

DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

ISOEDIT: A Program for Interactive Editing
of Seismic Reflection Velocity Models

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Open-File Report 89-310A

Although this program has been extensively tested, the Geological Survey cannot guarantee that it will give accurate results for all applications nor that it will work on all computer systems.

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the U.S. Geological Survey.

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**ISOEDIT: A PROGRAM FOR INTERACTIVE EDITING OF
SEISMIC REFLECTION VELOCITY MODELS
By Frederick N. Zihlman**

ABSTRACT

ISOEDIT is an interactive velocity editing program written in the C programming language for use on PC/AT-type microcomputers. ISOEDIT takes a file of velocity functions composed of time/velocity pairs grouped by location and displays them regionally (like a conventional seismic section) or individually (velocity versus time) in CGA, EGA-VGA or Hercules resolution. Isovelocity contours may be displayed over the regional display with or without data points being displayed. Time/velocity points may be edited graphically. Time/velocity points may be shifted along the time coordinate in the regional display; added and/or removed in the individual display. CGA resolution displays may be sent to a graphics-capable printer. Edited data may be written to a file in either the input format or DISCO "DEFINE" module format for incorporation into a DISCO batch processing job.

INTRODUCTION

In 1987, we purchased four 80286 personal computers as standalone work stations serving the VAX 11/780 DISCO seismic data processing system. This resulted in a reduced interactive demand on the VAX, thus allowing more of it's resources to be used for batch data processing. ISOEDIT was written to provide users the capability to enter, inspect and edit velocity functions interactively on the PC. The functions are displayed on the PC screen and the final edited velocity functions may be output in DISCO "DEFINE" module format that can be uploaded to the VAX and incorporated into a DISCO batch processing file.

SOFTWARE/HARDWARE REQUIREMENTS AND AVAILABILITY

ISOEDIT was developed using Borland Turbo C V2.0 on a Kaypro 286i having an Intel 80286 processor, enhanced keyboard and MS-DOS V3.21. Compatibility has been tested only with an IBM AT. Compatibility with other systems is unknown but assumed to be good.

ISOEDIT may be run on PC, XT, and AT type microcomputers using MS-DOS (PC-DOS) V2.0 or greater. The executable image is available in two versions: PC/XT type and AT type. The PC/XT type will run on AT type machines but the AT type requires an AT machine. IOSEDIT will use a math coprocessor if one is present, otherwise it will use software emulation. ISOEDIT will automatically detect and use CGA, EGA, VGA and Hercules video resolutions but will only produce a monochrome display on a color monitor. This open-file report (OF89-xxA) is available in paper copy. The executable and source code files are available as a separate open file diskette, OF89-xxB. The diskette is 5.25 inches.

TERMS USED

Below are listed some common terms and their definitions as they are used in the body of the text:

Velocity function: Seismic velocity expressed as a mathematical function of depth or time (Sheriff, 1976). It is represented by a series of time/ velocity points by location.

Velocity model: A series of velocity functions for a region (Sheriff, 1976).

Time/Velocity point: The velocity at a given point in time within a velocity function.

Individual display: A graphical display of a single velocity function. The horizontal axis represents velocity increasing from left to right. The vertical axis represents time increasing from top to bottom.

Regional display: A graphical display of all the velocity functions within a region comprising a velocity model. Each velocity function within the velocity model is represented by a vertical column of points representing the time/velocity values. The horizontal axis represents the locations of the individual velocity function within the velocity model. The vertical axis represents time increasing from top to bottom.

Record section: A display of seismic traces side-by-side to show the continuity of events (Sheriff, 1976).

Input file: An ascii file of velocity functions comprising a velocity model in the format necessary in order to be read by ISOEDIT.

Output file: An ascii file of time velocity functions written by ISOEDIT in either the ISOEDIT input format or in DISCO DEFINE module format.

PROGRAM OVERVIEW

ISOEDIT consists of three program sections: entry of input/output file names, entry of data display parameters and data display/edit functions. The program is started by typing ISOEDIT at the MS-DOS prompt. The user is first prompted for the input and output file names and output format. Entering "exit" or "quit" to either file name prompt will halt program execution and return the user to the MS-DOS prompt.

Once the input/output file names have been entered, the program prompts for data display parameters: the starting and ending location numbers, minimum and maximum time values to display, the starting and ending velocity values and velocity increment for isovelocity contouring. Entering "exit" to any of these prompts halts program execution, while entering "quit" will return the user to the input/output file names

prompts. All prompts offer a default response, shown within square brackets ([{default}]), which may be taken by pressing the carriage return. A response to a program prompt becomes the new default for that prompt.

Upon successful completion of all prompts, ISOEDIT will open the input file and read all the velocity functions within the starting and ending values entered. Those velocity functions found will be displayed with the low location number on the left and high location number on the right. ISOEDIT is capable of automatically detecting CGA, EGA, VGA or Hercules screen resolutions and displaying the data accordingly. The user may edit the data displayed by either moving time/velocity points along the time coordinate or by adding and deleting individual time/velocity points from selected functions. Editing, redisplaying of the data points, isovelocity contouring, or data output continues until the user presses "q". Upon pressing "q", the user is returned to the data display parameters portion of the program. If the user has not explicitly saved the current screen of data to an output file before pressing "q", all edits to that screen will be lost. Note that all prompt responses are case-insensitive.

INPUT FILE FORMAT

ISOEDIT input files (referred to as "ISO" files) are ascii text files consisting of velocity function location numbers (usually CDP numbers) followed by time/velocity pairs. Each velocity function is separated from the next by a blank line which may actually contain any whitespace, or non-printing, characters. Blank lines must appear between velocity functions and nowhere else within the input file. The velocity function location numbers may start in any column and must be integer values in ascending order throughout the file. Each time/velocity pair must be on a separate line with the time value on the left and the velocity value on the right. Time/velocity pairs may start in any column and must have a minimum of one whitespace separating the time and velocity values. Time values are traditionally given in milliseconds (the TIME axis is labeled as such in the displays) and velocity values as either meters or feet per second, though ISOEDIT will accept practically anything given it (for example time/depth pairs). There is a maximum limit of fifty time/velocity pairs per velocity function and no limit on how many velocity functions per input file. Figure 1 shows the file format from a portion of an input file.

OUTPUT FILE FORMAT

ISOEDIT output files are ascii text files in either the "ISO" format, described above for the velocity functions input file, or "DEF" format as selected by the user. Output files in the ISO format may be used as input to later invocations of ISOEDIT. Output files having the DEF format are in DISCO module DEFINE format and are suitable for incorporation into DISCO processing jobs. DEF format files may not be used as input to ISOEDIT. Figure 2 shows the input data in figure 1 as an output file in the DEF format.

250	<-----	Location number of the velocity
185	1649	function
331	1700	
811	1805	FIRST VELOCITY FUNCTION
1277	1953	
1453	1989	
2029	2167	
2827	2309	
350		
105	1589	
379	1662	
800	1820	SECOND VELOCITY FUNCTION
1307	1979	
1995	2180	
2329	2262	
.		
.		
.		
1050		
124	1470	
425	1725	
850	1835	LAST VELOCITY FUNCTION
1372	1998	
1671	2037	
2646	2393	

Figure 1.--ISORDIT input file format. The ellipses indicate intermediate functions not shown.

HANDVEL 250							
185	1649	331	1700	811	1805	1277	1953
1453	1986	2029	2167	2827	2309		
HANDVEL 350							
105	1589	379	1662	800	1820	1307	1979
1995	2180	2329	2262				
.							
.							
.							
HANDVEL 1050							
124	1470	425	1725	850	1835	1372	1998
1671	2037	2646	2393				

Figure 2.--ISOEDIT DEF output file format. The ellipses indicate intermediate functions not shown.

ENTRY OF INPUT/OUTPUT FILE NAMES

ISOEDIT will prompt the user for the input and output file names. These can be any standard MS-DOS file names and will remain in use until explicitly changed by the user or the program exited. Input files normally have a ".ISO" file suffix to indicate a file having the proper input format but may have any suffix desired. Output file names are entered with no file suffix. After the user enters the output file name the program prompts for the output file format. The user enters an "i" to indicate an output file having an "ISO" format, or a "d" to indicate a DISCO DEFINE file format. ISOEDIT will append either ".ISO" (ISO format) or ".DEF" (DEFINE format) to the output file name entered. If the user specifies an output file name for a currently existing file, that file will be written over by ISOEDIT, destroying any previous data contained in that file. If no output file is desired, the user should enter "none" in response to that program prompt. Entering either "exit" or "quit" to either file prompt will halt the program. Figure 3a shows the input/output files prompts with no output file selected. Figure 3b shows the input/output files prompts with an output file name and the output file format selected.

ENTRY OF DATA DISPLAY PARAMETERS

After accepting input and output file names, ISOEDIT will prompt the user for the starting and ending velocity function location (CDP) numbers to read from the input file, the starting and ending time range to display, the starting and ending velocity values for the isovelocity contouring and the velocity increment between contours. The user response to any prompt will become the new default value for that prompt. Entering "quit" to any prompt will return the user to the input/output file names entry portion of ISOEDIT. Entering "exit" to any prompt halts program execution. Figure 4 shows all the data display parameters prompts.

STARTING AND ENDING LOCATION NUMBERS

The user will be prompted for the starting location number and ending location numbers (usually CDP numbers) to be used as the horizontal end points for the regional data display. These should be entered as integer values with the ending value greater than the starting value. The starting location, or first CDP to display, will be located on the left of the display. The ending location, or last CDP to display, will be located on the right. ISOEDIT will read the input file and accept any velocity function whose location is within these end points, up to a maximum of twenty locations. If more than twenty functions exist within the location range specified, the twentieth velocity function read becomes the ending location number, as well as the ending location default value. All functions are displayed on the screen at their true relative horizontal position.

Interactive Velocity Edit Pgm V0.2

Source file [exit]: d:\seismic\velocity\L1.iso

Output file [exit]: none

Figure 3a.--Input/output file name prompts with no output file name entered.

Interactive Velocity Edit Pgm V0.2

Source file [exit]: d:\seismic\velocity\L1.iso

Output file [exit]: d:\seismic\velocity\L1edit

Output file format: i(so) or d(isco define) [i]:

Figure 3b.--Input/output file name prompts specifying an output file and format.

Interactive Velocity Edit Pgm V0.2

input file in use: d:\seismic\velocity\L1.iso
output file in use: d:\seismic\velocity\Lledit.iso

First CDP to display [1]: 150

Last CDP to display [500]: 3150

Starting time value to display [-1]:

Ending time value to display [-1]:

Starting iso-line velocity [0]: 1500

Ending iso-line velocity [20000]: 4500

Iso-line velocity increment [1000]: 250

Figure 4.—Data display parameters prompts. Default values are shown within the square brackets.

STARTING AND ENDING TIME VALUES

The user will be prompted for the starting and ending time values to be used as the vertical end points for the data display. The starting time value will be located at the top of the display, the ending time value will be located at the bottom. These should be entered as integer values though ISOEDIT will accept floating point values and truncate them to integers. If the user enters a time value less than zero for the starting time value ISOEDIT will determine the minimum time found from those velocity functions selected and use it as the starting time value. Similarly, if the user enters an ending time less than zero ISOEDIT will determine the maximum time from those velocity functions selected. ISOEDIT will display all time/velocity pairs within this time and location range at horizontal and vertical scales relative to the size of the view screen.

ISOVELOCITY CONTOURING PARAMETERS

The user will be prompted for the starting and ending velocity values and the velocity increment to be used for isovelocity contouring. These should be entered as integers though ISOEDIT will accept floating point values and truncate them to integers. If a user enters a starting velocity less than the lowest velocity found in the velocity functions selected, it will be adjusted to the lowest velocity found amongst those functions, which will also become the new starting velocity default. A similar determination will be made if the user enters an ending velocity greater than the greatest velocity found in the velocity functions selected.

REGIONAL VELOCITY DISPLAYS AND EDITS

After answering all the program prompts the first display afforded the user is the regional one consisting of all the velocity points found in the input data set (figure 5) and displayed within the desired time range. The horizontal axis represents the location of the displayed velocity functions in space and the vertical axis the position of the velocity picks in time. Time/velocity pairs composing the individual velocity functions are represented as small circles or small squares, with the small squares symbolizing simple velocity inversions. The larger circle represents the screen cursor which may be moved about the screen by the use of various keyboard keys, summarized in Table 1. Various data displays and editing functions are performed with function keys F2 through F7, summarized in Table 2 and discussed below. Help in use of the function keys and cursor movement is available by pressing function key F1 (figures 6a and 6b). Pressing "q" will quit the regional display and return the user to ISOEDIT's data display parameters section.

REGIONAL DATA DISPLAY/EDIT KEYS

F2 will redisplay the data points on the screen without the cursor. F2 should always be pressed at the end of a help session to redisplay the data points. The cursor will remain invisible until a movement key is pressed, allowing a screen dump to a printer (described below) of the data points without the cursor being displayed.

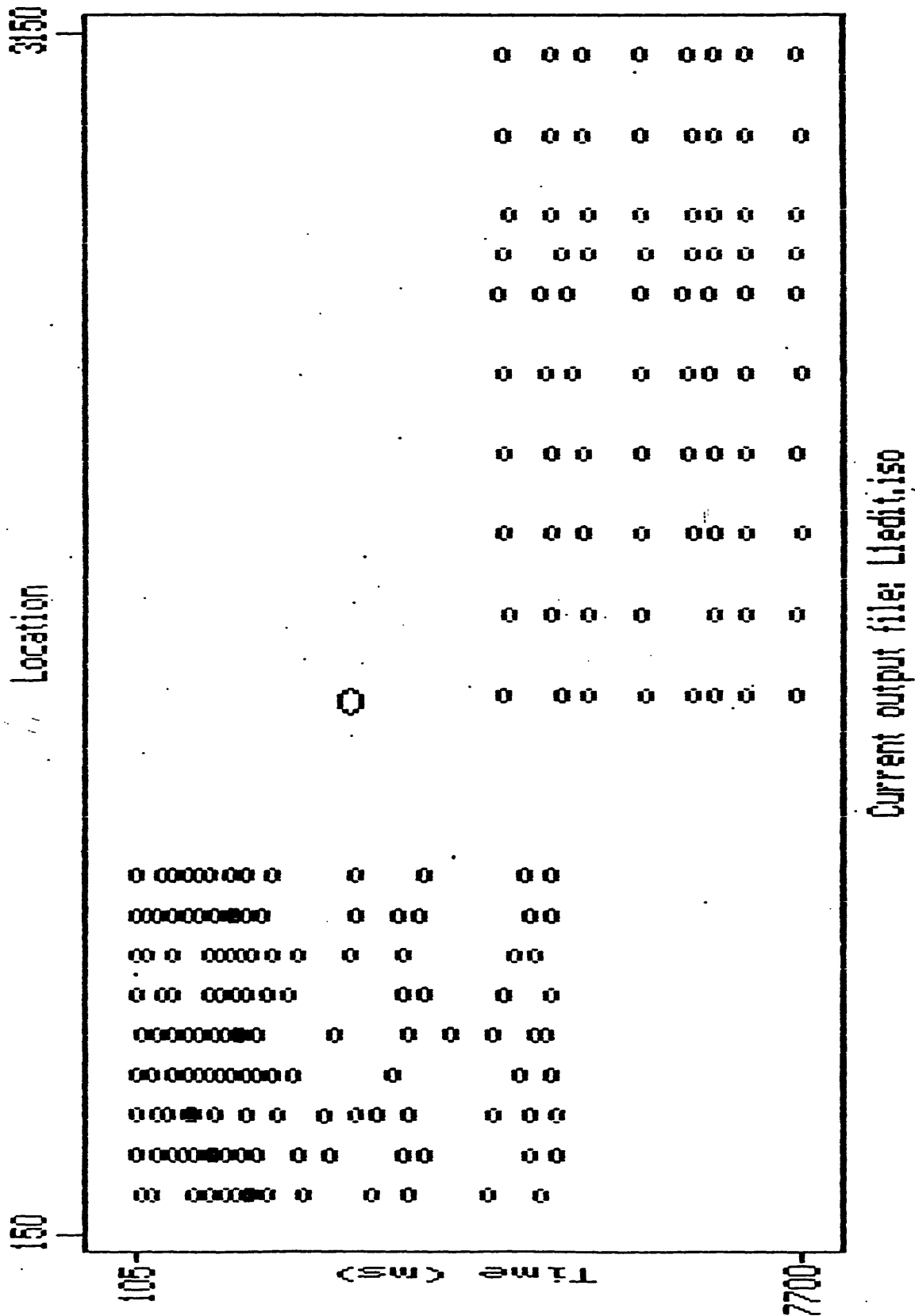


Table 1. Cursor movement keys definitions

UP arrow:	Move the cursor up 1 unit.
DOWN arrow:	Move the cursor down 1 unit.
RIGHT arrow:	Move the cursor right 1 unit.
LEFT arrow:	Move the cursor left 1 unit.
"u" or SHIFT-UP arrow:	Move the cursor up 10 units.
"d" or SHIFT-DOWN arrow:	Move the cursor down 10 units.
"r" or SHIFT-RIGHT arrow:	Move the cursor right 10 units.
"l" or SHIFT-LEFT arrow:	Move the cursor left 10 units.

Arrow keys separate from the keypad arrow keys on enhanced keyboards will move the cursor 1 unit in the appropriate direction.

Table 2.--Regional velocity display function keys definitions.

F1:	Display this information.
F2:	Redraw the data points.
F3:	Draw isovelocity lines over the data points.
SHIFT-F3:	Draw isovelocity lines without data points.
F4:	Select a time/velocity point to move in time.
SHIFT-F4:	Place a selected time/velocity point in time.
F5:	Dump the screen to a printer (CGA ONLY).
F6:	Write the current data set to an output file.
F7:	Edit an individual velocity function.

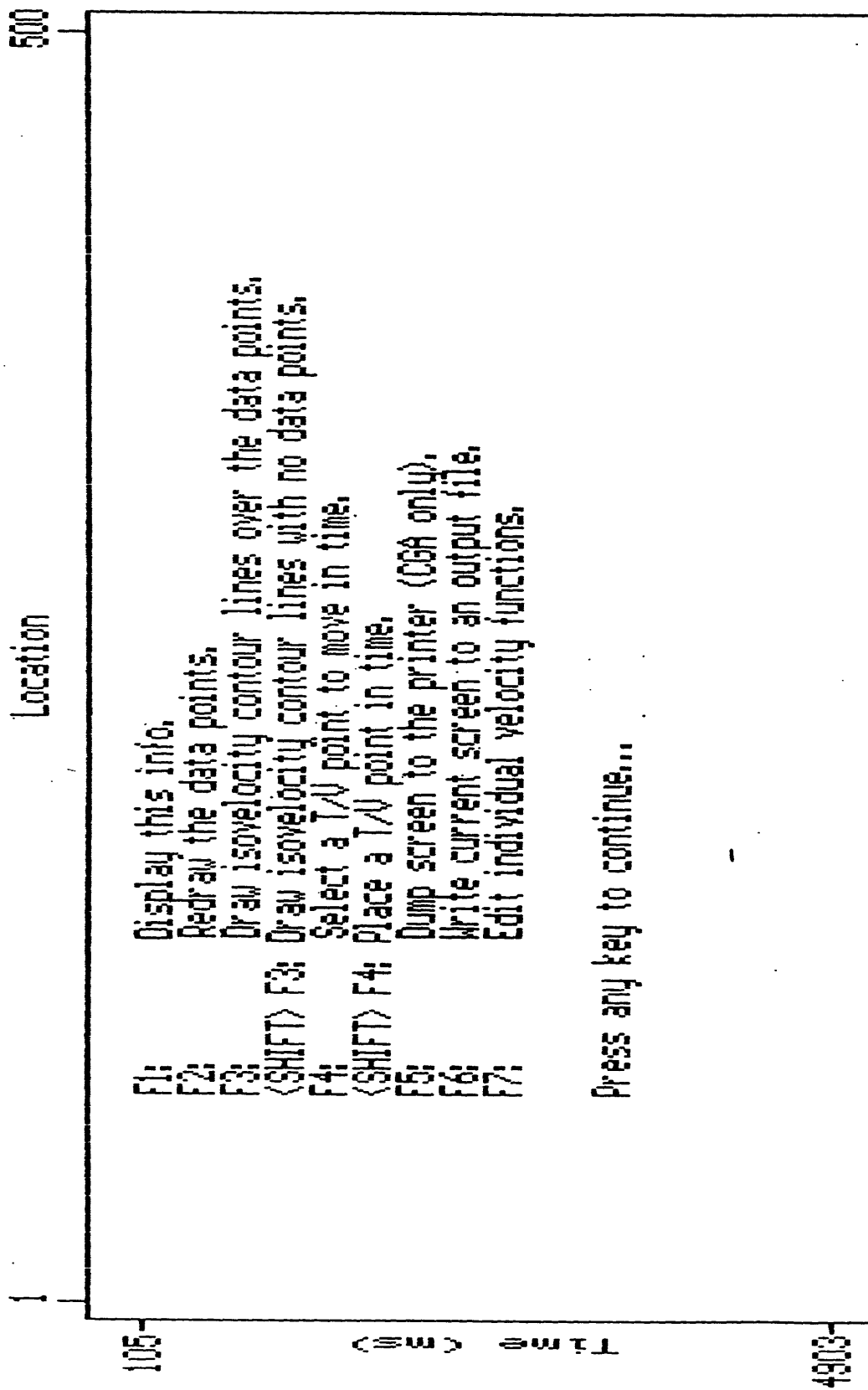


Figure 6a.--Regional display help screen obtained by using function key F1, describing the function key usage.

105	Location	1	500
UP arrow: Move cursor up one unit,			
DOWN arrow: Move cursor down one unit,			
RIGHT arrow: Move cursor right one unit,			
LEFT arrow: Move cursor left one unit,			
U or <SHIFT> UP arrow: Move cursor up ten units,			
D or <SHIFT> DOWN arrow: Move cursor down ten units,			
R or <SHIFT> RIGHT arrow: Move cursor right ten units,			
L or <SHIFT> LEFT arrow: Move cursor left ten units,			
Arrow keys separate from the keypad on enhanced keyboards will move the cursor one unit in the appropriate direction.			
4903			

Figure 6b.--Continuation of regional display help screen describing the cursor movement keys.

F3 will display the isovelocity contours over the data points within the velocity range entered by the user (figure 7). SHIFT-F3 (the F3 key pressed while holding down the SHIFT key) will erase the display and then draw the isovelocity contours with no data points displayed (figure 8). The isovelocity "contours" displayed result from simple linear interpolations between the time/velocity points in each function.

Regional time/velocity points displayed may be shifted in time by placing the cursor over the point to be moved (figure 9a) and pressing F4. The point will disappear leaving only the cursor. After a point has been selected the cursor may only move up or down in response to the cursor movement keys. ISOEDIT will not allow the user to move the cursor past any lower or higher time/velocity points within the same function, or the minimum/maximum values of the screen display. The time value of the cursor's position within the display as well as the velocity of the point being moved is displayed in the upper right-hand portion of the screen (figure 9b). This information is continually updated as the cursor moves. Once the cursor is moved to the desired position in time the point may be placed in the display by pressing SHIFT-F4 (figure 9c). If the time/velocity points in the display are very close together it is sometimes necessary to redraw the display (pressing F2) between edits since the selection of an individual point may erase the display of those neighboring it. All time/velocity edits will be lost if the user presses "q" before saving the current screen display (see F6, below).

F5 will dump a CGA resolution screen display to an attached printer with a side label containing various items of information. Currently only MS-DOS 4.0 will dump screen resolutions greater than CGA to a printer. Accordingly, ISOEDIT is programmed so that it will not attempt to screen dump EGA, VGA and Hercules resolution displays to avoid the possibility of locking up the PC. Figure 10 shows a screen dump of a data set with isovelocity contours. Note that the screen dump includes a side label.

F6 will write the currently displayed data set to the output file if one was specified. A title bar at the bottom of the screen will display the velocity function range written, as shown in figure 11.

F7 will invoke the option to display/edit an individual velocity function as described below.

INDIVIDUAL VELOCITY FUNCTION DISPLAY AND EDITS

An individual velocity function may be selected by placing the cursor over any portion of a velocity function in the regional display and pressing F7. The regional display is erased and replaced with a velocity versus time plot with the time-velocity picks represented by small circles connected with a dotted line. As with the regional display, the larger circle is the screen cursor and may be moved about the screen using the same movement keys shown in Table 1. The horizontal axis represents velocity with the minimum velocity located on the left and the maximum on the right. The vertical axis represents time with the minimum time at the top and the maximum at the bottom. The minimum and maximum of the display

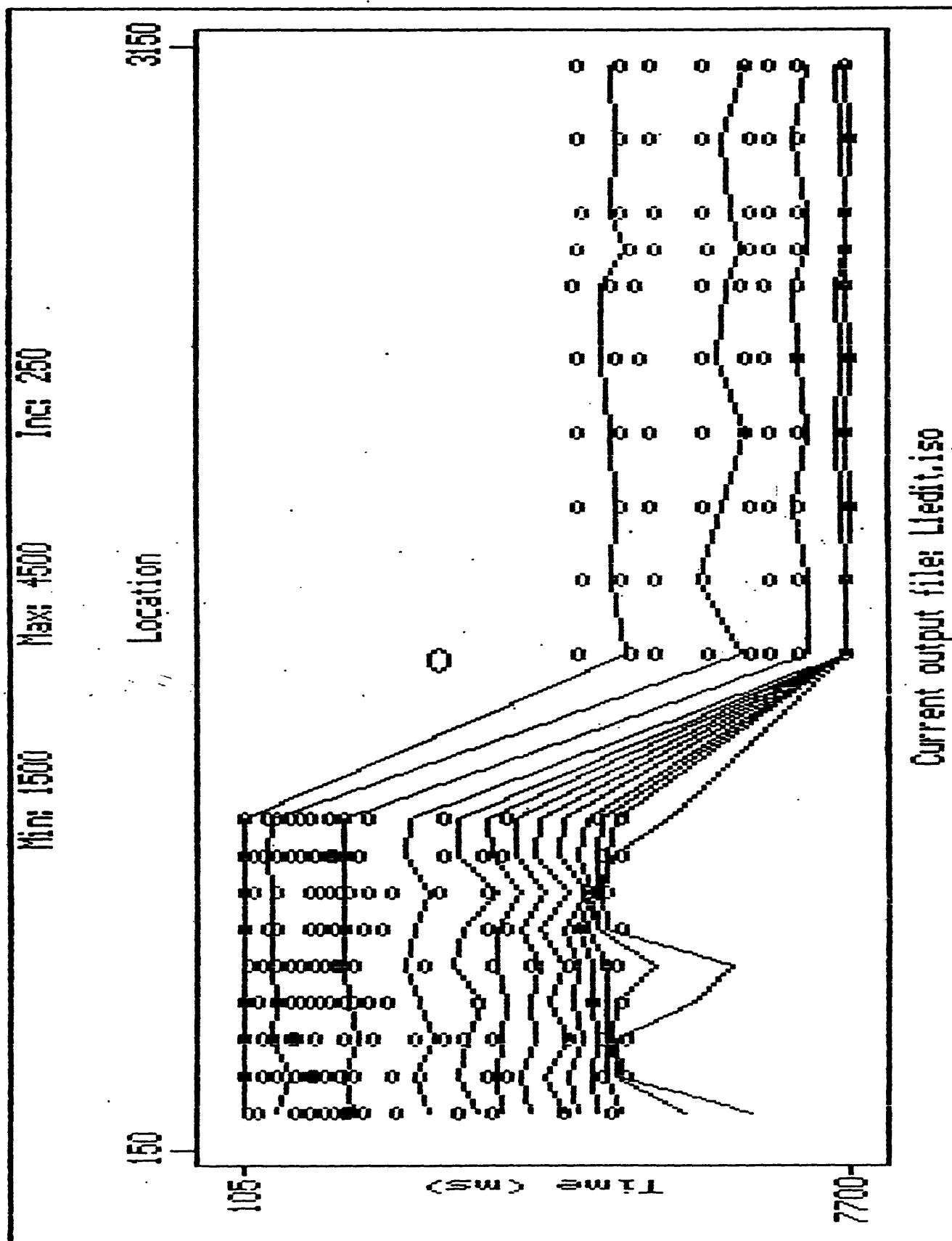
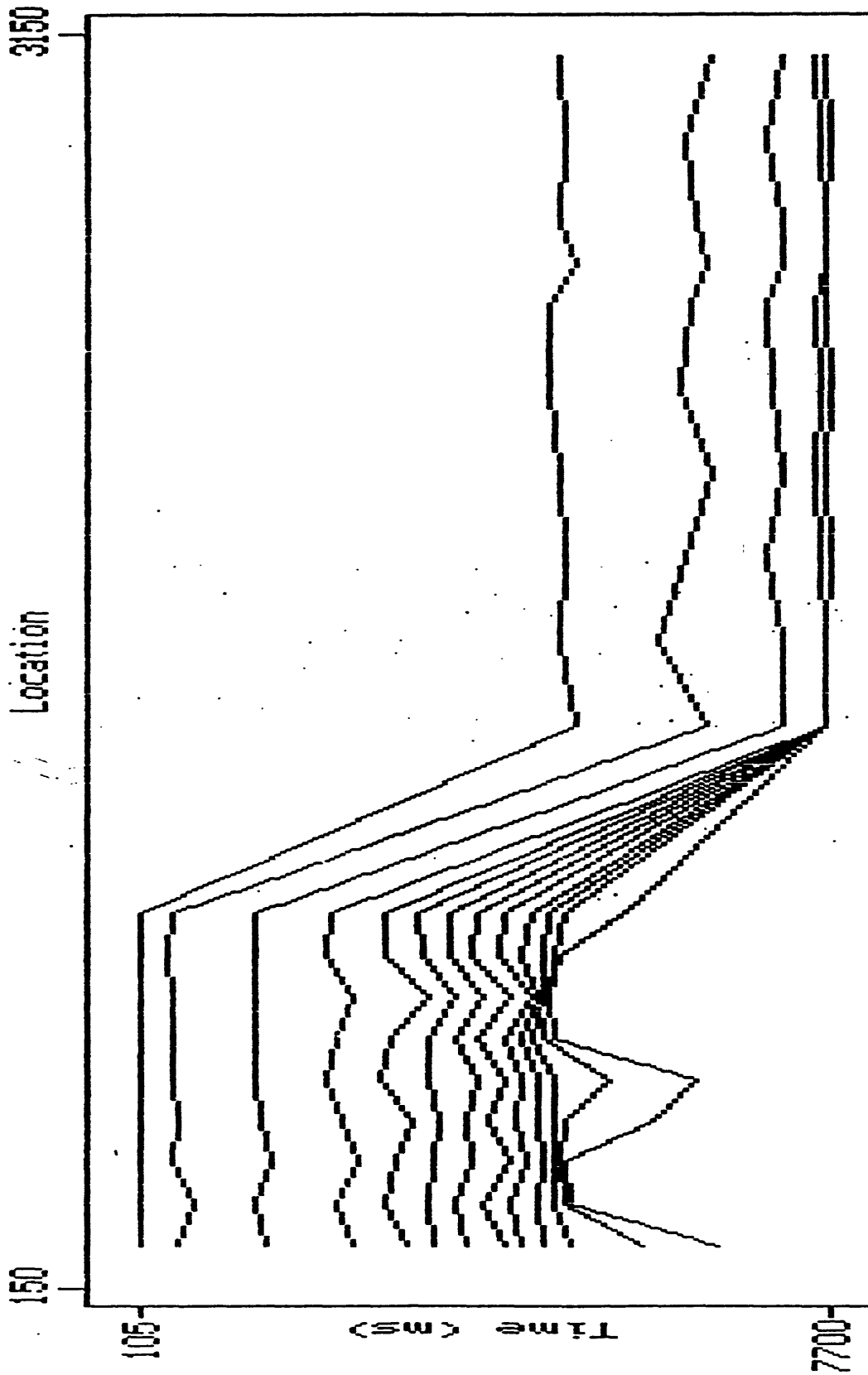


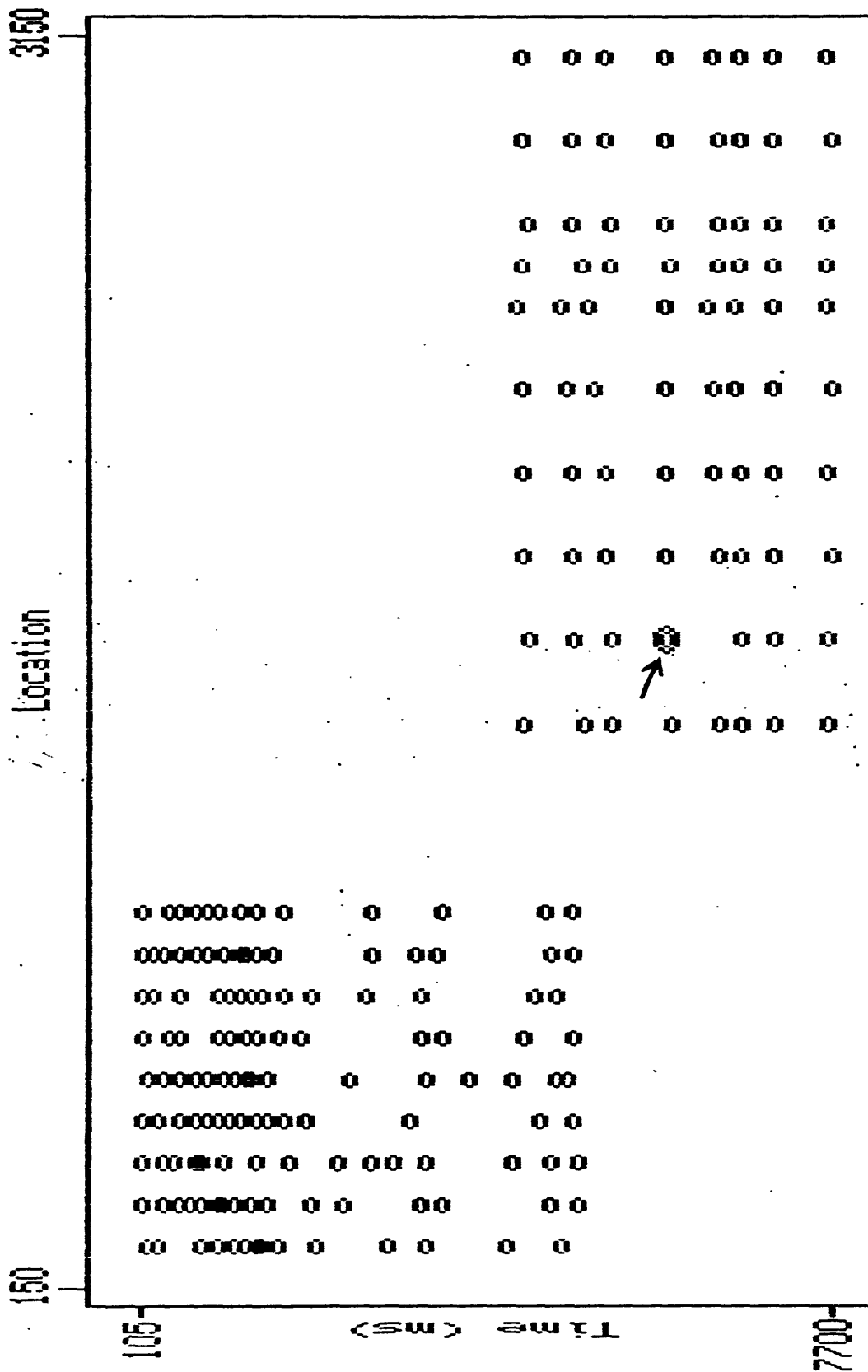
Figure 7.--Isovelocity contours displayed over the regional data points obtained by using function key F3. Note the minimum and maximum isovelocity values as well as the velocity increment are given at the top of the screen.

Min: 1500 Max: 4500 Inc: 250



Current output file: L1edit.iso

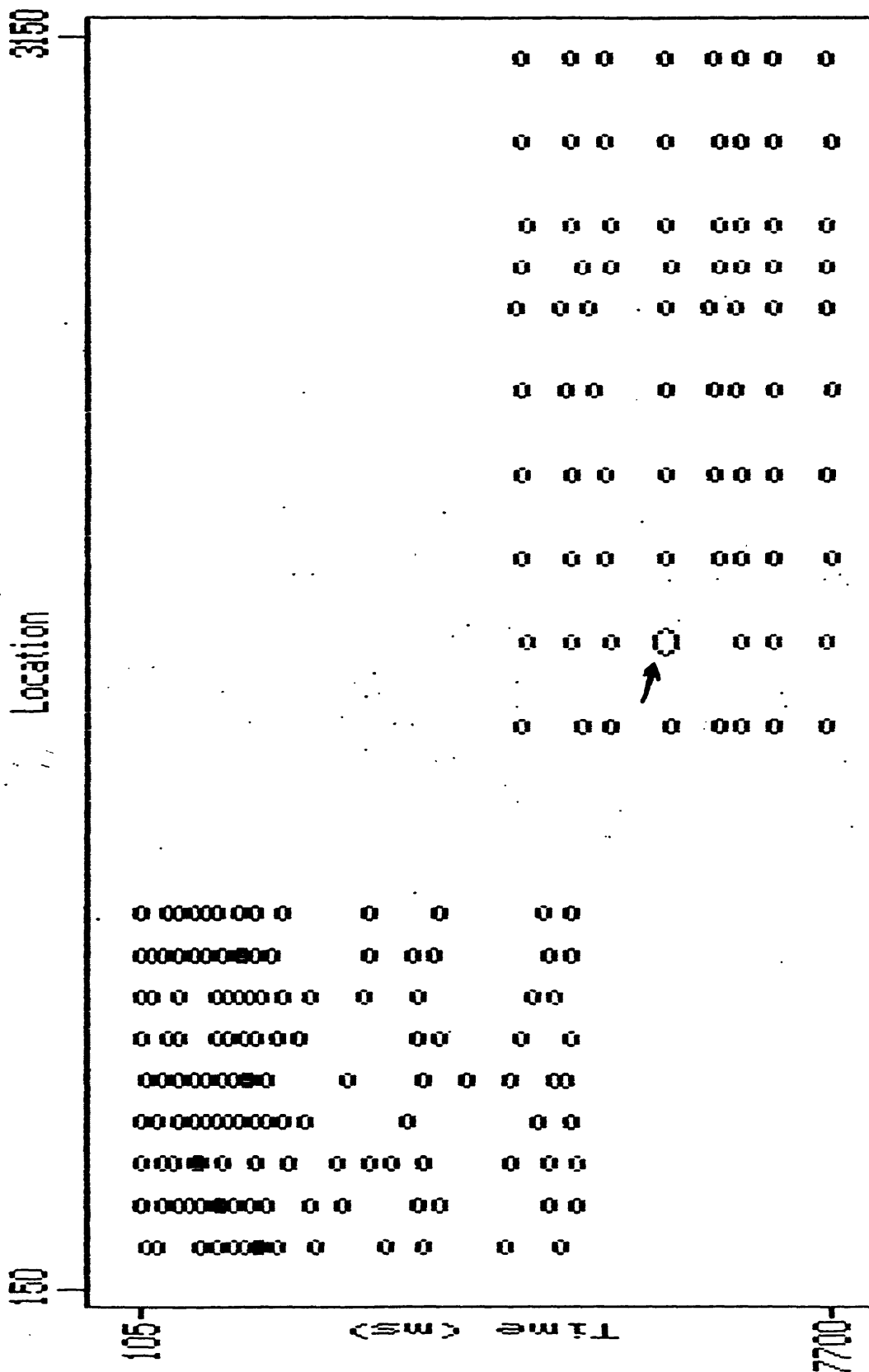
Figure 8.--Isovelocity contours displayed without data points obtained by using function key SHIFT-F3.



Current output file: Lledit.v150

Figure 9a.---Regional data display with the cursor positioned over a data point (arrow) to be selected and shifted along the time axis:

TIME: 5846
VELOCITY: 1793



Current output file: l1edit.iso

Figure 9b.---Regional data display after a data point has been selected (F4) and the cursor moved in time. Note the time/velocity display in the upper right-hand corner.

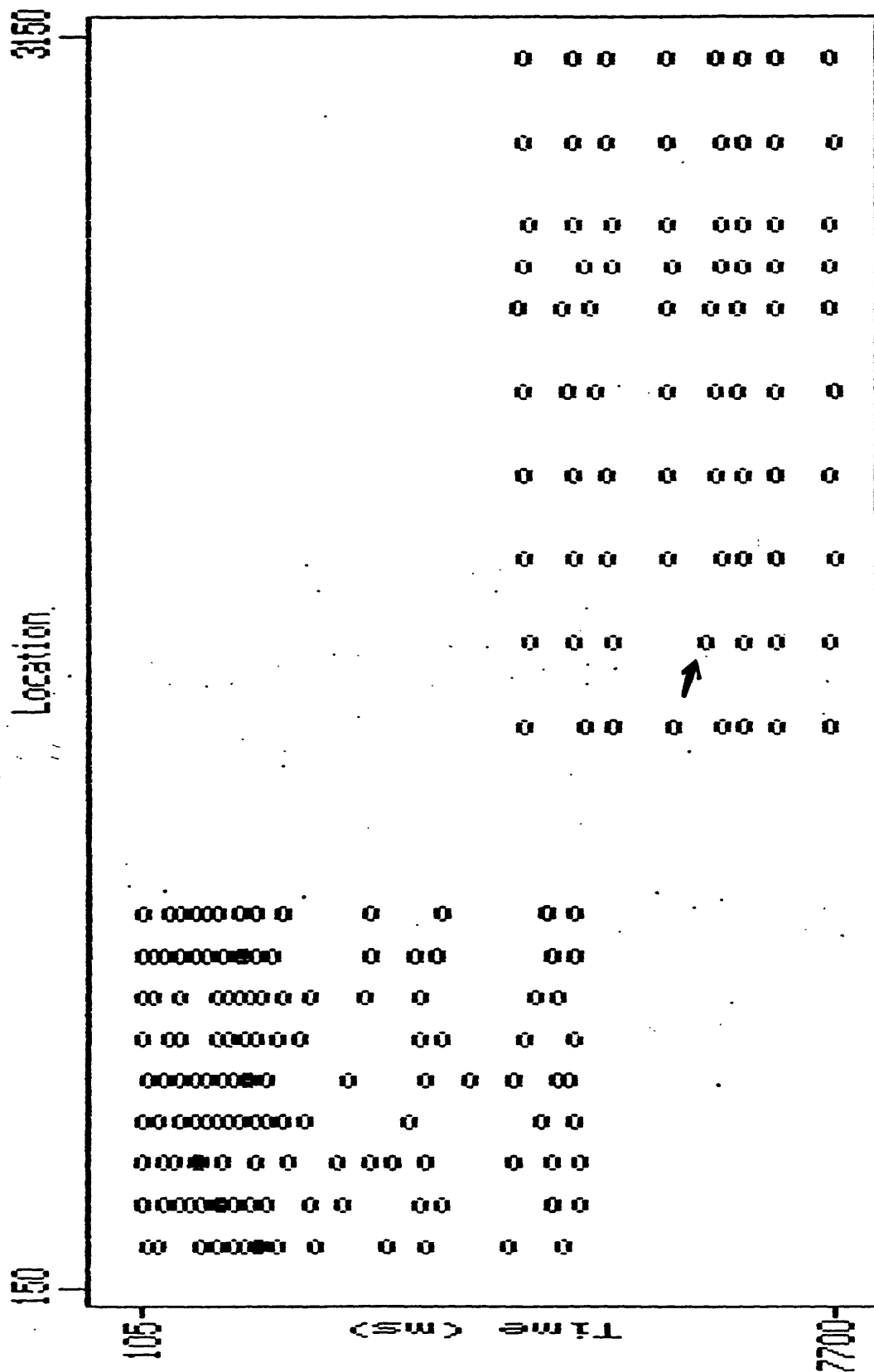


Figure 9c.--Regional data display after several data points have been selected (P4) and placed in new positions in time (SHIFT-P4) in the same velocity function.

January 20, 1989

11:07:37.43

DATA FILE: L1.iso

OUTPUT FILE: L1edit.iso

Velocity

min: 1429

max: 4884

Time

min: 105

max: 7700

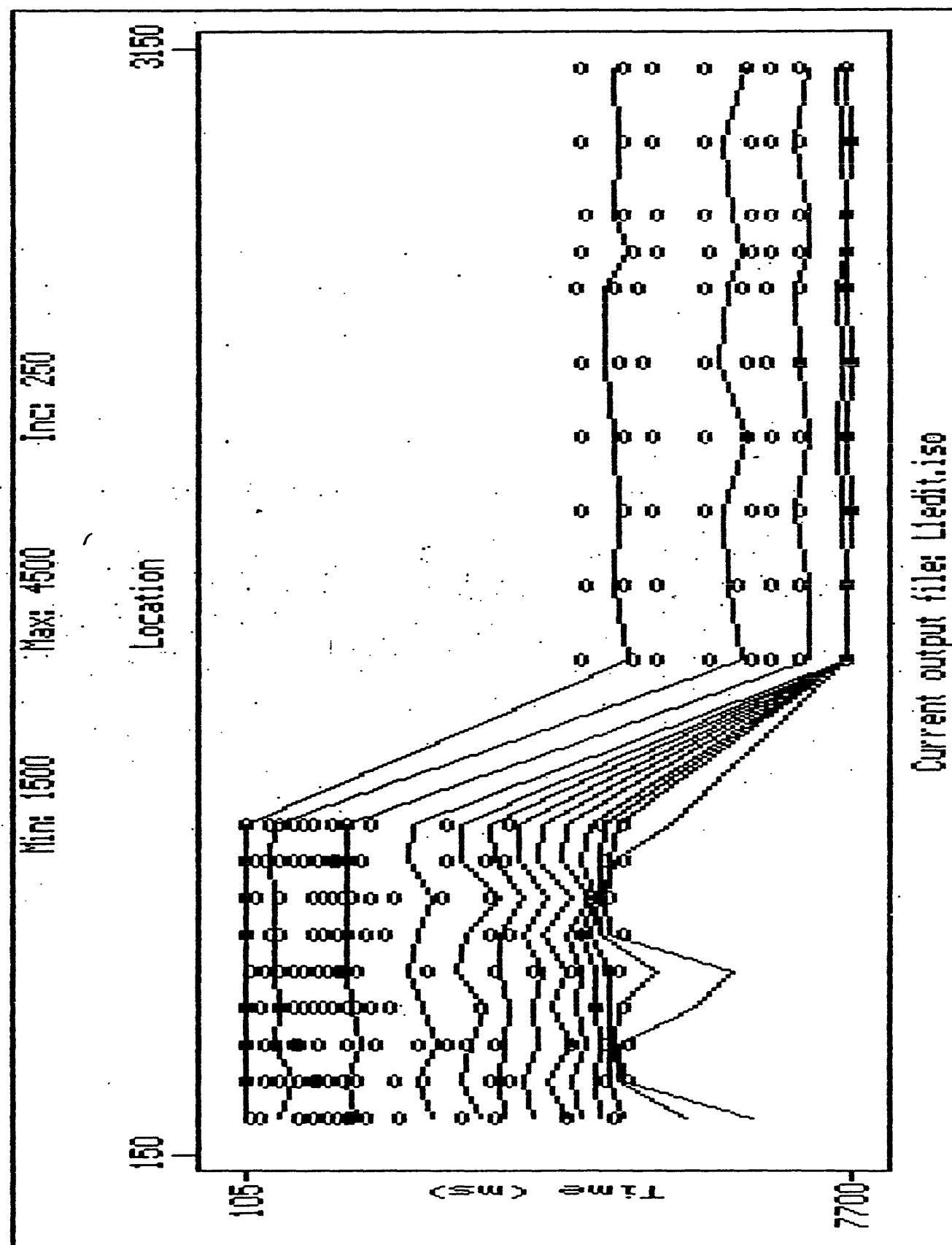


Figure 10.--Screen dump of a regional data display (F5).

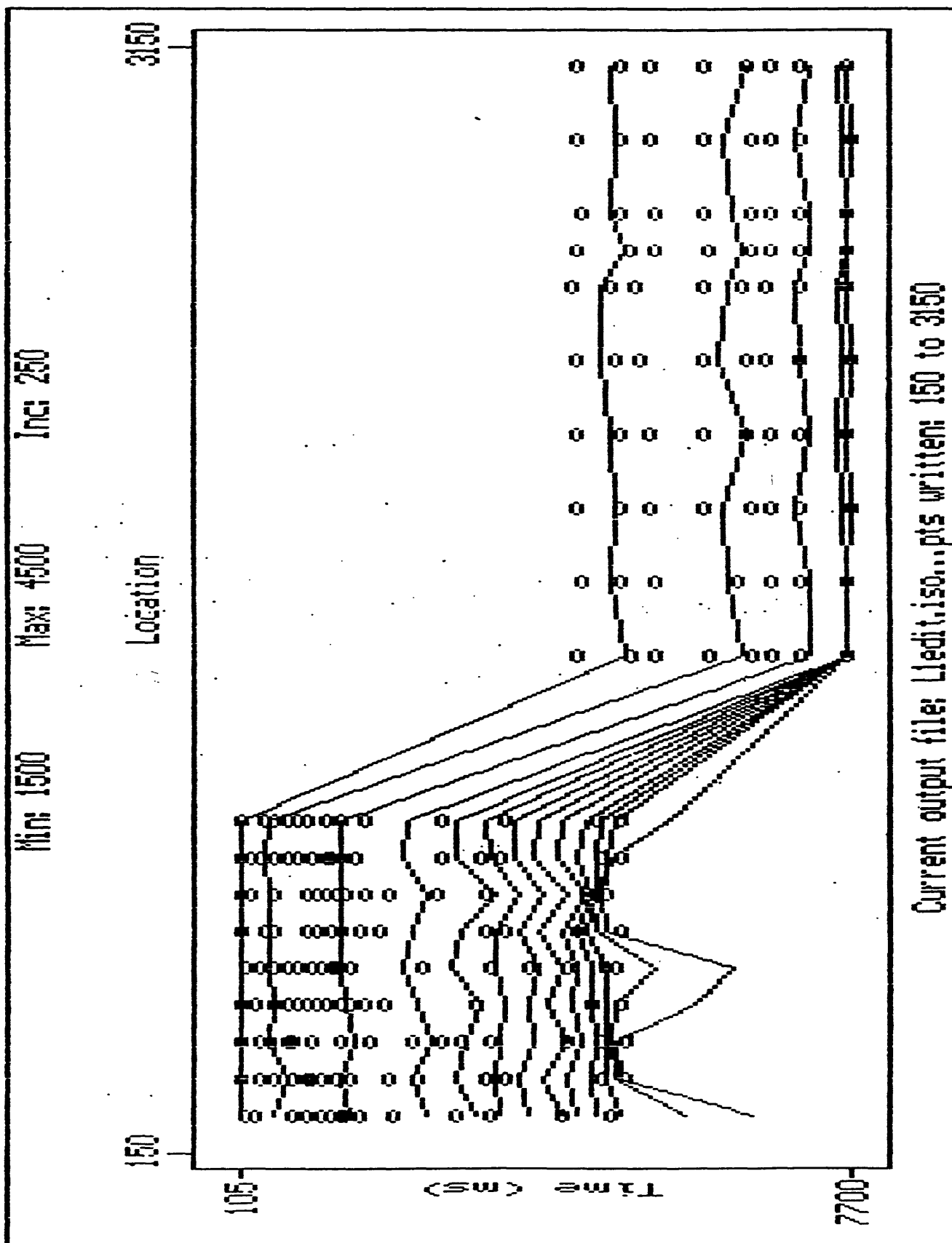


Figure 11.---Regional data display with a title bar at the bottom displaying the function range written to an output file (F6).

represent those of the velocity function selected, not those of the regional data display. The time and velocity values corresponding with the cursor's position are displayed in the upper right-hand portion of the screen with the first movement of the cursor and are continually updated as the cursor moves. Help in cursor movement and the use of function keys is available by pressing F1. Redisplaying and editing the data is performed using function keys F2 through F5, summarized in Table 3 and discussed below. Pressing "q" will return to the regional display, retaining all edits made to the individual velocity function. Figure 12 shows a display of a velocity function selected from the regional display of figure 5. Figures 13a and 13b show the help screens available by pressing F1.

INDIVIDUAL VELOCITY FUNCTION DATA DISPLAY/EDIT KEYS

F2 functions as in the regional data display, redisplaying the data points on screen without the cursor.

Individual time/velocity points may be removed from the velocity function by positioning the cursor over the desired point (figure 14a) and pressing F3. Note that the time/velocity location of the cursor is given in the upper right-hand corner of the display. The point selected will be removed from the curve and the curve redrawn without that point (figure 14b). Note that if the points having the minimum or maximum time values are removed, new minimum or maximum time limits will be defined for that function.

Individual time/velocity points other than the minimum or maximum may be added to a velocity function by positioning the cursor at the desired time/velocity location in the display (figure 15a) and pressing F4. The time/velocity location of the cursor is shown in the upper right-hand corner of the display. The curve will be redrawn as each new time/velocity point is added (figure 15b). Addition of points defining new minimum or maximum time values to a velocity function is described below.

F5 functions as it does for the regional data display, producing a CGA resolution screen dump on an attached printer, adding a side label (figure 16).

Figure 17 shows the regional display of the data set in figure 5 after having edited the individual velocity function. Note the point added to the function is displayed as a box instead of a circle, indicating it is a velocity inversion.

ADDING A POINT ABOVE OR BELOW THE MINIMUM AND MAXIMUM TIME PICKS

Time/velocity points may be added to the beginning of individual velocity functions by the following procedure:

1. In the Data Display Parameters Entry portion of the program specify a starting time value less than the minimum time value to be added to a velocity function and produce a regional display of the data.

Table 3.—Individual velocity function display function keys definitions

F1:	Display this information.
F2:	Redisplay the data points.
F3:	Delete a time/velocity point from the function.
F4:	Add a time/velocity point to the function.

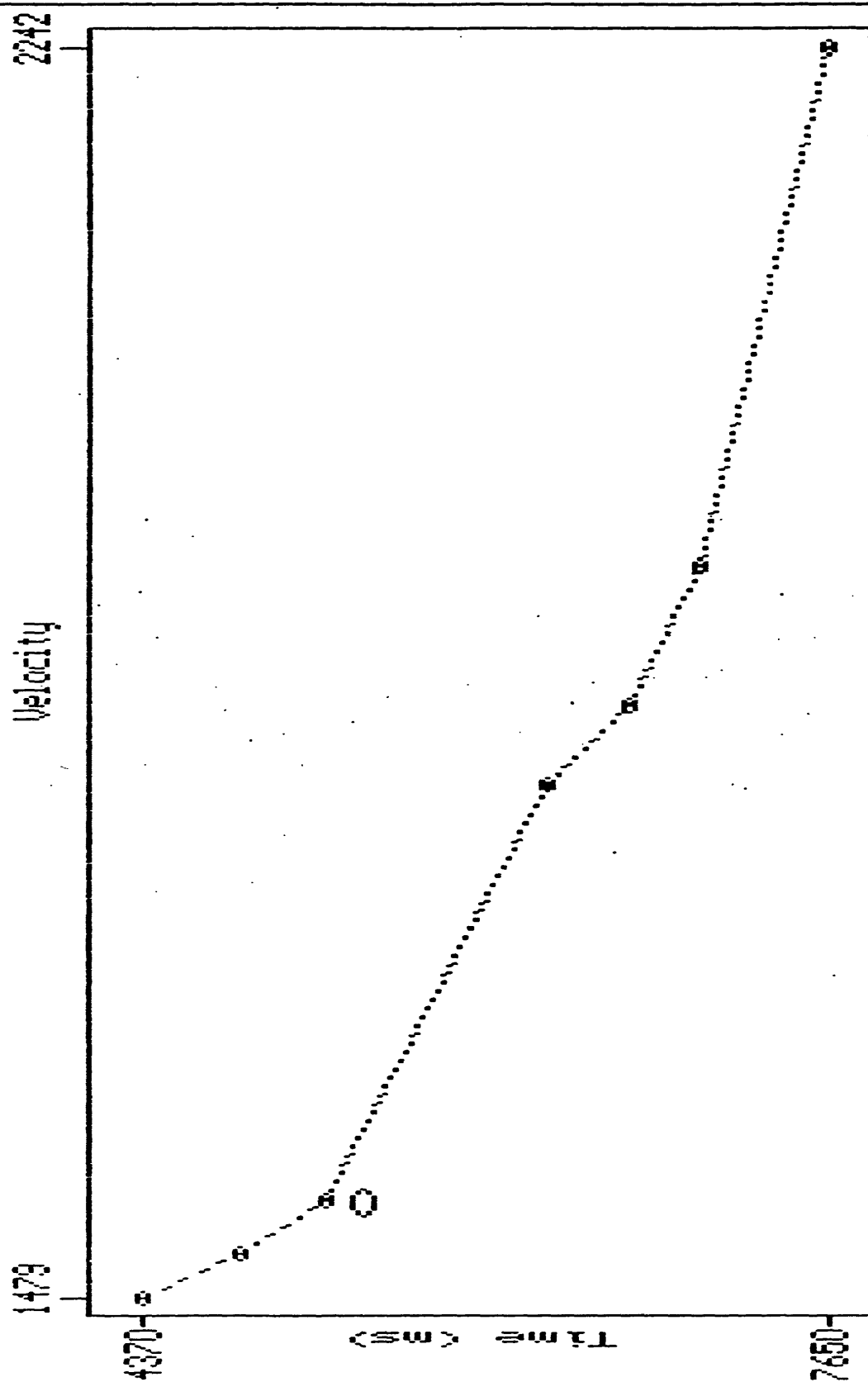


Figure 12.--Individual velocity function display of that function edited in figures 9a, 9b, and 9c.

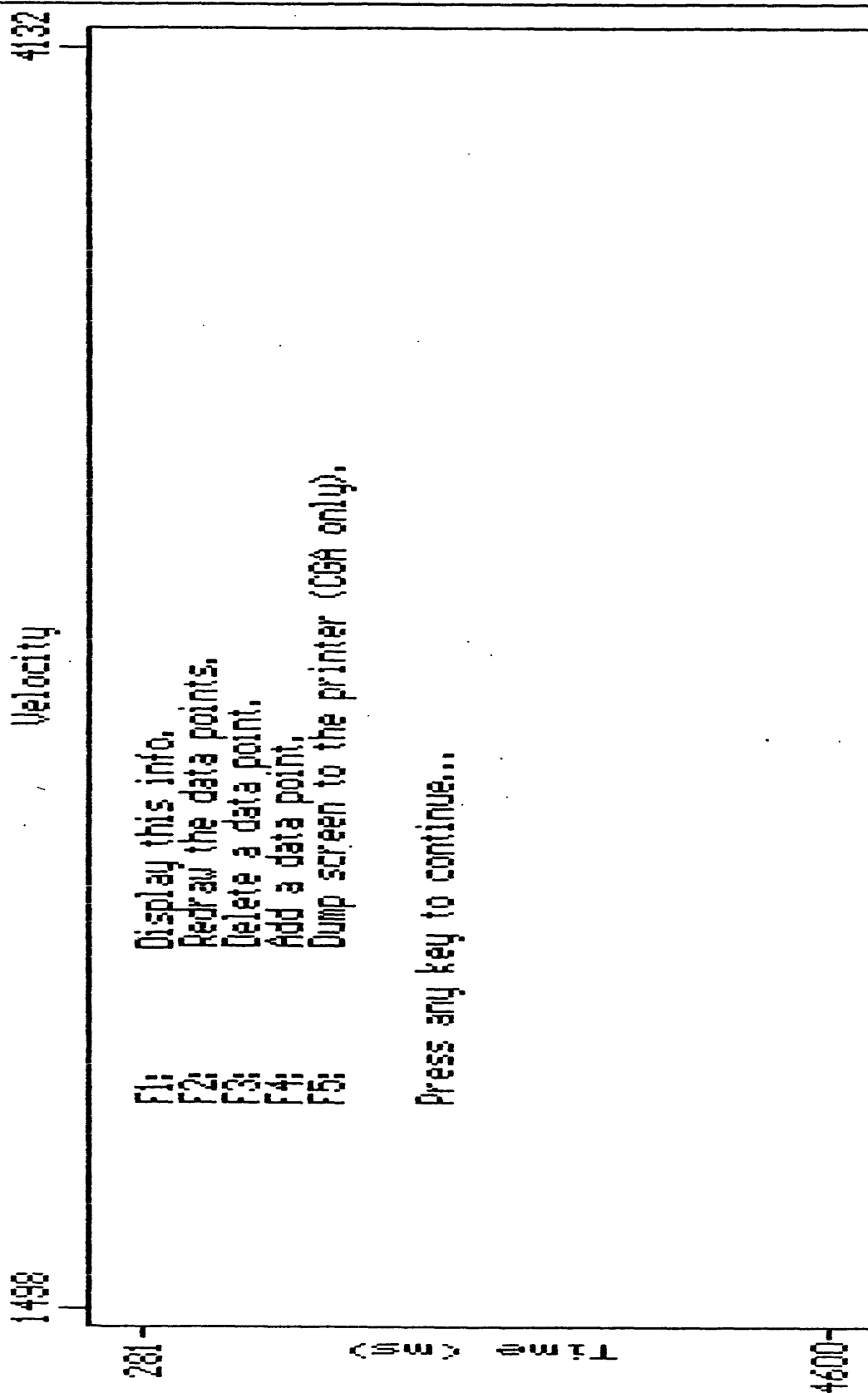


Figure 13 .--Individual velocity function display help file obtained by function key F1, describing the function key usage.

1498	Velocity	4132
2937	UP arrow: Move cursor up one unit. DOWN arrow: Move cursor down one unit. RIGHT arrow: Move cursor right one unit. LEFT arrow: Move cursor left one unit.	
	U or <SHIFT> UP arrow: Move cursor up ten units. D or <SHIFT> DOWN arrow: Move cursor down ten units. R or <SHIFT> RIGHT arrow: Move cursor right ten units. L or <SHIFT> LEFT arrow: Move cursor left ten units.	
4953	Arrow keys separate from the keypad on enhanced keyboards will move the cursor one unit in the appropriate direction.	

Figure 13b.--Continuation of regional display help screen describing the cursor movement keys.

TIME: 5248
VELOCITY: 1538

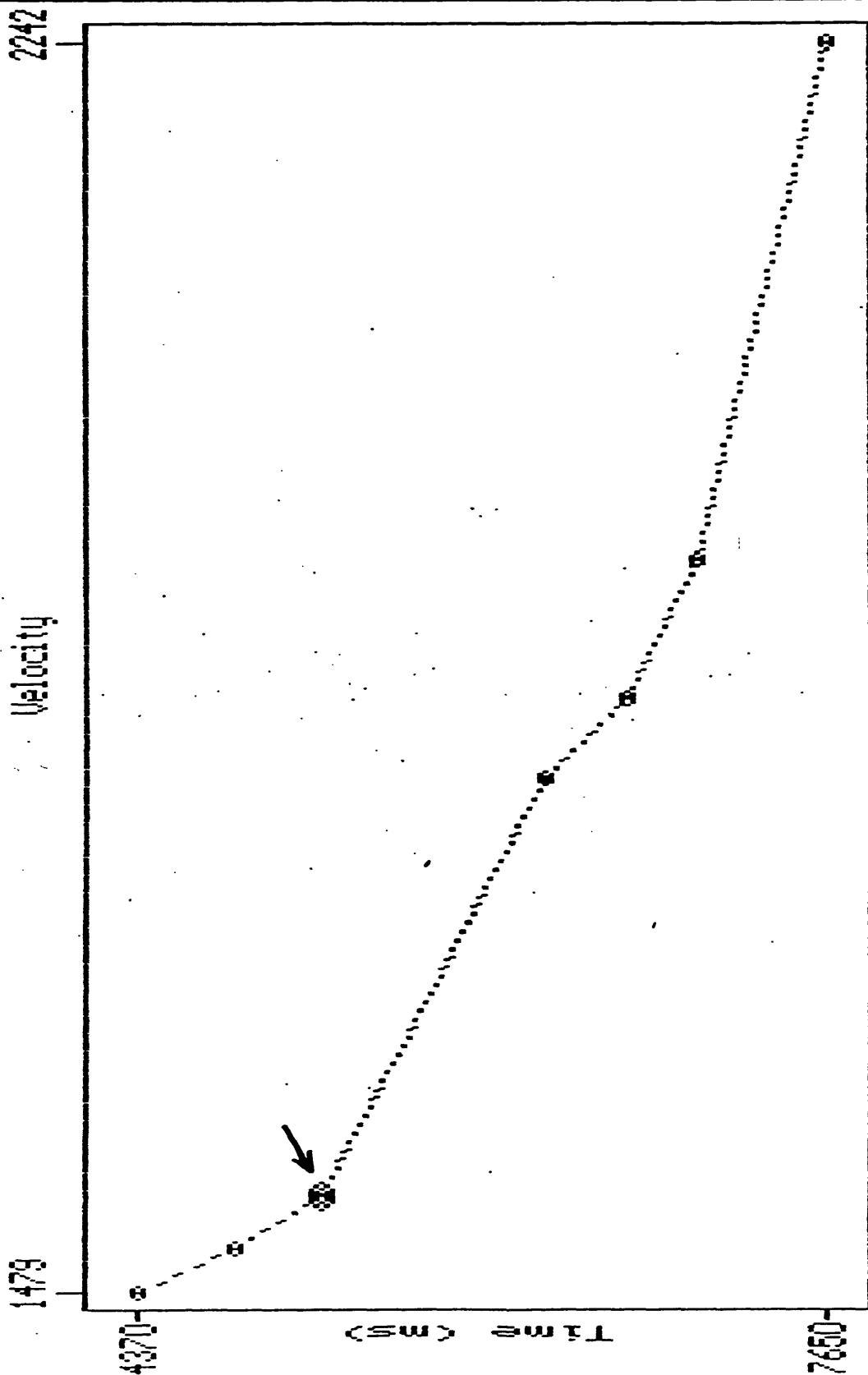


Figure 14a.---Individual velocity function displayed in figure 12 with the cursor positioned over a time/velocity point to be removed (arrow). Note the time/velocity coordinates of the cursor are displayed in the upper right-hand corner.

TIME: 5248
VELOCITY: 1538

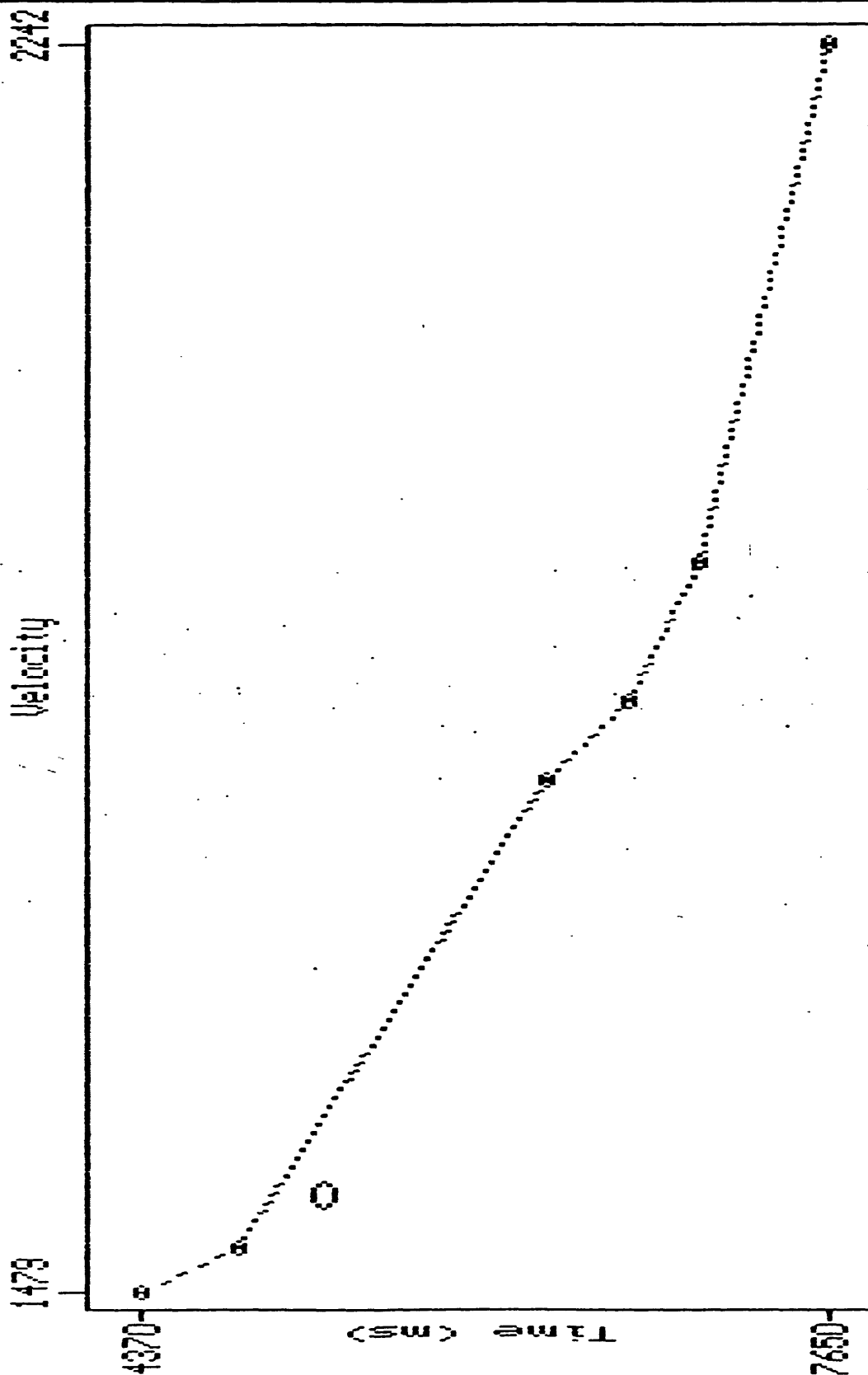


Figure 14b.---Individual velocity function displayed in figure 14a with the time/velocity point removed (F3) and the curve redrawn.

1 20.1989 * Interactive Velocity Edit V0.2 * 11:12:44.85

TIME: 5610
VELOCITY: 1484

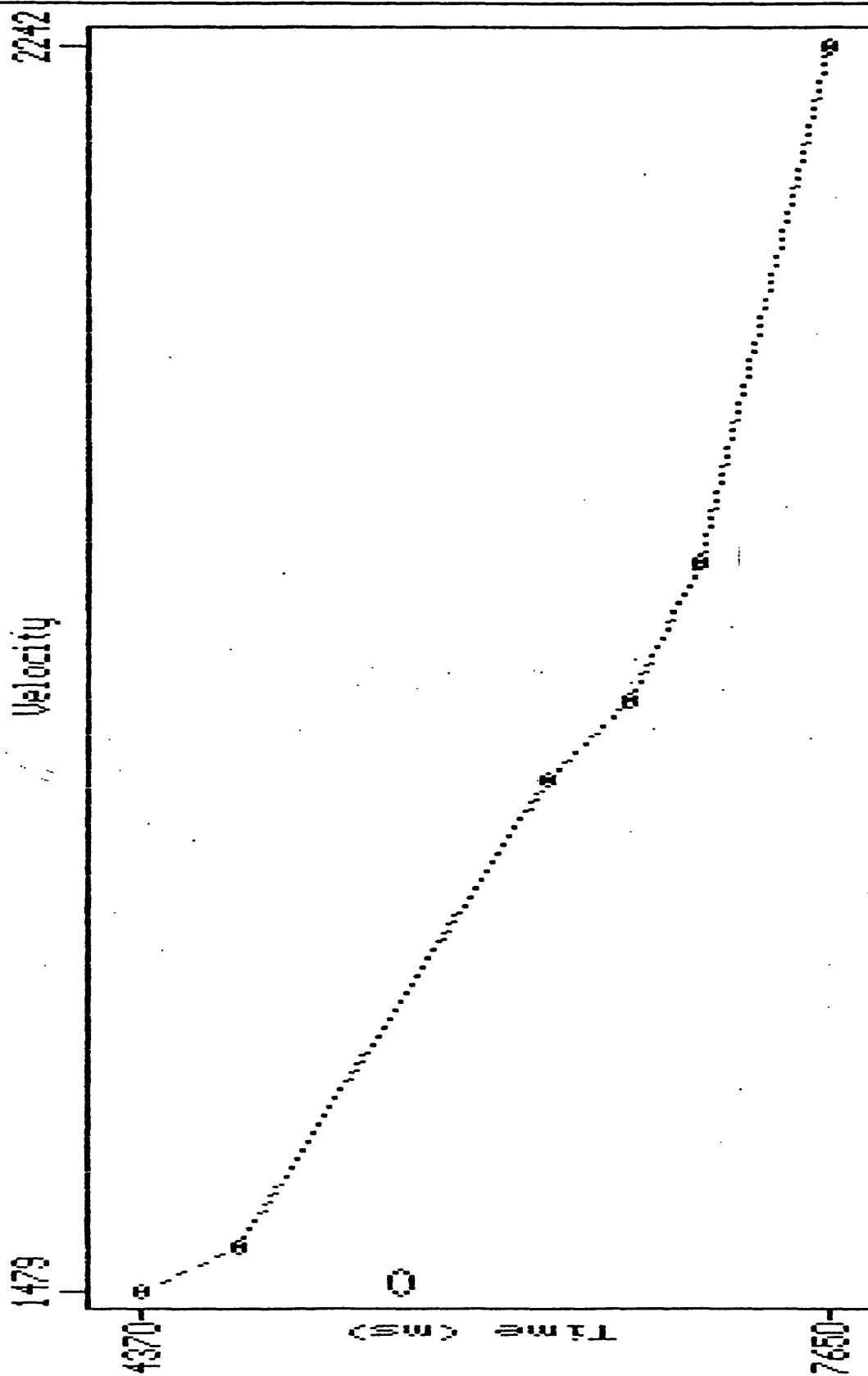


Figure 15a.--Individual velocity function of figure 14b with the cursor positioned to add a new time/velocity point whose values will be those as shown in the upper right-hand corner.

TIME: 5610
VELOCITY: 1484

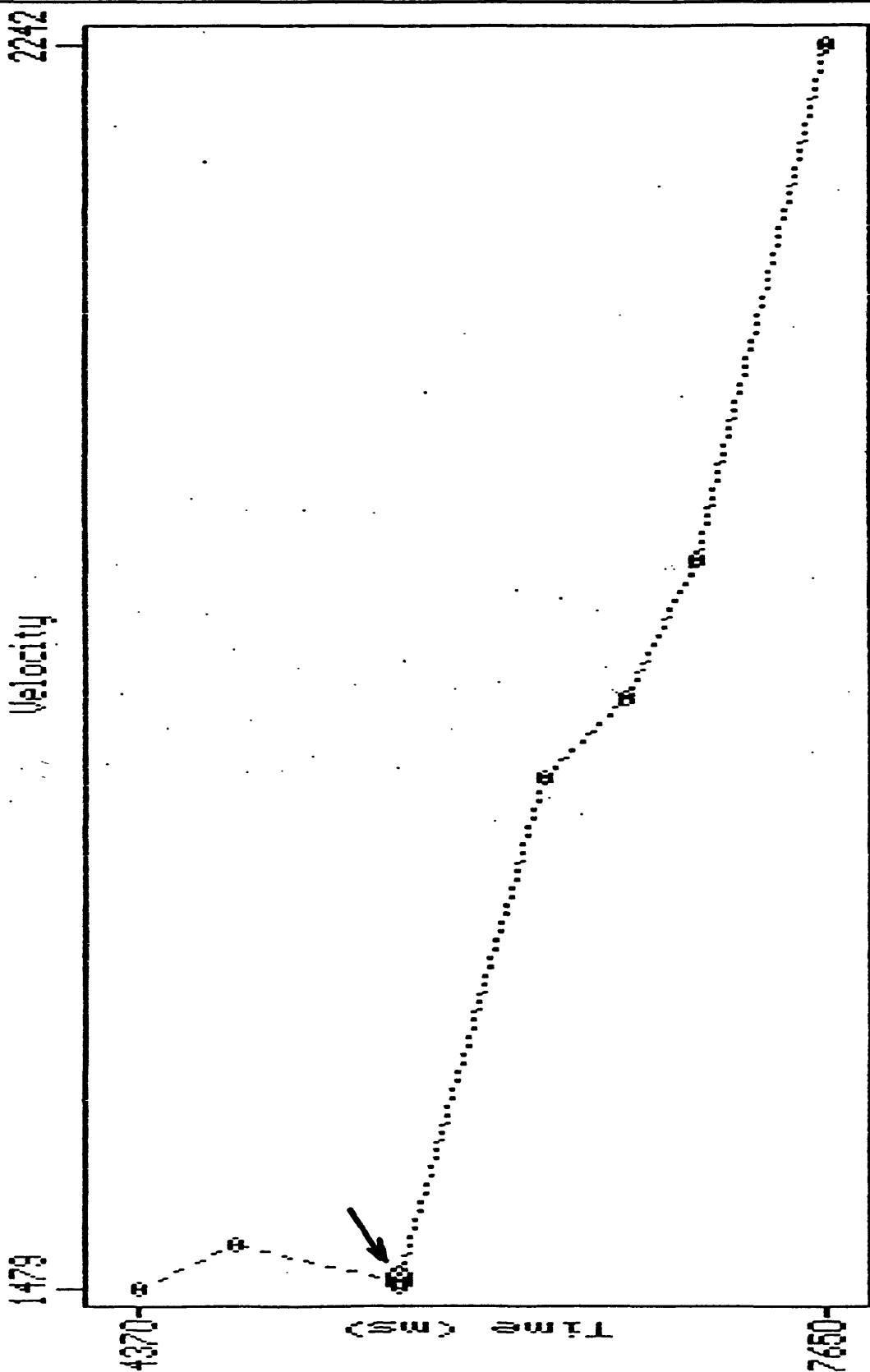


Figure 15b.--Individual velocity function of figure 15a with a new time/velocity point added (F4) (arrow).

January 20, 1989

11:26:51.47

Velocity
Time

min: 1479
min: 4370

max: 2242
max: 7650

1-20-1989 * Interactive Velocity Edit V0.2 * 11:12:44.85

TIME: 5610
VELOCITY: 1484

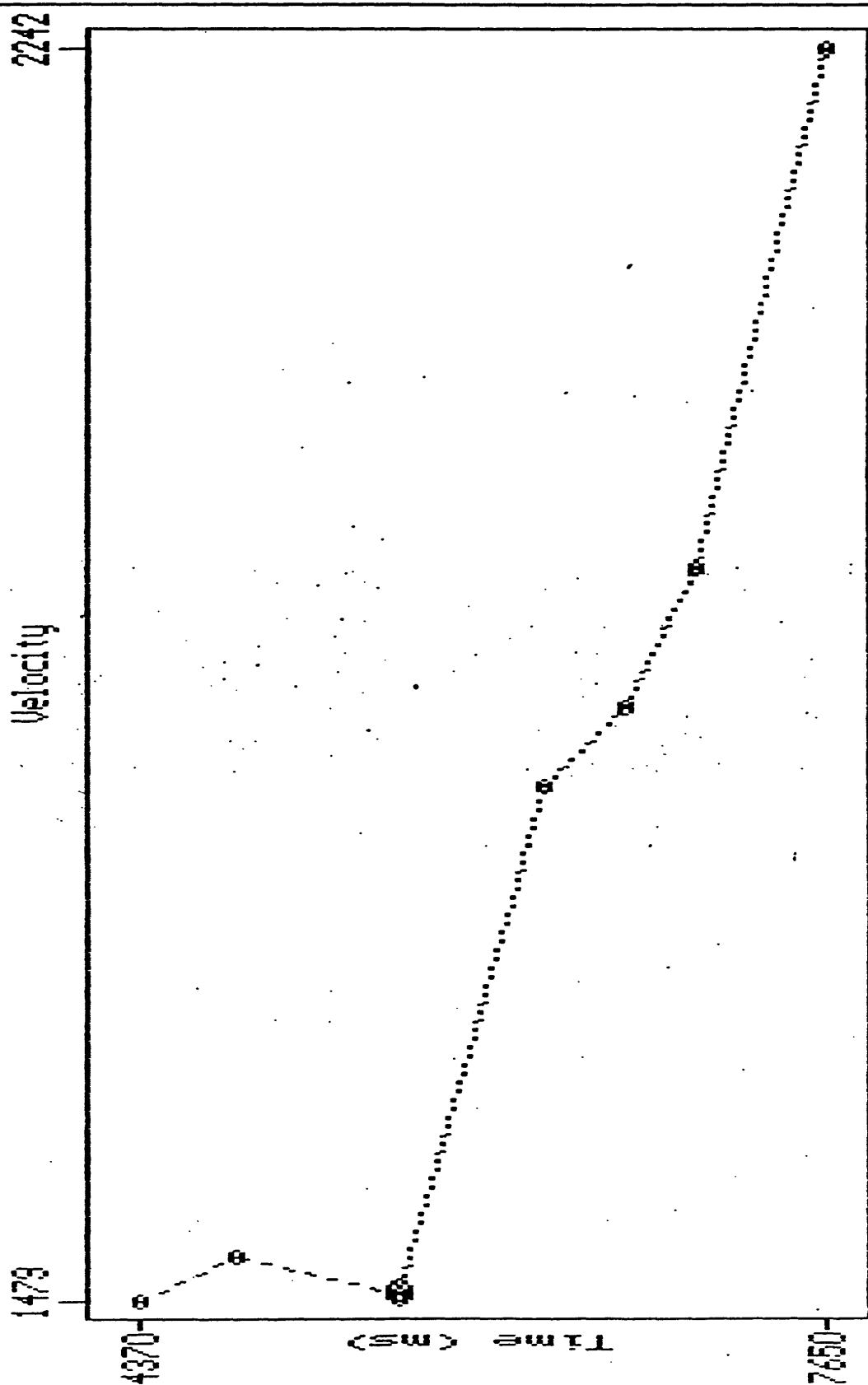


Figure 16.--Screen dump of the individual velocity function of figure 15b (F5).

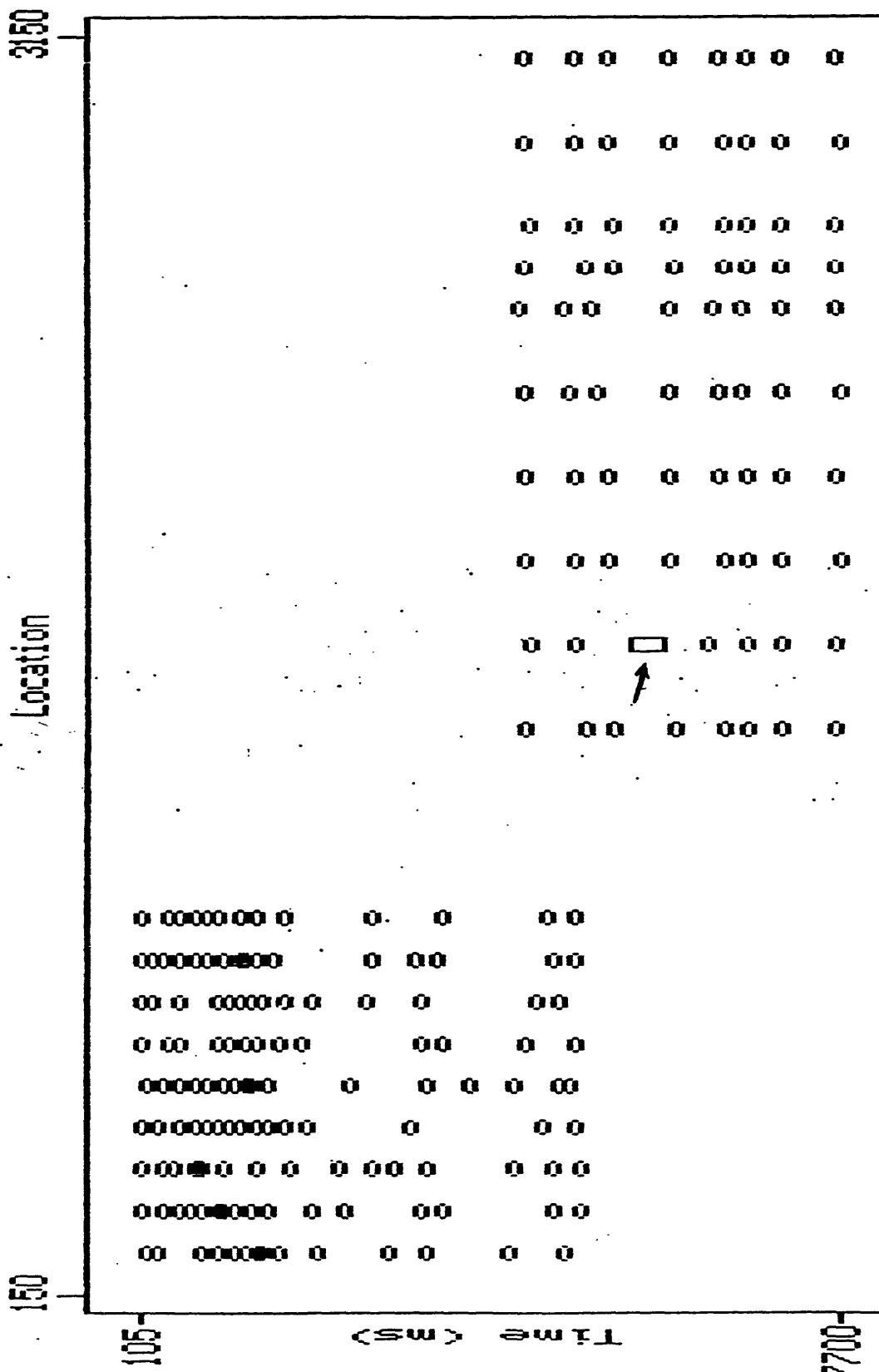


Figure 17.--Regional display of the data set after editing the individual velocity function of figures 14-16. Note that the point added in figure 15b is a velocity inversion, indicated by a box instead of a circle (arrow).

2. In the desired function place the cursor over the time/velocity point currently having the minimum time value.
3. Select that point to be shifted in time by pressing F4.
4. Move the cursor to the desired starting time value and place the point there by pressing SHIFT-F4.
5. Press F7 to enter the Individual Velocity Function Display/Edit mode and adjust the velocity of that starting point by adding and deleting points (F3 and F4) as well as adding any intermediate points desired. After the function has been adjusted press "q" to return to the regional display.

Similarly, time/velocity points may be added to the end of individual velocity functions by shifting the time/velocity point in the regional display that has the maximum time value to a greater time value and then editing that function.

PROGRAM NOTES

The following ISOEDIT caveats are made to further describe the program, its functions and components.

Cursor movement within 10 screen units of the display boundaries is only allowed in 1 unit increments by means of the arrow keys alone (not shifted). The cursor will not move outside the display boundaries.

ISOEDIT was written to provide interactive modification of velocity models and not necessarily proper isovelocity contours. For each isovelocity line value (determined by user-provided starting and ending isovelocity values and the increment used between isovelocity values) the individual velocity functions are searched for a set of consecutive time/velocity pairs where the velocity of the first pair (having the lesser time value) is less than or equal to the iso-line velocity and the velocity of the second pair is greater than or equal to that iso-line velocity. The time value for the iso-line is determined by linear interpolation between the two selected time/velocity pairs. Using this method with data sets containing large and numerous velocity inversions will produce interesting displays. A future release of ISOEDIT may have a more accurate contouring algorithm.

ISOEDIT calls the ANSI.SYS device driver to clear the screen in between text displays. This file should reside in the PC's boot directory and be referred to in the CONFIG.SYS file as:

DEVICE = ANSI.SYS

which will load it when the system boots. ISOEDIT will run properly if ANSI.SYS is not present or loaded but the screen will not be cleared between text displays.

REFERENCES

Sheriff, R.E., 1976, Encyclopedic Dictionary of Exploration Geophysics, Society of Exploration Geophysicists, Tulsa, Oklahoma.