3/13/92 LOADS OF 2+3 MPH. TEST WERE ABORTED. AP

3/24/92 APPARATUS WAS DISASSEMBLED. SPECIMENS WERE PHOTOGRAPHED. RAN PROFILE T12PBBAT.DAT. AP

3/25/92 RAN PROFILE T12PTBAT.DAT.

3/26/92 CALIBRATED ALL BENTLY PROXIMITORS. CALIBRATION DATA IS IN LAB NOTEBOOK UNDER CAL DATA.

3/27/92 CALIBRATED ALL LVDT'S. CAL DATA IS IN LAB NOTEBOOK.

4/1/92 CALIBRATED ALL LOAD CELLS. FOUND ONE 25,000# LOAD CELL TO BE BAD. ALL CAL DATA IN LAB NOTEBOOK

4/9/92 CALIBRATED ACCELEROMETERS TO 2 GS/VOLT. EQUIPMENT USED WAS ENDEVCO MODEL ECG ACCEL #4 + #8; MEASUREMENTS GROUP CONDITIONER 2120A, S/N 84077, CAL NOT REQ'D; FLUKE MODEL 87 DMM, S/N 51502012, CAL DUE 8 AUG 92; USED ROLLOVER METHOD TO CAL 1G = 0.5V

LEFT CHANNEL ACCEL #4	RIGHT CHANNEL ACCEL #8
BRIDGE VOLTAGE = 5V	BRIDGE VOLTAGE 5V
GAIN - X200 KNOB 0.76	GAIN - X200 KNOB 0.92

APPARATUS WAS REASSEMBLED. SPECIMENS WERE INSTRUMENTED AS ILLUSTRATED ON PAGE 95. PREVIOUS TO REASSEMBLY THE TOP BOX WAS WELDED TOGETHER AS A SOLID PIECE. THE BACK PLATE IS STILL REMOVABLE. THE TOP ROCK WAS REGROUTED AND CURED OVERNIGHT IN A 105°C OVEN.

4/10/92 A 9VDC SIGNAL WAS FED INTO ALL INPUTS OF THE COMPUTER. THE COMPUTER REFLECTED 9V ON ALL CHANNELS. A 14 CHANNEL TAPE RECORDER WAS SET-UP TO RECORD 13 CHANNELS OF DATA. A 9VDC SIGNAL WAS INPUT TO THE 13 CHANNELS. FOLLOWING IS THE CHANNEL LISTING OF THE COMPUTER AND THE TAPE RECORDER WITH CALIBRATION VALUES.

AP 4/13/92

4/10/92 TAPE RECORDER (SEE END OF SERIES FOR TAPE LOG)

CHANNEL	TRANSDUCER	CAL LEVEL	CAL VALUE
1	TOTAL VERT LD	8863 #	10,051 #/V
2	HORIZ. LD	5913 #	9,972 #/V
3	BENTLY #7	~~345 MILS~~ 330 MILS	94.38 MILS/V
4	BENTLY #4	~~364 MILS~~ 367 MILS	98.58 MILS/V
5	BENTLY #5	~~327 MILS~~ 320 MILS	90.74 MILS/V
6	LVDT #1	~~0.29 IN~~ 0.5"	0.2"/V
7	LVDT #2	~~0.28 IN~~ 0.5"	0.19"/V
8	ACCEL #4	4.3 G's	2 GS/V
9	ACCEL #8	4.9 G's	2 GS/V
10	BENTLY #6	~~381 MILS~~ 372 MILS	100.34 MILS/V
11	VERT LD CELL #4	2945 #	10,057 #/V
12	VERT LD CELL #3	~~2959 #~~ 2993 #	10,065 #/V
13	VERT LD CELL #1	2937 #	10,031 #/V

AP 4/13/92

COMPUTER

CHANNEL	XDCR	CAL VALUE	CAL DATE
0	TOTAL VERT LD	10,051 #/V	4/10/92
1	HORIZ LD	9,972 #/V	4/1/92
2	BENTLY #7	94.38 MILS/V	3/26/92
3	BENTLY #4	98.58 MILS/V	3/26/92
4	BENTLY #5	90.74 MILS/V	3/26/92
5	LVDT #1	0.2"/V	3/27/92
6	LVDT #2	0.19"/V	3/27/92
7	ACCEL #4	2 GS/V	4/9/92
8	ACCEL #8	2 GS/V	4/9/92
9	BENTLY #6	100.34 MILS/V	3/26/92
10	VERT LD CELL #4	10,057 #/V	4/1/92
11	VERT LD CELL #3	10,065 #/V	4/1/92
12	VERT LD CELL #1	10,031 #/V	4/1/92

AP

4/13/92 RAN TEST T13DYN10.DAT. TAPE RECORDER CHANNELS 3,4,5 & 10 WERE OVERDRIVEN. ADJUSTMENTS WERE MADE TO THE TAPE RECORDER TO PROVIDE FOR ACCURATE TAPING OF BENTLY CHANNELS. ALSO 1ST RESPONSE SPECTRUM WAS PLOTTED AS A DISPLACEMENT SPECTRUM. MOVED CHANNEL TO PLOT ACCELEROMETER #8. AP

4/13/92 RAN TEST T13DYN11.DAT. COMPUTER PROGRAM RESTARTED MULTIPLE TIMES AND OVERWROTE THE DATA. ACCELEROMETERS WERE CLIPPING. READJUSTED CALIBRATION TO 10G's/V

LEFT CHANNEL (ACCEL #4)
BRIDGE VOLTAGE = 5V
GAIN X20, KNOB 1.56

RIGHT CHANNEL (ACCEL #8)
BRIDGE VOLTAGE = 5V
GAIN KNOB X20, KNOB 2.00

RAN TEST T13DYN12.DAT. RAN TEST T13DYN13.DAT.
FOLLOWING ~~IS~~ IS THE TAPE LOG FOR T13 SERIES TESTING
TAPE SPEED WAS 19 CM/SEC

TAPE COUNT	ACTION
0 - 50	CALIBRATION SIGNALS
50 - 62	T13DYN10.DAT
64 - 80	T13DYN11.DAT
100 - 110	NEW CAL SIGNAL FOR CHNL 8 & 9 (ACCEL'S)
112 - 124	T13DYN12.DAT
125 - 137	T13DYN13.DAT

THE NORMAL STRESS TESTS WERE RUN ON 4/10/92. FILENAMES ARE T13NS1.DAT, T13NS2.DAT, T13NS3.DAT, T13NS4.DAT AND T13NS5.DAT. ALL TEST PARAMETERS WERE SUPPLIED BY SIMON HSIUNG. (ALLEN PICKLES)

4/17/92 Rebound tests for specimen ~~SRM13~~ SRM13.2.3/13.3.4.
Schmidt hammer tests on 4 sides of top block (SRM13.2.3)

Test #	Rebound #
1	64
2	63
3	62
4	62
5	59
6	60
7	60
8	62
9	63
10	62

Test #	Rebound #
11	60
12	60
13	64
14	62
15	60
16	63

Schmidt hammer tests on the joint surface of Top block.

Test #	Rebound #
1	40
2	56
3	53
4	44
5	50
6	50
7	43
8	50
9	43
10	45
11	44
12	46

Schmidt hammer tests on 4 sides of bottom block (SRM13.3.4)

Test #	Rebound #
1	60
2	59
3	60
4	60
5	60
6	64
7	63
8	62
9	62
10	64
11	60
12	58
13	62

Test #	Rebound #
14	64
15	59
16	62

Schmidt hammer tests on joint surface of bottom block

Test #	Rebound #
1	49
2	50
3	50
4	47
5	46
6	48
7	50
8	40
9	42
10	44
11	45
12	47

Schmidt hammer tests are performed to determine the rebound number on rock or joint surfaces. The rebound number, r, is needed for the determination of residual friction angle, ϕ_r, and compressive strength, JCS, of joint, which are the parameters needed for using the Barton-Bandis rock joint model.
Calculation of the two parameters is as follows:

$$\log(JCS) = 0.00088\,\gamma r + 1.01$$

6/17/92

where γ is rock density in kN/m^3 and JCS is in MPa.

$$\phi_r = (\phi_b - 20^\circ) + 20\left(\frac{r}{Re}\right)$$

where ϕ_b is the basic friction angle which is estimated from tilt tests on dry core cylinders and Re is the rebound number for intact rock.
Schmidt hammer tests are performed based on the operating instructions provided by the manufacture of the Schmidt hammer.
For Task 3, Schmidt hammer test was performed by applying the hammer on horizontal surfaces. Four readings on each side of

the joint rock block and 10 reading for the joint surface are taken. Average values for the sides of joint block and joint surface are obtained separately. Compare the average values to the individual readings. Any reading with the value ~~more or less~~ r units more or less the average value are discarded and test is redone.
Tests No. 12 and No. 13 are dynamic test on rock joints. Earthquake motion was simulated for these two tests. Earthquake tests are a part of dynamic tests. Dynamic tests are being performed for Task 2 include harmonic load and earthquake load tests.

For harmonic load tests, the shear stress will be preloaded statically to a certain value, preferably greater than or at least equal to the estimated residual shear strength of the specimen tested. An additional harmonic shear load which is about 5 percent to 20 percent of the applied shear stress will then be applied to the tested specimen through a function generator under a preset frequency. The cyclic loading effect on joint shear strength degradation will be studied. For earthquake tests, a given type of displacement-time history will be applied through the use of a digital-computed electrohydraulic drive signal. This signal is tailored to produce a motion whose acceleration matches within a specific tolerance of a prescribed acceleration response spectrum. The same or different displacement-time history may be repeatedly applied to the same joint specimen to study a phenomenon of joint surface attrition. It is recognized that the number of excursions of dynamic loading into the plastic range of joint deformation determines the performance of joints.

The applied normal stresses for these dynamic tests will be the ones located at both ends of the stress range to be used in the previous section. For each test, normal stress, shear stress, joint closure, and shear displacement will be monitored through an automatic recording system and stored on magnetic tapes.

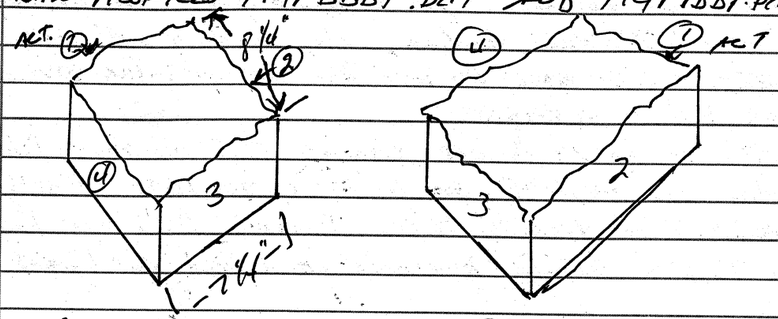
4/18/92 RAW PROFILES T13PBRAT.DAT AND T13PTBAT.DAT.

4/21/92 PERFORMED TILT TEST ON SPECIMEN SPM 13.2.3/13.3.4. TOP BLOCK MOVED AT 63.5° IN THE SIDE 3 THROUGH 1 AND 1 THROUGH 3 CONFIGURATIONS. THE TOP BLOCK WEIGHED 19.2#. THE TOP BLOCK MEASURED 7¼"X8¾".

4/23/92 THE BOTTOM BLOCK WAS GROUTED INTO THE BOX. DUE TO THE ABNORMAL SURFACE STRUCTURE THE BLOCK WAS VERY LOW AND POSITIONED TO ONE SIDE AND TO THE FRONT OF THE BOX. THE TOP BLOCK WAS THEN GROUTED IN PLACE. GROUT RECIPE WAS AS LISTED ON PAGE 74. AFTER ALLOWING TOP BLOCK TO SET-UP FOR APPROX 4 HRS, THE BLOCKS WERE PLACED IN AN OVEN AT 105°C FOR 24 HRS TO CURE.

4/24/92 REMOVED BLOCKS FROM OVEN. A

4/25/92 INSTRUMENTED SPECIMENS AS ILLUSTRATED ON PAGE 85.
RAW PROFILES T14PBBBT.DAT AND T14PTBBT.DAT.



SRM 13.2.3 TOP BLOCK — SRM 13.3.4 BOTTOM BLOCK

WEIGHT = 13.2#

T14PBBBT.DAT - MAX X = 12,129, MAX Y = 8807, X OFFSET = 3590, Y OFFSET = 1385, INDEX = 1
T14PTBBT.DAT - MAX X = 8044, MAX Y = 7129, X OFFSET = 3719, Y OFFSET = 1896, INDEX = 2 A

4/26/92 REASSEMBLED APPARATUS. COMPUTER CHANNELS AND
*TAPE RECORDER CHANNELS WERE AS LISTED ON PAGE 97. A

4/28/92 STARTED NORMAL LOAD TESTS T14NS1.DAT, T14NS2.DAT,
T14NS3.DAT, T14NS4.DAT AND T14NS5.DAT. RAN TEST
SEE PG 107 FOR PARAMETERS → T14DYN10.DAT, T14DYN11.DAT, T14DYN12.DAT AND T14DYN13.DAT.
ALL PARAMETERS WERE SUPPLIED BY SIMON H. - A

5/4/92 RAN PROFILES T14PBBAT.DAT AND T14PTBAT.DAT. RECEIVED
SPECIMEN SRM 13.4.6/13.4.5. PERFORMED TILT TEST ON
SPECIMEN. THE TOP BLOCK MOVED AT 51.5° IN THE SIDE 3 THROUGH
1 CONFIGURATION. THE TOP BLOCK MOVED AT 52.5° IN THE SIDE
1 THROUGH 3 CONFIGURATION. SIMON HSUING PERFORMED
REBOUND TEST FOR SPECIMEN. ORIGINAL NOTEBOOK SHEETS
ARE IN 3-RING BINDER AS THIS NOTEBOOK WAS NOT
AVAILABLE TO SIMON WHEN TESTS WERE PERFORMED.

*TAPE LOG PAGE 105 A

Alex Mercer

5/4/92 REBOUND TESTS FOR SRM 13.4.6 (TOP BLOCK) 4 SIDES.

TEST NO	REBOUND NO
1	61
2	60
3	58
4	60
5	58
6	57
7	58
8	60
9	61
10	59
11	60
12	60
13	62
14	59
15	58
16	58

JOINT SURFACE TOP BLOCK

1	54
2	51
3	52
4	49
5	55
6	54
7	49
8	52
9	53
10	46
11	54

BOTTOM BLOCK 4 SIDES

1	62
2	60
3	60
4	60
5	61

A Mercer

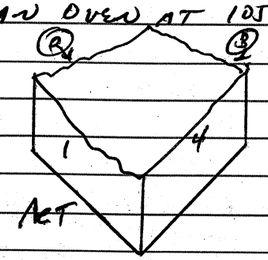
Bottom Block 4 Sides (cont.)

6	60
7	59
8	60
9	62
10	59
11	60
12	60
13	59
14	60
15	60
16	61

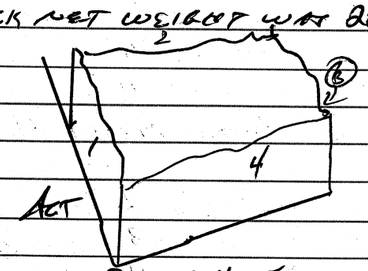
Joint Surface Bottom Block

1	49
2	44
3	49
4	48
5	53
6	53
7	46
8	46
9	48
10	56
11	55
12	52

5/15/92 Specimens 13.4.6/13.4.5 were grouted. Grout recipe was as listed on page 74. Specimens were placed in an oven at 105°C. Top block net weight was 20.3 #



Spec 13.4.6
Top Block



Spec 13.4.5
Bottom Block

5/16/92 Removed specimens from oven.

5/17/92 Ran profile T15PBBBT.DAT. Computer stopped at within 3/8" from the back side of profile due to power surge from lightning. Called Simon and informed him of situation. Simon stated that this sufficient data and we did not need to reprofile the specimen. Ran profile T15PTBBT.DAT.

FF	T15PBBBT	T15PTBBT
Max "X"	11522	7866
Max "Y"	7710	7736
X offset	3982	3720
Y offset	1736	1737
Index	1	1

6/3/92 This is the tape log for the T14 series testing. Tape speed was 19 cm/sec.

140 - 152 T14DYN10
155 - 170 T14DYN11
173 - 182.5 T14DYN12
185 - 194 T14DYN13

Apparatus was reassembled. Computer channels were as listed on page 97. Tape recorder channels are listed below:

1	Total Vert LD	8825 # ← Calculated (T15)
2	Horiz LD	5915 #
3	Bent 7	363 mils
4	Bent 4	373 mils
5	Bent 5	352 mils
6	LVDT 1	0.5"
7	LVDT 2	0.5"
8	Accel #4	1.8 g's
9	Accel #8	1.9 g's
10	Bent 6	373 mils
11	VLC 4	2925 #
12	VLC 3	2935 #
13	VLC 1	2942 #

6/3/92 STARTED TEST T15NS1 - NS5.DAT

Allen Parks

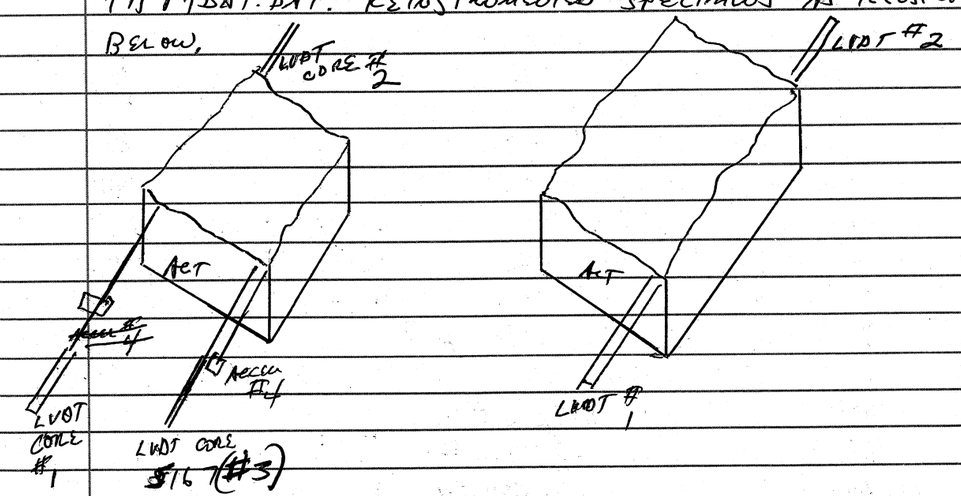
6/4/92 RAN TESTS LISTED BELOW. ALL TEST PARAMETERS WERE SUPPLIED BY SIMON ASOINE. (T14 SERIES TESTING PERFORMED 4/28/92.)

CYCLIC TESTING (1 Mpa)

NAME	HZ	AMPLITUDE (PK)
T14 DYN 10	1.4	0.5"
T14 DYN 11	1.4	1.0"
T14 DYN 12	2.8	0.25"
T14 DYN 13	2.8	0.5"
T15 DYN 10	1.4	0.5"
T15 DYN 11	1.4	1.0"
T15 DYN 12	2.8	0.25"
T15 DYN 13	2.8	0.5"
T15 DYN 14	2.1 HZ	0.5"
T15 DYN 15	2.1 HZ	1.0"
T15 DYN 16	3.5	0.25"
T15 DYN 17	3.5	0.5"

Allen Parks

6/23/92 DISASSEMBLED APPARATUS. RAN PROFILES T15PBBAT.DAT & T15PTBAT.DAT. REINSTRUMENTED SPECIMENS AS ILLUSTRATED BELOW.



PROXIMITOR REMAINED AS IN TEST SERIES T15.

Allen Parks

6/24/92 FOLLOWING IS THE CALIBRATION DATA FROM THE LVDT #5167
EQUIPMENT LIST: MODEL 500HR SHAEVITZ LVDT S/N 5167; (#3)
FLUKE MODEL 87 DMM, S/N 515 02012, CAL DUE ON AUG.93
SIX INCH STEEL SCALE 1/100TH INCREMENTS.

DISTANCE	VOLTAGE	CAL IN/V
+0.5	0.436	1.15
+0.4	0.352	1.14
+0.3	0.266	1.13
+0.2	0.183	1.09
+0.1	0.094	1.06
0	-0.003	AVG = 1.09 IN/V
-0.1	-0.088	1.14
-0.2	-0.182	1.10
-0.3	-0.281	1.07
-0.4	-0.406	0.99
-0.5	-0.506	0.99

6/25/92 REASSEMBLED APPARATUS. FOLLOWING ARE THE COMPUTER CHANNELS:

CHANNEL	XDCR
0	TOTAL VERT LD
1	HORIZ LD
2	BENTLY #7
3	BENTLY #4
4	BENTLY #5
5	LVDT #1
6	LVDT #2
7	ACCEL #4
8	LVDT 5167 (#3)
9	BENTLY #6
10	VERT LD CELL #4
11	VERT LD CELL #3
12	VERT LD CELL #1

A Pickles

6/26/92 RAN TESTS T16NS1.DAT THROUGH T16NS5.DAT.
6/29/92 RAN THE FOLLOWING DYNAMIC TESTS:

TEST NAME	HZ	AMPLITUDE (PK)
*T16DYN10	1.4	0.5"
T16DYN11	1.4	1.0"
T16DYN12	2.8	0.25"
T16DYN13	2.8	0.5"
T16DYN14	2.1	0.5"
T16DYN15	2.1	1.0"
T16DYN16	3.5	0.25"
T16DYN17	3.5	0.5"

* THIS TEST HAD TO BE REPEATED FOLLOWING THE INITIAL RUN. THE COMPUTER OVERWROTE THE RAW DATA WITH ZERO DATA. ALL TEST PARAMETERS WERE SUPPLIED BY DAN KANA.

7/1/92 DISCOVERED THAT NEW CALIBRATION VALUES WERE NOT ENTERED INTO THE COMPUTER FOR THE BENTLY PROBES. FOLLOWING IS A SUMMARY OF CALIBRATION VALUES AND DATES.

CHL	~~TYPE~~ XDCR	CAL VALUE/VOLT	CAL DATE
0	TOTAL VERTICAL LOAD	10,051 POUNDS	4/1/92
1	HORIZONTAL LOAD	9,972 POUNDS	4/1/92
2	BENTLY #7	91.56 MILS	3/26/92
3	BENTLY #4	90.20 MILS	3/26/92
4	BENTLY #5	92.08 MILS	3/26/92
5	LVDT #1	0.2 INCHES	3/27/92
6	LVDT #2	0.19 INCHES	3/27/92
7	ACCEL #4	106 G's	4/13/92
8	LVDT #3	1.09 INCHES	~~3/26/92~~ 4/14/92
9	BENTLY #6	101.66 MILS	3/26/92
10	VERTICAL LD CELL 4	10,057 POUNDS	4/1/92
11	VERTICAL LD CELL 3	10,065 POUNDS	4/1/92
12	VERTICAL LD CELL 1	10,031 POUNDS	4/1/92

A M Pickles

Schmidt hammer tests for sample SRM 12.4.5 / 12.4.4-A. Rebound test for top block (4 sides)

Test #	Rebound #
1	56
2	58
3	58
4	58
5	59
6	58
7	61
8	63
9	60
10	58
11	56
12	59
13	60
14	60
15	61
16	58

Rebound # for joint surface (top block)

Test #	Rebound #
1	52
2	49
3	50
4	45
5	49
6	56
7	44
8	48
9	47
10	52
11	42
12	39
13	51
14	34
15	45

Rebound test on 4 sides (bottom block)

Test #	Rebound #
1	60
2	62
3	61
4	62
5	60
6	56
7	61
8	60
9	60
10	63
11	62
12	61
13	62
14	62
15	60
16	61

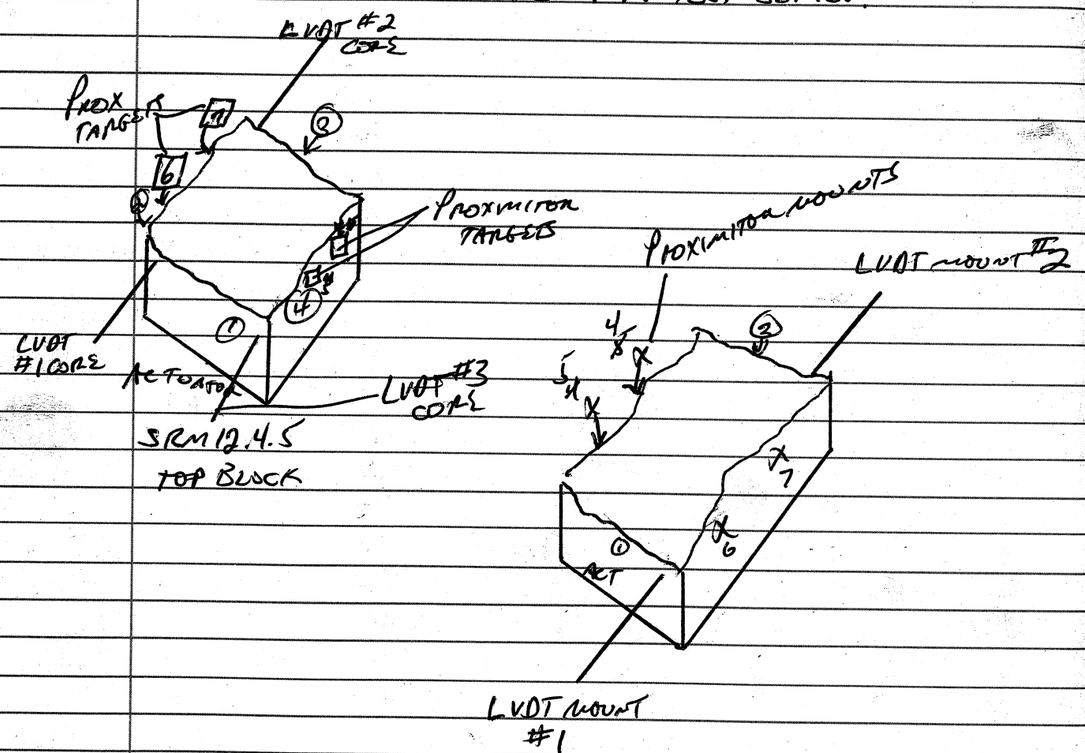
Rebound # for joint surface bottom block

Test #	Rebound #
1	54
2	51
3	36
4	40
5	48
6	62
7	42
8	32
9	44
10	56
11	50
12	47
13	52
14	42
15	39
16	39
17	39

Test #	Rebound #
18	48
19	50
20	47

8/10/92 PERFORMED TILT TEST ON SPECIMEN 12.4.5/12.4.4A. SPECIMEN MOVED AT 57° IN THE SIDE 3 THROUGH 1 CONFIGURATION. SPECIMEN MOVED AT 58° IN THE SIDE 1 - 3 CONF.

8/11/92 TOP SPECIMEN NET WEIGHT IS 19.8 LBS. GROUTED BOTTOM + TOP SPECIMEN GROUT RECIPE IS LISTED ON PAGE 74. PLACED SPECIMENS IN ~~105°C~~ 105°C OVEN FOR 24 HOURS TO CURE. FOLLOWING IS AN ILLUSTRATION OF THE SPECIMENS + HOW THEY WERE INSTRUMENTED FOR THE T17 TEST SERIES.



8/12/92 LVDT MOUNT #3 WAS MOUNTED TO THE LOAD CELL. REMOVED SPECIMENS FROM OVEN.

Allen Pickles

8/13/92 RAN PROFILES T17PBBBT.DAT AND T17PTBBT.DAT.

	BB	TB
MAX X	11817	8126
MAX Y	7825	7874
X OFFSET	3817	3592
Y OFFSET	1716	1514
INDEX	1	7

REASSEMBLED APPARATUS. FOLLOWING ARE THE COMPUTER CHANNELS: T17 SERIES

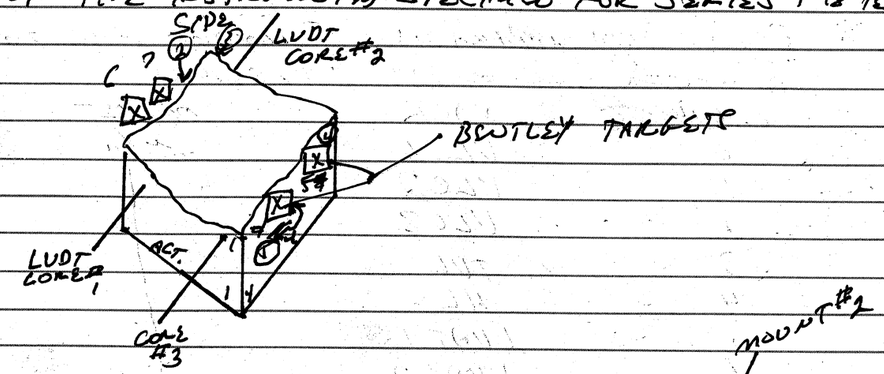
CHNL	XDCR	OFFSET
0	VLC1	N/A
1	VLC2	
2	VLC3	
3	TVL	
4	HL	
5	LVDT1	
6	LVDT2	
7	LVDT3	
8	PROX 4	-386
9	PROX 5	-423
10	PROX 6	-383
11	PROX 7	-364
12	ACCEL (NOT USED)	N/A

8/14/92 TEST PARAMETERS REFLECTED THOSE LISTED ON PAGES 27-30 FOR THE T2 SERIES TESTING. TEST PARAMETERS WERE SUPPLIED BY ASAD C. DURING T17NS1.DAT SOME VERTICAL OSCILLATION WAS EXPERIENCED DUE TO TOO MUCH GAIN ON THE SERVO CONTROLLER. THE GAIN WAS ADJUSTED AND TESTING WAS CONTINUED. TESTS T17NS1.DAT THROUGH T17NS5.DAT WERE RAN. RAN TESTS T17CND10.DAT THROUGH T17CND50.DAT.

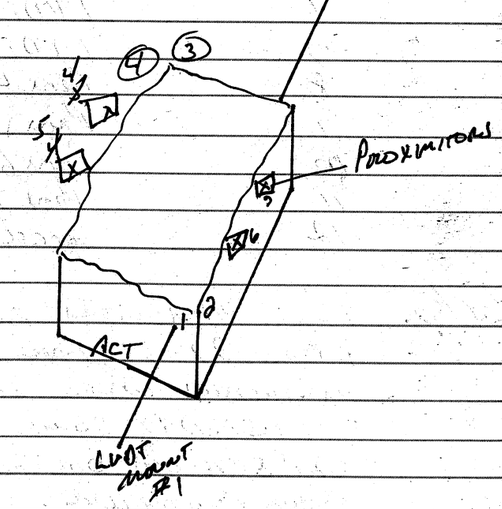
Allen Pickles

8/17/92 RAN PROFILE T17PBBAT.DAT. DURING THE LAST 30 MINUTES OF THE PROFILE A STATEMENT FOLLOWING EACH PASS WAS DISPLAYED ON THE MONITOR. "T17PBBAT.DAT. NO SUCH FILE OR DIRECTORY." THE "D" DRIVE RAN OUT OF DISK SPACE. RERAN T17PBBAT.DAT. AP

8/18/92 RAN PROFILE T17PTBAT.DAT. RECEIVED SPECIMEN SRM 15.3.5-A/15.4.6-①. FOLLOWING IS AN ILLUSTRATION OF THE INSTRUMENTED SPECIMEN FOR SERIES T18 TESTING.



SRM 15.3.5-A
TOP BLOCK



SRM 15.4.6-①
BOTTOM BLOCK

Schmidt hammer tests for Sample # SRM 15.3.5-A / 15.4.6-① (Test #18) Rebound number for top specimen (SRM 15.3.5-A) (4 sides) (test #18)

Test #	Rebound #
1	59
2	60
3	60
4	61
5	58
6	59
7	59
8	60
9	60
10	60
11	60
12	59
13	60
14	59
15	59
16	59

Rebound # for joint surface of top specimen

Test #	Rebound #
1	43
2	54
3	58
4	37
5	46
6	42
7	38
8	44
9	54
10	42
11	46
12	27
13	29
14	54

Test #	Rebound #
15	54
16	36
17	33
18	39
19	59
20	35

Rebound # for bottom specimen [STRM 15.4.6-①] (4 sides)

Test #	Rebound #
1	61
2	62
3	61
4	62
5	62
6	60
7	62
8	61
9	60
10	60
11	59
12	62
13	60
14	61
15	61
16	61

Rebound # for joint surface of bottom specimen.

Test #	Rebound #
1	44
2	30
3	58
4	23
5	46
6	52
7	47
8	56

Test #	Rebound #
9	54
10	39
11	52
12	48
13	49
14	34
15	46
16	49
17	50
18	47
19	19
20	40

Mikko Ahola

8/18/92 PERFORMED TILT TEST ON SPECIMEN T18. TOP BLOCK MOVED AT 54.5° IN THE SIDE 1 THROUGH 3 CONFIGURATION. TOP BLOCK MOVED AT 56° IN THE SIDE 3 THROUGH 1 CONFIG. THE TOP BLOCK NET WEIGHT WAS 19.7 LBS. GROUTED SPECIMENS USING GROUT RECIPE LISTED ON PAGE 74. AP

8/19/92 PLACED SPECIMENS IN AN OVEN AT 105°C FOR 24 HOURS AP

8/20/92 REMOVED SPECIMENS FROM OVEN. AP

8/21/92 RAN PROFILES T18PBBBT.DAT AND T18PTBBT.DAT.

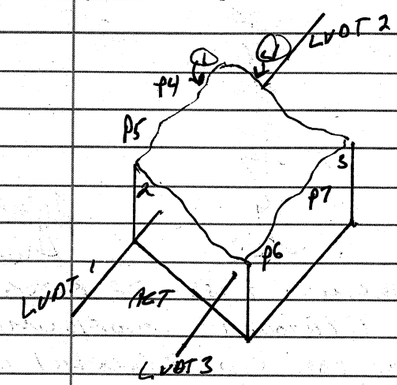
T18

	BBBT	TBBT
MAX X	11718	7686
MAX Y	7743	7417
X OFFSET	3861	3943
Y OFFSET	1687	1849
INDEX	3	1

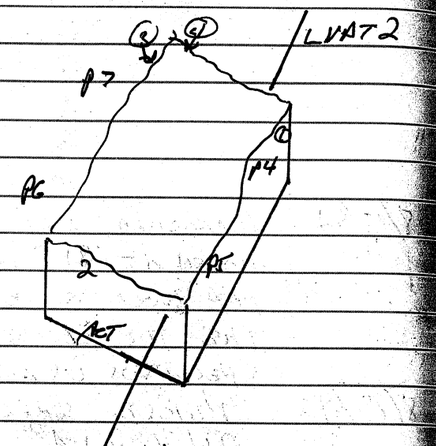
INSTRUMENTED SPECIMEN AS ILLUSTRATED ON PAGE 114. REASSEMBLED APPARATUS. COMPUTER CHANNELS ARE AS LISTED ON PAGE 113. PROXIMITOR OFFSETS WERE -362, -376, -384, AND -374 RESPECTIVELY. STARTED TESTS T18NS1.DAT, & T18NS2.DAT. AP

AP

8/23/92 RAN TEST T18NS3-5.DAT. RAN TESTS T18CND20+50.DAT
ALL TEST PARAMETERS WERE SUPPLIED BY MIKKO AHOLA
8/24/92 DISASSEMBLED APPARATUS. RAN PROFILE T18PBBAT.DAT. RAN PROFILE T18PTBAT.DAT.
8/26/92 PERFORMED TILT TEST ON SPECIMEN SRM 19.1.3①/19.1.3②.



SRM 19.1.3①
TOP BLOCK



SRM 19.1.3②
BOTTOM BLOCK

TOP BLOCK MOVED AT 57° IN SIDE 2 THROUGH 4 CONFIGURATION.
TOP BLOCK MOVED AT 56° IN SIDE 4 THROUGH 2 CONFIGURATION.
TOP BLOCK NET WEIGHT WAS 18.5#.
8/27/92 GROUTED TOP AND BOTTOM SPECIMENS GROUT RECIPE WAS AS FOLLOWS:
1 POUND 10 OZ WATER
20 GRAMS DARACEM
3 POUNDS 5 OZ CEMENT
8 POUNDS 5 OZ SAND
SPECIMENS WERE PLACED IN 105°C OVEN FOR 24 HOURS
8/28/92 REMOVED SPECIMENS FROM OVEN.

Allen Pickes

8/25/92 Test #19 - Schmidt hammer tests for Sample No. SRM 19.1.3①/SRM 19.1.3②. Rebound # for 4 sides of top specimen. [19.1.3①]

Test #	Rebound #
1	60
2	60
3	60
4	62
5	62
6	60
7	60
8	60
9	60
10	61
11	61
12	62
13	60
14	59
15	61
16	62

Rebound # for joint surface of top specimen.

Test #	Rebound #
1	34
2	45
3	40
4	17
5	52
6	60
7	45
8	26
9	49
10	53
11	53
12	53
13	45
14	48

Test #	Rebound #
15	50
16	45
17	53
18	45
19	52
20	38

Rebound # for 4 sides of bottom block SPM 19.1.3 (2)

Test #	Rebound #
1	60
2	62
3	62
4	60
5	60
6	60
7	58
8	59
9	60
10	63
11	60
12	60
13	60
14	60
15	61
16	59

Rebound # for joint surface of bottom block

Test #	Rebound #
1	36
2	39
3	50
4	52
5	45
6	49
7	19
8	45
9	50

Test #	Rebound #
10	42
11	39
12	52
13	42
14	52
15	24
16	43
17	40
18	50
19	44
20	52
	22

Mitko Ahola

8/31/92 RAW PROFILE T19PTBBT.DAT AND T19PBBBT.DAT.

	T19PTBBT	T19PBBBT
MAX X	7798	11806
MAX Y	7735	7784
X OFFSET	4019	3528
Y OFFSET	1692	1693
INDEX	1	1

9/1/92 INSTRUMENTED SPECIMENS AS ILLUSTRATED ON PAGE 118. RECALIBRATED LVDT #3 (BETWEEN ROCK AND LOAD CELL).

0"	0 VOLTS
0.1"	0.494
0.2"	0.978
0.3"	1.433
-0.1"	-0.486
-0.2"	-1.043
-0.3"	-1.557

CAL = 4.98 VOLTS/INCH OR 0.2"/VOLT

STARTED TESTS T19NS1 THROUGH T19NS5.DAT. TEST PARAMETERS FOR THE COMBINED TESTS WERE MODIFIED BY SIMON H. AS FOLLOWS.

A Pierce

9/1/92 INCREASE NORMAL LOAD TO 3 Mpa (1/2 Mpa/min), HOLD FOR 1 MINUTE, PULL TOP ROCK TOWARD ACTUATOR 2" OVER 20 MINUTES, HOLD FOR 1 MINUTE, PUSH TOP ROCK AWAY FROM ACTUATOR 3" OVER 30 MINUTES, HOLD FOR 1 MINUTE, PULL TOP ROCK TOWARD ACTUATOR 1" OVER 10 MINUTES (ZERO POSITION), HOLD FOR 1 MIN. DECREASE NORMAL LOAD TO ZERO AT 1/2 Mpa/min. REPEAT FOR 4 & 5 Mpa LEVELS. RAN TEST T19CND3A.DAT.
RAN TEST T19CND4A.DAT AND T19CND5A.DAT.

9/3/92 SRM15.3.4/15.3.5 ~~(TEST 19)~~ (TEST 20)

Rebound number for top block SRM15.3.4 (4 sides)

Test #	Rebound #
1	62
2	62
3	60
4	60
5	59
6	58
7	57
8	58
9	61
10	60
11	62
12	62
13	58
14	58
15	57
16	56

Rebound Number for joint surface of top block

Test #	Rebound #
1	34
2	39
3	46
4	42
5	42
6	44
7	38

8	33
9	48
10	49
11	36
12	40
13	32
14	42
15	41

Rebound Number for bottom block SRM15.3.5 (4 sides)

Test #	Rebound #
1	61
2	60
3	61
4	58
5	62
6	60
7	61
8	63
9	60
10	59
11	59
12	60
13	62
14	61
15	62
16	60

Rebound Number for joint surface of bottom block

Test #	Rebound #
1	50
2	43
3	43
4	46
5	44
6	40
7	40
8	43

test #	Rebound #
9	45
10	48
11	44
12	39

9/3/92 PROFILED T19PBBAT.DAT + T19PTBAT.DAT.

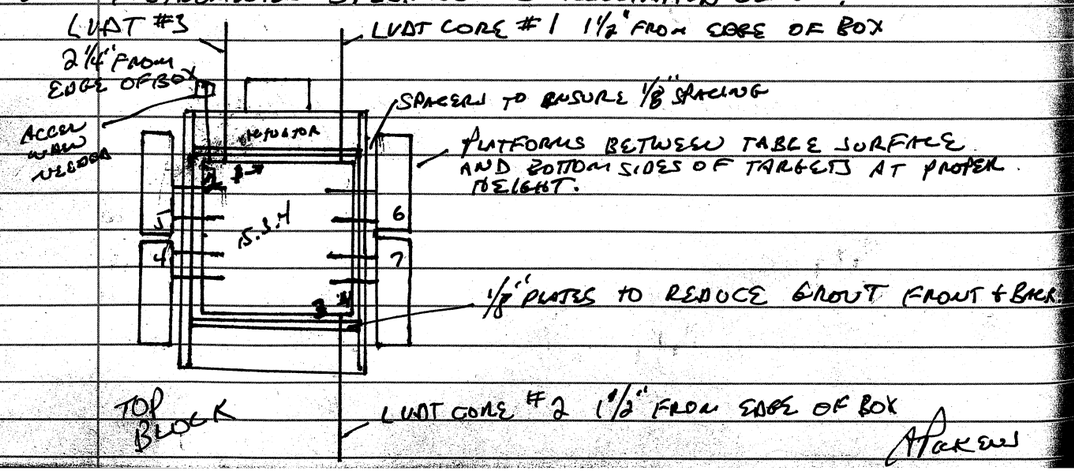
9/4/92 GROUTED SPECIMENS SRM 15.3.4/15.3.5. GROUT RECIPE WAS AS LISTED ON PAGE 118. SPECIMENS WERE PLACED IN OVEN AT 105°C. THE ANGLE TEST WAS PERFORMED. THE TOP BLOCK MOVED AT 59.5° IN THE SIDE 1-3 CONFIGURATION. THE TOP BLOCK MOVED AT 62° IN THE SIDE 3-1 CONFIGURATION. THE TOP BLOCK TEST WEIGHT WAS 21.9#.

9/5/92 THE OVEN THERMOSTAT HAD BECOME DEFECTIVE APPROX. 10 HRS INTO THE CURING. THE TEMPERATURE INCREASED TO 85°C OVER APPROX 14 HRS.

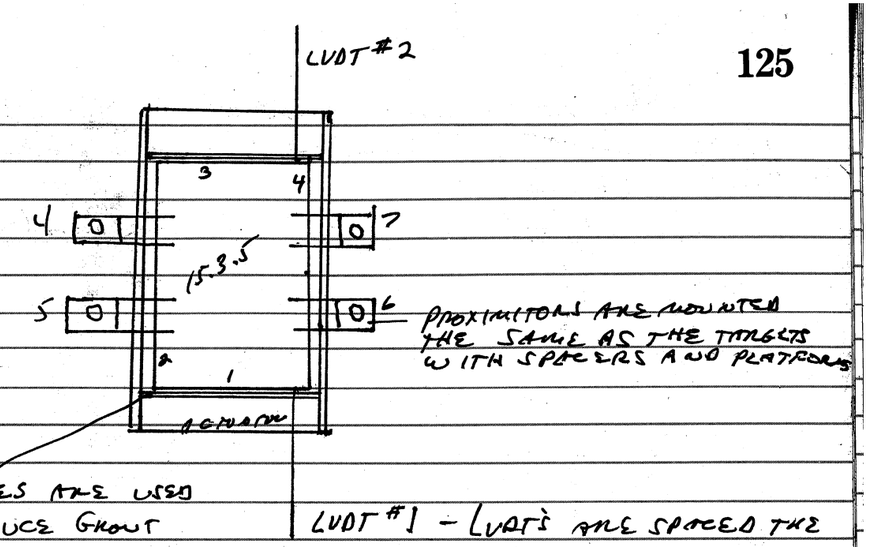
9/8/92 RAN PROFILES T20PBBBT.DAT AND T20PTBBT.DAT.

	T20TB	T20BB
MAX X	7907	11883
MAX Y	7947	7857
X OFFSET	3823	3858
Y OFFSET	~~1663~~ 1664	1636
INDEX	1	1

9/10/92 INSTRUMENTED SPECIMENS AS ILLUSTRATED BELOW:



9/10/92



9/11/92 RAN TESTS T20NS1-5.DAT. (5 TESTS) PARAMETERS FOR SERIES T20 SUPPLIED BY SIMON H. RAN TEST T20CUD5A.DAT. PARAMETERS OUTLINED ON PAGE 122 FOR 4 + 5 MPa. TARGETS FOR PROXIMITORS WERE MEASURED PRIOR TO TESTING:

	0"	1"	2"	3"	4"	5"	6"
4)	-.0855	.0690	.3135	.5050	.7125	1.000	1.1595
5)	1.1505	1.9050	1.1080	1.1840	1.2640	1.2540	1.4350
6)	1.0200	.7490	.5040	.3530	.2540	.2050	.1770
7)	.0065	.1450	.3040	.4310	.4130	.3960	3240

OFFSETS FOR PROXIMITORS ~~WERE~~ 4-7 WERE -.351, -.364, -.372, AND -.366 RESPECTIVELY. RAN TEST T20CUD5A.DAT.

TARGET MEASUREMENTS AFTER TESTING

	0	1	2	3	4	5	6
4)	-.1750	.0900	.2920	.5380	.7090	.9690	1.1280
5)	1.1890	1.1370	1.1435	1.1880	1.2170	1.2810	1.3840
6)	.9310	.6370	.4605	.2750	.1400	.0195	-.0110
7)	-.0210	.1140	.2670	.3450	.4000	.3250	.3540

9/14/92 RAN PROFILES T20PTBAT.DAT + T20PBBAT.DAT.

9/15/92 Schmidt hammer test for sample SRM 11.1.1/11.1.2 (Test #21) Rebound # for top block (SRM 11.1.2) (4 sides).

Test #	Rebound #
1	58
2	60
3	61
4	60
5	59
6	60
7	59
8	60
9	58
10	58
11	60
12	62
13	56
14	60
15	60
16	61

Rebound # for joint surface of top block

Test #	Rebound #
1	43
2	41
3	48
4	46
5	30
6	50
7	46
8	36
9	40
10	44
11	52
12	44
13	38
14	49
15	40

16	30
17	42
18	48
19	37
20	41
21	38
22	51
23	33
24	36
25	46

Rebound # for 4 sides of bottom block (SRM 11.1.1)

Test #	Rebound #
1	58
2	61
3	60
4	58
5	59
6	60
7	61
8	62
9	61
10	60
11	62
12	61
13	58
14	60
15	60
16	57

Rebound # for joint surface of bottom block

Test #	Rebound #
1	40
2	46
3	47
4	44
5	44
6	42

Test #	Rebound #
7	51
8	38
9	50
10	50
11	39
12	45
13	32
14	49
15	37
16	48
17	38
18	48
19	52
20	47
21	42
22	33
23	44
24	46
25	40

9/19/92 PERFORMED TILT TEST ON SPECIMEN SRM 11.1.2/11.1.1. (T21) THE TOP BLOCK MOVED AT 66° IN BOTH CONFIGURATIONS. THE TOP BLOCK DEAD WEIGHT WAS 17# 9 OZ. BOTH SPECIMENS WERE GROUTED. GROUT RECIPE IS LISTED ON PAGE 118. SPECIMENS WERE PLACED IN A 105°C OVEN FOR 24 HOURS. A

9/20/92 REMOVED SPECIMEN FROM OVEN. A

9/21/92 RAN PROFILES T21PTBBT.DAT AND T21PBBBT.DAT. A

9/22/92 ~~RAN~~ INSTRUMENTED SPECIMEN AS ILLUSTRATED ON PAGE 124. REASSEMBLED APPARATUS. RAN TEST T21NS1-5.DAT (5 TESTS). PROXIMITON OFFSETS WERE -314, -324, -356, -350 FOR ~~PROXIMITON CHANNELS~~ 4-7 RESPECTIVELY. A

9/22/92 RAN TEST T21CNDSB.DAT. PARAMETERS WERE SUPPLIED BY MIKKO AHOLA AS FOLLOWS: LOAD NORMAL TO 5 MAX. PULL TOP BLOCK 2", PUSH 4" BACK, RETURN TO ZERO POSITION. REPEAT 2 MORE TIMES WITHOUT UNLOADING VERTICAL LOAD. REMOVE VERTICAL LOAD AFTER CYCLING.

ALAN PICKER

2/24/92 RAN PROFILE T21PTBAT.DAT. + T21PBBAT.DAT

T21TB	T21BB
3848	11779
7764	7734
3881	~~P2388~~ 3788
1667	1723
1	3

A

10/09/92 SCHMIDT HAMMER TEST FOR SPECIMEN SRM 13.4.6①/13.4.5. THESE SPECIMENS WERE USED FOR THE SERIES T15 + T16 TESTING.

TOP BLOCK (13.4.6①) SIDES

TEST #	REBOUND #
1	58
2	58
3	61
4	57
5	58
6	59
7	60
8	56
9	57
10	61
11	59
12	58
13	53
14	58
15	59
16	59

TOP BLOCK JOINT SURFACE

TEST #	REBOUND #
1	51
2	59
3	56
4	54
5	59
6	54

A PICKER

10/3/92 TOP BLOCK (SPM 13.4.6①) JOINT SURF

TEST #	REBOUND #
7	52
8	56
9	47
10	59
11	58
12	53
13	54
14	61
15	43
16	59
17	59
18	59
19	58
20	45
21	64
22	56
23	43
24	61
25	64

BOTTOM BLOCK (13.4.5) SIDES

TEST #	REBOUND #	TEST #	REBOUND #
1	60	9	57
2	60	10	59
3	60	11	59
4	55	12	58
5	58	13	60
6	61	14	67
7	61	15	59
8	58	16	59

M Pickles

10/3/92 BOTTOM BLOCK JOINT SURFACE

TEST #	REBOUND #	TEST #	REBOUND #
1	48	14	64
2	57	15	51
3	51	16	57
4	49	17	62
5	52	18	63
6	60	19	53
7	50	20	53
8	56	21	51
9	62	22	42
10	58	23	53
11	63	24	58
12	53	25	50
13	64		

PERFORMED TILT TEST ON SPECIMEN SPM 13.4.6①/13.4.5 (T22) TOP BLOCK MOVED AT 35° IN THE SIDE 1-3 ORIENTATION. THE TOP BLOCK MOVED AT 34° IN THE SIDE 3-1 ORIENTATION. THE TOP BLOCK NET WEIGHT WAS 19 LBS 14 OZS.
GROUTED BOTH SPECIMENS WITH RECIPE LISTED ON PAGE 118. SPECIMENS WERE PLACED IN A 105°C OVEN. THE CHART RECORDER PEN RAN OUT OF INK SO THERE IS NO CHART FOR THIS SPECIMEN. ALL INSTRUMENTATION WAS CALIBRATED AS OF 9/28/92. FOLLOWING IS THE CAL VALUES USED:

0	VLC 1	9979 ~~10035~~ #/V	12 ACCEL #/ 10g's/V
1	VLC2	10035 #/V	
2	VLC3	10172 #/V	
3	TVL	10022 #/V	(AS OF 9/28/92)
4	~~TB~~ NL	10408 #/V	
5	~~0.2~~ LVDT1	0.2"/V	
6	LVDT2	0.2"/V	
7	LVDT3	0.2"/V	ALL CALIBRATION RECORDS
8	PROX 4	100.3 MILS/V	AND INFO ARE IN THE
9	PROX5	90.23 MILS/V	LAB NOTEBOOK
10	PROX6	101.53 MILS/V	
11	PROX7	103.38 MILS/V	

M Pickles

10/8/92 THE ACCELEROMETER WAS CALIBRATED USING THE ROLLOVER METHOD. THE APPARATUS WAS ASSEMBLED USING THE 75,000 POUND ACTUATOR. THE FOLLOWING INPUTS WERE USED TO TEST THE ACTUATOR. ALL SIGNALS RETURNED GOOD CLEAN SIGNALS FROM THE ACT. XDCR.

1.7 HZ AT 4" PK-PK, 21.4"/SEC
2.1 HZ AT 3" PK-PK, 19.8"/SEC
2.1 HZ AT 4" PK-PK, 26.4"/SEC

THE SPECIMEN WERE INSTRUMENTED AS ILLUSTRATED ON PAGE 124. THE APPARATUS WAS REASSEMBLED. FOLLOWING ARE THE PROXIMITOR OFFSETS USED FOR PROX 4-7 RESPECTIVELY. -368, -317, -340, -375. TEST PARAMETERS WERE SUPPLIED BY MIKKO AHOLA. RAN TESTS T22NS1-5.DAT (5 FILES). AP

10/9/92 CYCLIC PARAMETERS ARE AS FOLLOWS:

FILE NAME	HZ	AMP (IN)(PK)	LEVEL (MPH)
T22DYN10	1.4	0.5	1
T22DYN11	1.4	1.0	1
T22DYN12	2.8	0.25	1
T22DYN13	2.8	0.5	1
T22DYN14	2.1	0.5	1
T22DYN15	2.1	1.0	1
T22DYN16	3.5	0.25	1
T22DYN17	3.5	0.5	1
T22DYN18	1.4	0.5	3
T22DYN19	1.4	1.0	3
T22DYN20	2.8	0.25	3
T22DYN21	2.8	0.5	3
T22DYN22	2.1	0.5	3
T22DYN23	2.1	1.0	3 *

ALL TEST WERE RAN FOR 30 SECONDS. * THIS TEST WAS STOPPED AT APPROXIMATELY 20 SECONDS AS THE ROCK HAD WORN DOWN TO THE POINT WHERE THE PROXIMITORS WERE TOUCHING THE TARGETS. AP

APicrey

10/12/92 DISASSEMBLED APPARATUS. FOUND ALL PROBES HAD BROKEN LOOSE FROM THE TOP BLOCK. RAN PROFILE T22PTBAT.DAT & T22PBBAT.DAT. BEFORE TEST PROFILES WERE T16PTBBT.DAT + T16PBBBT.DAT.* AP *SEE PAGE 131 AP

10/13/92 SCHMIDT HAMMER TEST FOR SPECIMEN SRM9.4.5/9.3.4-A. SERIES T23. SRM 9.4.5 TOP BLOCK (SIDES)

TEST #	REBOUND	TEST #	REBOUND
1	60	9	59
2	62	10	60
3	63	11	60
4	59	12	62
5	62	13	60
6	62	14	63
7	60	15	62
8	58	16	61

SRM9.4.5 JOINT SURFACE

TEST	REBOUND	TEST	REBOUND
1	54	14	52
2	47	15	52
3	52	16	52
4	52	17	50
5	52	18	52
6	45	19	48
7	50	20	58
8	56	21	59
9	45	22	56
10	50	23	58
11	52	24	52
12	51	25	58
13	58		

APicrey

10/13/92 SRM 9.3.4A BOTTOM BLOCK (SIDES)

TEST	REBOUND	TEST	REBOUND
1	60	9	61
2	59	10	61
3	56	11	61
4	60	12	61
5	61	13	62
6	65	14	62
7	63	15	62
8	63	16	62

JOINT SURFACE

TEST	REBOUND	TEST	REBOUND
1	54	14	51
2	54	15	53
3	52	16	53
4	52	17	51
5	46	18	49
6	50	19	50
7	52	20	56
8	62	21	53
9	48	22	53
10	49	23	57
11	55	24	55
12	56	25	48
13	61		

TILT TEST —

SIDE 1-3 58° SIDE 3-1 55° TOP BLOCK NET WEIGHT WAS 21.6#.

GROUTED BOTH SPECIMENS WITH THE RECIPE LISTED ON PAGE 118. PLACED SPECIMENS IN AN OVEN AT 105°C FOR 24 HRS. AP

10/14/92 REMOVED SPECIMENS FROM OVEN. AP

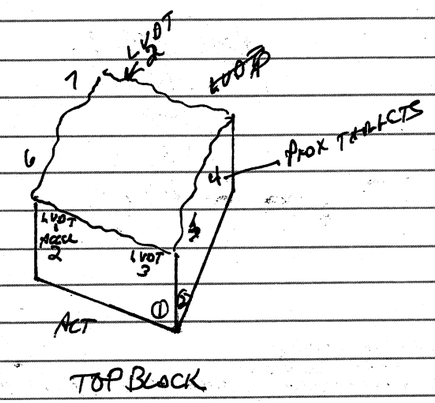
10/15/92 RAN PROFILE T23PBBBT.DAT AND T23PTBBT.DAT. AP

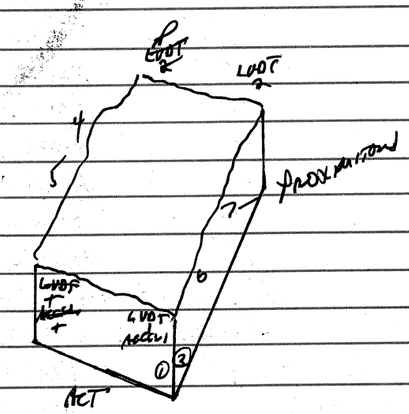
A Pickens

10/15/92

T23BT		T22AT	
BB	TB	TB	BB
11895	8065	7974	11729
7942	8156	7792	7756
3716	3746	3669	3870
1580	1479	1620	1713
4	1	1	2

INSTRUMENTED SPECIMENS AS ILLUSTRATED: ~~ON PAGE 112~~ AP 10/18





ACCELEROMETER WAS ATTACHED TO THE TOP BOX ON NEAR RIGHT SIDE. AP

10/18/92 ACCELEROMETER #1 & #2 ARE ENTRAN EGC-500S. THESE ACCELS ARE CALIBRATED FOR 10 gs/VOLT USING THE ROLLOVER METHOD BEFORE USE. ACCEL #3 IS A PCB MODEL 303A, S/N 12677. THIS ACCEL WAS MOUNTED BACK TO BACK WITH THE CALIBRATION STANDARD ON A SHAKER. TRACES WERE COMPARED ON A CALIBRATED 5111 TEKTRONIX OSCILLISCOPE. BOTH ACCELS REFLECTED 10 mV/g. AP

10/21/92 A 14 CHANNEL TAPE RECORDER WAS SET UP TO RECORD THE T23 SERIES DATA. CALIBRATION SIGNALS WERE TAPED AND REPLAYED TO DETERMINE THE OUTPUT VALUES FOR THE TAPE RECORDER.

A Pickens

10/21/92 FOLLOWING ARE THE COMPUTER CHANNELS FOR T23:

CHNL	XDCR	PROX OFFSETS
0	VLC1	
1	VLC2	
2	VLC3	
3	TVL ~~[illegible]~~	
4	HL	
5	LVDT1	
6	LVDT2	
7	LVDT3	
8	PROX4	-344
9	PROX5	-348
10	PROX6	-437
11	PROX7	-414
12	ACCEL 1	
13	ACCEL2	
14	ACCEL3	
15	HOR. DISP (ACTUATOR)	

FOLLOWING ARE THE ~~COMPUTER~~ TAPE RECORDER 11/5/92 CHANNELS AND OUTPUT CAL VALUES

CHNL	XDCR	OUTPUT CAL VALUE/VOLT
1	VLC1	17,725 #
2	VLC2	17,383 #
3	VLC3	18,603 #
4	TVL	17,972 #
5	HL	18,559 #
6	LVDT1	0.34"
7	LVDT3	~~0.2"~~ 0.385"
8	PROX5	164 MILS
9	PROX6	184 MILS
10	PROX7	173 MILS
11	ACCEL 1	17 G'S
12	ACCEL2	17 G'S
13	ACCEL3	17.56 G'S
14	HOR DISP (ACTUATOR)	0.544"

MPICKERS

10/22/92 RAN TESTS T23NS1-5.DAT (5 TESTS). RAN TESTS T23SEIS1.DAT AND T23SEIS2.DAT. THESE RUNS WERE DIGITIZED AT 100 SAMPLES/SEC AND RECORDED ON ANALOG TAPE.

10/28/92 THE ANALOG DATA WAS FILTERED AND REDIGITIZED AS FOLLOWS: COMPUTER CHANNELS FILTERED — 3, TOTAL VERTICAL LOAD; 4, HORIZONTAL LOAD; 5, LVDT1; 6, LVDT2; 9, PROXIMITOR #5; 10, PROXIMITOR #6; 11, PROXIMITOR #7; 12, ACCELEROMETER #1; 13, ACCELEROMETER #2; ~~14, ACCELEROMETER~~ # 15, HORIZONTAL DISPLACEMENT. DATA FILES CREATED—

FILTER/SAMPLE RATE	1" PK	2" PK
32 HZ / 50 S/S	T23F321.DAT	T23F322.DAT
63 HZ / 100 S/S	T23F631.DAT	T23F632.DAT
125 HZ / 200 S/S	T23F1251.DAT	T23F1252.DAT

T23COMP1.DAT AND T23COMP2.DAT WERE CREATED WITH NO FILTERS.

10/30/92 A MODAL ANALYSIS OF THE APPARATUS WAS PERFORMED TO DETERMINE IF ANY NATURAL FREQUENCIES WERE PRESENT. THE VERTICAL LOAD WAS 1 MPa DURING THIS ANALYSIS. 3 UNLOADING/LOADING CYCLES WERE NECESSARY FOR THIS ANALYSIS.

11/4/92 FOLLOWING TESTS WERE PERFORMED ON SPECIMEN T23:

	TVL	AMPLITUDE	
T23SEIS3.DAT	1 MPa	1" PK	(DAS LATE)
T23SEIS3A.DAT	1 MPa	1" PK	(GLITCH)
T23SEIS4.DAT	1 MPa	2" PK	(GLITCH)
T23SEIS6.DAT	0 MPa	2" PK	(CHECK ACT.)
T23SEIS5.DAT	3 MPa	1" PK	
T23SEIS7.DAT	3 MPa	2" PK	
T23SEIS8.DAT	5 MPa	1" PK	
T23SEIS9.DAT	5 MPa	2" PK	

MPICKERS

11/4/92 FOLLOWING WERE THE ~~TAPE~~ A/D, COMPUTER AND FILTER CONFIGURATION FOR TESTS T23SEIS3-9.DAT:

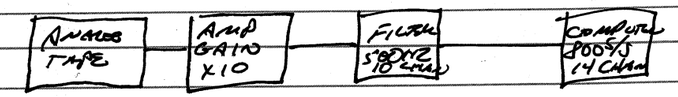
COMPUTER/XDCR	~~TAPE CHAN~~	FILTER/SLOT
0 VLC1	1	~~34353/1~~
1 VLC2	2	~~34353/3~~ A
2 VLC3	3	~~34353/5~~
3 TVL	4	34353/1
4 HL	5	34353/3
5 LVDT1	6	34353/5
6 LVDT2	7	34353/7
7 LVDT3	8	
8 PROX4		
9 PROX5	9	38410/2
10 PROX6	10	38410/3
11 PROX7	11	38410/4
12 ACCEL1	12	38410/5
13 ACCEL2	13	38410/6
14 ACCEL3		
15 HOR. DISP.	~~14~~	38410/7

TAPE WAS USED FOR DRIVE SIGNAL

DATA WAS DIGITIZED AT 800 S/S. FILTERS WERE SET AT 500 HZ. BETWEEN RUNS T23SEIS4 + 6 A RUN WITH NO VERTICAL LOAD AND A 1" PK AMPLITUDE WAS PERFORMED BUT NO DATA WAS TAKEN. ON RUN T23SEIS3.DAT THE DATA ACQUISITION WAS STARTED LATE, APPROX 5-10 SECONDS INTO THE TEST. T23SEIS3A WAS A REPEAT. TESTS T23SEIS4 + T23SEIS4 HAD GLITCHES IN THE HORIZONTAL ACTUATOR. THE CAUSE OF THESE GLITCHES WAS NOT DETERMINED. OMPA RUNS WERE PERFORMED TO CHECK THE ACTUATOR WITH MINIMAL SPECIMEN WEAR (T23SEIS6.DAT). THE GLITCHES DID NOT REOCCUR SO TESTING WAS CONTINUED. A

A Pickens

11/5/92 THE FIRST TWO T23 RUNS WERE AMPLIFIED, FILTERED AND REDIGITIZED FROM THE ANALOG TAPE. FOLLOWING WERE THE DATA CHANNELS ON THE COMPUTER AND FILTERS.



ONLY 10 CHANNELS OF THE 14 COULD BE FILTERED. THE AMPS HAD A GAIN OF 10. THE FILTERS WERE SET AT 500 HZ. THE COMPUTER SAMPLED 14 CHANNELS AT 800 SAMPLES PER SECOND FOR 43 SECONDS.

CHAN/XDER		FILTER (500 HZ)	CAL VALUES/V
0	VLC1		1781 #
1	VLC2		1752 #
2	VLC3		1860 #
3	TVL	X	4586 #
4	HL	X	4645 #
5	LVDT1	X	0.17"
6	LVDT3	X	0.04"
7	PROX5	X	41 MILS
8	PROX6	X	43 MILS
9	PROX7	X	44 MILS
10	ACCEL1	X	8G's
11	ACCEL2	X	8G's
12	ACCEL3		8G's
13	HOR DISP.	X	0.25"

FILENAMES WERE T23158FS.BIN + T23258FS.BIN. THE ORIGINAL DATA WAS T23SEIS1.DAT T23SEIS2.DAT

A Pickens

11/11/92 Recieved Specimen SRM 9.2.3/9.3.4. Schmidt Hammer: (124)

9.2.3 Top Block (Sides)

Test	Rebound	Test	Rebound
1	57	9	58
2	62	10	59
3	61	11	61
4	58	12	61
5	61	13	59
6	61	14	62
7	61	15	62
8	58	16	59

9-2-3 Joint Surface

1	51	14	55
2	52	15	53
3	50	16	53
4	55	17	51
5	55	18	58
6	50	19	59
7	49	20	55
8	62	21	51
9	52	22	55
10	56	23	61
11	60	24	53
12	60	25	52
13	53		

9.3.4 Bottom Block Sides

1	60	9	56
2	61	10	61
3	61	11	59
4	56	12	57
5	52	13	58
6	57	14	58
7	56	15	58
8	56	16	59

Mickes

11/11/92 9.3.4 Joint Surface

1	53	14	43
2	51	15	45
3	42	16	45
4	51	17	56
5	60	18	51
6	43	19	46
7	38	20	46
8	50	21	42
9	45	22	43
10	47	23	47
11	46	24	42
12	46	25	40
13	43		

Net weight of top block was 21.8 lbs. Tilt angle - Side 3-1 54.1°. Side 1-3 59°. Grouted bottom block with recipe on page 118A

11/12/92 Grouted top block using same recipe. Top block was allowed to set up for approx 5 hours before screeding. Both specimens were placed in a 101°C oven for 24 hours.

11/13/92 Removed specimens.

11/16/92 Ran profiles T24PBBBT.DAT & T24PTBBT.DAT.

T24BT

TB	BB
7924	11884
7764	7820
3742	3790
1622	1649
2	2

The tilt angle in both directions was >85°. No tilt angle could be determined. The top block net weight was 20.7 # (T25 series)

Mickes

11/16/92 SCHMIDT HAMMER REBOUND SRM 23.3.4/23.2.3 (T25)

BOTTOM BLOCK SIDES (23.2.3)

1	60	9	56
2	62	10	56
3	62	11	61
4	56	12	60
5	60	13	60
6	62	14	61
7	62	15	60
8	57	16	58

BOTTOM BLOCK (JOINT SURFACE)

1	48	14	53
2	40	15	50
3	48	16	46
4	42	17	60
5	47	18	50
6	48	19	50
7	56	20	50
8	53	21	56
9	52	22	49
10	56	23	56
11	56	24	45
12	58	25	56
13	55		

TOP BLOCK (23.3.4) SIDES

1	60	9	59
2	64	10	59
3	59	11	59
4	58	12	60
5	59	13	58
6	61	14	58
7	61	15	62
8	60	16	59

A Pickens

11/16/92 TOP BLOCK, JOINT SURFACE

1	50	14	53
2	46	15	53
3	48	16	58
4	45	17	48
5	48	18	57
6	47	19	50
7	49	20	56
8	56	21	55
9	48	22	54
10	50	23	59
11	46	24	51
12	52	25	56
13	52		

GROUTED BOTTOM BLOCK WITH RECIPE LISTED ON PAGE 118 (T25).
T24 - INSTRUMENTED SPECIMENS AS LISTED ON PAGE 135.
REASSEMBLED APPARATUS. A

11/17/92 T24 - RAN TESTS T24NS1-5 (5 FILES).
T25 - GROUTED TOP BLOCK. SPECIMENS WERE PLACED IN AN OVEN AT 105°C TO CURE FOR 24 HRS. A

11/18/92 T24 - RAN TEST T24SEIS1-5.DAT.

FILENAME	PARAMETERS (SUPPLIED BY SIMON HSIUNG)
T24SEIS1.DAT	1" PK 1 Mpa
T24SEIS2.DAT	2" PK 1 Mpa
T24SEIS3.DAT	1" PK 3 Mpa
T24SEIS4.DAT	2" PK 3 Mpa
T24SEIS5.DAT	1" PK 5 Mpa
T24SEIS6.DAT	2" PK 5 Mpa - TEST STOPPED EARLY DUE TO EXCESSIVE ROCK WEAR.

T25 - SPECIMENS WERE REMOVED FROM OVEN.
T24 - DISASSEMBLED APPARATUS. RAN PROFILES T24PBBAT.DAT & T24PTBAT.DAT. A

11/19/92 RAN PROFILES T25PTBBT.DAT AND T25PBBBT.DAT. REASSEMBLE AND INSTRUMENTED AS ILLUSTRATED ON PAGE 135.

A Pickens

11/20/90 Ran tests T25SEIS1-6.DAT.

NAME	PARAMETERS
T25SEIS1.BAT	1 Mpa 1" PK
T25SEIS2.DAT	1 Mpa 2" PK
T25 SEIS3.DAT	3 Mpa 1" PK
T25 SEIS4.DAT	3 Mpa 2" PK
T25 SEIS5.DAT	5 Mpa 1" PK
T25 SEIS6.DAT	5 Mpa 2" PK

11/23/92 Schmidt Hammer for SPM 15-1.1/15-2.2:(T26)

15-1.1 Top Block Sides

Test	Rebound	Test	Rebound
1	61	9	54
2	56	10	61
3	60	11	61
4	59	12	59
5	58	13	55
6	59	14	56
7	57	15	57
8	53	16	57

15-1.1, Joint Surface

1	49	14	50
2	51	15	52
3	58	16	51
4	53	17	50
5	57	18	46
6	52	19	58
7	50	20	51
8	45	21	62
9	55	22	50
10	60	23	56
11	60	24	52
12	51	25	52
13	56		

A Pickens

11/23/92 SPM 15-2.2 Bottom Block Sides

Test	Rebound	Test	Rebound
1	54	9	54
2	60	10	52
3	57	11	58
4	58	12	58
5	55	13	56
6	55	14	45
7	52	15	58
8	51	16	55

15-2.2 Joint Surface

1	44	14	55
2	46	15	58
3	52	16	55
4	56	17	50
5	50	18	56
6	48	19	54
7	49	20	58
8	61	21	50
9	55	22	54
10	49	23	56
11	50	24	56
12	58	25	52
13	60		

Tilt Angle - Side 1-3 - 62° Side 3-1 Passed through C.G. at 67°, top rock fell off.

Top rock net weight was 21.5#

Grouted Bottom Block (T26)

Profiled T25PTBAT.DAT.

11/24/92 Profiled T25PBBAT.DAT (see page 151)

Grouted T26 - Placed specimen in 105° C oven 13:00 24 Nov.

11/25/92 Removed specimen from oven.

A Pickens

11/30/92

Revised spec inc Spm 23.1.2/23.2.3-A (TBT) from water performance Sonnet Hammark test:

Top rock Spm 23.1.2 (sides)

Test #	Rebound
1	56
2	56
3	58
4	55
5	58
6	59
7	58
8	55

Test #	Rebound
9	56
10	54
11	58
12	56
13	56
14	54
15	54
16	53

~~Top~~ rock joint sequence A 11/30

Nicks

11/18/92

INSTRUMENTATION CHANNEL IDENTIFICATION FOR DIRECT SHEAR TEST APPARATUS

500 Hz LP* FILTER	CHANNEL NO.	DESCRIPTION	POLARITY POSITIVE
-	1	Vertical Load Cell No. 1	Compression
-	2	Vertical Load Cell No. 2	Compression
-	3	Vertical Load Cell No. 3	Compression
x	4	Analog Summation of Total Vertical Normal Load	Compression
x	5	Horizontal Load Cell**	Compression
x	6	Horizontal Displacement of Top Block Relative to Bottom Block Near Actuator - LVDT1	Toward Actuator
x	7	Horizontal Displacement of Top Block Relative to Bottom Block Opposite Actuator - LVDT 2	Away From Actuator
-	8	Horizontal Displacement of Top Block Relative to Horizontal Load Cell - LVDT3	Toward Actuator
-	9	Specimen Vertical Relative Displacement Proximeter No. 4	Dilation
x	10	Specimen Vertical Relative Displacement Proximeter No. 5	Dilation
x	11	Specimen Vertical Relative Displacement Proximeter No. 6	Dilation
x	12	Specimen Vertical Relative Displacement Proximeter No. 7	Dilation
x	13	Horizontal Acceleration at Near Right of Lower Specimen Block	Away From Actuator
x	14	Horizontal Acceleration at Near Right of Upper Specimen Block	Away From Actuator
-	15	Horizontal Acceleration at Near Right of Upper Box	Away From Actuator
x	16	Horizontal Displacement of Actuator Piston	Extension

Digitized at 800 samples/sec.

* After 11/02/92

** After 10/21/92

C:\DATA\DDK\INSTCHAN.DOC

11/18/92
20-PST 1

PROCEDURE FOR SEISMIC ROCK MECHANICS

EARTHQUAKE TEST

This procedure supplements "Pseudostatic Shear Tests For Jointed Specimens" (20-PST, dated 10/09/90, modified 10/28/91).

Normal Load Conditioning

1. Adjust four vertical displacement detectors to inital range position.

2. Turn on shear displacement actuator at null position and normal load actuators at no-load position.

3. Start digital data acquisition system set to scan sixteen channels every five seconds. Data channels listed on "Instrumentation Channel Identification For Direct Shear Test Apparatus" (dated 10/12/92 and 11/20/92)

4. Apply five sequential normal load cycles 0-~~5~~-0 ~~Mpa~~ # per 20-PST Procedure. 73,600 # DDK 11/18/92

Earthquake Shear Load Sequence

Fourteen data channels of backup analog tape recorder are identified in laboratory log. Steps 7 through 14 below are performed in sequence shown on figure of typical drive tape signal as observed on oscilloscope readout.

5. Apply normal load to test Mpa level.

6. Adjust and record horizontal shear null position: Adjust Horizontal load to null (Zero+or-400lb.) on voltmeter. Record vertical displacement detector positions from digital readout. Record horizontal shear LVDT positions from digital readout.

7. Turn on fourteen-channel analog tape recorder.

8. Trigger oscilloscope to observe drive tape signal.

9. Turn on drive tape.

10. At end of square wave, trigger digital data acquisition system set to ~~40~~ 43 seconds duration. DDK 11/18/92

11/18/92

11. Turn on horizontal shear actuator switch.

---------- Earthquake test run proceeds ----------

12. When digital data acquisition system sequence stops, turn off horizontal shear actuator switch.

13. Turn off fourteen-channel analog tape recorder.

14. Turn off drive tape.

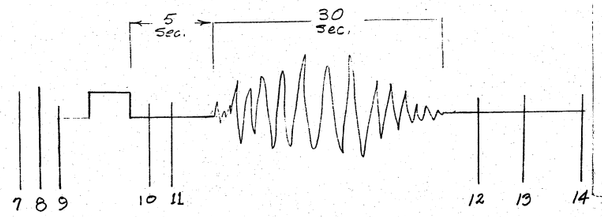
15. Perform digital data copying sequence.

16. Relieve normal load to zero.

17. Rewind drive tape (only if necessary for next run level).

18. Return to Step 5 to initiate next run.

19. Typical earthquake test sequence includes:
    Run 1 - normal load at 1-Mpa, shear disp. 1-in. peak
    Run 2 - normal load at 1-Mpa, shear disp. 2-in. peak
    Run 3 - normal load at 3-Mpa, shear disp. 1-in. peak
    Run 4 - normal load at 3-Mpa, shear disp. 2-in. peak
    Run 5 - normal load at 5-Mpa, shear disp. 1-in. peak
    Run 6 - normal load at 5-Mpa, shear disp. 2-in. peak



Typical Drive Tape Signal Sequence

11/30/92 TOP ROCK (JOINT SURFACE)

TEST	REBOUND
PS 1	52
2	52
3	53
4	56
5	50
6	51
7	50
8	53
9	53
10	51

BOTTOM BLOCK SPM 23.2.3-A (SIDE1)

1	59	9	56
2	58	10	59
3	58	11	59
4	53	12	49
5	55	13	50
6	58	14	60
7	58	15	58
8	58	16	54

BOTTOM BLOCK (JOINT SURFACE)

1	56x	11	46
2	43x	12	46
3	46	13	50
4	42x	14	51
5	44	15	56x
6	51		
7	54		
8	56x		
9	53		
10	47		

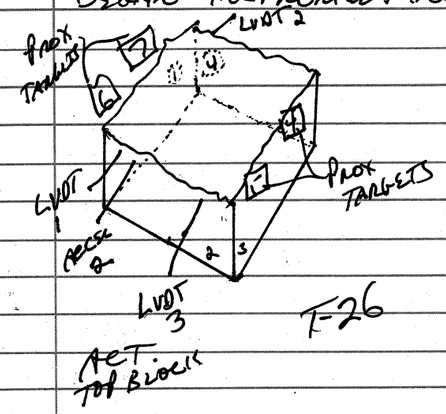
TILT ANGLE - SIDE 2-4 58° SIDE 4-2 57°

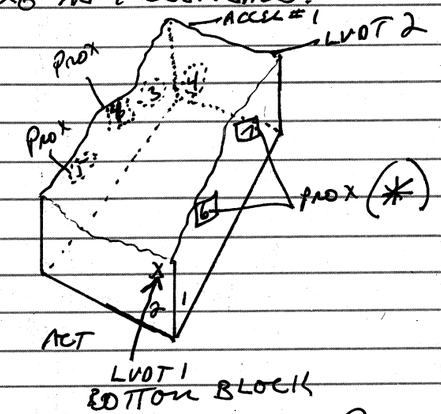
TOP ROCK NET WEIGHT - 25.3#

APICKS

11/30/92 RAN PROFILES T26PBBBT.DAT AND T26PTBBT.DAT AP.

12/1/92 GROUTED T-27 WITH RECIPE LISTED ON PAGE 118. GROUTED SPECIMEN WAS ALLOWED TO SET-UP FOR FIVE (5) HOURS BEFORE SEPERATING. SPECIMEN WAS ALLOWED TO SET-UP OVERNIGHT BEFORE RESUBMERGING IN WATER. BEGAN INSTRUMENT ON T26 AS ILLUSTRATED.





ACCEL #3 WAS MOUNTED TO THE TOP BOX AP

12/2/92 RESUBMERGED T-27 GROUTED IN BOXES. RAN TEST T26NS1-5.DAT (5 FILES). RAN THE FOLLOWING SERIES OF DYNAMIC TESTS:

T26SEIS1.DAT	1 MPa 1" PK	DRIVE TAPE WAS ½ SPEED
T26SEIIA.DAT	1 MPa 1" PK	
T26SEIS2.DAT	1 MPa 2" PK	
T26SEIS3.DAT	3 MPa 1" PK	
T26SEIS4.DAT	4 MPa 2" PK	VERT. LD. INCREASED
T26SEIS5.DAT	5 MPa 1" PK	
T26SEIS6.DAT	5 MPa 2" PK	

* - PROX #6 FAILED ON INSTALLATION. OPENING WAS APPROX 650 MILS. SEE "CNF" FILES FOR OFFSET.

DATA WAS TAKEN DIGITALLY & ANALOG TAPE AS LISTED ON PAGE 147. RAN PROFILE T26PBBAT.DAT.

APICKS

12/3/92 RAN PROFILE T26PTBAT.DAT.
REMOVED SPECIMEN SRM 10.2.2①/10.1.1 FROM WATER.
(T28 SERIES). PERFORMED SCHMIDT HAMMER REBOUND TEST:

TEST T28 TOP BLOCK (SIDES)

TEST	REBOUND	TEST	REBOUND
1	55	9	55
2	54	10	57
3	56	11	57
4	50	12	57
5	57	13	53
6	55	14	58
7	55	15	58
8	52	16	59

TOP BLOCK & JOINT SURFACE

1	48	12	48
2	50	13	50
3	56		
4	51		
5	51		
6	54		
7	50		
8	54		
9	56		
10	46		
11	56		

T28 BOTTOM BLOCK (SIDES)

1	55	9	57
2	56	10	56
3	58	11	57
4	54	12	54
5	58	13	57
6	58	14	57
7	60	15	58
8	54	16	56

A Pickens

12/3/92 T28 BOTTOM BLOCK JOINT SURFACE

TEST	REBOUND		
1	45	11	49
2	50	12	54
3	42 x	13	50
4	49	14	43
5	50		
6	53		
7	45		
8	47		
9	51		
10	40 x		

T28 TILT ANGLE-SIDE 4-2 = 42° SIDE 4-2 = 56°
TOP BLOCK NET WEIGHT = 21.9 #

T25		T26	
BB	TB	BB	TB
11745	7678	11945	8220
7805	7754	7988	7801
3864	3923	3724	3495
1584	1656	1559	1762
2	1	2	5

A

12/4/92 GROUTED SPECIMEN T28 WITH RECIPE ON PAGE 118. A
12/5/92 SUBMERGED SPECIMENS T28 GROUTED IN BOXES. A
12/8/92 RAN PROFILES T27PBBBT.DAT AND T27PTBBT.DAT.

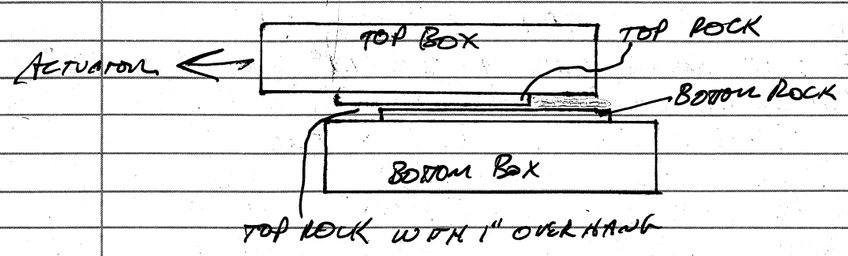
T27.

BB	TB
11902	7952
7929	7822
3848	3785
1576	1667
1	2

INSTRUMENTED T27 AS ILLUSTRATED ON PAGE 149 A
12/9/92 RAN TESTS T27NS1-5.DAT (5-FILES).

A Pickens

12/9/92 RAN TEST T27CND1.DAT. TEST WAS AS FOLLOWS:
INCREASE VERTICAL LOAD TO 1 MPa AT ½ MPa PER MIN.
PULL TOP BLOCK TOWARD ACTUATOR 2" OVER 20 MIN.
PUSH TOP BLOCK AWAY FROM ACTUATOR 2" OVER 20 MIN.
UNLOAD VERTICAL LOAD AT ½ MPa/MIN.
REPEAT PROCEDURE FOR 2 THROUGH 5 MPa.
THE FIRST TEST AT THE 1 MPa LEVEL PULLED THE TOP BLOCK 3" ACROSS THE BOTTOM BLOCK LEAVING 1" OF BARE TOP ROCK AT THE TRANSITION POINT.



THE ORIGINAL COMMAND PROGRAM WAS WRITTEN FOR A 4" ACTUATOR STROKE. THE 75K ACTUATOR IS A 6" STROKE WITH THE SAME COMMAND VOLTAGE. THE PROGRAM WAS MODIFIED TO THE PROPER COMMAND LEVEL BEFORE PROCEEDING WITH TEST #2. FOLLOWING ARE THE TEST FILENAMES: T27CND2.DAT, T27CND3.DAT, T27CND4.DAT AND T27CND5.DAT.

12/10/92 RAN PROFILE T27PBBAT.DAT. RAN PROFILE T27PTBAT.DAT TEST WAS STOPPED INADVERTENTLY. RESTARTED TEST AT POW 75

12/10/92 PERFORMED SCHMIDT HAMMER REBOUND TEST ON SPECIMEN SRM 10.2.2②/10.2.2③ (T29).

TOP BLOCK SRM 10.2.2② SIDES

TEST	REBOUND	TEST	REBOUND
1	56	9	56
2	57	10	57
3	58	11	56
4	54	12	57
5	59	13	54
6	57	14	55
7	55	15	56
8	55	16	57

TOP BLOCK JOINT SURFACE

TEST	REBOUND
1	47
2	52
3	52
4	48
5	48
6	44
7	43
8	48
9	53
10	49

BOTTOM BLOCK SIDES (10.2.2③)

TEST	RBD	TST	RBD
1	58	9	57
2	59	10	59
3	60	11	56
4	58	12	51
5	58	13	57
6	56	14	60
7	58	15	56
8	57	16	57

12/10/92 BOTTOM BLOCK JOINT SURFACE

TEST	REBOUND	TEST	REBOUND
1	47 x	11	58
2	44 x	12	54
3	40 x	13	46 x
4	~~STP~~ 55	14	54
5	55		
6	55		
7	50		
8	52		
9	54		
10	53		

TILT ANGLE - SIDE 1 THROUGH 3 = 44° SIDE 3 THROUGH 1 = 54°
TOP BLOCK NET WEIGHT WAS - 20.6 #. A

12/11/92 RAN PROFILES T28PBBBT.DAT AND T28PTBBT.DAT. RESUBMERGED SPECIMENS.
GROUTED T29 WITH RECIPE LISTED ON PAGE 118.

12/12/92 T29 WAS SUBMERGED IN WATER.

12/14/92 INSTRUMENTED T28 AS ILLUSTRATED ON PAGE 149 LESS ACCELEROMETERS. REASSEMBLED APPARATUS. RAN TESTS T28NS1-5.DAT (5 FILES). RAN TEST T28CND3.DAT. HORIZONTAL FORCE DID NOT BUILD AS EXPECTED. PROGRAM WAS STOPPED. FOUND WIRE REVERSED AND CORRECTED IT. WHEN THE PROGRAM WAS RESUMED, THE COMMAND VOLTAGE INCREASED TO THE POINT WHERE IT NORMALLY WOULD HAVE BEEN HAD THE PROGRAM BEEN ALLOWED TO RUN. THIS RESULTED IN THE ACTUATOR MOVING APPROX. 0.3". SEE DATA FOR MORE ACCURATE MEASUREMENT. RAN TEST T28CND4.DAT AND T28CND5.DAT. A

12/15/92 RAN PROFILES T28PBBAT.DAT AND T28PTBAT.DAT. A

12/16/92 RECEIVED SPECIMEN SRM 22.3.3/22.2.2 ~~T28~~ (T30 SERIES)

A Pickles

12/16/92 PERFORMED SCHMIDT HAMMER REBOUND TEST

SRM #22.3.3 TOP BLOCK, SIDES

TEST	REBOUND	TEST	REBOUND
1	52	9	60
2	56	10	60
3	55	11	60
4	58	12	60
5	58	13	60
6	60	14	61
7	61	15	59
8	59	16	58

TOP BLOCK, JOINT SURFACE

1	46	11	54 x
2	45	12	48
3	49	13	50
4	46	14	52
5	55 x		
6	61 x		
7	47		
8	49		
9	46		
10	49		

SRM 22.2.2 BOTTOM BLOCK, SIDES

1	53	9	57
2	60	10	61
3	60	11	60
4	60	12	61
5	61	13	61
6	62	14	53
7	61	15	62
8	61	16	60

A Pickles

12/16/92 SPM 22.2.2 Bottom Block, Joint Surface

Test	Rebound	Test	Rebound
1	56	8	43
2	53	9	50
3	53	10	53
4	51	11	41
5	58	12	48
6	49	13	53
7	52	14	51

Tilt Angle Test – 62° Side 2 through 4; 67° Side 4 thru 2.
Top Rock Net Weight was 19.9#. A

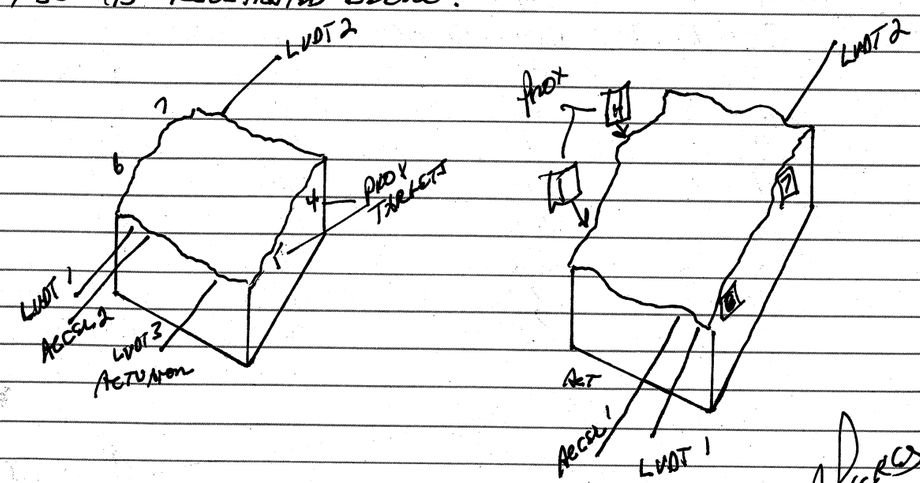
12/16/92 Grouted Bottom Block (T30) with recipe listed on page 118. A

12/17/92 Grouted Top Block (T30) with recipe as above. Specimen were placed in 105° C oven for 24 hrs. A

12/18/92 Ran Profiles T29PBBBT.DAT and T29PTBBT.DAT. Specimen were resubmerged after profiling. Remove specimen T30 from oven. A

12/21/92 Assembled apparatus with instrumented specimen T29. (See page 149.) Ran test T29NS1-5.DAT (5 files). Ran test T29CNO5.DAT. Test parameters supplied by Smooth.

12/29/92 Ran Profiles T30PBBBT.DAT and T30PTBBT.DAT. Instrumented T30 as illustrated below.



A Pickens

12/23/92

12/30/92 Assembled apparatus. Accel #3 was attached to the upper box assy near right side. LVDT 3 was mounted between upper rock and load cell. The following 16 channels were taped, digitized and filtered as listed below:

XDCR	Computer Channel	500 Hz Filter	Tape Recorder Channel
VLC 1	0	N/A	1
VLC 2	1	N/A	2
VLC 3	2	N/A	3
TVL	3	X	4
HL	4	X	5
LVDT 1	5	X	6
LVDT 2	6	X	7
LVDT 3	7	X	8
Prox 4	8	N/A	N/A
Prox 5	9	X	9
Prox 6	10	X	10
Prox 7	11	X	11
Accel 1	12	X	12
Accel 2	13	X	13
Accel 3	14	X	N/A
Hor Disp.	15	X	14

Ran tests T30NS1-5.DAT (5 files). Ran the following seismic tests; (parameters by Smooth.)

Test	Parameters	
T30SEIS1.DAT	1" PK	1 Mpa
T30SEIS2.DAT	2" PK	1 Mpa
T30SEIS3.DAT	1" PK	3 Mpa
T30SEIS4.DAT	2" PK	3 Mpa
T30SEIS5.DAT	1" PK	5 Mpa
T30SEIS6.DAT	2" PK	5 Mpa

Ran profile T29PTBAT.DAT. A

A Pickens

12/31/92	RAN PROFILE T29PBBAT.DAT
1/4/93	RAN PROFILES T30PTBAT.DAT AND T30PBBAT.DAT.

Final Entry
4/30/93
Sri-Min Li

Standard Used: 100 KIP Morehouse Serial No: 811

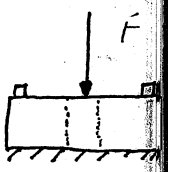
Calibration of: Load Cell INTERFACE 1220-AJ 5,000# Serial No: 48240 (LC#1)

Amplifier: 2120A (LEFT SIDE) Serial No: 82094

Digital Voltmeter: HP 3466A Serial No: 1716A22587 (CAL DUE 22 MAY 92)

Frame No. 3 By: P Tens. or Comp.: COMP.

Date: 4-1-92 Temp: ~~74°F~~ 71.9°F Cal. Volts A: 0.2926 B: -0.2927



1/2

DEFL	Load #	Run #1	Run #2	Run #3	Avg.	
0	No load	.0000	+ 0.0002 ~~P0.0000~~	+0.0003		
40	5674	-.5653	-0.5607	-0.5612		
50	7091	-0.7060	-0.7020	-0.7025		
60	8508	-0.8480	-0.8434	-0.8415		
70	9924	-0.9900	-0.9850	-0.9830		
80	11340	-1.1309	-1.1245	-1.1210		
90	12755	-1.2730	-1.2650	-1.2610		
100	14170	-1.4130	-1.4050	-1.4035		
110	15585	-1.5542	-1.5470	-1.5431		
120	16999	-1.6960	-1.6850	-1.6845		
130	18413	-1.8376	-1.8328	-1.8228		
140	19826	-1.9780	-1.9680	-1.9630		
150	21239	-2.120	-2.106	-2.102		
160	22651	2.262	-2.246	-2.241		
170	24063	2.403	2.382	2.380		
	Y INT	4.5	3.3	-0.4	~~2.47~~ 2.33	
	SLOPE	-10,011 #/V	-10,081 #/V	-10,104 #/V	-10,065 #/V	

Y intercept : ~~2.47~~ 2.33 R fit of slope: 0.999993

Slope : -10,065 #/VOLT volt * _____ = _____

Poly. Fit Coeff. a_0 : _____

a_1 : _____

a_2 : _____

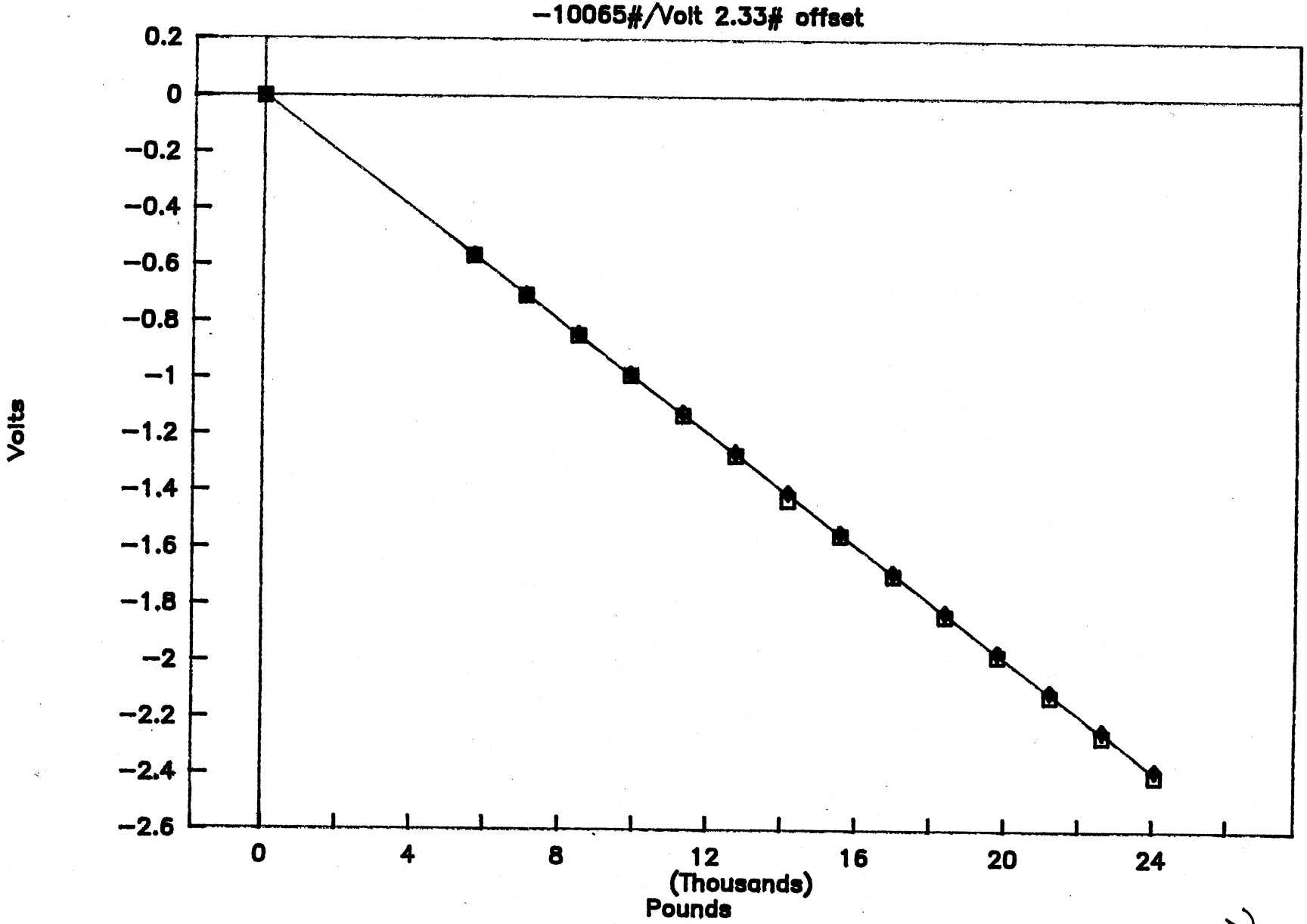
2

LOAD	LC 1 RUN 1	RUN 2	RUN 3	AVG	VOLTS
0	0.0000	0.0002	0.0003	0.0002	0.0002
5674	-0.5653	-0.5607	-0.5612	-0.5624	-0.5635
7091	-0.7060	-0.7020	-0.7025	-0.7035	-0.7043
8508	-0.8480	-0.8434	-0.8415	-0.8443	-0.8451
9924	-0.9900	-0.9850	-0.9830	-0.9860	-0.9857
11340	-1.1309	-1.1245	-1.1210	-1.1255	-1.1264
12755	-1.2730	-1.2650	-1.2610	-1.2663	-1.2670
14170	-1.4300	-1.4050	-1.4035	-1.4128	-1.4076
15585	-1.5542	-1.5470	-1.5431	-1.5481	-1.5482
16999	-1.6960	-1.6850	-1.6845	-1.6885	-1.6886
18413	-1.8376	-1.8328	-1.8228	-1.8311	-1.8291
19826	-1.9780	-1.9680	-1.9630	-1.9697	-1.9695
21239	-2.1200	-2.1060	-2.1020	-2.1093	-2.1099
22651	-2.2620	-2.2460	-2.2410	-2.2497	-2.2502
24063	-2.4030	-2.3820	-2.3800	-2.3883	-2.3905

Regression Output:

Constant	2.331099
Std Err of Y Est	17.71893
R Squared	0.999993
No. of Observations	15
Degrees of Freedom	13
X Coefficient(s)	-10065.2
Std Err of Coef.	6.933135

Load cell #1 calibration 4/1/92



2

Standard Used: 100 KIP Morehouse INTERFACE 100 HP — Serial No: 811

Calibration of: Load Cell LC #3 — Serial No: 48724 LC #3

Amplifier: 2120A (LEFT SIDE) 1220 AT — Serial No: 82097

Digital Voltmeter: HP-3466A — Serial No: 1716A 22587 CAL DUE 22 MAY 92

Frame No. 3 By: [illegible] — Tens. or Comp.: Comp

Date: 4-1-92 Temp: 74°F — Cal. Volts A: 0.2953 B: -0.2956

4

DEFL	Load #	Run #1	Run #2	Run #3	Avg.	
0	No load	0.0001	0.0000	0.0000		
40	5674	-0.5637	-.5703	-0.5697		
50	7091	-0.7098	-0.7125	-0.7111		
60	8508	-0.8479	-0.8546	-0.8520		
70	9924	-0.9881	-0.9937	-0.9926		
80	11340	-1.1320	-1.1347	-1.1324		
90	12755	-1.2726	-1.2744	-1.2747		
100	14170	-1.4115	-1.4145	-1.4150		
110	15585	-1.5526	-1.5563	-1.5552		
120	16999	-1.6948	-1.6956	-1.6963		
130	18413	-1.8367	-1.8397	-1.8369		
140	19826	-1.9775	-1.9800	-1.9768		
150	21239	-2.119	-2.117	-2.120		
160	22651	-2.260	-2.261	-2.260		
170	24063	-2.402	-2.401	-2.402		
	~~Y INT~~	~~4.5~~	~~3.3~~	~~-0.4~~	~~2.47~~	
	~~SLOPE~~	~~-10,011 #/V~~	~~-10,044 #/V~~	~~-10,104 #/V~~	~~10,065~~	
	Y INT	9.8	-41.1	~~283.7~~ -27.5	~~52.20 #~~	-19.96
	SLOPE	-10,020 #/V	-10,038 #/V	~~-9940 #/V~~ -10035 #/VOLT	~~-10,023 #/V~~	-10,031 #/V

Y intercept : ~~2.4~~ ~~52.20 #~~ -19.96 # R fit of slope: ~~0.998792~~ 0.999987

Slope : ~~-10,023 #/VOLT~~ 10,031 #/VOLT volt * _____ = _____

Poly. Fit Coeff. a_0 : _____

a_1 : _____

a_2 : _____

5

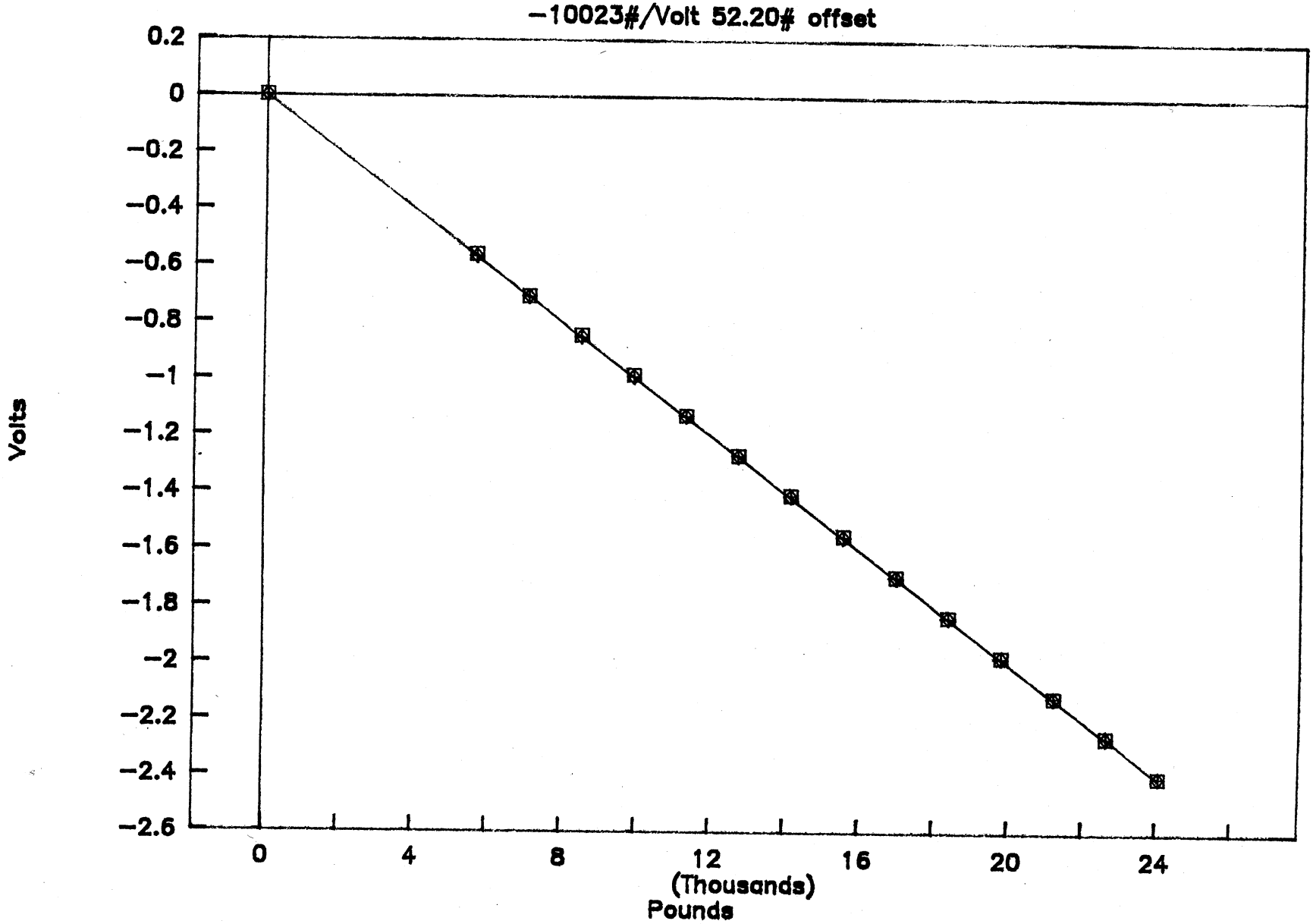
	LC 3				
LOAD	RUN 1	RUN 2	RUN 3	AVG	VOLTS
0	0.0001	0.0000	0.0000	0.0000	-0.0020
5674	-0.5637	-0.5703	-0.5697	-0.5679	-0.5676
7091	-0.7098	-0.7125	-0.7111	-0.7111	-0.7089
8508	-0.8479	-0.8546	-0.8520	-0.8515	-0.8502
9924	-0.9881	-0.9937	-0.9926	-0.9915	-0.9913
11340	-1.1320	-1.1347	-1.1324	-1.1330	-1.1325
12755	-1.2726	-1.2744	-1.2747	-1.2739	-1.2736
14170	-1.4115	-1.4145	-1.4150	-1.4137	-1.4146
15585	-1.5526	-1.5563	-1.5552	-1.5547	-1.5557
16999	-1.6948	-1.6956	-1.6963	-1.6956	-1.6966
18413	-1.8367	-1.8397	-1.8369	-1.8378	-1.8376
19826	-1.9775	-1.9800	-1.9768	-1.9781	-1.9785
21239	-2.1190	-2.1170	-2.1200	-2.1187	-2.1193
22651	-2.2600	-2.2610	-2.2600	-2.2603	-2.2601
24063	-2.4020	-2.4010	-2.4020	-2.4017	-2.4009

Regression Output:

Constant	-19.9571
Std Err of Y Est	11.02169
R Squared	0.999997
No. of Observations	15
Degrees of Freedom	13

X Coefficient(s)	-10030.9
Std Err of Coef.	4.297914

Load cell #3 calibration 4/1/92



Standard Used: 100K Morehouse Serial No: 811

Calibration of: Load Cell INTERFACE 251000# 1220 LC #4 Serial No: 48963 LC #4

Amplifier: 2120A (RIGHT SIDE) Serial No: ~~48963 LC #4~~ 82094

Digital Voltmeter: HP 3466A Serial No: 1716A22587 (CAL DUE 22 MAY 92)

Frame No. 3 By: [illegible] Tens. or Comp.: comp

Date: 4-1-92 Temp: ~~74°F~~ 73°F Cal. Volts A: +0.2907 B: -0.2907

DEFL	Load #	Run #1	Run #2	Run #3	Avg.	
0	No load	0.0001	+0.0006	+0.0006		
40	5674	-0.5699	-0.5666	-0.5661		
50	7091	-0.7097	-0.7045	-0.7058		
60	8508	-0.8500	-0.8499	-0.8475		
70	9924	-0.9942	-0.9905	-0.9895		
80	11340	-1.1340	-1.1298	-1.1296		
90	12755	-1.2744	-1.2668	-1.2690		
100	14170	-1.4170	-1.4130	-1.4116		
110	15585	-1.5540	-1.5530	-1.5517		
120	16999	-1.6960	-1.6920	-1.6910		
130	18413	-1.8365	-1.8340	-1.8307		
140	19826	-1.9750	-1.9730	-1.9711		
150	21239	-2.117	-2.110	-2.11[illegible]		
160	22651	-2.257	-2.254	-2.253		
170	24063	-2.397	-2.395	-2.393		
	Y INT	-40.78	-14.15	-29.74	-28.28	
	SLOPE	10,050 #/v	10,055 #/v	10,067 #/v	10,057 #/v	

Y intercept : -28.28 R fit of slope: 0.999992

Slope : 10,057 #/v volt * _____ = _____

Poly. Fit Coeff. a_0 : _____

a_1 : _____

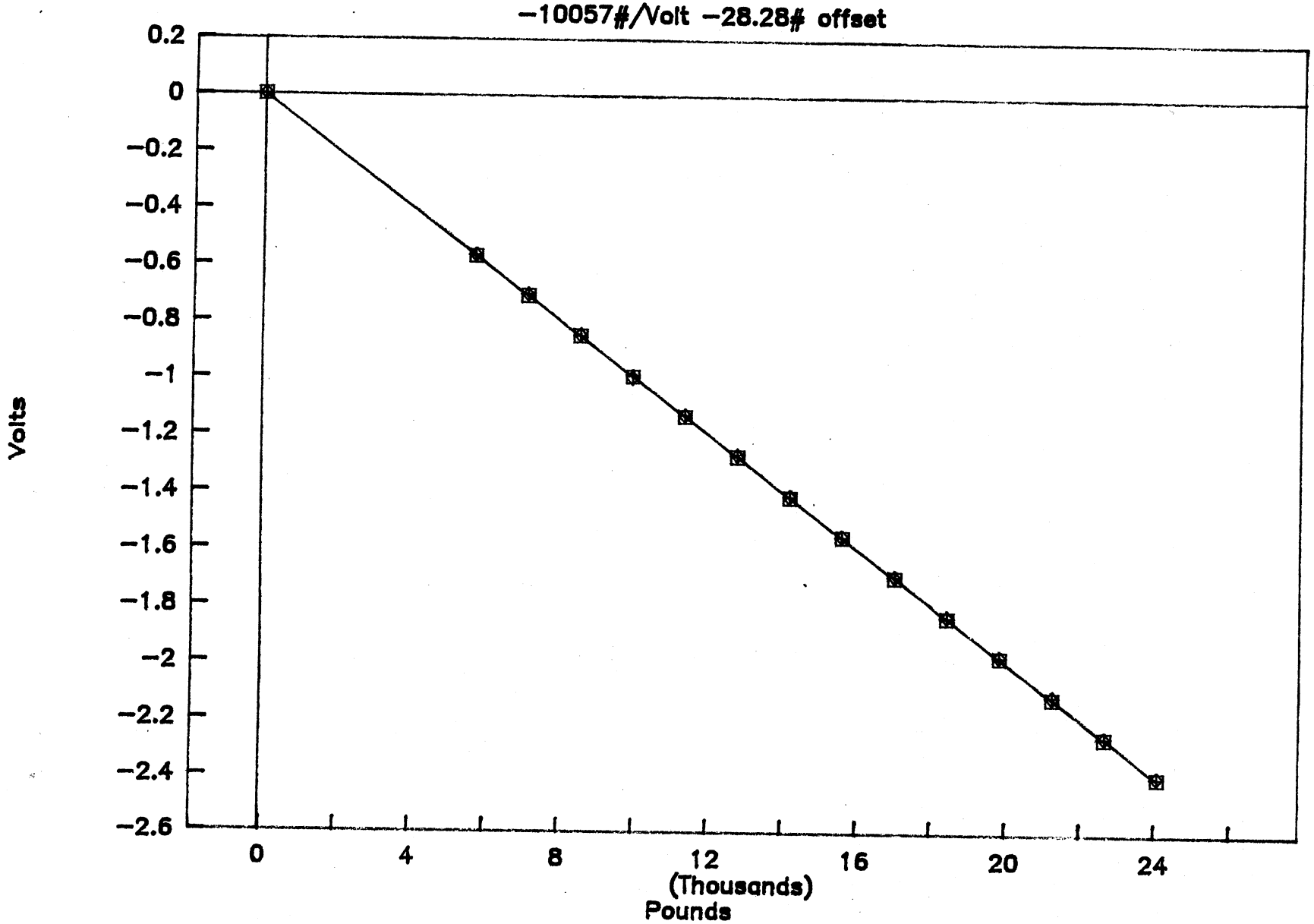
a_2 : _____

LOAD	LC 4 RUN 1	RUN 2	RUN 3	AVG	VOLTS
0	0.0001	0.0006	0.0006	0.0004	-0.0028
5674	-0.5699	-0.5666	-0.5661	-0.5675	-0.5670
7091	-0.7097	-0.7045	-0.7058	-0.7067	-0.7079
8508	-0.8500	-0.8499	-0.8475	-0.8491	-0.8488
9924	-0.9942	-0.9905	-0.9990	-0.9946	-0.9896
11340	-1.1340	-1.1298	-1.1296	-1.1311	-1.1304
12755	-1.2744	-1.2668	-1.2690	-1.2701	-1.2711
14170	-1.4170	-1.4130	-1.4116	-1.4139	-1.4118
15585	-1.5540	-1.5530	-1.5517	-1.5529	-1.5524
16999	-1.6960	-1.6920	-1.6910	-1.6930	-1.6930
18413	-1.8365	-1.8340	-1.8307	-1.8337	-1.8336
19826	-1.9750	-1.9730	-1.9711	-1.9730	-1.9741
21239	-2.1170	-2.1100	-2.1110	-2.1127	-2.1146
22651	-2.2570	-2.2540	-2.2530	-2.2547	-2.2550
24063	-2.3970	-2.3950	-2.3930	-2.3950	-2.3954

Regression Output:

Constant	-28.2812
Std Err of Y Est	19.50718
R Squared	0.999992
No. of Observations	15
Degrees of Freedom	13
X Coefficient(s)	-10057.2
Std Err of Coef.	7.626759

Load cell #4 calibration 4/1/92



Standard Used: 100 K lb Morehouse (50,000 1220-AJ) Serial No: 811

Calibration of: INTERFACE LOAD CELL Serial No: 54101 LC #5

Amplifier: 2120 A (RIGHT SIDE) Serial No: 82097

Digital Voltmeter: HP-3466A Serial No: 1716A 22587 (CAL DUE 22 MAY 92)

Frame No. 3 By: [illegible] Tens. or Comp.: Comp 1D

Date: 4/1/92 Temp: 72.9°F Cal. Volts A: _____ B: _____

DEFL	Load#	Run #1	Run #2	Run #3	Avg.	
0	No Load	-0.0002	-0.0008	-0.0012		
40	5674	-0.5725	-0.5688	0.5702		
60	8508	-0.8543	-0.8533	-0.8520		
80	11340	-1.1383	-1.1392	-1.1360		
100	14170	-1.4215	-1.4231	-1.4210		
120	16999	-1.7072	-1.7056	-1.7030		
140	19826	-1.9879	-1.9876	-1.9880		
160	22651	-2.270	-2.2733	-2.270		
180	25475	-2.554	-2.556	-2.554		
200	28297	-2.837	-2.838	-2.839		
220	31117	-3.120	-3.122	-3.121		
250	35345	-3.545	-3.547	-3.544		
300	42382	-4.251	-4.250	-4.251		
350	49409	-4.923	-4.900	-4.907		
	Y INT	-62.95	-95.30	-72.75	-77.06	
	SLOPE	-10,008 #/V	-10,028 #/V	-10,020 #/V	-10,019 #/V	

Y intercept : -77.06 R fit of slope: 0.999949

Slope : -10,019 #/VOLT volt * _____ = _____

Poly. Fit Coeff. a_0 : _____

a_1 : _____

a_2 : _____

a_3 : _____

$y = a_0 + a_1 * X + a_2 * X^2 + a_3 * X^3$

LC 5 Compression

LOAD	RUN 1	RUN 2	RUN 3	AVG	VOLTS
0	-0.0002	-0.0008	-0.0012	-0.0007	-0.0028
5674	-0.5725	-0.5688	-0.5702	-0.5705	-0.5670
8508	-0.8543	-0.8533	-0.8520	-0.8532	-0.8488
11340	-1.1383	-1.1392	-1.1360	-1.1378	-1.1304
14170	-1.4215	-1.4231	-1.4210	-1.4219	-1.4118
16999	-1.7072	-1.7056	-1.7030	-1.7053	-1.6930
19826	-1.9879	-1.9876	-1.9880	-1.9878	-1.9741
22651	-2.2700	-2.2730	-2.2700	-2.2710	-2.2550
25475	-2.5540	-2.5560	-2.5540	-2.5547	-2.5358
28297	-2.8370	-2.8380	-2.8390	-2.8380	-2.8164
31117	-3.1200	-3.1220	-3.1210	-3.1210	-3.0968
35345	-3.5450	-3.5470	-3.5440	-3.5453	-3.5172
42382	-4.2510	-4.2500	-4.2510	-4.2507	-4.2169
49409	-4.9230	-4.9000	-4.9070	-4.9100	-4.9156

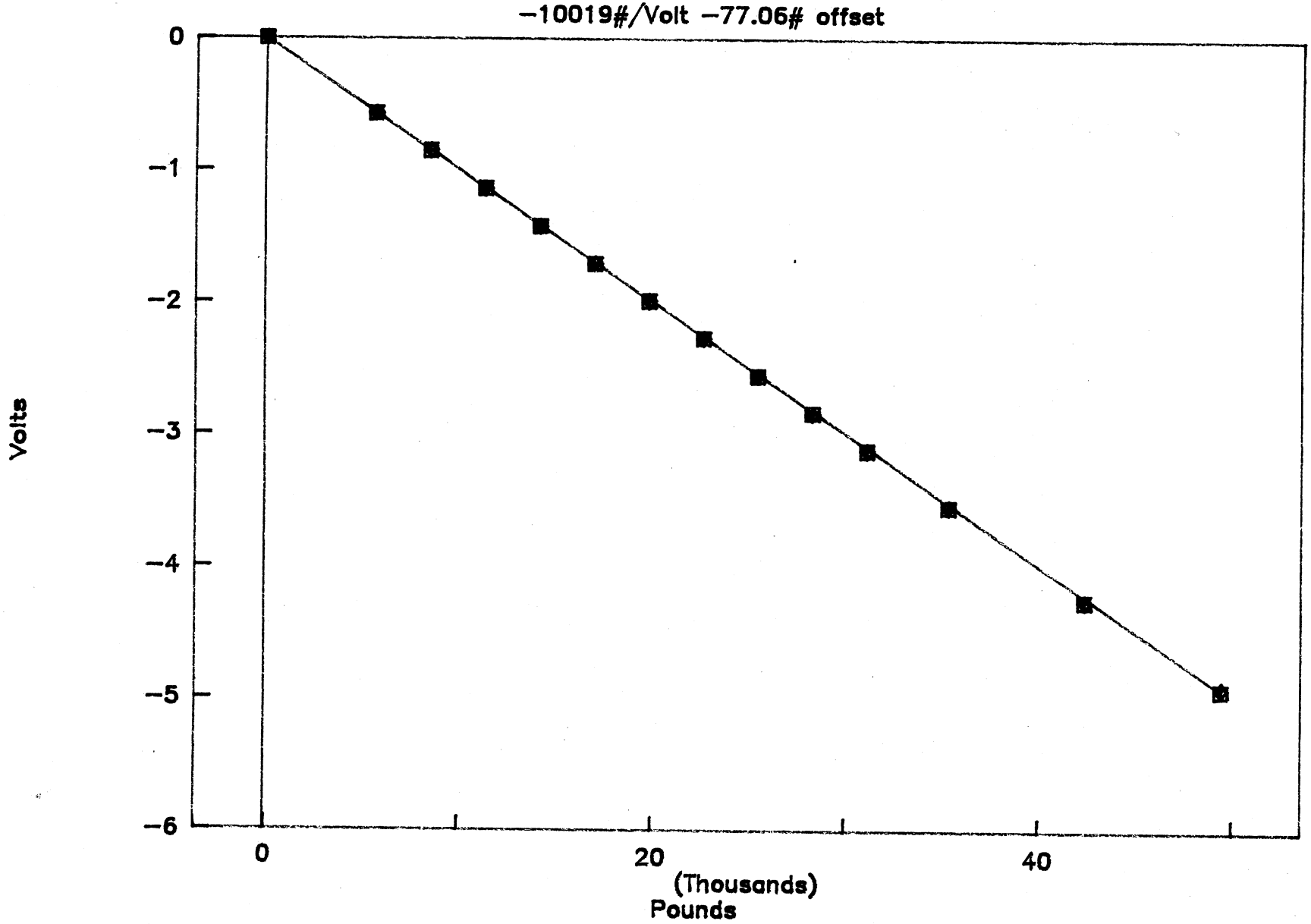
Regression Output:

Constant	-77.0581
Std Err of Y Est	104.7461
R Squared	0.999949
No. of Observations	14
Degrees of Freedom	12

X Coefficient(s)	-10019.0
Std Err of Coef.	20.51674

11

Load cell #5 (comp) calibration 4/1/92



12

Standard Used: 100K IP Morehouse (50,000 1220-AJ) Serial No: 811

Calibration of: INTERFACE LOAD CELL Serial No: 54101 LC #5

Amplifier: 2120A (RIGHT SIDE) Serial No: 82097

Digital Voltmeter: HP3466A Serial No: 1716A 22587 (CAL DUE 22 MAY 91)

Frame No. 3 By: RL (Tens.) or Comp.: TENSION

Date: 4/1/92 Temp: 73°F Cal. Volts A: 0.5929 B: -0.5933

13

DEFL	Load #	Run #1	Run #2	Run #3	Avg.	
0	No load	0.0000	.0008	0.0000		
50	7105	0.7210	0.7245	0.7238		
80	11369	1.1497	1.1536	1.1558		
110	15636	1.5816	1.5810	1.5850		
140	19907	2.013	2.014	2.014		
170	24181	2.444	2.438	2.444		
200	28459	2.872	2.876	2.875		
230	32740	3.305	3.308	3.305		
260	37025	3.738	~~3.887~~ 3.235	3.739		
290	41313	4.166	4.173	4.169		
320	45605	4.600	4.601	4.600		
350	49900	5.029	5.028	5.029		
	Y INT	-45.34#	-59.76	-73.50	-59.56	
	SLOPE	9924 #/V	9925 #/V	9928 #/V	9926 #/V	

Y intercept : -59.56 R fit of slope: 0.999997

Slope : 9926 #/VOLT volt * _____ = _____

Poly. Fit Coeff. a_0 : _____

a_1 : _____

a_2 : _____

a_3 : _____

$y = a_0 + a_1 * X + a_2 * X^2 + a_3 * X^3$

14

LC 5 Tension

LOAD	RUN 1	RUN 2	RUN 3	AVG	VOLTS
0	0.0000	0.0008	0.0000	0.0003	0.0060
7105	0.7210	0.7245	0.7238	0.7231	0.7218
11369	1.1497	1.1536	1.1558	1.1530	1.1514
15636	1.5816	1.5810	1.5850	1.5825	1.5813
19907	2.0130	2.0140	2.0140	2.0137	2.0116
24181	2.4440	2.4380	2.4440	2.4420	2.4422
28459	2.8720	2.8760	2.8750	2.8743	2.8732
32740	3.3050	3.3080	3.3050	3.3060	3.3045
37025	3.7380	3.7350	3.7390	3.7373	3.7362
41313	4.1660	4.1730	4.1690	4.1693	4.1682
45605	4.6000	4.6010	4.6000	4.6003	4.6007
49900	5.0290	5.0280	5.0290	5.0287	5.0334

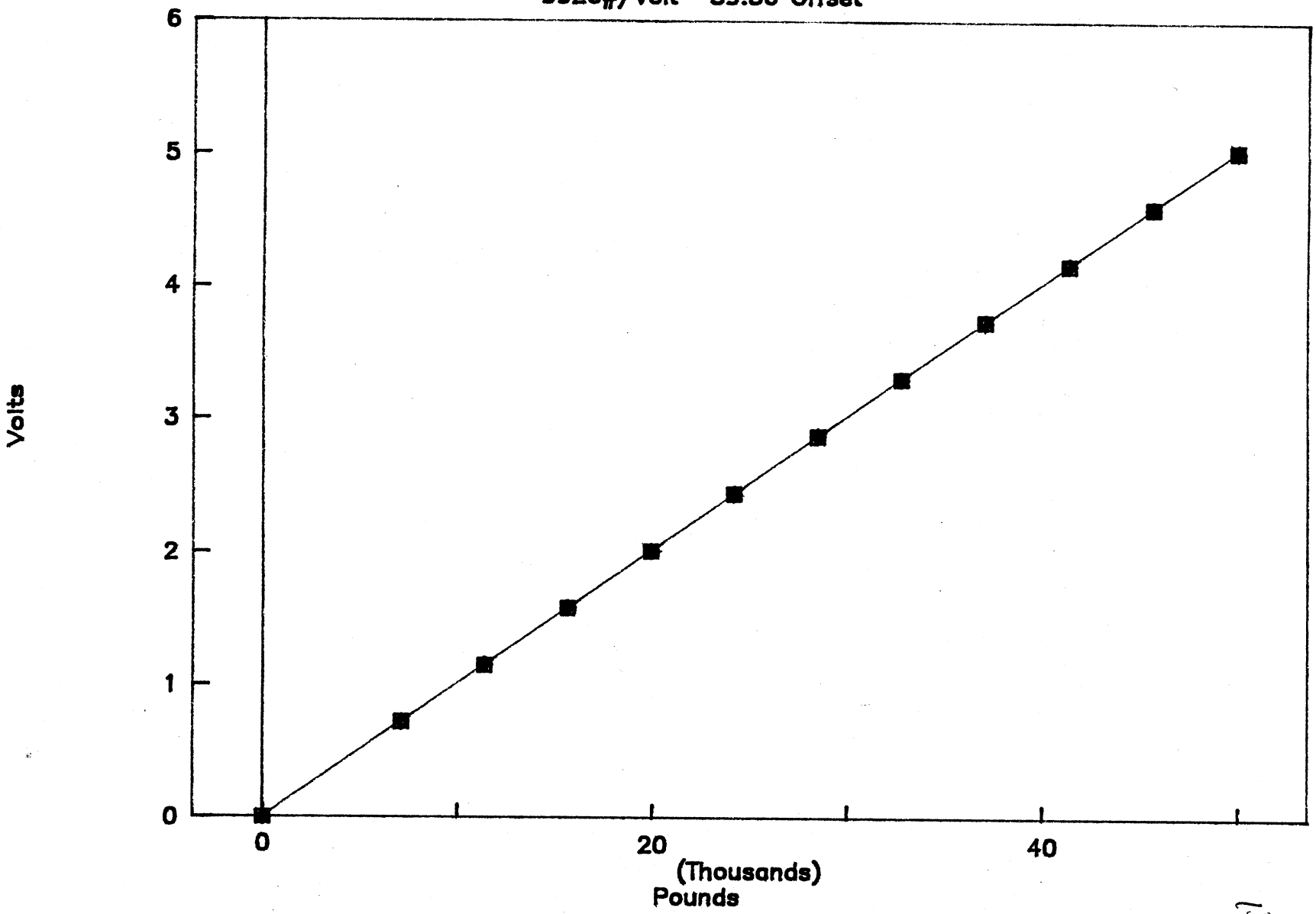
Regression Output:

Constant	-59.5607
Std Err of Y Est	26.44742
R Squared	0.999997
No. of Observations	12
Degrees of Freedom	10

X Coefficient(s)	9925.664
Std Err of Coef.	4.998682

Load cell #5 (Tens) calibration 4/1/92

9926#/Volt −59.56 Offset



LVDT calibration 3/27/92
Equipment list: Schaevitz model 2000 DC-E LVDT, Fluke Model 87 DMM, S/N 51502012
,
Cal due 13 Aug 92: Craftsman 6" steel scale, 1/100" increments

LVDT S/N 4601 (#1)

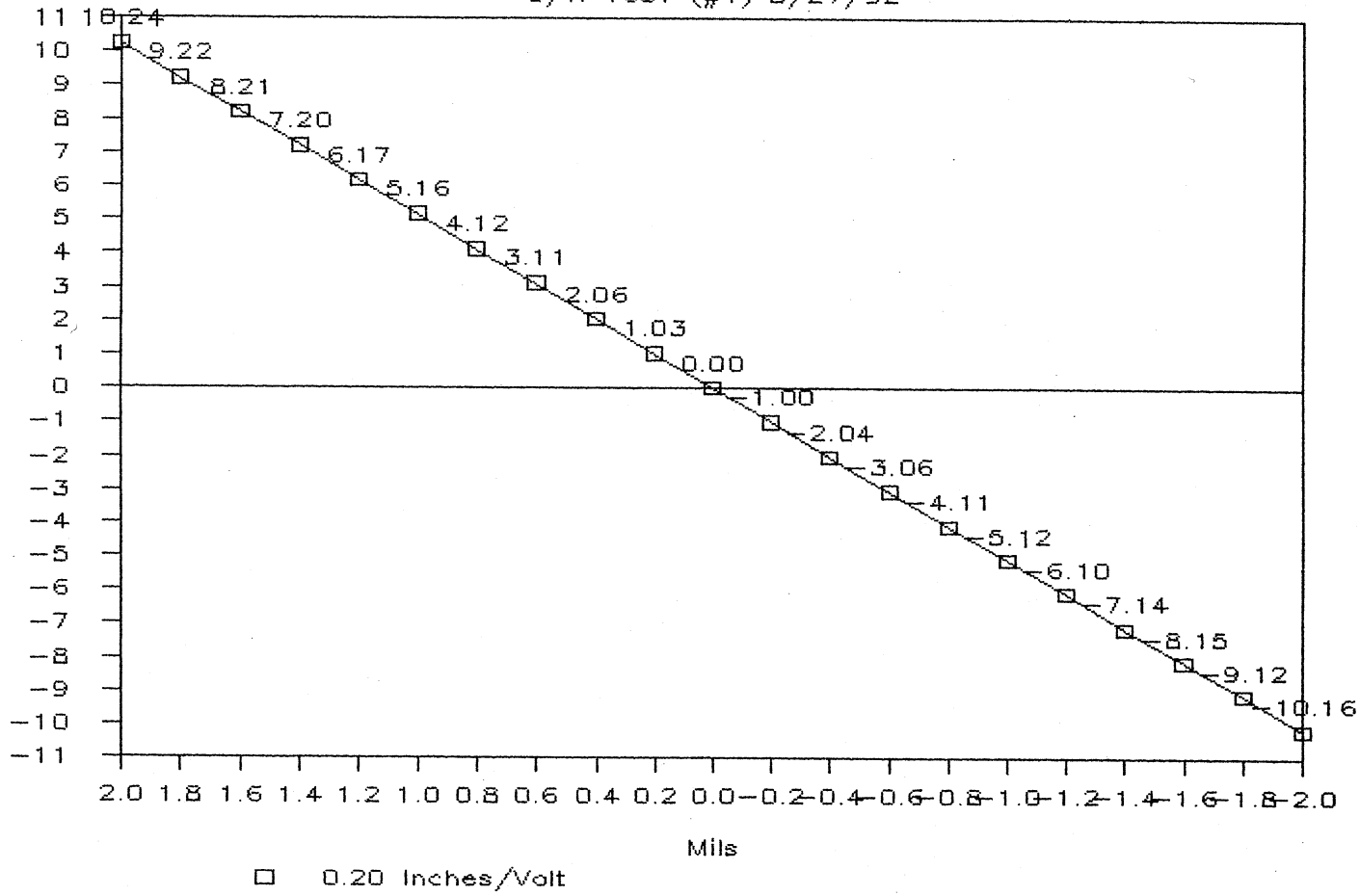
Inches	Volts	Inches/Volt	
2.0	10.24	0.20	0.20
1.8	9.22	0.20	
1.6	8.21	0.19	
1.4	7.20	0.19	
1.2	6.17	0.19	
1.0	5.16	0.19	
0.8	4.12	0.19	
0.6	3.11	0.19	
0.4	2.06	0.19	
0.2	1.03	0.19	
0.0	0.00	0.00	
-0.2	-1.00	0.20	
-0.4	-2.04	0.20	
-0.6	-3.06	0.20	
-0.8	-4.11	0.19	
-1.0	-5.12	0.20	
-1.2	-6.10	0.20	
-1.4	-7.14	0.20	
-1.6	-8.15	0.20	
-1.8	-9.12	0.20	
-2.0	-10.16	0.20	

LVDT S/N 4612 (#2)

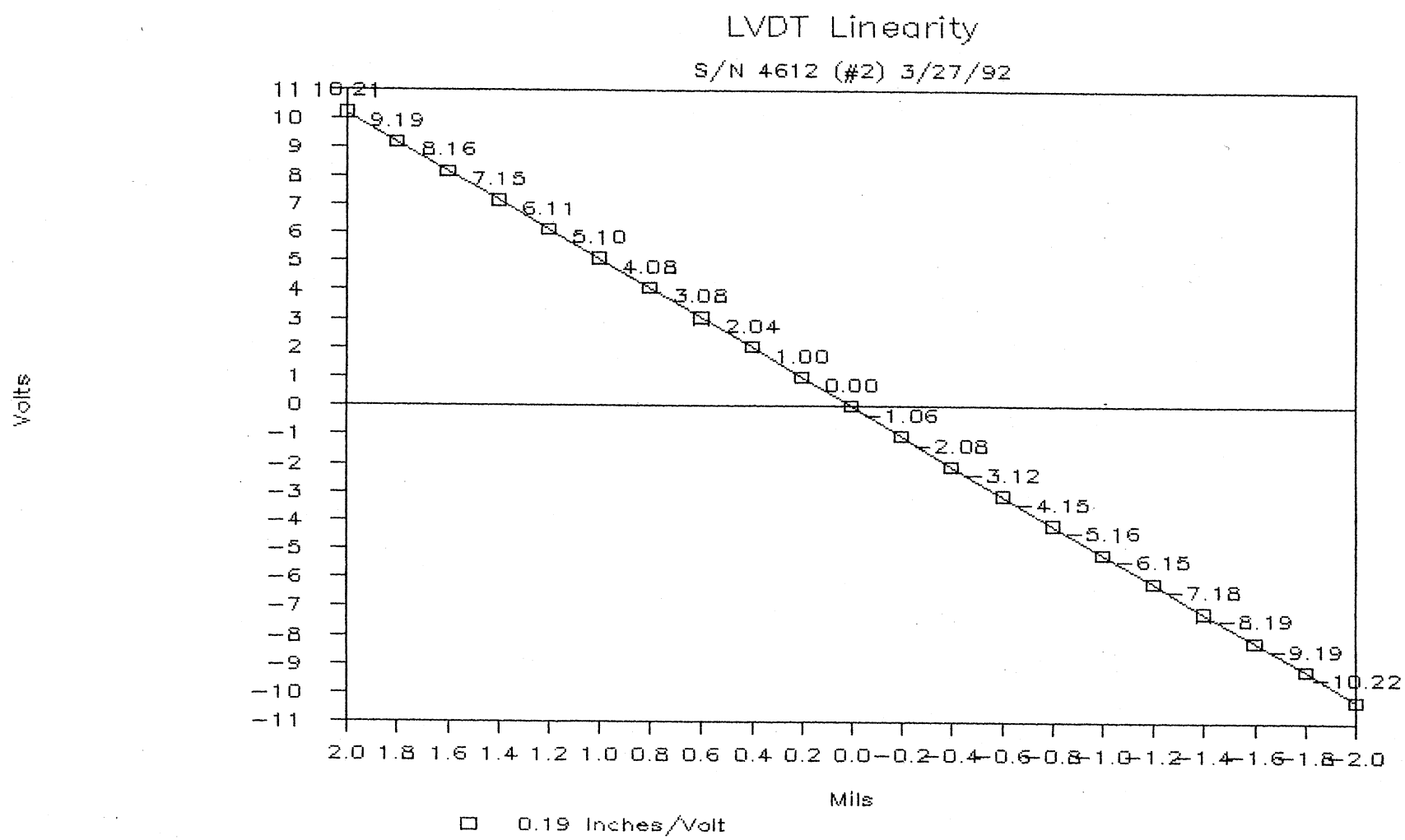
Inches	Volts	Inches/Volt	
2.0	10.21	0.20	0.19
1.8	9.19	0.20	
1.6	8.16	0.20	
1.4	7.15	0.20	
1.2	6.11	0.20	
1.0	5.10	0.20	
0.8	4.08	0.20	
0.6	3.08	0.19	
0.4	2.04	0.20	
0.2	1.00	0.20	
0.0	0.00	0.00	
-0.2	-1.06	0.19	
-0.4	-2.08	0.19	
-0.6	-3.12	0.19	
-0.8	-4.15	0.19	
-1.0	-5.16	0.19	
-1.2	-6.15	0.20	
-1.4	-7.18	0.20	
-1.6	-8.19	0.20	
-1.8	-9.19	0.20	
-2.0	-10.22	0.20	

LVDT Linearity

S/N 4601 (#1) 3/27/92



17


LVDT Linearity
S/N 4612 (#2) 3/27/92
Volts
Mils
0.19 Inches/Volt
10.21
9.19
8.16
7.15
6.11
5.10
4.08
3.08
2.04
1.00
0.00
-1.06
-2.08
-3.12
-4.15
-5.16
-6.15
-7.18
-8.19
-9.19
-10.22

CB

18

25mm Bently proximitor calibration 3/26/92
Equipment list: Starrett Vernier height gage, model 454F, cal not req'd;
Acopian model K32S60 power supply, Cal not req'd;
16ga steel target, mounted to height gage;
Fluke model 87 DMM, SN51502012, Cal'd on 13 Aug 91;

Proximitor #4 Power Supply 81

Mils	Volts	Mils/Volt	
0	0.91	0.00	45.10
50	1.54	32.50	
100	2.40	41.67	
150	3.45	43.50	
200	4.59	43.54	
250	5.73	43.60	
300	6.78	44.24	
350	7.75	45.14	
400	8.71	45.95	
450	9.71	46.37	
500	10.75	46.51	
550	11.67	47.12	
600	12.38	48.45	
650	12.95	50.21	
700	13.39	52.27	

Proximitor #5 Power Supply 27

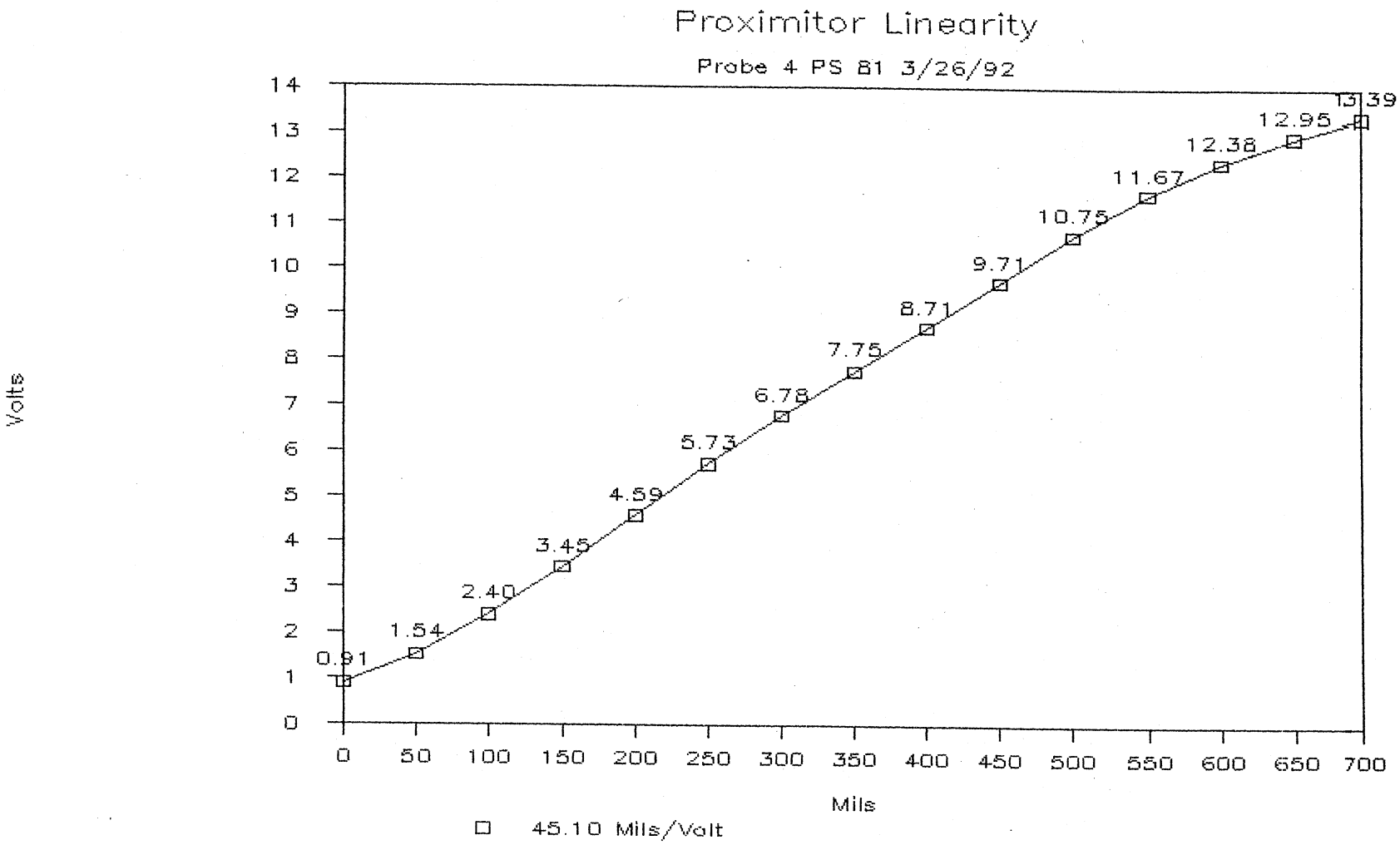
Mils	Volts	Mils/Volt	
0	0.88	0.00	46.04
50	1.27	39.44	
100	2.10	47.53	
150	3.11	48.20	
200	4.25	47.03	
250	5.42	46.13	
300	6.54	45.89	
350	7.75	45.14	
400	8.63	46.36	
450	9.82	45.81	
500	11.13	44.91	
550	12.34	44.58	
600	13.36	44.90	
650	14.03	46.34	
700	14.12	49.57	

Proximitor #6 Power Supply 80

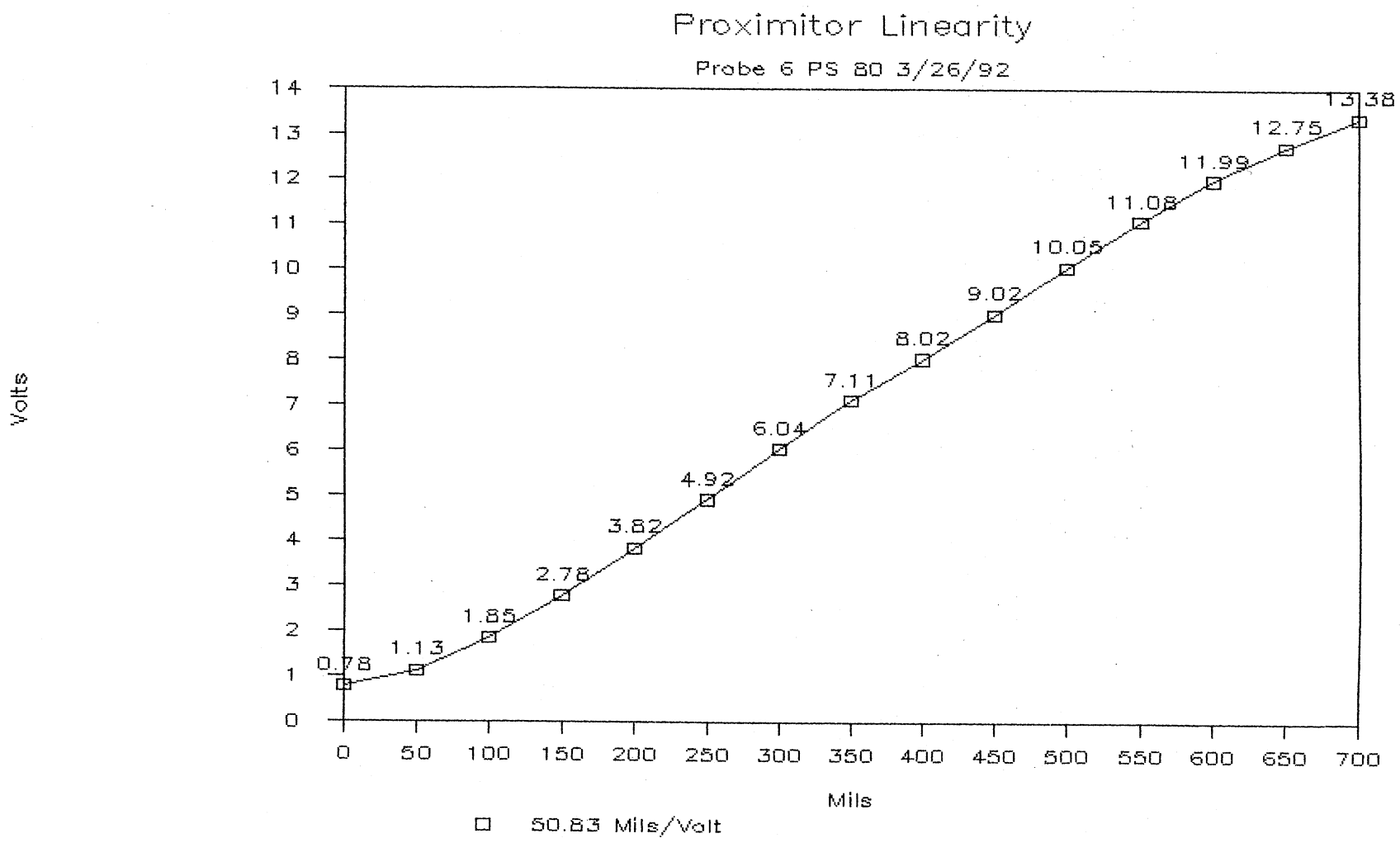
Mils	Volts	Mils/Volt	
0	0.78	0.00	50.83
50	1.13	44.18	
100	1.85	53.93	
150	2.78	53.92	
200	3.82	52.30	
250	4.92	50.85	
300	6.04	49.64	
350	7.11	49.23	
400	8.02	49.88	
450	9.02	49.92	
500	10.05	49.76	
550	11.08	49.66	
600	11.99	50.05	
650	12.75	50.98	
700	13.38	52.33	

Proximitor #7 Power Supply 87

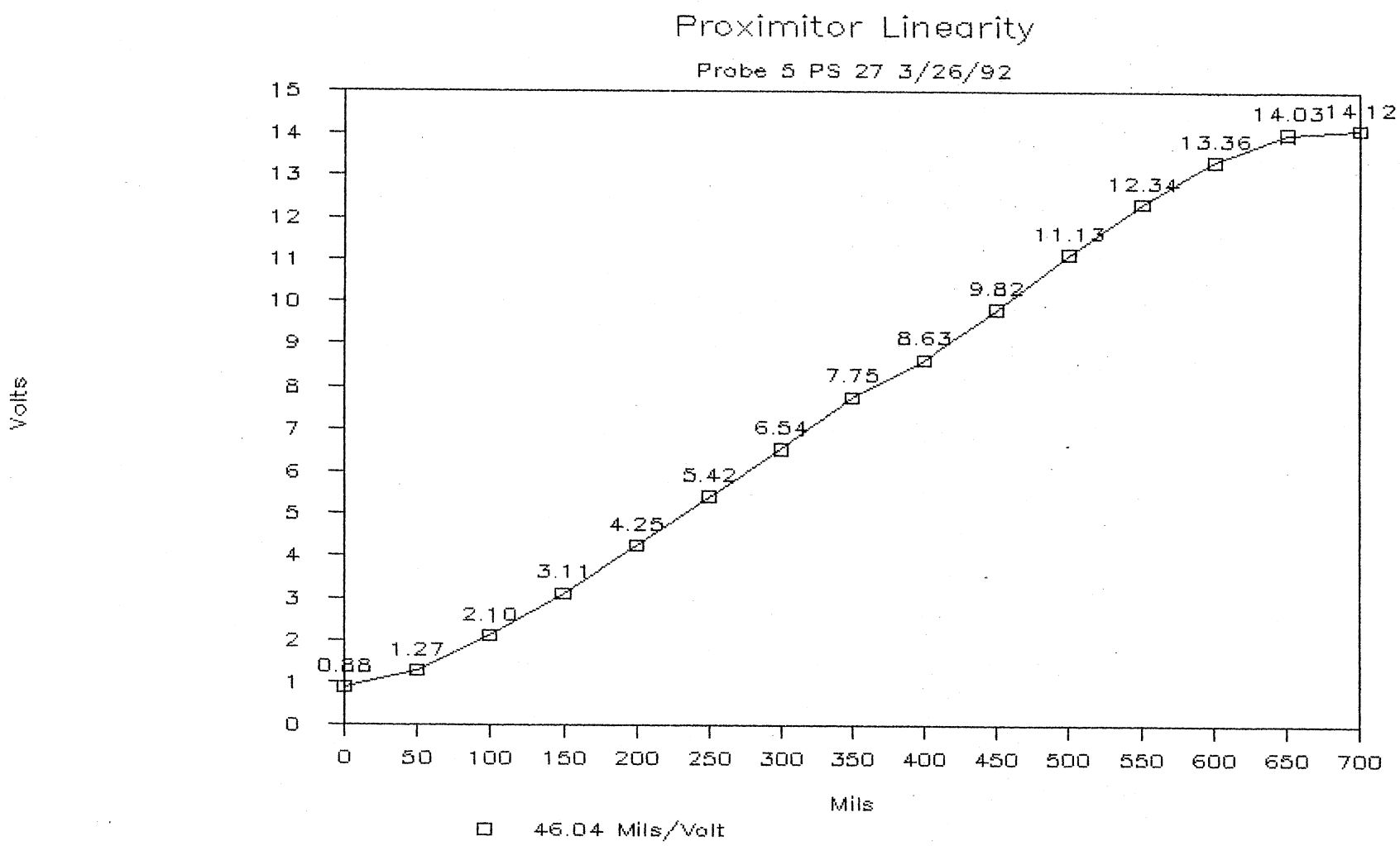
Mils	Volts	Mils/Volt	
0	0.89	0.00	45.78
50	1.51	33.11	
100	2.37	42.16	
150	3.40	44.08	
200	4.51	44.34	
250	5.64	44.30	
300	6.71	44.72	
350	7.64	45.81	
400	8.53	46.91	
450	9.55	47.12	
500	10.58	47.28	
550	11.48	47.91	
600	12.26	48.93	
650	12.88	50.47	
700	13.36	52.41	


Proximitor Linearity
Probe 4 PS 81 3/26/92
Volts
Mils
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
0.91
1.54
2.40
3.45
4.59
5.73
6.78
7.75
8.71
9.71
10.75
11.67
12.38
12.95
13.39
45.10 Mils/Volt

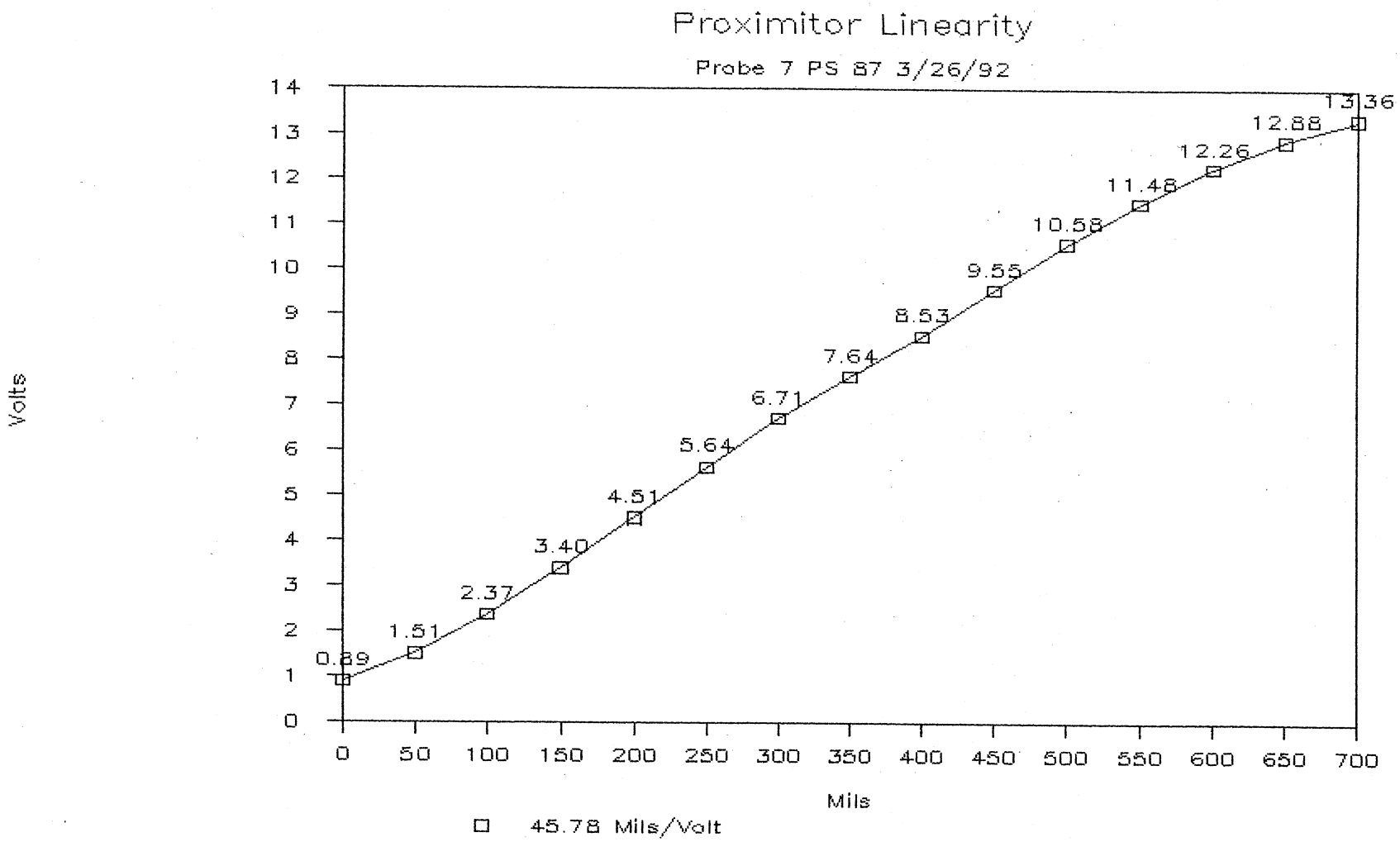
92


Proximitor Linearity
Probe 6 PS 80 3/26/92
Volts
Mils
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
0.78
1.13
1.85
2.78
3.82
4.92
6.04
7.11
8.02
9.02
10.05
11.08
11.99
12.75
13.38
50.83 Mils/Volt

12


Proximitor Linearity
Probe 5 PS 27 3/26/92
Volts
Mils
0.88
1.27
2.10
3.11
4.25
5.42
6.54
7.75
8.63
9.82
11.13
12.34
13.36
14.03
14.12
46.04 Mils/Volt

22


Proximitor Linearity
Probe 7 PS 87 3/26/92
Volts
Mils
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
0.89
1.51
2.37
3.40
4.51
5.64
6.71
7.64
8.53
9.55
10.58
11.48
12.26
12.88
13.36
45.78 Mils/Volt