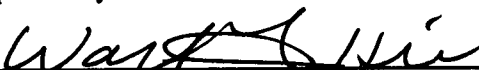
Calibration Date: 24 May 02 **Calibration Procedure:** CLCP-PI-001 6/99

Condition as Received: IN TOLERANCE

Condition as Returned: IN TOLERANCE

Remarks:

Approved by:


Walt Hill, Metrology Group Leader
Institute Calibration Laboratory

Measurements performed by:


Mack Wood, Technician



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

Certificate of Calibration

18 July 2002

Issued to: TROY MAXWELL DIV20 B57
Manufacturer/Model: PAROSCIENTIFIC 740-45A
Description: PRESSURE GAUGE, DIGITAL
Serial Number: 60999
Asset Number: 003972
Work Order Number: 444049372

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NC SL 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: 68.0 Degrees Fahrenheit Humidity: 39 % RH

Calibration Date: 18 Jul 02 **Calibration Procedure:** CLCP-PI-001 6/99

Condition as Received: IN TOLERANCE


Condition as Returned: IN TOLERANCE

Remarks:

Approved by:


Walt Hill, Metrology Group Leader
Institute Calibration Laboratory

Measurements performed by:


Mack Wood, Technician



SOUTHWEST RESEARCH INSTITUTE™

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: TROY MAXWELL

Manufacturer Model: PAROSCIENTIFIC 740-45A

Description: PRESSURE GAUGE, DIGITAL

Serial No: 60999

Asset No: 003972

Procedure: CLCP-PI-001, 6/99

Work Order: 444050461

Date Issued: Oct 2, 2002

Calibration Date: Oct 2, 2002

****Calibration Due:** Apr 2, 2003

Calibration Location: N/A

Environment: Temp. 68.0°F Hum. 39 %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/NC SL 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
003048	RUSKA	2468-758	PRESSURE CALIBRATOR	Mar 10, 05
002856	RUSKA	2468-714-69900	WEIGHT SET, CLASS N/S	Mar 10, 05
003949	TROEMNER	5MG-100G	WEIGHT SET, CLASS 1	Jan 07, 03
003216	HASTINGS	VT-6B	VACUUM CONTROLLER & GAGE TUBE	Oct 16, 02

Approved by: Walt Hill
Metrology Group Leader
m:\Nona21a1.rpt Rev date 15, August 02

Measurements by: Mack Wood
Metrology Technician

