EW9705

Iberia 1997 - Line 9 Processing Scheme

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The Iberia Line 9 dataset was very large, and proved unwieldy for Geovecteur in many circumstances. The data had to be divided up into pieces for the f-k migration to run, and for the final plot to be a manageable size, every four adjacent CDPs had to be stacked together.

Initially the data appeared very noisy, and deconvolution was deemed inconsequential before stacking. A post-stack predictive deconvolution was performed on the data. In the end, Iberia line 9 came out looking surprisingly good. Figure 1 shows the processing sequence in Geovecteur, which is described in detail below.

EDITE

The first thing I did with the data was to plot out shot gathers and examine them for bad traces. See figures 2 and 3 for shot gathers 1093 and 1805. The noisy traces I found were consistent throughout the entire line, so I set up an edit library of the channel numbers and called EDITE to zero every trace with header word 17 equal to a value in the library. Bad channels were: 164-157, 152-151, 149, 144, 127, 115, 103-102, 73, and 59.

FILTR

To determine an optimum bandpass filter, I plotted the frequency spectra of all the traces in two shot gathers, as well as the mean frequency spectrum (figs. 4, 5) for each of the two shots. Then filter panels were plotted to examine the frequency extent of the signal. A bandpass filter of 5-10-40-55 Hz was chosen for these data.

HABIL, MODET, OUTST, & YDRIV

Because Iberia line 9 was shot on time rather than distance, and progress along the line was not at a constant rate (figs. 6, 7), setting up the geometry for the line proved to be complicated. I divided the shooting line into twelve general trends and calculated rates of progress for each separately. I was able to do this using HABIL, MODET, OUTST & YDRIV rather than using QSORT, by a method shown to me by Steffen. We chose a CDP bin size of 25 meters, which gives a maximum fold of 32 (fig. 8) and a total number of CDPs of over 10,000.

FANMO

To get a velocity structure with which to move out the data for stacking, I first built a rough velocity structure using VESPA. Then I used VELCOM to fine-tune the velocities. Figure 9 shows a map of the locations along line 9 where I picked velocities. Note that the denser coverage is in the shallower section of the line, where there is more complicated

structure. For each location, four adjacent CDP gathers (fig. 10) were examined in VELCOM (figs. 11, 12). Figure 13 displays an isovelocity plot of the subsurface velocity structure of line 9.

MUTES

Mutes for six moved-out CDP gathers were picked in SEISMIC (fig. 14), then transformed into a format that could be hung from the water bottom (the IQ method).

STACK

Stacking the data revealed an apparent bubble pulse, though it was inconsistent across the line. Plotting the autocorrelation function of some of the stacked traces showed where the bubble was coming in, when it did appear.

TRITA

As a predictive deconvolution operator, I hung from the water bottom a window of 0-2000 milliseconds, an operator position at 136 milliseconds, an operator length of 60 milliseconds, prewhitening of 0.5%, 21 traces used to compute the operator.

FKMIG

After plotting several sections with different velocities used in the migration, I determined a constant velocity of 1450 as the optimum velocity for F-K Migration of these data.

MNGTY & SPSTA

After plotting over 10,000 CDP traces with as close a trace spacing as possible, I had to do something to reduce the size of my plot. I used MNGTY & SPSTA to stack every group of four traces together, effectively quadrupling the fold and quartering the length of the plot.

MUTES

As a final step to cleaning up the section, I muted everything above the seafloor, to get rid of migration parabolas.

DYNQU

Before plotting I used automatic gain control on the section with an operator length of 500 milliseconds.

Processing Sequence

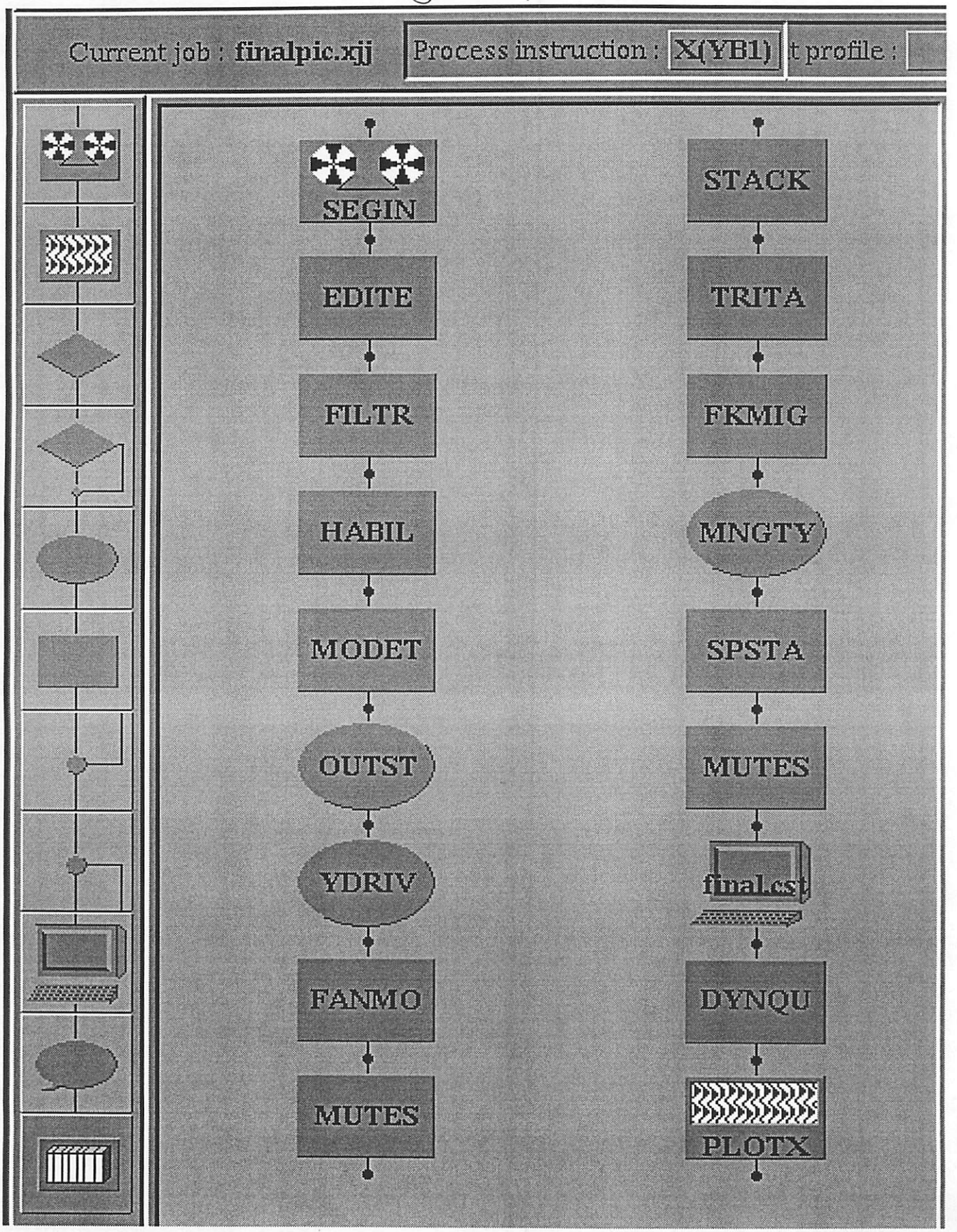


Fig. 1

Shot #1093 Gather

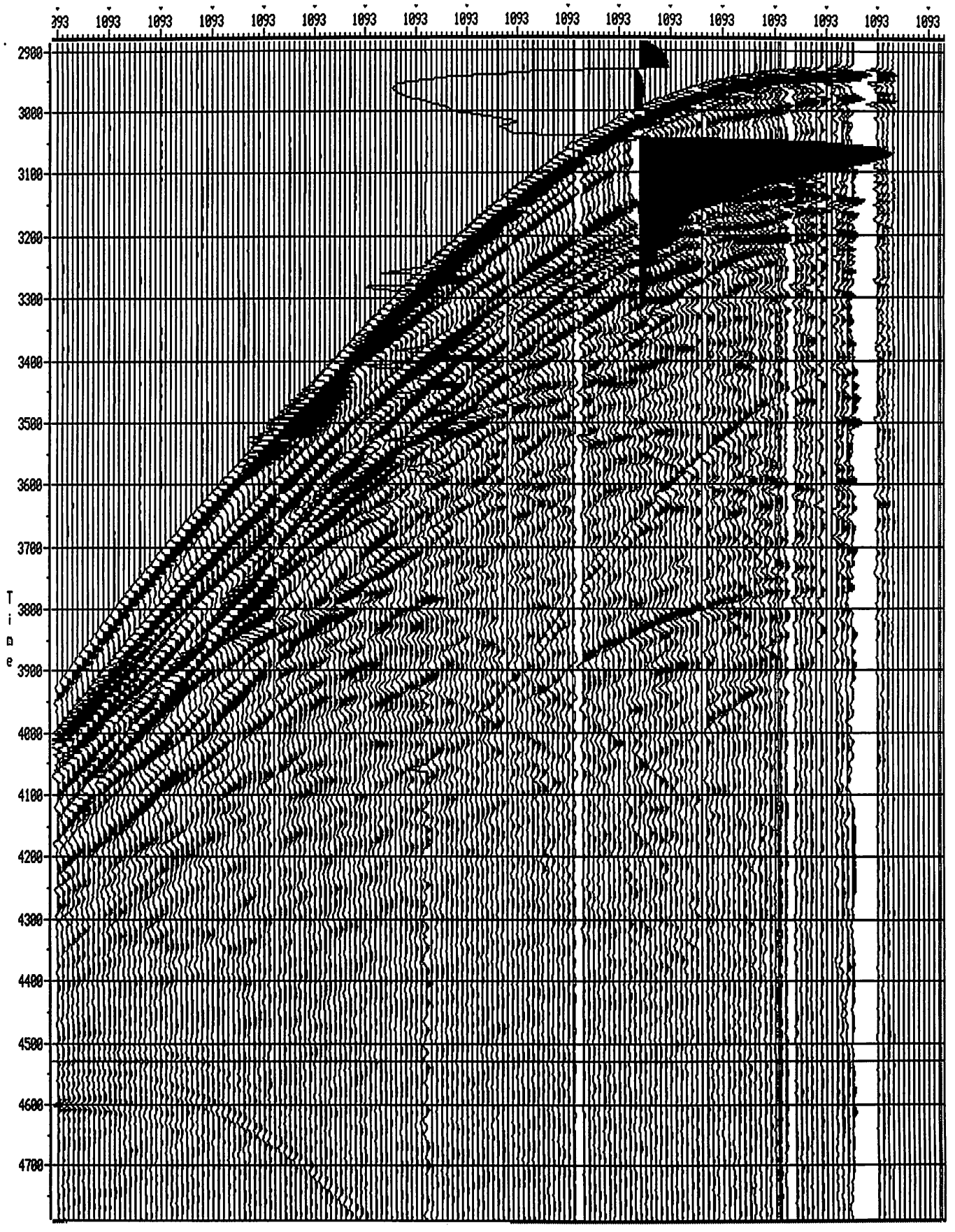


Fig. 2

Shot #1805 Gather

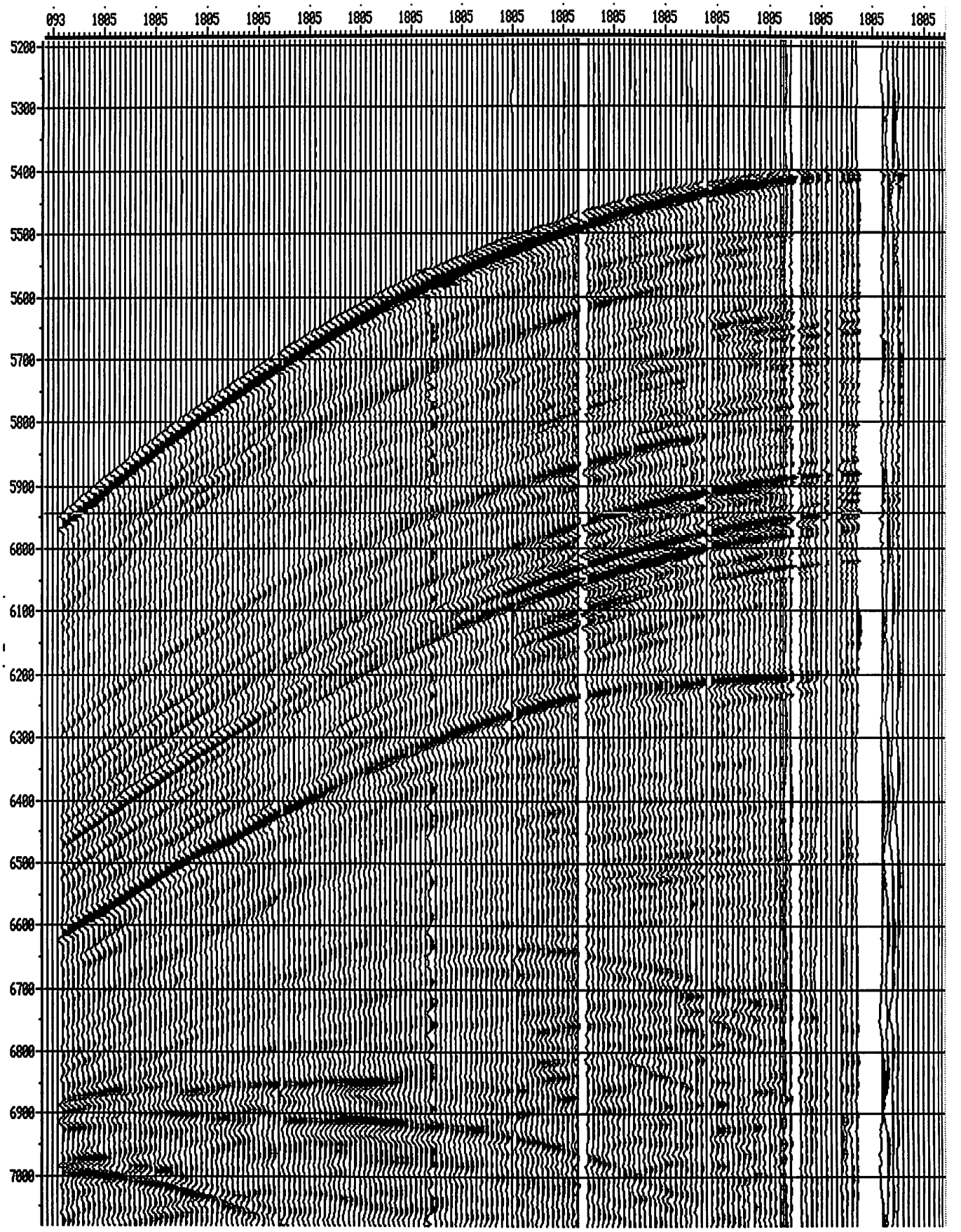


Fig. 3

MEAN AMPLITUDE SPECTRUM

SHOT #1093

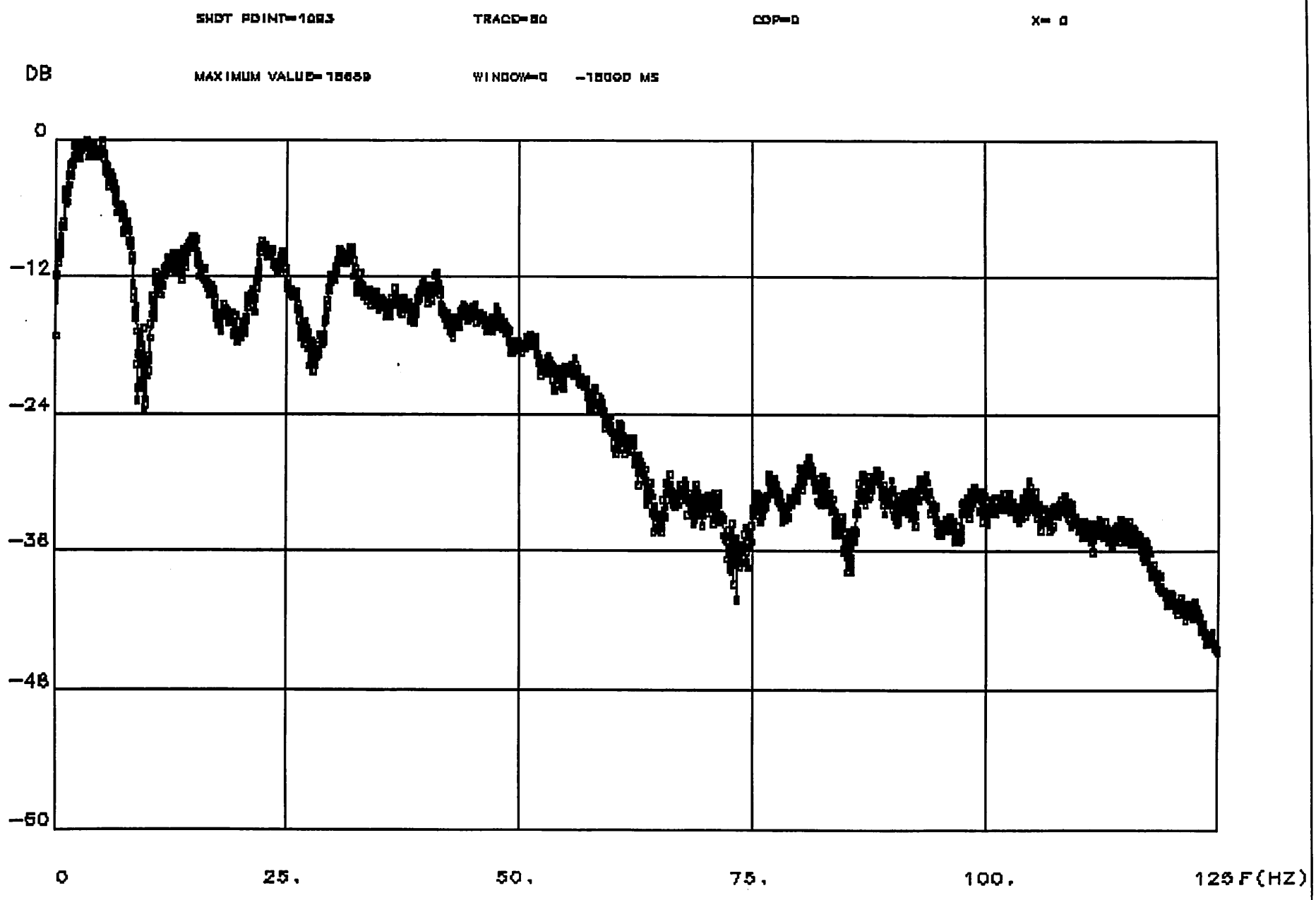


Fig. 4

MEAN AMPLITUDE SPECTRUM

SHOT # 1805

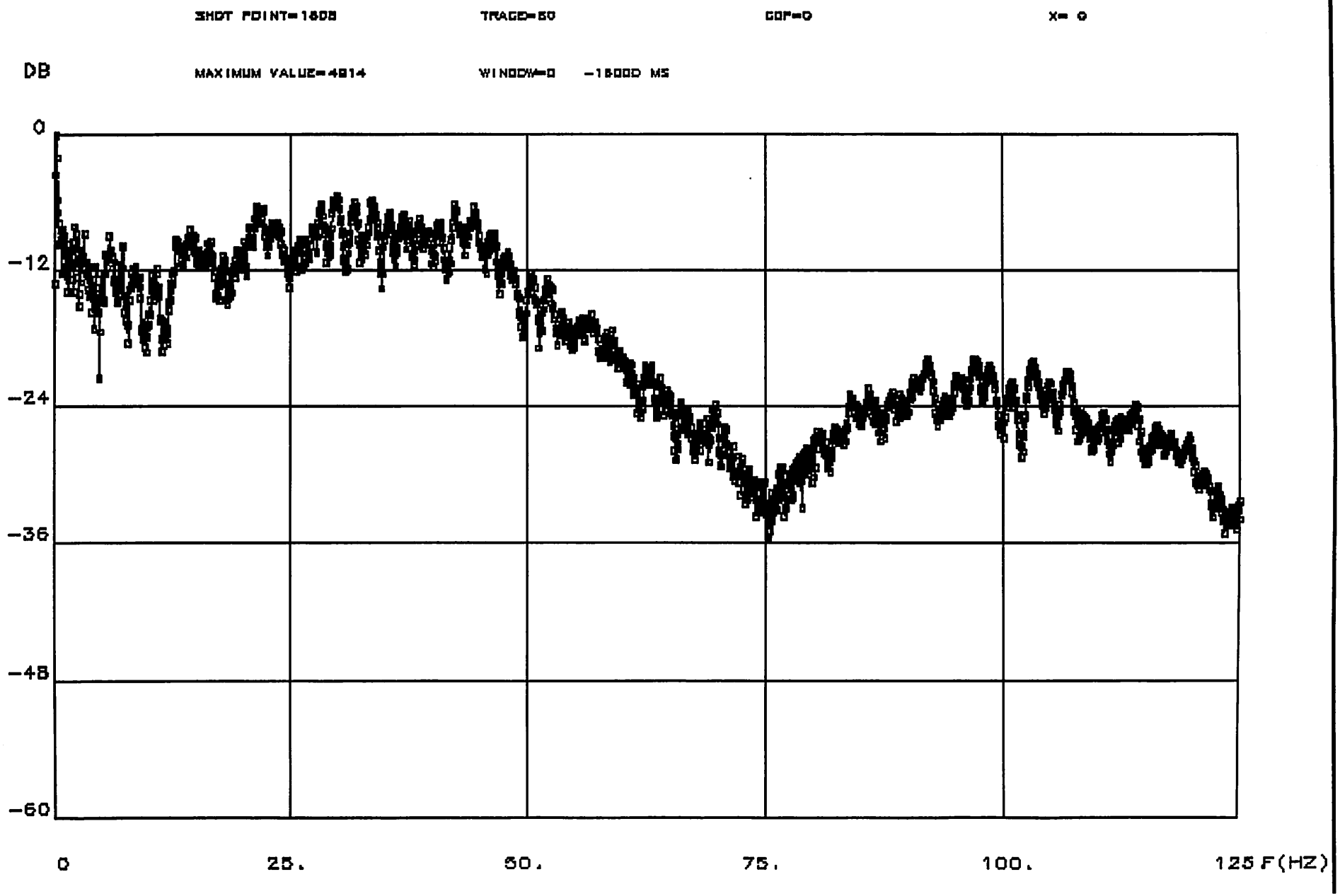


Fig. 5

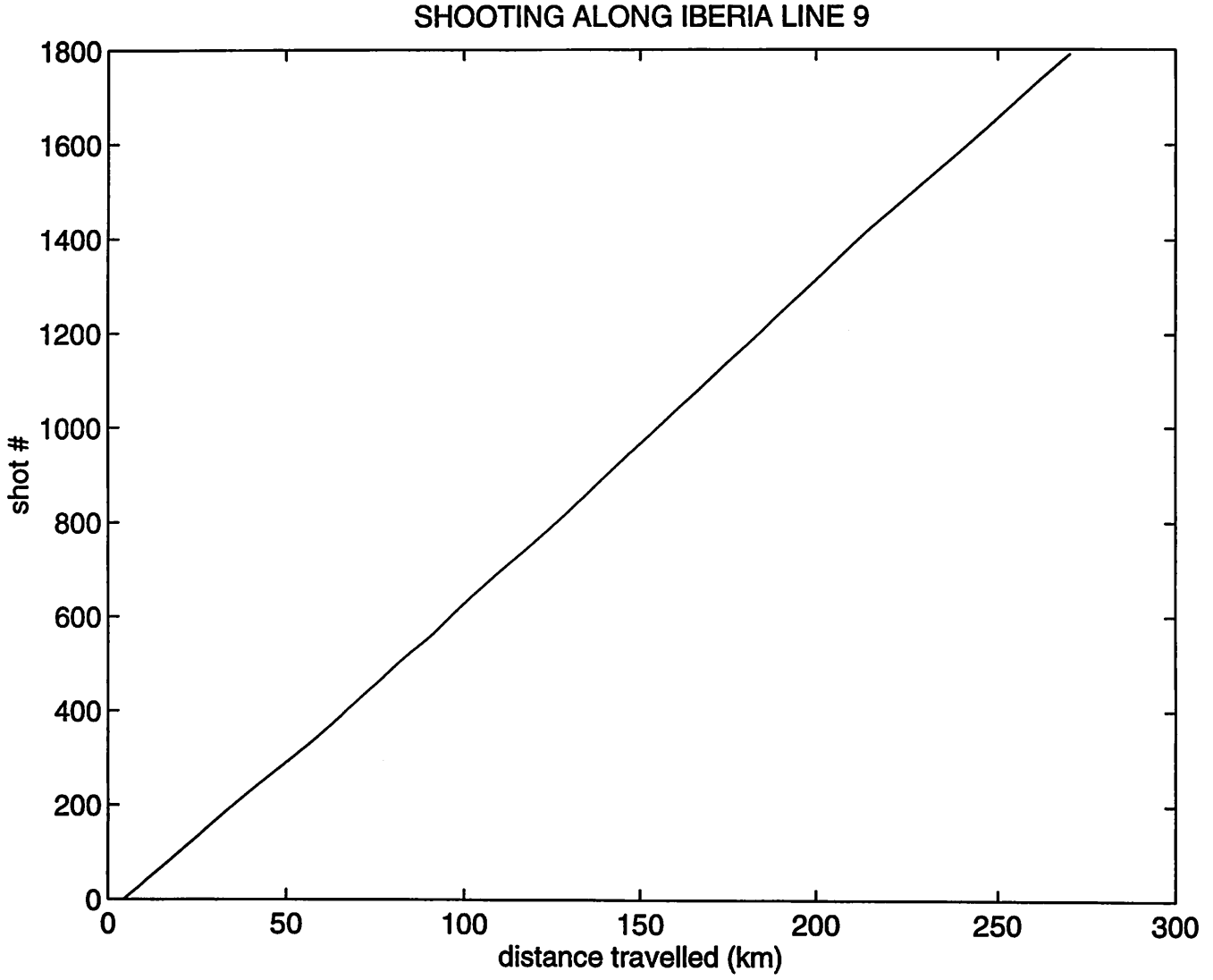

SHOOTING ALONG IBERIA LINE 9
1800
1600
1400
1200
1000
800
600
400
200
0
shot #
0
50
100
150
200
250
300
distance travelled (km)

Fig. 6

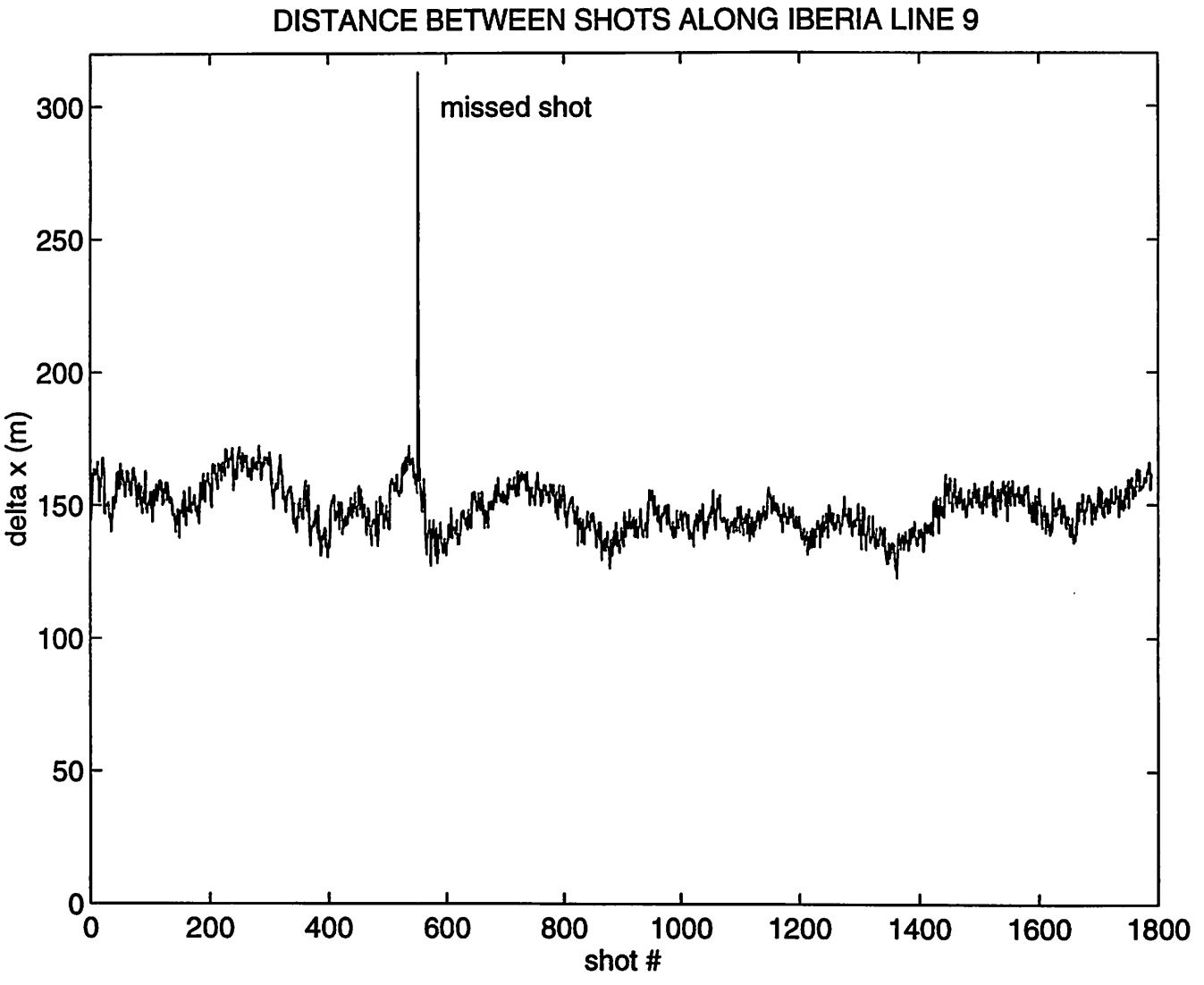

DISTANCE BETWEEN SHOTS ALONG IBERIA LINE 9
missed shot
delta x (m)
shot #
0
50
100
150
200
250
300
0
200
400
600
800
1000
1200
1400
1600
1800

Fig. 7

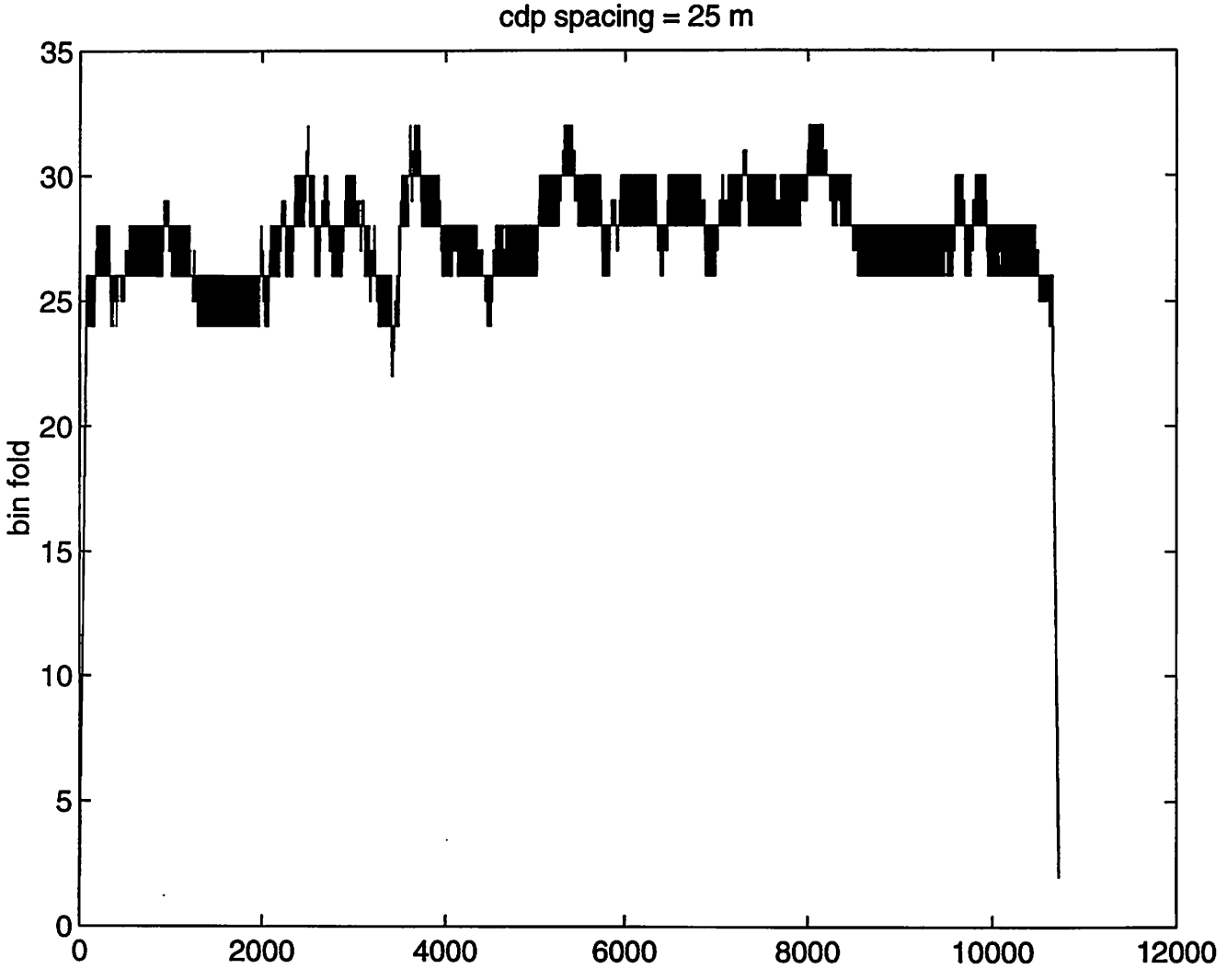

cdp spacing = 25 m
bin fold
35
30
25
20
15
10
5
0
0
2000
4000
6000
8000
10000
12000

Fig. 8

Location of Velocity Picks along line

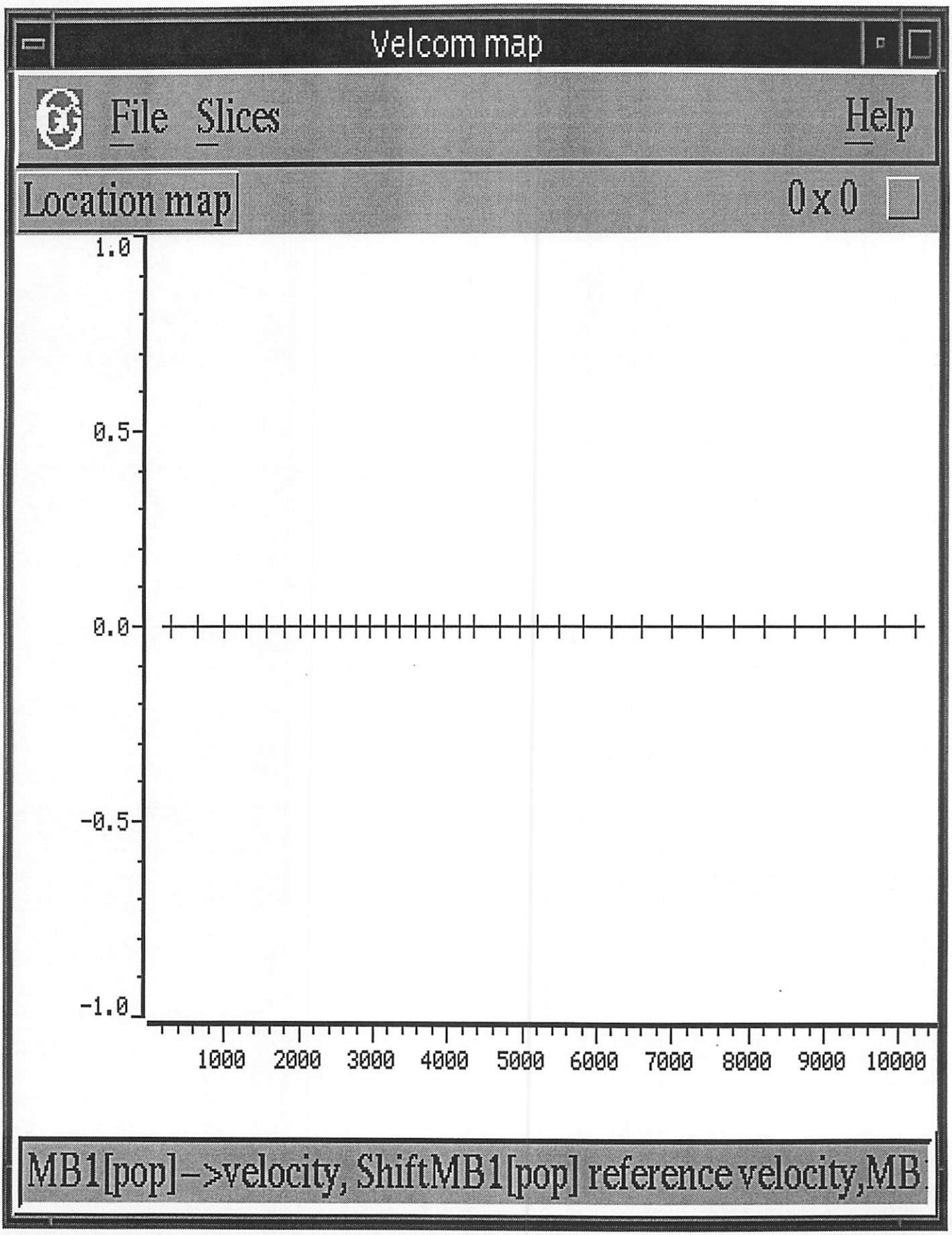


Fig. 9

Set of 4 Adjacent CDP Gathers for Velocity Analysis

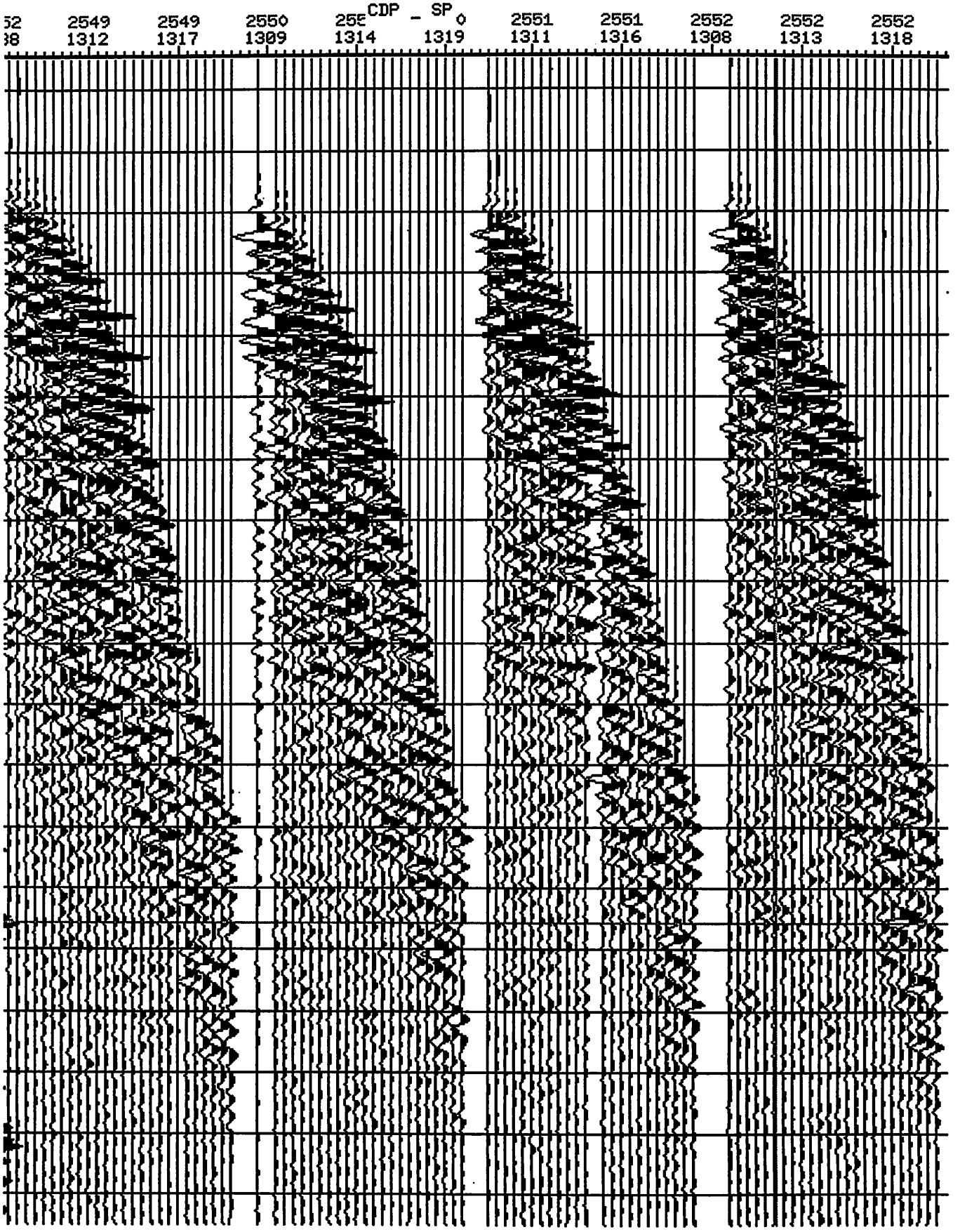


Fig. 10

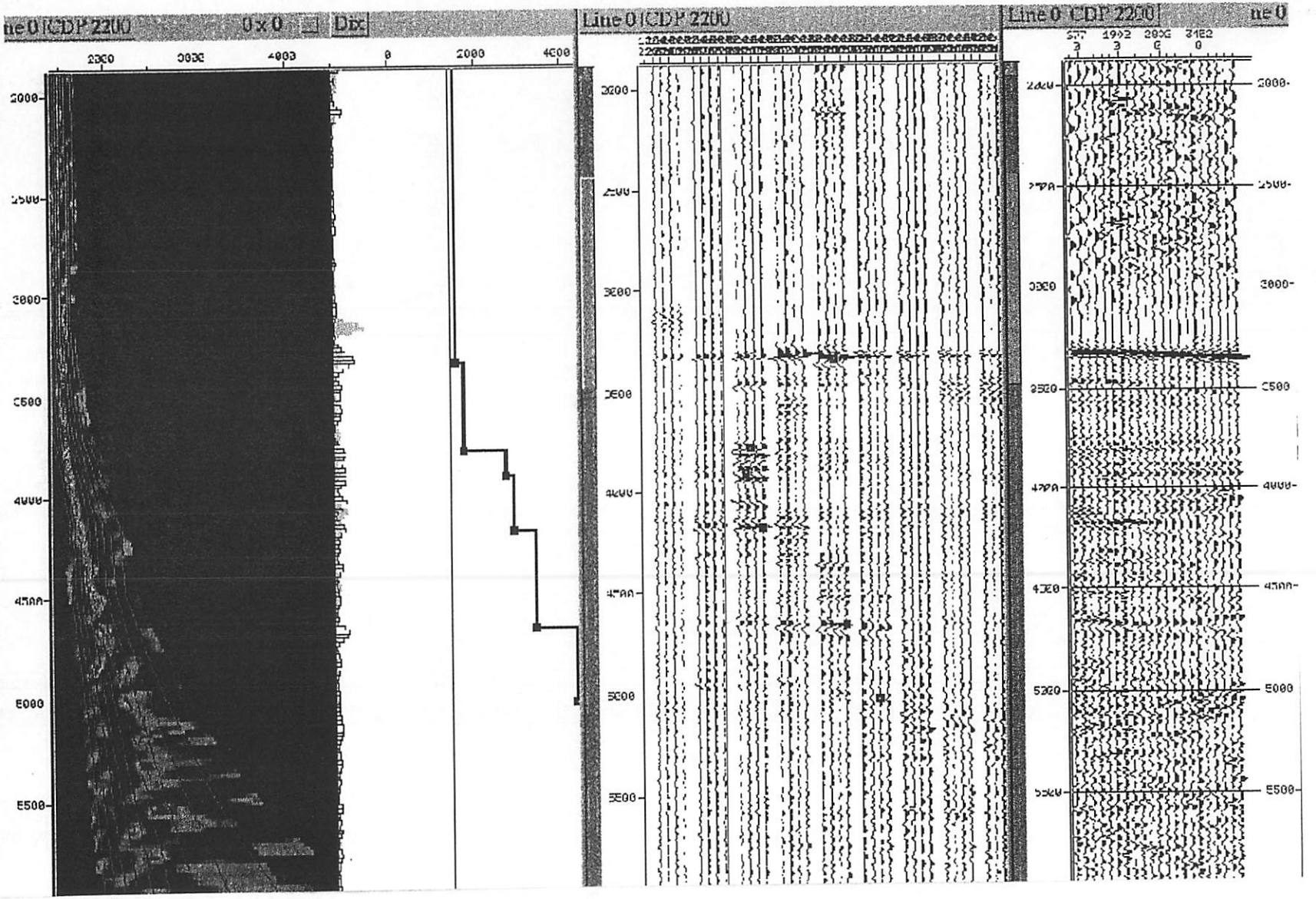


Fig. 11

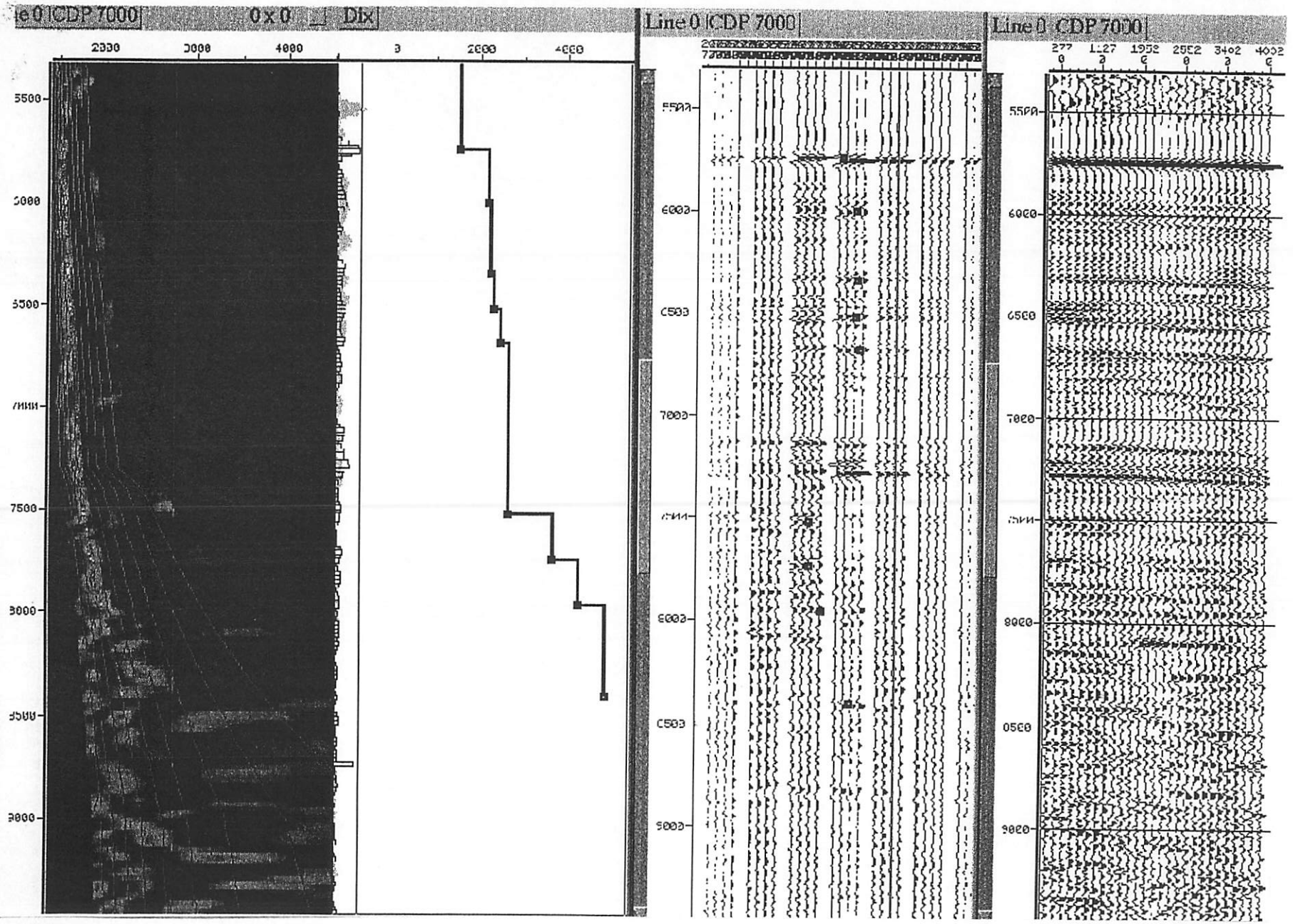
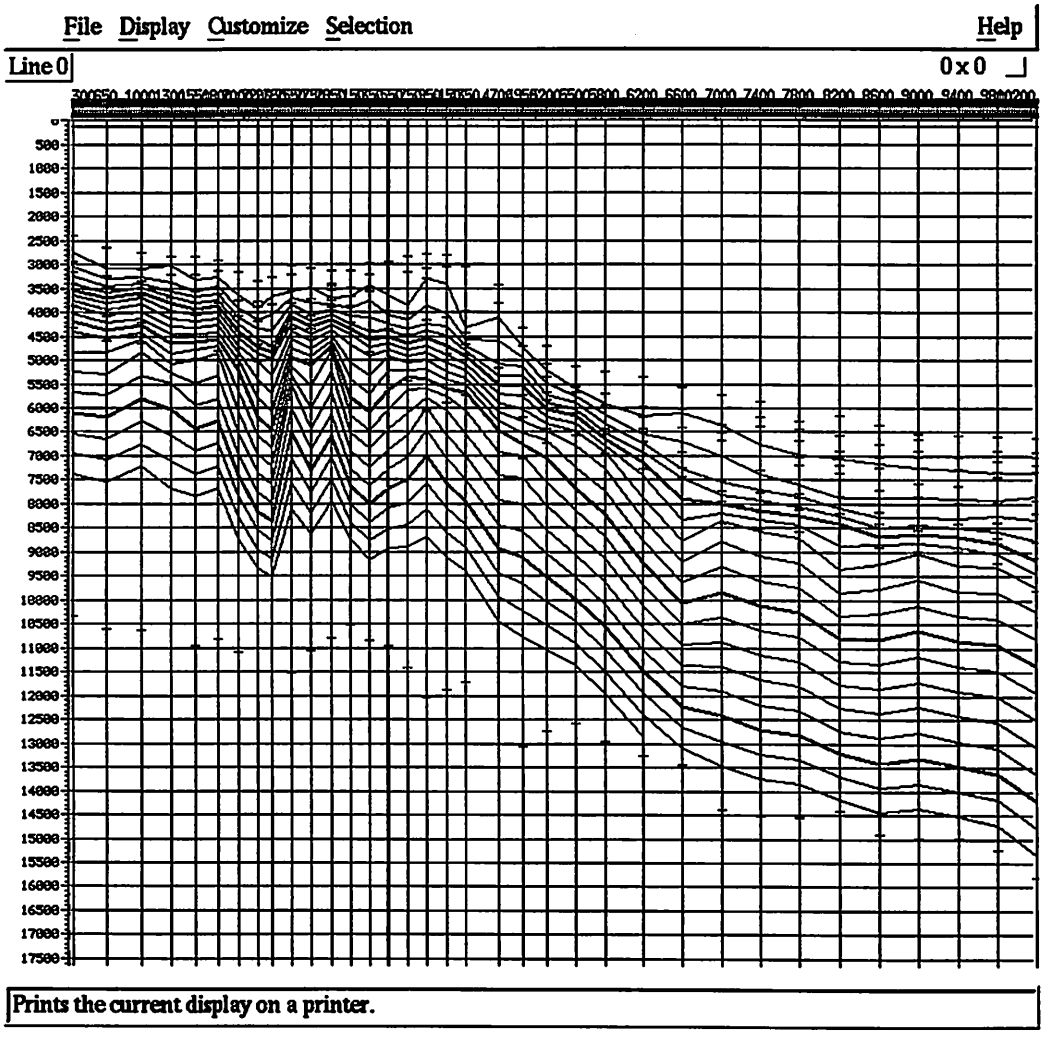


Fig. 12

A Libdl print for stoney@utig2:0.0



On Thu Apr 30 18:37:28 1998

Fig. 13

Mute at CDP 2200

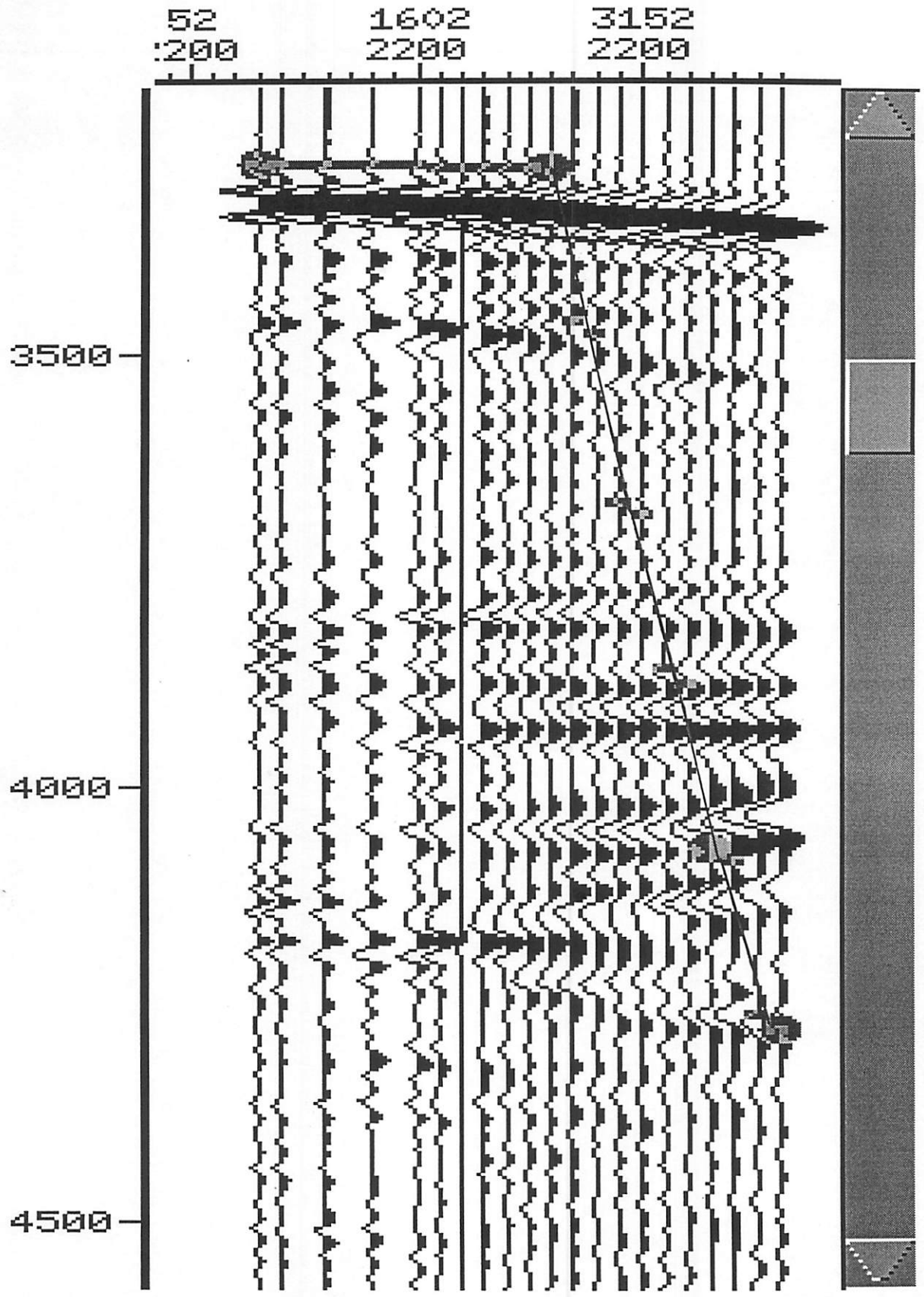


Fig. 14

Stack before decon and migration

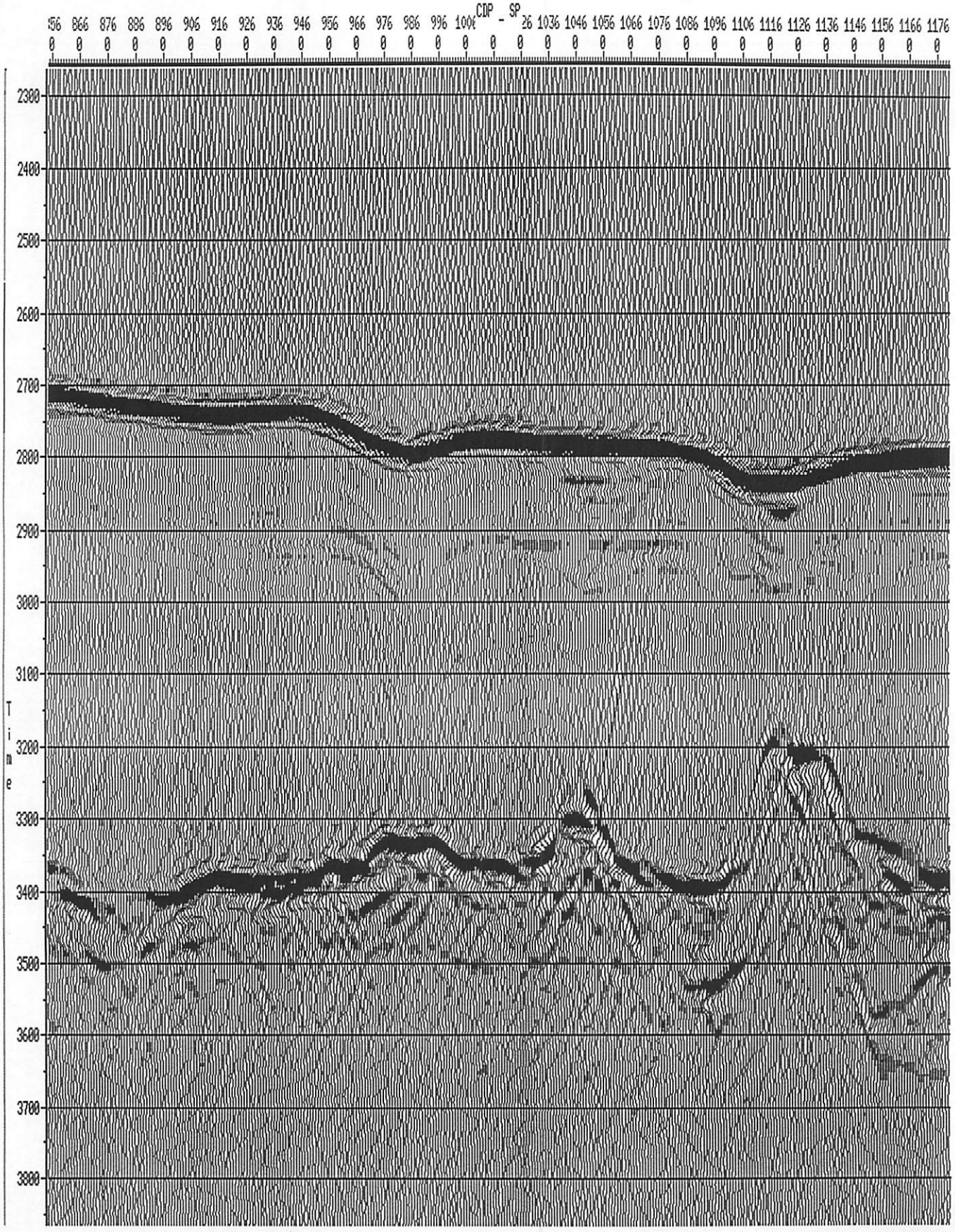


Fig. 15

Stack before decon and migration

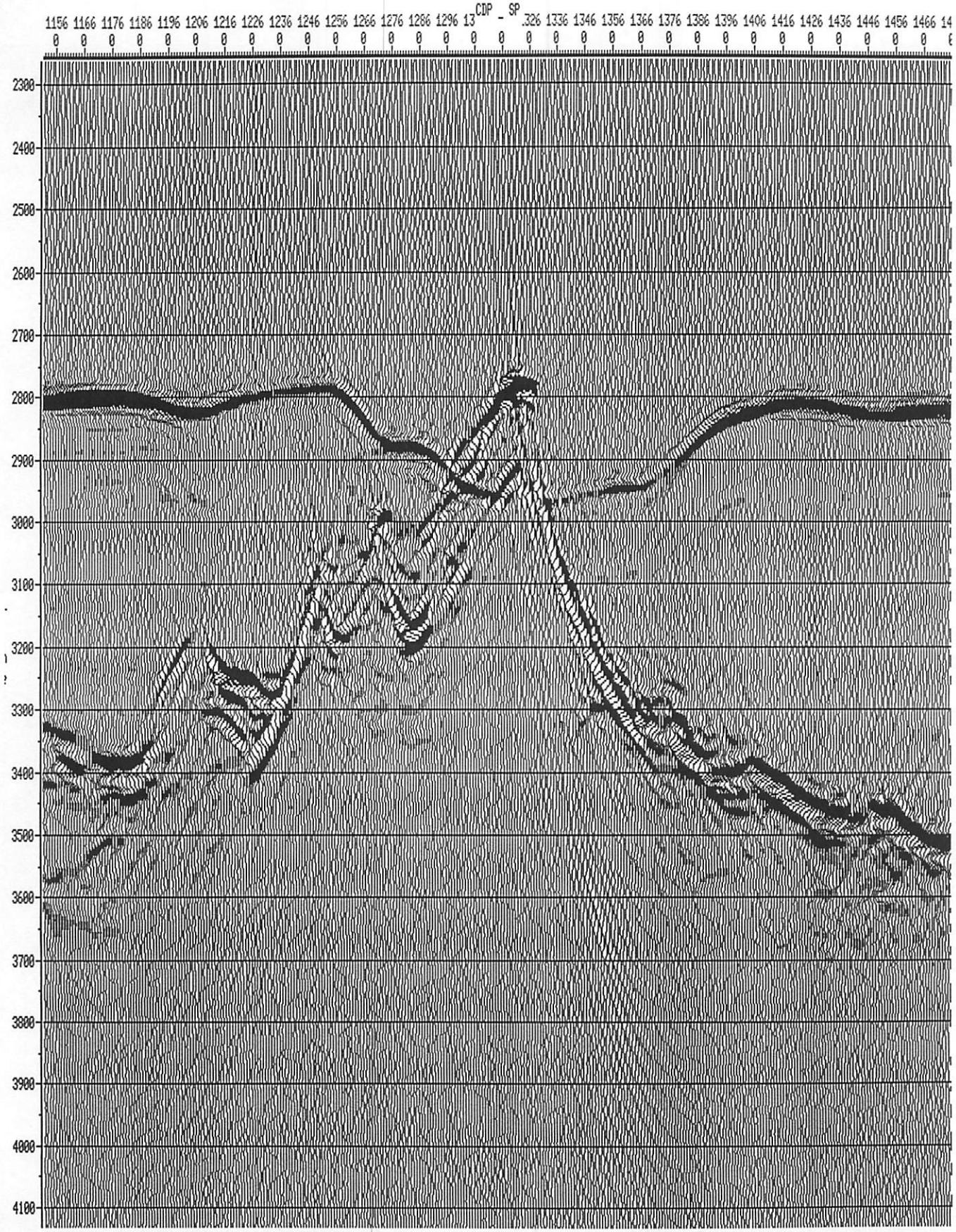


Fig. 16