

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



Certificate # 0972-01

Certificate of Calibration

9 June 1999

Issued to:DARRELL DUNN DIV20 B57Manufacturer/Model:SWRI 10K-100M OHMSDescription:RESISTOR BOXSerial Number:7243Asset Number:007243

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: 39 % RH

Calibration Date: 9 Jun 99

Calibration Procedure: CLCP-OR-001 APRIL, 1997

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor or Walt Hill, Metrologist Certificate # 33940 m:\a2la.rpt Rev date 10 Mar 99 Measurements performed_by:

Topy Planas, Technician

Page 1 of 1



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

9 December 1999

Issued to:DARRELL DUNN DIV20 B57Manufacturer/Model:SWRI 10K-100M OHMSDescription:RESISTOR BOXSerial Number:7243Asset Number:007243

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: 70.0 Degrees Fahrenheit Humidity: 40 % RH

Calibration Date: 9 Dec 99 Calibration Procedure: CL70 JUNE99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor or Walt Hill, Metrologist Certificate # 37059 m:\a2la.rpt Rev date 10 Mar 99 Measurements performed by: Vary Vary

Tony Planas, Technician Page 1 of 1



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

9 August 2000

DARRELL DUNN DIV20 B57 Issued to: SWRI 10K-100M OHMS Manufacturer/Model: **RESISTOR BOX Description:** Serial Number: 7243 **Asset Number:** 007243

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.

Temperature: 74.0 Degrees Fahrenheit Humidity: 40 % RH **Ambient Conditions:**

Calibration Procedure: CL70JUN99 Calibration Date: 9 Aug 00

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor, or Walt Hill, Metrologist Certificate # 39643 m:\a2la.rpt Rev date 22 May 00

Measurements performed by:

Jany Planas, Technician

Page 1 of 1

SOUT R R ®	6220 Culebra Road Institute Qu Institute Calibu Phone: 210-522-52	CARCH INSTITU 1, P.O. Drawer 28510 Hality Systems ration Laboratory 15 Fax 210-522-3692 of Calibration	ΓΕ™
Submitted By: DIV20 Address: B57 Contact: DARRELL D Manufacturer Model: SWRI 100K Description: RESISTOR E Serial No: 7243 Asset No: 007243 Procedure: CL-70, JUN9 This certificate documents traceability to the Nation conforms to ISO/IEC 17025, 1999 and ANSI/NCSL be reproduced, except in full, without the written ap instrument described above. This certificate shall n U. S. Government.	-10M OHMS BOX 9 al Institute of Standards and Technol Z540-1-1994 which are equivalent to proval of the Southwest Research Ins	Calibration Date: **Calibration Due: Calibration Location: Environment: *As Found: *As Left: ogy (NIST) and the International System of U or relevant requirements of the ISO 9000-1994 titute Calibration Laboratory. The results of the	Oct 15, 2002 Oct 15, 2002 Apr 15, 2003 N/A Temp. 72.0°F Hum. 40 %RH IN TOLERANCE IN TOLERANCE nits (SI). The Laboratory quality system series of standards. This certificate may not his calibration relate only to the individual
Uncertainty evaluation includes the item under test represents an expanded uncertainty using a coverage than or equal to 25% (4:1) of the test limit unless of *The client has sole responsibility for determination on the Test Instrument (TI) reading(s) and limits as stability of the TI. **Calibration interval is determined by the client an be out of tolerance before the next calibration date. Remarks: None	e factor of $k=2$ to approximate a 95% herwise stated in remarks or an attach of in/out of tolerance or compliance/ reported. The reported uncertainty re	confidence level. The calibration process pro ment noncompliance. An in/out of tolerance opinic lates only to the results at the time of calibrati	vides a Test Uncertainty Ratio (TUR) of less on is provided for your convenience based only on and does not imply any short or long term
Standards Used Asset Manufacturer	Model	Description	Cal Due
007001 HEWLETT-PACKARD	3458A/OPT-002	MULTIMETER	Jan 06, 03
Approved by: Walt Hill Metrology Group Leader m:\Nona2la1.rpt Rev date 15, August 02	LN	Measurements Metrology Tea	By: Tony Planas chnician

Southwest Research Institute Calibration Laboratory Calibration Sheet

Work Order: Asset No. Serial No.	444050664 7243 7243	Mfr. Model Type.	SWRI 100k-10M OHM Resistors		Technician Procedure Cal Date.	Tplanas CL-70 06/99 15-Oct-02
Remarks:	1243	Ттуре.		<u> </u>		
Function/Range	Test Point	TI Reading	Difference	Test Limits+/-	Uncertainty	Found/Left
Function/Range Resistance	kOhm	kOhm	kOhm	kOhm	kOhm	Results
			kOhm -0.29	kOhm 1.00	kOhm >4:1	
	kOhm	kOhm	kOhm	kOhm	kOhm	Results

x . *

S. R		SOUTI	6220 Culebra Roa Institute Q Institute Calil Phone: 210-522-52	EARCH INSTITU ad, P.O. Drawer 28510 Quality Systems bration Laboratory 215 Fax 210-522-3692 of Calibration	ГЕ	
s	Submitted By:	DIV20		Work Order:	444053025	
	Address:			Date Issued:	Apr 3, 2003	
		DARRELL DU	JNN	Calibration Date:	• •	
Manufa	cturer Model:	SWRI 100K-	10M OHMS	**Calibration Due:	•	
	Description :	RESISTOR BO	XC	Calibration Location:	Bldg. 64	
	Serial No:	7243		Environment:	Temp. 68.0°F	Hum. 42 %RH
	Asset No:				IN TOLERANC	
	Procedure:	CL-70, JUN99)	*As Left:	IN TOLERANC	CE
presents an e an or equal to	xpanded uncertaint o 25% (4:1) of the t	y using a coverage est limit unless othe	factor of k=2 to approximate a 95% erwise stated in remarks or an attac	the ISO "Guide to the Expression of Uncertain 6 confidence level. The calibration process pro- chment e/noncompliance. An in/out of tolerance opinic	vides a Test Uncertai	nty Ratio (TUR) of less
n the Test Inst tability of the *Calibration in	trument (TI) readin TI. interval is determine ince before the next	g(s) and limits as re ed by the client and	ported. The reported uncertainty r	Il remain within tolerance until this date. Any r	on and does not impl	y any short or long term
n the Test Inst ability of the Calibration in e out of tolera cemarks:	trument (TI) readin TI. interval is determine ince before the next None	g(s) and limits as re ed by the client and	ported. The reported uncertainty r	relates only to the results at the time of calibrati Il remain within tolerance until this date. Any r	on and does not impl	y any short or long term
n the Test Inst ability of the *Calibration ii e out of tolera temarks: tandards U Asset	trument (TI) readin TI. interval is determine ince before the next None Used	g(s) and limits as re ed by the client and calibration date.	ported. The reported uncertainty r does not assure the instrument wil	relates only to the results at the time of calibrati	on and does not impl	y any short or long term
n the Test Inst tability of the *Calibration in e out of tolera Remarks:	trument (TI) readin TI. interval is determinunce before the next None Used Manufacturer	g(s) and limits as re ed by the client and calibration date.	ported. The reported uncertainty r does not assure the instrument wil	relates only to the results at the time of calibrati Il remain within tolerance until this date. Any r Description	on and does not impl	y any short or long term y cause the instrument to Cal Due

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Southwest Research Institute Calibration Laboratory Measurement Report

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Work Order: Asset No.	444053025 007243	Mfr. Model	SWRI 100k-10M OHM		Technician	Thomas Hannon
Serial No.	7243	Туре.	Resistors		Cal Date.	3-Apr-03
Remarks:						
-unction/Rang	e Test Point	TI Reading	Difference	Test Limits+/-	Uncertainty	Found/Left
Resistance	kOhm	kOhm	kOhm	kÖhm	kOhm	Results
	100.00	99.71	-0.29	1.00	0.0002	Pass

Resistance	kOhm	kOhm	kOhm	kOhm	kOhm	Results
	100.00	99.71	-0.29	1.00	0.0002	Pass
	MOhm	MOhm	MOhm	MOhm	MOhm	Results
	10.00	9.96	-0.04	0.10	0.059	Pass
		E	END OF REPO	RT		

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Sw R I	8	SOUTH	6220 Culebra Ro Institute (Institute Cali Phone: 210-522-5	EARCH INSTITU ad, P.O. Drawer 28510 Quality Systems bration Laboratory 215 Fax 210-522-3692 of Calibration	ТЕ™	ACCREDITED Certificate # 0972-01
	Submitted By:	DIV20		Work Order:	444055693	
	Address:	B57			Oct 7, 2003	
		DARRELL DU		Calibration Date:	,	
Manuf	acturer Model:			**Calibration Due:	-	
	Serial No:	RESISTOR BO)X	Calibration Location:	-	Hum. 40 %RH
	Asset No:				IN TOLERAN	
		CL-70, JUN/99)		IN TOLERAN	
This certifica				ology (NIST) and the International System of U	Inits (SI) The Labo	ratory quality system
instrument de U. S. Governi Uncertainty e represents an than or equal *The client ha on the Test Ir stability of th	escribed above. This ment valuation includes the expanded uncertaint to 25% (4:1) of the t as sole responsibility estrument (TI) readin e TI.	certificate shall not ne item under test an ty using a coverage f test limit unless othe v for determination or ug(s) and limits as re	be used to claim product endorse ad is calculated in accordance with factor of k=2 to approximate a 95 prwise stated in remarks or an atta of in/out of tolerance or compliance ported. The reported uncertainty	nstitute Calibration Laboratory. The results of ment by the American Association for Laborat n the ISO "Guide to the Expression of Uncertai % confidence level. The calibration process pr chment relates only to the results at the time of calibrat ill remain within tolerance until this date. Any	ory Accreditation (A nty in Measurement" ovides a Test Uncerta on is provided for yo tion and does not imp	2LA) or any agency of the (GUM). The uncertainty ainty Ratio (TUR) of less ur convenience based only ly any short or long term
	rance before the next	t calibration date.				
Remarks:	None					
Standards	Used					
Asset	Manufacturer		Model	Description		Cal Due
001505	HEWLETT-PA	ACKARD	3458A/OPT-002	MULTIMETER		Apr 14, 04
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	by: Walt Hill Group Leader	Lúi	<u>~~</u>	Measurement Metrology Te	ucer H	Torales

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Southwest Research Institute Calibration Laboratory Calibration Report

Work Order: Asset No.	444055693 7243	Mfr. Model	SWRI 100k-10M OHM		Technician	Vmorales
Serial No.	7243	Туре.	Resistors		Cal Date.	3-Oct-03
Remarks:						
Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Resistance			kOhm	kOhm	kOhm	Results
Resistance	kOhm	kOhm	KOIIII	KOnni	KOnin	Results
Resistance	100.00	99.71	-0.29	1.00	0.0002	Pass
Resistance				-		

END OF REPORT

R		6220 Cule Ins Institu	RESEARCH INSTITU bra Road, P.O. Drawer 28510 stitute Quality Systems ite Calibration Laboratory 0-522-5215 Fax 210-522-3692	
	®	Certi	ficate of Calibration	0972-01
	Submitted By:	DIV20	Work Order:	444058432
	Address:		Date Issued:	
		DARRELL DUNN	Calibration Date:	• •
Manufa		SWRI 100K-10M OHMS	**Calibration Due:	
	Description: Serial No:	RESISTOR BOX	Calibration Location: Environment:	Bidg. 64 Temp. 73.0°F Hum. 45 %RH
	Asset No:			IN TOLERANCE
	Procedure:	RESISTORS JAN/04	*As Left:	IN TOLERANCE
conforms to IS be reproduced, instrument des U. S. Governm	O/IEC 17025, 1999 except in full, with cribed above. This ent.	and ANSI/NCSL Z540-1-1994 which are e nout the written approval of the Southwest R certificate shall not be used to claim produce	nd Technology (NIST) and the International System of U. equivalent to relevant requirements of the ISO 9000-1994 esearch Institute Calibration Laboratory. The results of the endorsement by the American Association for Laborato dance with the ISO "Guide to the Expression of Uncertain	series of standards. This certificate may not nis calibration relate only to the individual ry Accreditation (A2LA) or any agency of the
represents an e	xpanded uncertaint		nate a 95% confidence level. The calibration process pro-	
	trument (TI) readin		compliance/noncompliance. An in/out of tolerance opinio certainty relates only to the results at the time of calibration	
be out of tolera Remarks:	nce before the next None	•	rument will remain within tolerance until this date. Any n	umber of factors may cause the instrument to
Standards I	Usea Manufacturer	Model	Description	Cal Due
010465	FLUKE	8508A-01	MULTIMETER	Aug 27, 04
Approved by Metrology C		Alli	Measurements Metrology Tec	by: Bob Trollinger

Southwest Research Institute Calibration Laboratory Calibration Report

Work Order: Asset No. Serial No.	444058432 007243 7243	Mfr. Model Type.	SWRI 100k-10M OHM Resistors		Technician Cal Date.	blt 7-Apr-04
Remarks:						<u> </u>
Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Resistance	kOhm	kOhm	kOhm	kOhm	kOhm	Results
	100.00	99.71	-0.29	1.00	0.0002	Pass
	MOhm	MOhm	MOhm	MOhm	MOhm	
	10.00	9.96 END (-0.04 DF REPORT	0.10	0.059	Pass

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R	B	SOUTH	6220 Culebra Institu Institute Phone: 210-52	ESEARCH I a Road, P.O. Drawer 28 the Quality Systems Calibration Laboratory 22-5215 Fax 210-522- cate of Calibration	3510 3692	ГЕ ™	ACCREDITED Certificate # 0972-01
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	cturer Model:	B57 DARRELL DU SWRI 100K-1	0M OHMS	**	Calibration Date: Calibration Due:	Oct 14, 2004 Oct 14, 2004 Apr 14, 2005	
	-	RESISTOR BO	Λ	Call	bration Location:	-	Uum 40.0/DU
i i	Serial No: Asset No:					IN TOLERAN	Hum. 40 %RH
		RESISTORS JA	N/04			IN TOLERAN	
				Fechnology (NIST) and the Int			
be reproduced, instrument dese U. S. Governm Uncertainty eva represents an e number for cali	except in full, with cribed above. This ent. aluation includes the xpanded uncertaint ibration data.	nout the written appro certificate shall not l ne item under test and y using a coverage fa y for determination of	to be used to claim product en- lis calculated in accordance c tor of $k=2$ to approximate in/out of tolerance or com	valent to relevant requirements arch Institute Calibration Labo dorsement by the American A e with the ISO "Guide to the E a 95% confidence level. See pliance/noncompliance. An in ainty relates only to the results	ratory. The results of t ssociation for Laborate xpression of Uncertain Remarks or attached C /out of tolerance opinio	his calibration relate ry Accreditation (A2 ty in Measurement" alibration Report wit on is provided for you	only to the individual 2LA) or any agency of the (GUM). The uncertainty th the same Work Order ar convenience based only
stability of the			·				
	nterval is determin nce before the next None		loes not assure the instrum	ent will remain within toleranc	e until this date. Any r	number of factors ma	y cause the instrument to
Standards U							
Asset	Manufacturer		Model	Descript			Cal Due
007001	HEWLETT-PA	CKARD	3458A/OPT-002	MULTIM	ETER		Feb 19, 05
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Approved by		Ln	$\frac{1}{\nu}$			tt Keste by: Scott Ke	ster
Metrology G	y: Walt Hill Group Leader 20 date 11, May 04	Ln			Measurements Metrology Te		ster

Southwest Research Institute Calibration Laboratory Calibration Report

Work Order:	444061102 007243	Mfr.	SWRI 100k-10M OHM		Technician	SRK
Asset No. Serial No.	7243	Model Type.	Resistors		Cal Date.	14-Oct-04
Remarks:						
Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Resistance	kOhm	kOhm	kOhm	kOhm	kOhm	Results
	100.00	99.72	-0.28	1.00	0.00016	Pass
	MOhm	MOhm	MOhm	MOhm	MOhm	
	10.00	9.96	-0.04	0.10	0.059	Pass
		END	OF REPORT			

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