X5 Well Data Set
For Modal Analysis

Dr. P. Michaels, PE

28th May 2003

1   Maps, Data, and Views

Shown in Figure 1 is a map view of the experiment conducted on 17 April 2001. The modal hammer with red tip was used. The data consist of the following directories:

1. 041703: Down-hole data collected every 0.25 meters with source at surface.

2. 041704: Surface data, 0.25 meter station spacing designated line 10X5

3. 041705: Surface data, 1.0 meter station spacing designated line 20X5

4. 041706: Surface data, irregular spacing, infill, designated line 30X5

Figure 2 shows a right isometric view of the experiment.

The subdirectories *"mat"* contain Matlab compatible files. The directories *"seg-2"* are the field data from the Geometrics Strataview Seismograph. The directories *"seg"* are segy data without reel headers.

The *"mat"* directories contain files with 8 columns (sample time (s), down-hole VRT, surface VRT, load_cell signal). There are also files labeled listing.lst that contain the locations of the source and receivers for each signal.

1.1   Format of listing.lst files

These files show where everything was located, and in what direction each element was pointed (polarization). Figure 3 provides an index of where to find each item of interest.

The following conventions are used:

1. Each geophone is represented by an arrow. Ground motion in the direction of the arrow produces a negative voltage in microvolts. The direction of the arrow is given by an azimuth and vertical angle.

2. The azimuth is from North. Thus 0 degrees is North, 90 degrees is East, etc.

3. The vertical angle is from zenith. Thus 180 degrees points towards the center of the earth.

4. All distances are in meters.

Figure 1: Plan View

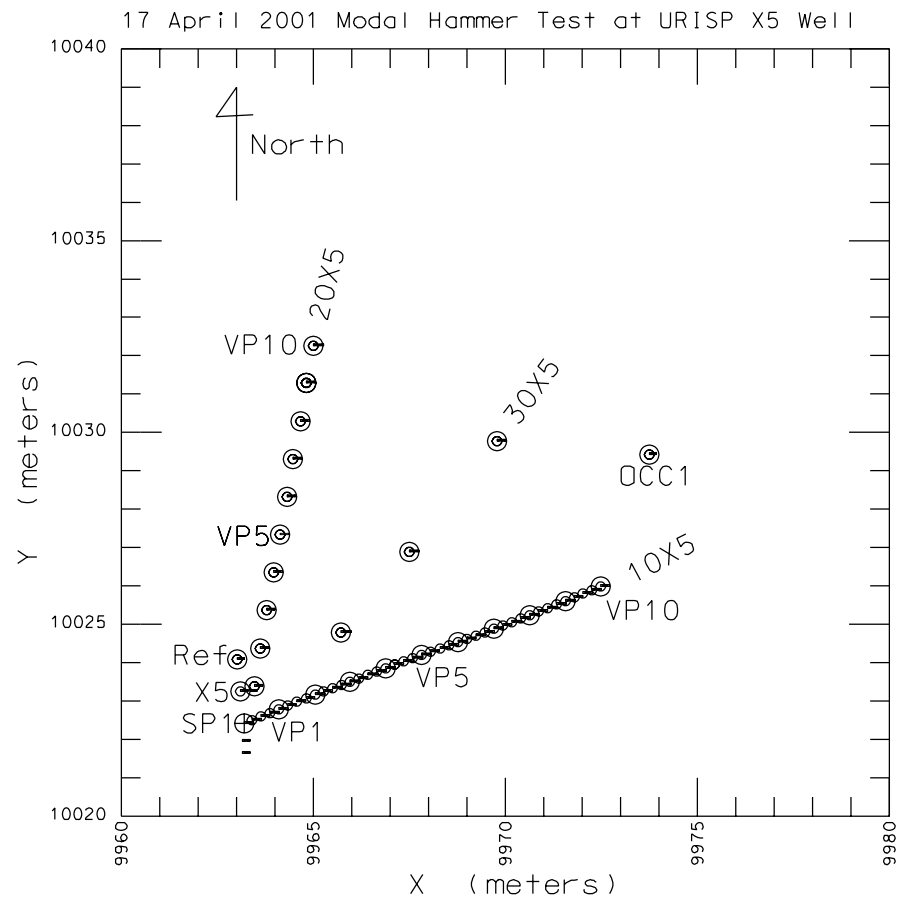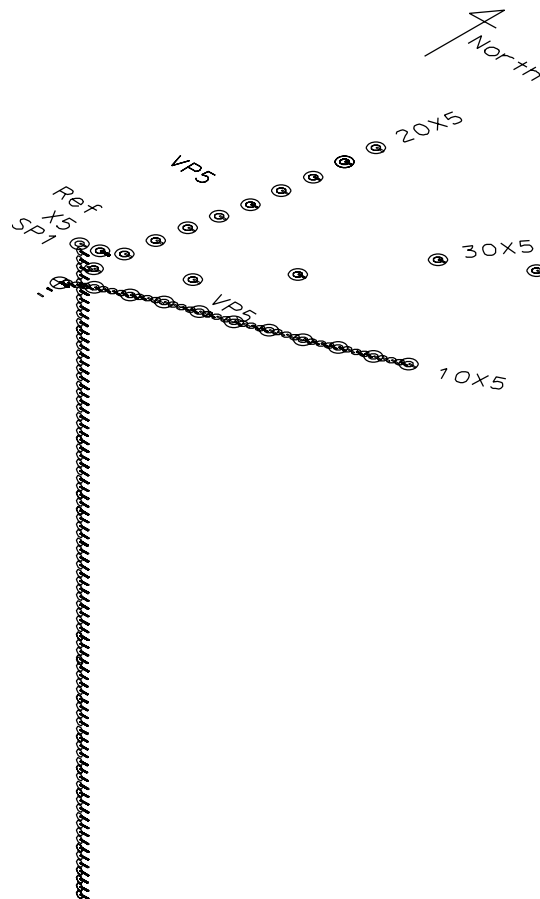Figure 2: Right Isometric View

1.2   Scale factors for voltages

The following factors may be used to convert from voltage to particle velocity (geophones) or force (load cell)

1. Load cell (channel 7) 0.96 millivolts/pound or 0.22 millivolts/Newton

2. Down-hole 3-C phone (Oyo 28Hz, SMC-28-720), 4.0978E-8 m/s per microvolt

3. Surface (blue) 3-C phone (Oyo 14 Hz), 5.6497E-8 m/s per microvolt

```
listing.lst          Tue Apr 24 20:26:50 2001          1

Definition of traces:
1= T-component down-hole
2= R-component down-hole
3= V-component down-hole
4= T-component blue phone on surface
5= R-component blue phone on surface
6= V-component blue phone on surface
7= Load Cell Signal
Data in microvolts


                      |------------------------------|
                      |    PARTIAL SEGY HEADER DUMP   |
                      |                              |
                      |            1001.seg          |
                      |                              |
                      |------------------------------|


   --------------------------------------------------------------------------------
     Length =  2000 samples            | Shot Elevation =       849.2
     Sample Interval =    0.00025 sec. | Shot Depth =           0.0
     Delay Time =  -10 msec.           | Up Hole Time =       0 msec
     Low Cut Filter  =     0 Hz.       | Shot X-COORD =      9963.21
     High Cut Filter = 1000 Hz.        | Shot Y-COORD =    10022.42
     Line ID: 10X5                     | Shot Date (year.day) = 2001.0107
     Shot Orientation:                 | Shot Time (hr:min)   = 11:49
     Azimuth=  0 Deg.  Vertical=180 Deg.| Charge Size (grams)=     0
   --------------------------------------------------------------------------------
   TRACE|SHOT| STATION | OFFSET|      RECEIVER         |VERT|1STBRK|K-GAIN|AZI|VER|
     #   |REC.|SHOT  REC|       |ELEV.  X-COORD   Y-COORD|FOLD|(SEC.)| (dB) |   |   |
   -----|----|---------|-------|---------------------------|--|------|------|---|---|
     1  |1001| 001  004|   3.35|845.92   9963.09  10023.25| 5|0.0000|    0 |  0|  0|
     2  |1001| 001  004|   3.35|845.92   9963.09  10023.25| 5|0.0000|    0 |260| 90|
     3  |1001| 001  004|   3.35|845.92   9963.09  10023.25| 5|0.0000|    0 |350| 90|
     4  |1001| 001  000|   0.22|849.20   9963.40  10022.50| 5|0.0000|    0 |  0|  0|
     5  |1001| 001  000|   0.22|849.20   9963.40  10022.50| 5|0.0000|    0 | 69| 90|
     6  |1001| 001  000|   0.22|849.20   9963.40  10022.50| 5|0.0000|    0 |339| 90|
     7  |1001| 001  001|   0.00|849.16   9963.21  10022.42| 5|0.0000|    0 |  0|  0|
```

(A) arrow to "Azimuth= 0 Deg. Vertical=180 Deg."
(B) arrow to Shot Elevation / Shot X-COORD / Shot Y-COORD
(D) arrows to OFFSET / ELEV. / X-COORD / Y-COORD columns
(C) arrows to AZI / VER columns

(A)=Direction of the source blow (180=vertical, down)
(B)=Location of the source (x,y,z)
(C)=Direction of each geophone element (90=horizontal)
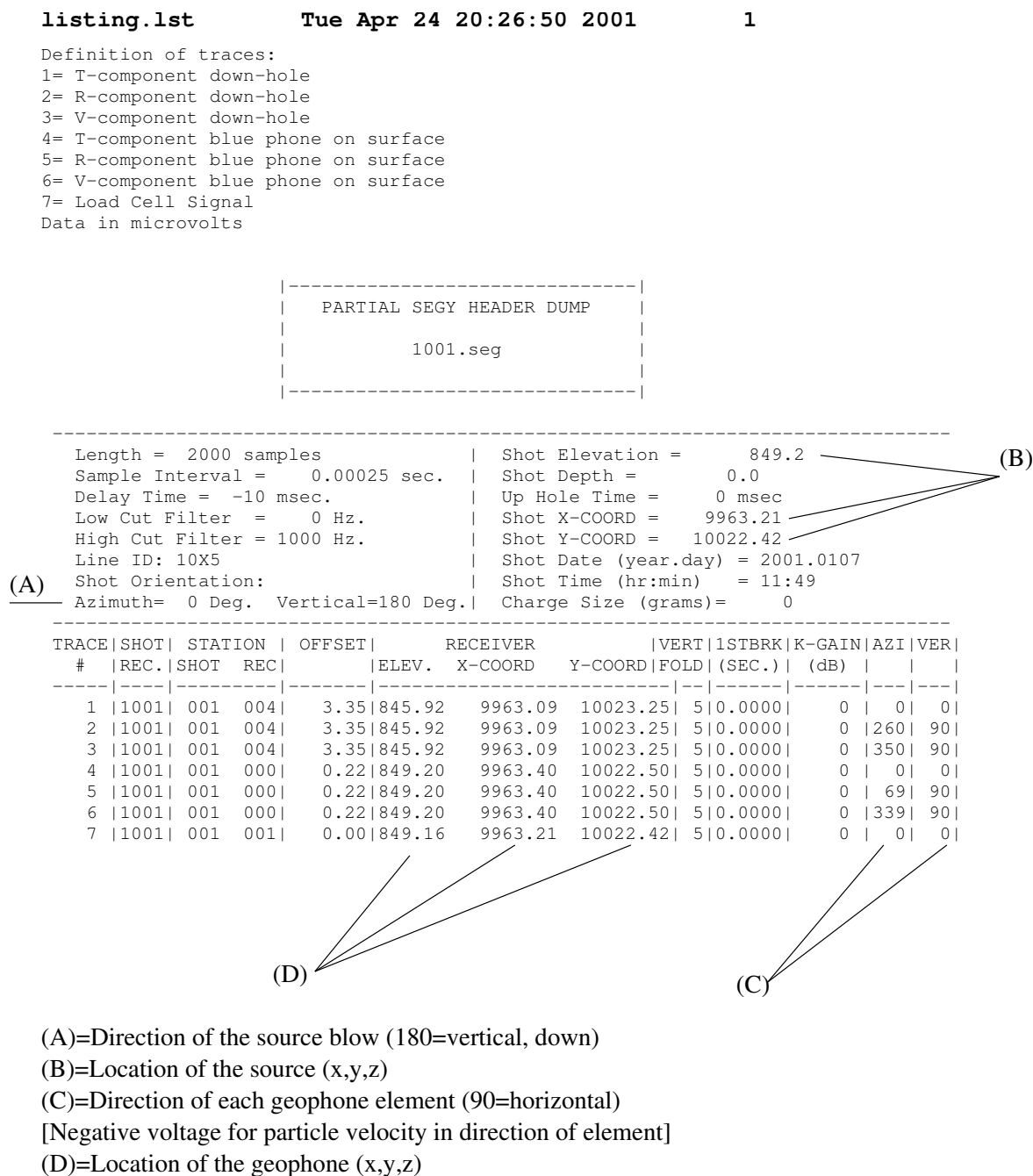[Negative voltage for particle velocity in direction of element]
(D)=Location of the geophone (x,y,z)

Figure 3: Index to listing.lst file