



COMPASS – Measurement

Interactive Weak and Strong Motion Data Processing Software

Rev 2008.11.19 Document Rev C

2011.02.22

This COMPASS manual provides instructions for using the measurement menu of the COMPASS software to measure time values of traces.



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COMPASS – Measurement

Revision History:

Revision	Date	Reason for change	Pages
C	2008.12.30	New Version 2008Nov19	All
B	2008.07.08	Updated for COMPASS	All
A	2007.05.05	Update for REF TEK SM	All
0.1	2007.02.23	Initial Draft	All

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Notation Conventions

The following notation conventions are used throughout REF TEK documentation:

Notation	Description
ASCII	Indicates the entry conforms to the American Standard Code for Information Interchange definition of character (text) information.
Binary	Indicates the entry is a raw, numeric value.
Hex	Indicates hexadecimal notation. This is used with both ASCII characters (0 – 9, A – F) and numeric values.
BCD	Indicates the entry is a numeric value where each four bits represents a decimal digit.
FPn	Indicates the entry is the ASCII representation of a floating-point number with n places following the decimal point.
<n>	Indicates a single 8-bit byte. When the contents are numeric, it indicates a hexadecimal numeric value; i.e. <84> represents hexadecimal 84 (132 decimal). When the contents are capital letters, it represents a named ASCII control character; i.e. <SP> represents a space character, <CR> represents a carriage return character and <LF> represents a line feed character.
MSB	Most Significant Byte of a multi-byte value.
MSbit	Most Significant Bit of a binary number.
LSB	Least Significant Byte of a multi-byte value.
LSbit	Least Significant Bit (bit 0) of a binary number.
YYYY	Year as a 4-digit number
DDD	Day of year
HH	Hour of day in 24-hour format
MM	Minutes of hour
SS	Seconds of minute
TTT	Thousandths of a second (milliseconds)
IIII	Unit ID number

n, nS	nano, nanoSecond; $10^{-9} = 0.000000001$
u, uS	micro, microSecond; $10^{-6} = 0.000001$
m, mS	milli, milliSecond; $10^{-3} = 0.001$
K, KHz	Kilo, KiloHertz; $10^3 = 1,000$
M, MHz	Mega, MegaHertz; $10^6 = 1,000,000$
G, GHz	Giga, GigaHertz; $10^9 = 1,000,000,000$
Kb, KB	Kilobit, KiloByte; $2^{10} = 1,024$
Mb, MB	Megabit, MegaByte; $2^{20} = 1,048,576$
Gb, GB	Gigabit, GigaByte; $2^{30} = 1,073,741,824$

Related Manuals:

130-SMA System Documents	Number	PDF file
130-SMA Startup (Command Line)	Doc-SMA-Ops	130SMA_startup.pdf
Data Utilities Users Guide	Doc-Datautils	130_utilities.pdf
130-SMA Command Interface	Number	PDF file
130 Cmd Line - Theory of Operations	Doc-CmdL-Theory	130_CLtheory.pdf
130 Cmd Line - Release Notes	Doc-CmdL-Release	130_CLRN.pdf
130 Cmd Line - Reference	Doc-CmdL-Ref	130_CLcmd.pdf
130 Cmd Line - Recording Format	Doc-CmdL-Record	130_CLrecord.pdf
130-SM GUI Users Guide	Doc-130-SMGui	RT130SM.pdf
Optional Manuals	Number	PDF file
SNDP Installation and Users Guide	Doc-SNDP-User	SNDPUser.pdf
SNDP Reference Guide	Doc-SNDP-Ref	SNDPRef.pdf
RTCC Command / Control Users Guide	Doc-RTCC	RTCC.pdf
RT_Display Users Guide	Doc-RT_Display	RTDisplay.pdf
RT_View Users Guide	Doc-RTView	RTView.pdf
RTPMonitor Installation and Users Guide	RTPM-S-008	RTPM.pdf
RTPD Installation and Users Guide	RTPD-OP-005	RTPD.pdf
(part of RTPD manual) RTP Protocol		
Accelerometers		
131A-02/3 3G Triaxial Accelerometer	Doc-131A-03/2	131A023.pdf
131A-02/2 3G Triaxial Accelerometer	Doc-131A-02/2	131A022.pdf
131A-01/3 4G Triaxial Accelerometer	Doc-131B-01/3	131B013.pdf
131B-01/1 4G Unixial Accelerometer	Doc-131B-01/1	131B011.pdf

REF TEK Support and update notifications

As a valued user of REF TEK equipment we would like to provide the best support possible by keeping you up to date with our product updates.

If you would like to be notified of any REF TEK product updates please spend a couple of minutes to register with the REF TEK customer support team.

To register, fill out our online registration form at <http://support.reftek.com> .

Once we register your contact we will only send necessary notifications via email. The same notifications will be shown on our website <http://support.reftek.com> notifications page

Thanks,

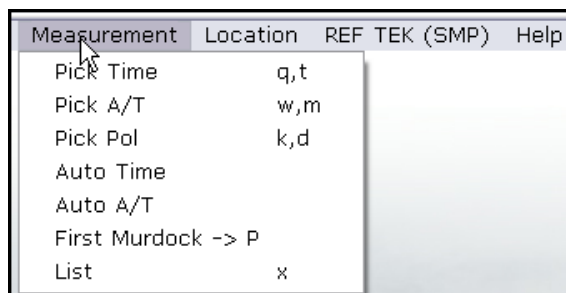
Your REF TEK support team

Software Version:

Current software and documentation is available on our web site. Some early units may require hardware modifications to use the latest software. Contact REF TEK if you have any queries on the compatibility of your unit(s) and the current software release.

About this manual:

This COMPASS Technical Reference manual provides a detailed overview of using the Measurement menu of the COMPASS software. It covers the following broad operational topics:



- **Pick Time** – pick phase arrivals on the current seismogram determined by the location of the cursor.
- **Pick A/T** – Used to do manual period and amplitude estimates.
- **Pick Polarization** – Used during a 3-D Component study.
- **Auto Time** – Uses an STA/LTA Auto detector to detect 'P' wave arrivals.
- **Auto A/T** – Automatic pick with maximum amplitude of the signal.
- **First Murdock->** - Available only with miniseed data records containing [Murdock Event Detection Blockette (201)] inside data records.
- **List** – Manipulate marked intervals, amplitudes and polarizations.

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7 Measurement menu

7.1 Measurement overview

The **Measurement** menu is used to measure time values of traces.

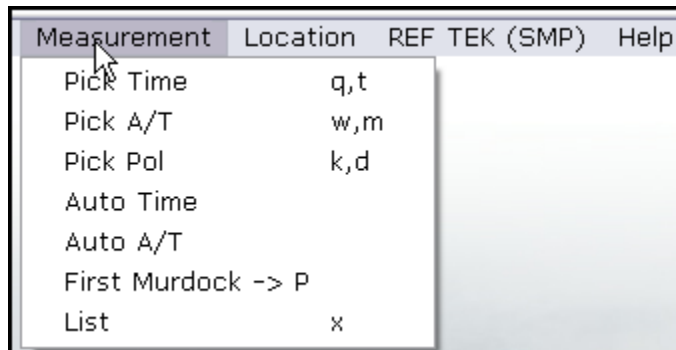


Figure 7-1 Measurement

7.2 Pick Time

The pick phase arrivals on the current seismogram are determined by the location of the cursor:

1. Select the **Pick Time** menu.

-OR-

Use the hot key q

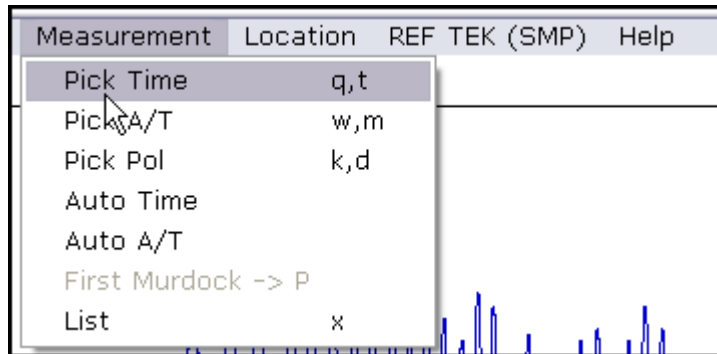


Figure 7-2 Pick Time

2. The CROSS cursor should be inside the corresponding trace rectangle.
3. Move the cursor and select with the left-mouse button.
4. The **Mark Time Ahead** menu dialog box.

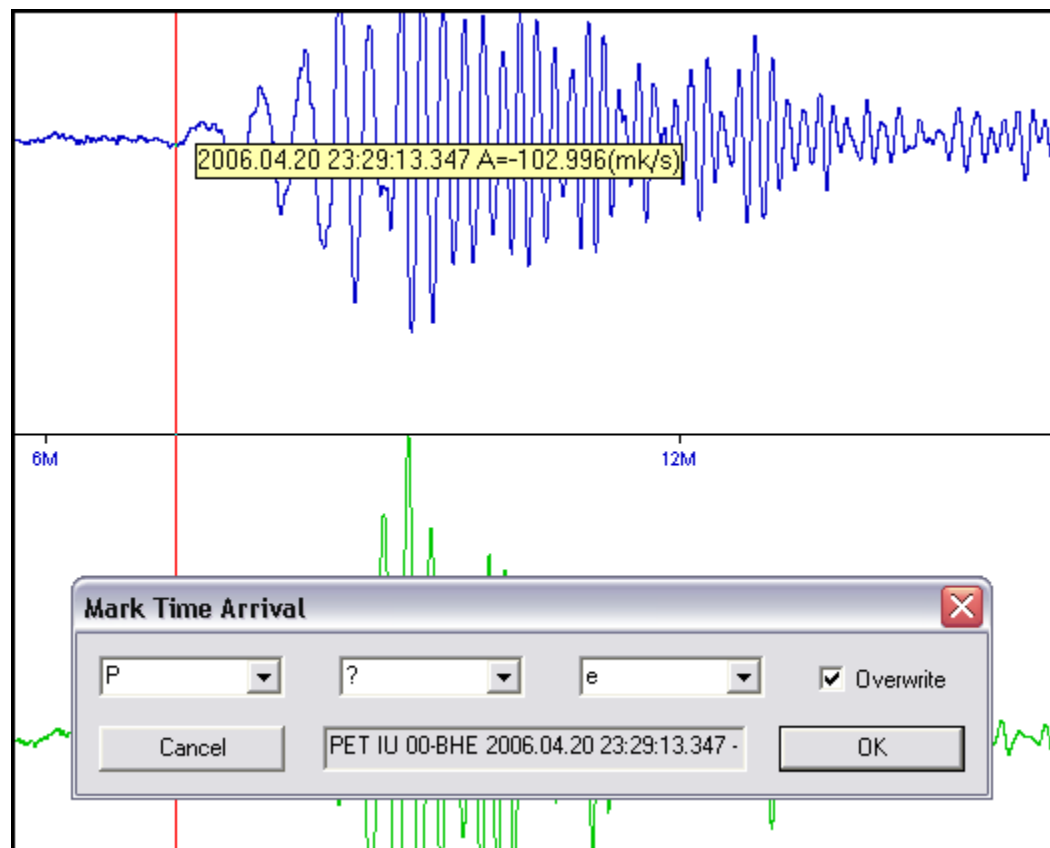


Figure 7-3 Pick Time Dialog Box

5. Select or edit the wave name.

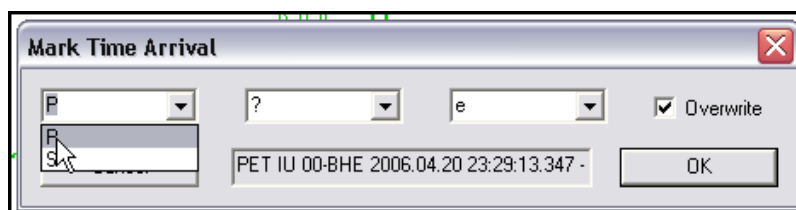


Figure 7-4 Wave Name

6. Select the sign of the wave (+, -, ?).

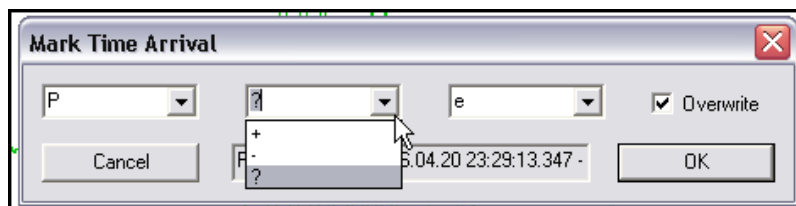


Figure 7-5 Sign of Wave

7. Select the wave quality (i=good, e=bad, ee=very bad).

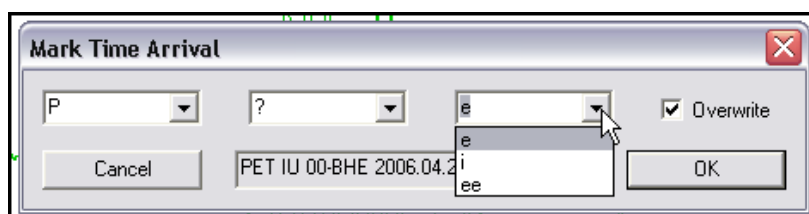


Figure 7-6 Wave Quality

The marked arrival is always bound to the trace on which it was picked. So if the trace is removed from memory, the arrival will also disappear.

Note: If the **Overwrite** check box is turned on the program will overwrite the previous picks with the same wave name and for the same station.

Note: If the **Overwrite** check box is turned off, it is possible to mark the arrival independently on all channels which belong to the same station.

8. To approve the settings select the **OK** button.

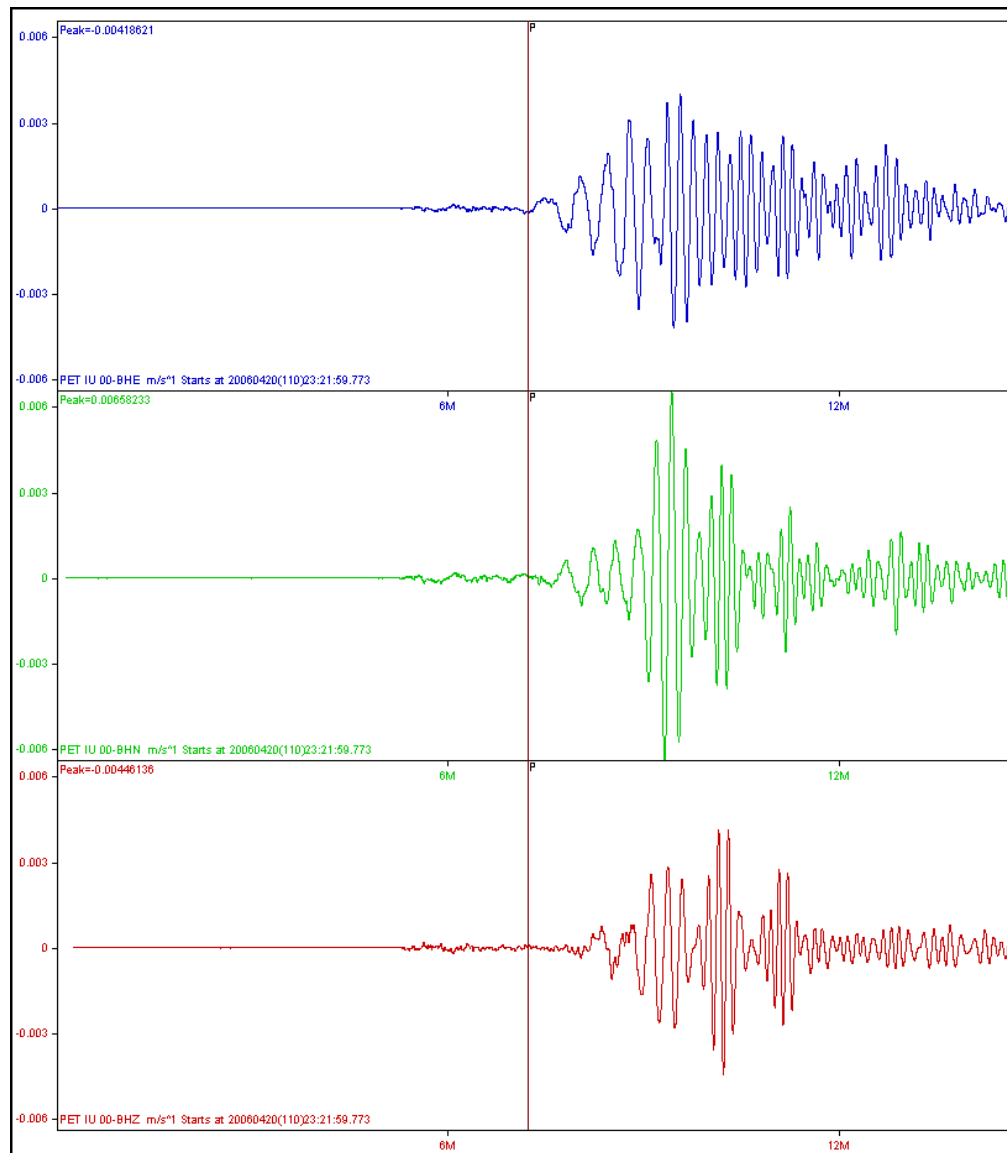


Figure 7-7 Example Pick Time

7.3 Pick A/T

Magnitude estimates require the user to supply an amplitude and period estimate for the desired phase.

Use the Pick A/T command to do manual measurements

1. Use the **Zoom In** command from the **View** pull-down menu to select a smaller time series segment to make the wave periods separate on the plot.

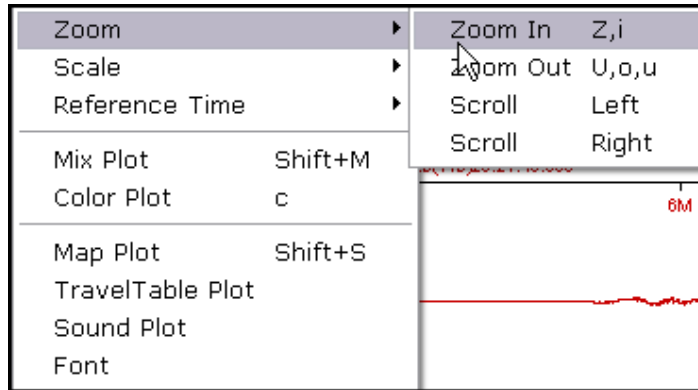


Figure 7-8 Pick A/T Zoom In

2. Select the **Pick A/T** menu item

-OR-

Use the hot key **w** or **Shift+B**.

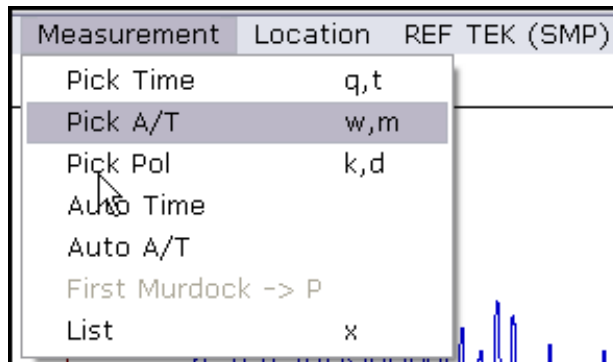


Figure 7-9 Pick A/T

3. With the cross cursor in the desired rectangle, click the left mouse button on the (a little bit left) maximum of the signal.

Note: By visual study of the waveform choose the half period of the wave having maximum amplitude of the signal and move the vertical mouse cursor.

4. Click the left mouse button on the left side of half and then on the right side of the same half period.

Note: Both mouse clicks should be done over the same trace.

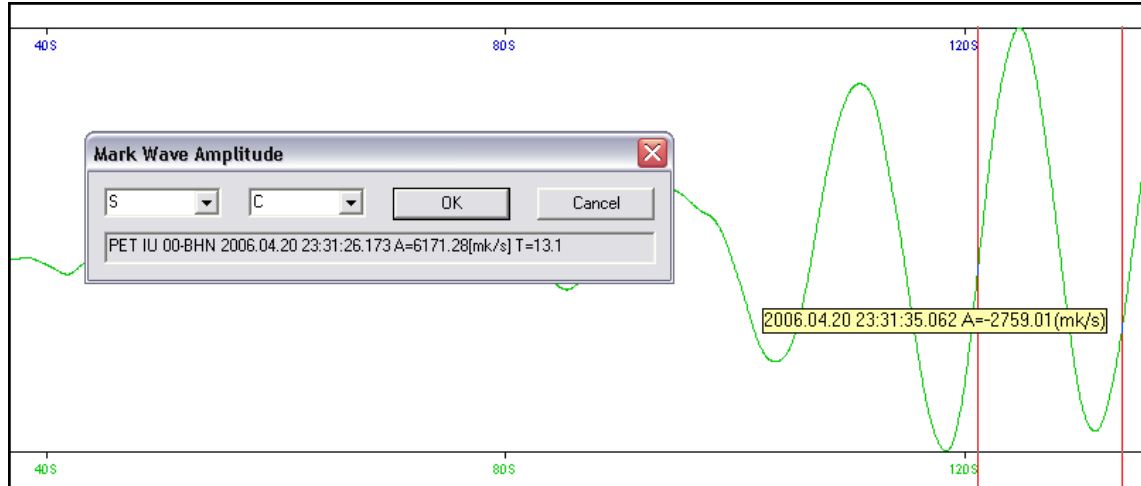


Figure 7-10 Pick Points for Wave

5. Select the appropriate wave type from the pull-down menu.

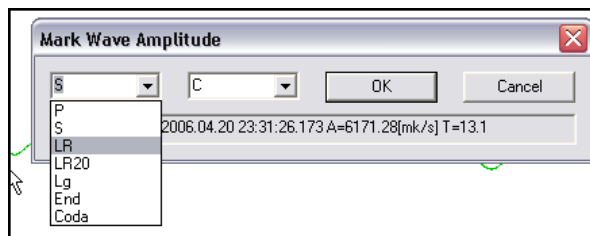


Figure 7-11 Wave type

In general, magnitude calculations assume a certain standard instrument type. Magnitude calibration curves are defined in the MAGNITUDE folder. To simplify this even more, this program offers the following options:

The types of instrument for Amplitude picking are:

- A - Short period instrument
- B - Middle period instrument
- C - Long period instrument

This information is necessary during Magnitude estimation.

6. Select the desired type of instrument from the drop-down menu.
7. Select the **OK** button to approve the settings.

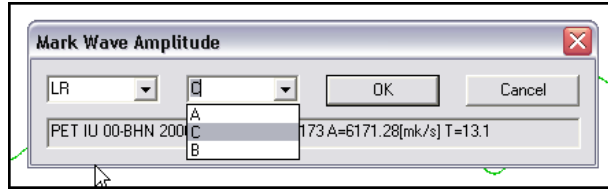


Figure 7-12 Type of Instrument

8. The screen redraws with the updated display.

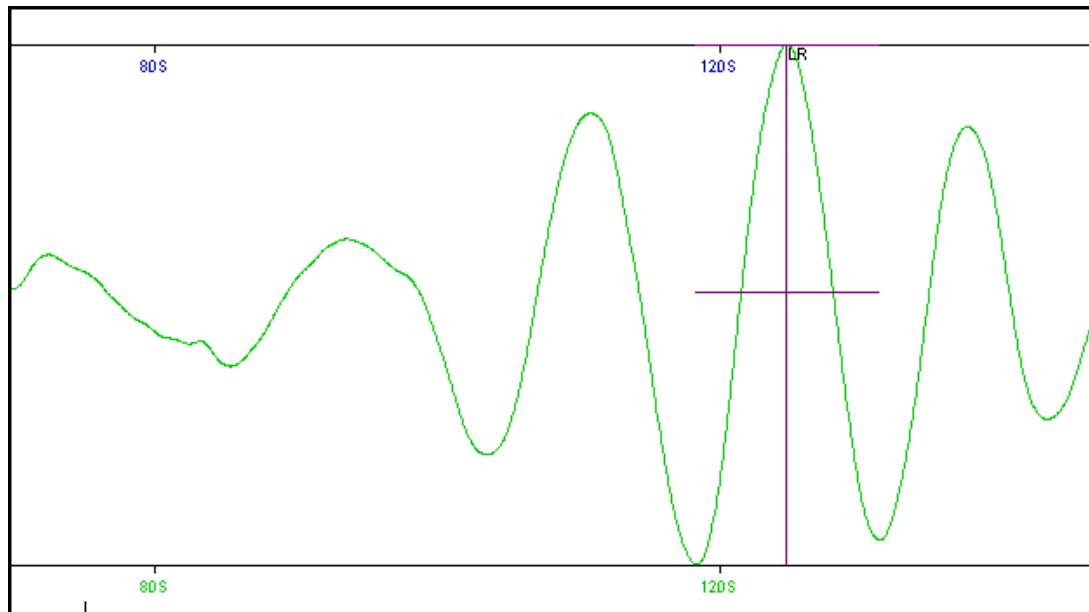


Figure 7-13 Pick A/T Display

7.4 Pick Polarization

This menu is ONLY applicable during the 3-D component polarization study.

1. Select the **Pick Pol** command from the **Measurement** menu.

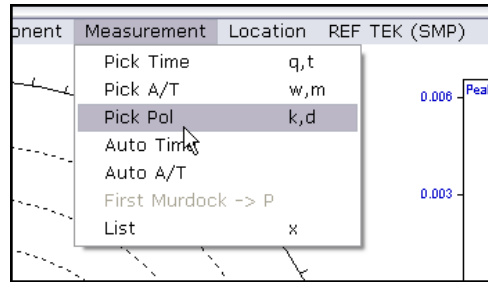


Figure 7-14 Pick Pol

2. Select the wave type from the pull-down menu.
3. Approve the setting with the **OK** button.

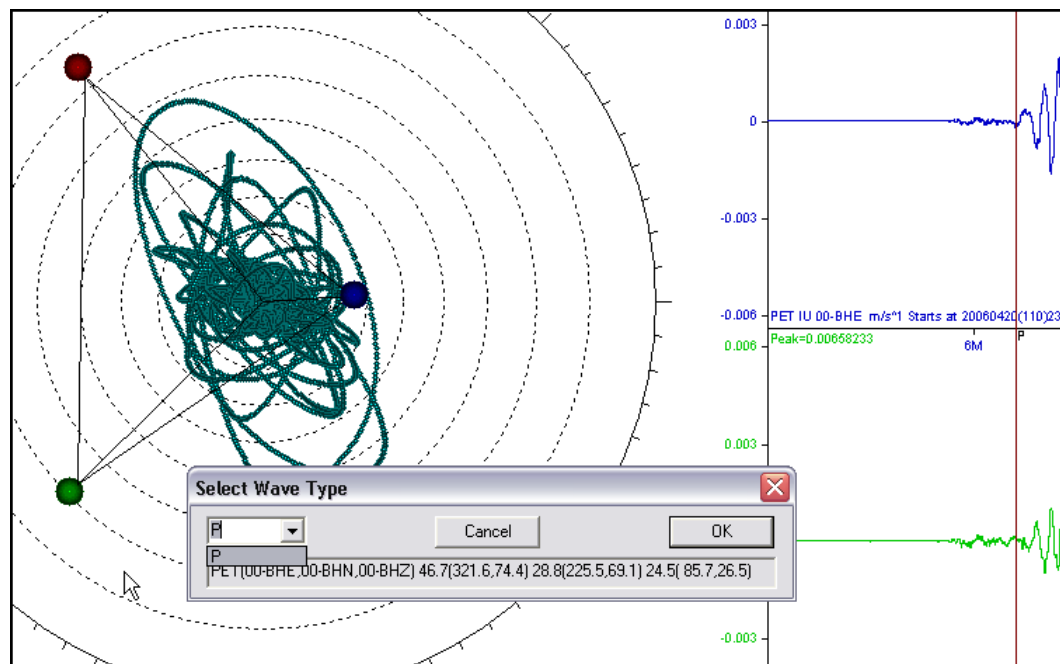


Figure 7-15 Pick Polarization

7.5 Auto Time

This command uses an STA/LTA Auto detector used to automatically detect 'P' wave arrivals.

1. To get the best performance of automatic 'P' waves detector display only vertical channels using the **Select Channels** command.

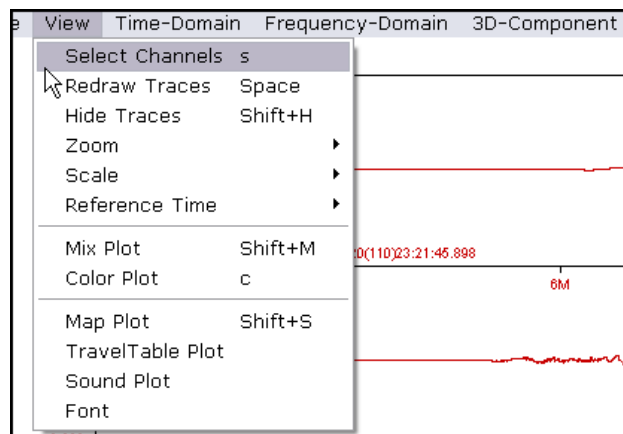


Figure 7-16 Select Vertical Channels

2. Apply the band-pass filter within 1-6 Hz to all vertical channels by using the **Filter** -> **IIR Butterworth** command from the **Time-Domain** menu.

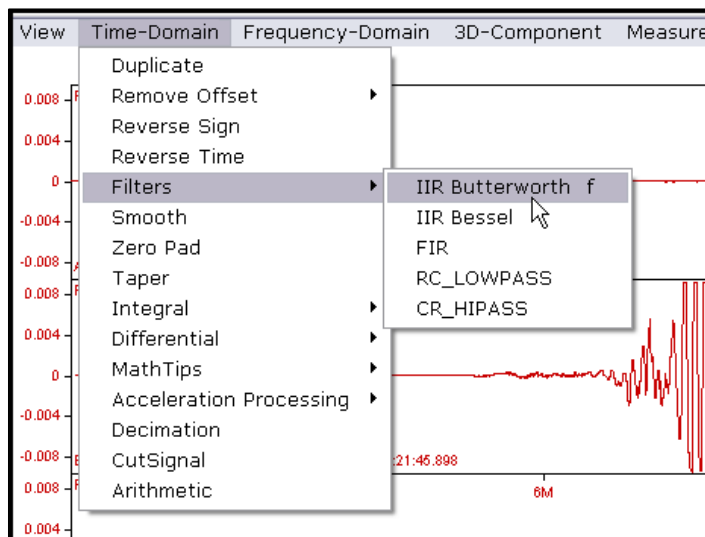
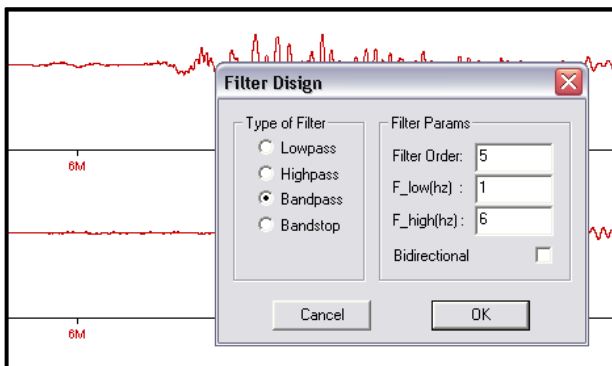


Figure 7-17 Bandpass Filter



3. Select the **Auto Time** command from the **Measurement** menu.

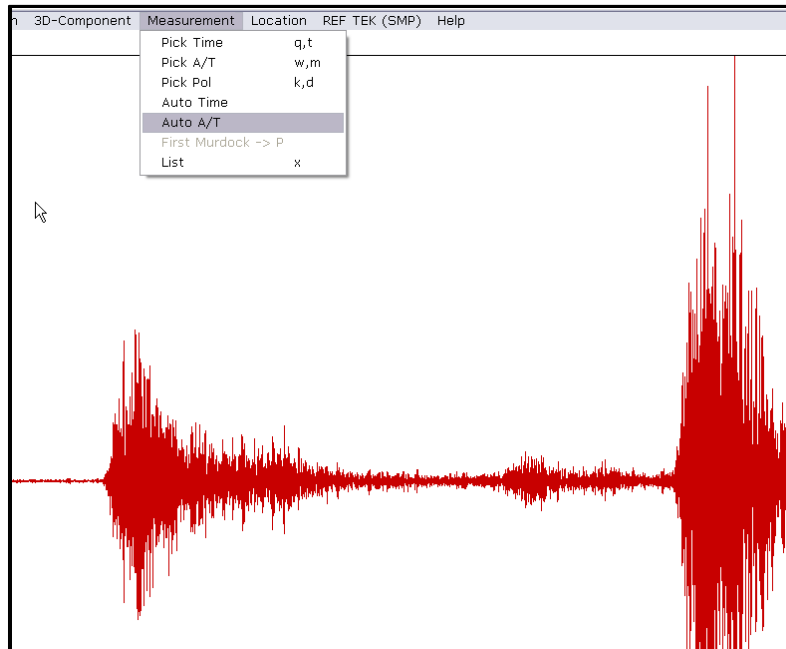


Figure 7-18 Auto Time

Use the figure to set the following parameters in the opening dialog box:

4. Length of LTA in seconds.
5. Length of STA in seconds (STA<LTA).
6. LTA level **Start**: Detector Threshold On of STA.
7. LTA level **End**: Detector Threshold Off of STA (End)< (Start) Threshold.
8. Minimal duration in seconds which should pass with Threshold On.
9. Check the **All** box to detect only the first **P** arrival.
10. Approve the settings with the **OK** button.

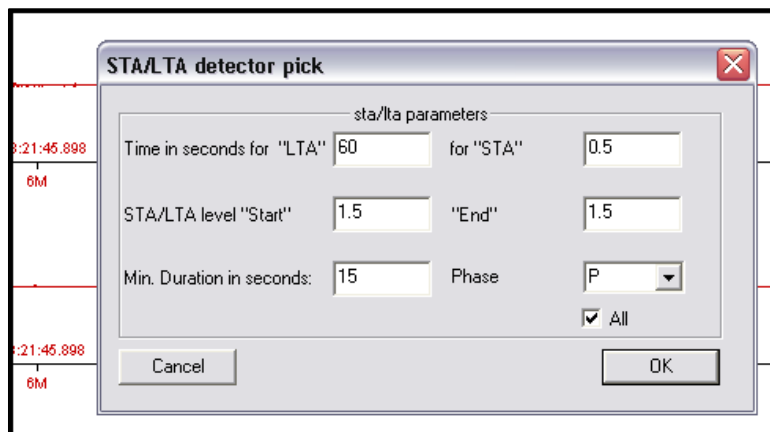
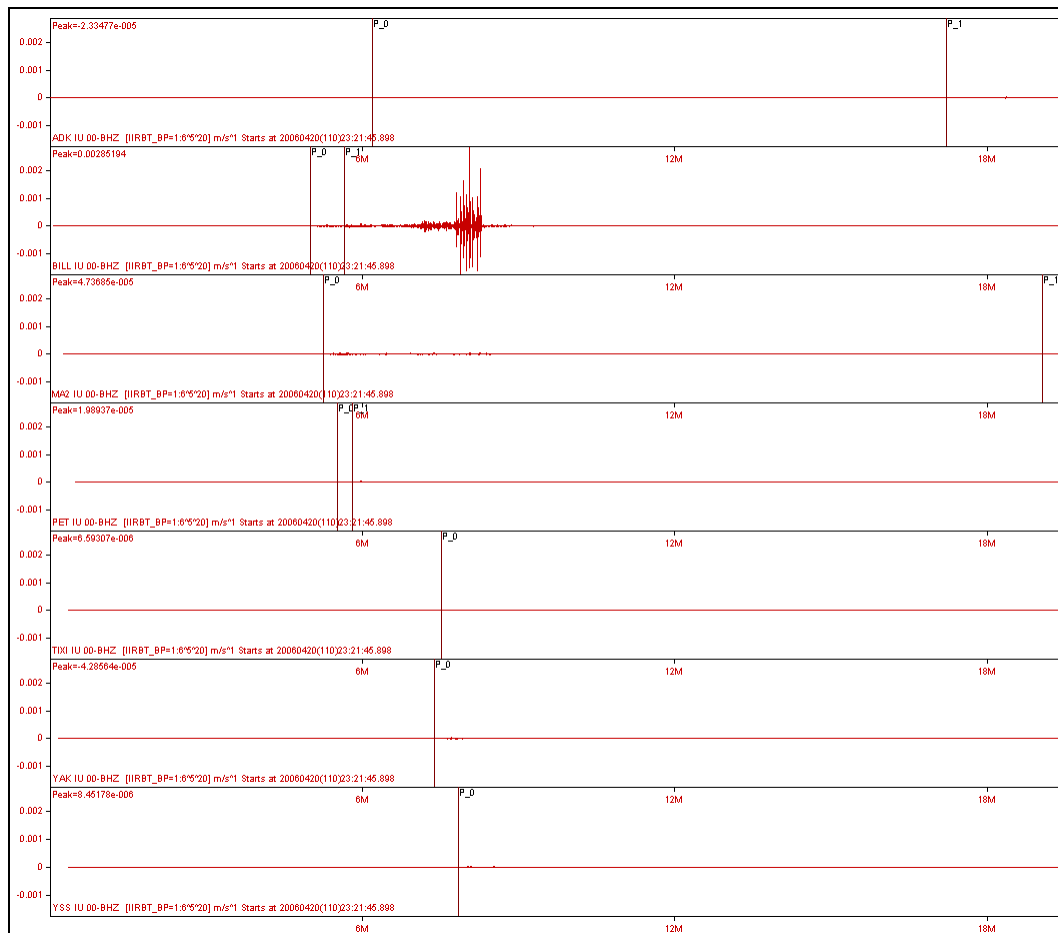


Figure 7-19 STA/LTA Detector Pick

11. The display redraws to show the pick operation.

7.6 Auto A/T

Use the **Auto A/T** command to automatically pick waves with maximum amplitude of the signal inside the preview interval.

Note: Maximum trace amplitude usually corresponds to “S” wave arrivals on horizontal channels for local and regional events or for teleseismic events it is better to apply this option for 20 second period LR waves on the vertical channel.

1. Select all vertical channels of a broadband record using the **Select Channels** command from the **View** menu.

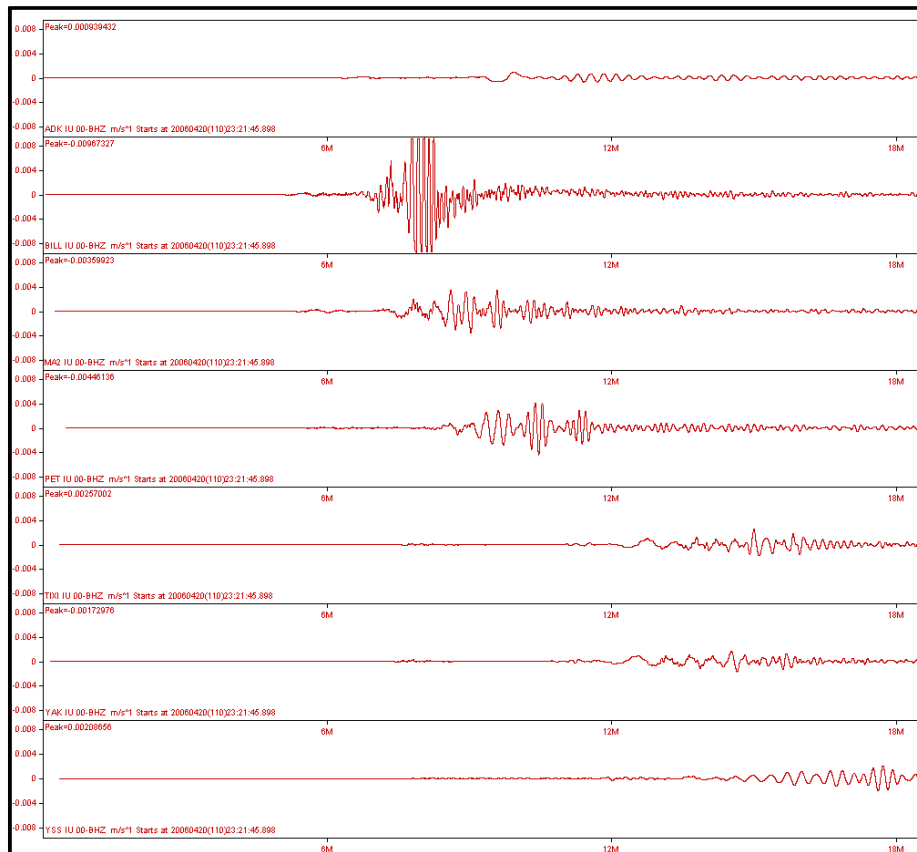


Figure 7-20 Vertical Channels for Auto A/T

2. Select the **Auto A/T** command from the Measurement menu.

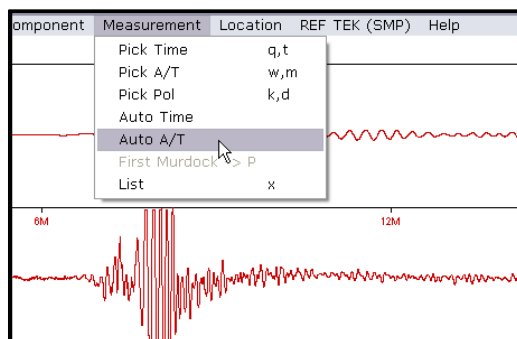


Figure 7-21 Auto A/T

3. Using a zoomed interval, select the name of a wave from the **Wave Type** pull-down menu.

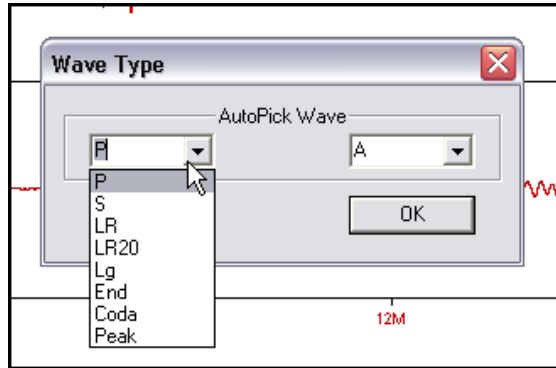
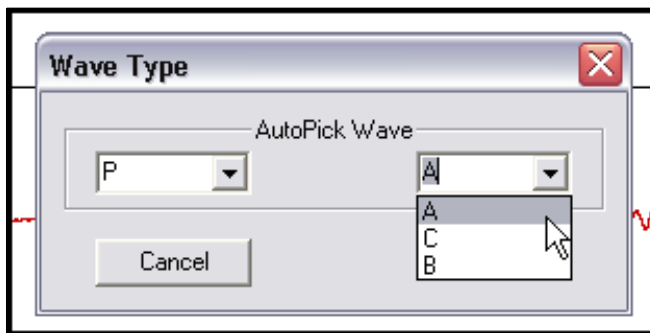


Figure 7-22 Wave Type

4. Define the instrument type for proper magnitude estimation:
- A - Short period
 - B - Middle period
 - C - Long period
5. Approve the estimation with the **OK** button.



6. The display redraws to show the estimation.

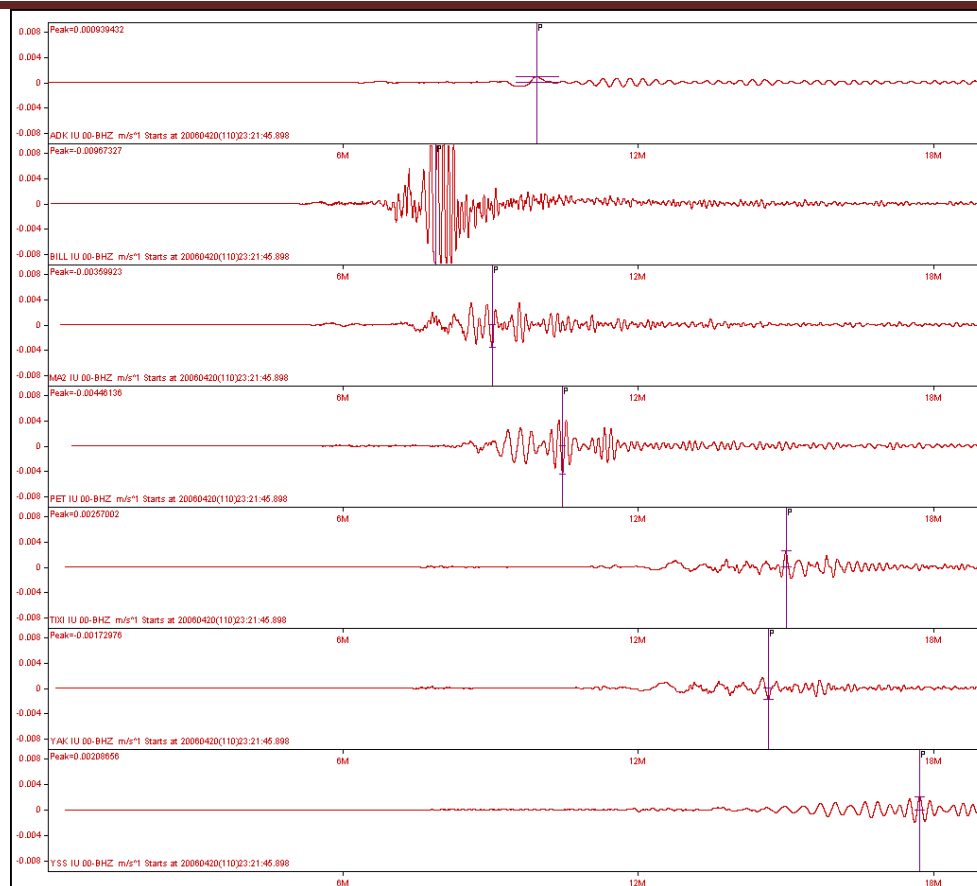


Figure 7-23 Auto A/T

Note: To see and save the calculated results refer to the section on the next section on the List Command.

7.7 First Murdock->P

This menu command is **ONLY** available when miniSEED data records that contain [Murdock Event Detection Blockette (201)] inside the data records.

1. Select the **First Murdock->P** menu if you want the first Murdock detected onset to be treated as the first "P" wave arrival.

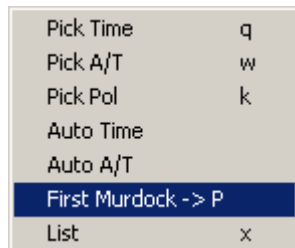
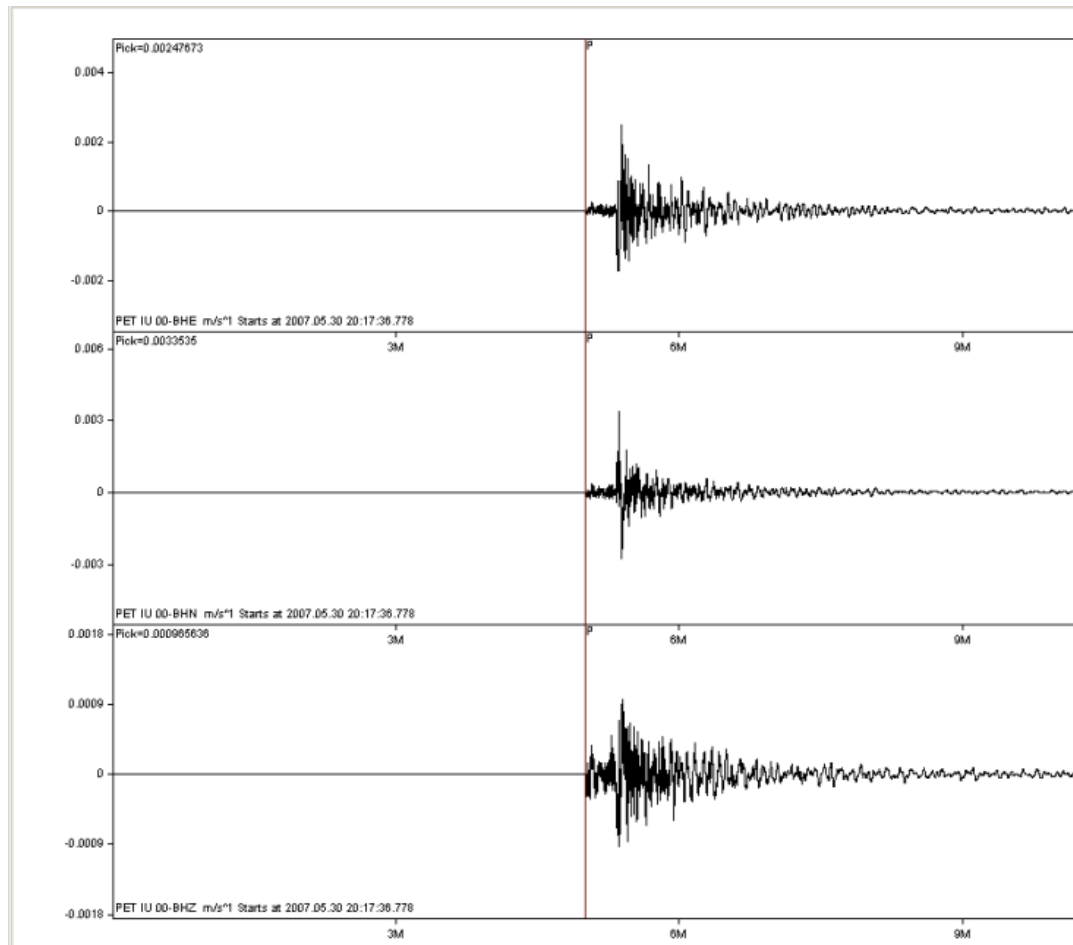


Figure 7-24 First Murdock

2. The display redraws to show the picked "P" wave.



7.8 List command

To manipulate marked arrivals, amplitudes and polarizations use the List command.

1. Select the **List** command from the **Measurement** menu.

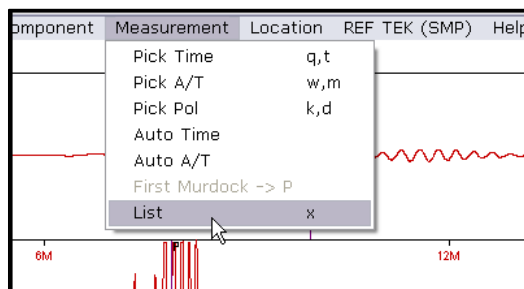


Figure 7-25 List

2. The list display opens to allow several operations.

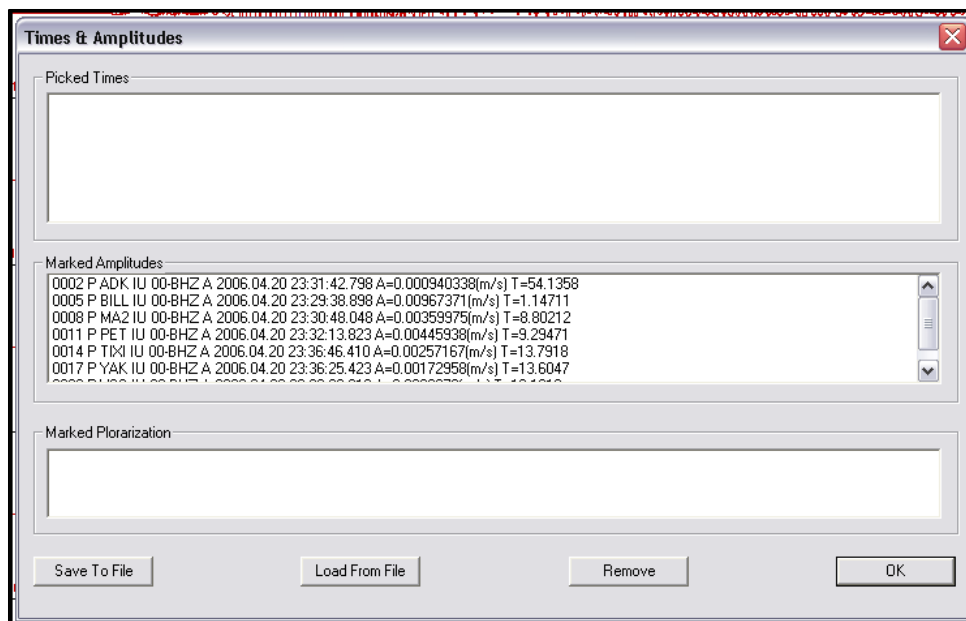


Figure 7-26 Times and Amplitudes

7.8.1 To save this information to an ASCII file:

Use the **Save to File** menu button:

1. Select the **Save To File** button.
2. A dialog box opens to enter a file name for the saved file.
3. Approve the save operation with the **Save** button.

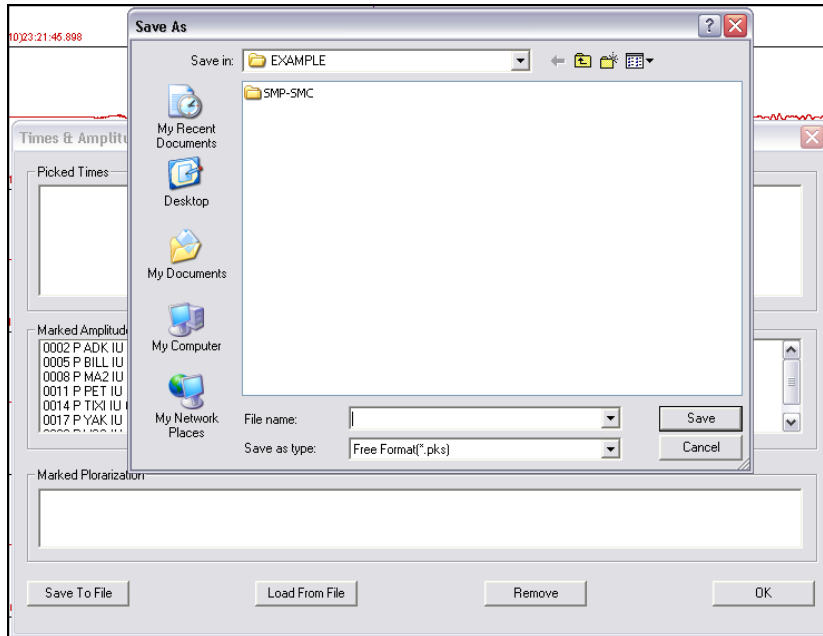


Figure 7-27 Save to File

7.8.2 To load a file from a previous save:

1. Select the **Load From File** button.
2. A dialog box opens to select the file to load.
3. Select the file and the **Open** button to load the file.

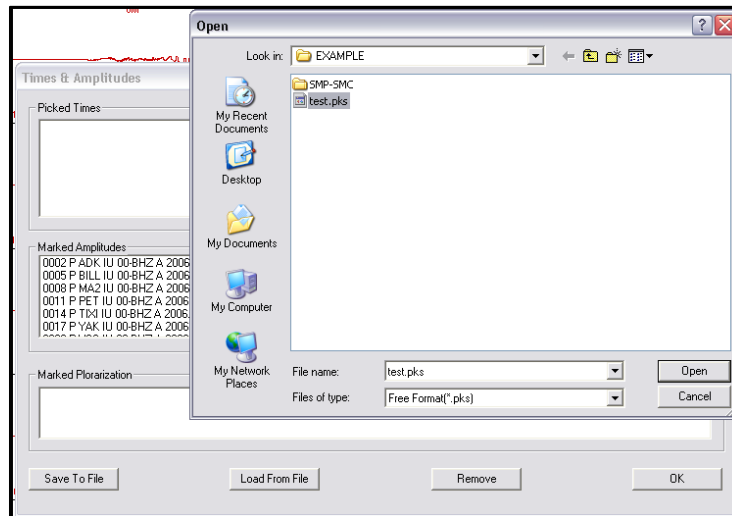


Figure 7-28 Load From File

7.8.3 To remove an item from memory:

1. Select the desired Pick Time, Amplitude or Polarization to be removed.
2. Select the **Remove** button to complete the operation.

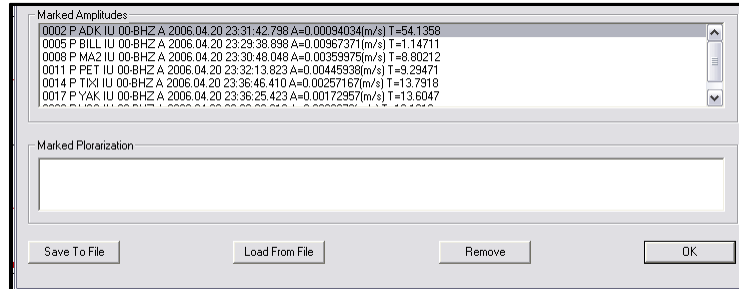


Figure 7-29 Remove Time

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