

PAPER L**XPICK - X WINDOW INTERACTIVE TRAVEL TIME PICKER FOR
CROSSWELL SEISMIC DATA****Caroline Lambert***Seismic Tomography Project***ABSTRACT**

The xpick program allows the user to quickly pick crosswell seismic data in a window environment. The use of X windows makes the program network transparent and easily portable. Data is read in from TIMS segy files, and the picked travel times are written out in TIMS pick format, which can then be read into subsequent TIMS programs or can be converted to ASCII format. Within the program the user can select from several picking modes, and can view the data in a variety of sorts.

INTRODUCTION

xpick is an interactive travel time pick program written specifically for crosswell seismic data. The program is written as an X window application, which allows it to be executed across a computer network, and should be easily portable to any system that runs X. Whole data sets or sub-cubes of data sets can be read into the program. The ability to switch easily between different sorts, such as common source, common receiver, or common offset, makes the program also useful as a tool for viewing data quickly on the screen.

XPICK PROGRAMData

xpick reads crosswell seismic data stored in TIMS segy files. Any subset of sources, receivers or time samples can be chosen to be read in. As the data is read in it is converted from floating point (32 bit) to short integers (16 bit). There is no loss of resolution in doing

this since the data is used only for display purposes, but the conversion allows better utilization of run-time computer memory. After the data has been picked, the travel times are written out to a file in TIMS pick format. This file can be read back into the program if the picks need to be reviewed or modified. Once in TIMS pick format, the picks can be read into other TIMS programs, such as the string inversion program or the pick plotting program, or can be converted to ASCII format.

Display

After the data is read in, a window is brought up and the first common source gather displayed. A sample display is shown in fig. 1. The traces are drawn horizontally and are registered by depth (in a common offset gather the source depth is used). The depth of the source and receiver for any trace can be found by placing the cursor over the trace - the depths are automatically displayed in the main window panel and automatically updated as the cursor is moved. The time sample under the cursor, the source and receiver numbers, and any picked travel time for the current horizon are also shown in the panel.

Unless overridden by command line arguments, default values are used for display parameters. If the display parameters, such as depth axis scaling, time axis scaling or trace amplitude scaling, are not suitable, they can be changed by selecting the DISPLAY button and entering a new value into a pop-up window. At any time the original parameters can be restored. Alternatively, a selection of the data can be magnified by choosing the ZOOM button and outlining the portion of data to be magnified using mouse buttons. If the gather being viewed cannot fit into the window with the specified scaling parameters, the window can be scrolled to view the hidden portion.

Picks are displayed by default in red. In some situations red can be difficult to see, so the user can select another color from the "colors" menu. If more than one horizon is picked, the different horizons are displayed in different colors.

Sorting

Initially, the data is displayed as a common source gather. A pull-down menu allows the user to quickly switch back and forth between different data sorts. The sorts that are currently implemented are common source, common receiver and common offset. This is extremely useful in travel time picking; when running into difficulties deciding where to pick a travel time, it is often very illuminating to switch to another sort to see how the picks match up.

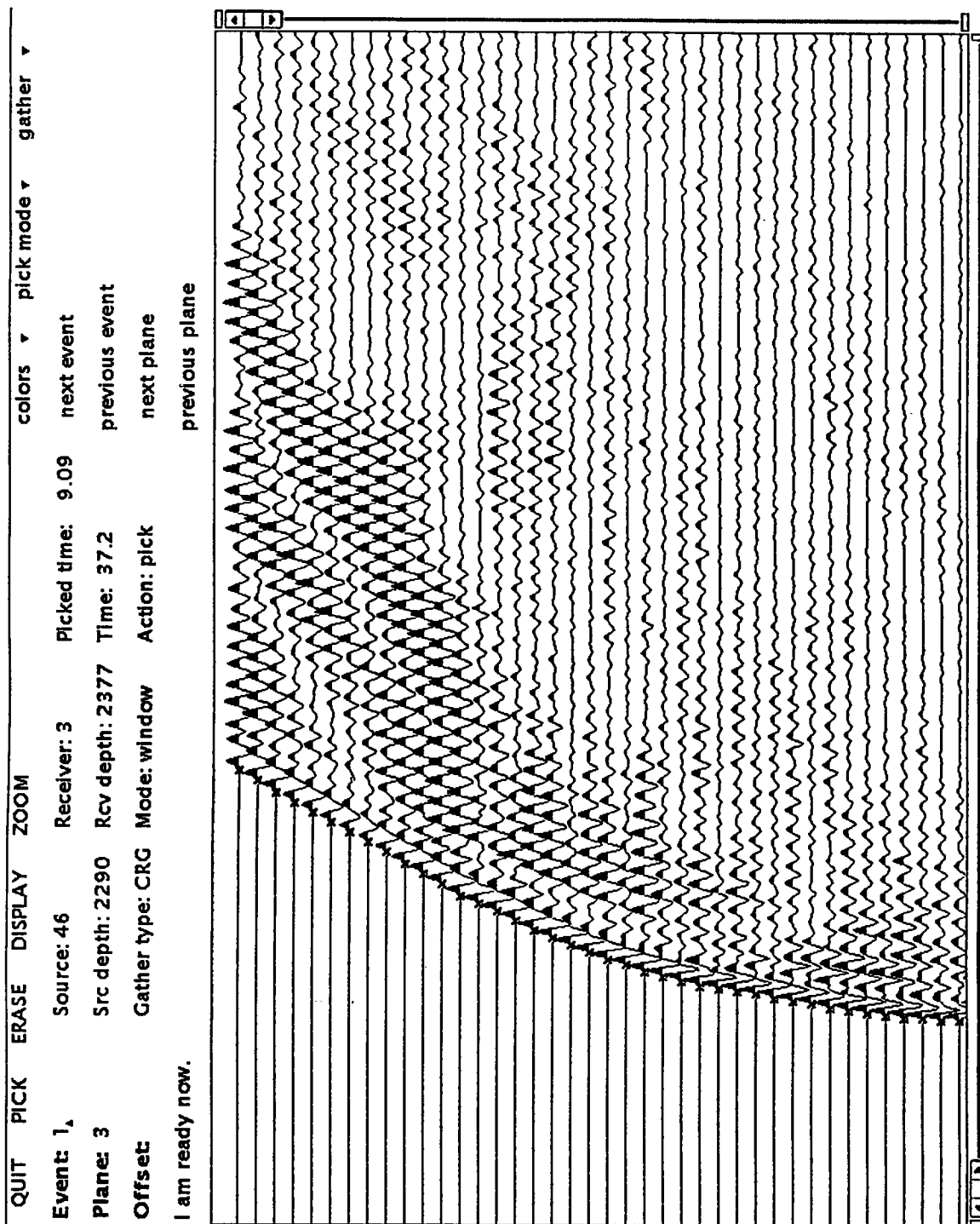


Figure 1: Screen dump of xpick program

After selecting the common source or common receiver gather option, the first gather in that particular sort is displayed. The data can then be stepped through one plane at a time by selecting the "next plane" or "previous plane" buttons, or the user can enter the number of a plane to be viewed into the main window panel. When the common offset gather is chosen, the first gather displayed is the gather with 0.0 unit depth offset. A new offset can be selected by entering the number into the appropriate place in the main window panel.

Picking

Picking can be done in one of several modes, manual, automatic, window or first break.

In "manual" mode, the selected event is chosen with the mouse individually for each trace. If a change needs to be made, the trace can be picked again and the original pick is erased.

In "automatic" mode the user makes a pick on a beginning trace. The program finds the peak or trough on the trace nearest to where the mouse button is and draws the pick there. Whether a peak or trough is chosen depends on whether "maximum" or "minimum" has been chosen under the "pick mode" menu. Then an ending trace is selected in the same manner, and the program performs a correlation on successive traces between the selected ones. If the correlation makes erroneous picks, they can be corrected in manual mode, or a range of picks can be erased by switching to ERASE mode, selecting a range of traces to be erased, going back to PICK mode, and attempting the automatic pick again.

In "window" mode the user outlines a horizon of interest by drawing lines with the mouse on either side of the horizon. The program then interpolates the data within this window using splines, and selects either the maximum or minimum value within the window as the pick value. With the interpolation this results in a more accurate pick than the initial sampling interval allows. While in "window" mode, only lines can be selected to be erased. Once a segment of a line is erased, the picks within the corresponding window are also erased.

Portability

xpick was written using the XView user-interface toolkit, version 2.0. This toolkit follows the OPEN LOOK (TM) Graphical User Interface, and consequently has the OPEN LOOK 'look and feel'. XView is publicly available software from MIT, and has been ported to many systems. The only requirement for XView is that the window manager should be ICCCM-compliant (for example, olwm or mwm).

xpick also uses the netCDF library for data storage. netCDF is publicly available from UCAR (University Corporation for Atmospheric Research), and is used here to enhance portability between different computer systems.

(OPEN LOOK is a trademark of AT&T, the X Window System is a trademark of MIT, XView is a trademark of Sun Microsystems, Inc., netCDF is a trademark of UCAR).

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