

3/13/92 LOADS OF 2+3 MPa. TEST WERE ABORTED. APPARATUS WAS DISASSEMBLED. SPECIMENS WERE PHOTOGRAPHED. RAW PROFILE T12PBBAT.DAT. A  
 3/24/92 RAW PROFILE T12PTRAT.DAT.  
 3/25/92 CALIBRATED ALL BENTLY PROXIMITORS. CALIBRATION DATA IS IN LAB NOTEBOOK UNDER CAL DATA.  
 3/26/92 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<sup>g</sup>/VOLT. EQUIPMENT USED WAS SUDSICO MODEL ECH ACCEL #4 + #8; MEASUREMENT GROUP CONDITIONER 2120A, S/N 84077, CAL NOT REQ'D; FWDK MODEL 87 DMM, S/N 51502012, CAL DUE BAUF92; USED ROLL-OVER 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 <sup>BACK</sup> PLATE IS STILL REMOVABLE. THE TOP ROCK WAS RETROUTED 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 8V 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.

APR 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       | 1913 #           | 9,972 #/V         |
| 3       | BENTLY #7       | -345 mms-330 mms | 94.38 mms/V       |
| 4       | BENTLY #4       | -364 mms-367 mms | 98.58 mms/V       |
| 5       | BENTLY #5       | -327 mms-320 mms | 90.74 mms/V       |
| 6       | LVDT #1         | -0.28 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 <sup>g</sup> /V |
| 9       | ACCEL #8        | 4.9 G's          | 2 <sup>g</sup> /V |
| 10      | BENTLY #6       | -381 mms-372 mms | 100.34 mms/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        |

#### COMPUTER

| CHANNEL | TYPE            | 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 mms/V       | 3/26/92  |
| 3       | BENTLY #4       | 98.58 mms/V       | 3/26/92  |
| 4       | BENTLY #5       | 90.74 mms/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 <sup>g</sup> /V | 4/9/92   |
| 8       | ACCEL #8        | 2 <sup>g</sup> /V | 4/9/92   |
| 9       | BENTLY #6       | 100.34 mms/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   |

4/13/92 RAW 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. ADJUSTED CHANNEL TO PLOT ACCELERATION #8. ADJUSTED

4/13/92 RAN TEST T13DYN11.DAT. COMPUTER PROGRAM RESTARTED MULTIPLE TIMES AND OVERWROTE THE DATA. ACCELERATIONS WERE CLIPPING. READJUSTED CALIBRATION TO 106<sup>5</sup>/V

LEFT CHANNEL (ACCEL #4) RIGHT CHANNEL (ACCEL #8)  
BRIDGE VOLTAGE = 5V BRIDGE VOLTAGE = 5V  
GAIN X20, KNOB 1.56 GAIN KNOB X20, KNOB 2.00

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

| TAPE COUNT | ACTION                               |
|------------|--------------------------------------|
| 0-50       | CALIBRATION SIGNAL                   |
| 50-62      | T13DYN10.DAT                         |
| 64-90      | T13DYN11.DAT                         |
| 100-110    | NEW CAL SIGNAL FOR CML 8+9 (ACCEL'S) |
| 112-124    | T13DYN12.DAT                         |
| 126-137    | T13DYN13.DAT                         |

THE NORMAL STRESS TESTS WERE RUN ON 4/10/92.  
FILENAMES ARE T13US1.DAT, T13US2.DAT, T13US3.DAT,  
T13US4.DAT AND T13US5.DAT. ALL TEST PARAMETERS  
WERE SUPPLIED BY SIMON HEIUNG. (ALLEN PICKER)

4/17/92 Rebound tests for specimen ~~SRM13.2.3~~ 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,  $R_n$ , is needed for the determination of residual friction angle,  $\phi_r$ , 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:

$$\log\left(\frac{JCS}{\gamma}\right) = 0.0008 R_n + 1.01 \quad \text{from 4/17/92}$$

where  $\gamma$  is rock density in  $\text{KN/m}^3$  and  $JCS$  is in MPa.

$$\phi_r = (\phi_b - 26^\circ) + 20\left(\frac{R_n}{R_e}\right)$$

where  $\phi_b$  is the basic friction angle which is estimated from tilt tests on dry core cylinders and  $R_e$  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 readings 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~~ <sup>less</sup> 5 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~~ 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.

4/15/92 RAN PROFILES T13PBBAT.DAT AND T13PTRAT.DAT.

4/21/92 PERFORMED TILT TEST ON SPECIMEN SRM13.2.3/13.3.4. TOP BLOCK MOVED AT  $63.5^\circ$  IN THE SIDE 3 THROUGH 1 AND 1 THROUGH 3 CONFIGURATIONS. THE TOP BLOCK WEIGHED 19.2#. THE TOP BLOCK MEASURED  $7\frac{1}{4}" \times 8\frac{1}{4}"$ .

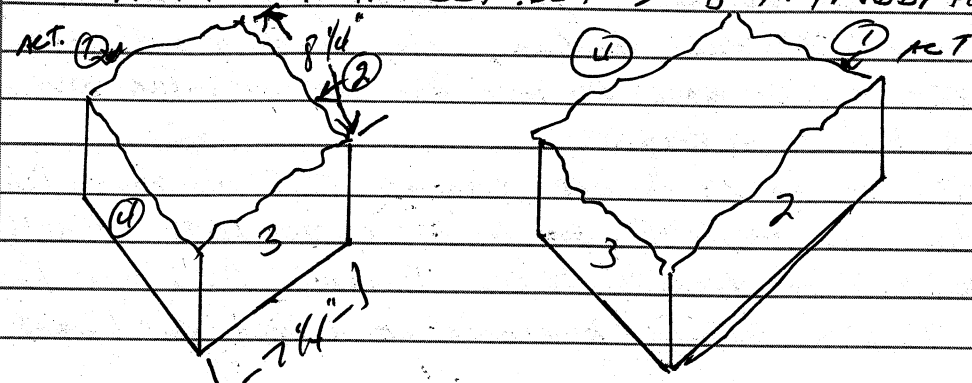
4/23/92 THE BOTTOM BLOCK WAS MOVED INTO THE BOX. DUE TO THE ABNORMAL SURFACE STRUCTURE THE BLOCK WAS VERY LOW AND POSITIONED TO ONE SIDE AND TO THE FRONT OF THE BOX. THE TOP BLOCK WAS THEN GROUTED IN PLACE. GROUT MIXTURE WAS AS LISTED ON PAGE 74. AFTER ABOUT TOP BLOCK TO SET-UP FOR APPROX 4 HRS, THE BLOCKS WERE PLACED IN AN OVEN AT  $105^\circ\text{C}$  FOR 24 HRS TO CURE. *Amelias*



4/24/92  
4/25/92

REMOVED BEWERS. KNOW OVER. P

INSTALLED SPECIMENS AS ILLUSTRATED ON PAGE 25.  
RAW PROFILES T14PBBT.DAT AND T14PTBBT.DAT.



SRM B-2.3

TOP BLOCK

WEIGHT = 19.2#

SRM B-3.4

BOTTOM BLOCK

T14PBBT.DAT - MAX X = 12,129, MAX Y = 8607, X OFFSET = 3590, Y OFFSET = 1385, INDEX = 1

T14PTBBT.DAT - MAX X = 8044, MAX Y = 7129, X OFFSET = 3719, Y OFFSET = 1896, INDEX = 2 P

4/26/92

REASSEMBLED APPARATUS. COMPUTED CHANNELS AND

4/28/92

\*TAPE RECONSTRUCTION CHANNELS WERE AS LISTED ON PAGE 97. P

STANDARD NORMAL LOAD RITS T14NS1.DAT, T14NS2.DAT, T14NS3.DAT, T14NS4.DAT AND T14NS5.DAT. RAW TEST

SEE PG 107  
FOR PARAMETERS

T14DYN10.DAT, T14DYN11.DAT, T14DYN12.DAT AND T14DYN13.DAT

ALL PARAMETERS WERE SUPPLIED BY SIMON H. - P

5/4/92

RAW PROFILES T14PBBAT.DAT AND T14PTBAT.DAT. RECEIVED

SPECIMEN SRM B-4.6/13.4.5. PERFORMED TLT 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 HSUNG PERFORMED

REBOUND TEST FOR SPECIMEN. ORIGINAL NOTEBOOK SHEETS

ARE IN 3-PIN BINDER AS THE NOTEBOOK WAS NOT

AVAILABLE TO SIMON WHEN TESTS WERE PERFORMED.

\*TAPE LOG PAGE 105 P

AND MERCS

4/24/92

REBOUND TESTS FOR SRM B-4.6, (TOP BLOCK) 4 SIDES.

TEST NO REBOUND NO

|    |    |
|----|----|
| 1  | 61 |
| 2  | 60 |
| 3  | 58 |
| 4  | 60 |
| 5  | 58 |
| 6  | 59 |
| 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 |

ALICES



## Bottom Block 4 Sides (cont.)

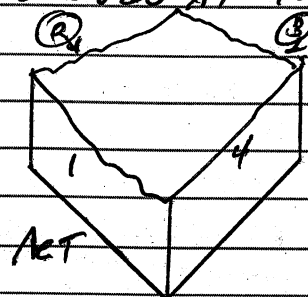
|    |    |
|----|----|
| 6  | 60 |
| 7  | 59 |
| 8  | 60 |
| 9  | 62 |
| 10 | 59 |
| 11 | 60 |
| 12 | 60 |
| 13 | 59 |
| 14 | 60 |
| 15 | 60 |
| 16 | 61 |

## JOINT SURFACE Bottom Block

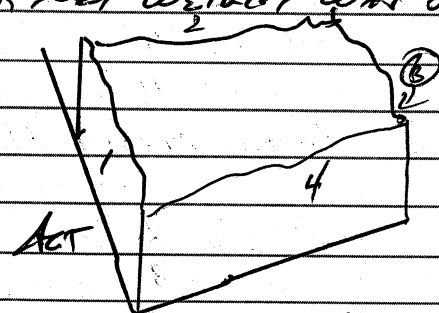
|    |    |
|----|----|
| 1  | 49 |
| 2  | 44 |
| 3  | 49 |
| 4  | 48 |
| 5  | 53 |
| 6  | 53 |
| 7  | 46 |
| 8  | 46 |
| 9  | 48 |
| 10 | 56 |
| 11 | 55 |
| 12 | 52 |

8/15/92

SPECIMENS 13.4.6/13.4.5 WERE GROUTED. GROUT RECIPE WAS AS LISTED ON PAGE 74. SPECIMENS WERE PLACED IN AN OVEN AT 125°C. TOP BLOCK NET WEIGHT WAS 80.3%



Spec 13.4.6  
TOP BLOCK



Spec 13.4.5  
Bottom Block

5/16/92  
5/17/92

REMOVED SPECIMENS FROM OVEN.   
RAW PROFILE T15PBBT.DAT. COMPUTER STOPPED AT WITHIN 3/8" FROM THE BACK SIDE OF PROFILE DUE TO POWER SURGE FROM LIGHTNING. CAUSED SIMON AND INFORMED HIM OF SITUATION. SIMON STATED THAT THIS SUFFICIENT DATA AND WE DID NOT NEED TO REPROFILE THE SPECIMEN. RAW PROFILE T15PTBBT.DAT.

| FP       | T15PBBT | 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 TAP LOG FOR THE T14 SERIES TESTING. TAP SPEED WAS 19 cm/sec.

|           |            |
|-----------|------------|
| 140-152   | T14 DYN 10 |
| 155-170   | T14 DYN 11 |
| 173-182.5 | T14 DYN 12 |
| 185-194   | T14 DYN 13 |

APPARATUS WAS REASSEMBLED. COMPUTER CHANNELS WERE AS LISTED ON PAGE 97. TAP RECORD CHANNELS ARE LISTED BELOW:

|    |              |                           |
|----|--------------|---------------------------|
| 1  | TOTAL WEIGHT | 8825 # ← CALCULATED (T15) |
| 2  | WATER LO     | 5915 #                    |
| 3  | BENT 7       | 363 mls                   |
| 4  | BENT 4       | 373 mls                   |
| 5  | BENT 5       | 352 mls                   |
| 6  | LVOT 1       | 0.5"                      |
| 7  | LVOT 2       | 0.5"                      |
| 8  | ACCUM #4     | 1.9 g                     |
| 9  | ACCUM #8     | 1.9 g                     |
| 10 | BENT 6       | 373 mls                   |
| 11 | VLC 4        | 2925 #                    |
| 12 | VLC 3        | 2935 #                    |
| 13 | VLC 1        | 2942 #                    |

6/3/92

STARTED TEST T15NS1 - NSI.DAT. *P**Am mfg*

6/4/92

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

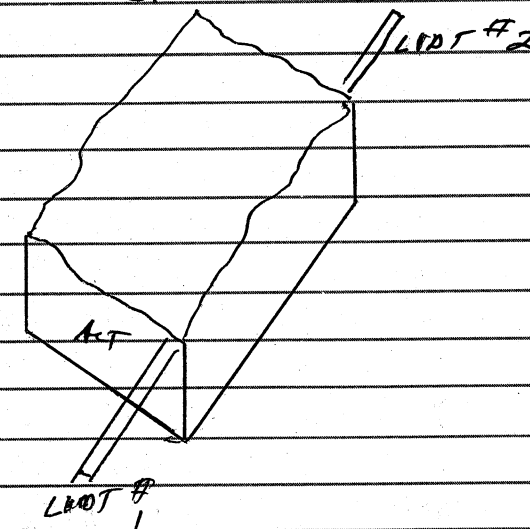
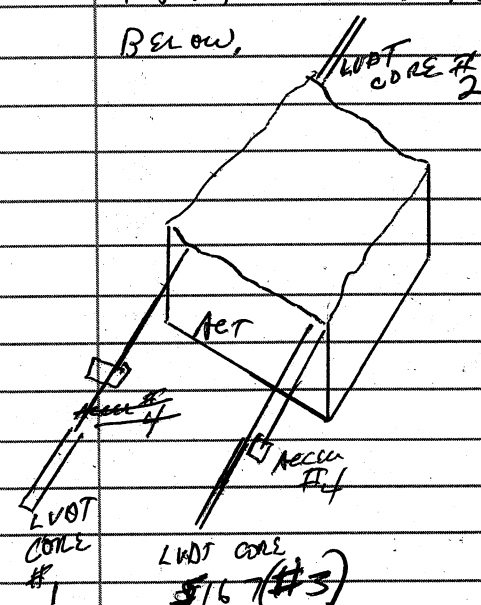
## CYCLIC TESTING (1 Mpa)

| 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"           |

ACUM PERAS

6/23/92

DISASSEMBLED APPARATUS. RAN PROFILES T15PRBAT.DAT &amp; T15PTBAT.DAT. REINSTRUMENTED SPECIMENS AS ILLUSTRATED BELOW.



PROXIMITY REMAINED IN TEST SERIES T15.

*Am mfg*

6/24/92 Following is the calibration data from the LVDT #5167  
 EQUIPMENT LIST: MODEL 500HR SNAEVIETZ LVDT 1/2" 5167 (#3)  
 FLUKE MODEL 87 DMM, S/N 515 02012, CAL DUE ON AUG. 13  
 SIX INCH STEEL SCALE 1/100TH INCREMENTS.

| DISPLACEMENT | VOLTAGE | CM 1/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  |        |
| -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   |

AVG = 1.09 1/V

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

| CHANNEL | DESCRIPTION     |
|---------|-----------------|
| 0       | TOTAL VERT LO   |
| 1       | HORIZ LO        |
| 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 LO CELL #4 |
| 11      | VERT LO CELL #3 |
| 12      | VERT LO CELL #1 |

APR 1992

6/26/92 RAW TESTS T16NS1.DAT THROUGH T16NS5.DAT.  
 6/29/92 RAW 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.  
 DISCOVERED THAT NEW CALIBRATION VALUES WERE NOT ENTERED  
 INTO THE COMPUTER FOR THE BENTLY PROBES. FOLLOWING  
 IS A SUMMARY OF CALIBRATION VALUES AND DATES.

| CHNL | DESCRIPTION         | CAL VALUE/UNIT | 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             | 0.18 INCHES    | 3/27/92  |
| 7    | ACCEL #4            | 106'S          | 4/13/92  |
| 8    | LVDT #3             | 1.09 INCHES    | 3/26/92  |
| 9    | BENTLY #6           | 101.66 MILS    | 3/26/92  |
| 10   | VERTICAL LO CELL 4  | 10,057 POUNDS  | 4/1/92   |
| 11   | VERTICAL LO CELL 3  | 10,065 POUNDS  | 4/1/92   |
| 12   | VERTICAL LO CELL 1  | 10,021 POUNDS  | 4/1/92   |

APR 1992



Schmidt hammer tests for sample  
SRN 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

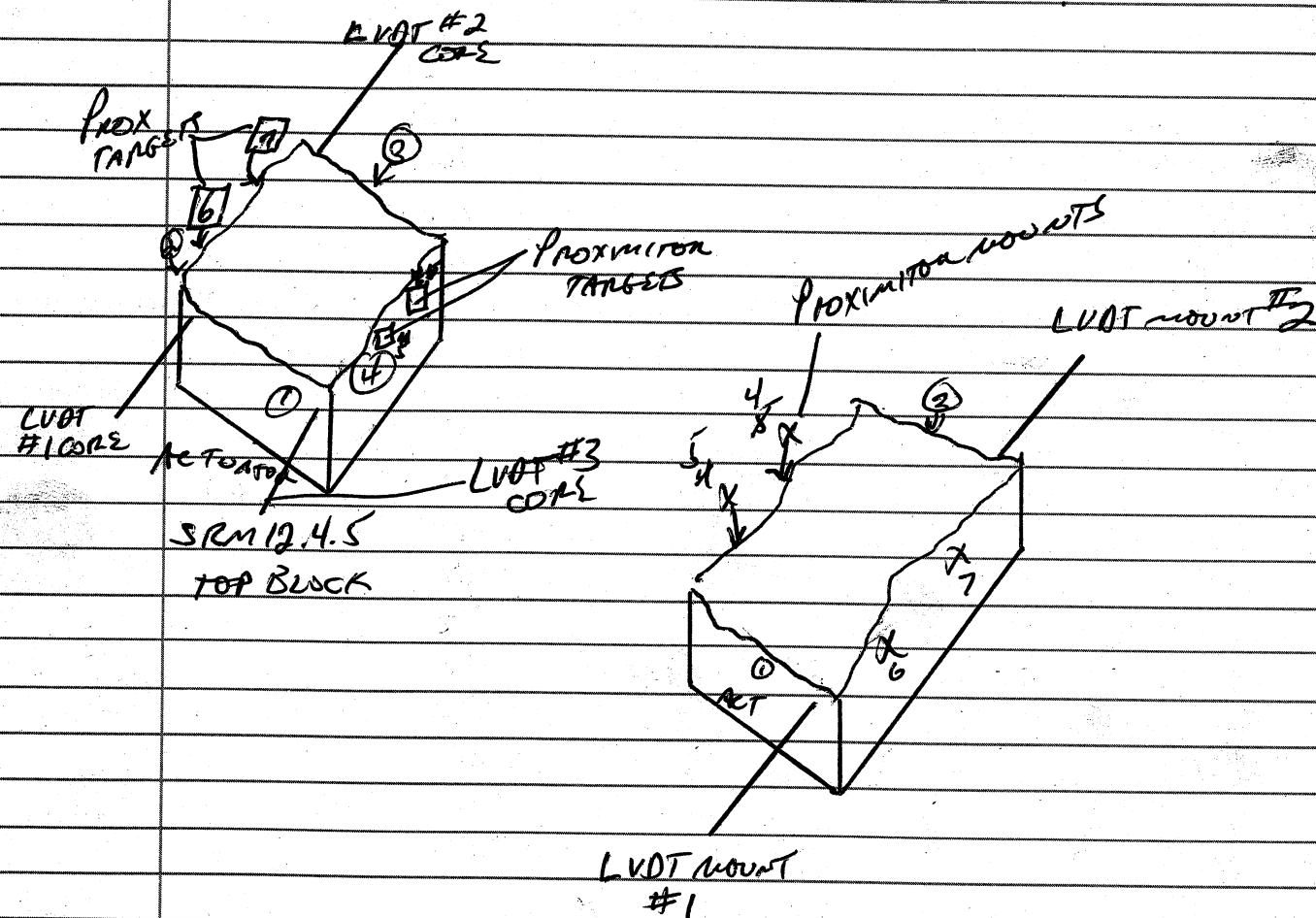
PERFORMED TILT TEST ON SPECIMEN 12.4.5/12.4.4A.

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. PURED SPECIMENS IN TOP OF 105°C OVEN FOR 24 HOURS TO CURE. FOLLOWING IS AN ILLUSTRATION OF THE SPECIMENS + HOW THEY WERE INSTRUMENTED FOR THE T17 TEST SERIES.



SRM 12.4.4A

BOTTOM BLOCK

8/12/92

LVDT MOUNT #3 WAS MOUNTED TO THE LOAD CELL. REMOVED SPECIMENS FROM OVEN. *AP*

*Accur Picked*

8/13/92

RAN PROFILES T17PBBST.DAT AND T17PTBBST.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 | XOCR             | 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           | -384   |
| 12   | ACCEL (NOT USED) | N/A    |

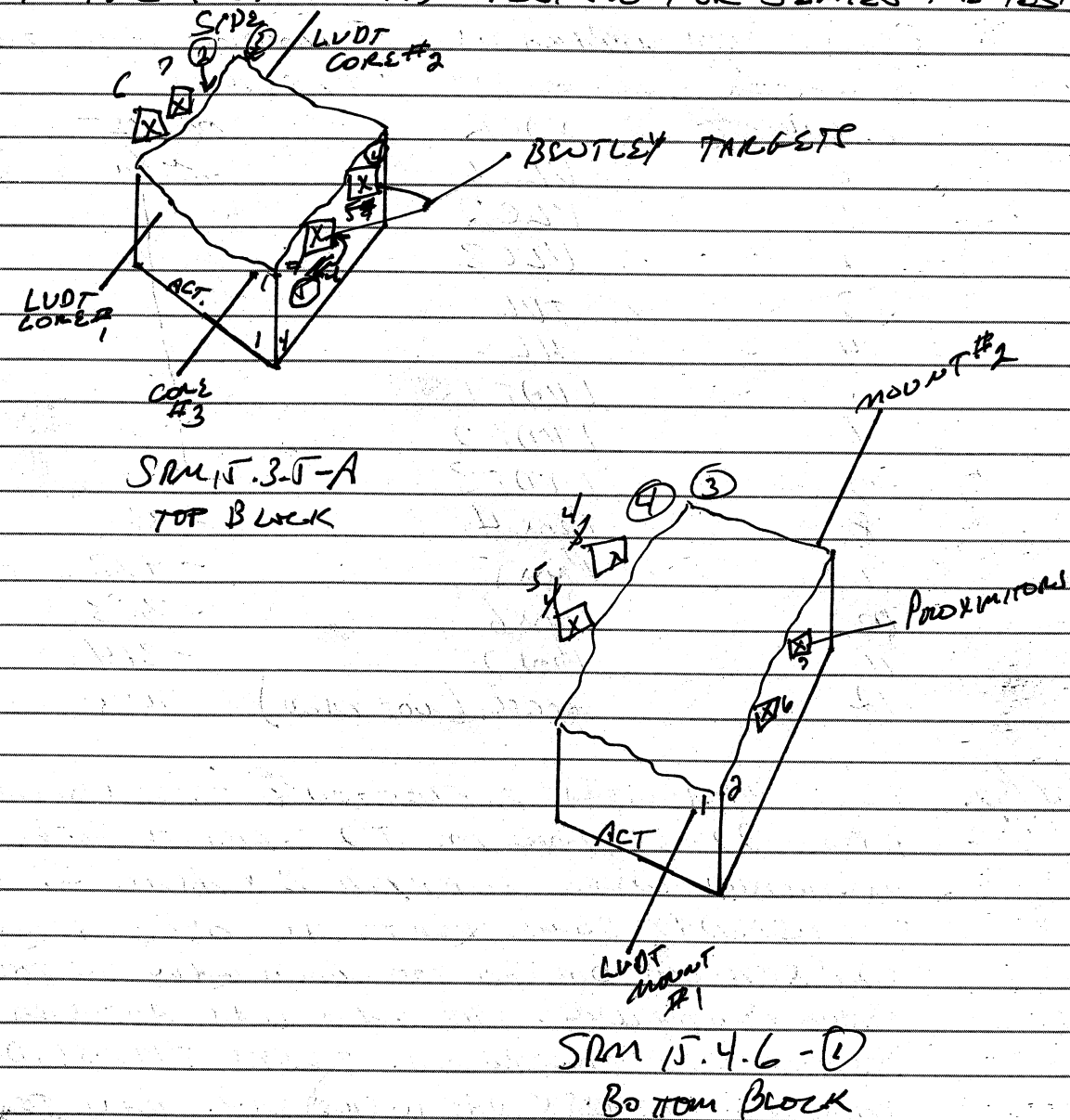
8/14/92

TEST PARAMETERS REFLECTED THOSE LISTED ON PAGES 27-30 FOR THE T2 SERIES TESTING. TEST PARAMETERS WERE SUPPLIED BY ASAD C. DURING T17US1.DAT SOME VERTICAL OSCILLATION WAS EXPERIENCED DUE TO TOO MUCH GAIN ON THE SERVO CONTROLLER. THE GAIN WAS ADJUSTED AND TESTING WAS CONTINUED. TESTS T17US1.DAT THROUGH T17USS5.DAT WERE RAN. RAN TESTS T17CND10.DAT THROUGH T17CND50.DAT. *AP*

*Accur Picked*

8/17/92 Ran PROFILE T17PBBAT.DAT. DURING THE LAST 20 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. RE-RAN 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 INSTRUMENT SPECIMEN FOR SERIES T18 TESTING.



Schmitt 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 STM  
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 |

M. K. K.  
A. K. K.

8/18/92 PERFORMED TILT TEST ON SPECIMEN TIP. TOP BLOCK  
MOVED AT 54.5° IN THE SIDE 1 THROUGH 3 CONFIGURATION.  
TOP BLOCK MOVED AT 16° IN THE SIDE 3 THROUGH 1 CONFIG.  
THE TOP BLOCK NET WEIGHT WAS 19.7 LBS. GROUTED  
SPECIMENS USING GROUT RELIPE LISTED ON PAGE 74. P

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

8/20/92 REMOVED SPECIMENS FROM OVEN. P

8/21/92 RAN PROFILES T18PBBT.DAT AND T18PTBBT.DAT.

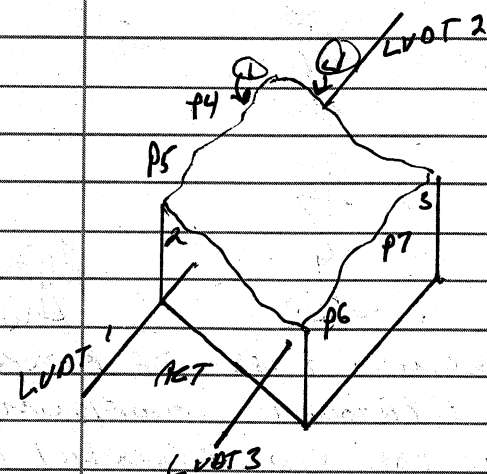
T18

|          | BBBT  | TBBT |
|----------|-------|------|
| MAX X    | 11718 | 7686 |
| MAX Y    | 7743  | 7417 |
| X OFFSET | 3861  | 3943 |
| Y OFFSET | 1697  | 1049 |
| INDEX    | 3     | 1    |

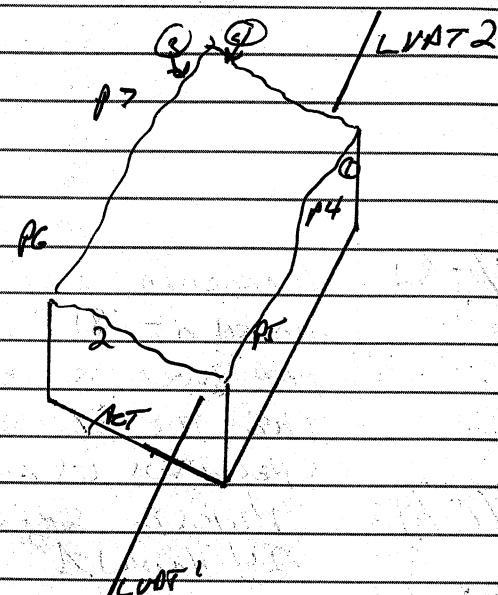
INSTALLED SPECIMEN AS ILLUSTRATED ON PAGE 114.  
REASSEMBLED APPARATUS. COMPUTER CHANNELS ARE AS  
LISTED ON PAGE 113. PROXIMATOR OFFSETS WERE -362,  
-376, -384, AND -374 RESPECTIVELY. STARTED TESTS  
T18US1.DAT, & T18US2.DAT. P

A. K. K.

- 8/23/92 RAN TEST TIBUS3-5.DAT. RAN TESTS TIBCONDROW.DAT.  
 8/24/92 ALL TEST PARAMETERS WERE SUPPLIED BY MIKKO AHOLA.  
 DISASSEMBLED APPARATUS. RAN PROFILE TIBPBBAT.DAT. RAN  
 PROFILE TIBPTBAT.DAT. P  
 8/26/92 PERFORMED TILT TEST ON SPECIMEN SRM 19.1.3(1)/19.1.3(2).



SRM 19.1.3(1)  
TOP BLOCK



SRM 19.1.3(2)  
BOTTOM BLOCK

TOP BLOCK MOVED AT  $57^\circ$  IN SIDE 2 THROUGH 4 CONFIGURATION.  
 TOP BLOCK MOVED AT  $56^\circ$  IN SIDE 4 THROUGH 2 CONFIGURATION.  
 TOP BLOCK NET WEIGHT WAS 18.57#  
 8/27/92 GROUTED TOP AND BOTTOM SPECIMENS GROUT RELIEF WAS  
 AS FOLLOWS:

- 1 POUND 10 OZ WATER
- 20 GRAMS DURALUM
- 3 POUNDS 7 OZ CEMENT
- 8 POUNDS 5 OZ SAND

8/28/92 SPECIMENS WERE PLACED IN  $105^\circ\text{C}$  OVEN FOR 24 HOURS /  
 REMOVED SPECIMENS FROM OVEN.

Alan Parks

8/25/92 Test #19 - Schmidt hammer tests for Sample  
 No. SRM 19.1.3(1)/SRM 19.1.3(2). Rebound  
 # for 4 sides of top specimen. [19.1.3(1)]

| 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      | 25        |
| 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(c)

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 20  
16 43  
17 40  
18 50  
19 44  
20 52  
22

Mitko  
Hole

8/31/92 RAW PROFILE T19PTBBT.DAT AND T19PBBT.DAT. A

|          | T19PTBBT | T19PBBT |
|----------|----------|---------|
| 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).

| Distance | Volts   | Cal                   |
|----------|---------|-----------------------|
| 0"       | 0 Volts | CAL = 4.98 Volts/INCH |
| 0.1"     | 0.494   |                       |
| 0.2"     | 0.978   | OR 0.2"/VOLT          |
| 0.3"     | 1.433   |                       |
| -0.1"    | -0.486  |                       |
| -0.2"    | -1.043  |                       |
| -0.3"    | -1.557  |                       |

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

APR 1992



9/1/92

$\frac{1}{2}$  MPa/min  
↓

INCREASE NORMAL LOAD TO 3 MPa, 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 MINUTE. DECREASE NORMAL LOAD TO ZERO AT  $\frac{1}{2}$  MPa/min. REPEAT FOR 4 ST MPa LEVELS. RAN TEST T19CND3A.DAT.

RAN TEST T19CND4A.DAT AND T19CND5A.DAT.  $\frac{1}{2}$ 

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 | 60 |
| 7 | 40 |
| 8 | 43 |

test # Rebound #

9 45  
10 48  
11 44  
12 39

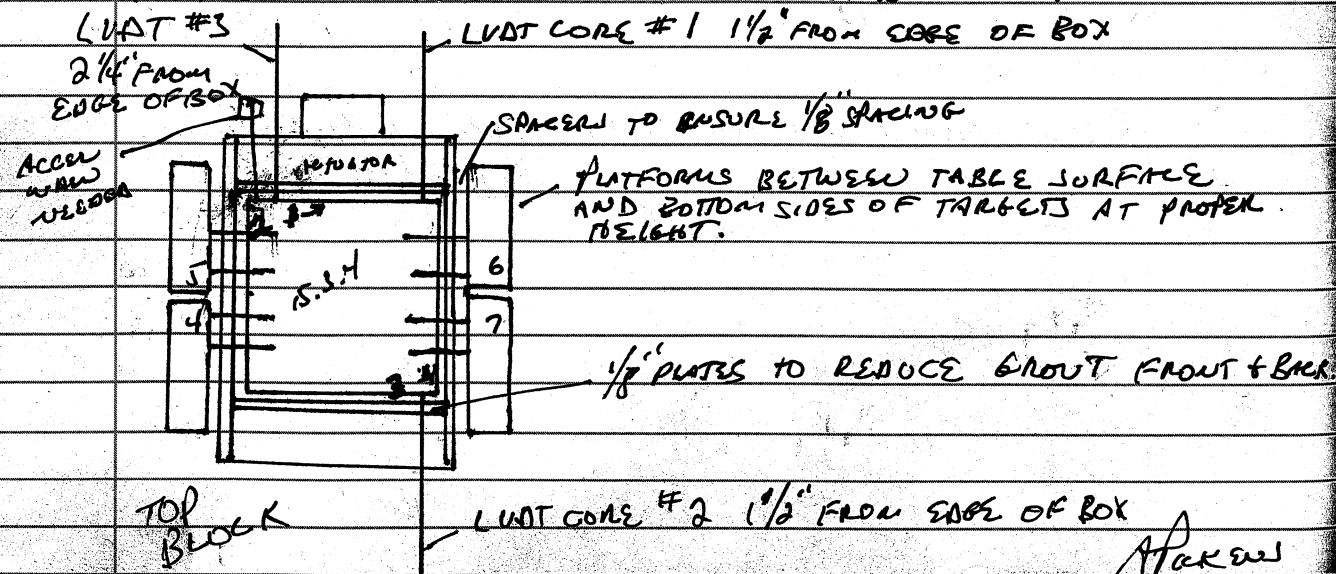
9/3/92 PROFILED TAPBBAT.DAT + T19PTBAT.DAT. *P*  
9/4/92 GROUTED SPECIMENS SRM 15.3.4/15.3.5. GROUT RECIPE WAS  
AS LISTED ON PAGE 118. SPECIMENS WERE PLACED IN  
OVEN AT 105°C. THE AUGER TEST WAS PERFORMED.  
THE TOP BLOCK MOVED AT 19.5° IN THE SIDE 1-3  
CONFIGURATION. THE TOP BLOCK MOVED AT 62° IN THE SIDE  
3-1 CONFIGURATION. THE TOP BLOCK NET WEIGHT WAS  
21.9#. *P*

9/5/92 THE OVEN THERMOSTAT HAD BECOME DEFECTIVE APPROX.  
10 HRS INTO THE CURING. THE TEMPERATURE INCREASED  
TO 125°C OVER APPROX 14 HRS. *P*

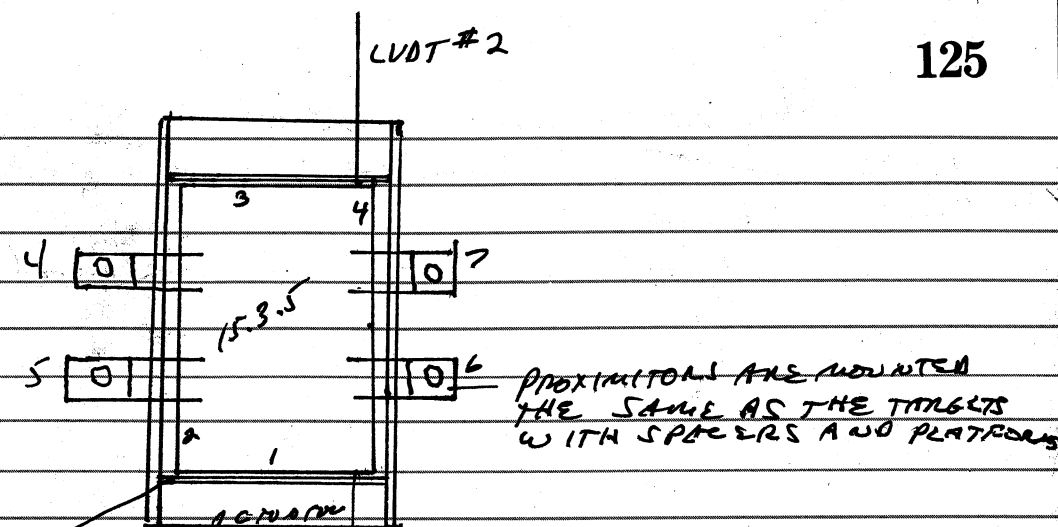
9/8/92 RAN PROFILES T20PBBBT.DAT AND T20PTBBT.DAT.

|          | 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



1/8" PLATES ARE USED  
TO REDUCE GROUT  
FRONT AND BACK

LVDT #1 - LVDT'S ARE SPACED THE  
SAME AS THE TOP BLOCK  
LVDT #3 IS MOUNTED TO THE  
HORIZONTAL LOAD CELL.

9/11/92 RAN TESTS T20NS1-5.DAT - (5 TESTS) PARAMETERS FOR  
SERIES T20 SUPPLIED BY SIMON H. RAN TEST T20C003A.DAT.  
PARAMETERS OUTLINED ON PAGE 122 FOR 4 + 5 MAP.

TARGETS FOR PROXIMITORS WERE MEASURED PRIOR TO TESTING:

|    | 0"      | 1"     | 2"     | 3"     | 4"     | 5"     | 6"     |
|----|---------|--------|--------|--------|--------|--------|--------|
| 4) | -0.0855 | .0690  | .3135  | .5050  | .7125  | 1.000  | 1.1595 |
| 5) | 1.1505  | 1.9000 | 1.1080 | 1.1840 | 1.2640 | 1.2540 | 1.4350 |
| 6) | 1.0200  | .7420  | .5040  | .3530  | .2540  | .2050  | .1720  |
| 7) | .0065   | .1450  | .3040  | .4310  | .4170  | .3960  | .3240  |

OFFSETS FOR PROXIMITORS WERE 4-7 WERE -351, -364,  
-372, AND -366 RESPECTIVELY. RAN TEST T20C003A.DAT.

TARGET MEASUREMENTS AFTER TESTING

|    | 0       | 1      | 2      | 3      | 4      | 5      | 6       |
|----|---------|--------|--------|--------|--------|--------|---------|
| 4) | -0.1750 | .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  | -0.0110 |
| 7) | -0.0210 | .1140  | .2670  | .3450  | .4000  | .3250  | .3540   |

9/14/92

RAN PROFILES T20PTBAT.DAT + T20PBBAT.DAT. *P*

*Amir*

9/15/92 Schmitt 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 | 48 |
| 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  $66^\circ$  IN BOTH CONFIGURATIONS.  
THE TOP BLOCK NET WEIGHT WAS 17# 13 OZ. BOTH SPECIMENS  
WERE GROUTED. GROUT RECIPE IS LISTED ON PAGE 118. SPECIMENS  
WERE CURED IN A  $105^\circ\text{C}$  OVEN FOR 24 HOURS. *P*

9/20/92 REMOVE SPECIMEN FROM OVEN. *P*

5/31/92 RUN PROFILES T21PTBBT.DAT AND T21PBBBT.DAT. *P*

9/21/92 REASSEMBLED APPARATUS. RUN TESTS T21NS1-5.DAT (5 TESTS)  
PROXIMITY OFFSET VALUES - 314, -324, -356, -350 FOR  
PROXIMITY CHANNELS 4-7 RESPECTIVELY. *P*

9/22/92 RUN TEST T21CND5B.DAT. PARAMETERS WERE SUPPLIED BY  
MIKO ANDRA AS FOLLOWS: LOAD NORM TO 5 MPa. 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 RUN PROFILE T21PTBAT.DAT. + T21PBBAT.DAT

| T21TB | T21BB                |
|-------|----------------------|
| 2848  | 11779                |
| 7764  | 7734                 |
| 3881  | <del>2388</del> 3788 |
| 1667  | 1723                 |
| 1     | 3 <i>P</i>           |

10/03/92 SCHMIDT HAMMER TEST FOR SPECIMEN SRM 13.4.6①/13.4.5.  
THESE SPECIMENS WERE USED FOR THE SERIES T15+TK 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 | JUNT SURFACE |
|-----------|--------------|
| TEST #    | Rebound #    |
| 1         | 51           |
| 2         | 59           |
| 3         | 56           |
| 4         | 54           |
| 5         | 59           |
| 6         | 54           |

*ALAN PICKER*



10/3/92 TOP BLOCK (SRM 13.4.60) 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. P. K. S. S.

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 TEST TEST ON SPECIMEN SRM 13.4.60/13.4.5 (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 12 LBS 14 OZS.  
 GROUNDED BOTH SPECIMENS WITH RESCUE LISTED ON PAGE 118. SPECIMENS  
 WERE PERIOD IN A 105°C OVEN. THE CHART REBOUND PEN WAS  
 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 #/V      | 12 ACCEL #4 10g's/v |
| 1  | VLC 2      | 10035 #/V     |                     |
| 2  | VLC 3      | 10172 #/V     |                     |
| 3  | TVL        | 10022 #/V     | (AS OF 9/28/92)     |
| 4  | HL         | 10408 #/V     |                     |
| 5  | 0.2 LVDT 1 | 0.2"/V        |                     |
| 6  | LVDT 2     | 0.2"/V        |                     |
| 7  | LVDT 3     | 0.2"/V        |                     |
| 8  | PROX 4     | 100.3 MILS/V  |                     |
| 9  | PROX 5     | 90.23 MILS/V  |                     |
| 10 | PROX 6     | 101.53 MILS/V |                     |
| 11 | PROX 7     | 103.38 MILS/V |                     |

ALL CALIBRATION RECORDS  
 AND INFO ARE IN THE  
 LAD NOTEBOOK

M. P. K. S. S.

10/8/92

THE ACCELEROMETER WAS CALIBRATED USING THE FOLLOWING 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. FORWARDING THE PROXIMITY OFFSETS USED FOR PROX 4-7 RESPECTIVELY. -368, -317, -340, -375. TEST PARAMETERS WERE SUPPLIED BY MIKKO ANOLA. RAN TESTS T22 DYN 1-5. DAT (5 FILES). P

10/9/92

CYCLIC PARAMETERS ARE AS FOLLOWS:

| FILE NAME  | HZ  | AMP (IN PK) | LSIDE (MPK) |
|------------|-----|-------------|-------------|
| T22 DYN 10 | 1.4 | 0.5         | 1           |
| T22 DYN 11 | 1.4 | 1.0         | 1           |
| T22 DYN 12 | 2.8 | 0.25        | 1           |
| T22 DYN 13 | 2.8 | 0.5         | 1           |
| T22 DYN 14 | 2.1 | 0.5         | 1           |
| T22 DYN 15 | 2.1 | 1.0         | 1           |
| T22 DYN 16 | 3.5 | 0.25        | 1           |
| T22 DYN 17 | 3.5 | 0.5         | 1           |
| T22 DYN 18 | 1.4 | 0.5         | 3           |
| T22 DYN 19 | 1.4 | 1.0         | 3           |
| T22 DYN 20 | 2.8 | 0.25        | 3           |
| T22 DYN 21 | 2.8 | 0.5         | 3           |
| T22 DYN 22 | 2.1 | 0.5         | 3           |
| T22 DYN 23 | 2.1 | 1.0         | 3*          |

ALL TEST WERE RUN FOR 30 SECONDS. \* THIS TEST WAS STOPPED AT APPROXIMATELY 20 SECONDS AS THE TACK HAD WORN DOWN TO THE POINT WHERE THE PROXIMITY WERE TOUCHING THE TARGETS. P

APICER

10/12/92

DISASSEMBLED APPARATUS. FOUND ALL PROBES HAD BROKEN LOOSE FROM THE TOP BLOCK. RAN PROFILE T22 PTBAT.DAT & T22 PBBAT.DAT. BEFORE TEST PROFILES WERE T16 PTBBT.DAT & T16 PBBBT.DAT. P<sup>SEE PAGE 124</sup>

10/13/92

SCHMIDT HAMMER TEST FOR SPECIMEN SRM 9.4.5/9.3.4-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      |

SRM 9.4.5 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      |      |         |

APICER

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 WT WEIGHT WAS 21.6#.

GRADED BOTH SPECIMENS WITH THE RELIPE LISTED ON PAGE 118. Placed SPECIMENS IN AN OVEN AT 105°C FOR 24 HRS.

REMOVED SPECIMENS FROM OVEN.

RAN PROFILE T23PBBT.DAT AND T23PTBBT.DAT.

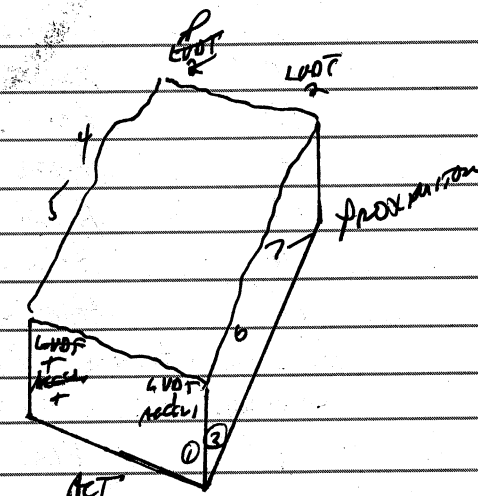
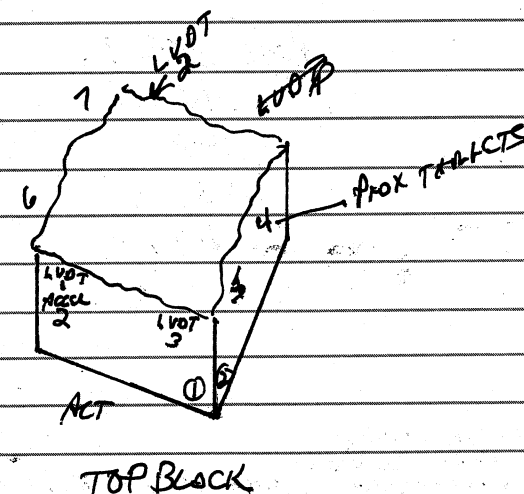
*APICKERS*

10/14/92

## T23BT

| 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 *10/18*



10/19/92

ACCELEROMETER WAS ATTACHED TO THE TOP BOX ON NEAR RIGHT SIDE. ACCELEROMETER #1 & #2 ARE SUTAN EGC-500S. THESE ACCEL ARE CALIBRATED FOR 10G/VOLT USING THE FOLLOWING METHOD DEBERS USC. ACCEL #3 IS A PCB MODEL 303A, 1/2 12677. THIS ACCEL WAS MOUNTED BACK TO BACK WITH THE CALIBRATION STANDARD ON A SHAKEN. TRACES WERE COMPARSED ON A CALIBRATED J111 TEKTRONIX OSCILLOSCOPE. BOTH ACCEL REFLECTED 10 mV/g.

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.

*APICKERS*

10/21/92

Following are the computer channels for T23:

| CHNL | XDER                 |             |
|------|----------------------|-------------|
| 0    | VLC1                 |             |
| 1    | VLC2                 |             |
| 2    | VLC3                 |             |
| 3    | TVL <del>PLAN</del>  |             |
| 4    | HL                   |             |
| 5    | LVD1                 |             |
| 6    | LVD2                 |             |
| 7    | LVD3                 | PROX OFFSET |
| 8    | PROX4                | -344        |
| 9    | PROX5                | -348        |
| 10   | PROX6                | -437        |
| 11   | PROX7                | -414        |
| 12   | ACCEL1               |             |
| 13   | ACCEL2               |             |
| 14   | ACCEL3               |             |
| 15   | HOR. DISP (rotation) |             |

Following are the <sup>TAPE RECORD</sup> ~~computer~~ channels and output cal values

| CHNL | XDER                 | OUTPUT CAL VALUE/VOLT |
|------|----------------------|-----------------------|
| 1    | VLC1                 | 17,725#               |
| 2    | VLC2                 | 17,383#               |
| 3    | VLC3                 | 18,603#               |
| 4    | TVL                  | 17,977#               |
| 5    | HL                   | 18,579#               |
| 6    | LVD1                 | 0.34"                 |
| 7    | LVD3                 | 0.2" 0.385"           |
| 8    | PROX5                | 164 MILS              |
| 9    | PROX6                | 184 MILS              |
| 10   | PROX7                | 173 MILS              |
| 11   | ACCEL1               | 17 G'S                |
| 12   | ACCEL2               | 17 G'S                |
| 13   | ACCEL3               | 17.5 G'S              |
| 14   | HOR. DISP (rotation) | 2.544"                |

Mickes

10/22/92

RAW TESTS T23US1-5.DAT (5 TESTS). RAW 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, LVD1; 6, LVD2; 9, PROXIMITY #5; 10, PROXIMITY #6; 11, PROXIMITY #7; 12, ACCELEROMETER #1; 13, ACCELEROMETER #2; ~~14, PROXIMITY #8~~; 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              |

Mickes



11/4/92

Following were the <sup>Ampl</sup>TAPE, COMPUTER AND FILTER CONFIGURATIONS FOR TESTS T23SEIS3-9.DAT:

| COMPUTER/CH   | TAPE CHAN | FILTER/SLOT |
|---------------|-----------|-------------|
| 0 VLC1        | 1         | 34353/1     |
| 1 VLC2        | 2         | 34353/3     |
| 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         |             |
| 9 PROX5       | 10        | 38410/2     |
| 10 PROX6      | 11        | 38410/3     |
| 11 PROX7      | 12        | 38410/4     |
| 12 ACCEL1     | 13        | 38410/5     |
| 13 ACCEL2     | 14        | 38410/6     |
| 14 ACCEL3     | 15        | 38410/7     |
| 15 HOR. DISP. |           |             |

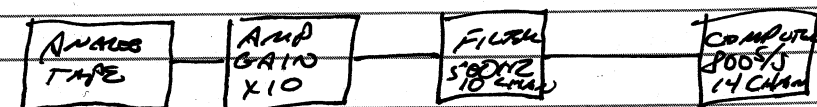
TAPE WAS  
USED FOR  
DRIVE  
SIGNAL

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. T23SEIS4 WAS A REPEAT. TESTS T23SEIS4 + T23SEIS5 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 WEIGHT (T23SEIS6.DAT). THE GLITCHES DID NOT REOCCUR SO TESTING WAS CONTINUED.

APR 1993

11/5/92

THE FIRST TWO T23 RUNS WERE AMPLIFIED, FILTERED AND RE-DIGITIZED 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.

| CH/CH        | FILTER (500 HZ) | CH 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               | 2 GS        |
| 11 ACCEL2    | X               | 2 GS        |
| 12 ACCEL3    | X               | 2 GS        |
| 13 HOR DISP. | X               | 0.25"       |

FILE NAMES WERE T23158F5.BIN + T23258F5.BIN.  
THE ORIGINAL DATA WAS T23SEIS1.DAT T23SEIS2.DAT

APR 1993

11/11/92 RECEIVED SPECIMEN SRM 9.2.3/9.3.4. SCHMIDT HAMMER (T24)

## 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 |

APR 1992

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 BOX USING SAME RECIPE. TOP BOX WAS  
ALLOWED TO SET UP FOR APPROX 5 HOURS BEFORE  
SEPARATING. BOTH SPECIMENS WERE PLACED IN A 10°C  
OVEN FOR 24 HOURS. A

11/13/92 REMOVED SPECIMENS - A

11/16/92 RAN PROFILE T24PBBBT.DAT & T24PTBBT.DAT.  
T24BT

| TA   | 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)

APR 1992

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. FICKENS

11/16/92 TOP BLOCK, JOINT SURFACE

|    |    |    |    |
|----|----|----|----|
| 1  | 50 | 14 | 53 |
| 2  | 46 | 15 | 53 |
| 3  | 48 | 16 | 58 |
| 4  | 45 | 17 | 48 |
| 5  | 43 | 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 - RAW TESTS T24NS1-5 (5 FILES).

T25 - GROUTED TOP BLOCK. SPECIMENS WERE PERCED IN  
 AN OVEN AT 105°C TO CURE FOR 24 HRS. *A*

11/18/92 T24 - RAW 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 - TESTS STOPPED EARLY

DUE TO EXCESSIVE ROCK WEAR.

T25 - SPECIMENS WERE REMOVED FROM OVEN.

T24 - DISASSEMBLED APPARATUS. RAW PROFILES T24PBBAT.DAT &

T24PTBAT.DAT. *A*

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

A. FICKENS

11/20/90

RAN TESTS T25SEIS1-6.DAT.

| NAME         | PARAMETERS |
|--------------|------------|
| T25SEIS1.BAT | 1 Mpa 1"PK |
| T25SEIS2.DAT | 1 Mpa 2"PK |
| T25SEIS3.DAT | 3 Mpa 1"PK |
| T25SEIS4.DAT | 3 Mpa 2"PK |
| T25SEIS5.DAT | 5 Mpa 1"PK |
| T25SEIS6.DAT | 5 Mpa 2"PK |

11/23/92

SCRIPT NAMEN FOR SRM 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

| TEST | Rebound | TEST | Rebound |
|------|---------|------|---------|
| 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. Peters

11/23/92

SRM 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    | 58      | 13   | 56      |
| 6    | 58      | 14   | 45      |
| 7    | 52      | 15   | 58      |
| 8    | 51      | 16   | 55      |

15-2.2 JOINT SURFACE

| TEST | Rebound | TEST | Rebound |
|------|---------|------|---------|
| 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 PLACED THROUGH CG AT 67°, TOP ROCK FALLS OFF.

TOP ROCK NET WEIGHT WAS 21.5#

GROUTED BOTTOM BLOCK (T26)

PROFILED T25PTBAT.DAT. P

PROFILED T25PBBAT.DAT (SEE PAGE 151)

GROUTED T26 - PLACED SPECIMEN IN 101° C OVEN FOR 24 HRS. P

11/25/92

REMOVED SPECIMEN FROM OVEN.

A. Peters



Digitized at 800 samples/sec.  
After 11/02/92  
After 10/21/92

| 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          |

INSTRUMENTATION CHANNEL IDENTIFICATION  
FOR DIRECT SHEAR TEST APPARATUS

11/8/92  
20PSTL

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

- Adjust four vertical displacement detectors to initial range position.
- Turn on shear displacement actuator at null position and normal load actuators at no-load position.
- 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)
- Apply five sequential normal load cycles 0-8-0 Mpa per 20-PST Procedure.   
73,600 #   
11/6/92

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.

- Apply normal load to test Mpa level.
- Adjust and record horizontal shear null position: Adjust Horizontal load to null (Zero-400lb.) on voltmeter. Record vertical displacement detector positions from digital readout. Record horizontal shear LVDT positions from digital readout.
- Turn on fourteen-channel analog tape recorder.
- Trigger oscilloscope to observe drive tape signal.
- Turn on drive tape.
- At end of square wave, trigger digital data acquisition system set to 40 seconds duration.

DPK 11/6/92 1

11/30/92 REMOVED SPECIMEN SRM 23.1.2/23.2.3-A (TAT) FROM WATER PERFORMED SCHMIDT HAMMER TEST:

TOP ROCK SRM 23.1.2 (SIDES)

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

TOP ROCK JOINT SURFACE 11/30

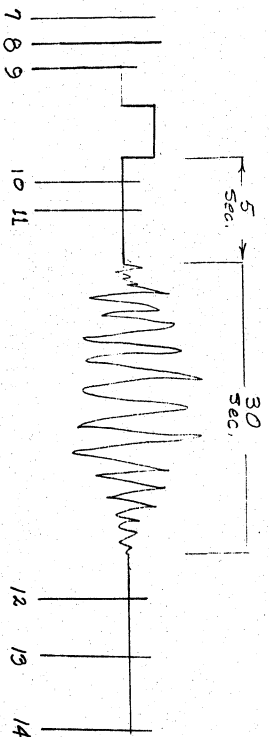
APICAN

11/8/92

- Turn on horizontal shear actuator switch.

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

- When digital data acquisition system sequence stops, turn off horizontal shear actuator switch.
- Turn off fourteen-channel analog tape recorder.
- Turn off drive tape.
- Perform digital data copying sequence.
- Relieve normal load to zero.
- Rewind drive tape (only if necessary for next run level).
- Return to Step 5 to initiate next run.
- 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

2

11/30/92

TOP ROCK (JOINT SURFACE)

TEST REBOUND

|    |    |
|----|----|
| 1  | 52 |
| 2  | 52 |
| 3  | 53 |
| 4  | 56 |
| 5  | 50 |
| 6  | 51 |
| 7  | 50 |
| 8  | 53 |
| 9  | 53 |
| 10 | 51 |

Bottom Block SAM 23.2.3-A (SIDE 1)

|   |    |    |    |
|---|----|----|----|
| 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#

APKES

11/30/92

RAN PROFILE T26PBBT.DAT AND T26PTBBT.DAT

12/1/92

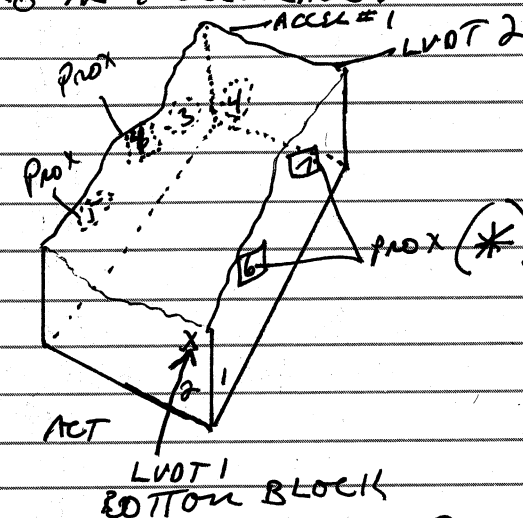
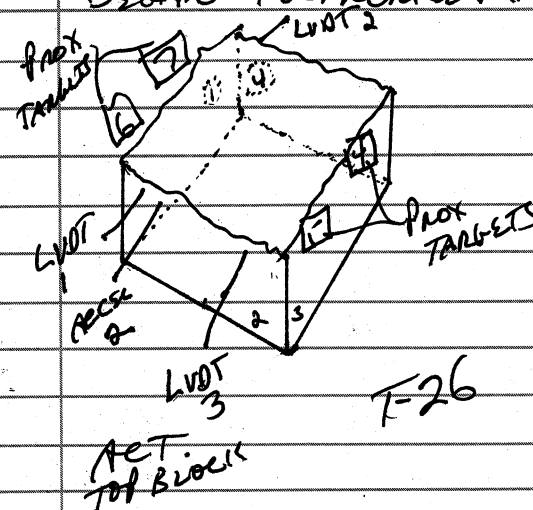
GROUTED T-27 WITH RECIPE LISTED ON PAGE 118. GROUTED

SPECIMEN WAS ALLOWED TO SET-UP FOR FIVE (5) HOURS

BEFORE SEPARATING. SPECIMEN WAS ALLOWED TO SET-UP

OVERNIGHT BEFORE RESUBMERGING IN WATER.

BEGAN INSTRUMENTING T26 AS ILLUSTRATED.



12/2/92

ACCEL #3 WAS MOUNTED TO THE TOP BOX

RESUBMERGED T-27 GROUTED IN BOXES.

RAN TEST T26US1-5.DAT (5 FILES). RAN THE

FOLLOWING SERIES OF DYNAMIC TESTS:

T26SEIS1.DAT 1 MPa 1" PK DRIVE TAPE WAS 1/2 SPEED

T26SEIS1A.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 GALLED ON INSTALLATION. OPENING WAS APPROX 650 MILS. SEE "CNE" FILES FOR OFFSET.

DATA WAS TAKEN DIGITALLY &amp; ANALOG TAPE AS LISTED ON PAGE 147. RAN PROFILE T26PBBT.DAT.

APKES

12/3/92

RAW PROFILE T26PTBAT.DAT.

REMOUSE SPECIMEN SRN 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 &amp; 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 |

APR 93

12/3/92

T28 BOTTOM BLOCK JOINT SURFACE

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

T28 TILT ANGLE - SIDE 4-2 = 42° SIDE 4-2 = 56°

TOP BLOCK NET WEIGHT = 21.9 lb

T25

T26

| BB    | TB   | BB    | TB   |
|-------|------|-------|------|
| 11745 | 7678 | 11945 | 8220 |
| 7805  | 7754 | 7988  | 7801 |
| 3864  | 3823 | 3724  | 3495 |
| 1584  | 1656 | 1559  | 1762 |
| 2     | 1    | 2     | 5    |

12/4/92

\*GROUTED SPECIMEN T28 WITH RECIPE ON PAGE 118. P

12/5/92

SUBMERGED SPECIMENS T28 GROUTED IN BOXES. P

12/8/92

RAW PROFILES T27PBBBT.DAT AND T27PTBBT.DAT.

T27.

| BB    | TB   |
|-------|------|
| 11902 | 7952 |
| 7829  | 7822 |
| 3848  | 3785 |
| 1526  | 1667 |
| 1     | 2    |

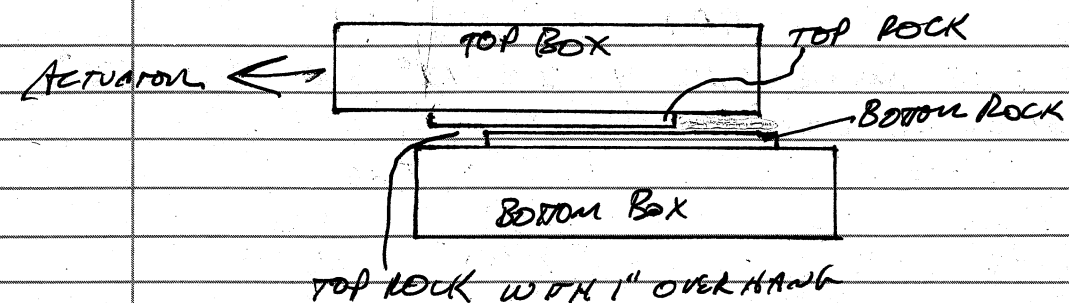
12/9/92

INSTUMENTED T27 AS ILLUSTRATED ON PAGE 149 P

RAW TESTS T27US1-5.DAT (5-FILES).

APR 93

12/9/92 RAN TEST T27CND1.DAT. TEST WAS AS FOLLOWS:  
 INCREASE VERTICAL LOAD TO 1 MPa AT  $\frac{1}{2}$  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  $\frac{1}{2}$  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 FILE NAMES:  
 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 POWER 75K

AKERS

12/10/92 PERFORMED SCHMIDT HAMMER REBOUND TEST ON SPECIMEN  
 SRM 10.2.2(2)/10.2.2(3) (T29).

TOP BLOCK SRM 10.2.2(2) 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 (10.2.2(3))

| TEST | RBD | TEST | 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  |

AKERS



12/10/92

Bottom Block Joint Surface

| TEST | REBOUND | TEST | REBOUND |
|------|---------|------|---------|
| 1    | 47x     | 11   | 58      |
| 2    | 44x     | 12   | 54      |
| 3    | 40x     | 13   | 46x     |
| 4    | 55x     | 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 #.

12/11/92

RAN PROFILES T28PBBT.DAT AND T28PTBBT.DAT. RESUBMERGED SPECIMENS.

12/12/92

GROUTED T29 WITH RECIPE LISTED ON PAGE 118.

T29 WAS SUBMERGED IN WATER.

12/14/92

INSTRUMENTED T28 AS ILLUSTRATED ON PAGE 149 LESS ACCELEROMETERS. REASSEMBLED APPARATUS. RAN TESTS T28US1-5.DAT (5 FILES). RAN TEST T28CNO3.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 T28CNO4.DAT AND T28CNO5.DAT.

12/15/92

RAN PROFILES T28PBBT.DAT AND T28PTBBT.DAT.

12/16/92

RECEIVED SPECIMEN SRM 22.3.3/22.2.2 (T30 SERIES)

APKES

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 | 54x |
| 2  | 45  | 12 | 48  |
| 3  | 49  | 13 | 50  |
| 4  | 46  | 14 | 52  |
| 5  | 55x |    |     |
| 6  | 61x |    |     |
| 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 |

APKES

12/16/92

SPM 22.2.2 Bottom Block, TONT 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#.

12/16/92

GROUTED BOTTOM BLOCK (T30) WITH RECIPE LISTED ON PAGE 118.

12/17/92

GROUTED TOP BLOCK (T30) WITH RECIPE AS ABOVE. SPECIMENS WERE PLACED IN 105°C OVEN FOR 24 HRS.

12/18/92

RAN PROFILES T29PBBBT.DAT AND T29PTBBT.DAT. SPECIMENS WERE RESUBMERGED AFTER PROFILING. REMOVE SPECIMEN T30 FROM OVEN.

12/21/92

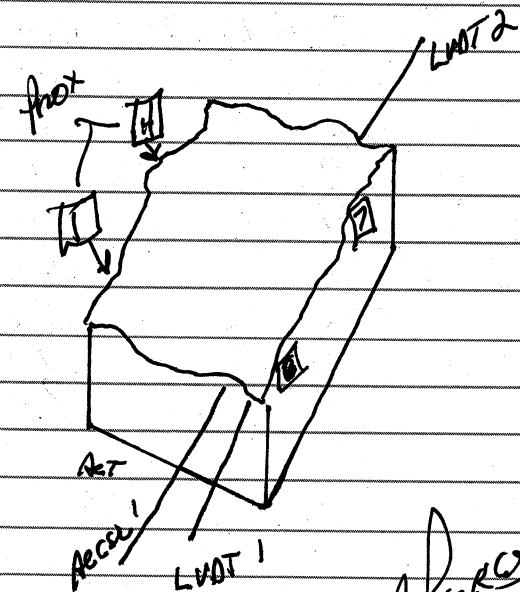
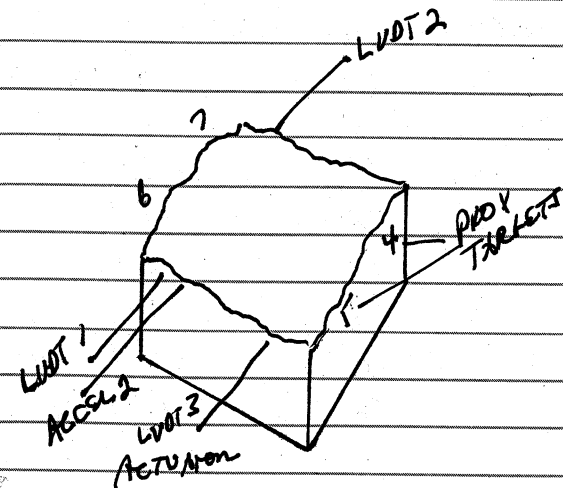
ASSEMBLED APPARATUS WITH INSTRUMENTED SPECIMEN T29.

(SEE PAGE 149.) RAN TEST T29NS1-5.DAT (5 FILES). RAN

TEST T29CND5.DAT. TEST PARAMETERS SUPPLIED BY SMOOTH.

12/29/92

RAN PROFILES T30PBBBT.DAT AND T30PTBBT.DAT. INSTRUMENTED T30 AS ILLUSTRATED BELOW.



PICKED

12/29/92

ASSEMBLED APPARATUS. ACCEL #3 WAS ATTACHED TO THE UPPER BOX ONLY NEAR RIGHT SIDE. LVDT3 WAS MOUNTED BETWEEN UPPER ROCK AND LOAD CELL. THE FOLLOWING WERE 16 CHANNELS WERE TAKEN, 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                   |
| NOR 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

PICKED

12/31/92

RAW PROFILE T29PBBAT.DAT *P*

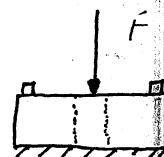
1/4/93

RAW PROFILES T30PTBAT.DAT AND T30PBBAT.DAT. *P*

Final Entry

4/30/93

Siv-Min H *P*

Standard Used: 100 KIP MorehouseSerial No: 811Calibration of: Load Cell 1220-AJSerial No: 48740 (LC#1)Amplifier: 2120A (LEFT SIDE)Serial No: 82094Digital Voltmeter: HP 3466ASerial No: 1716122587 (CAL DUE 22 MAR 1992)Frame No. 3 By: PTens. of Comp.: COMP.Date: 4-1-92 Temp: 74°F 71.9°FCal. Volts A: 0.2926 B: -0.2927

| DEFL | Load #           | Run #1      | Run #2                                    | Run #3             | Avg.                               |  |
|------|------------------|-------------|-------------------------------------------|--------------------|------------------------------------|--|
| 0    | No load          | .0000       | <sup>+0.0002</sup><br><del>PO .0000</del> | <sup>+0.0003</sup> |                                    |  |
| 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 <sub>INT</sub> | 4.5         | 3.3                                       | -0.4               | <sup>2.33</sup><br><del>2.47</del> |  |
|      | SLOPE            | -10,011 #/V | -10,081 #/V                               | -10,104 #/V        | -10,065 #/V                        |  |
|      |                  |             |                                           |                    |                                    |  |
|      |                  |             |                                           |                    |                                    |  |
|      |                  |             |                                           |                    |                                    |  |

Y intercept: 2.472.33R fit of slope: 0.999993Slope: -10,065 #/VOLT

volt \* \_\_\_\_\_ = \_\_\_\_\_

Poly. Fit Coeff. a0: \_\_\_\_\_

a1: \_\_\_\_\_

a2: \_\_\_\_\_

1/2



2

|       | LC 1    |         |         |         |         |
|-------|---------|---------|---------|---------|---------|
| LOAD  | 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 |

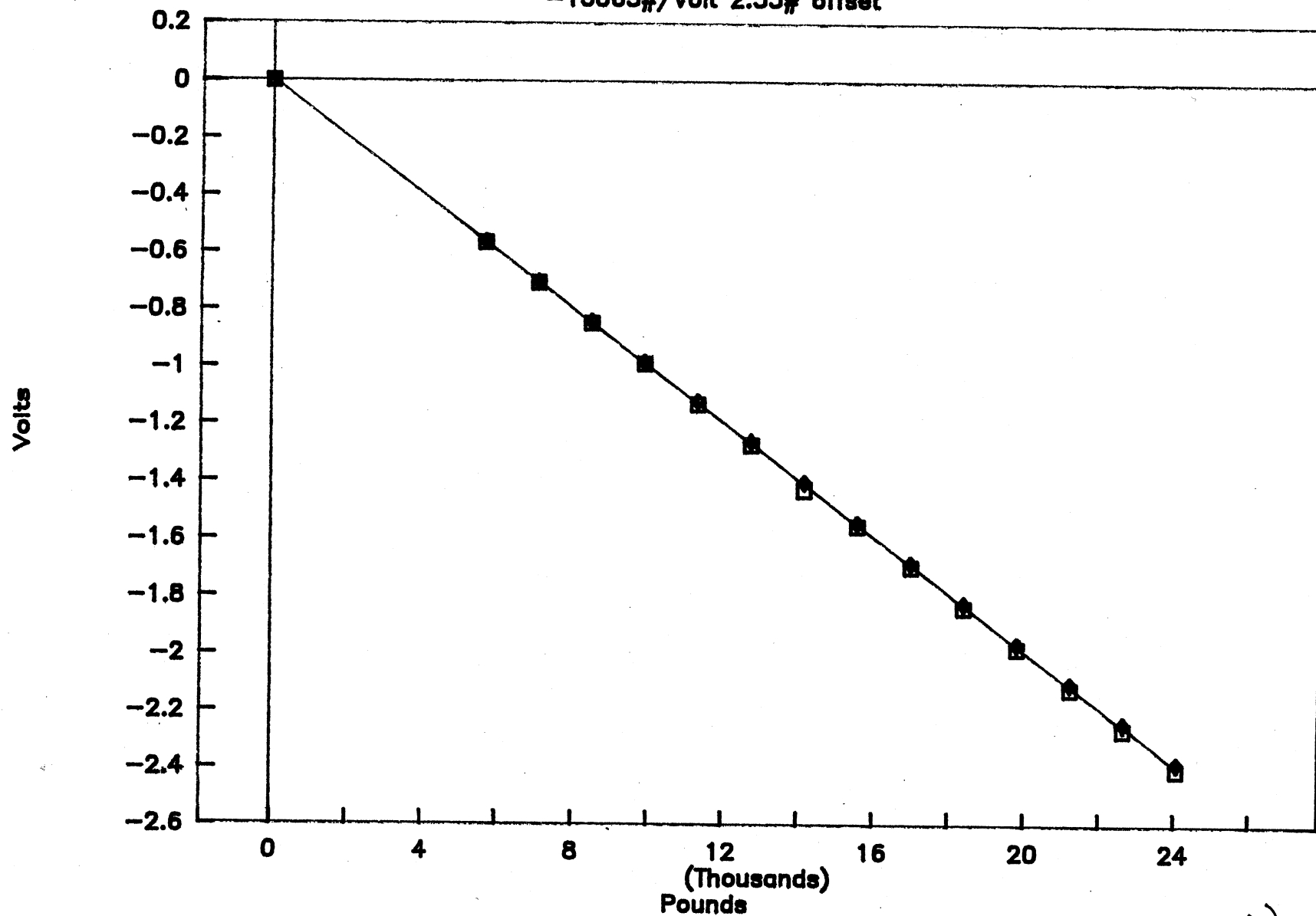
Regression Output:

|                     |          |
|---------------------|----------|
| 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

-10065#/Volt 2.33# offset



Standard Used: 100 KIP Morehouse

Calibration of: Load Cell <sup>INTERFERENCE</sup> LC #3

Amplifier: 2120A (LEFT SIDE)

Digital Voltmeter: HP-3466A

Frame No. 3 By: [Signature]

Date: 4-1-92 Temp: 74°F

Serial No: 811

Serial No: 48124 LC #3

Serial No: 82087

Serial No: 1716A 22587 <sup>CR DOE 22 MAY 92</sup>

Tens. of Comp.: Comp

Cal. Volts A: 0.2953 B: 0.2956

| DEFL | Load #           | Run #1                 | Run #2                 | Run #3                    | Avg.              |             |
|------|------------------|------------------------|------------------------|---------------------------|-------------------|-------------|
| 0    | No load          | 0.0001                 | 0.0000                 | 0.0000                    |                   |             |
| 40   | 5674             | -0.5637                | -0.5703                | -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                    |                   |             |
|      |                  |                        |                        |                           |                   |             |
|      | <del>Y INT</del> | <del>4.5</del>         | <del>3.3</del>         | <del>-0.4</del>           | <del>2.47</del>   |             |
|      | <del>SLOPE</del> | <del>-10,011 #/V</del> | <del>-10,004 #/V</del> | <del>-10,104 #/V</del>    | <del>10,065</del> |             |
|      | Y INT            | 8.8                    | -41.1                  | <del>-27.5</del><br>283.7 | 52.20             | -19.96      |
|      | SLOPE            | -10,020 #/V            | -10,038 #/V            | <del>-9940 #/V</del>      | -10,025 #/V       | -10,031 #/V |

Y intercept : 2.4 <sup>-19.96 #</sup> ~~52.20 #~~ R fit of slope: 0.998792 <sup>-10039/volt</sup> ~~0.999987~~

Slope : -10,023 #/VOLT <sup>10,031 #/VOLT</sup> volt \* \_\_\_\_\_ = \_\_\_\_\_

Poly. Fit Coeff. a0: \_\_\_\_\_  
a1: \_\_\_\_\_  
a2: \_\_\_\_\_

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:

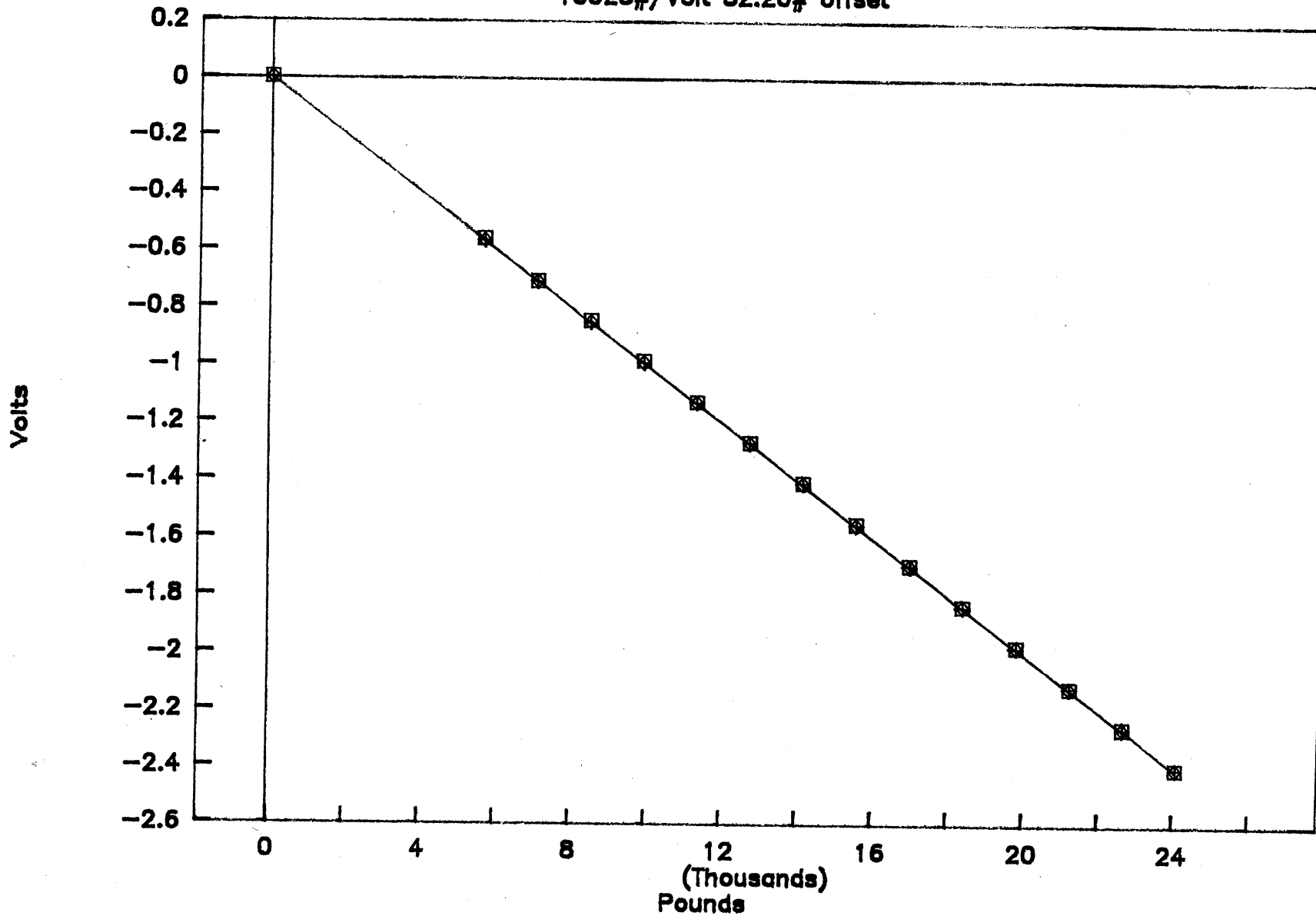
|                     |          |
|---------------------|----------|
| Constant            | -19.9571 |
| Std Err of Y Est    | 11.02169 |
| R Squared           | 0.999997 |
| No. of Observations | 15       |
| Degrees of Freedom  | 13       |

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



# Load cell #3 calibration 4/1/92

-10023#/Volt 52.20# offset



Standard Used: 100 K MorehouseSerial No: 811Calibration of: Load Cell <sup>1000000</sup> 1220AT LC #4Serial No: 48963 LC #4Amplifier: 2120A (RIGHT SIDE)Serial No: 48963 LC #4 82084Digital Voltmeter: HP 3466ASerial No: 1716A2258 <sup>(CPD DUE)</sup> 22 MAR 92Frame No. 3By: [Signature]Tens. or Comp.: compDate: 4-1-92 Temp: 74°F 73°FCal. Volts A: +0.2907 B: -0.2907

| DEFL       | Load #         | Run #1            | Run #2            | Run #3            | Avg.              |  |
|------------|----------------|-------------------|-------------------|-------------------|-------------------|--|
| <u>0</u>   | <u>No load</u> | <u>0.0001</u>     | <u>+0.0006</u>    | <u>+0.0006</u>    |                   |  |
| <u>40</u>  | <u>5674</u>    | <u>-0.5699</u>    | <u>-0.5666</u>    | <u>-0.5661</u>    |                   |  |
| <u>50</u>  | <u>7091</u>    | <u>-0.7097</u>    | <u>-0.7045</u>    | <u>-0.7058</u>    |                   |  |
| <u>60</u>  | <u>8508</u>    | <u>-0.8500</u>    | <u>-0.8499</u>    | <u>-0.8475</u>    |                   |  |
| <u>70</u>  | <u>9924</u>    | <u>-0.9942</u>    | <u>-0.9905</u>    | <u>-0.9895</u>    |                   |  |
| <u>80</u>  | <u>11340</u>   | <u>-1.1340</u>    | <u>-1.1298</u>    | <u>-1.1296</u>    |                   |  |
| <u>90</u>  | <u>12755</u>   | <u>-1.2744</u>    | <u>-1.2668</u>    | <u>-1.2690</u>    |                   |  |
| <u>100</u> | <u>14170</u>   | <u>-1.4170</u>    | <u>-1.4130</u>    | <u>-1.4106</u>    |                   |  |
| <u>110</u> | <u>15585</u>   | <u>-1.5540</u>    | <u>-1.5530</u>    | <u>-1.5517</u>    |                   |  |
| <u>120</u> | <u>16999</u>   | <u>-1.6960</u>    | <u>-1.6920</u>    | <u>-1.6910</u>    |                   |  |
| <u>130</u> | <u>18413</u>   | <u>-1.8365</u>    | <u>-1.8340</u>    | <u>-1.8307</u>    |                   |  |
| <u>140</u> | <u>19826</u>   | <u>-1.9750</u>    | <u>-1.9730</u>    | <u>-1.9711</u>    |                   |  |
| <u>150</u> | <u>21239</u>   | <u>-2.117</u>     | <u>-2.110</u>     | <u>-2.1111</u>    |                   |  |
| <u>160</u> | <u>22651</u>   | <u>-2.257</u>     | <u>-2.254</u>     | <u>-2.253</u>     |                   |  |
| <u>170</u> | <u>24063</u>   | <u>-2.397</u>     | <u>-2.395</u>     | <u>-2.393</u>     |                   |  |
|            | <u>Y INT</u>   | <u>-40.78</u>     | <u>-14.15</u>     | <u>-29.74</u>     | <u>-28.28</u>     |  |
|            | <u>SLOPE</u>   | <u>10,050 #/V</u> | <u>10,055 #/V</u> | <u>10,067 #/V</u> | <u>10,057 #/V</u> |  |
|            |                |                   |                   |                   |                   |  |
|            |                |                   |                   |                   |                   |  |
|            |                |                   |                   |                   |                   |  |

Y intercept: -28.28R fit of slope: 0.999992Slope: 10,057 #/V

volt \* \_\_\_\_\_ = \_\_\_\_\_

Poly. Fit Coeff. a0: \_\_\_\_\_

a1: \_\_\_\_\_

a2: \_\_\_\_\_

| LOAD  | LC 4<br>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 |

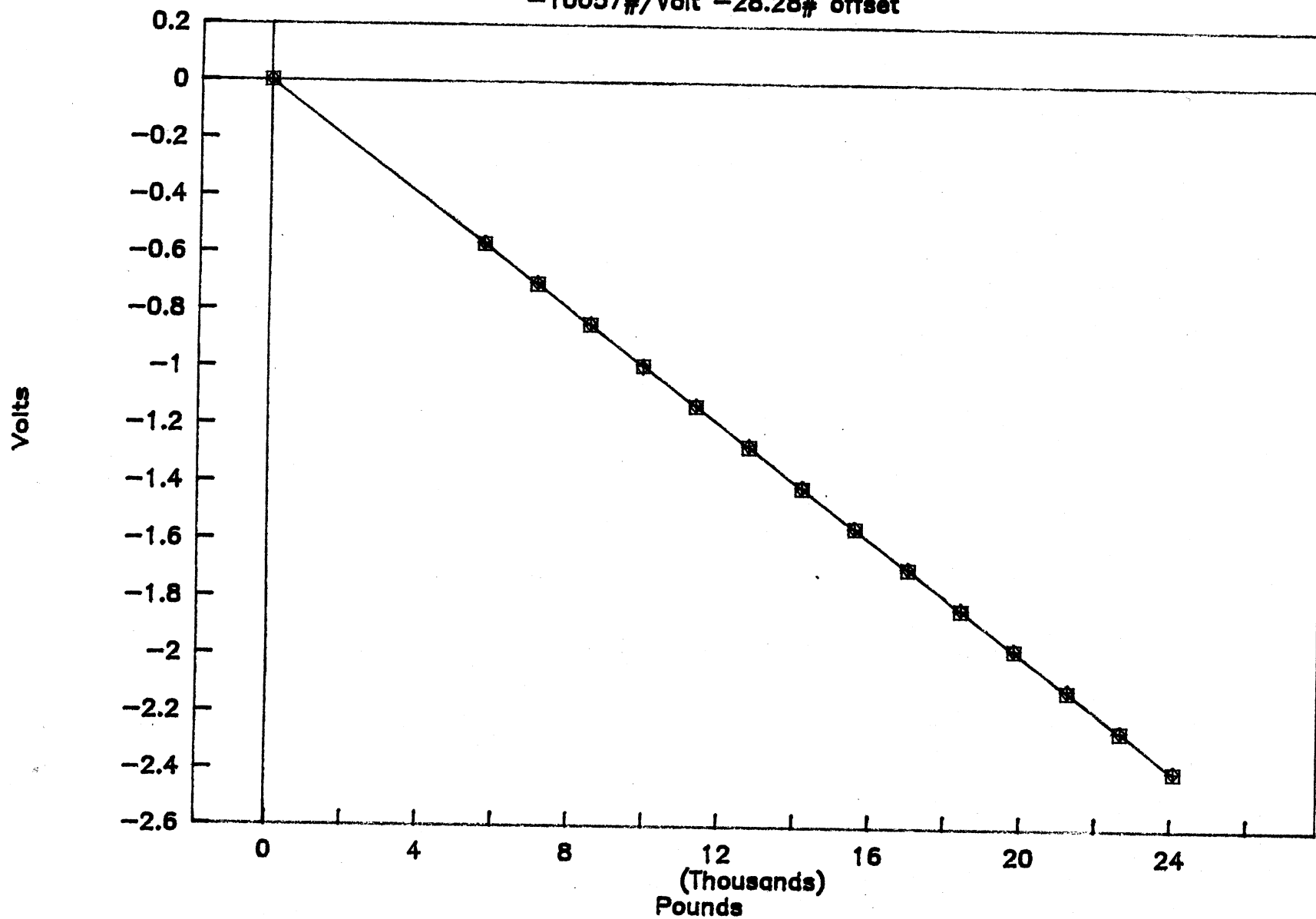
# Regression Output:

|                     |          |
|---------------------|----------|
| 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

-10057#/Volt -28.28# offset





Standard Used: 100 KIP MorehouseSerial No: 811Calibration of: 50,000 1220-AJ  
INTERFACE LOAD CELLSerial No: 54101 LC #5Amplifier: 2120 A (RIGHT SIDE)Serial No: 82097Digital Voltmeter: NP-3466ASerial No: 1716A 22187 (on DUC 22 MAY 12)Frame No. 3 By: APTens. or Comp. CompDate: 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 | 10,009%/V |  |
|      |         |           |           |           |           |  |
|      |         |           |           |           |           |  |
|      |         |           |           |           |           |  |
|      |         |           |           |           |           |  |

Y intercept : -77.06R fit of slope: 0.999949Slope : -10,019 #/VOLT

volt \* \_\_\_\_\_ = \_\_\_\_\_

Poly. Fit Coeff. a<sub>0</sub> : \_\_\_\_\_a<sub>1</sub> : \_\_\_\_\_a<sub>2</sub> : \_\_\_\_\_a<sub>3</sub> : \_\_\_\_\_

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

# 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 |

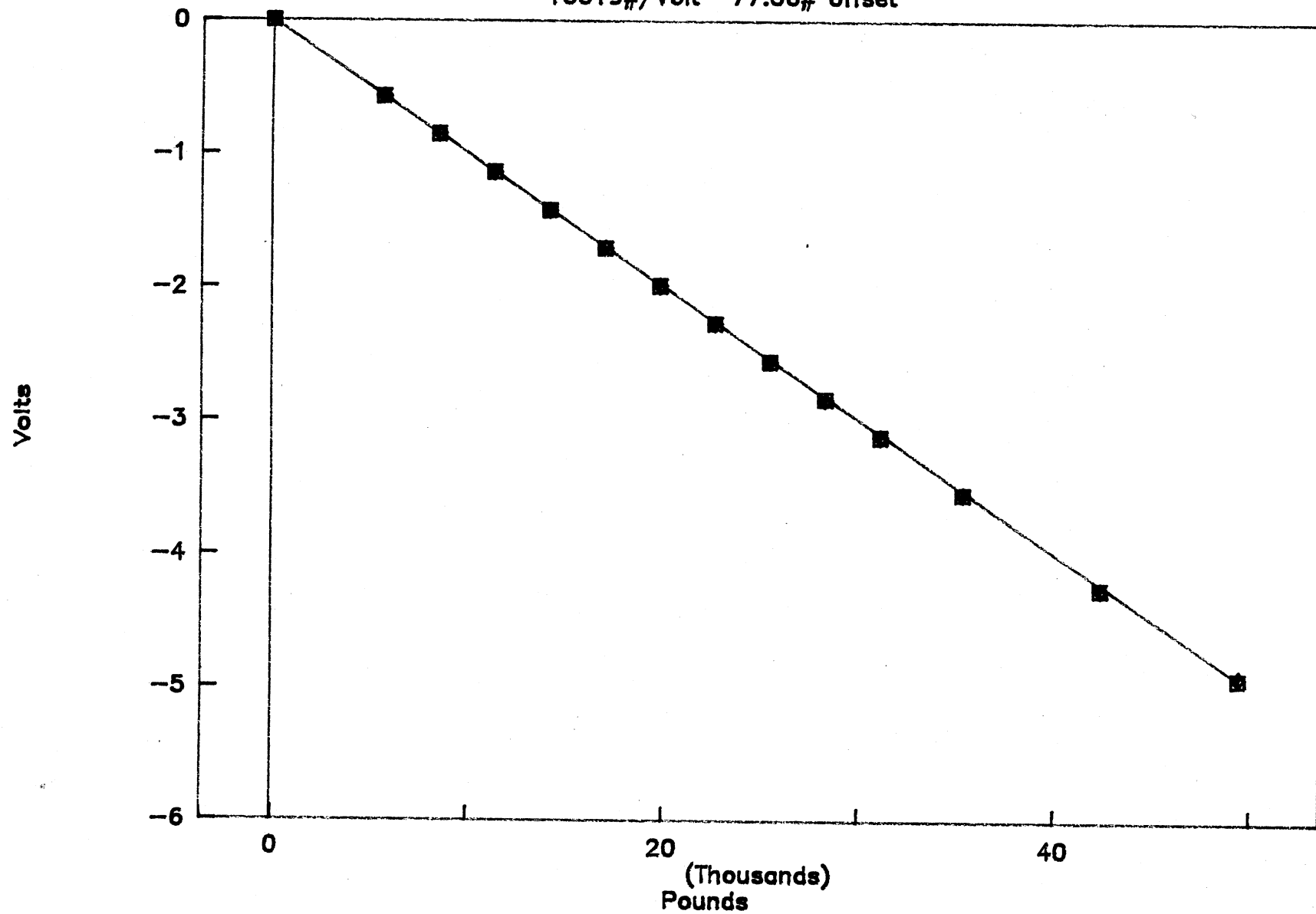
## Regression Output:

|                     |          |
|---------------------|----------|
| 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 |

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

-10019#/Volt -77.06# offset



Standard Used: 100 KIP Machine  
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: HP 3466A

Serial No: 1716A 22587 (CAL DUE 22 MAY 51)

Frame No. 3 By: P/

(Tens.) or Comp.: TENSION

Date: 4/1/92 Temp: 73°F

Cal. Volts A: 0.5929 B: -0.5933

| 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                             | <del>3.735</del><br>3.737         | 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#                           | -55.76                            | -73.50                            | -59.56                            |  |
|      | SLOPE   | 9924 <sup>#</sup> / <sub>in</sub> | 9925 <sup>#</sup> / <sub>in</sub> | 9928 <sup>#</sup> / <sub>in</sub> | 9926 <sup>#</sup> / <sub>in</sub> |  |
|      |         |                                   |                                   |                                   |                                   |  |
|      |         |                                   |                                   |                                   |                                   |  |
|      |         |                                   |                                   |                                   |                                   |  |
|      | .       |                                   |                                   |                                   |                                   |  |
|      |         |                                   |                                   |                                   |                                   |  |
|      |         |                                   |                                   |                                   |                                   |  |
|      |         |                                   |                                   |                                   |                                   |  |
|      |         |                                   |                                   |                                   |                                   |  |

Y intercept : -59.56

R fit of slope: 0.999997

Slope : 9926 #/VOLT

volt \* \_\_\_\_\_ = \_\_\_\_\_

Poly. Fit Coeff.  $a_0$  : \_\_\_\_\_

**a1 :** \_\_\_\_\_

**a2 :** \_\_\_\_\_

a3 : \_\_\_\_\_

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



# 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 |

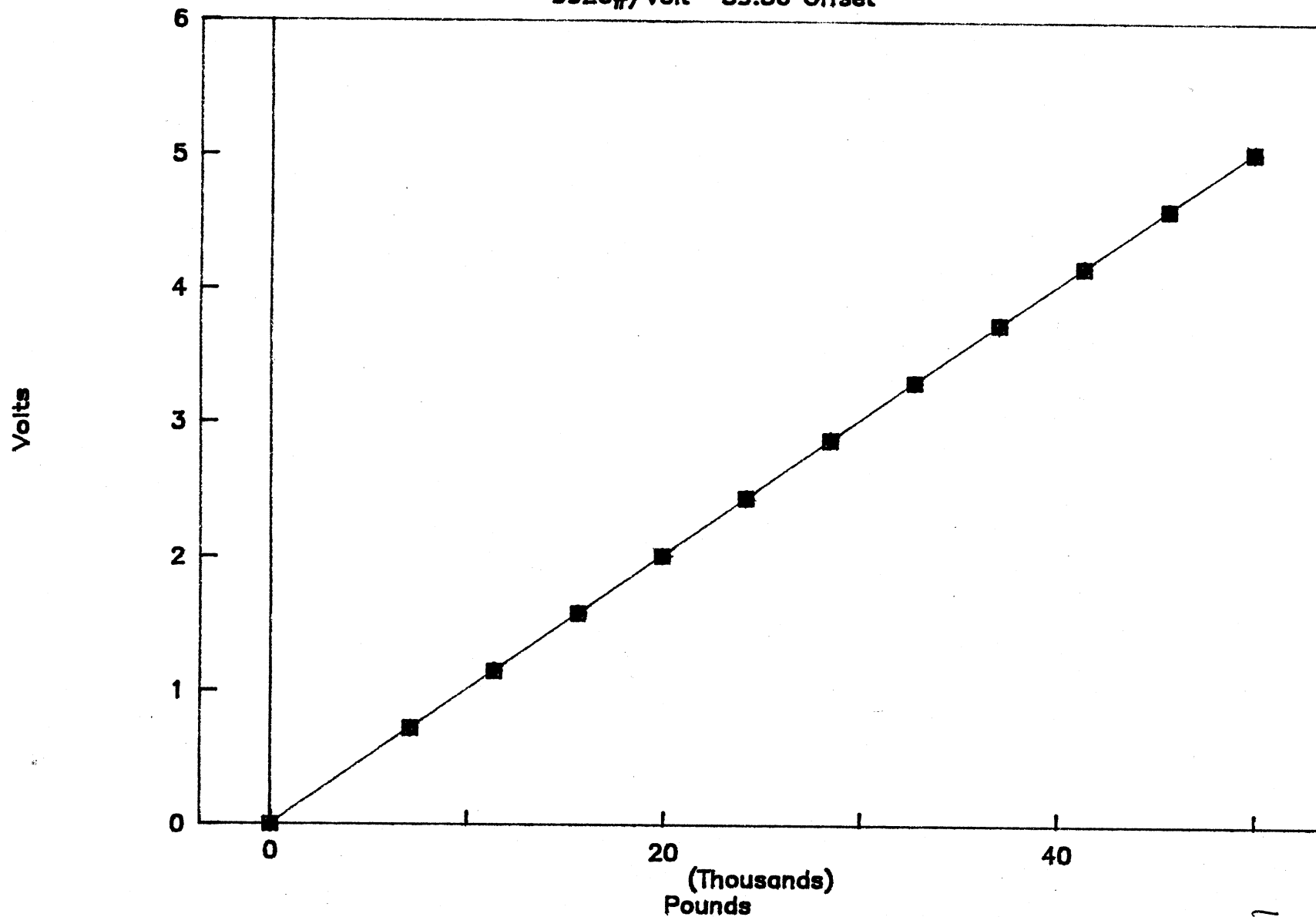
## Regression Output:

|                     |          |
|---------------------|----------|
| 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)

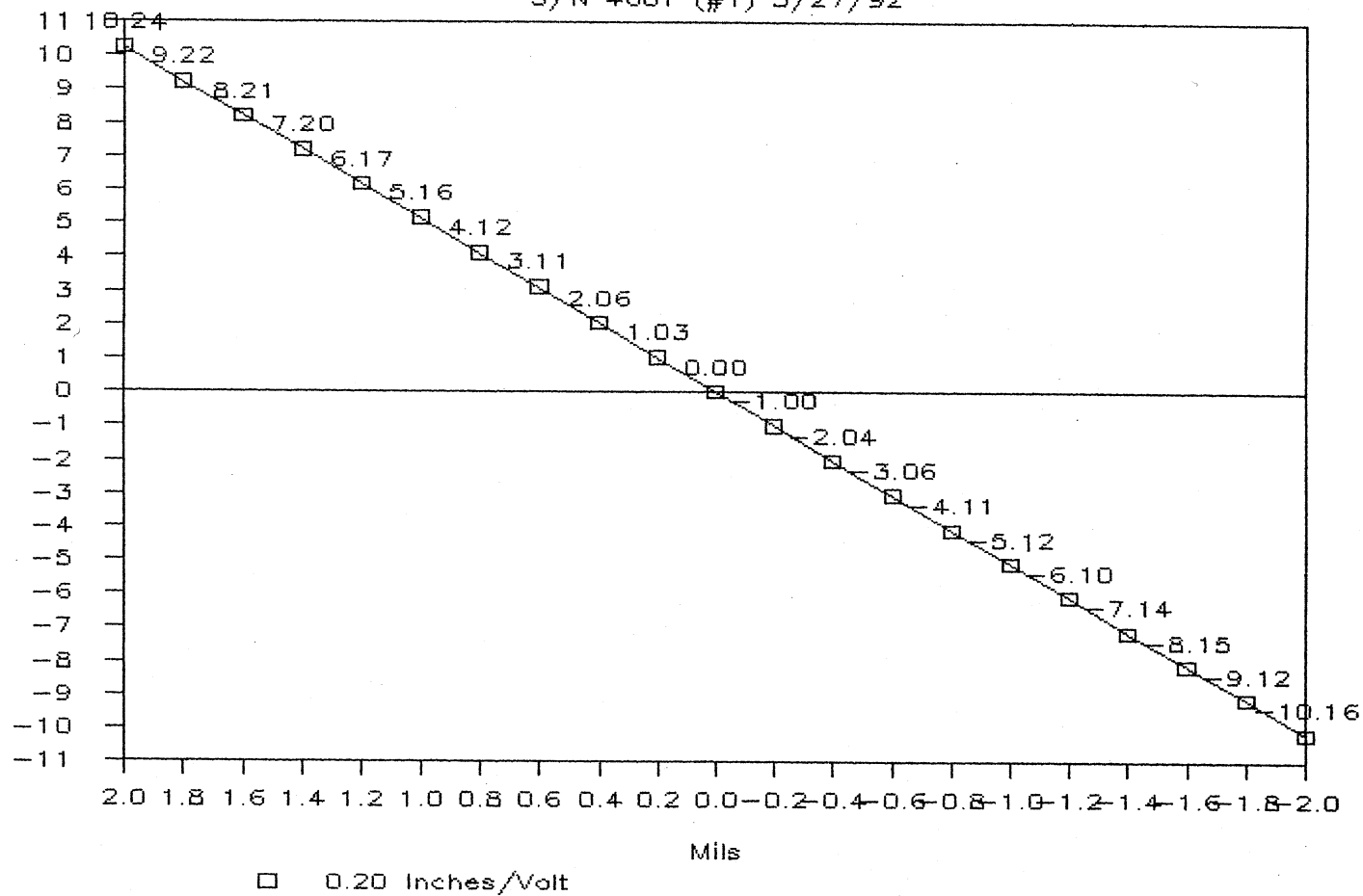
| Inches | Volts  | Inches/Volt |      |
|--------|--------|-------------|------|
| 2.0    | 10.24  | 0.20        | 0.20 |
| 1.8    | 9.22   | 0.20        |      |
| 1.6    | 8.21   | 0.19        |      |
| 1.4    | 7.20   | 0.19        |      |
| 1.2    | 6.17   | 0.19        |      |
| 1.0    | 5.16   | 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        |      |

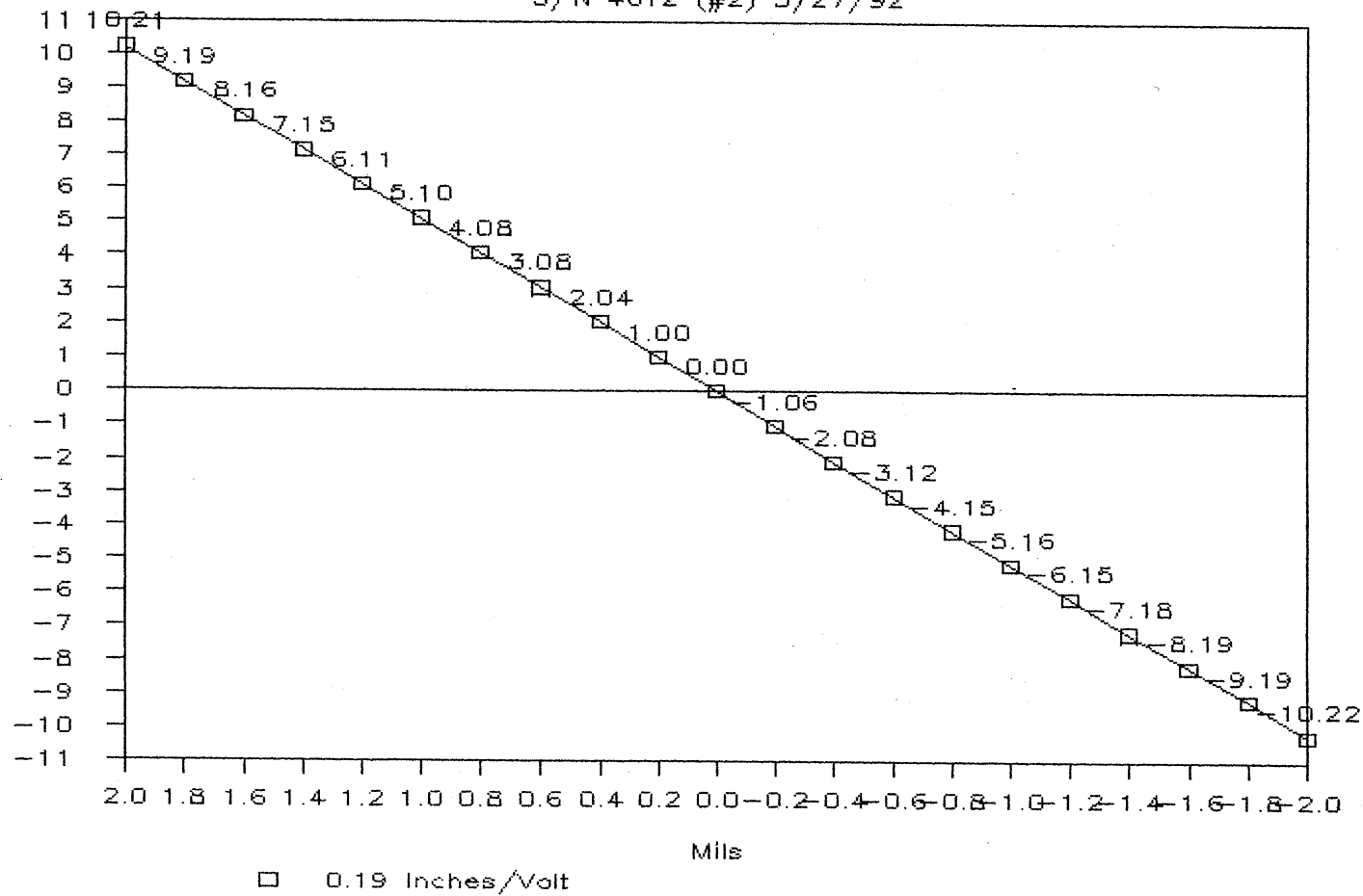
# LVDT Linearity

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



# LVDT Linearity

S/N 4612 (#2) 3/27/92



CB



25mm Bently proximitors 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;

Proximitors #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     |       |

Proximitors #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     |       |

Proximitors #6 Power Supply 80

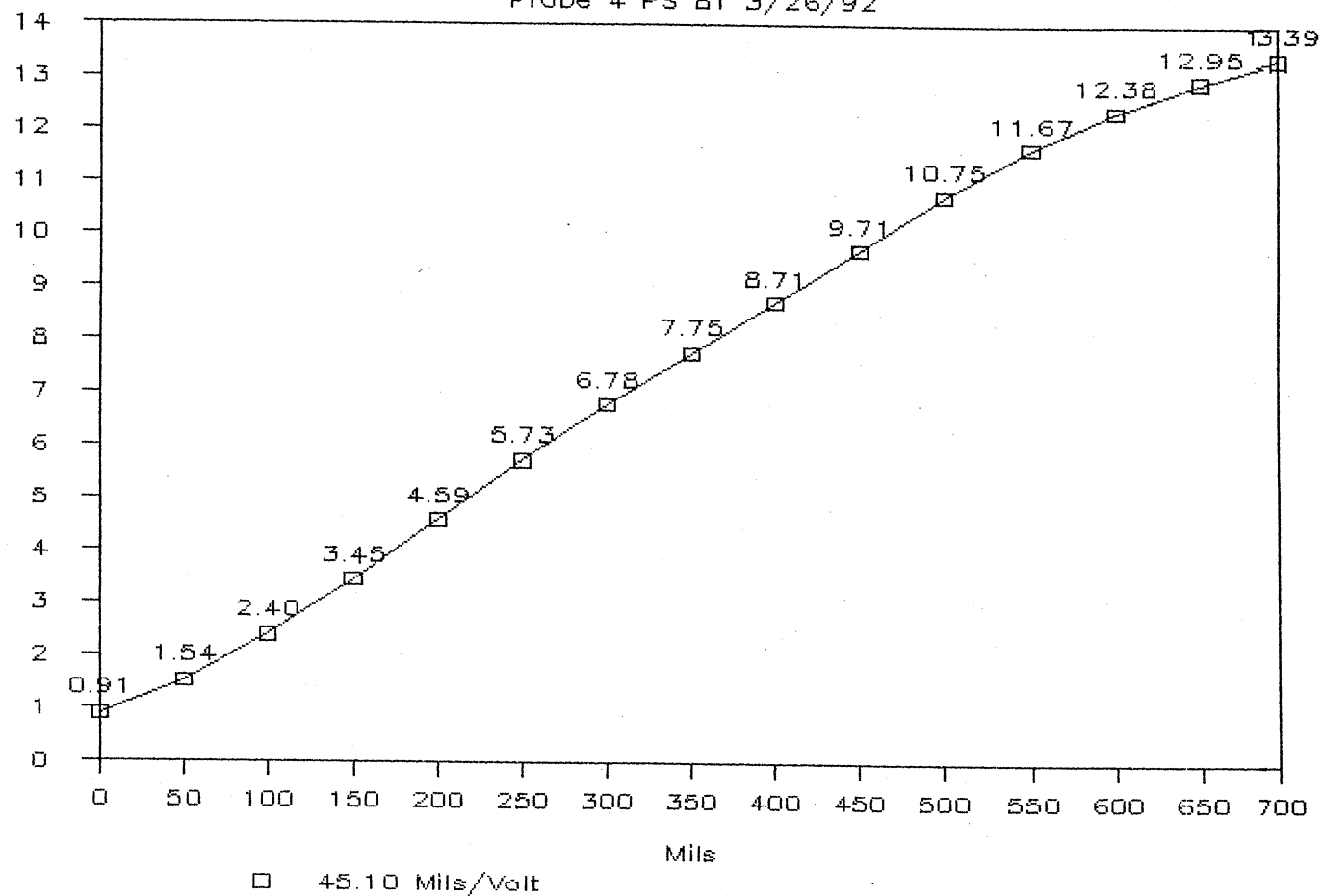
| Mils | Volts | Mils/Volt |       |
|------|-------|-----------|-------|
| 0    | 0.78  | 0.00      | 50.83 |
| 50   | 1.13  | 44.18     |       |
| 100  | 1.85  | 53.93     |       |
| 150  | 2.78  | 53.92     |       |
| 200  | 3.82  | 52.30     |       |
| 250  | 4.92  | 50.85     |       |
| 300  | 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     |       |

Proximitors #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     |       |

# Proximator Linearity

Probe 4 PS B1 3/26/92

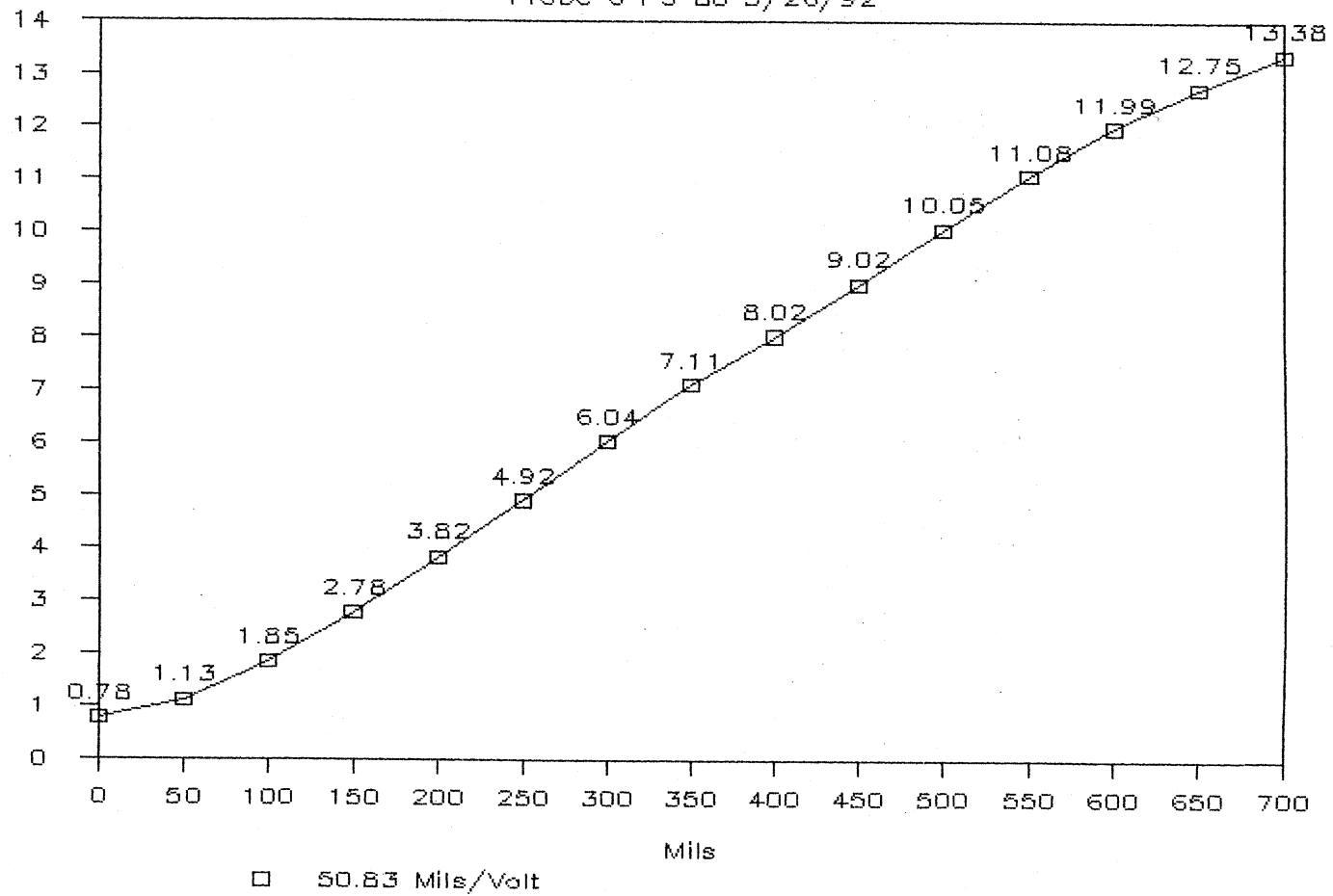


22

# Proximator Linearity

Probe 6 PS 80 3/26/92

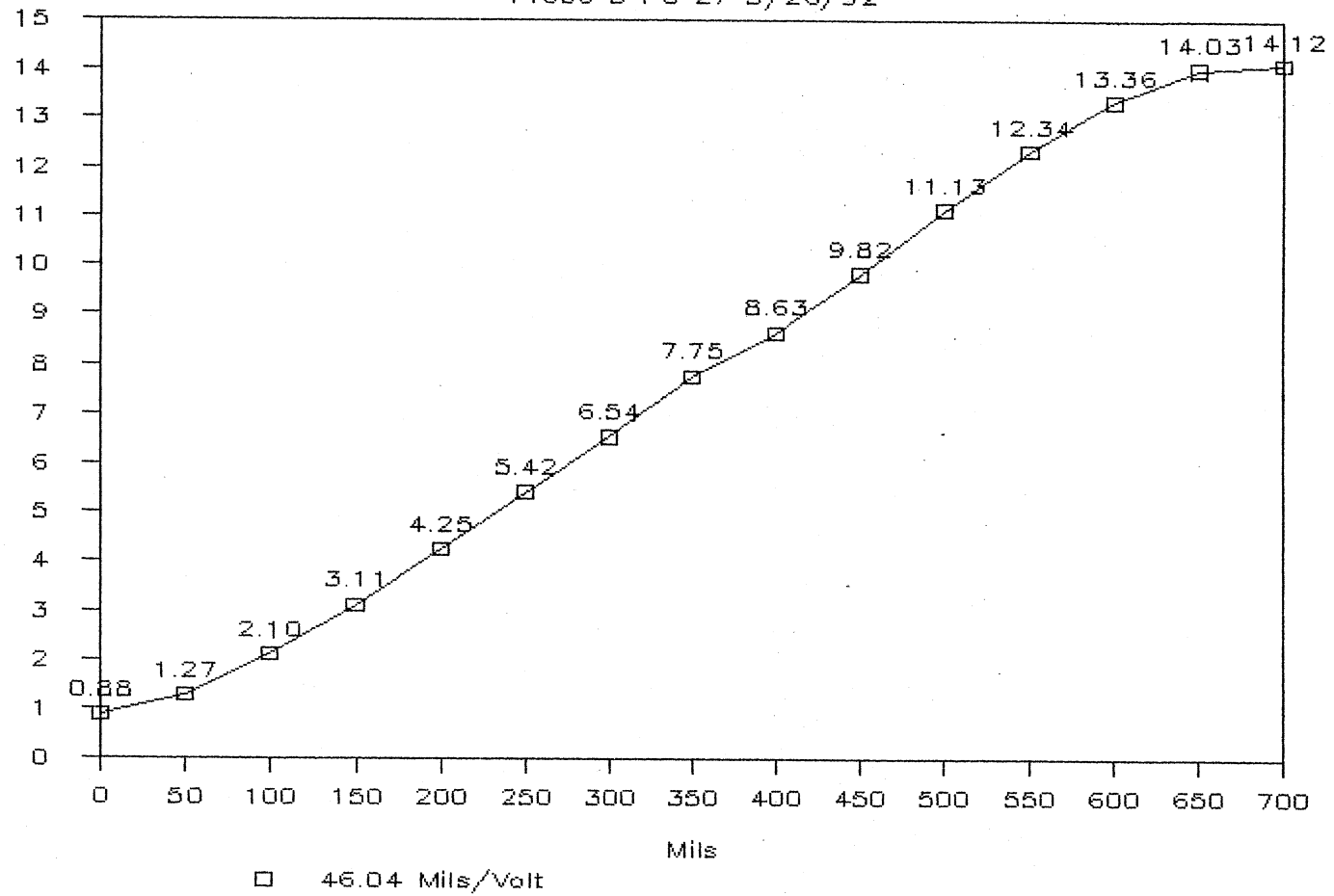
Volts



# Proximator Linearity

Probe 5 PS 27 3/26/92

Volts



22

# Proximator Linearity

Probe 7 PS 87 3/26/92

Volts

