

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

WORK ORDER

CERTIFICATE # 23192 ASSET # 2028 DATE 7 Jul 96

ITEM DATA:

Manufacturer METTLER Model 1114-2

Description BALANCE Serial # 211001-192

Accessories _____

ACTION REQUESTED cal

CUSTODIAN DCR20 DRAGALL DUNN

Turned in by: _____ Phone _____

CHARGE # _____ 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 interval
_____ Reliability code

ACTION TAKEN: (Calibration/Repair/Parts) cal

CAL ENVIRONMENT:
Temperature 71 °F Humidity 55 %RH

CALIBRATED/REPAIRED
By [Signature] Cal Procedure CLCA-10E-001
Date 14 July 96 Accuracy mk
Cal Interval 2 Time to complete 2h
Next Cal due 4 MAY 97 Cal 2h Repair _____
Standards used (Asset#) _____

DATE COMPLETED _____
DATE PICKED UP _____ PICKED UP BY [Signature]

23192

UNUS? 20 - 2

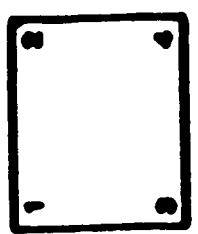
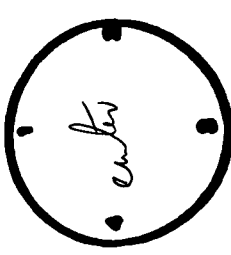
3157

BALANCE CALIBRATION VERIFICATION FORM

DATE: 7 Nov 97 MODEL: 6.0172
 SER. NO. 211001-142 RANGE: 2g CALIBRATION DATES: _____
 TEMPERATURE: 71 HUMIDITY: 55 LAST: 2 MAY 96 NEXT: 1 May 97
 CALIBRATED BY: Jerry A. White BALANCE TELEPHONE: _____
 BALANCE CAL. #: 23192 LINE TEL: _____ REP. TEL: _____

FAUSE VERIFICATION

	FAUSE #1		FAUSE #2		FAUSE #3	
	1	2	1	2	1	2
DATA Pts.	25	15	100	100	100	100
RUN #1	1.0000716	1.0000042	99.9994	100.0001	1.000071	1.000071
RUN #2	2.0000172	1.0000077	100.0015	0.9957		
RUN #3	2.0000175	1.0000074	100.0020	0.9960		
MEAN	2.0000174	1.0000075	100.0017	0.9957		
STD. DEV.						



COMMENTS: LIMITED TO +/- 0.03 MG/500MS

SIGNATURE: _____

SELF CALIBRATION VIA INTERNAL: _____

FAUSE POSITION

WEIGHT VALUE	FAUSE POSITION			
	1	2	3	4

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

WORK ORDER

CERTIFICATE # 27411 ASSET # 2028 DATE 3 Nov 97

ITEM DATA:

Manufacturer WEITLER Model 11AT 2
Description Balance Serial # 211501.142
Accessories _____

ACTION REQUESTED cal

CUSTODIAN DUNN 357 DUNN

Turned in by: _____ Phone _____

CHARGE # _____ 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) cal

CAL ENVIRONMENT:
Temperature 72 °F Humidity 30 %RH

CALIBRATED/REPAIRED:
By [Signature] Cal Procedure CEP-WT-001
Date 3 Nov 97 Accuracy M 7
Cal Interval 6 Reliability Code: _____
Next Cal due 3 MAY 98 Cal Time 1.1 Repair Time _____
Standards used (Asset#) _____

DATE COMPLETED [Signature]
DATE PICKED UP [Signature] PICKED UP BY [Signature]

27411

090.034

BALANCE CALIBRATION VERIFICATION FORM

DATE: 3 Nov 97
 BALANCE CAL NO.: _____
 TEMPERATURE: 72
 HUMIDITY: 37
 BARO. PRESSURE: 14.88

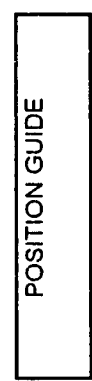
MFGR: METTLER
 MODEL: UM12
 SERIAL NO: 211001-142
 ASSET NO: 202Y
 RANGE: _____
 MASS UNCERTAINTY (U_m): _____

MFGR BALANCE TOLERANCES
 LINEARITY: _____
 ECCENTRICITY: _____
 REPRODUCIBILITY: _____
 TEMP. DRIFT/ °C: _____
 COMBINED MFR SPECS (U_{mfr}): _____

LAST CAL: 1 MVS
 NEXT CAL: 3 MAY 98
 TUR = Comb. MFR Specs (U_{mfr}) = 1
 U_{m-std}

If TUR < 4:1, U_b = _____

DATA POINTS	RANGE VERIFICATION		
	RANGE 1	RANGE 2	RANGE 3
20.00014	10.0014		
20.00016	10.0016		
20.00012	10.0012		
MEAN			
STD. DEV.			



Handwritten signature and initials over the position guide diagram.

SHIFT VERIFICATION
 SELF CALIBRATION Y/N INTERNAL: _____ EXTERNAL: _____

ACTUAL WEIGHT IN CENTER	PAN POSITION			
	1	2	3	4
DIFF.				

COMMENTS: _____
 SIGNATURE: _____

MEASURED UNCERTAINTY:

Linearity ± _____ g
 Eccentricity ± _____ g
 Comb. Uncertainty ± _____ g
 Rep. (σ) ± _____ g
 Mass tol. (2σ) ± _____ g
 Comb. Uncertainty ± _____ g

Std. Uncertainty ± _____ g
 Std. Uncertainty ± _____ g
 (σ) ± _____ g
 (linearity, eccentricity, reproducibility, mass)

Expanded Unc. (k = 2) ± _____ g

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

WORK ORDER

CERTIFICATE # 29572 ASSET # 2028 DATE 4 MAY 98

ITEM DATA:

Manufacturer METTLER Model 4112
Description ELECTRONIC BALANCE Serial # 211001-142
Accessories _____

ACTION REQUESTED CAL

CUSTODIAN DEPT 20 DARRELL DUNN

Turned in by: _____ Phone _____

CHARGE # _____ 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 _____

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) CAL

CAL ENVIRONMENT:
Temperature 73 °F Humidity 62 %RH

CALIBRATED/REPAIRED:
By [Signature] Cal Procedure CAL-WT-001
Date 4 MAY 98 Accuracy ± 0.034 mil grams
Cal Interval 6 Reliability Code: _____
Next Cal due 4 NOV 98 Cal Time 1.5 Repair Time _____
Standards used (Asset#) 1720 1706

DATE COMPLETED CAL DATE PICKED UP [Signature]

29572

BALANCE CALIBRATION VERIFICATION FORM

DATE: 4 NOV 97
 BALANCE CAL NO.: 29572
 TEMPERATURE: 22
 HUMIDITY: 72
 BARO. PRESSURE: 14.

MFGR: MATTAR
 MODEL: UM12
 SERIAL NO: 21001-42
 ASSET NO: 2021
 RANGE: 2g
 MASS UNCERTAINTY (U_m): _____


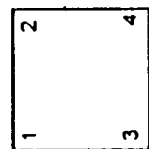
MFGR BALANCE TOLERANCES
 LINEARITY: _____
 ECCENTRICITY: _____
 REPRODUCIBILITY: _____
 TEMP. DRIFT/°C: _____
 COMBINED MFR SPECS (U_{mfr}): _____

CALIBRATION DATES
 LAST CAL: 3 NOV 97
 NEXT CAL: 4 NOV 97
 TUR = Comb. MFR Specs (U_{mfr}) = 1
 U_{mfr-stc}

If TUR < 4:1, U_g = _____

		RANGE VERIFICATION			
		RANGE 1	RANGE 2	RANGE 3	RANGE 4
DATA POINTS	CALIBRATION POINTS	CALIBRATION POINTS	CALIBRATION POINTS	CALIBRATION POINTS	CALIBRATION POINTS
1720	25	1g	500mg	2mg	
1704	2.000312	1.0000119	499946	2.0042	
RUN # 2	4.000310	1.0000122	4999552	2.0088	
RUN # 2	2.000311	1.0000121	499949	2.0040	
MEAN					
STD. DEV.					

POSITION GUIDE

SHIFT VERIFICATION	
SELF CALIBRATION Y/N	PAN POSITION
INTERNAL: _____	EXTERNAL: _____
1	2
3	4
DIFF.	

COMMENTS: uncertainty of +/- 0.0340 cal spec

SIGNATURE: _____

MEASURED UNCERTAINTY:
 Linearity ± _____ g
 Eccentricity ± _____ g
 Comb. Uncertainty = _____ g
 Rep (σ) ± _____ g
 Mass tol. (2σ) = _____ g
 Comb Uncertainty = _____ g

Std Uncertainty = _____ g
 Std Uncertainty = _____ g
 (σ) = _____ g
 (linearity, eccentricity, reproducibility, mass)

SWRI CALIBRATION LAB
 (210) 522-5215
 CAL 3 NOV 97 BY CAV
 DUE 3 NOV 98 ID 2021
 SIN 21001-42
 UNCERTAINTY of
+/- 0.0340 cal spec

Expanded Unc (k = 2) = _____ g

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

WORK ORDER

CERTIFICATE # 31805 ASSET # 2028 DATE 27 Oct 98

ITEM DATA:

Manufacturer METTLER Model UMT2
Description Balance Serial # 211001-142
Accessories _____

ACTION REQUESTED CrL

CUSTODIAN DIV20 B57 DARRELL DUNN

Turned in by: _____ Phone _____

CHARGE # _____ 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 _____

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) _____

CAL ENVIRONMENT:
Temperature 70 °F Humidity 65 %RH

CALIBRATED/REPAIRED:
By [Signature] Cal Procedure QREP-WT-001
Date 27 Oct 98 Accuracy mg
Cal Interval 6 Reliability Code: 710
Next Cal due 22 APR 99 Cal Time 1.0 Repair Time _____
Standards used (Asset#) 1706 1704 1720

DATE COMPLETED 27 Oct 98 [Signature]
DATE PICKED UP _____ PICKED UP BY _____

31805

BALANCE CALIBRATION VERIFICATION FORM

DATE 27 Oct 98
 BALANCE CAL NO: _____
 TEMPERATURE 70
 HUMIDITY 63
 BARO PRESSURE 44.32

MFGR: METTLER
 MODEL: UM172
 SERIAL NO: 211001-142
 ASSET NO: 2028
 RANGE: 2
 MASS UNCERTAINTY (U_m): _____

MFGR BALANCE TOLERANCES
 LINEARITY: _____
 ECCENTRICITY: _____
 REPRODUCIBILITY: _____
 TEMP DRIFT/°C: _____
 COMBINED MFR SPECS (U_{comb}): _____

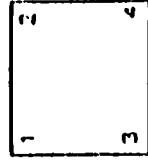
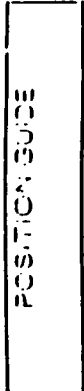
CALIBRATION DATES
 LAST CAL: 4 MAY 97
 NEXT CAL: 27 APR 99

TUR = Comb MFR Specs (U_{comb}) = 1
 U_{max} = _____

IF TUR < 4:1, U₃ = _____

4/0.034

170g 1704 1720	RANGE VERIFICATION		RANGE 3 CALIBRATION POINTS
	RANGE 1 CALIBRATION POINTS	RANGE 2 CALIBRATION POINTS	
DATA POINTS	2g	500mg	10mg
RUN #1	2.00003	1.000004	499996
RUN #2	2.00004	1.000007	499998
RUN #3	2.00005	1.00001	499996
MEAN			
STD DEV.			



SHIFT VERIFICATION
 SELF CALIBRATION IN INTERNAL EXTERNAL

ACTUAL WEIGHT IN CENTER	PAN POSITION		
	1	2	3
DIFF			

COMMENTS: _____

 SIGNATURE: [Signature]

MEASURED UNCERTAINTY:
 Linearity = _____ g
 Eccentricity = _____ g
 Comb Uncertainty = _____ g
 Rep (c) = _____ g
 Mass tol (2σ) = _____ g
 Comb Uncertainty = _____ g

Six Uncertainty = _____ g
 Six Uncertainty = _____ g
 (c) = _____ g
 (linearity eccentricity reproducibility mass)

Excesses Unc (AFC) = _____ g

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

WORK ORDER

CERTIFICATE # 37828 ASSET # 2028 DATE 26 May 99

ITEM DATA:

Manufacturer METTLER Model UMT2
Description BALANCE Serial # 211001-142
Accessories _____

ACTION REQUESTED Cal

CUSTODIAN DW20 DARRELL DUNN

Turned in by: _____ Phone _____

CHARGE # _____ 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 _____

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) Unit does not open - need cleaning/repair

CAL ENVIRONMENT:

Temperature 67 °F Humidity 68 %RH

CALIBRATED/REPAIRED

By [Signature] Cal Procedure QACP-05-001

Date 31 May 99 Accuracy ± 0.034 mg

Cal Interval 6 Reliability Code: _____

Next Cal due 30 Sept 99 Cal Time 1.5 Repair Time 2.5

Standards used (Asset#) cal & repair at site

DATE COMPLETED 31 May 99 [Signature]

DATE PICKED UP _____ PICKED UP BY _____

37828

BALANCE CALIBRATION VERIFICATION FORM

DATE: 31 MAR 99
 BALANCE CAL NO.: 33722
 TEMPERATURE: 67
 HUMIDITY: 64
 BARO. PRESSURE: 14.38

MFGR: METTLER
 MODEL: 1107.2
 SERIAL NO: 211001142
 ASSET NO: 2021
 RANGE: _____
 MASS UNCERTAINTY (U_m): _____

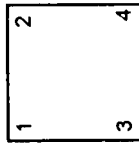
MFGR BALANCE TOLERANCES _____
 LINEARITY: _____
 ECCENTRICITY: _____
 REPRODUCIBILITY: _____
 TEMP. DRIFT/°C: _____
 COMBINED MFR SPECS (U_{mfr}): _____

CALIBRATION DATES
 LAST CAL: 27 Oct 98
 NEXT CAL: 30 Sept 99
 TUR = Comb. MFR Specs (U_{mfr}) = 1:1
 U_{mfr-std}

If TUR < 4:1, U_b = _____

E1 0.1

DATA POINTS	RANGE VERIFICATION				CALIBRATION POINTS	POSITION GUIDE		
	RANGE 1		RANGE 2				RANGE 3	
	CALIBRATION POINTS		CALIBRATION POINTS				CALIBRATION POINTS	
RUN #1	25	15	500	100	50	6m		
RUN #2	2.000005	999999	500004	999997	5.005	1.002		
RUN #2	1.000004	999995	500007	999994	5.008	1.002		
RUN #2	2.000003	999997	500006	999995	5.008	1.003		
MEAN								
STD. DEV.								



MEASUREMENT UNCERTAINTY is +/- 0.034 milligram

COMMENTS: _____
 SIGNATURE: [Signature]

*Rep's Draft shield - removed & adjusted
 sets under shield. (was sticking)*

MEASURED UNCERTAINTY:

Linearity ± _____ g
 Eccentricity ± _____ g
 Comb. Uncertainty ± _____ g
 Rep. (σ) ± _____ g
 Mass tol. (2σ) ± _____ g
 Comb. Uncertainty ± _____ g

Std. Uncertainty ± _____ g
 Std. Uncertainty ± _____ g
 (σ) ± _____ g
 (linearity, eccentricity, reproducibility, mass)

Expanded Unc. (k = 2) ± _____ g

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

B57
30 Sept 99

WORK ORDER

WORK ORDER # 36118 ASSET # 2028 DATE 23 Sept 99

ITEM DATA:

Manufacturer Mettler Model UMT2
Description Balance Serial # 21101-142
Accessories _____

ACTION REQUESTED _____

CUSTODIAN Darrell Dunn

Turned in by: _____ Phone _____

CHARGE # 20-0751-006 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 _____

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) Cal

CAL ENVIRONMENT: Temperature 77 °F Humidity 37 %RH 4.3

CALIBRATED/REPAIRED: By [Signature] Cal Procedure RLCP-WF-001 AUG 99
Date 30 Sept 99 Accuracy u/h
Cal Interval L Reliability Code _____
Next Cal Due 30 Dec 00 Cal Time 1.5 Repair Time _____
Standards used (Asset #) 710

DATE COMPLETED cal on site [Signature]

DATE PICKED UP _____ PICKED UP BY _____

36118

BALANCE CALIBRATION VERIFICATION FORM

DATE: 30 Sept
 BALANCE CAL NO.: 31118
 TEMPERATURE: 28
 HUMIDITY: 37
 BARO. PRESSURE: 14.35

MFGR: METTLER
 MODEL: 1101
 SERIAL NO: 21101-142
 ASSET NO: 2024
 RANGE: _____
 MASS UNCERTAINTY (U_m): _____

MFGR BALANCE TOLERANCES _____
 LINEARITY: _____
 ECCENTRICITY: _____
 REPRODUCIBILITY: _____
 TEMP. DRIFT/°C: _____
 COMBINED MFR SPECS (U_{mf}): _____

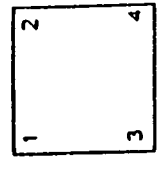
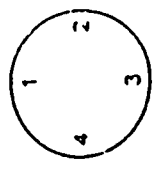
TUR = Comb MFR Specs (U_±) = 1
 U_{m-sig}

If TUR < 4:1, U_o = _____

710

DATA POINTS	RANGE VERIFICATION		
	RANGE 1	RANGE 2	RANGE 3
	CALIBRATION POINTS	CALIBRATION POINTS	CALIBRATION POINTS
RUN # 1	29 15 100mg		
RUN # 2	1.999987999985	0.099980	
RUN # 2	1.999985999990	0.099985	
RUN # 2	1.999987999992	0.099990	
MEAN			
STD. DEV.			

POSITION GUIDE



SWRI CALIBRATION LAB
 (210) 522-5218
 CAL 3/2000 99 BY JHP
 DUE 3/25/09 ID 2024
 SN 2/1001-142
 UNCERTAINTY of A
0.039 milligrams

SELF CALIBRATION Y/N INTERNAL: _____ EXTERNAL: _____

ACTUAL WEIGHT IN CENTER	PAN POSITION			
	1	2	3	4
DIFF				

COMMENTS: 7/0.039 Tur 142
Class 1 weight

SIGNATURE: [Signature]

MEASURED UNCERTAINTY:

Linearity = _____ g
 Eccentricity = _____ g
 Comb Uncertainty = _____ g

Rep (σ) = _____ g
 Mass tol. (2σ) = _____ g
 Comb Uncertainty = _____ g

Linearity uncertainty, reproducibility, mass Expanded Unc. (k = 2) = _____ g

WORK ORDER 38382

Date Received 3/24/00

Asset No. 002028 Manufacturer METTLER Model UMT2
Description ELECTRONIC BALANCE Serial Number 211001-142
Accessory Received/Required NONE
Div/CC ID NONE Accessory to Asset No. N/A Accuracy MFG SPECS
Div/CC DIV20 Location B57 Custodian DARRELL DUNN Tel. 6090
Charge/Project No. 20.00751.006 Proprietary/Confidential N Date Required ROUTINE
Work Requested CALIBRATION ONSITE
Receiving Inspection _____
Delivered By N/A Tel. 6090

WORK HISTORY

Date	Start Time	Stop Time	Notes

PARTS

Part Name	Part Number	Cost	Failure Description

WORK SUMMARY

Failure Description _____

Repair Action _____

Cal Procedure CLCP-WT-001, 12/99 Temp 72 F Hum 57 %

Tech JWD Cal Hrs. 1.5 Repair Hrs. _____ Part Cost _____

Action Taken cal

Standards Used 1706 1704 1720

Date Cal 4 Mar 2000 Int. 6 Mo. Date Due 24 Apr 2000 Reliability Code 3

Date Picked Up _____ Picked Up By _____

cal to set

38382

ELECTRONIC BALANCE CALIBRATION DATA SHEET

WORK ORDER _____ DATE 24 MAR 2000 TECHNICIAN JNW

MODEL UMT2 SERIAL NO. 211001-142 ASSET NO. 2028

LOCATION B87

AMBIENT: TEMP 72 HUMIDITY 57 BARO PRESS 14.29

1) CALIBRATION CHECK

AS FOUND FULL-CAPACITY INDICATION 2.000014

POST-CALIBRATION INDICATION 2.000014 TOLERANCE ±.034 P/F _____

1720

2) REPEATABILITY

1	1.000023	6	22
2	1.000020	7	20
3	1.000023	8	22
4	22	9	20
5	20	10	20

SWRI CALIBRATION LAB
 (210) 522-5215
 CAL BY JNW
 DUE DATE 30 MAR 00 ID 2028
 SN 211001-142
 UNCERTAINTY ±.034 milligram

1706
1704

S.D. _____ TOLERANCE _____ P/F _____

3) OFF-CENTER ERROR

1		3	
2		4	

TOLERANCE _____ P/F _____

4) NON-LINEARITY

TEST POINT	INDICATION	NON-LIN ERROR	TEST WEIGHT S/N
0	0.000000	—	—
25%	499999		
50%	499999		
75%	499998		
100%	499998		

TOLERANCE _____ P/F _____

5) COMMENTS:



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

Certificate of Calibration

24 March 2000

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: METTLER UMT2
Description: ELECTRONIC BALANCE
Serial Number: 211001-142
Asset Number: 002028

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: 57 % RH

Calibration Date: 24 Mar 00 **Calibration Procedure:** CLCP-WT-001, 12/99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor or Walt Hill, Metrologist

Certificate # 38382

m:\nona21a.rpt Rev date 13 Apr 99

Measurements performed by:

Jerry White, Technician

Page 1 of 1

WORK ORDER 40566

Date Received 9/14/00

Asset No. 002028 Manufacturer METTLER Model UMT2
 Description ELECTRONIC BALANCE Serial Number 211001-142
 Accessory Received/Required NONE
 Div/CC ID NONE Accessory to Asset No. N/A
 Div/CC DIV20 Location B57 Custodian DARRELL DUNN Tel. 6090
 Charge/Project No. 20.00751.006 Proprietary/Confidential N Date Required ROUTINE
 Work Requested CALIBRATION ONSITE
 Receiving Inspection
 Delivered By N/A Tel. 6090

WORK HISTORY

Date	Start Time	Stop Time	Notes

PARTS

Part Name	Part Number	Cost	Failure Description

WORK SUMMARY

Failure Description _____

Repair Action _____

Cal Procedure CLCP-WT-001, 12/99 Temp 71 F Hum 71 %

Tech GM Cal Hrs. 1.5 Repair Hrs. _____ Part Cost _____

Action Taken cal

Standards Used 7102

Date Cal 15 Sept 2000 Int. 6 Mo. Date Due 15 Mar 2001 Reliability Code _____

Date Picked Up _____ Picked Up By _____

cal on str

40566

ELECTRONIC BALANCE CALIBRATION DATA SHEET

WORK ORDER 40566 DATE 15 Sep/2000 TECHNICIAN JW

MODEL UMT2 SERIAL NO. 211001-142 ASSET NO. 2028

LOCATION B57

AMBIENT: TEMP 45 HUMIDITY 71 BARO PRESS 14.30

1) CALIBRATION CHECK

AS FOUND FULL-CAPACITY INDICATION 2.0000102 25 m/dl 25 w/dl
2.0000134

POST-CALIBRATION INDICATION 5nmv TOLERANCE _____ P/F _____

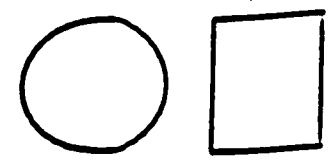
2) REPEATABILITY

1	1.0000116	6	1.0000122
2	1.0000125	7	1.0000124
3	1.0000120	8	1.0000120
4	1.0000118	9	1.0000119
5	1.0000115	10	1.0000117

7102.

SWRI CALIBRATION LAB
 (210) 522-5215
 CAL 24 MAR 2000 BY JW
 DUB 15 Sep 2000 ID 2028
 S/N 211001-142
 UNCERTAINTY of
± 0.034 milligrams

S.D. _____ TOLERANCE _____ P/F _____



3) OFF-CENTER ERROR

1		3	
2		4	Center

TOLERANCE _____ P/F _____

4) NON-LINEARITY

TEST POINT	INDICATION	NON-LIN ERROR	TEST WEIGHT S/N
0	0.000000	—	—
25%	0.5000099		
50%	0.5000051		
75%	0.5000025		
100%	0.5000030		

TOLERANCE _____ P/F _____

5) COMMENTS:



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 September 2000

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: METTLER UMT2
Description: ELECTRONIC BALANCE
Serial Number: 211001-142
Asset Number: 002028

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: 71.0 Degrees Fahrenheit Humidity: 71 % RH

Calibration Date: 15 Sep 00 **Calibration Procedure:** CLCP-WT-001, 12/99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor, or Walt Hill, Metrologist

Certificate # 40566

m:\a2la.rpt Rev date 22 May 00

Measurements performed by:

Jerry White, Technician

Page 1 of 1

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Processed by WHILL at 11:11:05AM on 3/1/01

||||| ||||| ||||| ||||| ||||| ||||| |||||

Work Order 444042611

Arrived 3/1/01

Asset No. 002028 Manufacturer METTLER

Model UMT2

Instrument Type/Class BALANCE

Serial No. 211001-142

Accessory No. Calibration Procedure CLCP-WT-001, 12/99

Location B57

Div/Client DIV20

Custodian DARRELL DUNN

Mail Stop B57

Tel. 6090

Charge/Project No. 20.00751.006

Delivered By / Telephone

IN4CAL

Special Instructions _____

WORK NOTES

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

REPAIR PARTS

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

WORK SUMMARY

Failure Description _____

Repair Action _____

Calibration Procedure CLCP-WT-001, 12/99 Temp 69.1F Hum. 29.7 %

Tech R. DeKster Totals Cal Hours 1.5 Repair Hours _____ Parts Cost _____

Standards Used 00712

Date Picked Up _____

Picked Up By _____

42611



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

16 March 2001

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: METTLER UMT2
Description: BALANCE
Serial Number: 211001-142
Asset Number: 002028
Work Order Number: 444042611

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.

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The uncertainty of the calibration was sufficient to determine that the item met the manufacturer's published specifications unless stated otherwise below.

Ambient Conditions: Temperature: 69.1 Degrees Fahrenheit Humidity: 29 % RH

Calibration Date: 16 Mar 01 **Calibration Procedure:** CLCP-WT-001, 12/99

Condition as Received: WITHIN LIMITED CALIBRATION

Condition as Released: LIMITED CALIBRATION

Remarks: LIMITED CALIBRATION, LIMITED ACCURACY TO +/- 0.034 MILLIGRAMS

Approved by:

Walt Hill, Supervisor
Institute Calibration Laboratory

Measurements performed by:

Roger Dykstra, Technician

ELECTRONIC BALANCE CALIBRATION DATA SHEET

WORK ORDER 1440A2611 DATE _____ TECHNICIAN R Dykster

MODEL UMT2 SERIAL NO. 211001-1A2 ASSET NO. 002029

LOCATION B57 L113 Materials Lab

AMBIENT: TEMP 69.1 °F HUMIDITY 29.7% BARO PRESS 14.38 PSIA

1) CALIBRATION CHECK 2g AN 007102

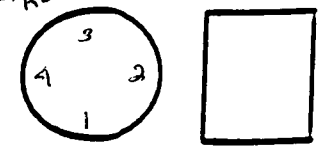
AS FOUND FULL-CAPACITY INDICATION 2.000026g

POST-CALIBRATION INDICATION 2.000026 TOLERANCE $\frac{34.0 \text{ RD}}{\pm 39.3 \mu\text{g}}$ P/F Pass

2) REPEATABILITY 1g AN 007102

1	1.000006	6	1.000009
2	1.000007	7	1.000008
3	1.000008	8	1.000007
4	1.0000 ⁰⁸ RD	9	1.000009
5	0.999999 1.000008 RD	10	1.000008

S.D. 9.18E-7 TOLERANCE $\frac{34 \mu\text{g}}{\pm 0.25 \mu\text{g}}$ RD P/F Failed RD



3) OFF-CENTER ERROR 1g

1	-0.600002 ¹⁰ g	3	0.0000002g
2	0.0000010 ¹⁰ g	4	0.0000009g

TOLERANCE $\frac{34 \text{ RD}}{\pm 1.0 \mu\text{g}}$ P/F Pass * Very hard to do off center due to weighing area so small

4) NON-LINEARITY

TEST POINT	INDICATION	NON-LIN ERROR	TEST WEIGHT S/N
0	0.000000	-	-
25%	0.4999990g	-10 μg	AN 007102
50%	0.5000025g	+25 μg	AN 007102
75%	0.5000027 ³⁴ RD	+34 μg	AN 007102
100%	0.5000023g	+23 μg	AN 007102

TOLERANCE $\frac{34 \text{ RD}}{\pm 1.0 \mu\text{g}}$ P/F Failed

5) COMMENTS: Balance was not level. Limited to $\pm 0.034 \text{ mg}$
door was sticking

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Received by MROMERO, 8/17/01 8:53:29AM

||||| ||||| ||||| ||||| ||||| ||||| |||||

Arrived 8/17/01

Work Order **444044840**

Asset No. 002028 Manufacturer METTLER

Model UMT2

Instrument Type/Class BALANCE

Serial No. 211001-142

Accessory No.

Calibration Procedure CLCP-WT-001, 12/99

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

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

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

WORK SUMMARY

Failure Description _____

Repair Action _____

Calibration Procedure _____

Temp 70 F

Hum. 55 %

Tech MMA Anthony Romero

Totals

Cal Hours 2.0

Repair Hours _____

Parts Cost _____

Standards Used 104

Date Picked Up _____

Picked Up By _____

448710



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

17 August 2001

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: METTLER UMT2
Description: BALANCE
Serial Number: 211001-142
Asset Number: 002028
Work Order Number: 444044840

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NCCL 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: 70.0 Degrees Fahrenheit Humidity: 55 % RH

Calibration Date: 17 Aug 01 **Calibration Procedure:** CLCP-WT-001, 12/99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

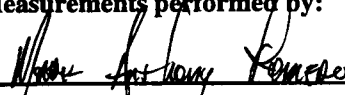
Remarks:

Approved by:



Walt Hill, Supervisor
Institute Calibration Laboratory

Measurements performed by:



Mark Romero, Technician

WORK ORDER 444044840 DATE 17 Aug. 2001 TECHNICIAN W. Anthony Demarco
 MODEL UMT 2 SERIAL NO. 211001-142 ASSET NO. 002028
 LOCATION b.57
 AMBIENT: TEMP 70 HUMIDITY 55 BARO PRESS 14.31

1) CALIBRATION CHECK

AS FOUND FULL-CAPACITY INDICATION 1.999914 g
~~1.000007 g~~

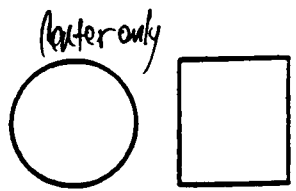
POST-CALIBRATION INDICATION _____ TOLERANCE _____

SWRI CALIBRATION LAB
 (210) 522-5215
 CAL 16 Mar 01 BY R. D. ...
 DUE 16 Sep 01 ID 2028
 SN 211001-142
 Uncertainty ± 0.039 milligrams

2) REPEATABILITY

1	1.000006 g	6	1.000003 g
2	1.000000 g	7	1.000004 g
3	0.999990 g	8	1.000005 g
4	0.999993 g	9	1.000004 g
5	0.999993 g	10	1.000004 g

S.D. _____ TOLERANCE _____ P/F _____



3) OFF-CENTER ERROR

1		3	
2		4	

TOLERANCE _____ P/F _____

4) NON-LINEARITY

TEST POINT %FS or value	INDICATION	NON-LIN ERROR	TEST WEIGHT S/N
	0	—	—
	0.500008 g		
	0.500004 g		
	0.500006 g		
	0.500009 g		

TOLERANCE _____ P/F _____

5) COMMENTS:

7102

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Received by MROMERO, 2/20/02 8:14:07AM

Arrived 2/20/02

Work Order **444047298**

Asset No. 002028 Manufacturer METTLER

Model UMT2

Equipment Type BALANCE

Serial No. 211001-142

Accessory No.

Interval 6 M

Calibration Procedure CLCP-WT-001, 12/99

Location B57

Div/Client DIV20

Custodian DARRELL DUNN

Mail Stop B57

Tel 6090

QUEUE

Special Instructions _____

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

Charge/Project No. 00751.006 1.20

Requester / Telephone _____

This information is correct for the work requested. _____

SWRI CALIBRATION LAB
(210) 522-5215

CAL 17 Aug 01 BY MMR
DUE 17 FEB 02 ID 002028
SN 211001-142

WORK NOTES

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

Uncertainty of
± 0.034 milligrams

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

WORK SUMMARY

Failure Description _____

Repair Action _____

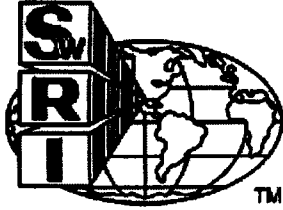
Tech MMR Cal Hrs. 1.0 Repair Hrs _____ Parts Cost _____ Temp 72 F Hum. 24 %

Standards Used 7102

Date Picked Up 19 FEB 2002

Picked Up By AL CONLITE

444047298



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

Certificate of Calibration

20 February 2002

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: METTLER UMT2
Description: BALANCE
Serial Number: 211001-142
Asset Number: 002028
Work Order Number: 444047298

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NCCL 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: 24 % RH


Calibration Date: 19 Feb 02 **Calibration Procedure:** CLCP-WT-001, 12/99

Condition as Received: LIMITED CALIBRATION

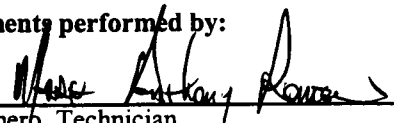
Condition as Returned: LIMITED CALIBRATION

Remarks: ACCURACY +/-0.034 MILLIGRAMS.

Approved by:


Walt Hill, Supervisor
Institute Calibration Laboratory

Measurements performed by:


Mark Romer, Technician

Southwest Research Institute
 Calibration Laboratory
 Calibration Data Sheet

Work Order 444047298	Mfr. Mettler	Technician Mark A. Romero
Asset No. 2028	Model UMT2	Procedure CLGP-WT-001, 12/99
Serial No. 211001-142	Type Balance	Cal Date 20-Feb-02

Location: Bldg. 57/ Lab L113

Ambient Conditions: 72 F 24 %RH 14.20 PSIA

Operational Check: Limits +/- : 0.0000340 g Uncertainty: 0.0000204 g

STD Mass Load	As Found Indication	Instrument Error
2.0000000 g	1.9999841 g	-0.0000159 g

Post Calibration Check:

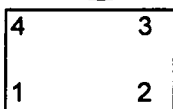
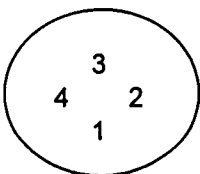
STD Mass Load	Post calibration Indication	Instrument Error	Results *
2.0000000 g	1.9999990 g	-0.0000010 g	Pass

Repeatability Check: Mass Load: 2.0000000 g

1	1.9999900 g	6	2.0000044 g
2	1.9999900 g	7	2.0000100 g
3	1.9999873 g	8	1.9999975 g
4	2.0000086 g	9	1.9999995 g
5	2.0000095 g	10	1.9999802 g

Std Deviation	Tolerance
0.0000105	0.0000340 g

Off-Centerline Check: Mass Load: 1.0000000 g Uncertainty: 0.0000204 g



	Indication	Instrument Error	+/- Limits	Results *
1	0.0000077 g	0.0000077 g	0.0000340	Pass
2	0.0000056 g	0.0000056 g	0.0000340	Pass
3	-0.0000045 g	-0.0000045 g	0.0000340	Pass
4	0.0000092 g	0.0000092 g	0.0000340	Pass

Non-Linearity Check: Range: 2.0000000 g Uncertainty: 0.0000204 g

STD Mass Load	Indication	Instrument Error	+/- Limits	Results *
0.0000000 g	0.0000000 g	0.0000000 g	0.0000340	Pass
0.5000000 g	0.5000003 g	0.0000003 g	0.0000340	Pass
1.0000000 g	0.4999968 g	-0.0000032 g	0.0000340	Pass
1.5000000 g	0.5000001 g	0.0000001 g	0.0000340	Pass
2.0000000 g	0.5000024 g	0.0000024 g	0.0000340	Pass

Remarks: Limited calibration - accuracy of +/-0.034 milligrams. Readability is 0.1 ug. Standards used 7102.
 * The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, which provides a level of confidence of approximately 95%. The results can be Pass, Fail, or if blank "not determinable". If "not determinable" the end user is responsible in determining whether the results meet their requirements.

Southwest Research Institute
 Calibration Laboratory
 Uncertainty Budget

Mettler UMT2 (TI)	Units	Range	Acc. +/- (1)	Resolution
	mg	2 100	0.034	0.0001
Source of Uncertainty	Value	Distribution	Divisor	Std. Uncert. mg
Standard weight (2)	0.0175	Rectangular	Sqrt 3	0.0101
Resolution	0.0001	Rectangular	Sqrt 3	0.0000577
Air buoyancy (3)	0.0021	Rectangular	Sqrt 3	0.00121
Combined Uncertainty	RSS			0.0102
Expanded Uncertainty	k=2			0.0204
Test Accuracy Ratio (TAR)	TI Acc./STD Acc.			
	1.9	to 1		
Test Uncertainty Ratio (TUR)	TI Acc./Muk=2			
	1.7	to 1		
<p>(1) Limited calibration - accuracy limited to +/-0.034mg.</p> <p>(2) RSS of combined tolerances for check weights [Class E1 2g (12ug), 1g (10ug), and 500mg (8ug)].</p> <p>(3) No correction is made for air buoyancy. As the span of the weighing machine was adjusted before calibration, the uncertainty limits were estimated to be 1 ppm of the nominal value ie= 2.1 ug.</p>				