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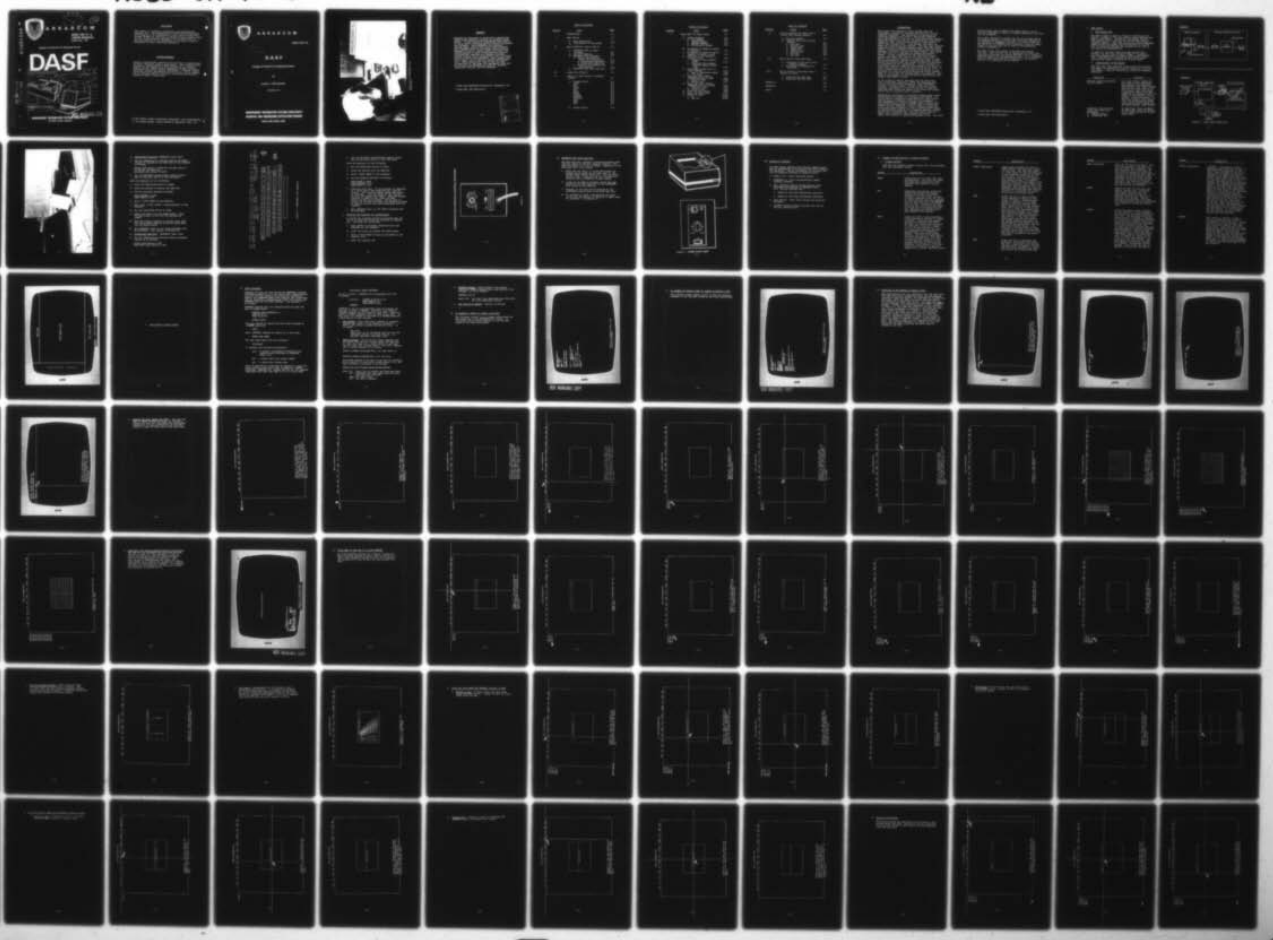

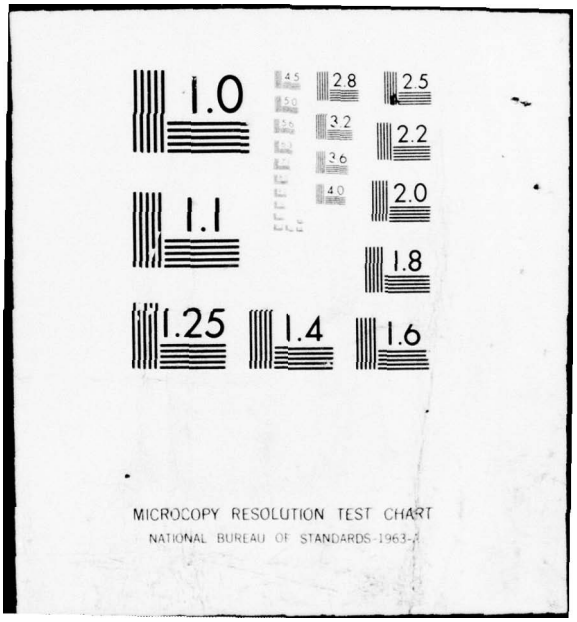
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DASF

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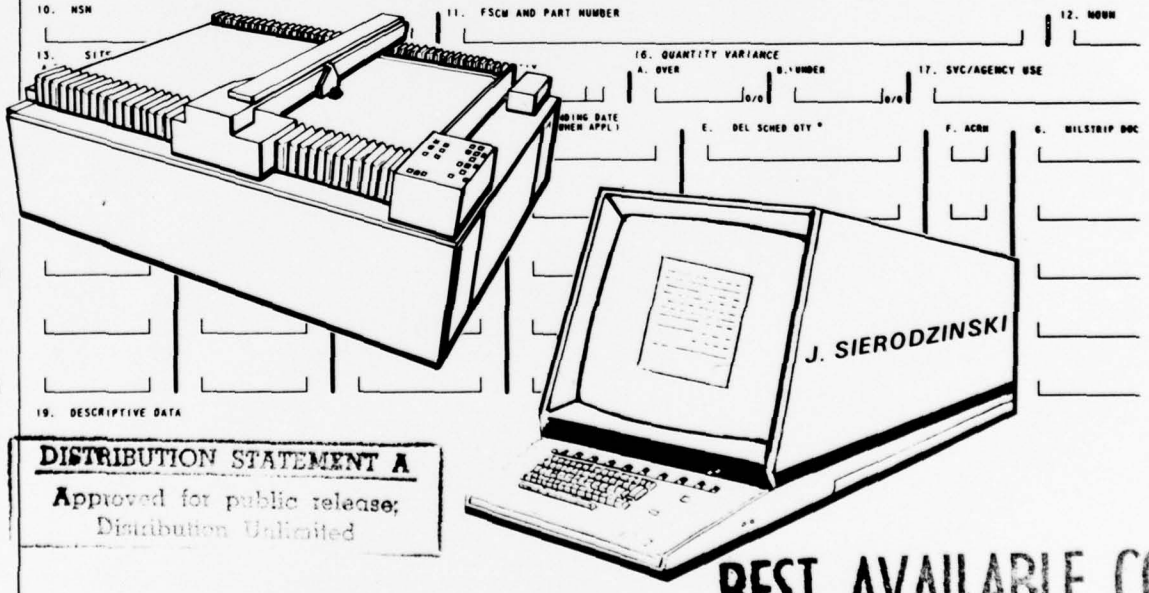

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D A S F

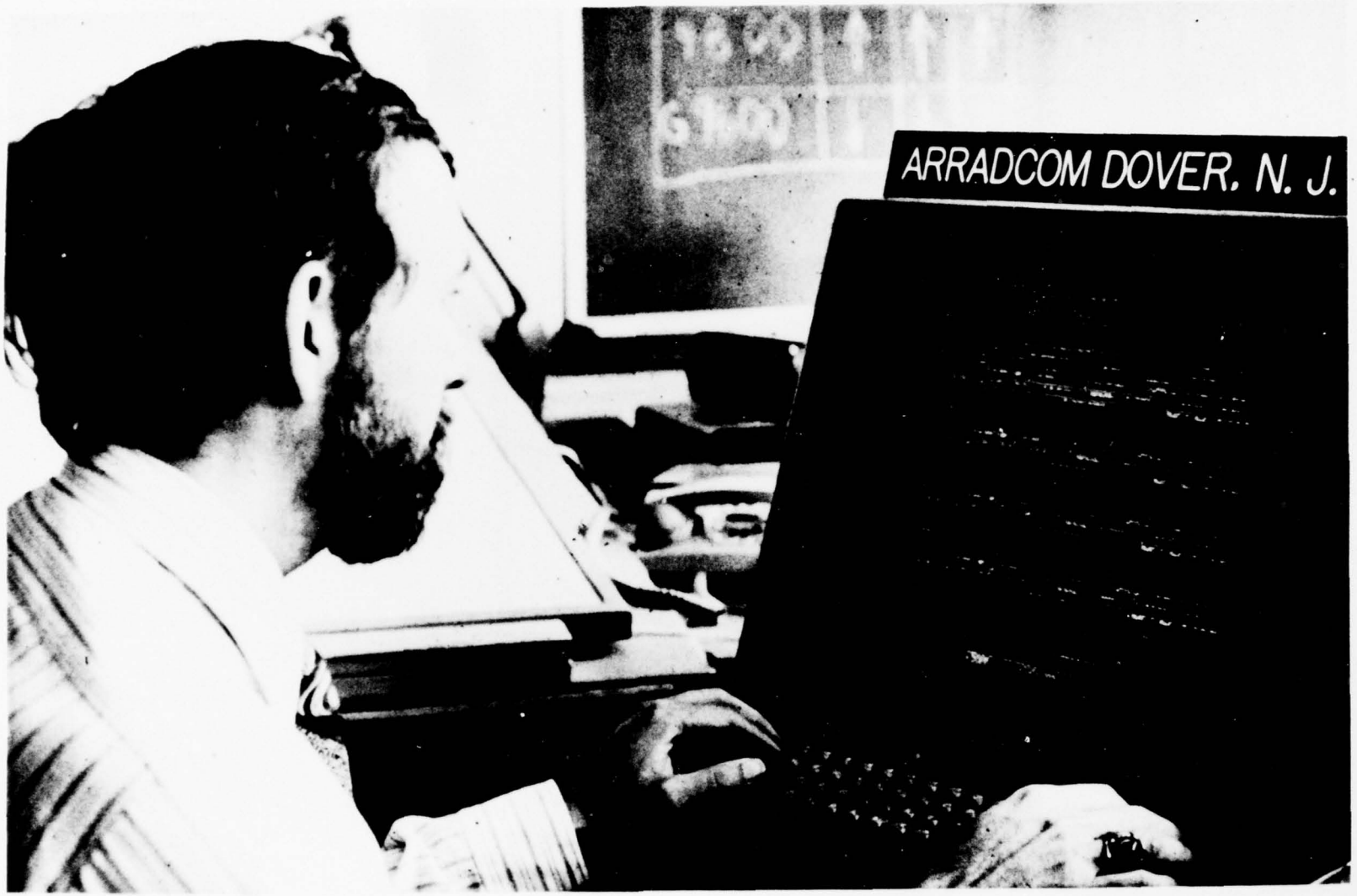
Design of Artwork for Standard Forms

by

Joseph J. Sierodzinski

OCTOBER 1977

MANAGEMENT INFORMATION SYSTEMS DIRECTORATE
SCIENTIFIC AND ENGINEERING APPLICATION DIVISION
DOVER, NEW JERSEY 07801



Author at the TEKTRONIX 4014
using DASF.

ABSTRACT

ARRADCOM has developed an interactive computerized system called Design of Artwork for Standard Forms (DASF). It was written to standardize forms design by using today's state-of-the-art graphics technology and equipment. With TEKTRONIX 4014 graphics storage tubes, Control Data series 6000 computers and a CALCOMP model 745 precision flatbed plotter, ARRADCOM is able to create, modify and store form artwork masters in their associated data bases in conversational sessions at a computer terminal. Artwork masters can be produced for local and higher authority Source Data Automation (SDA) systems with ink on paper, ink on mylar or exposed photographic film. These masters may then be used for mass reproduction of the forms. The reproduced forms may be utilized with REDACTOR's+, MTST's*, standard typewriter stations, and OCR equipment.

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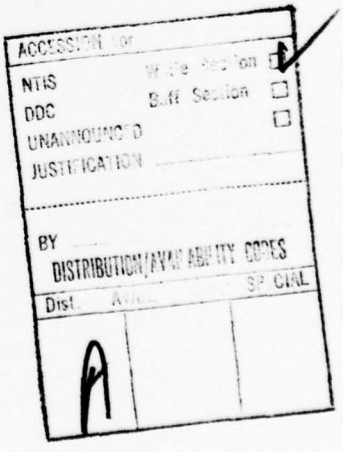

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INTRODUCTION

With Source Data Automation (SDA) systems came the requirement to design or redesign DOD forms for the new automated equipment. The procedures for designing new forms were numerous and varied. One process required the forms designer to lay out the rough form design requirements which were then sent out to professional form design companies. They in turn would generate a form artwork master that included text. This process took about two weeks for finalization and approval. The next step involved requesting bids to produce printed copies from the artwork master. A second alternative process was to have the forms designer, as before, lay out the basic design. This design was then given to a draftsman to prepare the artwork master. In most instances with the limited ability to produce very small text type on the form, the artwork master first had to be made at an enlarged scale. It then was photographically reduced to produce the final artwork master and printed forms were either produced by the agency or contracted out for reproduction. In all instances, a large time frame was required from conception to the final form artwork master to the actual printing of the form. It can be readily seen that there were no provisions in the procedure to allow for quick modifications and/or enhancements to a form once the artwork master was produced. This leads to the request for the feasibility analysis and subsequent development of DASF.

In the course of several meetings with the Armed Services Procurement Regulation (ASPR) sub committee Case 73-2-20, for Source Data Automation (SDA), ARRADCOM, formerly Picatinny Arsenal, agreed to develop a system allowing a proponent of a form the ability to move and rearrange data fields and change print sizes with minimal effort until a suitable form is created.

ARRADCOM has developed an interactive computerized system called Design of Artwork for Standard Forms (DASF). It was written to standardize forms design by using today's state-of-the-art graphics technology and equipment. With TEKTRONIX 4014 graphics storage tubes, Control Data series 6000 computers and a CALCOMP model 745 precision flatbed plotter, ARRADCOM is able to create, modify and store form artwork masters in their associated data bases in conversational sessions at a computer terminal. Artwork masters can be produced for local and higher authority Source Data Automation (SDA) systems with ink on paper, ink on mylar or exposed photographic film. The final

printed forms, mass produced from these masters, may be used with REDACTOR's+, MTST's*, standard typewriter stations, and OCR equipment.

This report describes in detail the use of the DASF System. It would be helpful if the user had a working knowledge of CDC INTERCOM IV commands, CDC SCOPE 3.4 control cards and the operation of TEKTRONIX 4014 Terminals. A list of useful manuals to aid the user can be found in the References listed in Appendix A.

For ease of use, this report is divided into several sections: some of which are to familarize the first time user with the system, and others designed to be a finger tip reference manual for the experienced user. It is important that all users pay particular attention to the notes in Section I on limitations of the system.

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I. DASF System

A. DASF System Flow

The Basic system is shown in figure 1 divided into two phases. In Phase I, the user creates and/or modifies the form artwork master. Internally, the system creates a form data base or a disk file at the CDC 6000 central computer facility. This data base can be saved (CATALOGED and/or stored on magnetic tape as described in Section VII) for archival purposes and restored at any time in the future for modifications.

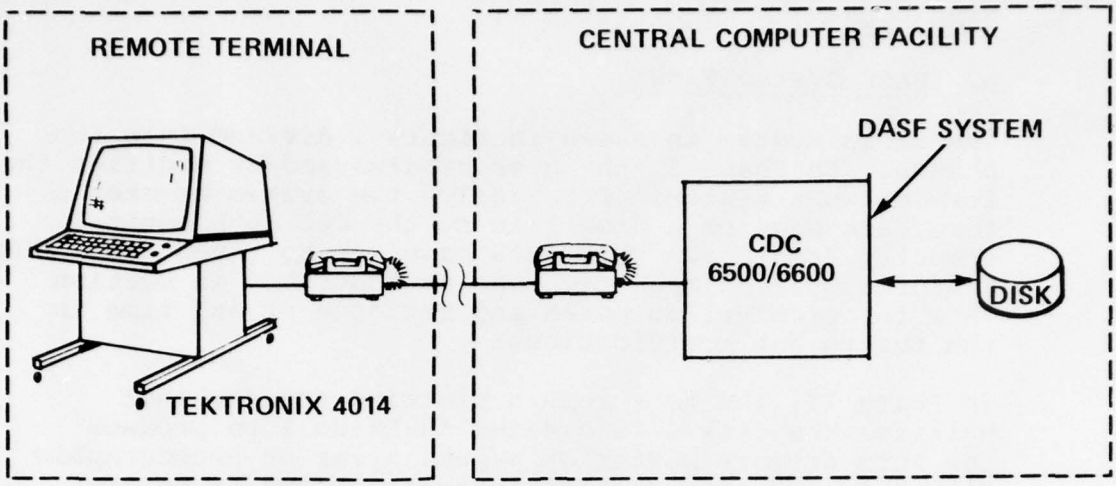
In Phase II, the user runs a plotting program that utilizes the disk file created in Phase I to produce the form artwork master on paper, mylar or photographic film. Explanation of plotting options and/or possibilities are listed in Section VI of this report.

B. "Limitations" Of The System

DASF does have some character restrictions which should not hamper the enthusiastic user in creating a form artwork master. They are listed below along with suggested solutions.

Limitation	Solution
Smallest character possible is 0.07 inches.	If a form is 8x11 inches and very small (text) characters are required, draw the form twice actual size (16x22 inches) and plot the final form at 1/2 (0.5) scale. This will allow a character drawn on the TEKTRONIX at the smallest size 0.07 inches to be plotted at 0.035 inches. A word of caution: if the form is drawn twice actual size, all lines must be drawn twice actual size (length) and the space between lines doubled.
Presently, only two character style fonts are available: 1) CALCOMP default 2) "drafting" font	No additional fonts available at this time. Refer to Section VI for direction on how to use these fonts.

PHASE I



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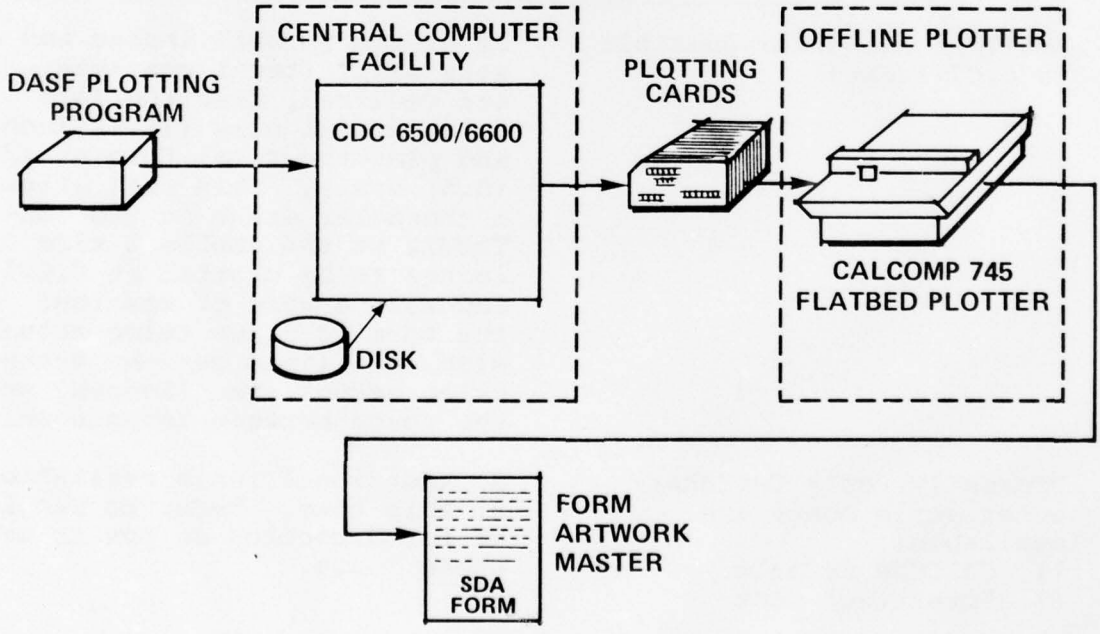

Figure 1 - Basic DASF System Flow

II. Basic Hardware And How To Use It

A. TEKTRONIX 4014 Terminal Hardware

A typical configuration (figures 2 & 3) consists of a nineteen inch diagonal rectangular graphics storage tube terminal with keyboard (figure 4) and cross-hair cursor, a synchronous interface, a hard copy unit and a graphics tablet. The keyboard will be discussed in detail later in this section. DASF is written to use all the terminal hardware except the graphics tablet which warrents no further discussion.

B. CDC 6000 Computers

There are two large scale digital computers (a CDC 6500 and a CDC 6600) at ARRADCOM, Dover, N.J. supporting a network of TEKTRONIX 4014's on a dial-up basis (that is, they are connected to the 6000's via telephone lines with dial-up data sets). There are two possible data communication speeds for DASF operation: 300 baud asynchronous or 4800 baud synchronous, and each requires different data sets. Since not all of the TEKTRONIX 4014 terminals are equipped with both data sets, two versions of DASF exist to accommodate all users.

C. TEKTRONIX 4014 Keyboard

The keyboard as pictured in figure 4 controls the terminal and program operation. First, the keyboard is used to get the terminal ready (initialized) for communications with a CDC 6000. This procedure is different for asynchronous (300 baud) and synchronous (4800 baud) and is described below. Once communications is established, the keyboard is used to communicate with the CDC 6000 under INTERCOM and then used by the program under program control. This will be described in Section III. The procedures to disconnect and clear the terminal after an application run are described in Section II.C.2. (Termination).

1. Getting the terminal ready (Initialization)

Turn the terminal ON (if it is already on, the green light on the upper left hand side of the keyboard is lit). The switch to turn the terminal ON is located on the lower right front side of the terminal about half way up between the floor and keyboard.

PRESENT LOW COST GRAPHICS TERMINAL (LCGT) NETWORK

- TEKTRONIX 4014 CRT TERMINAL CONFIGURATION
  - 19 INCH DIAGONAL SCREEN (STORAGE TUBE)
  - 12 BIT X & Y ADDRESSABILITY (4096)
  - CROSS HAIR CURSOR
  - ALPHANUMERIC KEYBOARD
  - HARDWARE CHARACTER GENERATOR
  - SYNC/COMM INTERFACE (SW SEL COMM)
  - HARD COPY (QUICK LOOK) UNIT
  - GRAPHIC DATA TABLET

Figure 2

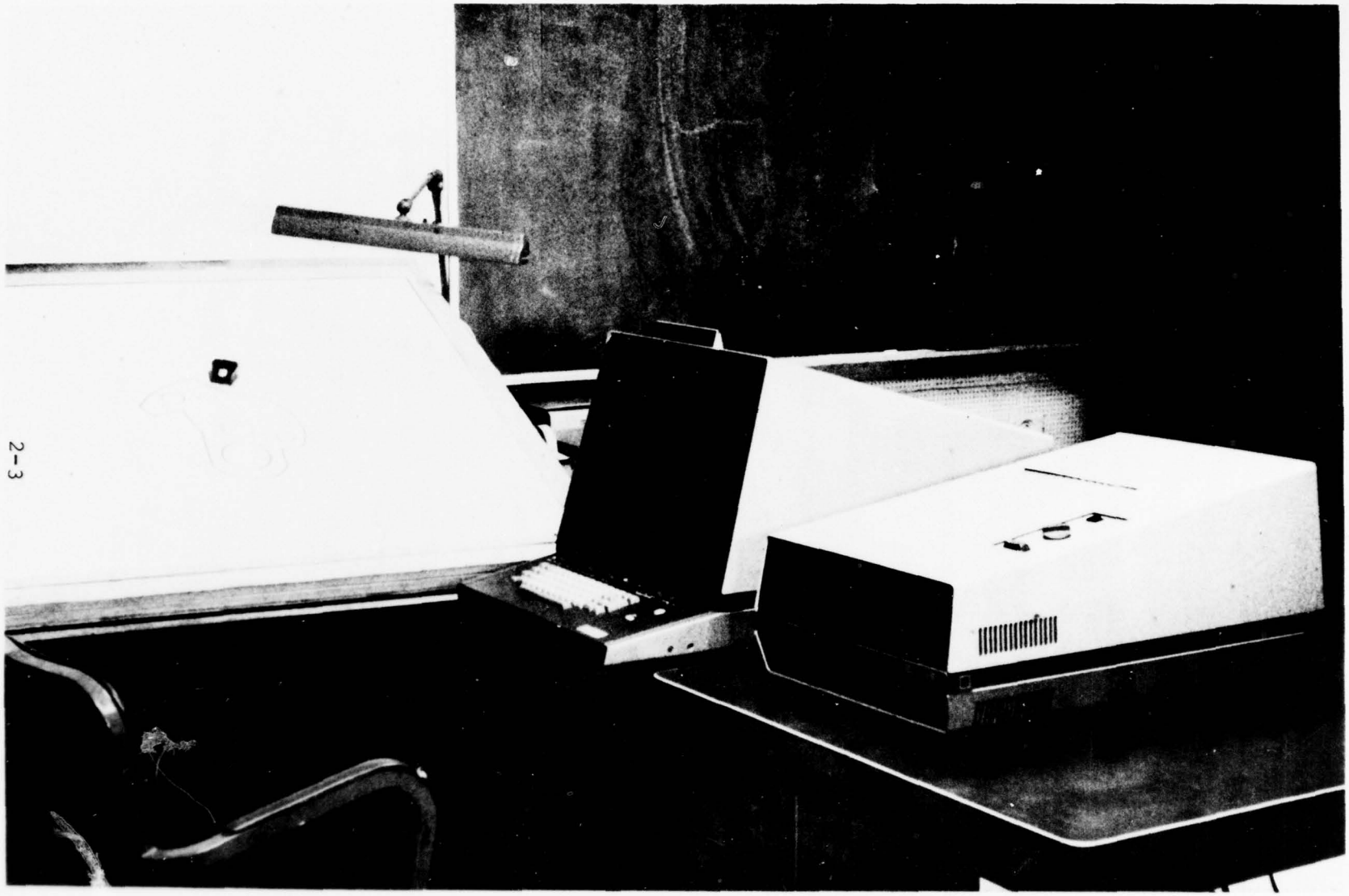

Figure 3 - TEKTRONIX 4014 Terminal Configuration.

a. Asychronous Operation (ARRADCOM, Dover Site)

1. Set the Communication Interface Control switches (figure 5) located on the back side of the terminal as follows:

   .Rotary baud switch to PROG for 110 baud rate or to 300 for 300 baud rate
   .ASCII/BCD side switch to ASCII

2. Set the MISD/SEAD communications toggle switch next to the data sets to B (for 300 baud).

From the keyboard, do the following:

3. Place the LOCAL/LINE switch to LOCAL.

4. Erase the display by pushing the PAGE key.

5. Set the following keyboard switches:

   .CODE EXPANDER to OFF
   .CLEAR WRITE to OFF

6. Enter a SHIFT RESET on the keyboard

7. Next enter a CTRL, SHIFT, P simultaneously on the keyboard.

8. Set the LOCAL/LINE switch to LINE.

9. Remove the phone from the modem cradle. Push the TALK button in and dial the appropriate number.

10. When the handset produces an audible tone, push the button marked DATA and place the phone back into the modem cradle.

11. When INTERCOM signs on, the LOGIN procedure must be performed. (See example in Section V).

b. Synchronous Operation (ARRADCOM, Dover site)

1. Set the Communication Interface Control switches (figure 5) as follows:

   .Rotary baud switch to EXT
   .ASCII/BCD slide switch to BCD

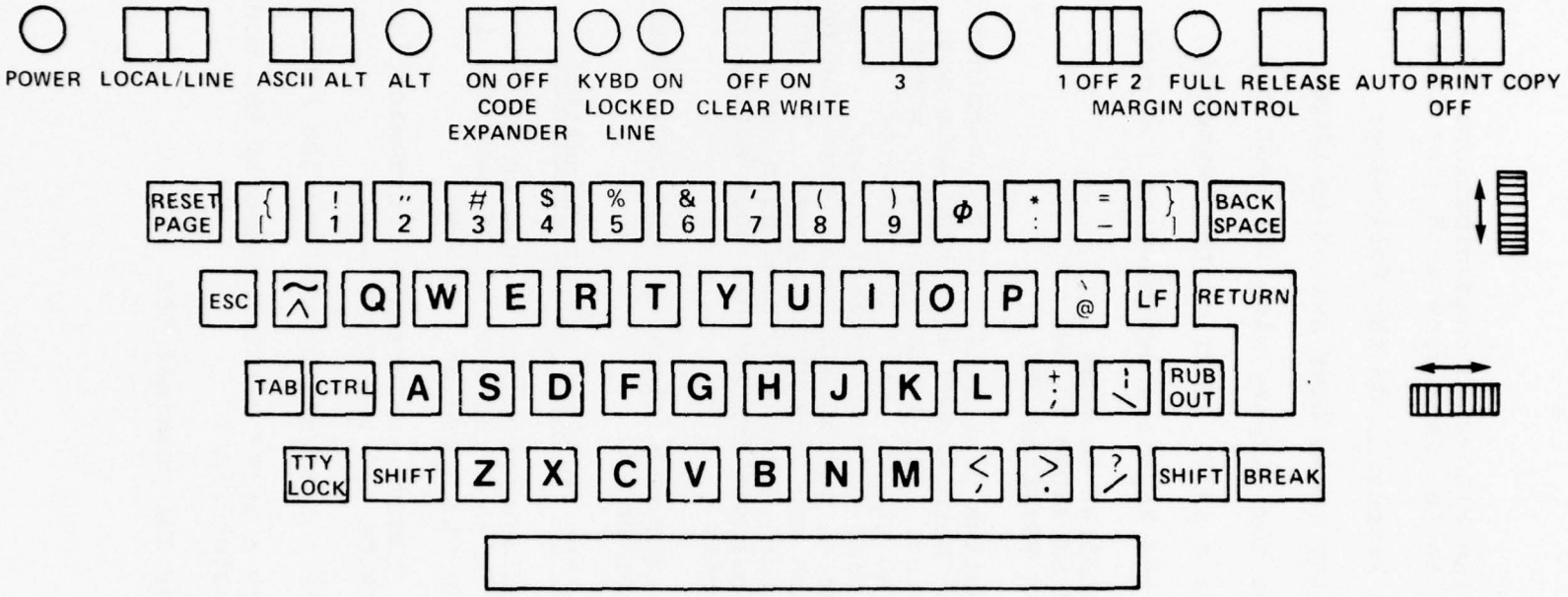

Figure 4 - TEKTRONIX 4014 Keyboard

2. Set the MISD/SEAD communications toggle switch next to the data sets to A (for 4800 baud).

From the keyboard, do the following:

3. Set the LOCAL/LINE switch to LOCAL.

4. Erase the display with the PAGE key.

5. Enter a SHIFT RESET on the keyboard.

6. Set the keyboard switches as follows:

   .LOCAL/LINE to LINE
   .CODE EXPANDER to ON
   .CLEAR WRITE to OFF

7. Establish data link. If the terminal is connected to a "hard wired" 4800 baud data set, then do nothing. For a dial-up modem, press TALK button on the phone. Lift the phone off the receiver and dial the appropriate number. When the handset produces an audible tone, press the DATA button and hang up the phone. The ON LINE indicator on the 4800 baud data set should be pulsing to indicate contact has been established with the computer.

8. When INTERCOM signs on, the LOGIN procedure must be performed.

2. Shutting the terminal off (termination)

A logging out procedure should be followed when the job is finished and before the terminal is powered off. The steps are as follows:

a. Type LOGOUT to terminate communications with INTERCOM and the computer.

b. Erase the screen by pushing the PAGE button.

c. Enter a SHIFT RESET to hang up the modem at the computer site.

d. Power the terminal OFF.

COMMUNICATION INTERFACE CONTROL SWITCHES

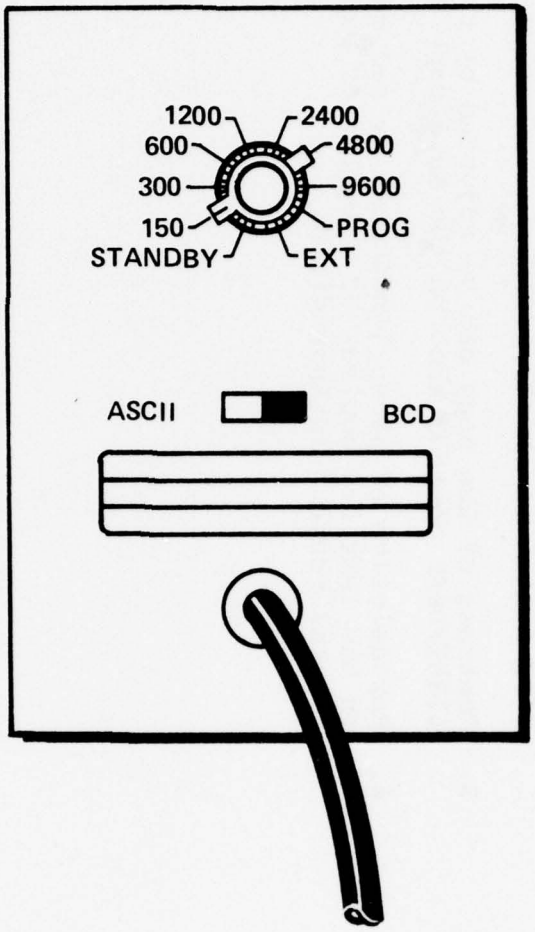

Figure 5

D. TEKTRONIX 4631 Hard Copy Unit

The Hard Copy Unit (figure 6) provides permanent high contrast copies of the 4014 terminal display. The copy size paper is 8.5 by 11 inches. Operation of the hard copy unit is as follows:

1. Power the unit ON if it is not ON already (indicated by the power on the light next to the ON/OFF rocker switch being lit). Set the rocker switch to ON. A warm up time of 10 minutes is required before attempting to make copies.

2. A copy can be made by pressing either the copy switch on the hard copy unit or the AUTOPRINT/ COPY switch on the keyboard.

3. Contrast of the copy can be adjusted by the LIGHT/DARK control knob on the hard copy unit.

4. For deletion of paper (indicated by red marks on the last few copies) or wrinkled or paper jams, see reference 7 in Appendix A.

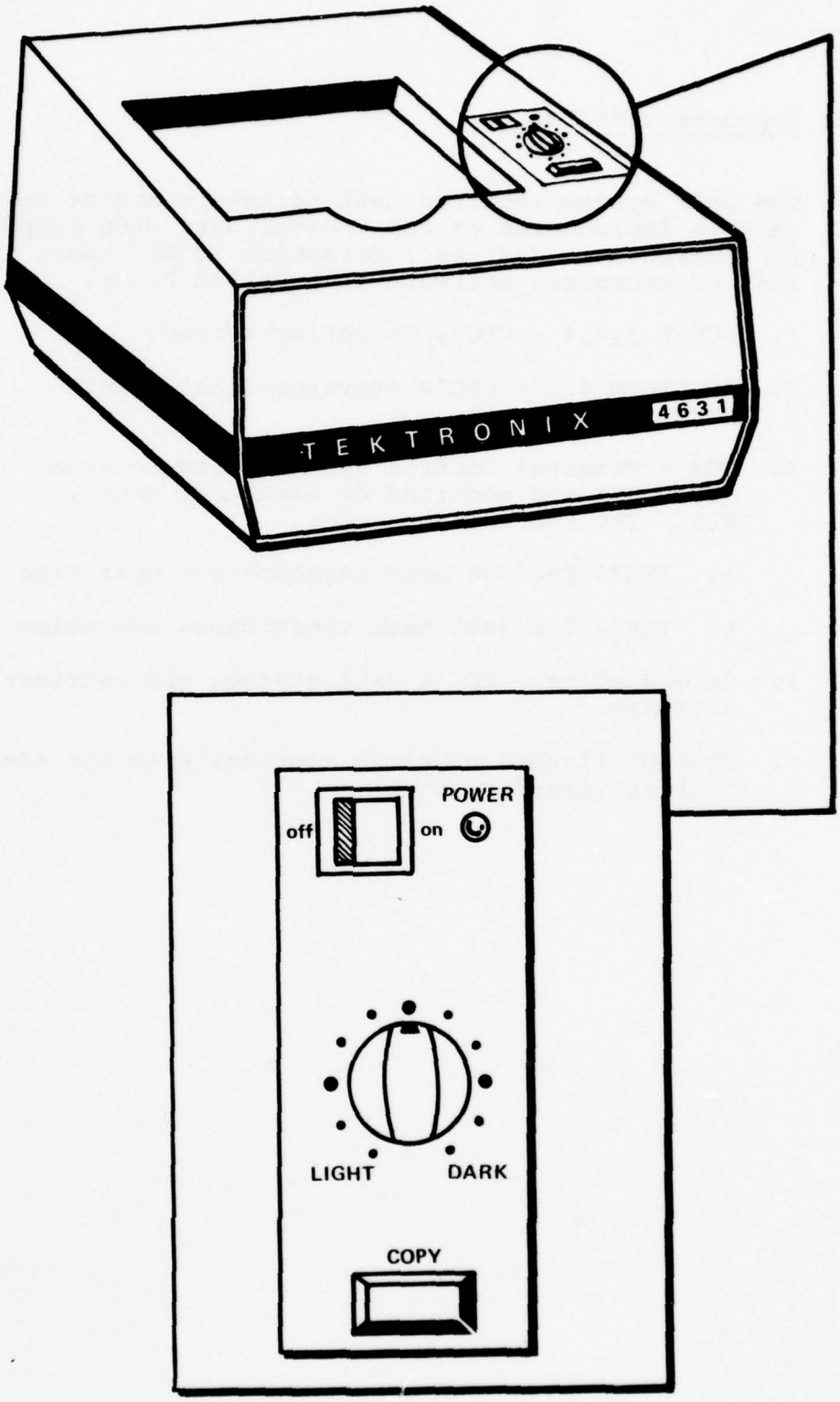

Figure 6 - HARD COPY UNIT

III. Supporting Software

The DASF system requires that certain computer software be implemented on the Control Data 6000 computers for operation. Just as information to the user, the list of necessary software is supplied below:

1. SCOPE 3.4.4 - CDC's operating system.

2. INTERCOM 4.5 - CDC's conversational remote terminal software.

3. TCS - Terminal Control System software from TEKTRONIX and modified by ARRADCOM, Dover, N.J. The two versions are:

   a. TEK30 for 300 baud asynchronous operation

   b. TEK48 for 4800 baud synchronous operation

4. Data Handler - CDC's data storage and retrieval software.

5. CALCOMP flatbed plotting routines with the additional drafting font.

IV. Summary Of DASF Options & Graphics Display

A. Program Options

DASF has the following twelve options that are selectable with the cross-hair cursor.

OPTION	DESCRIPTION
START	Allows the user to start over from the beginning. Note that new and/or old files must already have been attached (see Section V, the examples).
END	Terminates the program, clears the screen and displays the message "Catalog Data File to Save for Plotting". At this time, the user is under INTERCOM and has the option of cataloging his data file provided that he had picked the PLOT option prior to END. Otherwise, the plot data file will not have been properly closed and if attached and used will terminate the program with a DATA HANDLER error message.
HORIZ	Allows the user to draw horizontal lines composed of vectors 0.1 inches in length. Selecting this option displays the message "LINE WTH=" (or short for line width) and waits for the user to type in a number (1 to 4 for pen settings or 1 to 8 for light head aperture settings, as in Appendix B) followed by a RETURN. The cross-hairs appear, allowing the user to place them at the starting position. Once this is done, the user types a 1 (one) on the keyboard indicating to the program that this is the starting location. This type-in is for program control only and is not displayed on the screen. The cross hairs

OPTION	DESCRIPTION
HORIZ (continued)	appear again allowing the user to place them at the other end location for the line. The user then types a 2 (two) which is also not displayed on the keyboard indicating the end of the line. The line appears on the screen and the user is ready to pick another option. To simplify having to move the cross hairs to the menu area to select this option, the user only needs to type an "H" on the keyboard. The program then asks for the LINE WTH along with user selected starting (1) and ending (2) points of the line as outlined above.
VERT	Allows the user to draw vertical lines composed of vectors 0.16667 inches in length. Selecting this option is identical to the HORIZ option in that the message "LINE WTH=" appears first and the program waits for a type in. After typing in a pen or light head number (see HORIZ option) followed by a RETURN, the cross hairs appear. Next, the user selects the starting location and types a 1. The cross hairs appear again and the user selects the ending location and types a 2. The designated line appears on the screen and the system waits for the next user selected option. For simplicity, the user does not have to select this option from the menu and only has to type in a "V" to get this option followed by the above procedure.
MOVE	Allows the user to translate any horizontal or vertical line within the form. (Note that this does not include moving the border). Selecting this option displays the cross hairs which can be positioned any-

OPTION	DESCRIPTION
MOVE (continued)	where on the line to be moved. The user then depresses the space bar and the cross hairs reappear. The user positions the cross hairs at the starting location of where the line is to be moved and then types an "M" which is not displayed on the keyboard signifying to the program that this is the new location for the line. The screen is cleared and the display is regenerated with the line at the new location.
ERASE	Allows the user to erase any line except a border line. Selecting this option displays the cross hairs which allow the user to position them over any portion of the line to be erased. Then by pressing the space bar, the screen is cleared and the display regenerated with everything except the erased line.
TEXTIN	Allows the user to input a string of text (maximum of 120 characters per string) to be placed anywhere on the form. The limitation of a minimum size of 0.07 inches is imposed by the plotter: characters can be any size equal to or greater than 0.07". There are three angles for placement of the text string on the form (0.0,90.0 and 270.0 degrees measured counterclockwise from the horizontal). The procedure for inputting text goes as follows: First the message "LINE WTH=" appears following the user, as before, to select the pen (1-4) or light head aperture (1-8 setting for the text string. The user makes his selection followed by a RETURN. The message "SIZE=" appears. This allows the user to specify the text size followed by

OPTION	DESCRIPTION
TEXTIN (continued)	a RETURN. The message "ANGLE=" appears allowing the user to specify the angle for orientation of the text. Once the angle is specified, followed by a RETURN, the cursor appears on the lower left hand side of the screen (Text Input Area) awaiting the user type-in of the text string. Once the string is typed in, followed by a RETURN, the cross hairs appear. The user places the cross hairs at the lower left hand edge of where the text is to be placed and types in a "T" which is not displayed. The text is then written on the screen at the position indicated. One thing to be noted here is a program limitation of four lines of the text in the Text Input Area. If the user tries to type more, the screen will clear and regenerate the form with the cross hairs appearing and waiting for a selection of the next option. If this happens, the user should just select this option again and continue.
TEXTMOV	This option is similar to MOVE in that it allows the user to move (translate) a string of text. Selecting this option displays the cross hairs which are used to select the text string. Once selected, the user depresses the space bar and the cross hairs re-appear. The user then positions them at the lower left hand corner of the location to where he wishes to move the text string and types in a "P" which is not displayed. The screen is cleared and the display is redrawn with the text moved to the new location.

OPTIONS	DESCRIPTION
TEXTERAS	Allows the user to erase any text string. Selecting this option displays the cross hairs allowing the user to select the text string to be erased. Once selected, the user depresses the space bar. The screen is cleared and the display is regenerated without the selected text.
PLOT	Selecting this option closes out the users current form file that was designated at the beginning of the program. This option must be selected if a plot of the form is desired. After selecting this option followed by selecting the END option, the user's form file is ready to be cataloged under INTERCOM for Phase II of the system.
ZOOM	Allows the user to "zoom" in on any portion of the form in order to do detailed work. Selecting this option displays the message "ZOOM=" and the user can then select the zoom level (i.e. 1-5, etc.) desired with which to view a particular portion of the form. After typing in the number followed by a RETURN, the cross hairs appear. The user then places the cross hairs at the center location of that portion of the form that he desires to zoom in on. Then, by depressing the space bar, the screen is cleared and only that portion selected by the user at the desired zoom level is displayed on the screen. If the user wishes to return to the original form display, he need only type in a zero when the display asks for "ZOOM=" and depress the space bar when the cross hairs appear.

OPTIONS	DESCRIPTIONS
DUP	Allows the user to exactly duplicate either a line (horizontal or vertical) or any text string located within the form border. Selecting this option displays the cross hairs. The user places the cross hairs over the line or text string and then either types in a non displayed "L" if it is a line or depresses the space bar if it is text. The cross hairs reappear on the screen allowing the user to position them on the lower left hand corner where the duplicated line or text is to appear. Then by simply depressing the space bar, the line or text is duplicated at the selected location.

For further explanation and use of the options, see Section V.D.1.

B. Screen Layout

The TEKTRONIX screen is divided up into the following areas (figure 7):

NAME	DESCRIPTION
Menu Area	All cross hair selectable program options are located in this area.
Message Area	Area for program input requests and program error messages.
Text Input Area	A four line area where the user types in a form text (at a maximum of 120 characters/line).
Form Drawing Area (or window)	Area where the form is drawn and displayed. (This includes form text).

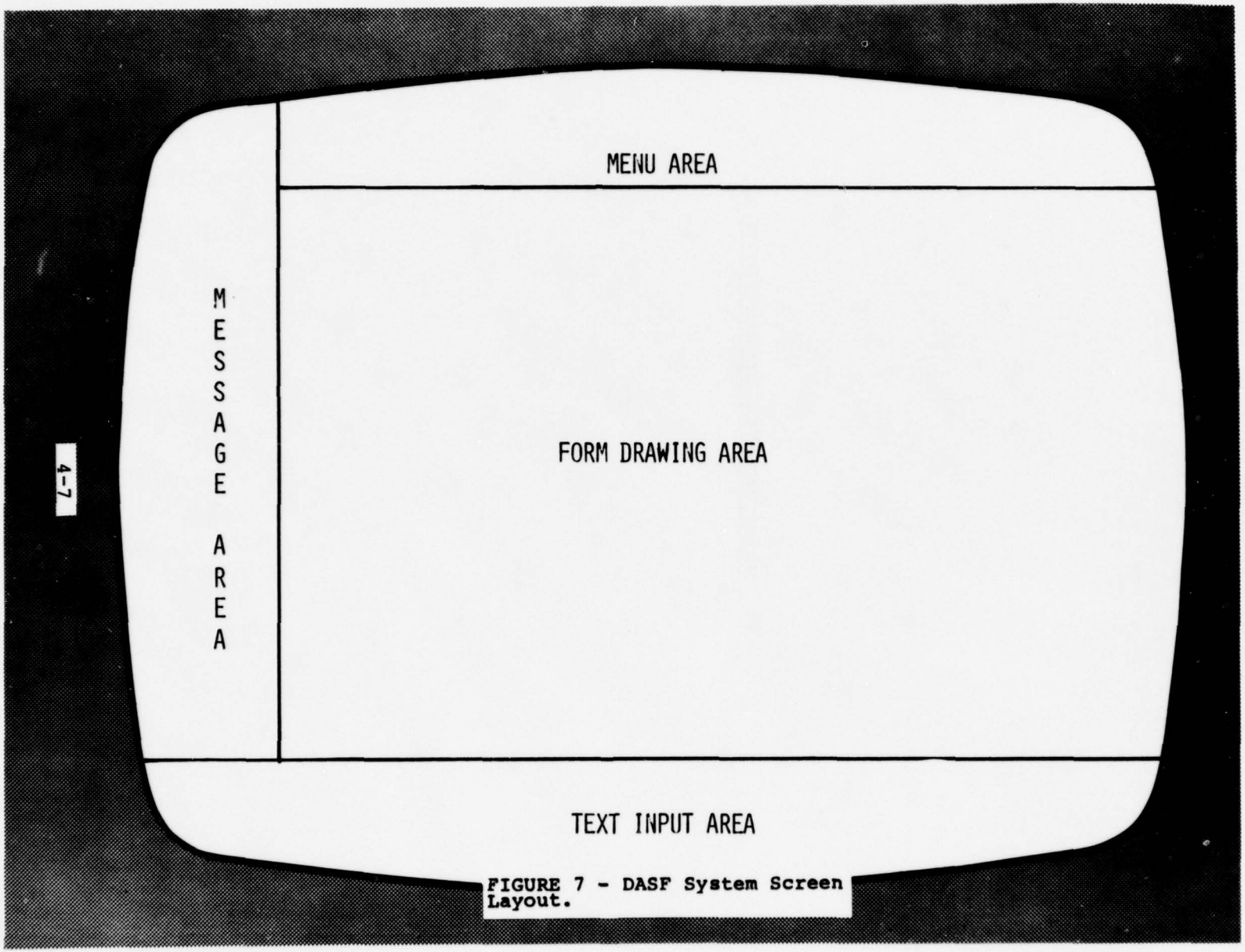

FIGURE 7 - DASF System Screen Layout.

V. Using DASF to Create Forms.

A. LOGIN Procedure

Assuming the user has initialized the TEKTRONIX terminal (reference Section II.C.1) and established communications with the CDC 6000 computer by dialing the appropriate number, the INTERCOM system then requests user identification to establish a conversational mode link between the TEKTRONIX and the CDC 6000 computer. The sequence is as follows:

INTERCOM responds with its identification and asks the user to please login.

```
CONTROL DATA INTERCOM 4.5
DATE 02/11/77
TIME 08.36.48.

PLEASE LOGIN
```

The user replies by typing the word login followed by a **RETURN** keystroke.

```
LOGIN
```

Next, INTERCOM responds by asking for a user name.

```
ENTER USER NAME-
```

The user name looks like the following:

```
uuuuxxxyyy
```

It contains the following information:

uuuu - a unique 4 alphanumeric character user identification assigned by ARRADCOM, Dover, N.J.

xxx - a three digit cost center number

yyy - a three digit charge code

which is described in Reference 10 Appendix A, page 12-1. After typing in the user's name followed by a RETURN keystroke, INTERCOM will respond and ask for the passwork associated with that user name if it is a valid name.

```
xxxxxxxxxx ENTER PASSWORD-
```

If it is correct, INTERCOM will acknowledge with the following:

```
02/11/77    LOGGED IN AT 08.37.29
            WITH USER-ID MY
            EQUIP/PORT 43/004
COMMAND-
```

INTERCOM is now in conversational mode and waiting for the user to enter a command. Basically, any SCOPE or INTERCOM command can be entered at this time. There are several standard commands that are used to run DASF. In each case, the command is followed by a RETURN keystroke. A description of each follows:

1. ETL Command - Enter Time Limit command is necessary because the length of time normally required to draw a form usually exceeds the default value. It is simply

   ETL,xxxx
   where xxxx is the estimated time for the form designing session in system seconds, i.e. ETL,500; ETL,1000; ETL,2500,: etc.

2. ATTACH Command - There are two attach commands that are used: one that will always remain the same and be used every time and a second which is used when the form data base already exists. The first command that is never changed is as follows:

   ATTACH,X,FORM48,ID=SIEROD,MR=1 (for 4800 baud) or

   ATTACH,X,FORM3,ID=SIEROD,MR=1 (for 300 baud)

   The second command to be used if the user is modifying and/or adding to a form that already exists (i.e. has been previously cataloged) is as follows:

   ATTACH,lfn,pfn,ID=name,RD=xxx,MD=xxx,EX=xxx

   where lfn - local file to contain the form data base
   pfn - permanent file name under which the data base has been cataloged
   name- the user's name
   xxx - the user's password

3. REQUEST Command - Used instead of the second (previous) ATTACH command when a new form is to be created. It is as follows:

   REQUEST,lfn,*PF

   where lfn - the local file name where the form data is to be temporarily stored

4. The Executive Command - Exactly as follows:

   X

B. An example of LOGIN to create a new form

The following (figure 8) is a sample LOGIN which the user would see on the TEKTRONIX 4014 screen. It illustrates the previous commands to run the DASF system at 300 baud asychronous.

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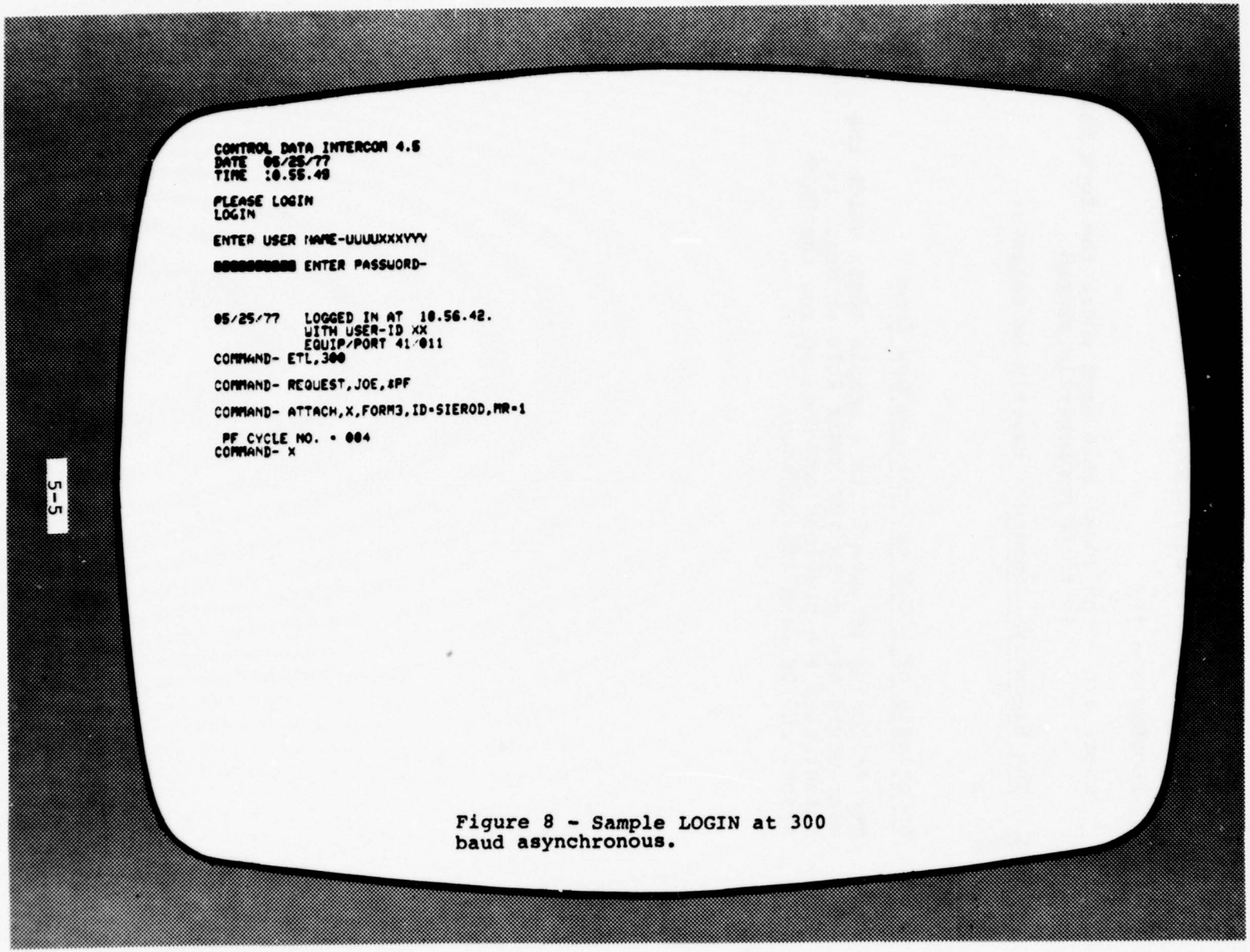

Figure 8 - Sample LOGIN at 300 baud asynchronous.

C. An example of LOGIN to add to, update or modify a form

The following sample LOGIN (figure 9) uses the previous commands to run the DASF system at 4800 baud synchronous.

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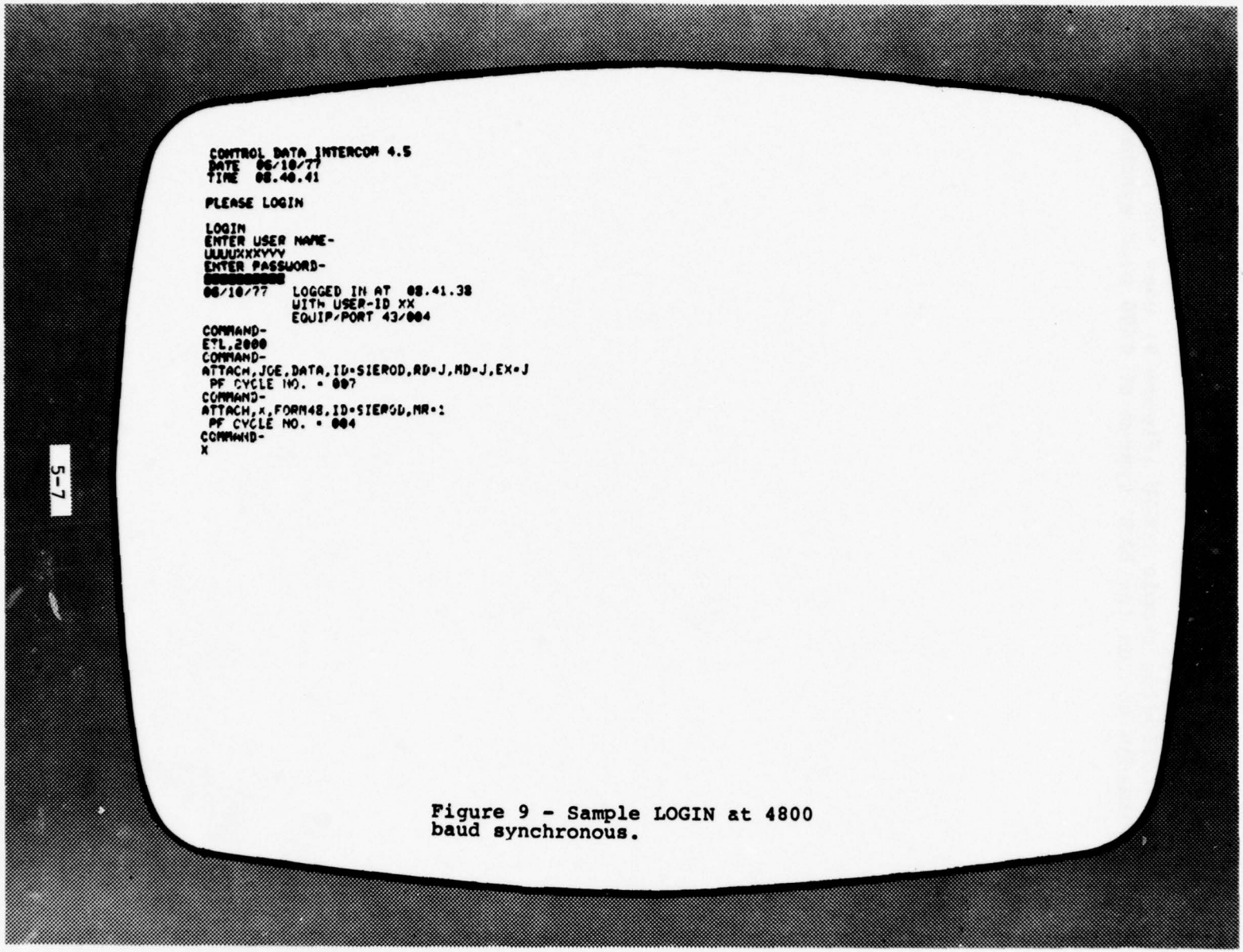


Figure 9 - Sample LOGIN at 4800 baud synchronous.

D. Execution of the system to create a form

Once the system is put into execution, the user must provide DASF with basic information about the form through interaction with the system. The information consists of: form type, form file name, form size, and form units. The form type is either new or old. The form file name is the same name (lfn) specified on the ATTACH or REQUEST command. (Refer to previous paragraph in this section A.2 and A.3). The form size which is actually the paper size (outer dimension) is required in the following order; width by height (i.e. 8½x11). Along with the form size is the form units which can be expressed in either inches or character - line (i.e. the total number of characters across the width of the paper by the total number of possible lines). As mentioned, an 8½x11 inch form is equal to an 85 character by 66 line form. The following sequence of figures (10 thru 15) illustrate the user initiating the first steps in creating a new form.

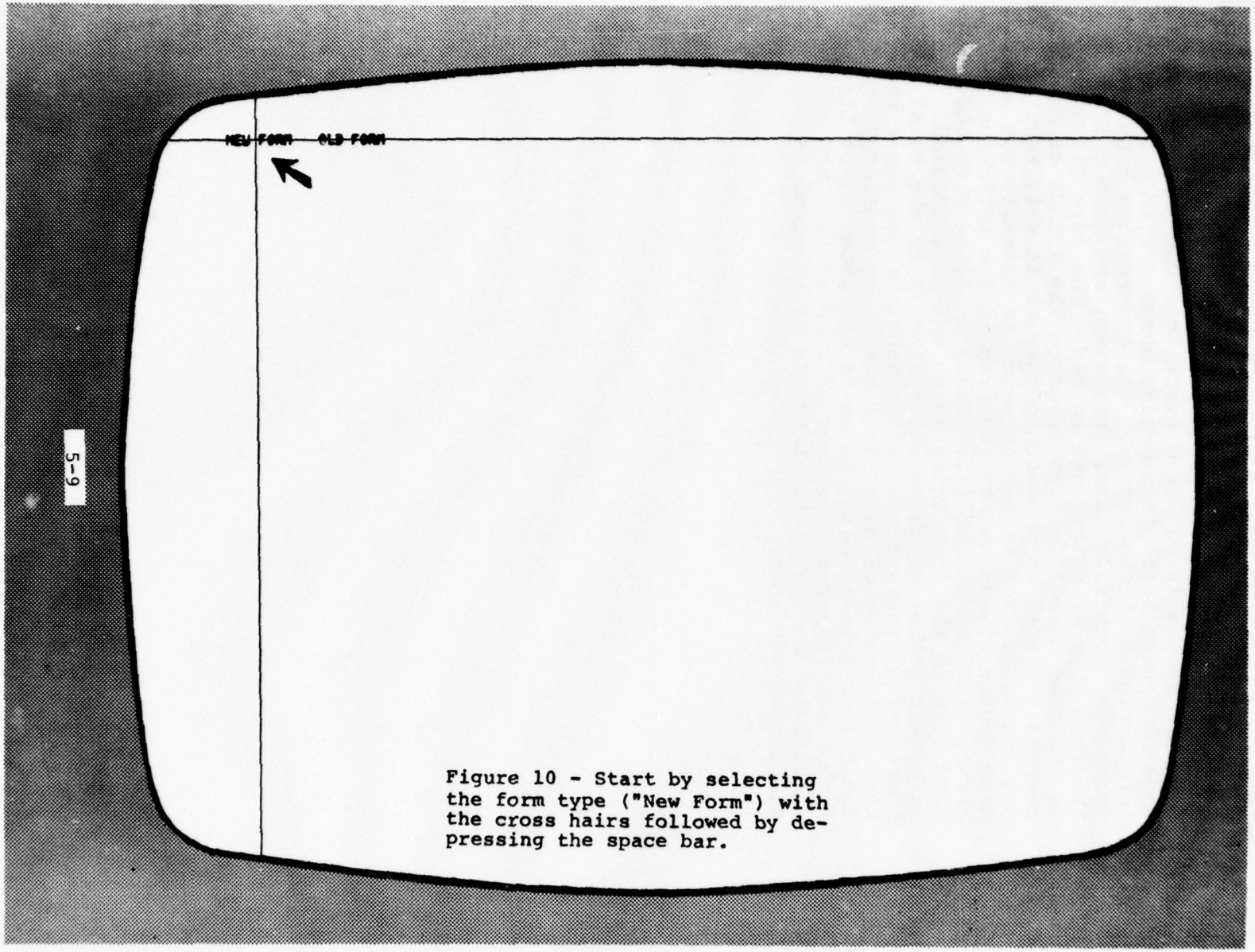


Figure 10 - Start by selecting the form type ("New Form") with the cross hairs followed by depressing the space bar.

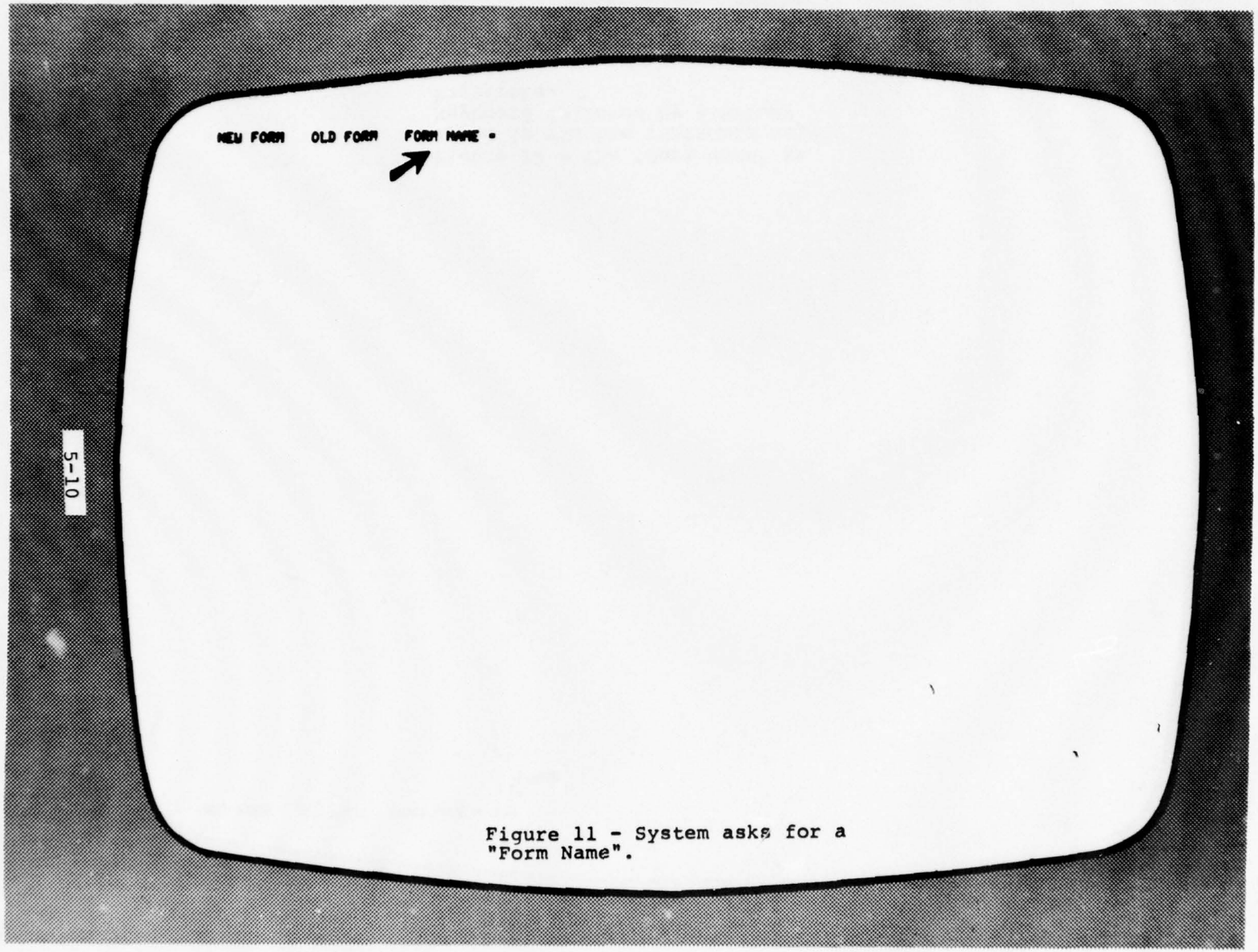


Figure 11 - System asks for a "Form Name".

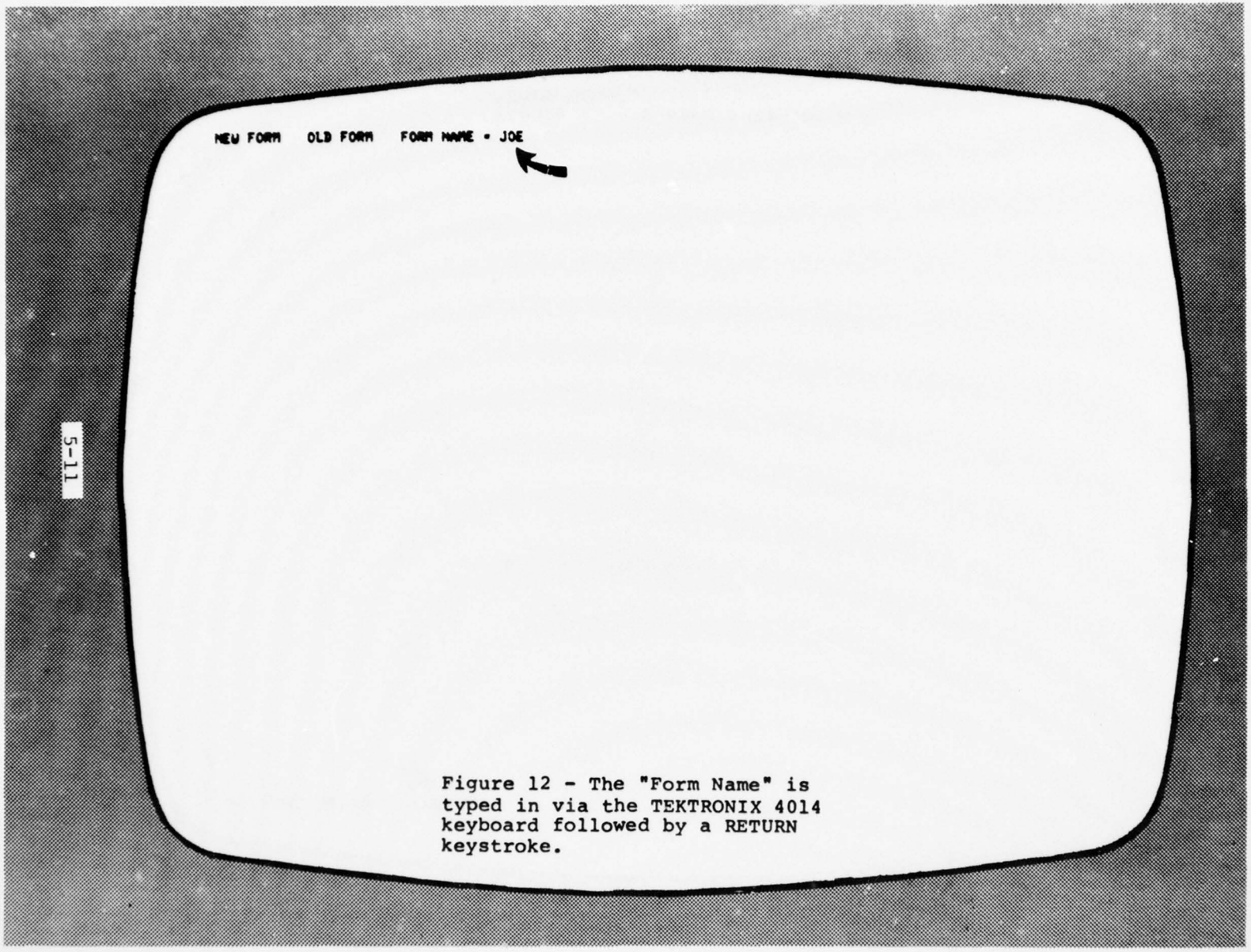
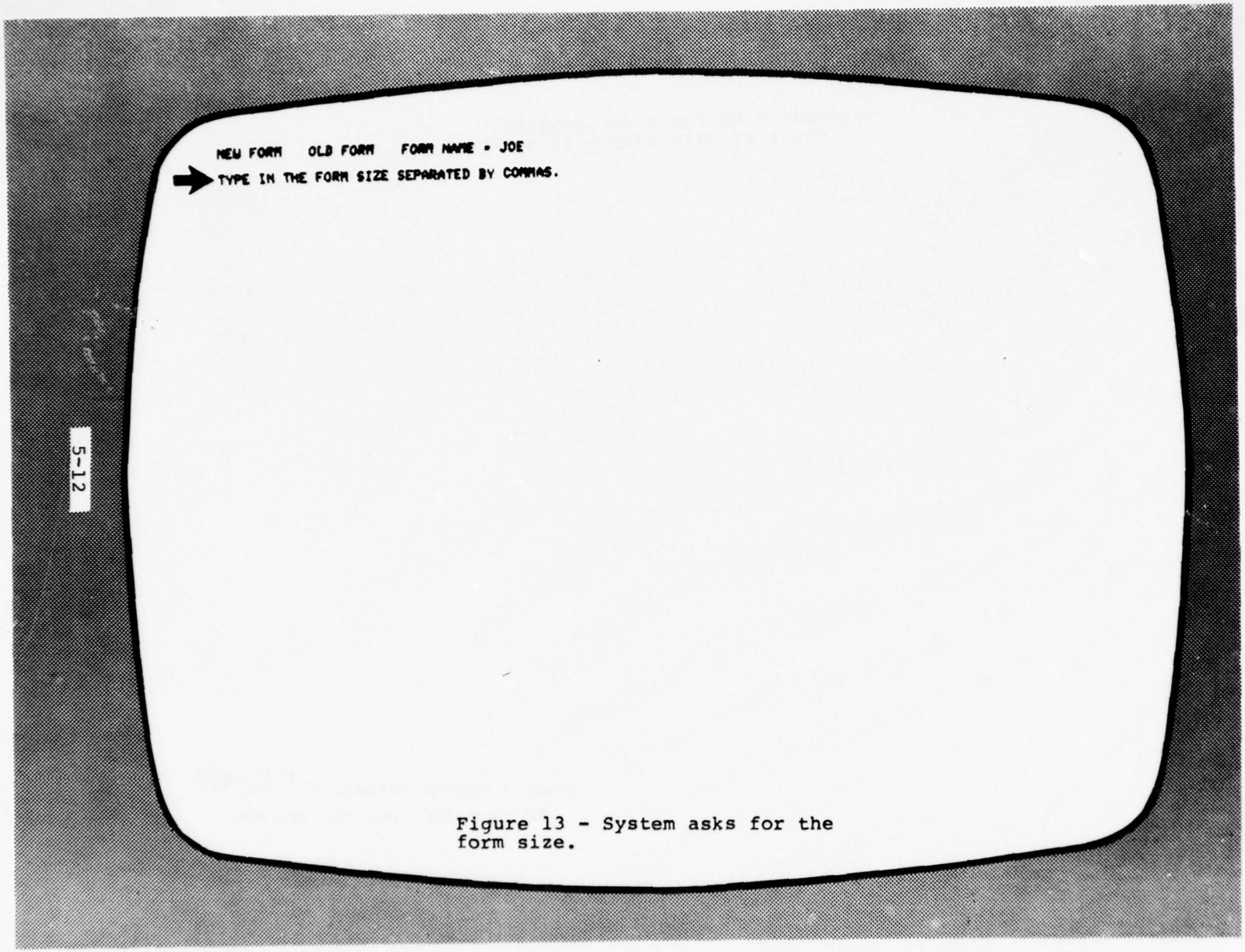


Figure 12 - The "Form Name" is typed in via the TEKTRONIX 4014 keyboard followed by a RETURN keystroke.



5-12

Figure 13 - System asks for the form size.

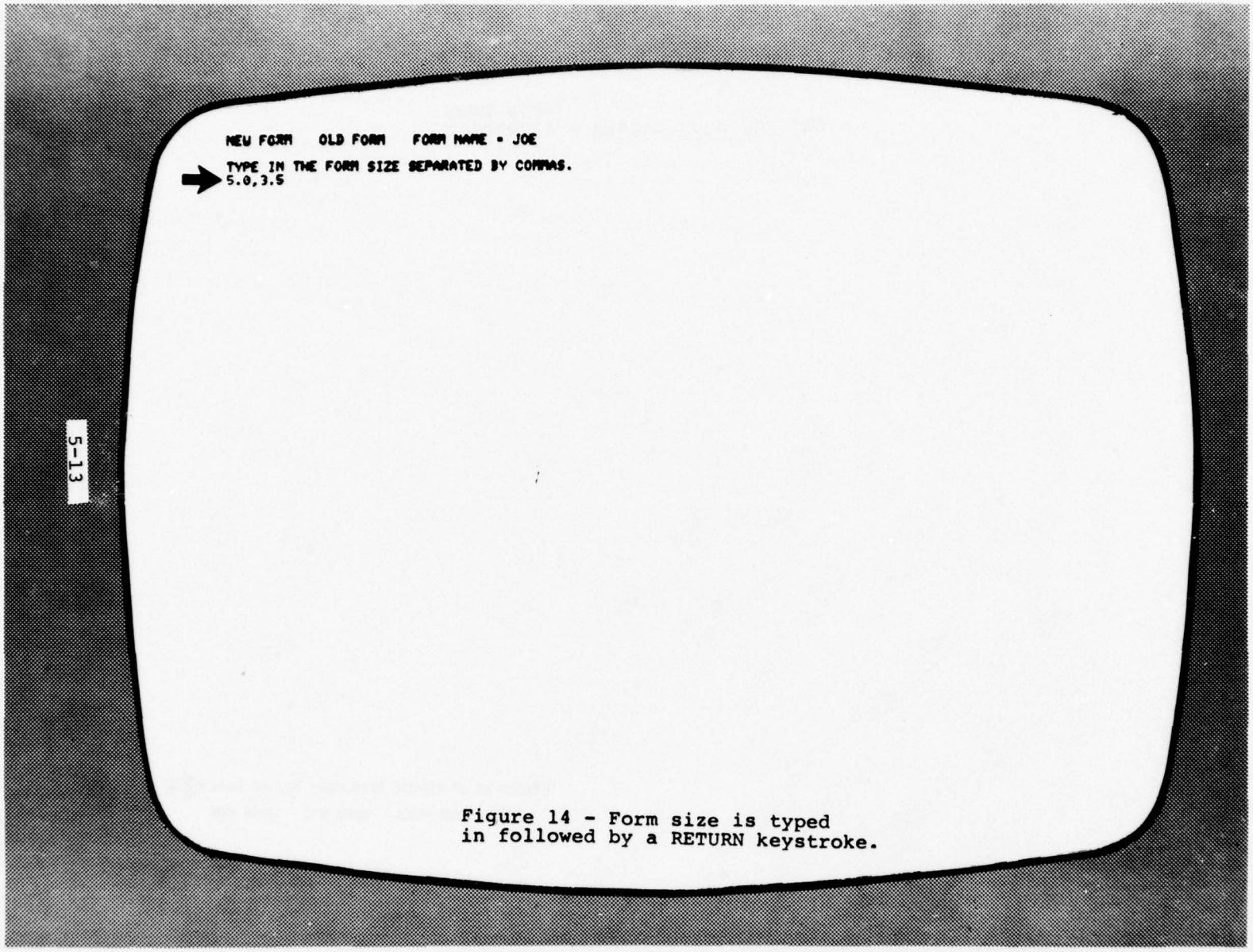


Figure 14 - Form size is typed in followed by a RETURN keystroke.

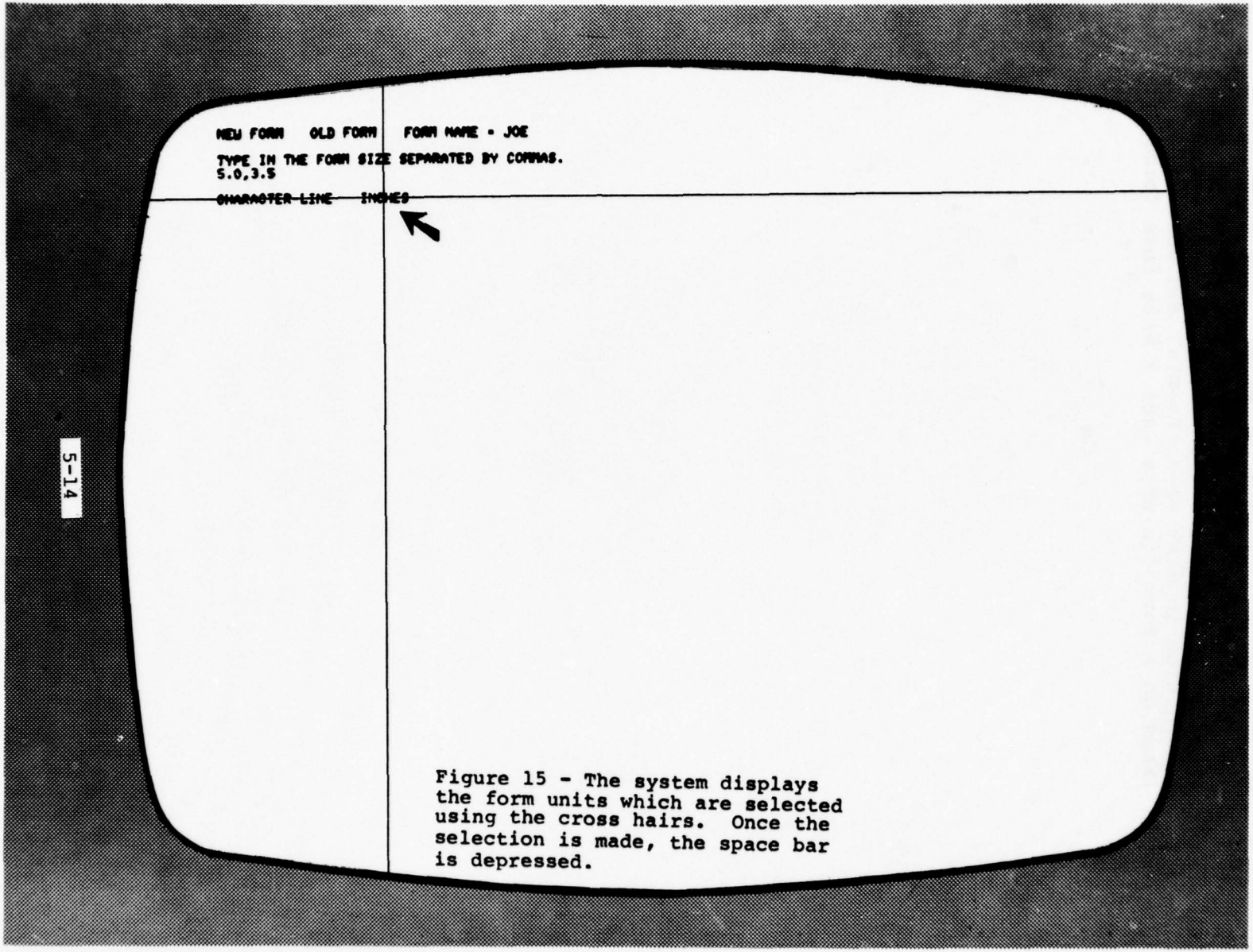


Figure 15 - The system displays the form units which are selected using the cross hairs. Once the selection is made, the space bar is depressed.

1. Drawing the form (HORIZ and VERT) - Now that the user is ready to draw the form, the following figures (16 thru 28) illustrates the user/system interaction in drawing horizontal and vertical lines on a form (in this case a 5x3½ inch form).

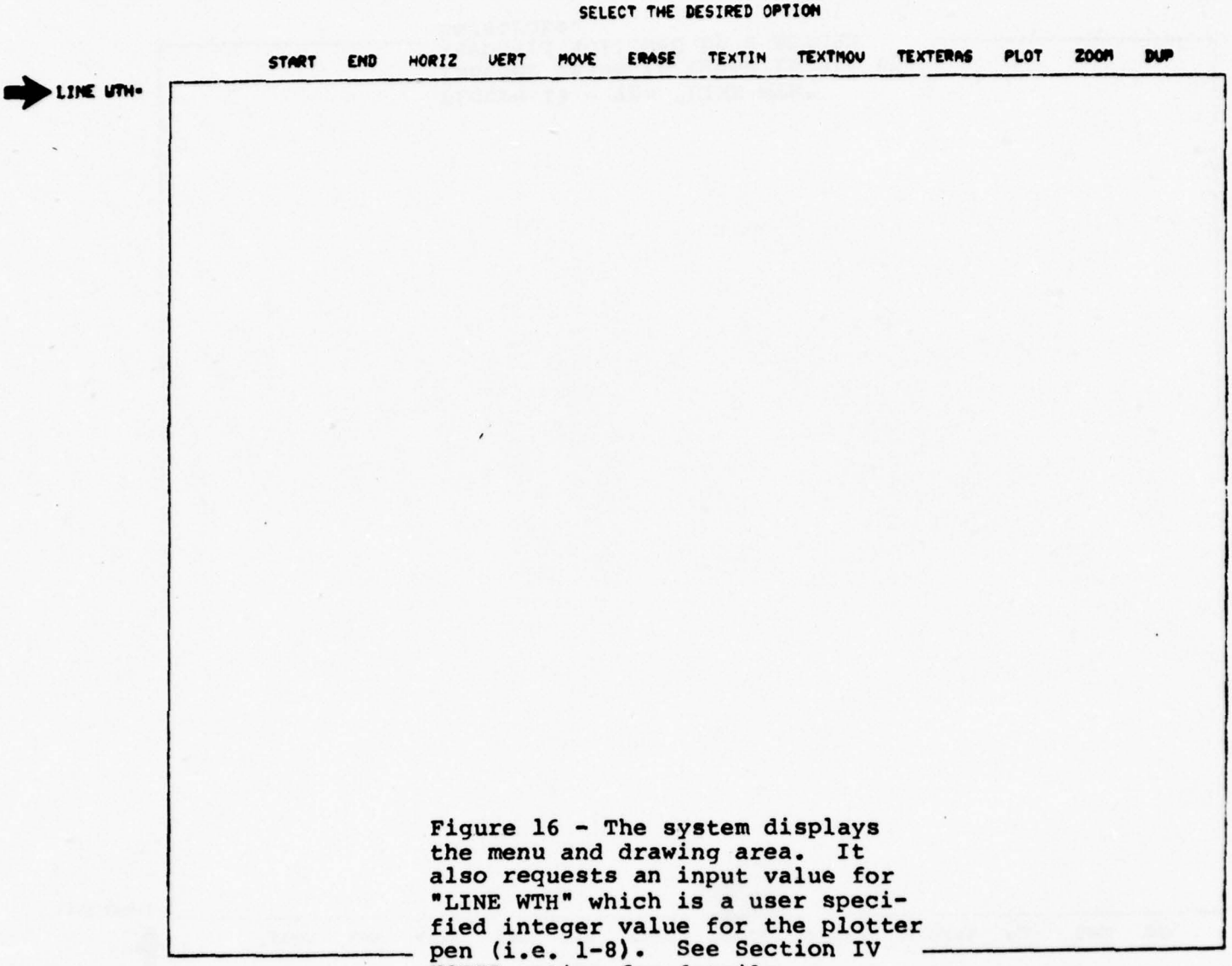


Figure 16 - The system displays the menu and drawing area. It also requests an input value for "LINE WTH" which is a user specified integer value for the plotter pen (i.e. 1-8). See Section IV HORIZ option for details.

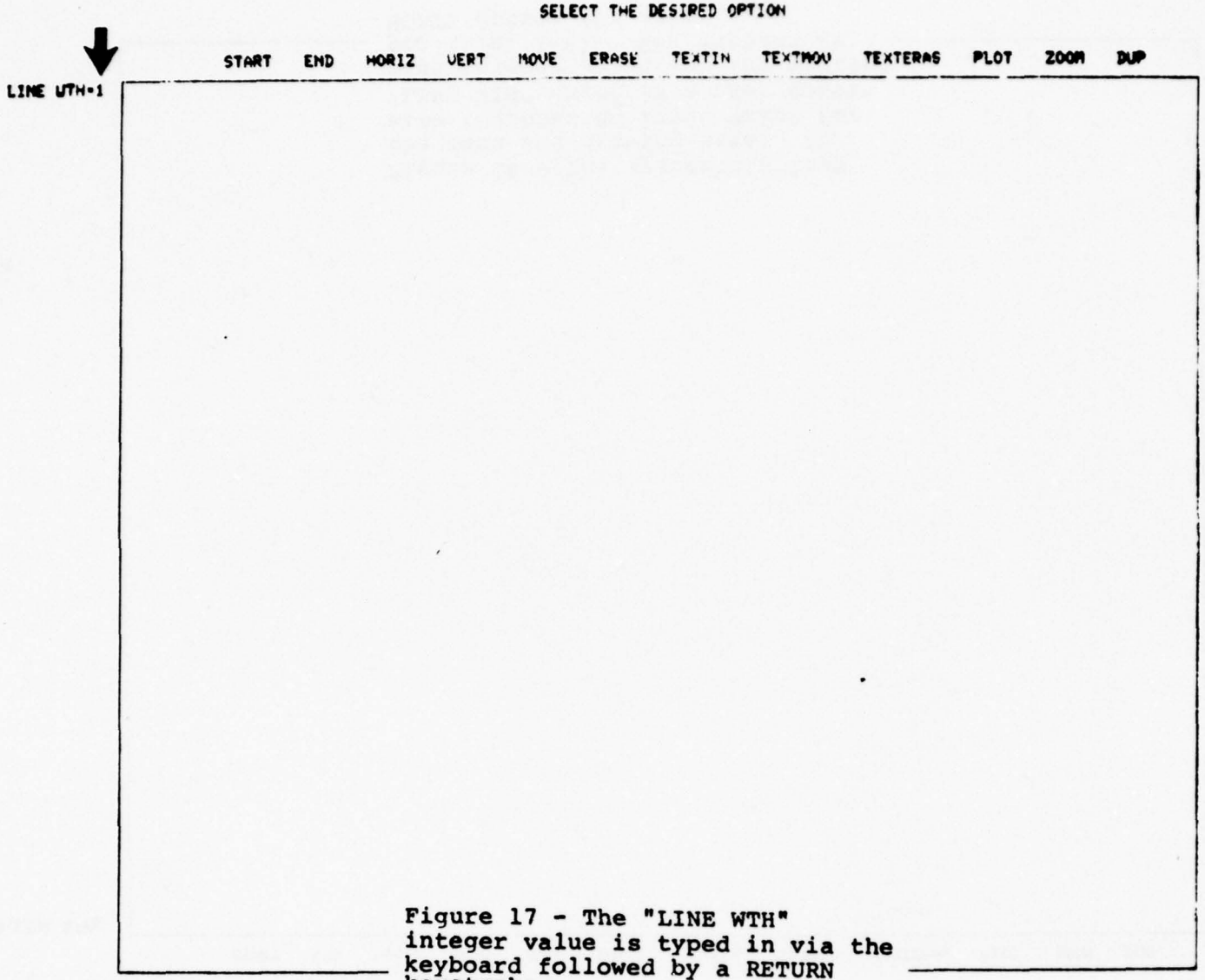


Figure 17 - The "LINE WTH" integer value is typed in via the keyboard followed by a RETURN keystroke.

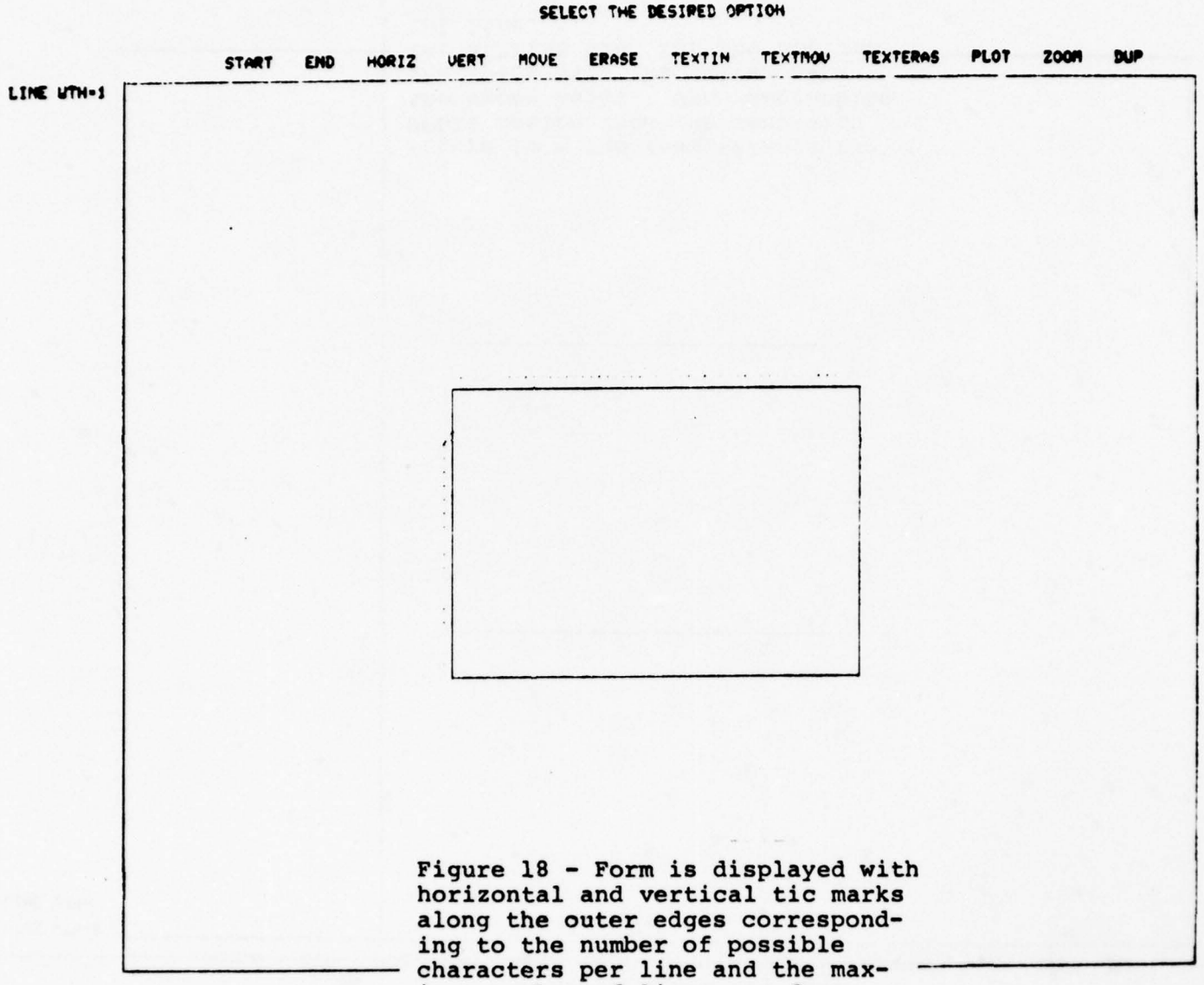


Figure 18 - Form is displayed with horizontal and vertical tic marks along the outer edges corresponding to the number of possible characters per line and the maximum number of lines per form.

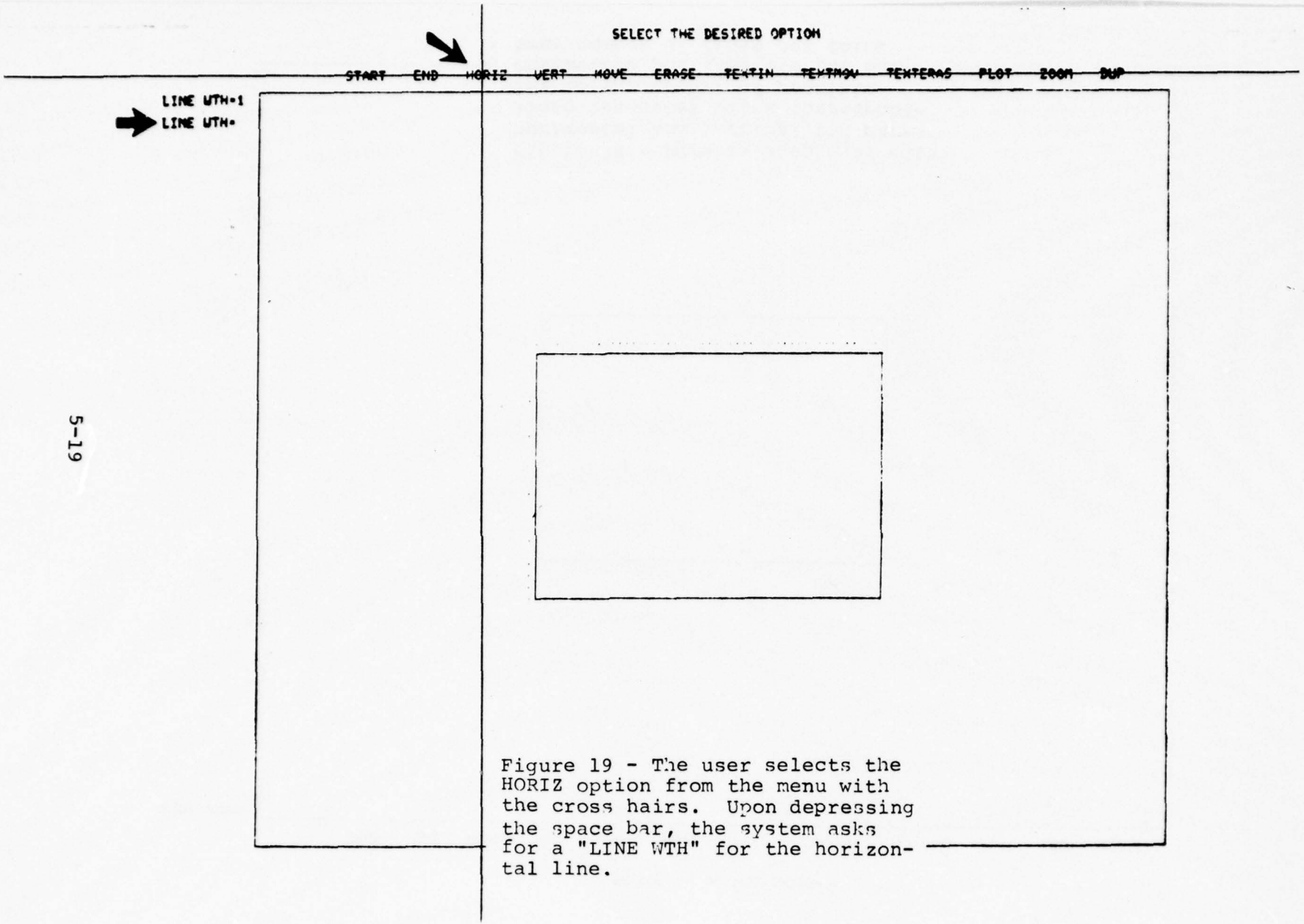


Figure 19 - The user selects the HORIZ option from the menu with the cross hairs. Upon depressing the space bar, the system asks for a "LINE WTH" for the horizontal line.

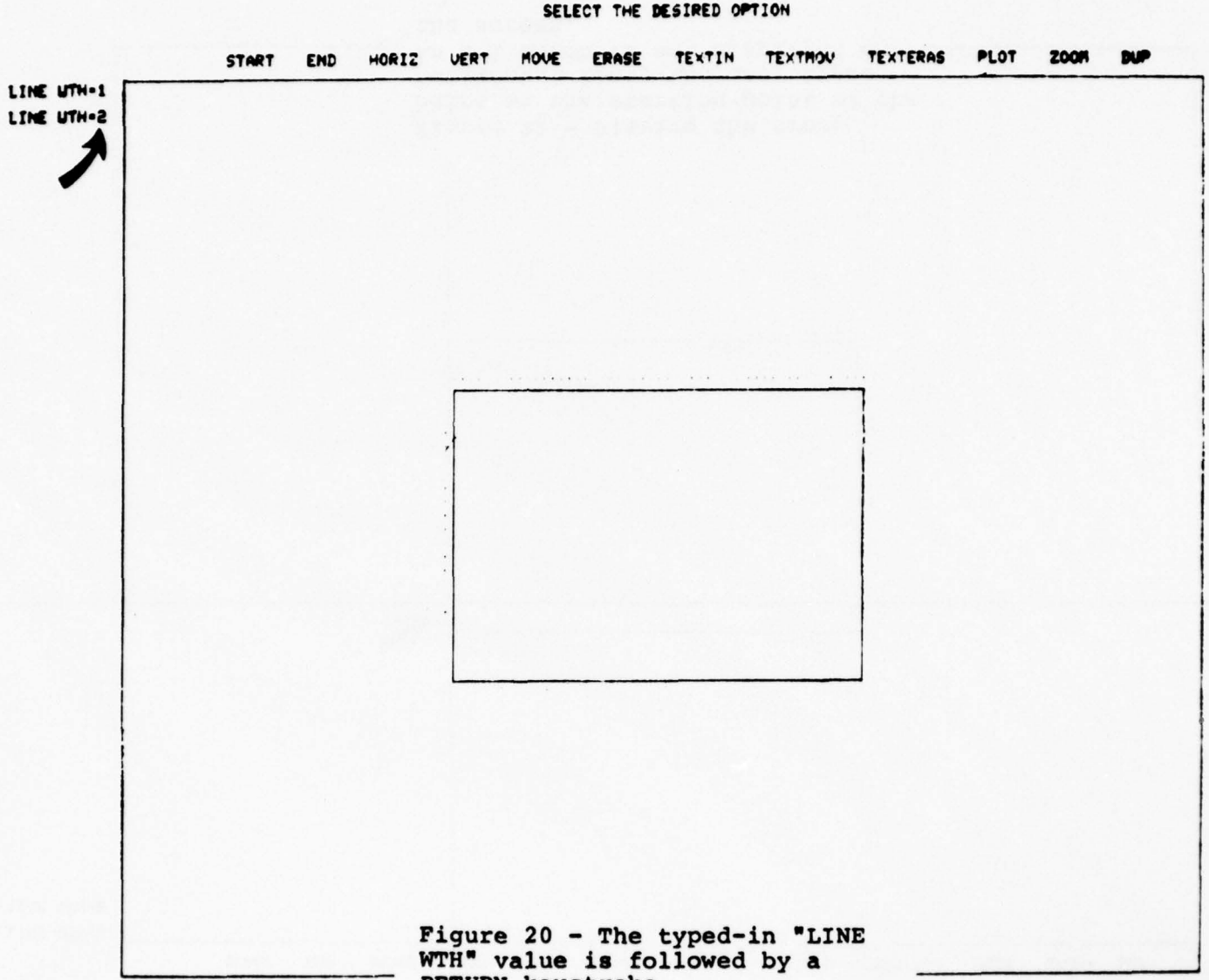


Figure 20 - The typed-in "LINE WTH" value is followed by a RETURN keystroke.

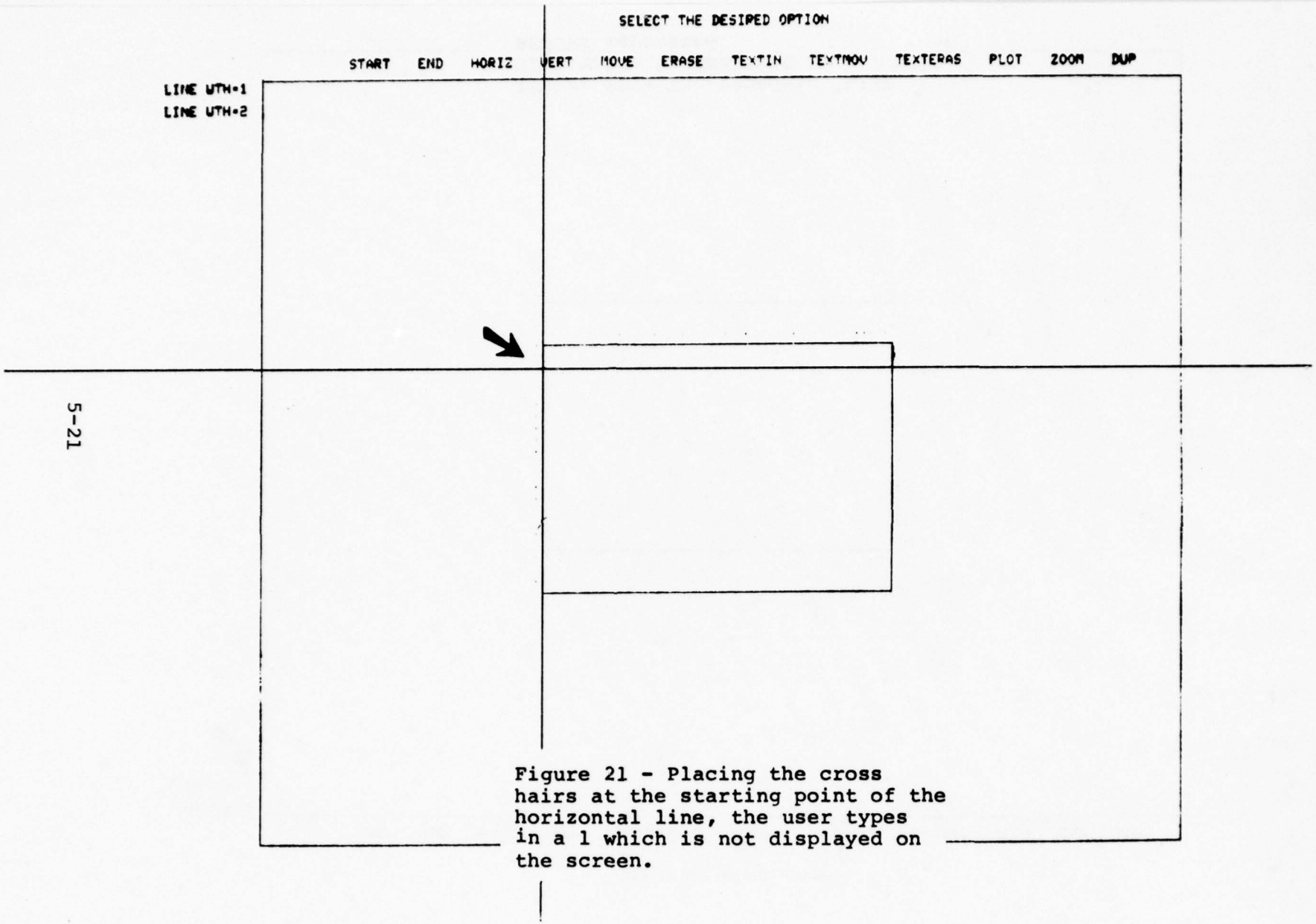


Figure 21 - Placing the cross hairs at the starting point of the horizontal line, the user types in a 1 which is not displayed on the screen.

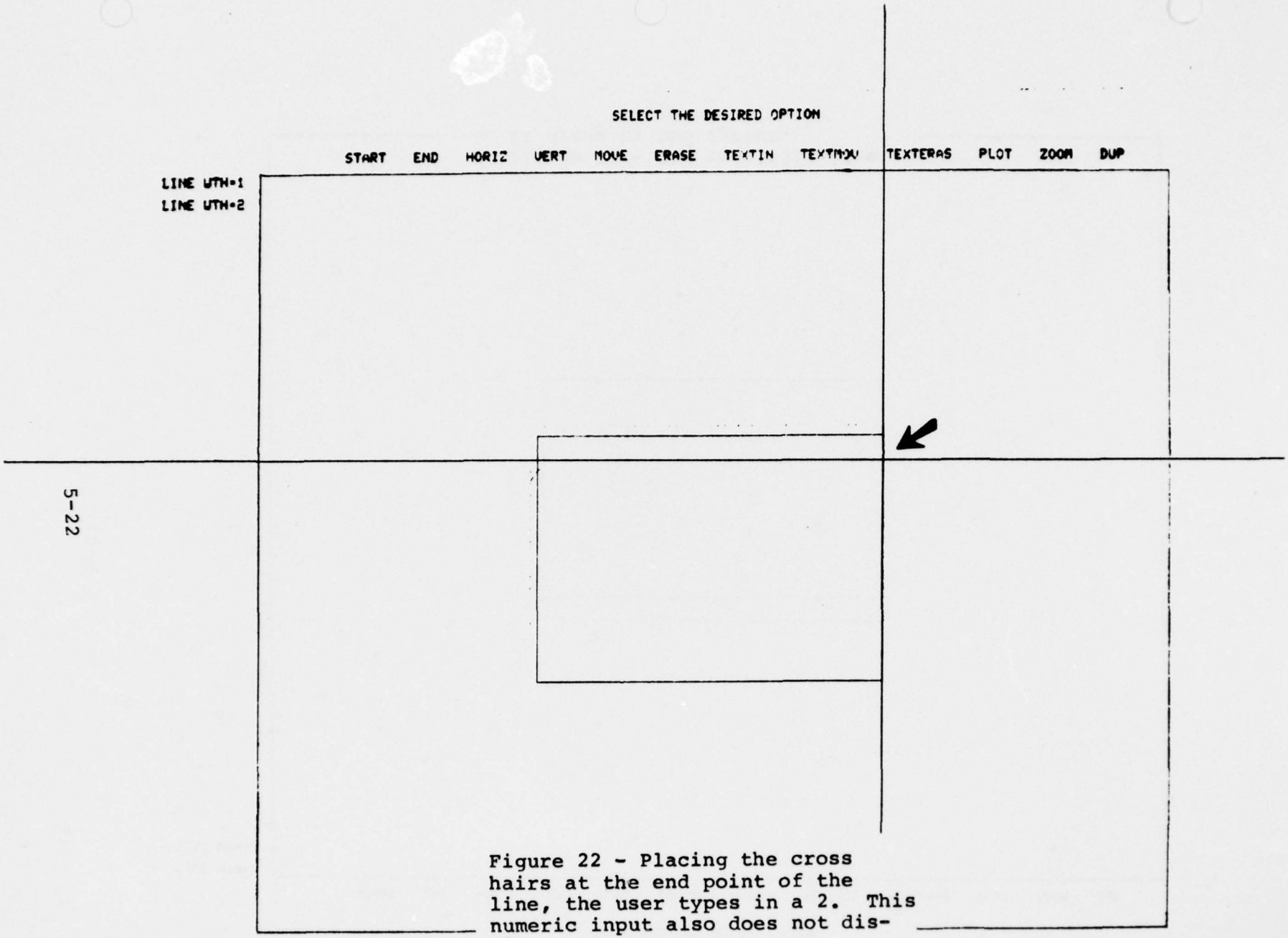


Figure 22 - Placing the cross hairs at the end point of the line, the user types in a 2. This numeric input also does not display.

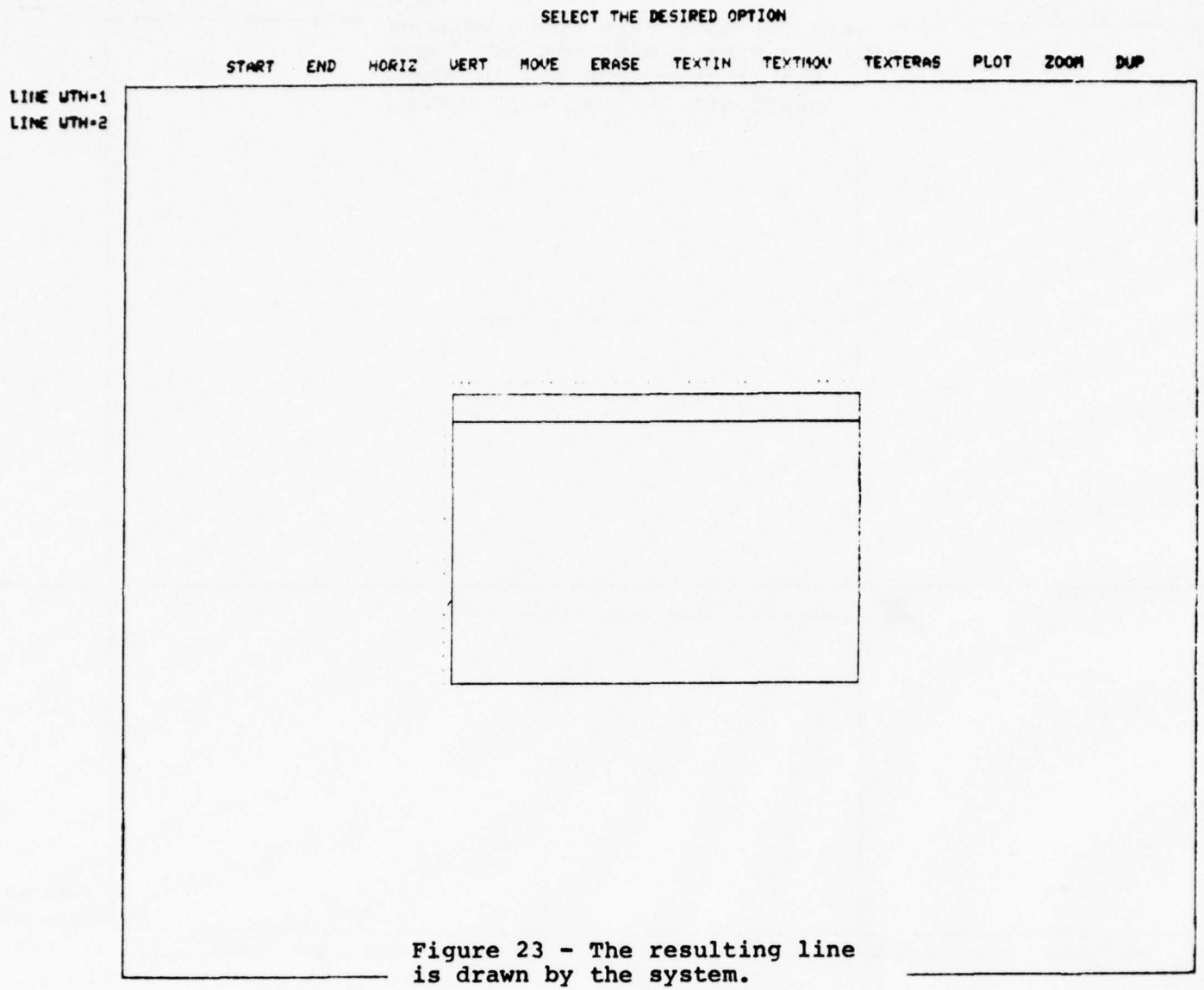


Figure 23 - The resulting line is drawn by the system.

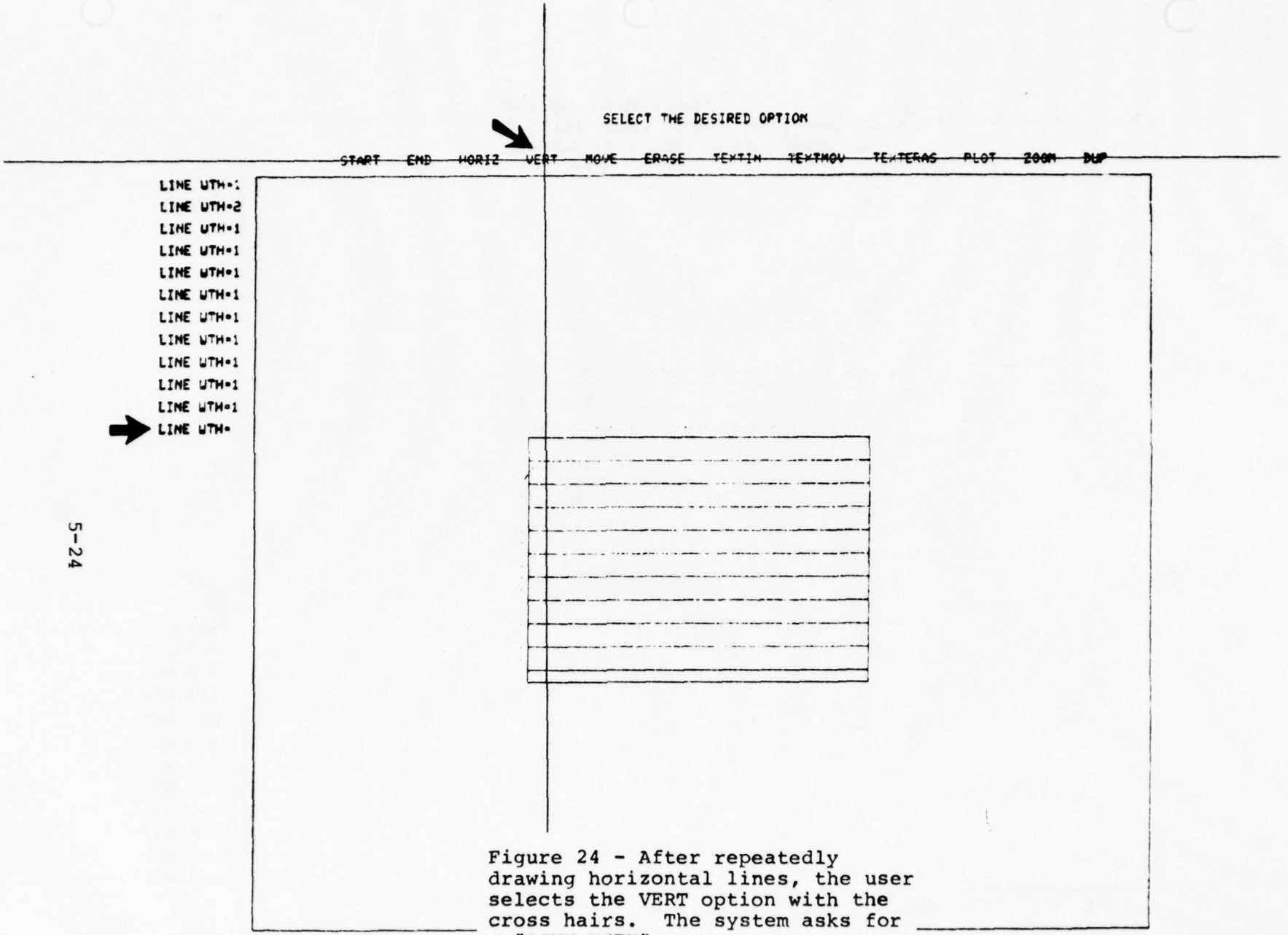


Figure 24 - After repeatedly drawing horizontal lines, the user selects the VERT option with the cross hairs. The system asks for a "LINE WITH".

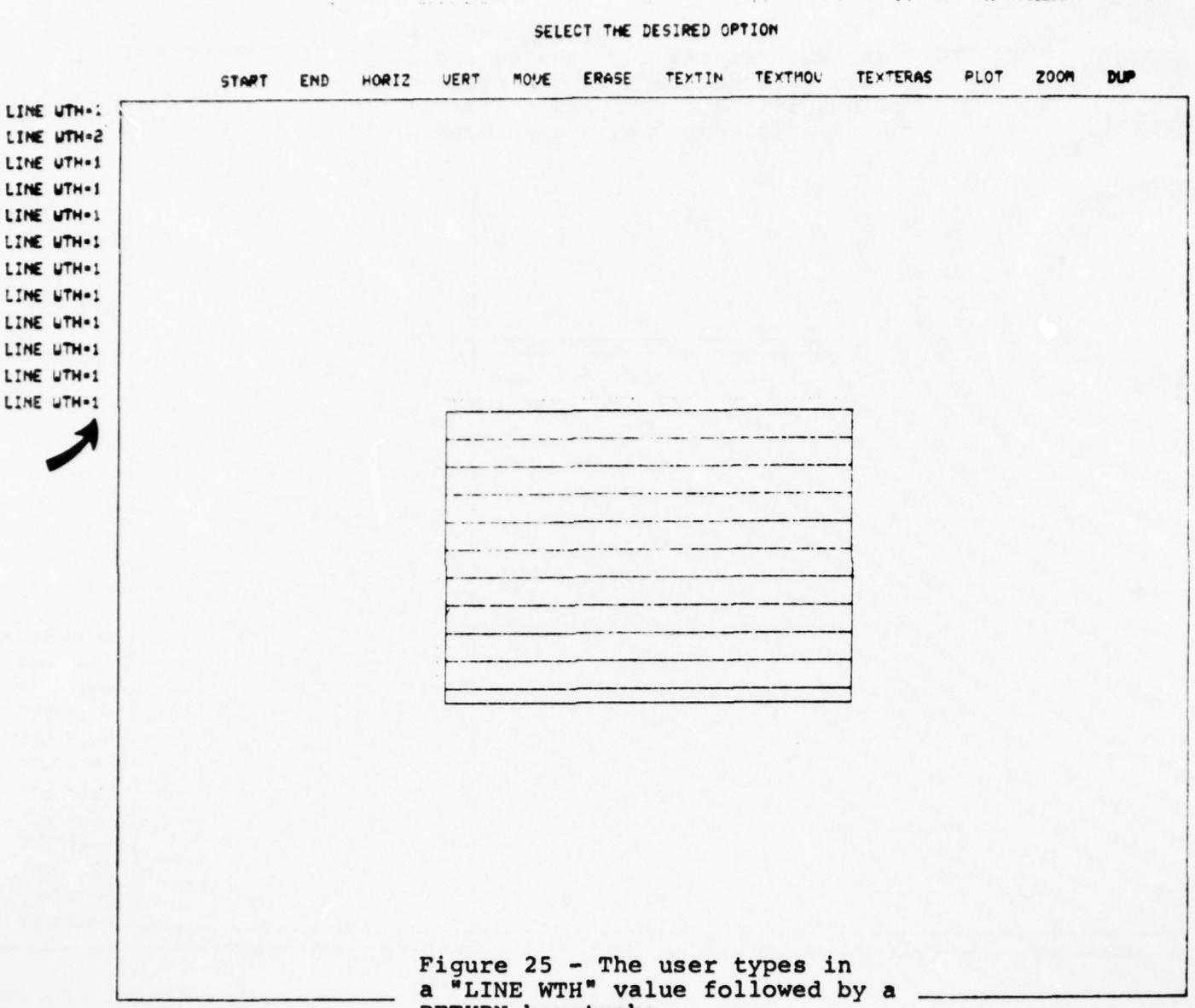


Figure 25 - The user types in a "LINE WTH" value followed by a RETURN keystroke.

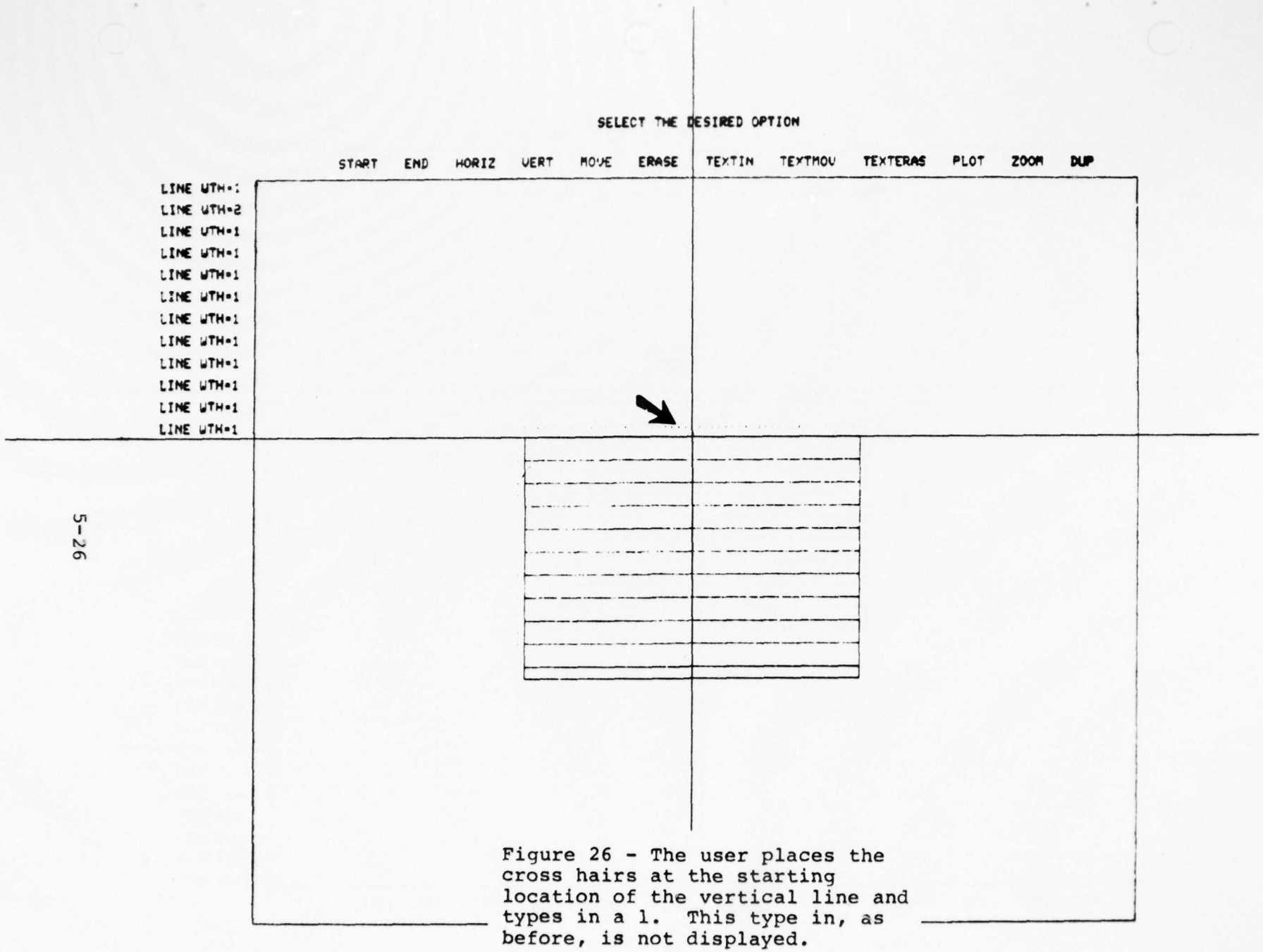


Figure 26 - The user places the cross hairs at the starting location of the vertical line and types in a 1. This type in, as before, is not displayed.

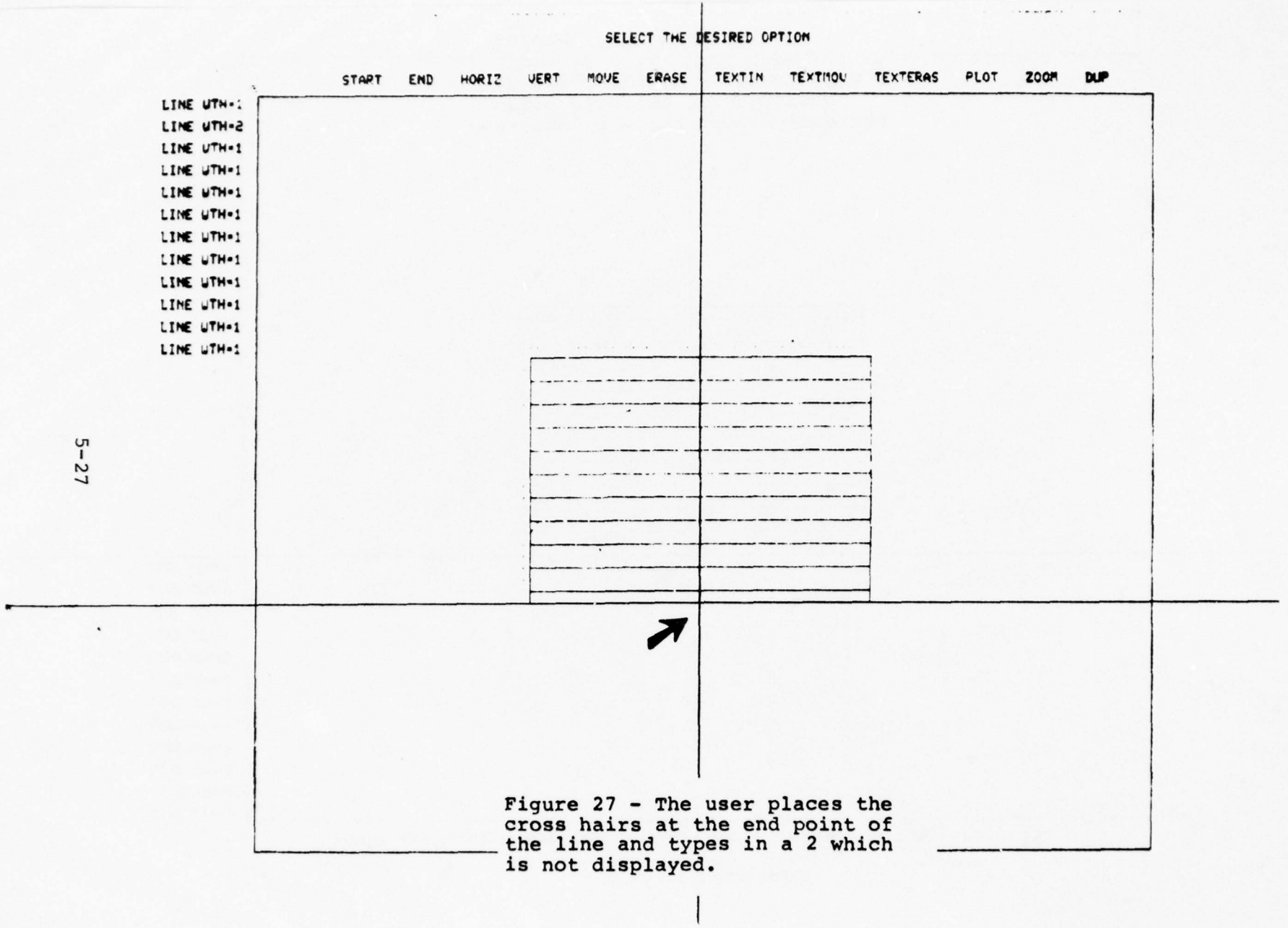


Figure 27 - The user places the cross hairs at the end point of the line and types in a 2 which is not displayed.

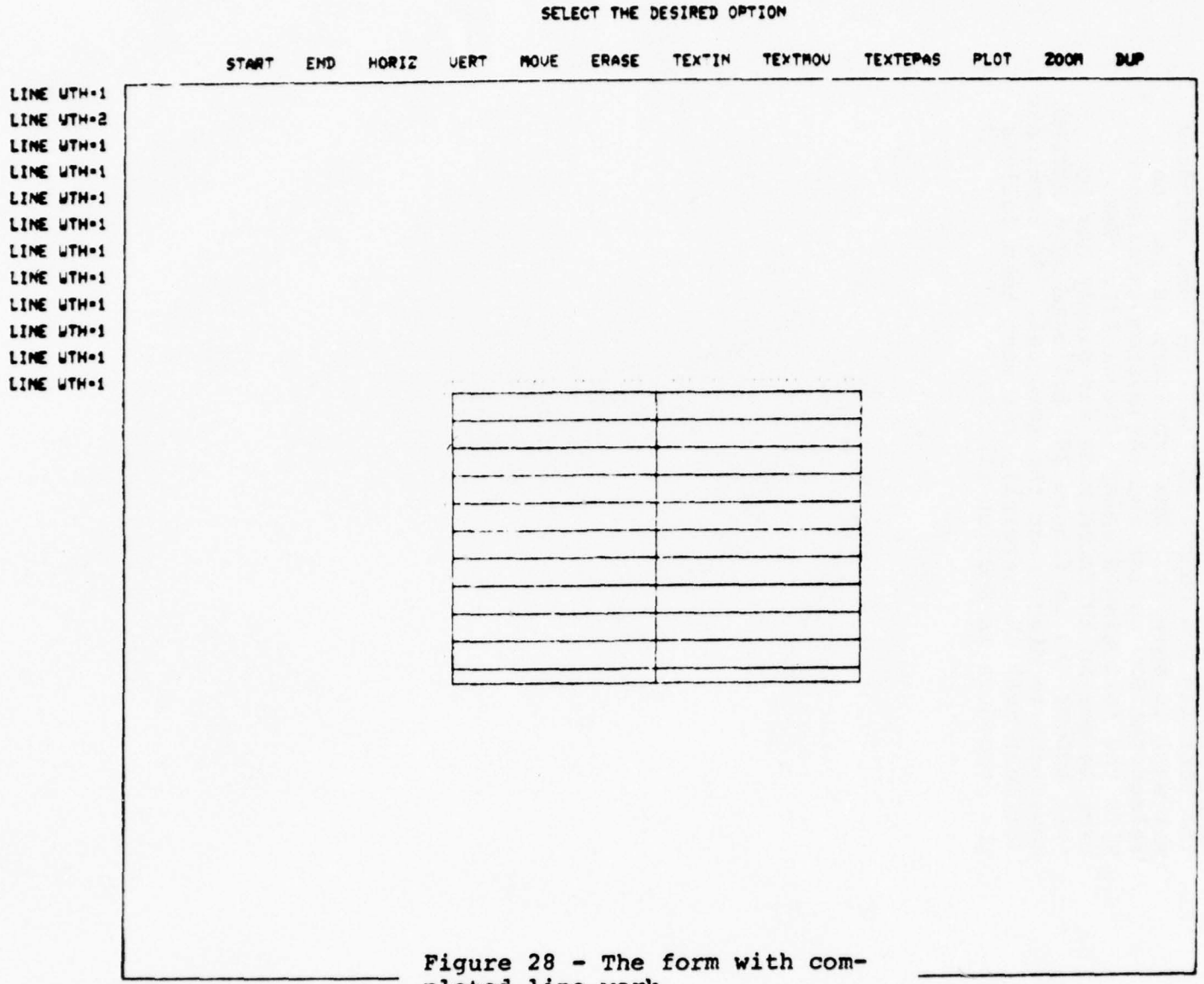


Figure 28 - The form with completed line work.

2. Terminate form drawing session without saving form - The user has now completed the line form and does not want to save it. The procedure is just to select the END option and the system terminates with the following display (figure 29). The user is now in INTERCOM mode and simply has to type LOGOUT (as in figure 29) followed by a RETURN keystroke to disconnect the terminal. To terminate (or shut off) the terminal, the user then follows the procedure in Section II,C.2.

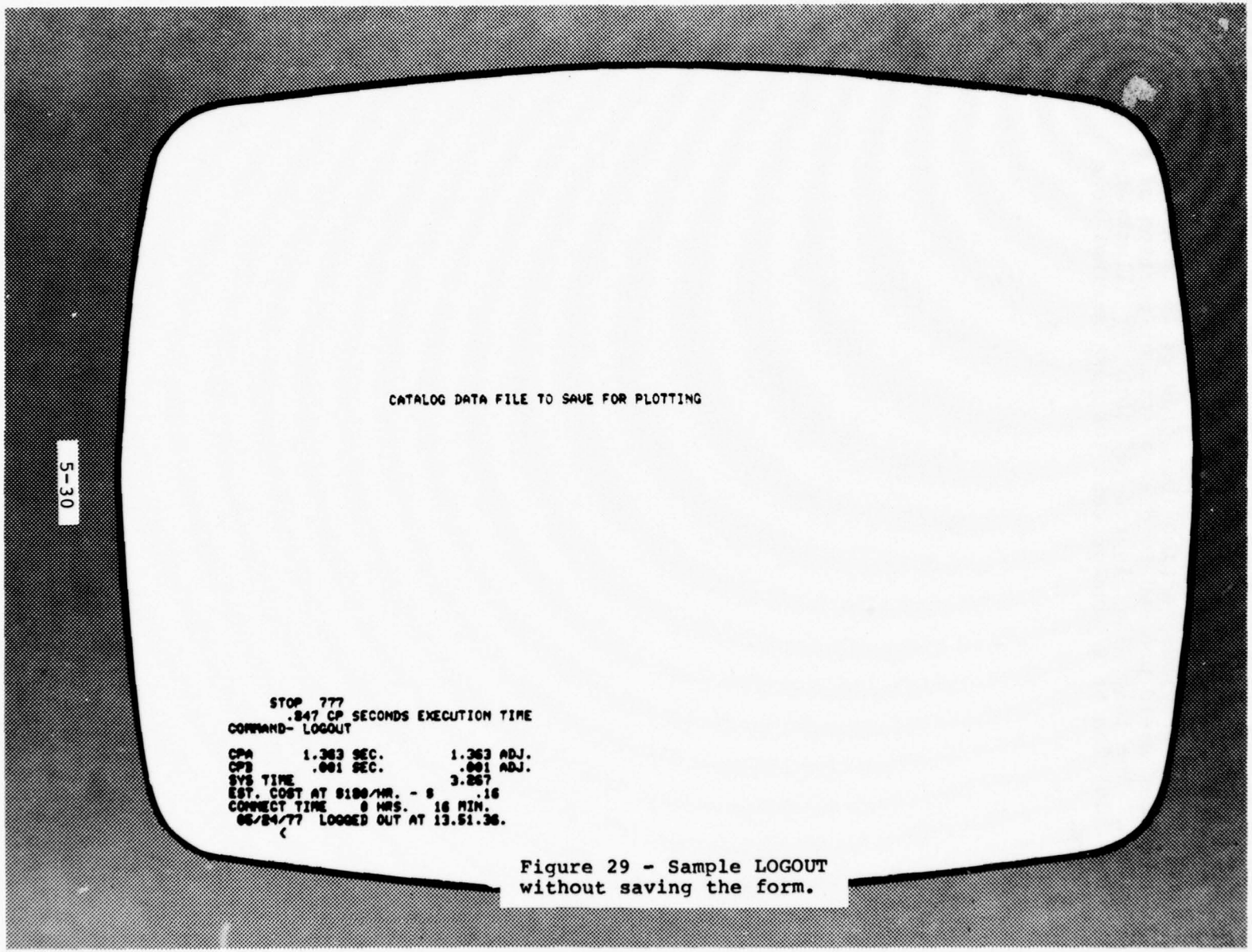


Figure 29 - Sample LOGOUT without saving the form.

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E. Using DASF to add text to a form (TEXTIN)

As in the previous section (D.1 figures 16 thru 23), the user would proceed to draw a form or portion of a form. The following figures (30 thru 39) illustrate the addition of a line of text (or text string) to a form.

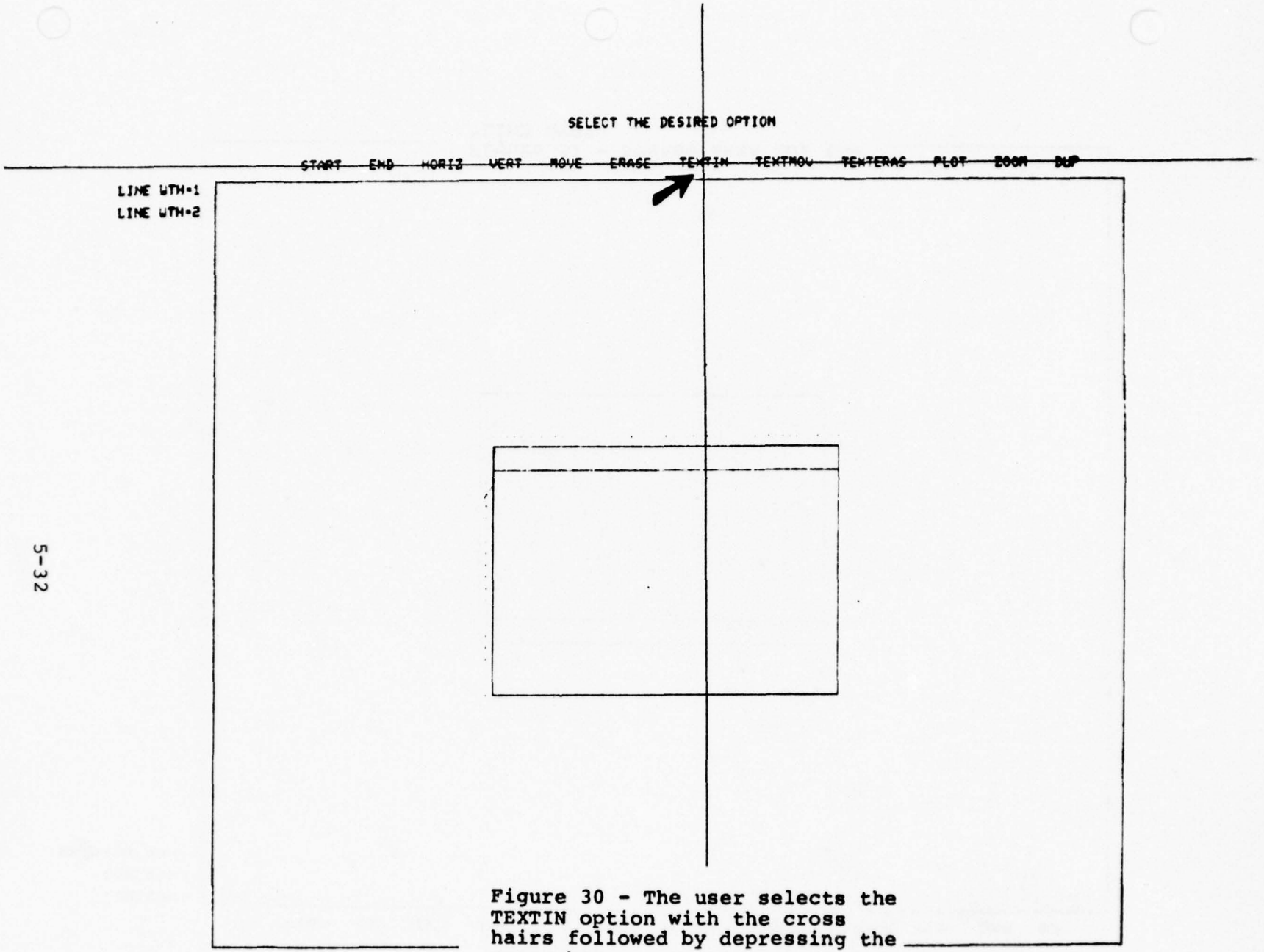

Figure 30 - The user selects the TEXTIN option with the cross hairs followed by depressing the space bar.

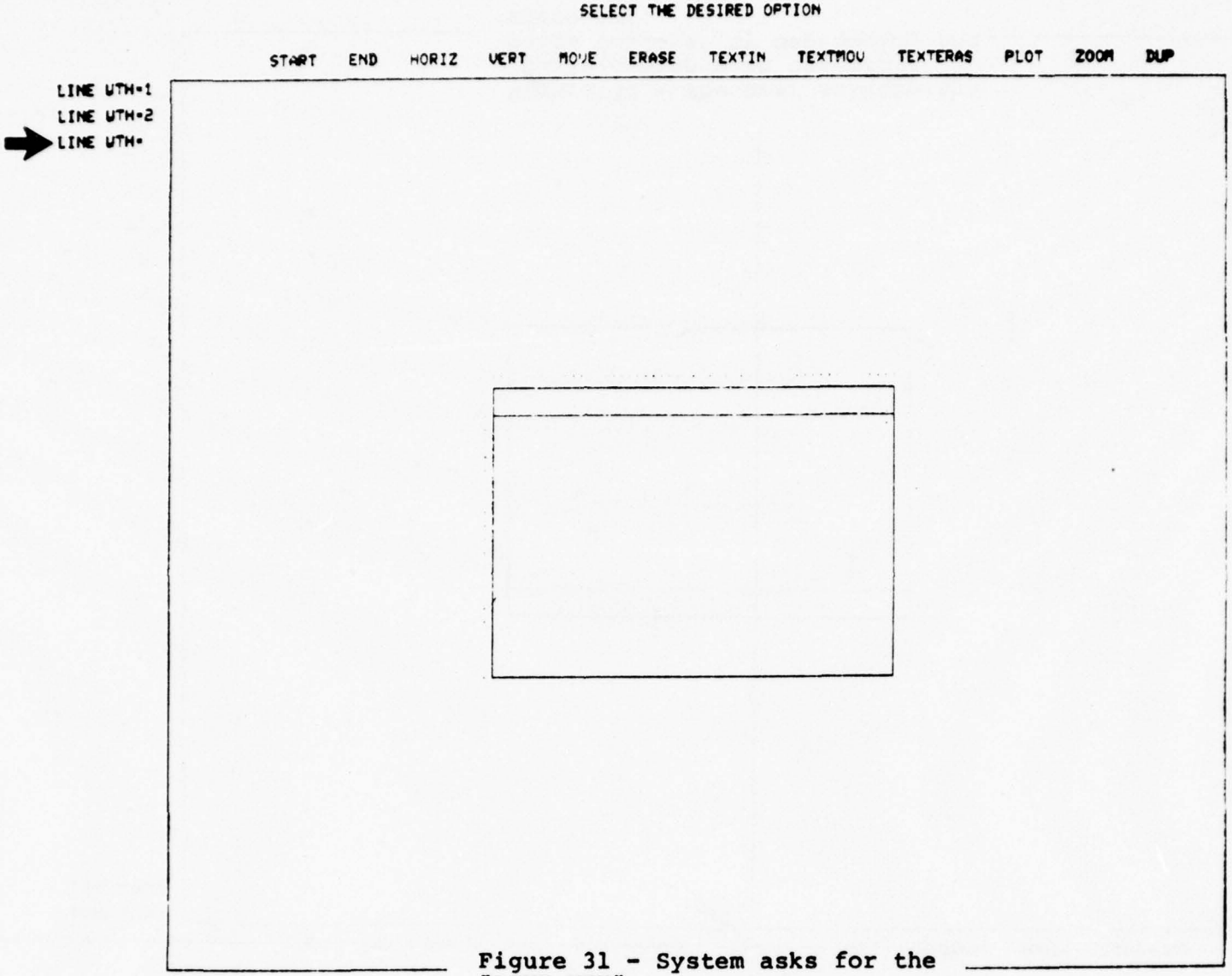

Figure 31 - System asks for the "LINE WTH".

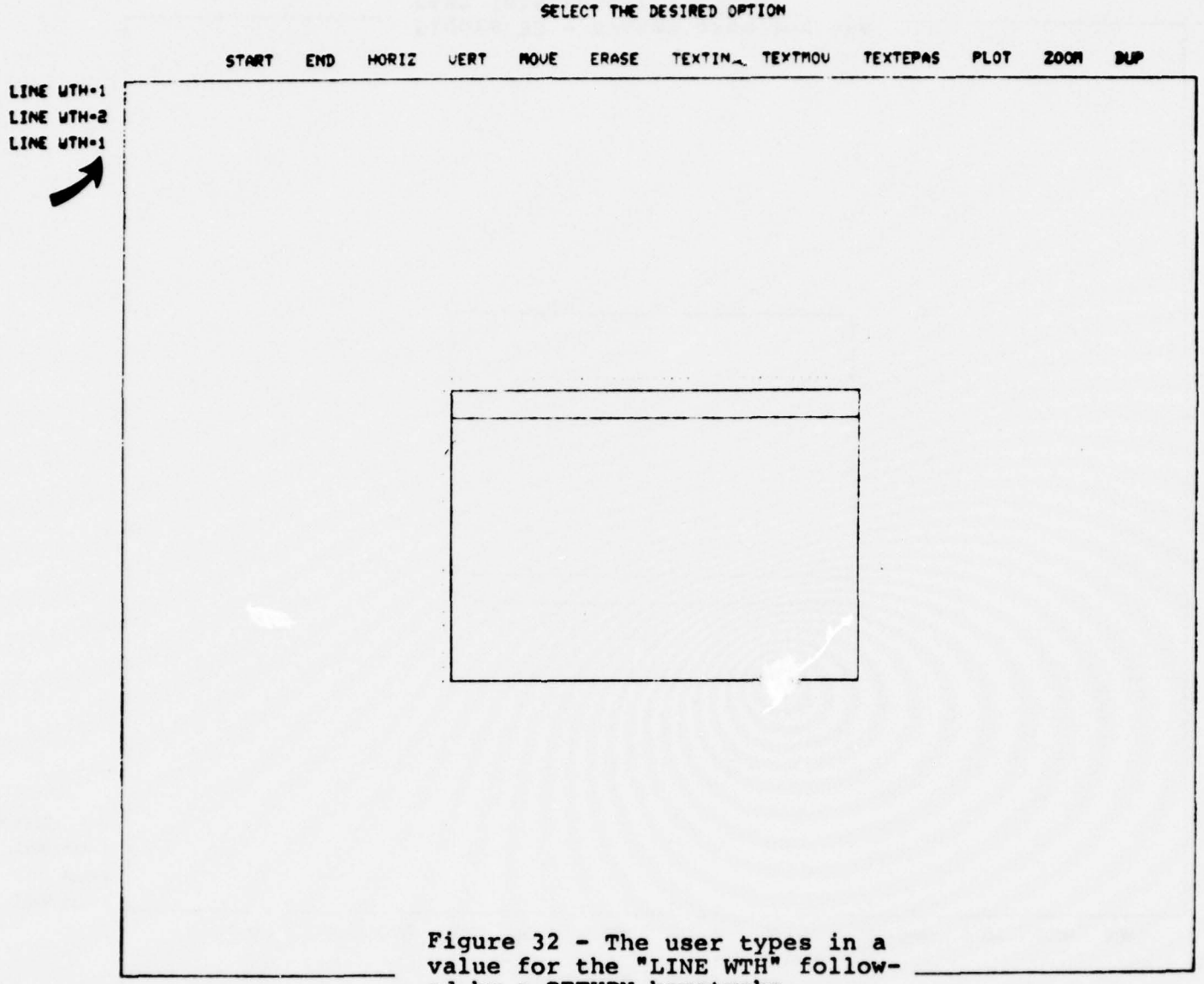

Figure 32 - The user types in a value for the "LINE WTH" followed by a RETURN keystroke.

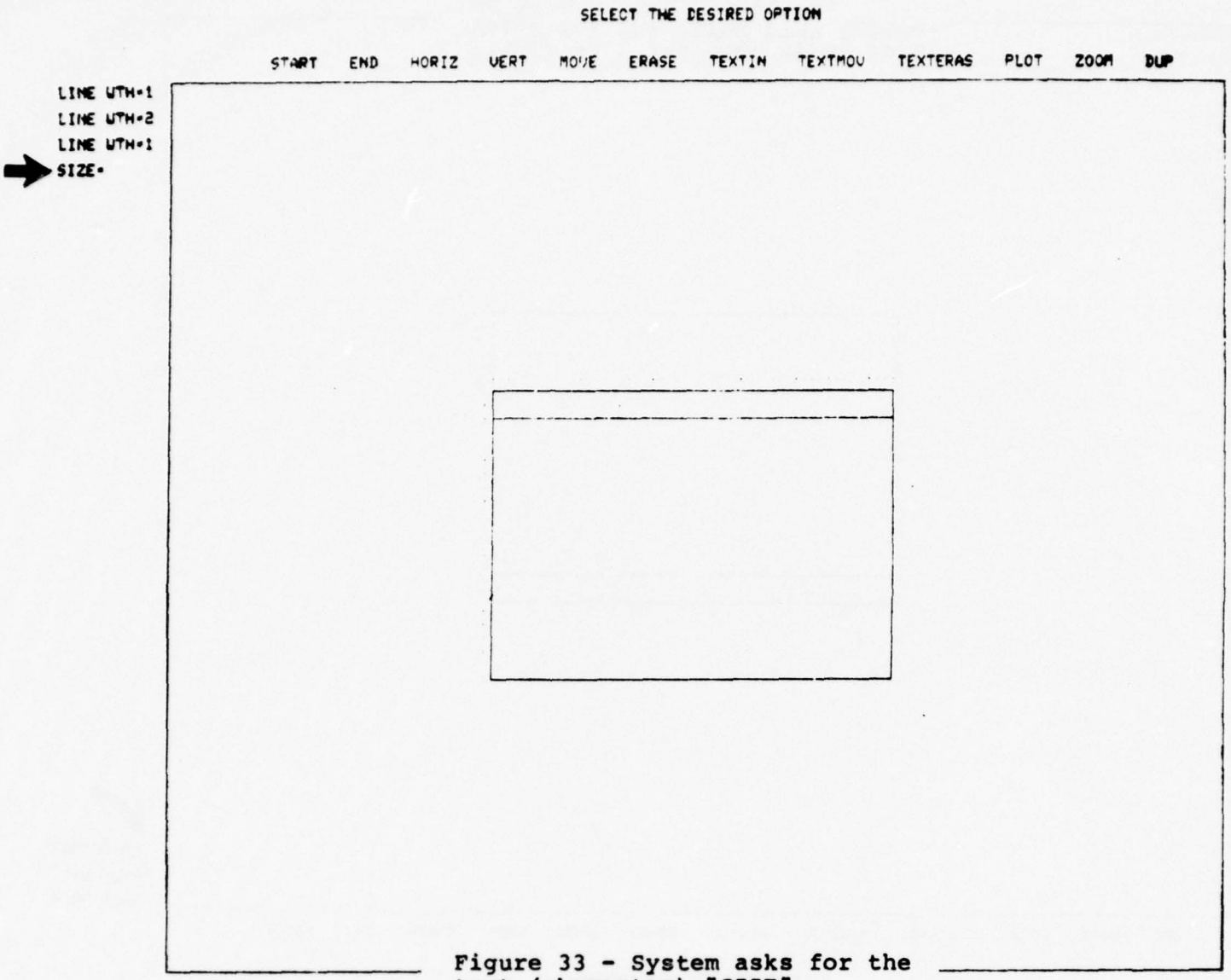

Figure 33 - System asks for the text (character) "SIZE".

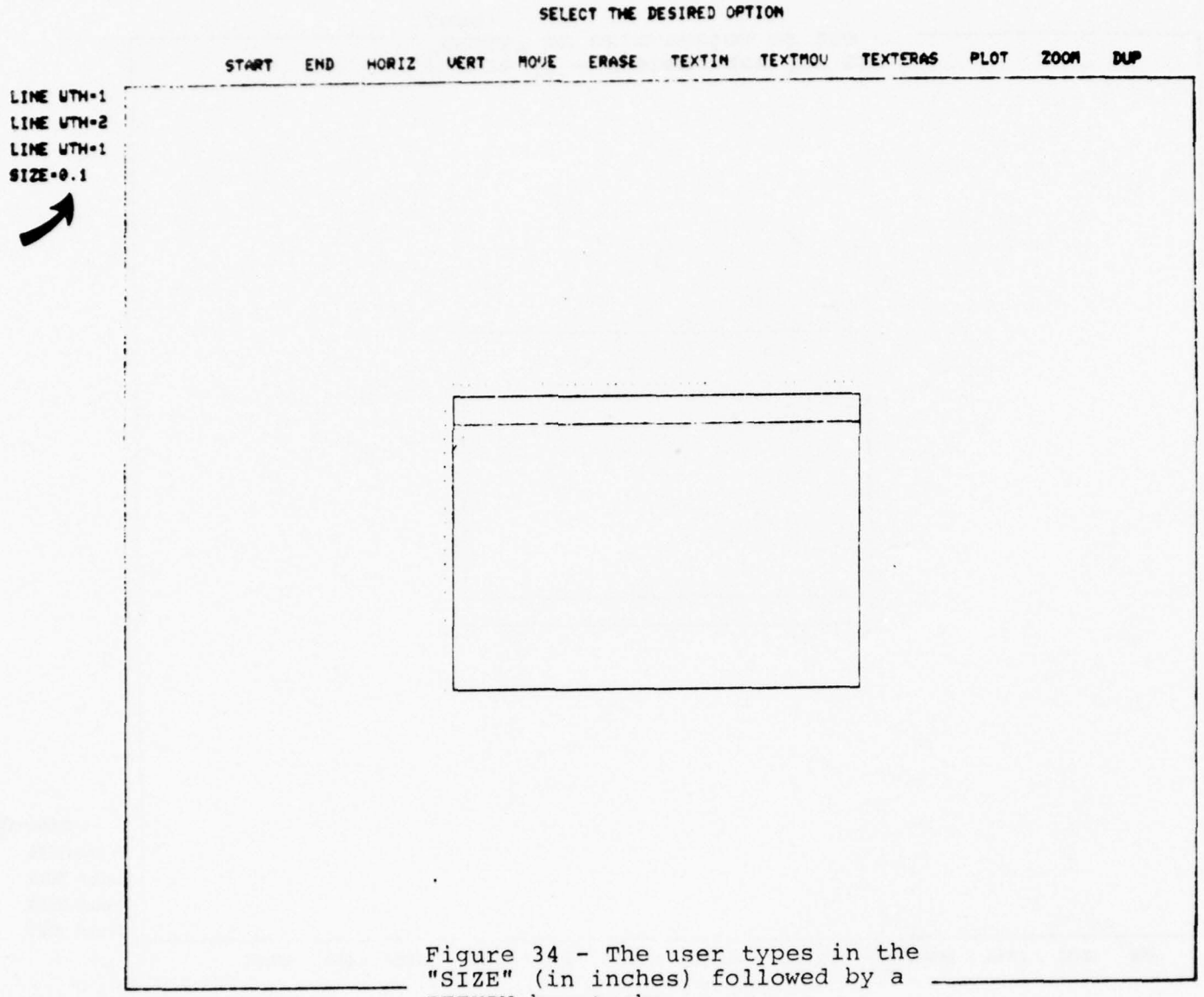

Figure 34 - The user types in the "SIZE" (in inches) followed by a RETURN keystroke.

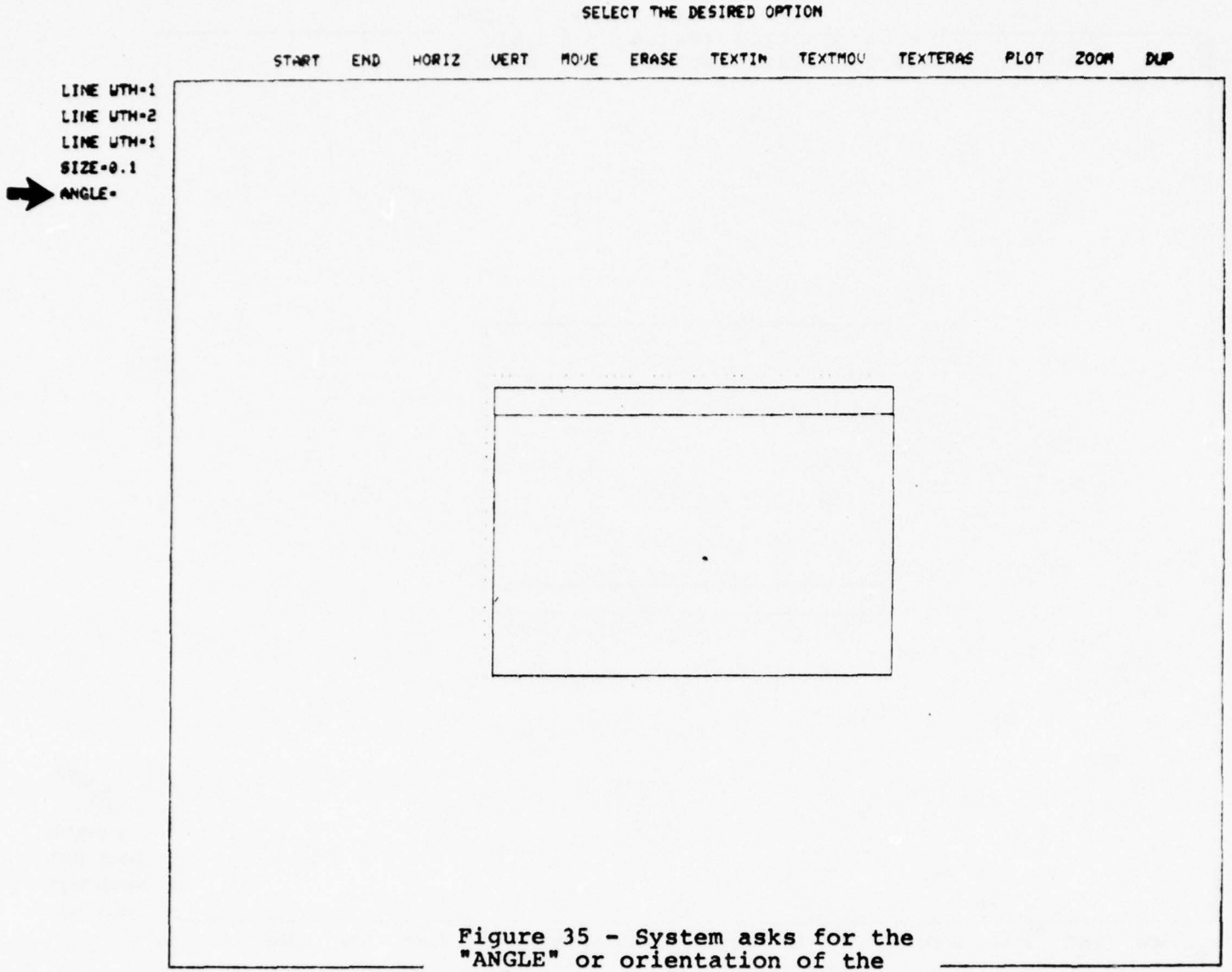

Figure 35 - System asks for the "ANGLE" or orientation of the text.

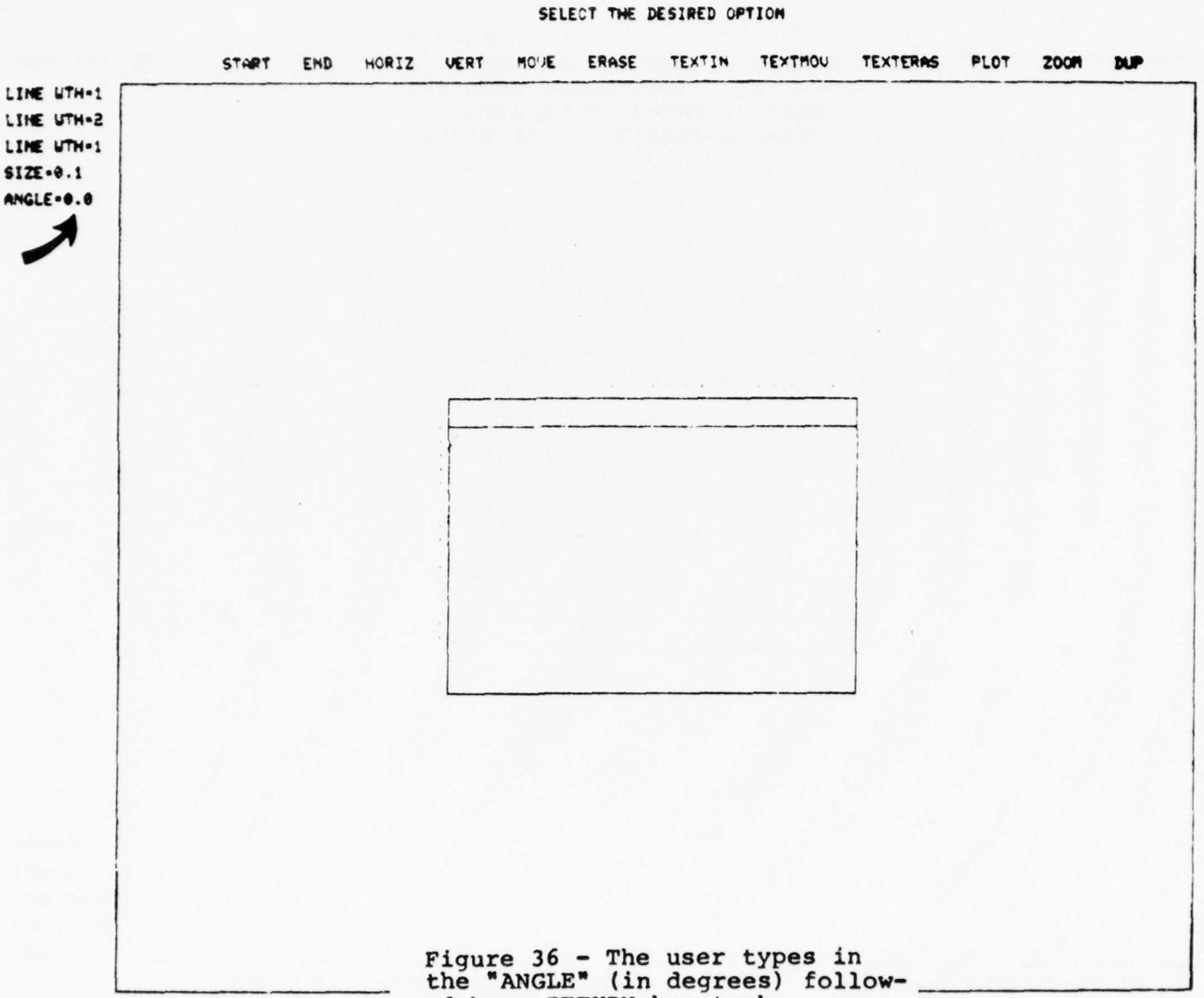

Figure 36 - The user types in the "ANGLE" (in degrees) followed by a RETURN keystroke.

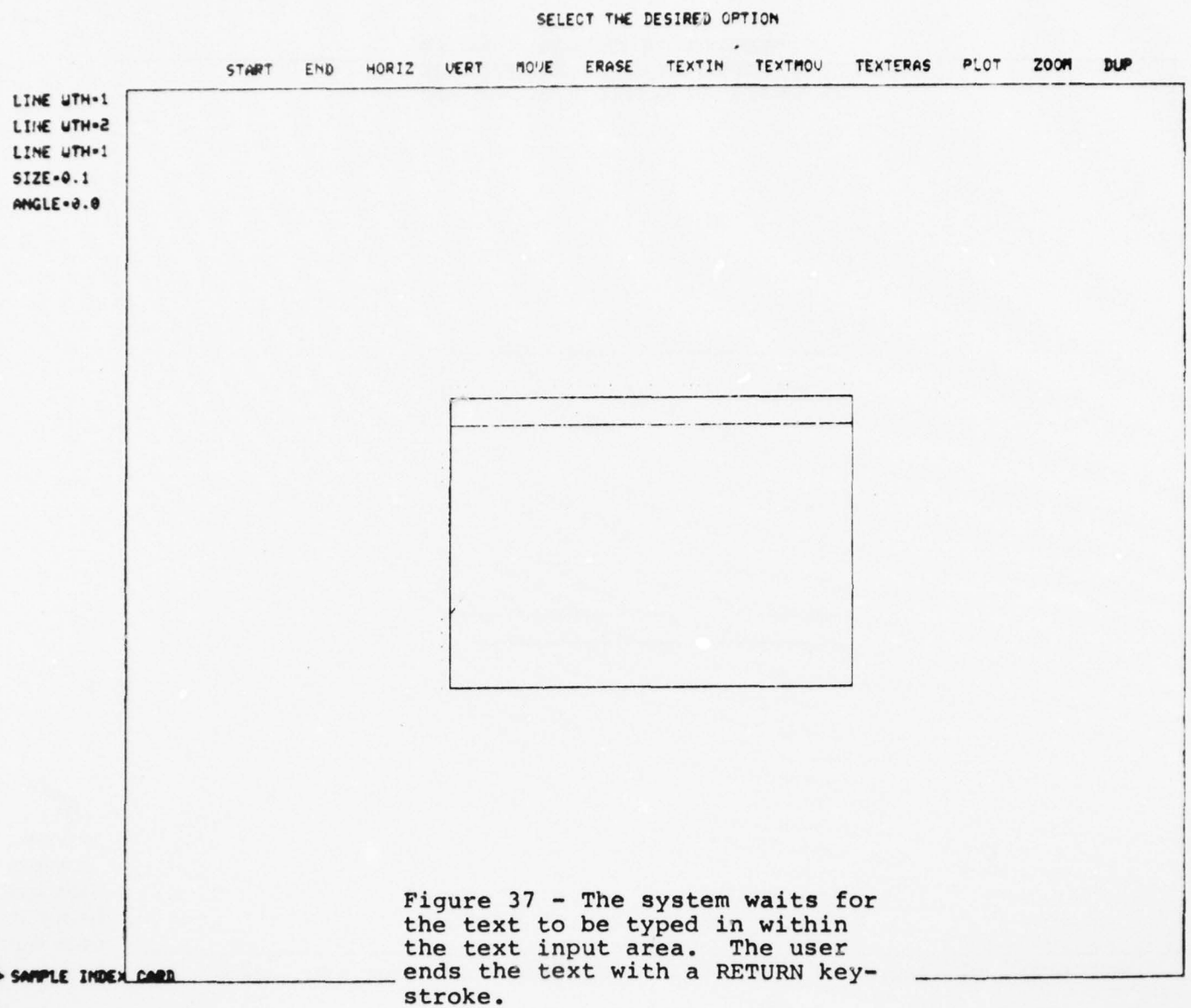

Figure 37 - The system waits for the text to be typed in within the text input area. The user ends the text with a RETURN key-stroke.

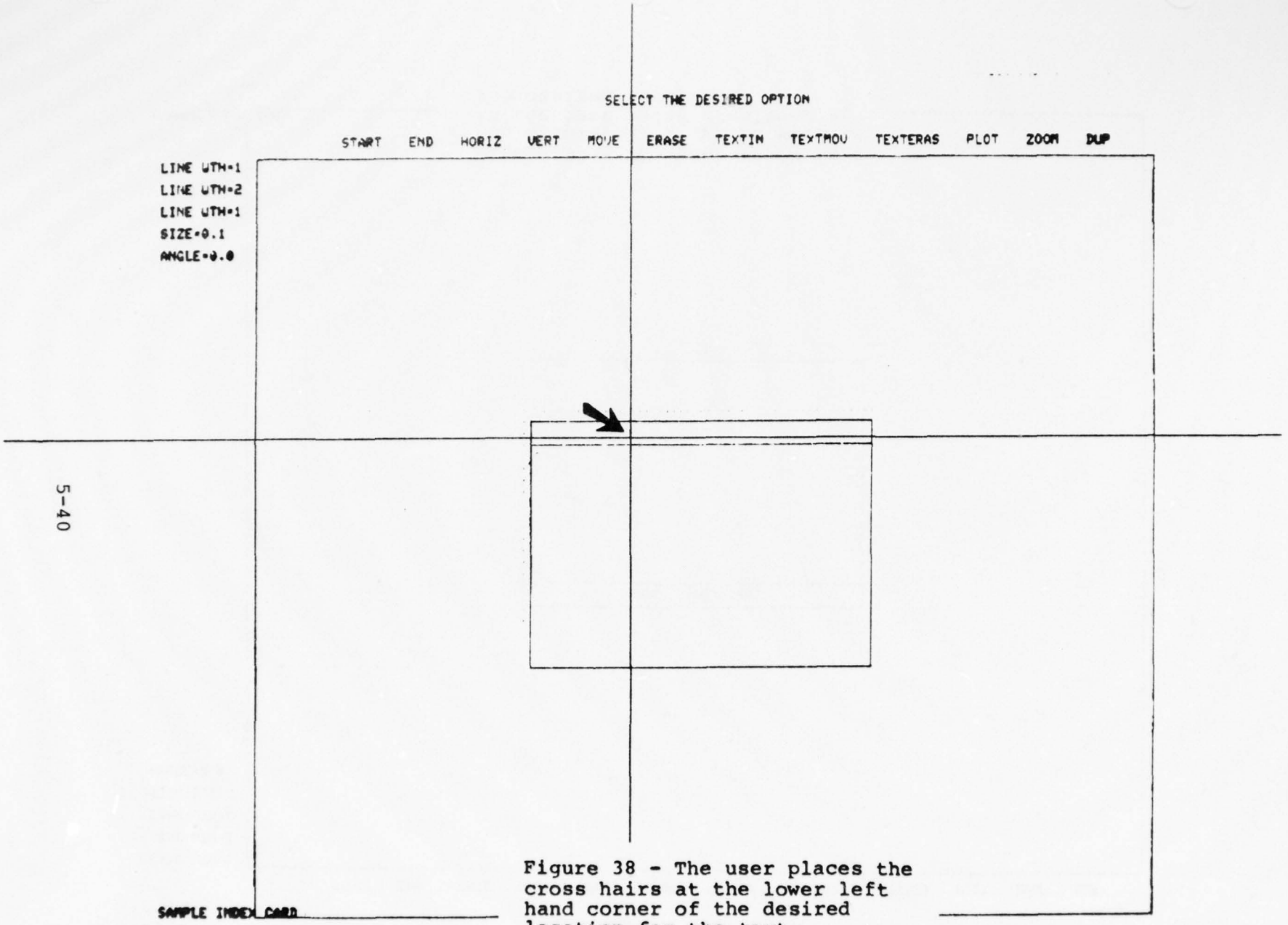

Figure 38 - The user places the cross hairs at the lower left hand corner of the desired location for the text.

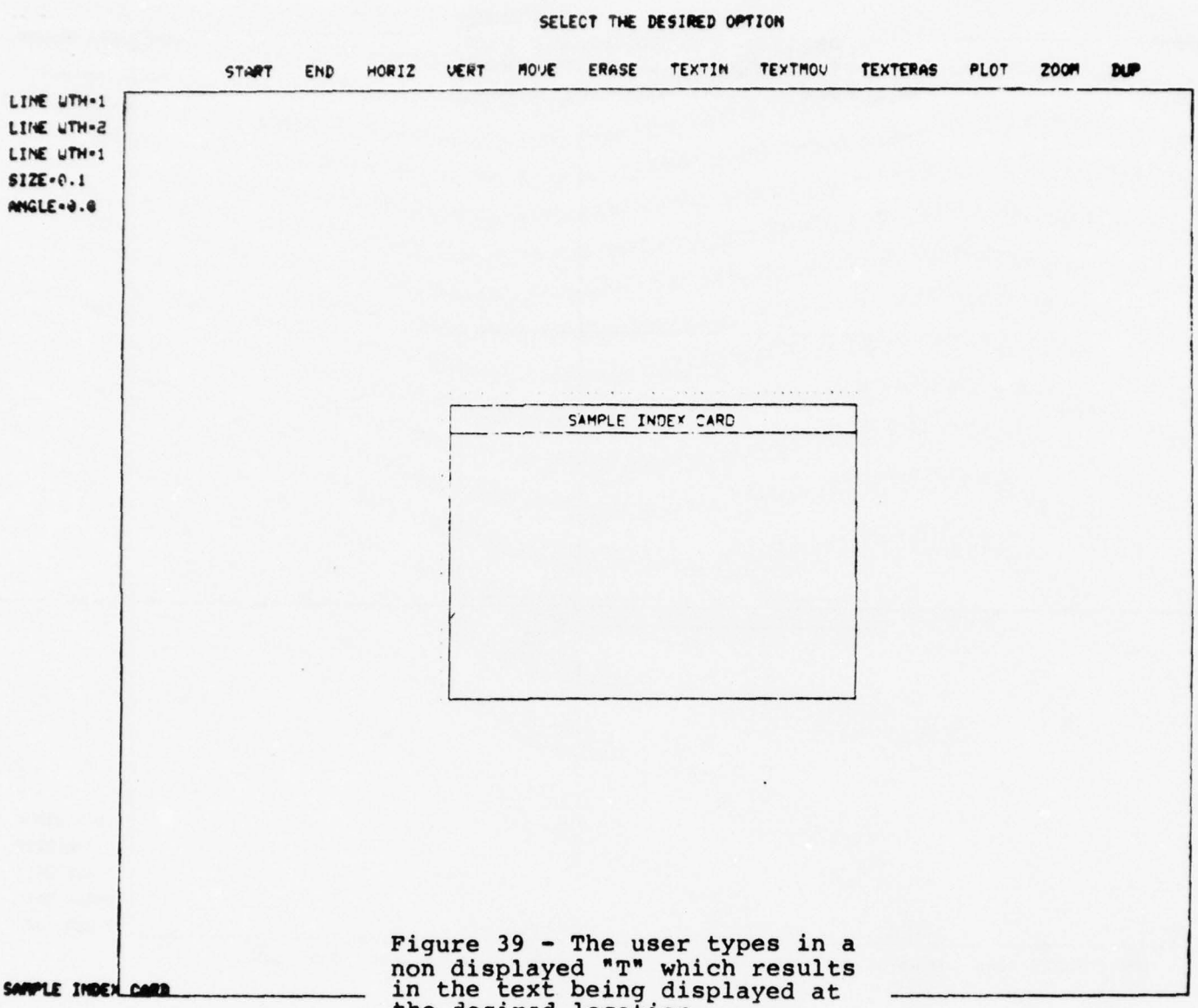

Figure 39 - The user types in a non displayed "T" which results in the text being displayed at the desired location.

1. Text at different angles - DASF allows the user to orient input text at three (3) angles. They are 0.0, 90.0, and 270.0 degress measured counter-clockwise from the horizontal. Figure 40 illustrates sample text strings at the three angles.

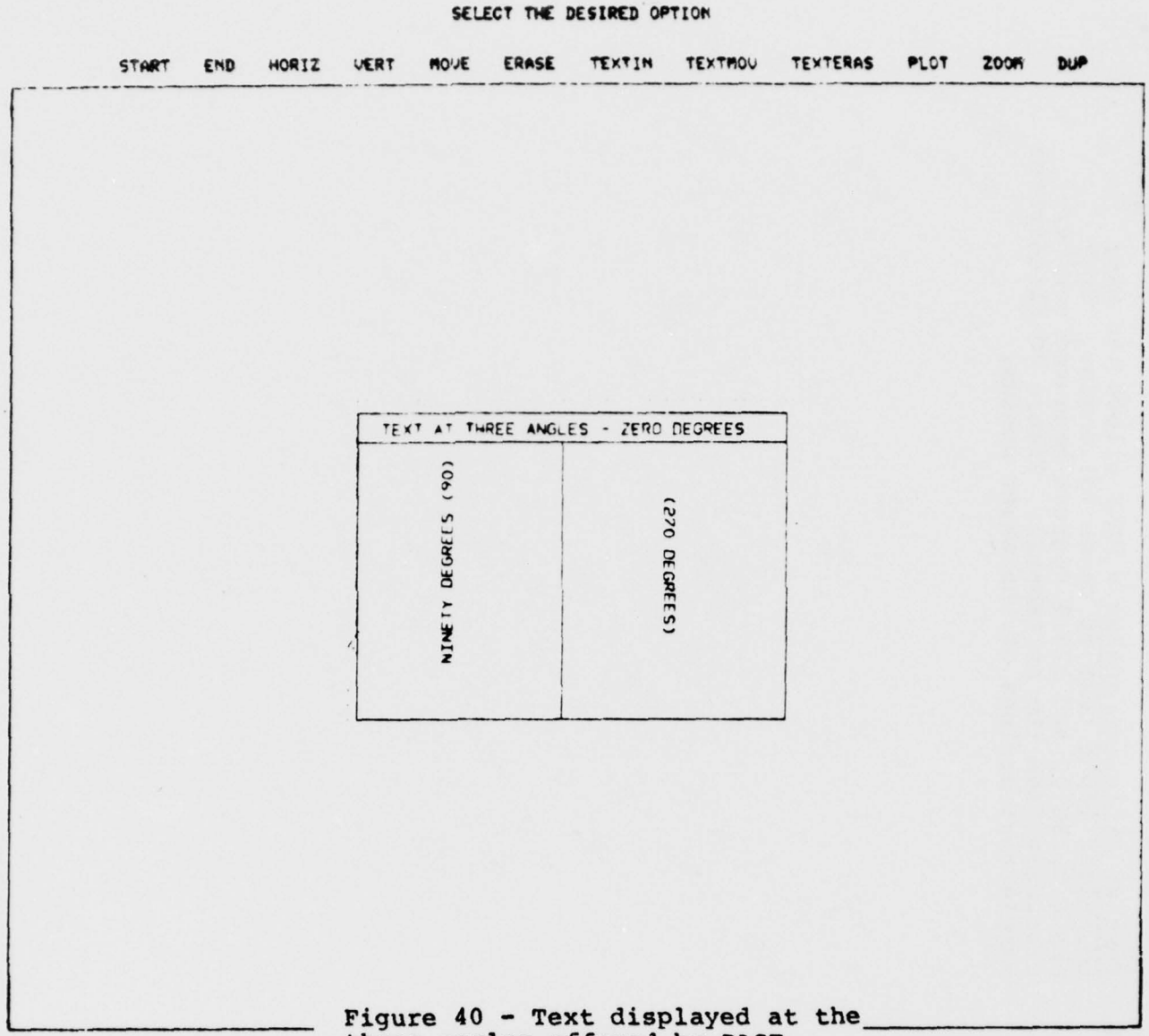

Figure 40 - Text displayed at the three angles offered by DASF.

2. Text sizes - Determination of text sizes is left up to the forms designer. It is basically governed by existing forms and space allocation on new forms. Figure 41 illustrates progressive sizes of text starting at the smallest (0.07 inch). It is not a complete list but will give the user a sample to go by.

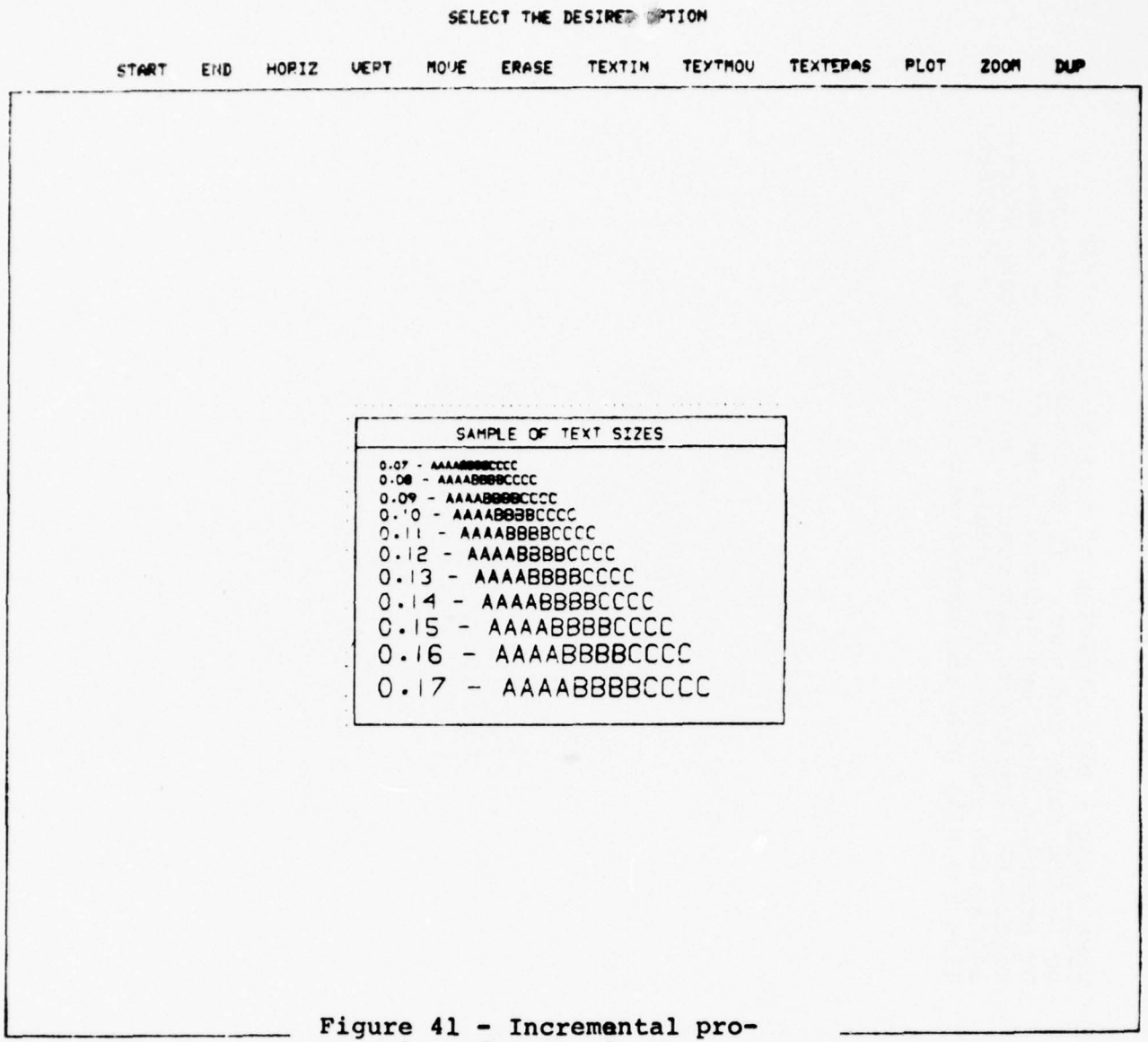

Figure 41 - Incremental progression of text sizes.

F. Using the move (MOVE and TEXTMOV) options in DASF

1. Moving a line - To move a line, the user would select the MOVE option. Figures 42 thru 45 illustrate using its use.

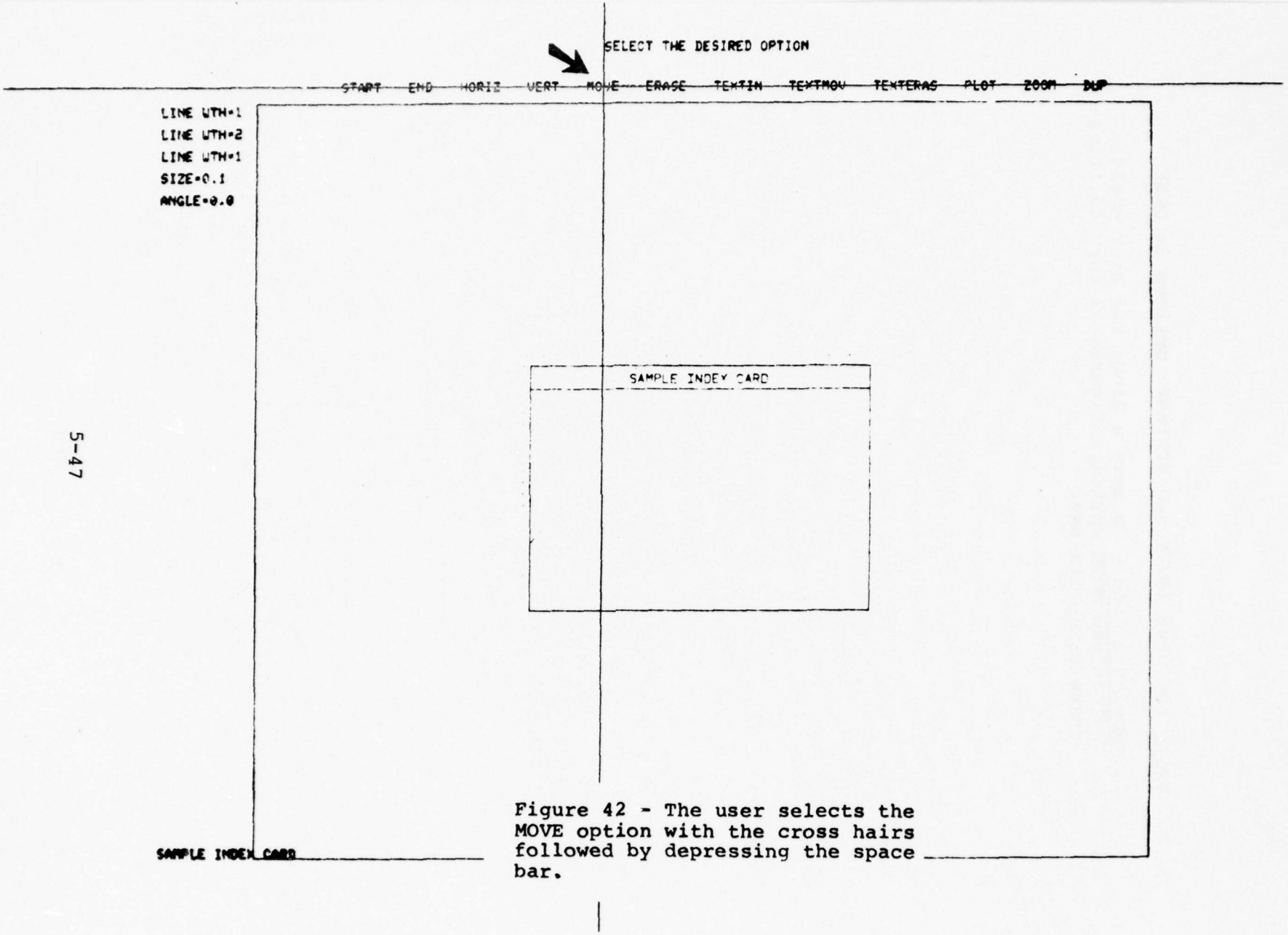

Figure 42 - The user selects the MOVE option with the cross hairs followed by depressing the space bar.

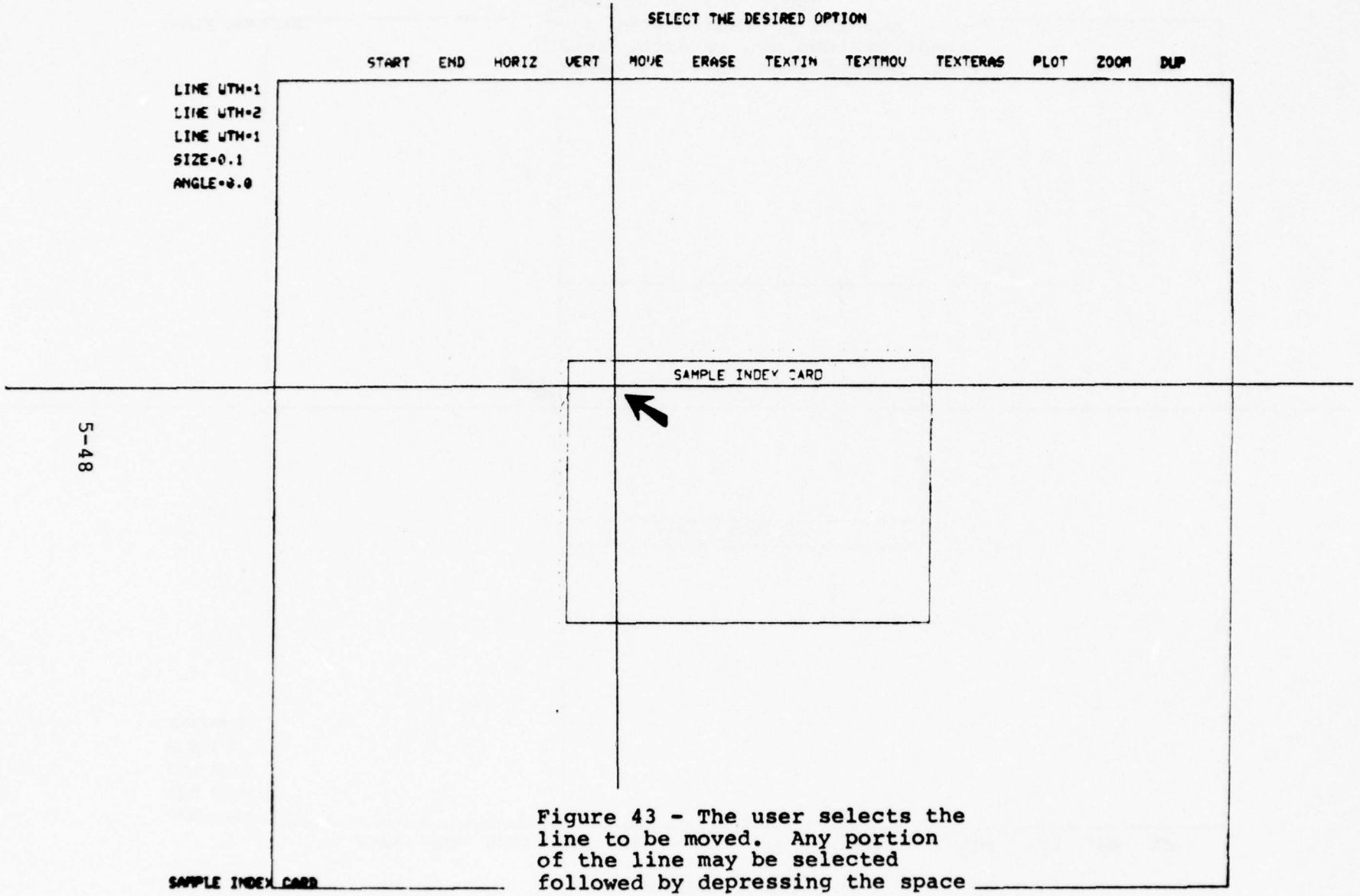

Figure 43 - The user selects the line to be moved. Any portion of the line may be selected followed by depressing the space bar.

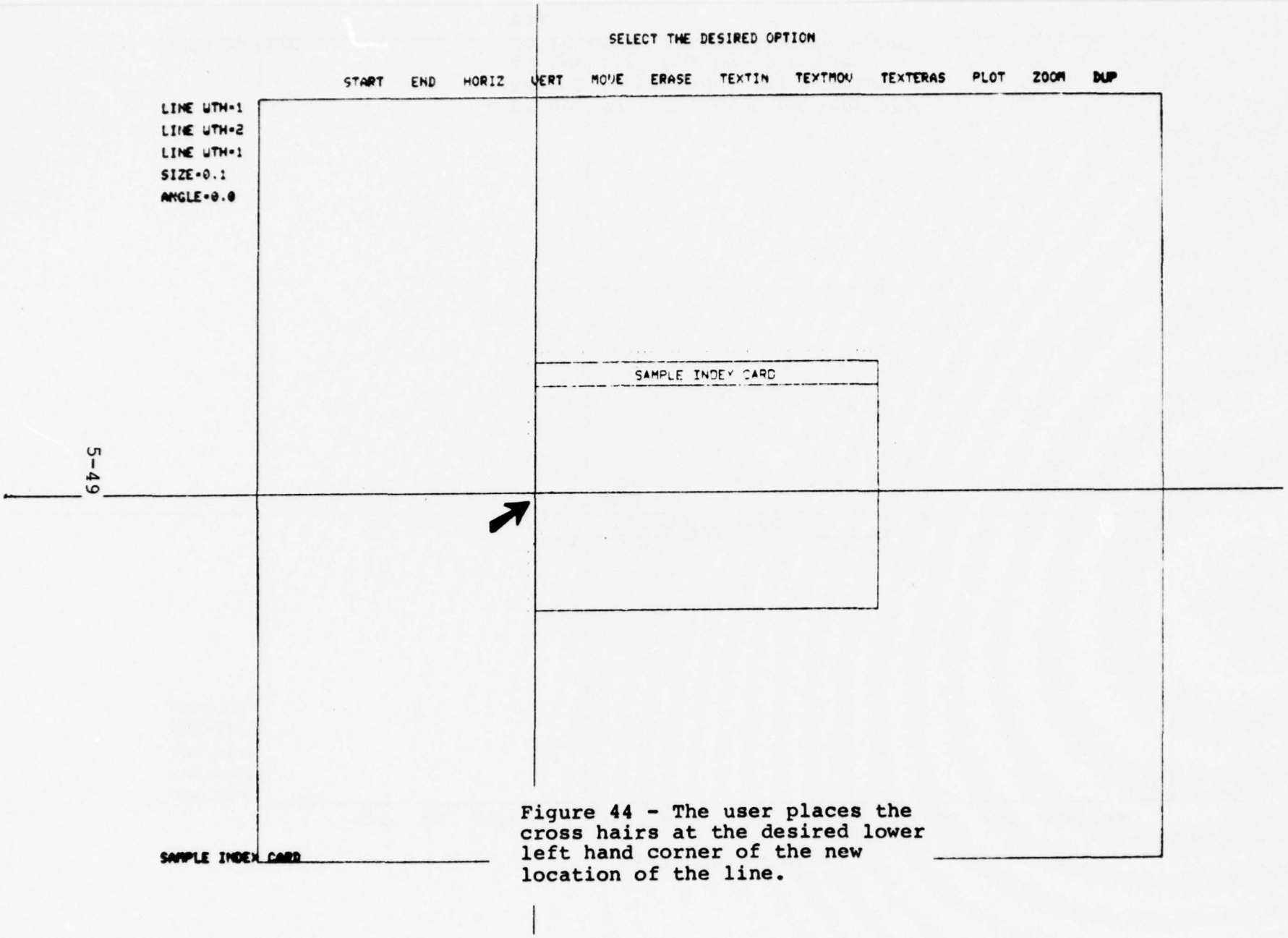

Figure 44 - The user places the cross hairs at the desired lower left hand corner of the new location of the line.

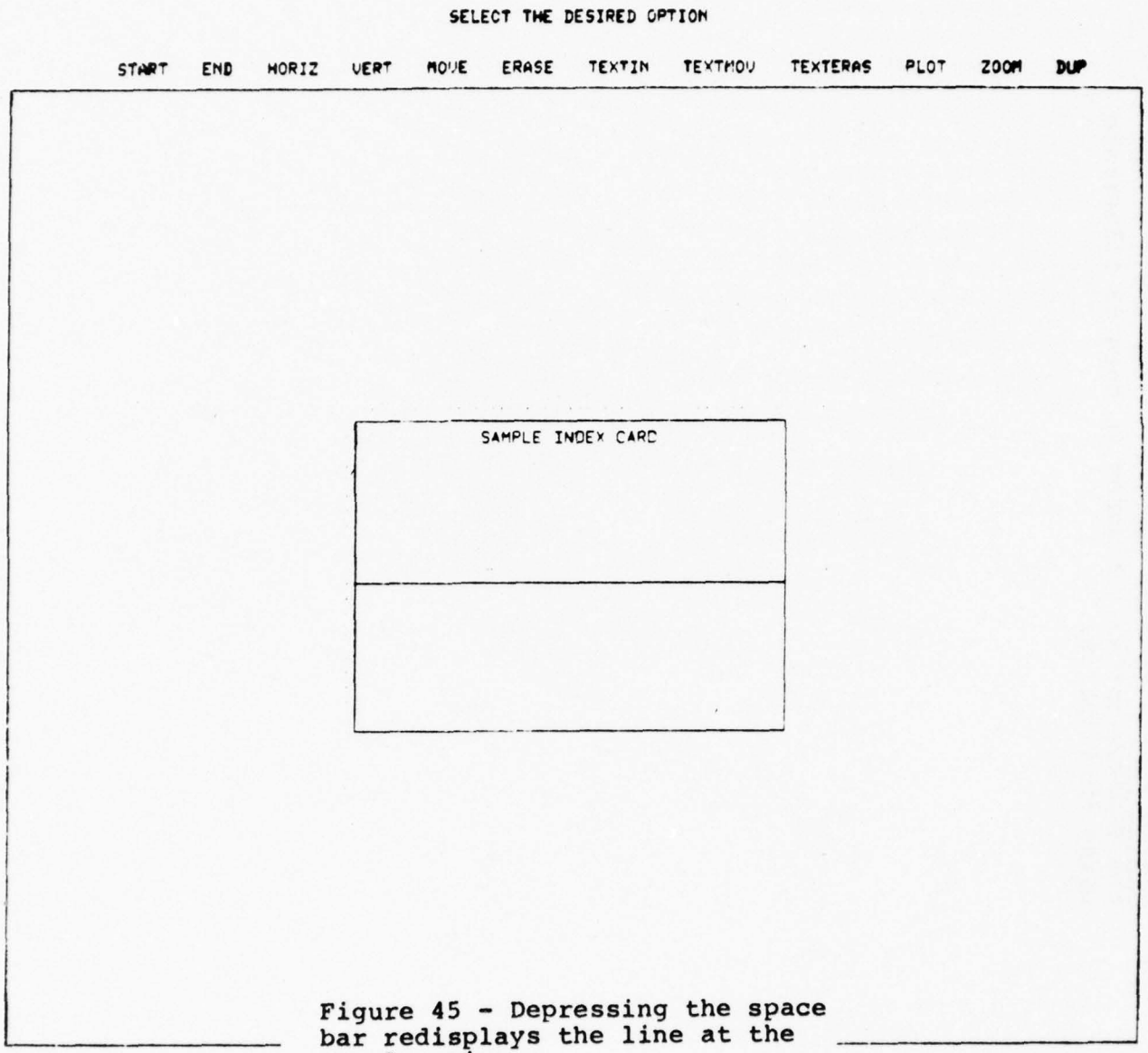

Figure 45 - Depressing the space bar redisplays the line at the new location.

2. Moving text - To move text, the user would select the TEXTMOV option. Figures 46 thru 49 illustrate using this option.

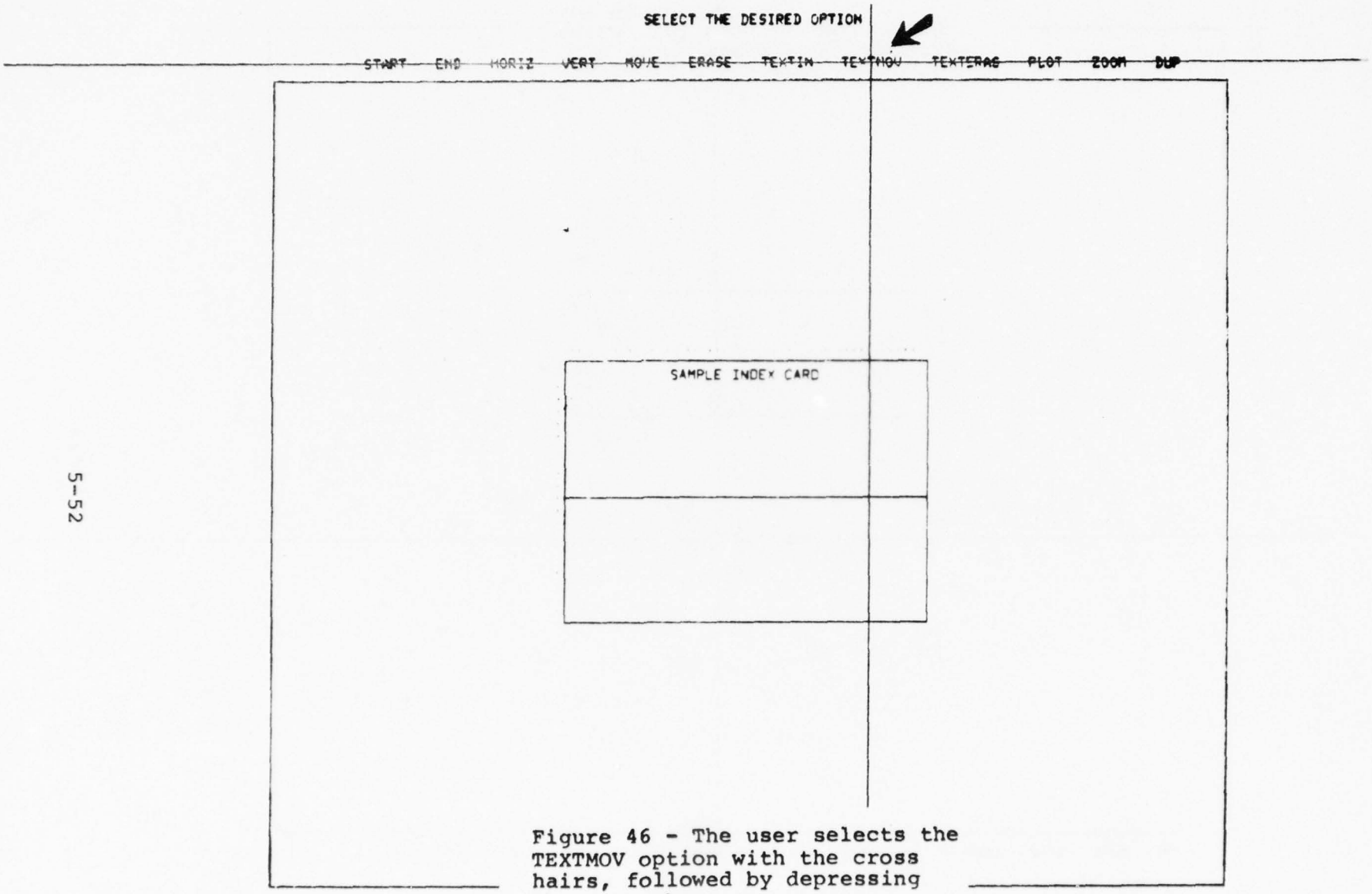

Figure 46 - The user selects the TEXTMOV option with the cross hairs, followed by depressing the space bar.

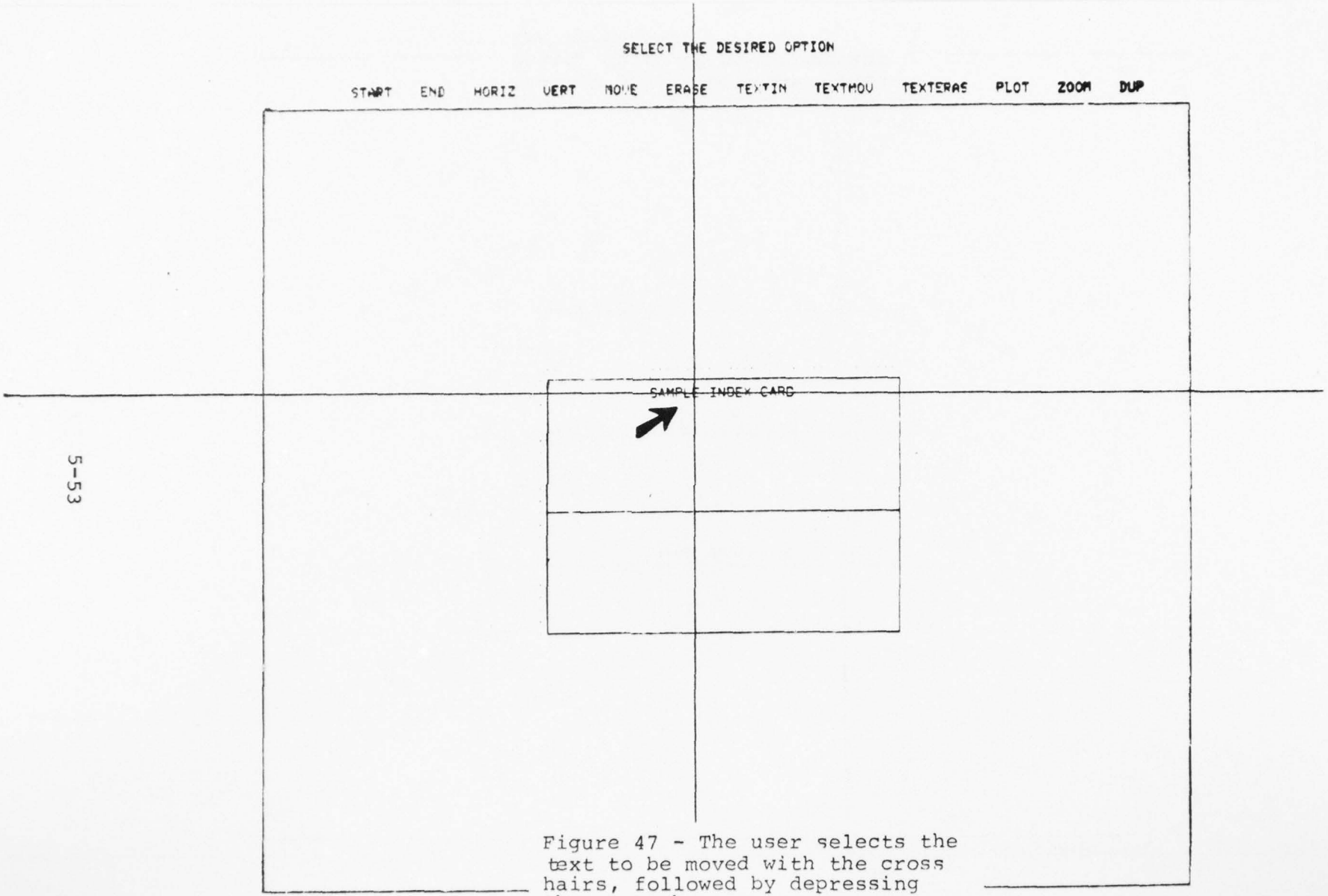

Figure 47 - The user selects the text to be moved with the cross hairs, followed by depressing the space bar.

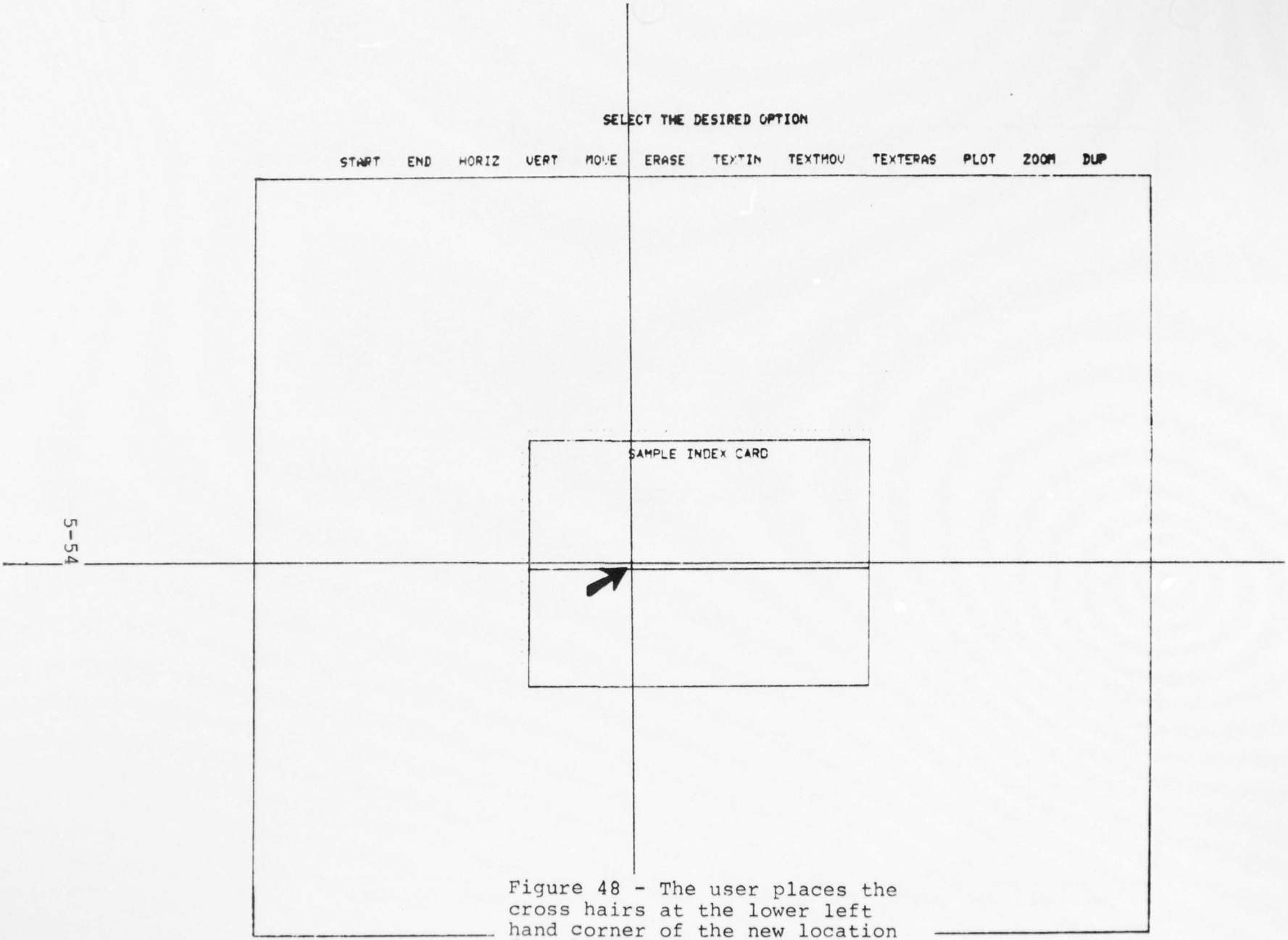

Figure 48 - The user places the cross hairs at the lower left hand corner of the new location for the text.

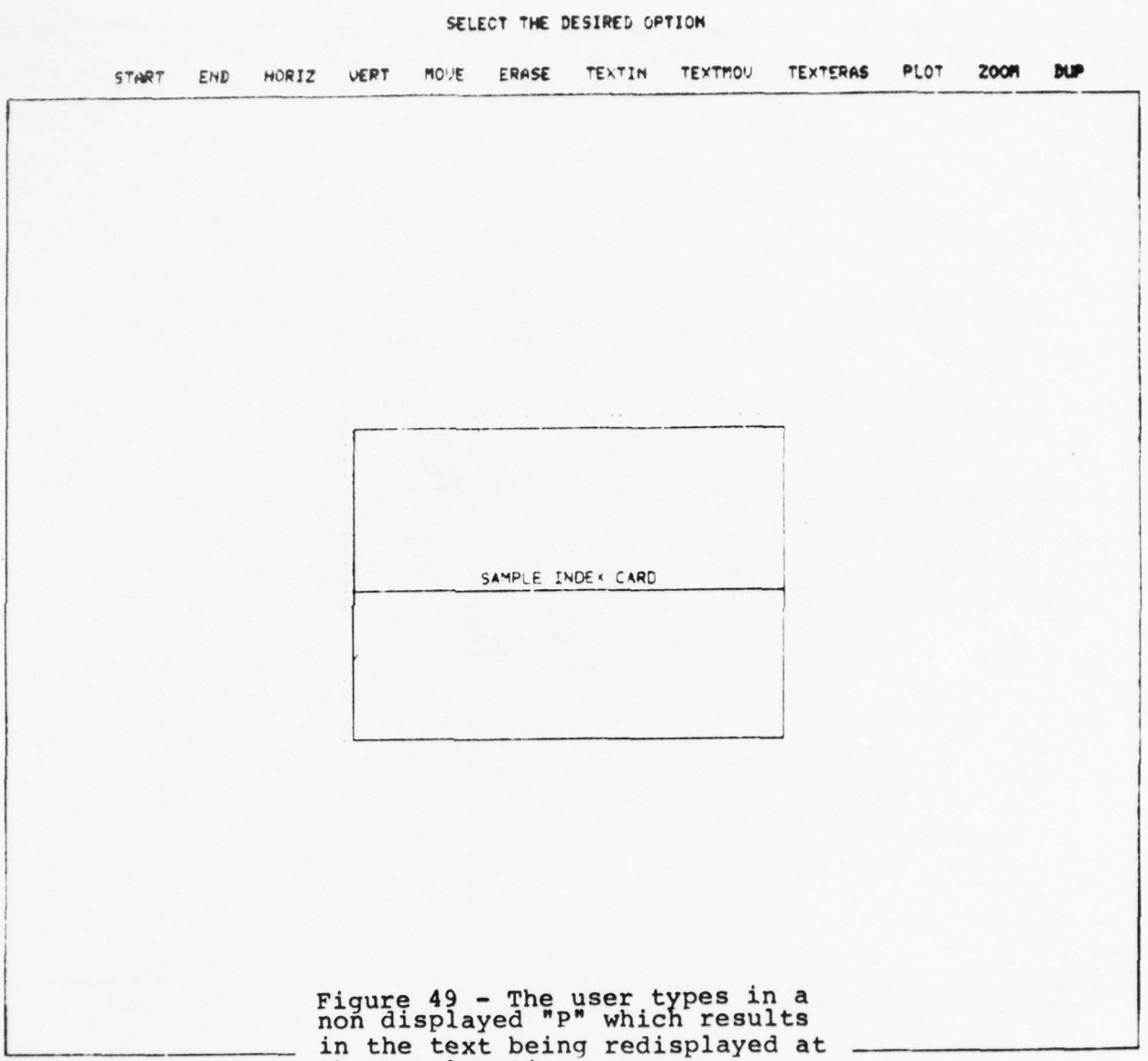

Figure 49 - The user types in a non displayed "P" which results in the text being redisplayed at the new location.

G. Using the erase (ERASE and TEXTERAS) options in DASF

1. Erasing a line - Figures 50 thru 52 illustrate using the ERASE option for erasing lines.

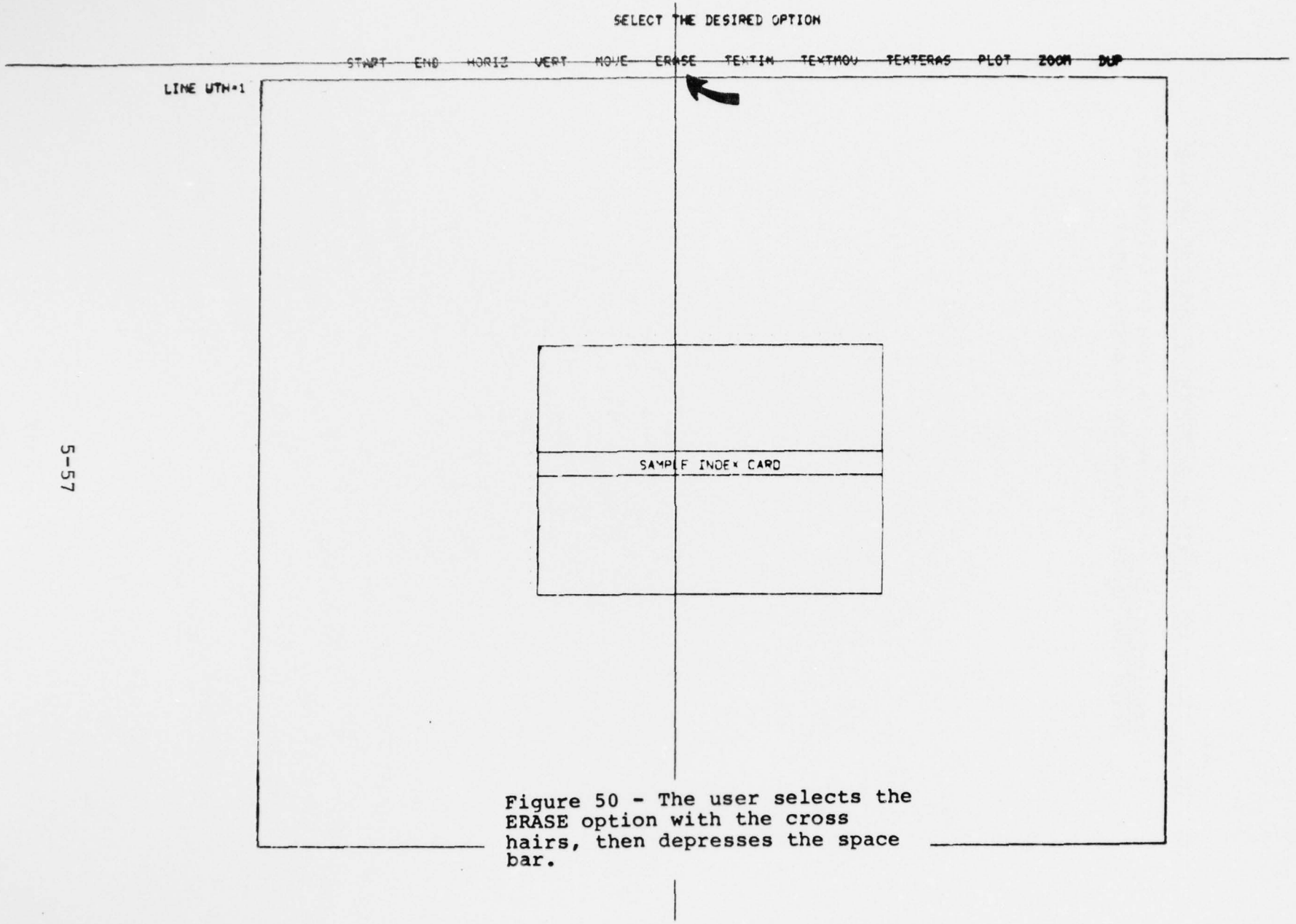

Figure 50 - The user selects the ERASE option with the cross hairs, then depresses the space bar.

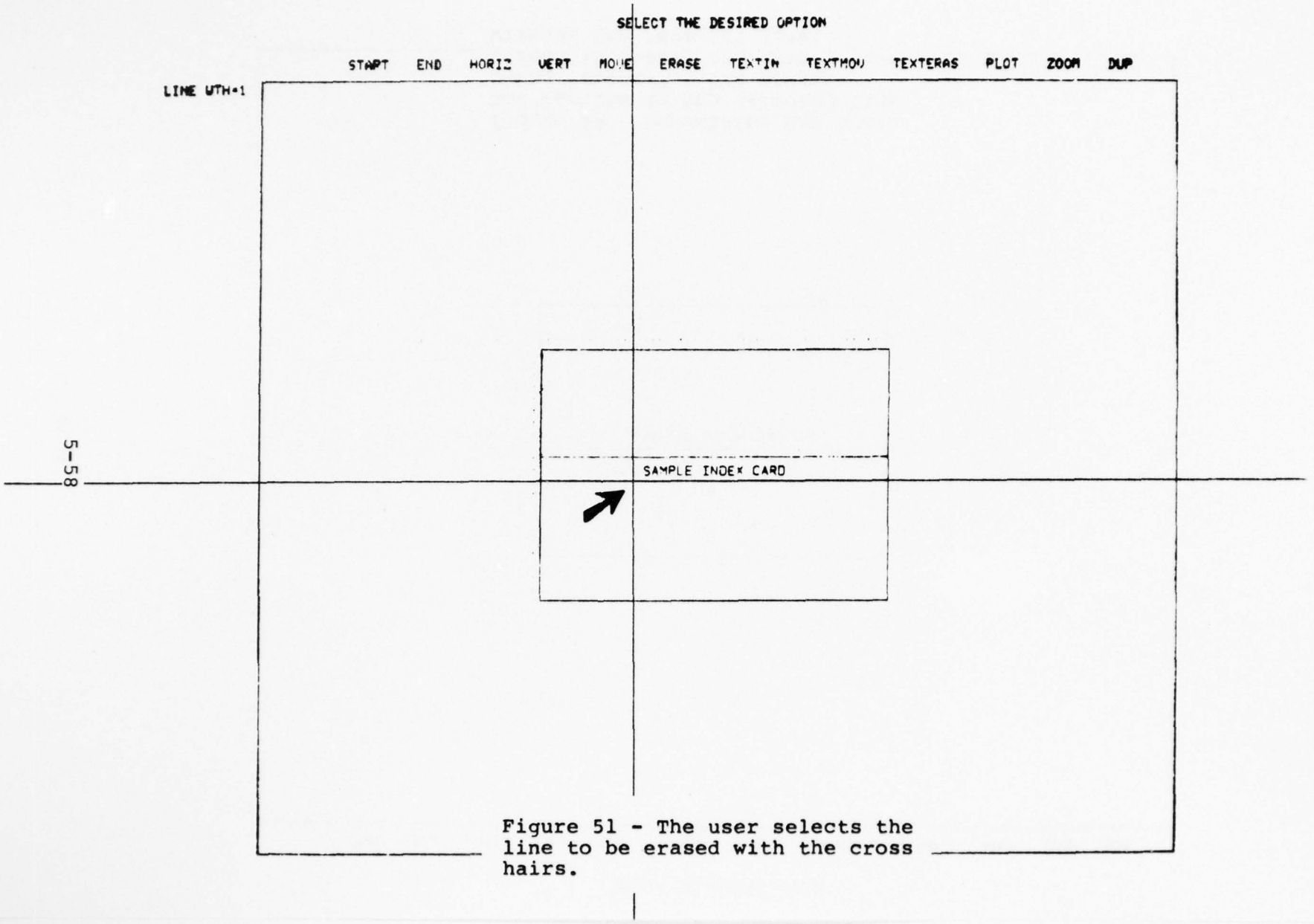

Figure 51 - The user selects the line to be erased with the cross hairs.

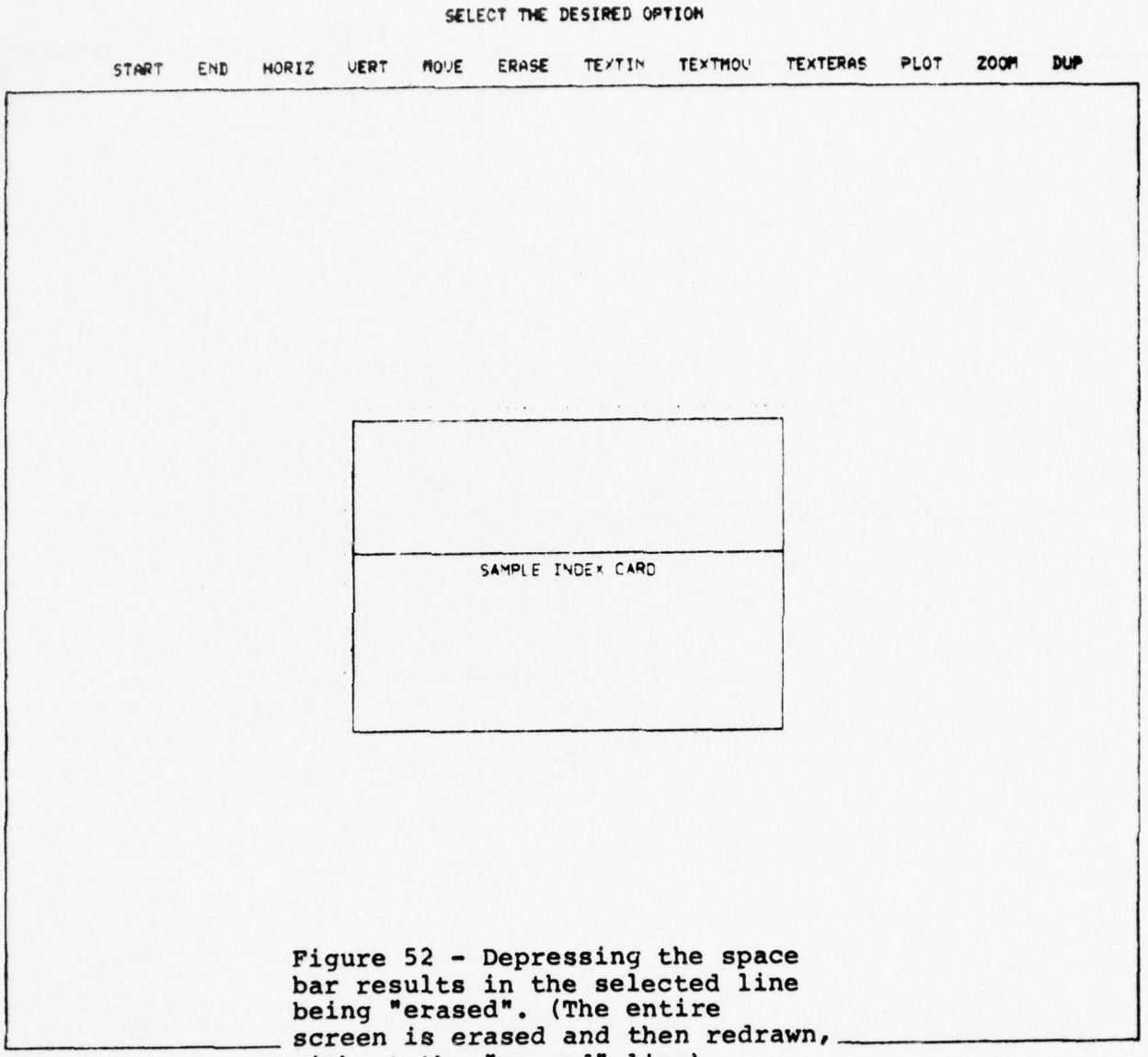

Figure 52 - Depressing the space bar results in the selected line being "erased". (The entire screen is erased and then redrawn, without the "erased" line).

2. Erasing text - Figures 53 thru 55 illustrate the TEXTERAS option for erasing text strings.

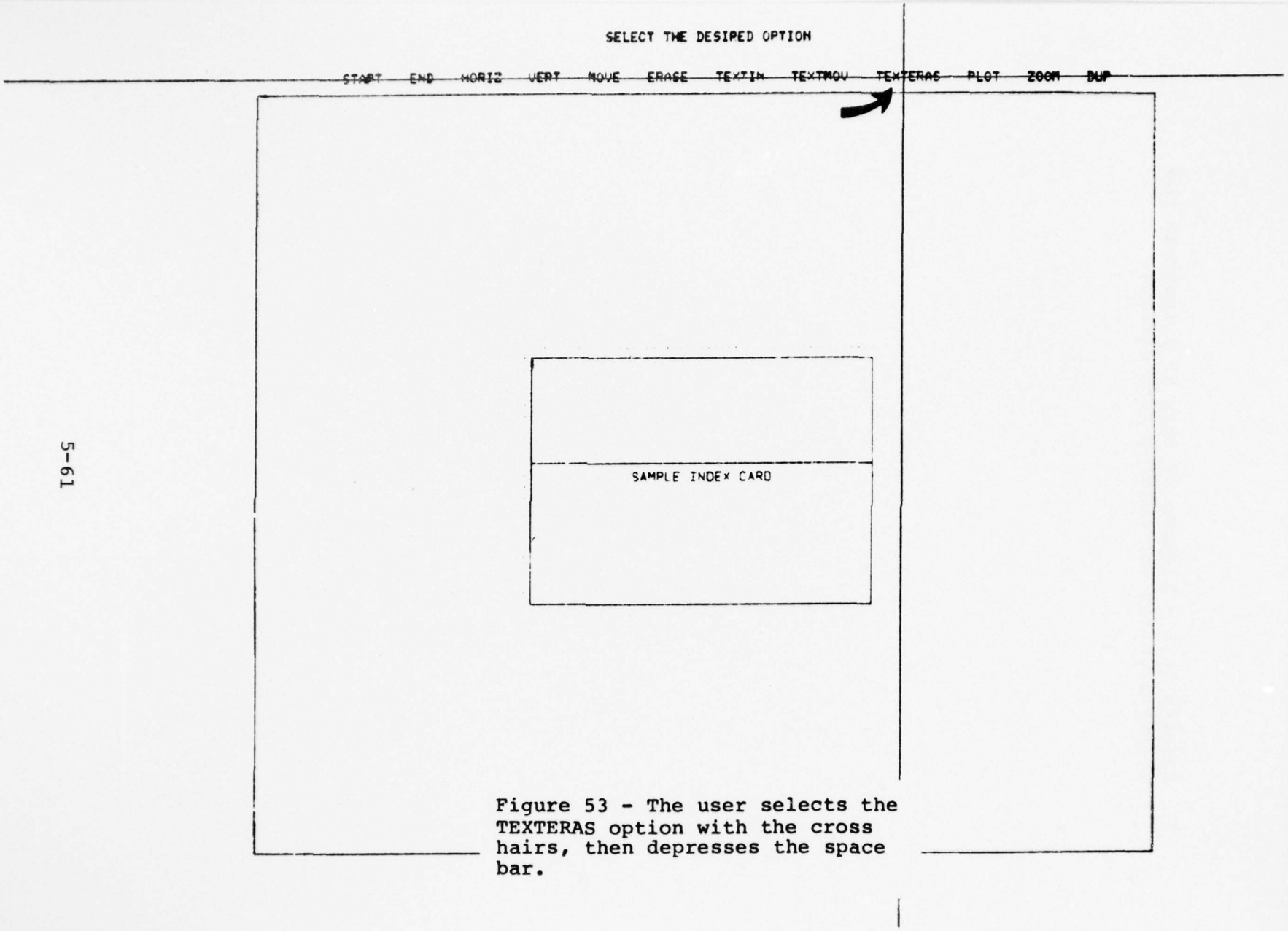

Figure 53 - The user selects the TEXTERAS option with the cross hairs, then depresses the space bar.

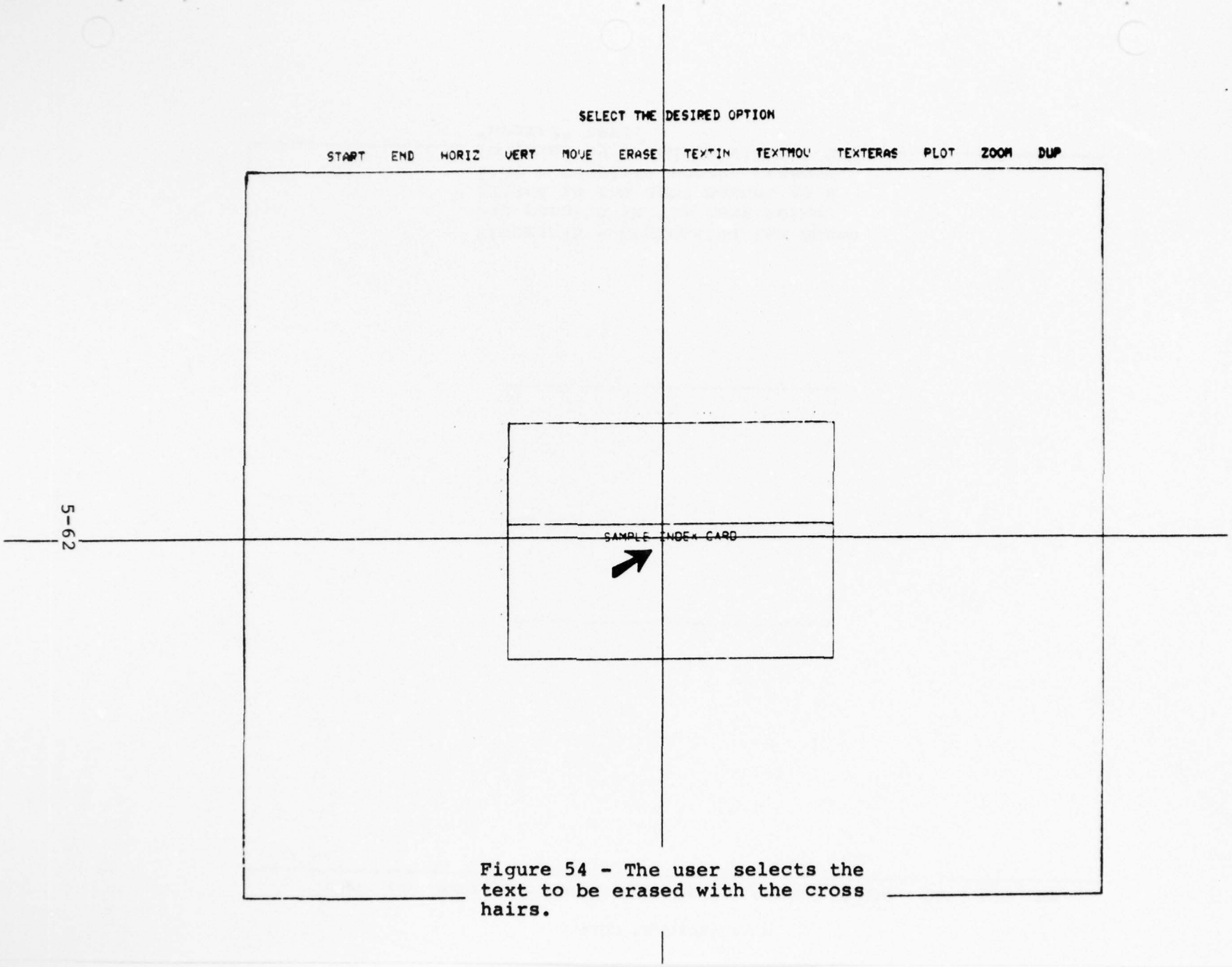

Figure 54 - The user selects the text to be erased with the cross hairs.

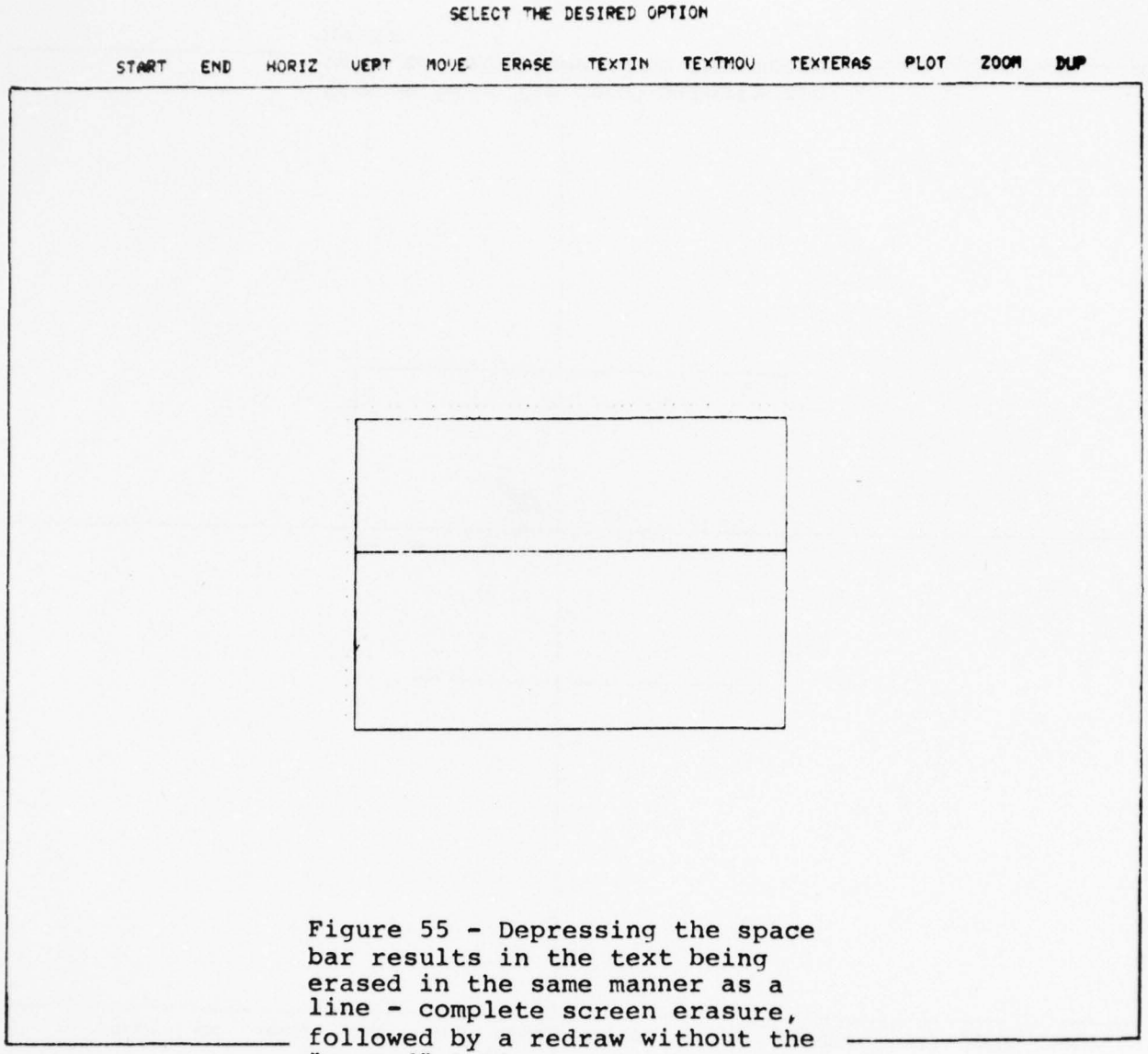

Figure 55 - Depressing the space bar results in the text being erased in the same manner as a line - complete screen erasure, followed by a redraw without the "erased" text.

H. Using the DUP option

This option allows the duplication of any lines or text strings within the form. Figures 56 thru 64 illustrate the selection and use of this option to first duplicate lines and then text.

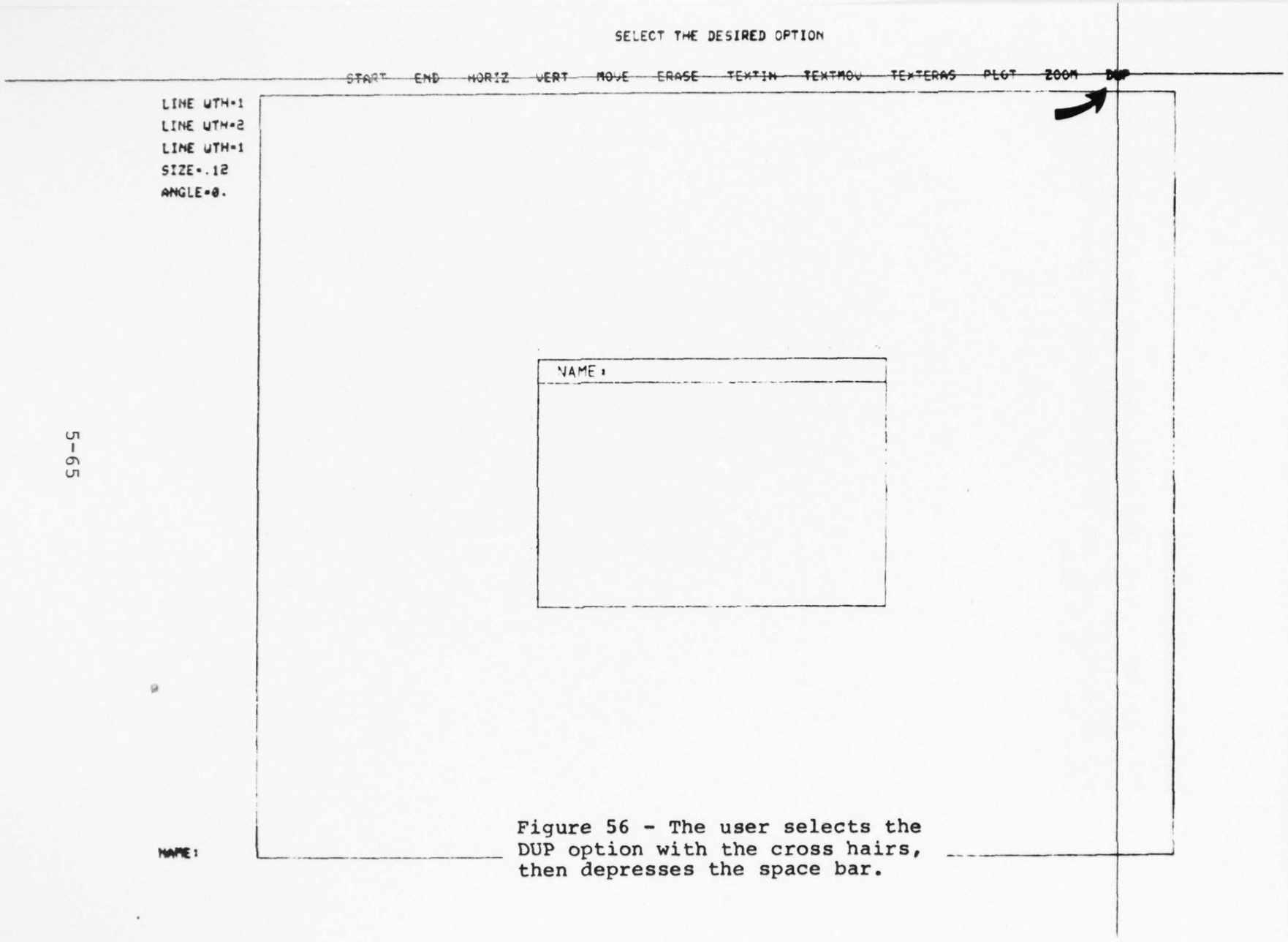

Figure 56 - The user selects the DUP option with the cross hairs, then depresses the space bar.

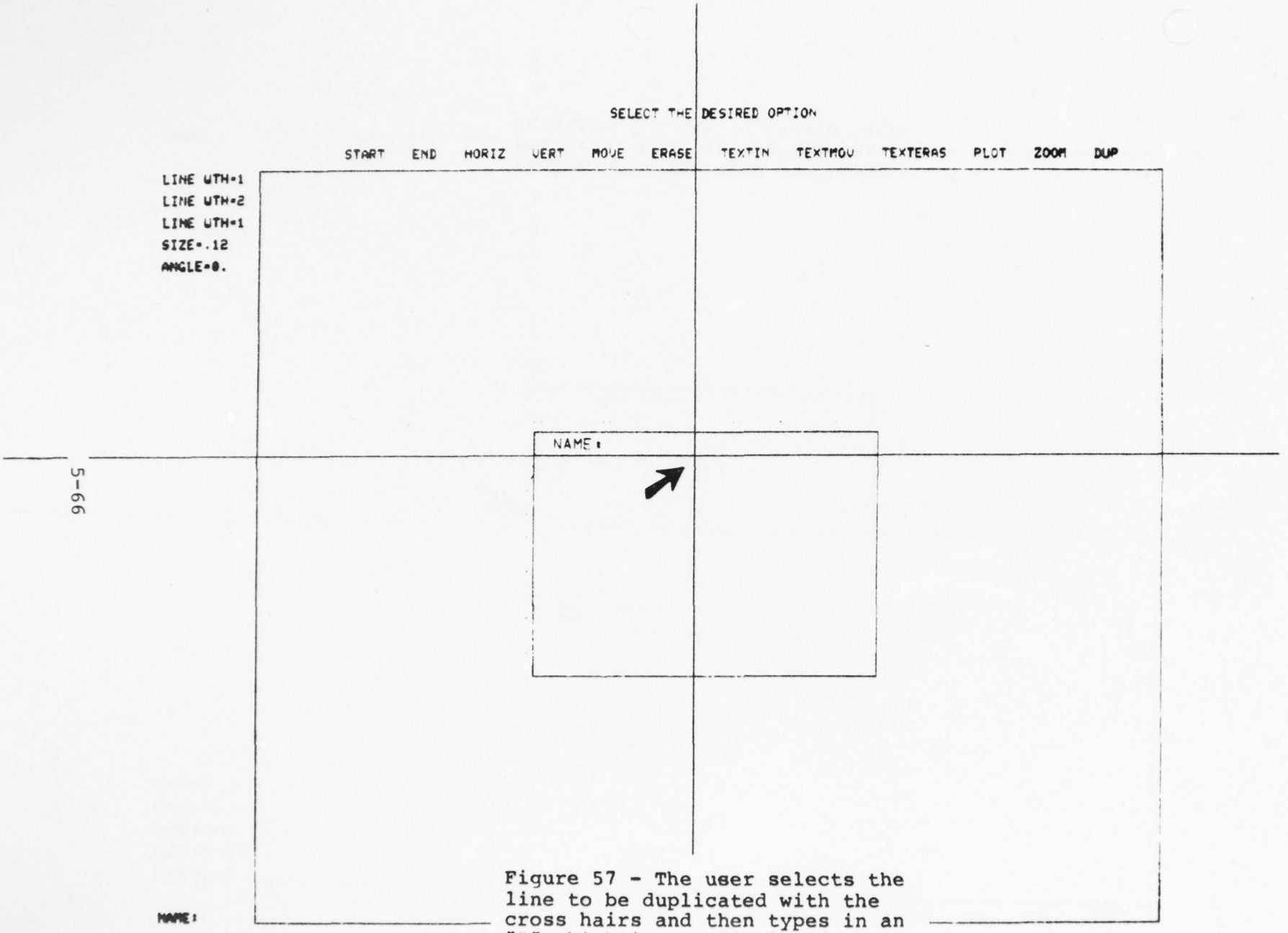

Figure 57 - The user selects the line to be duplicated with the cross hairs and then types in an "L" which is not displayed.

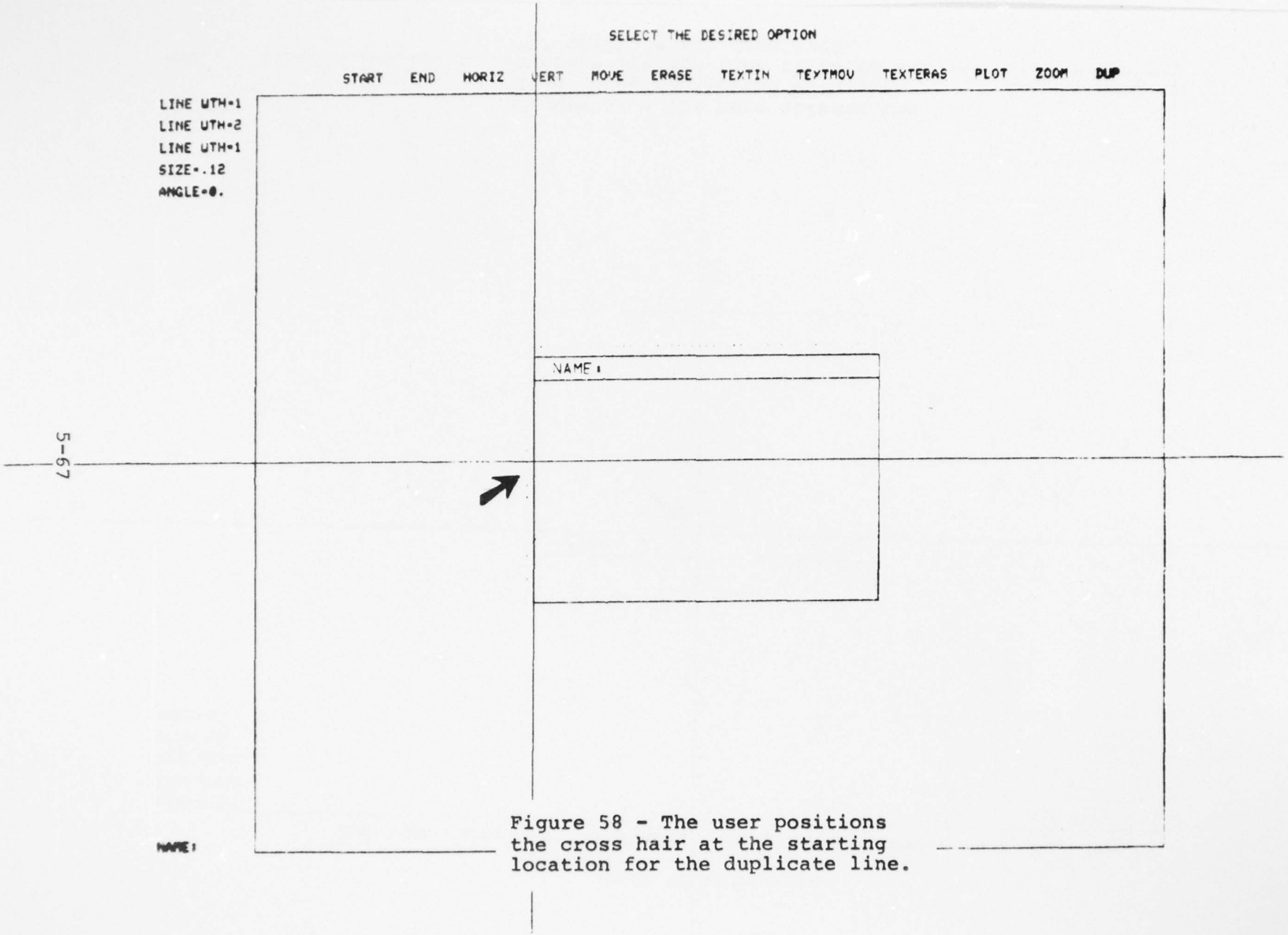

Figure 58 - The user positions the cross hair at the starting location for the duplicate line.

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DASF - DESIGN OF ARTWORK FOR STANDARD FORMS.(U)
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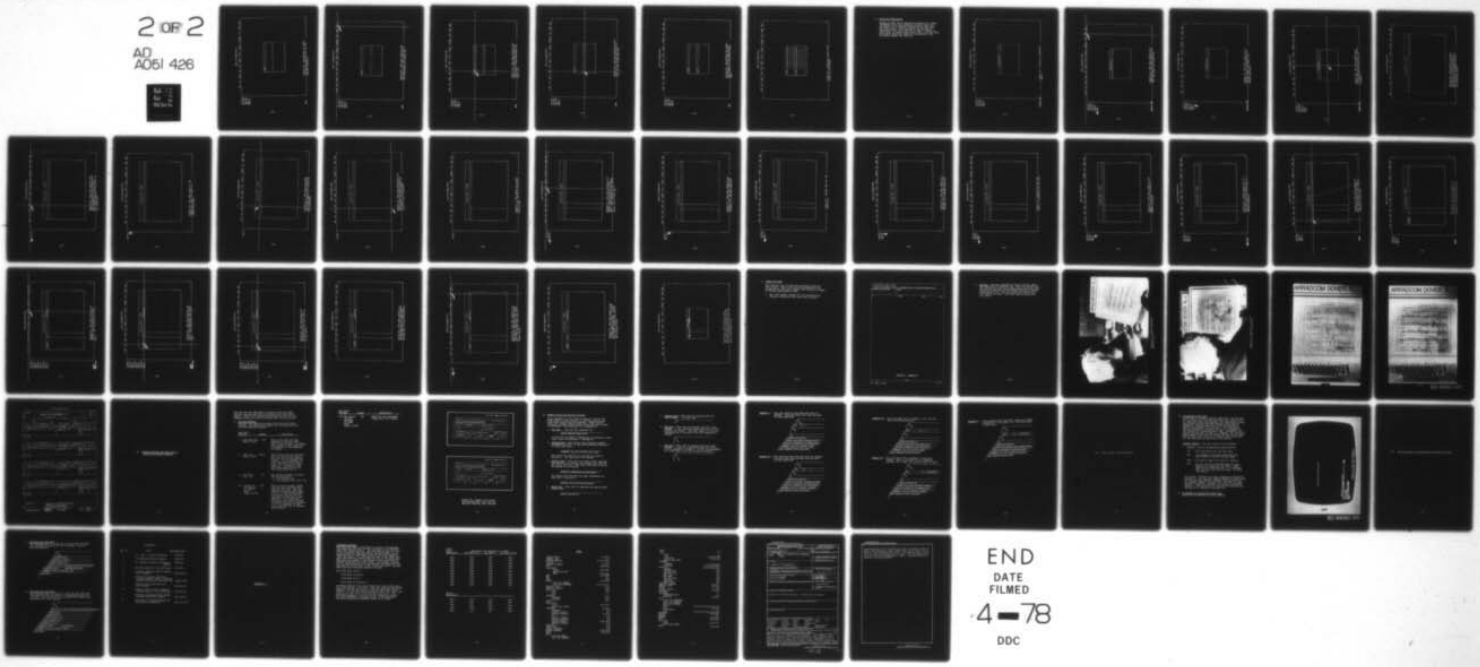

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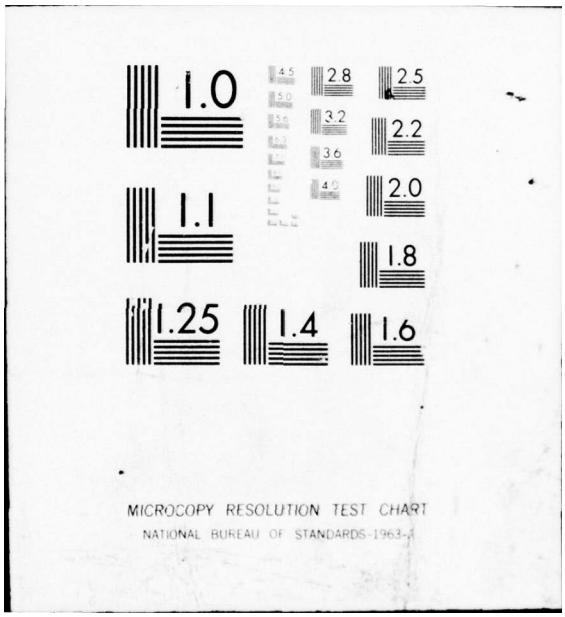
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
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4.0
4.5
5.0
5.6
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

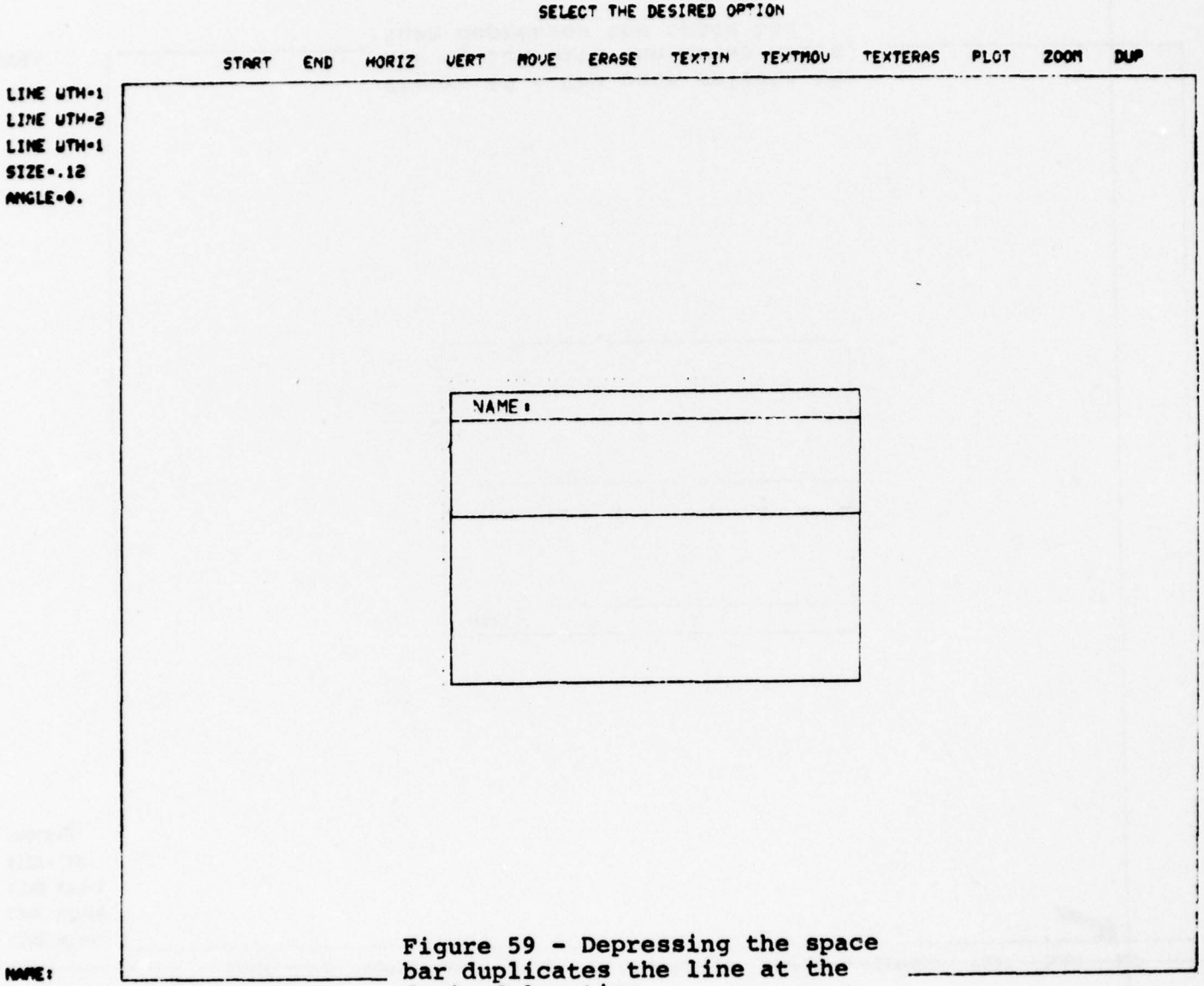

Figure 59 - Depressing the space bar duplicates the line at the desired location.

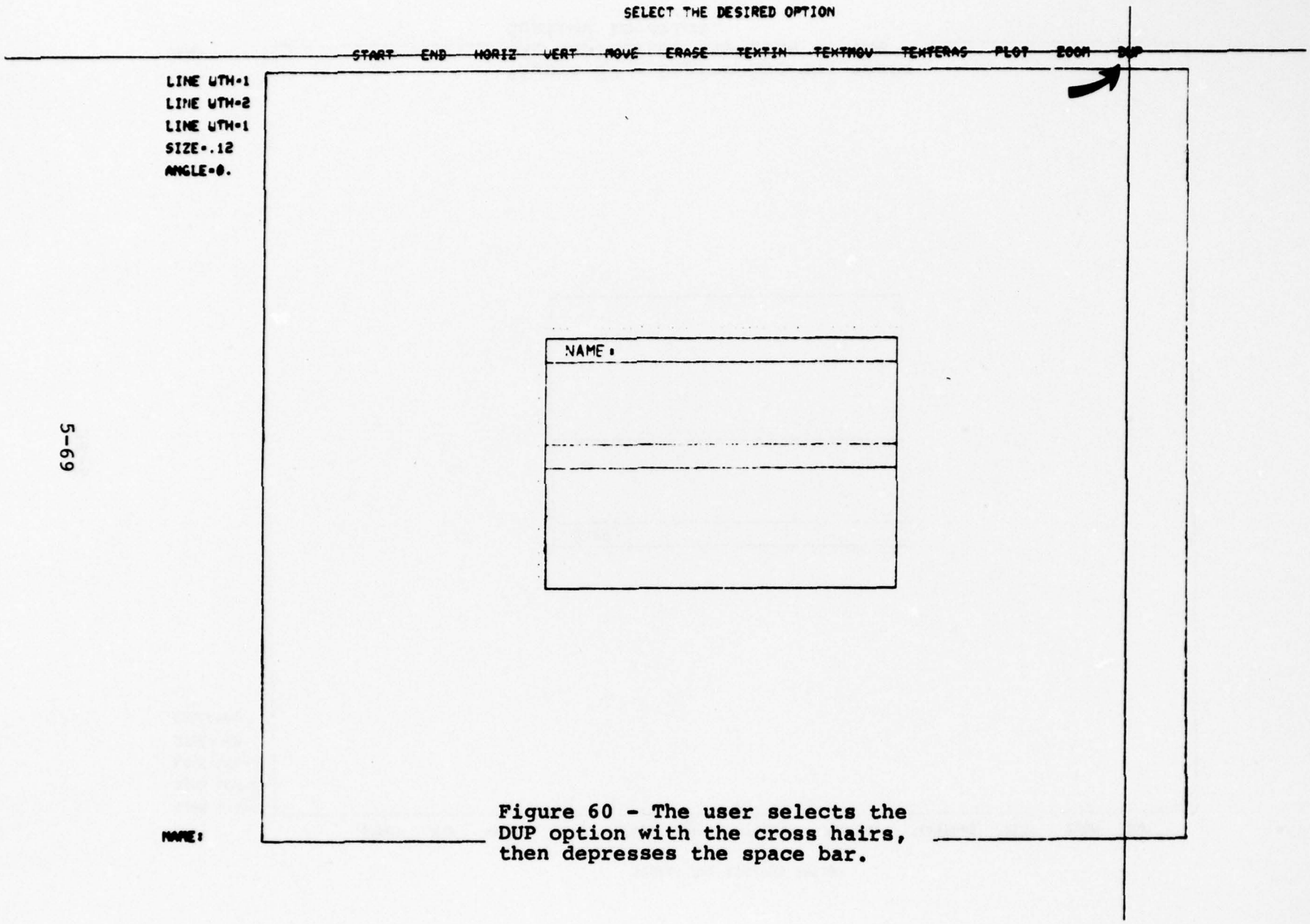

Figure 60 - The user selects the DUP option with the cross hairs, then depresses the space bar.

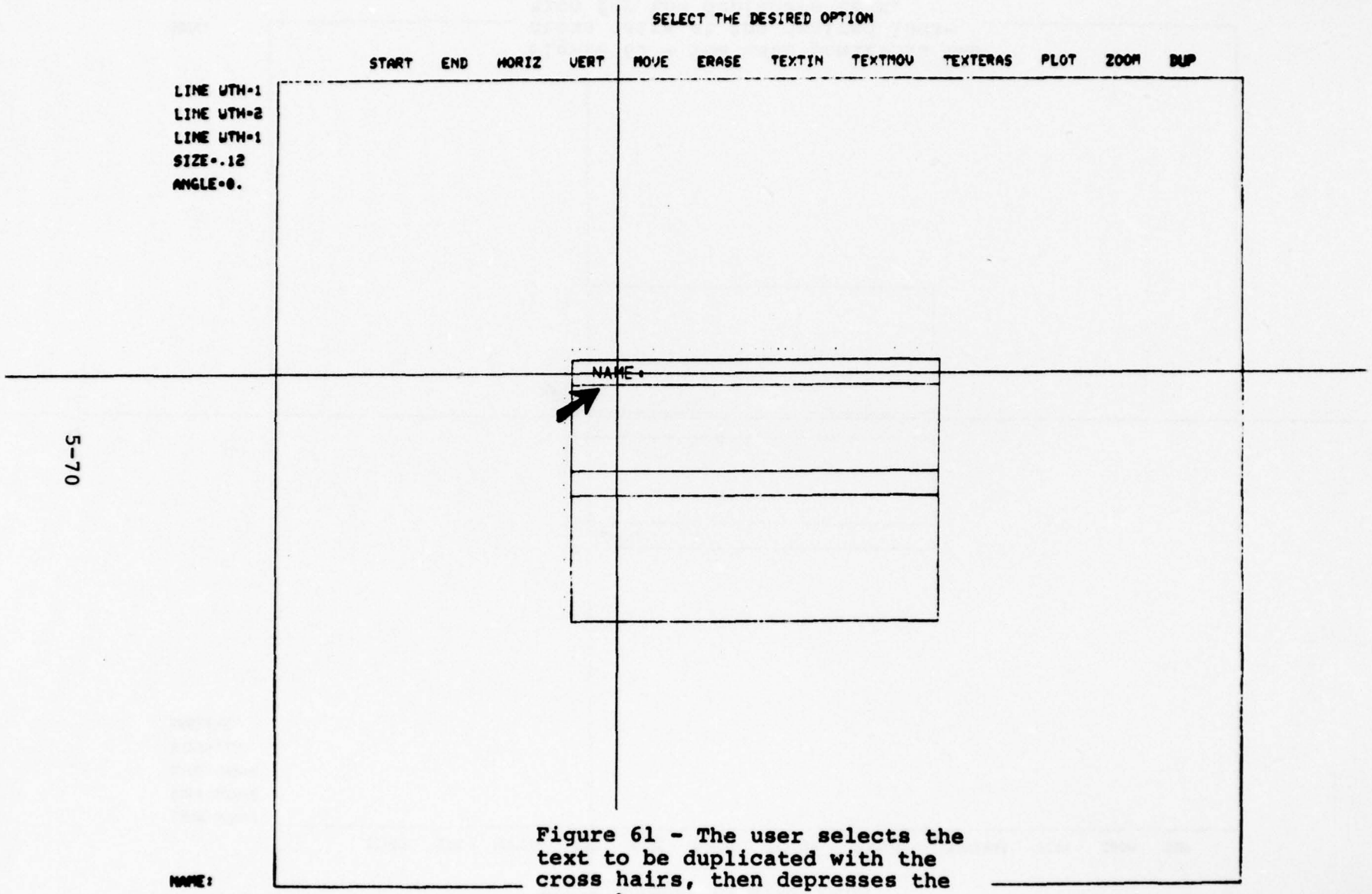

Figure 61 - The user selects the text to be duplicated with the cross hairs, then depresses the space bar.

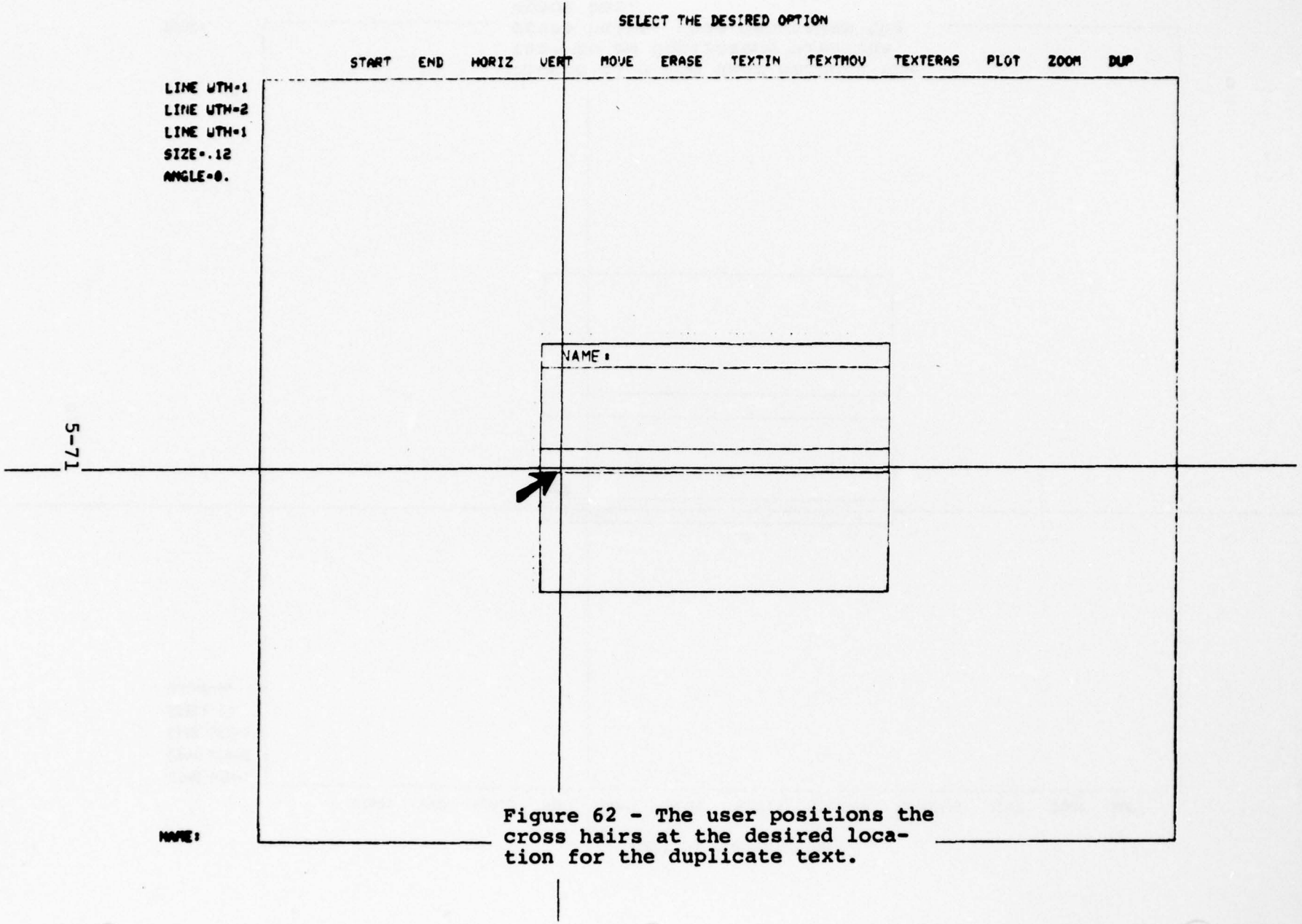

Figure 62 - The user positions the cross hairs at the desired location for the duplicate text.

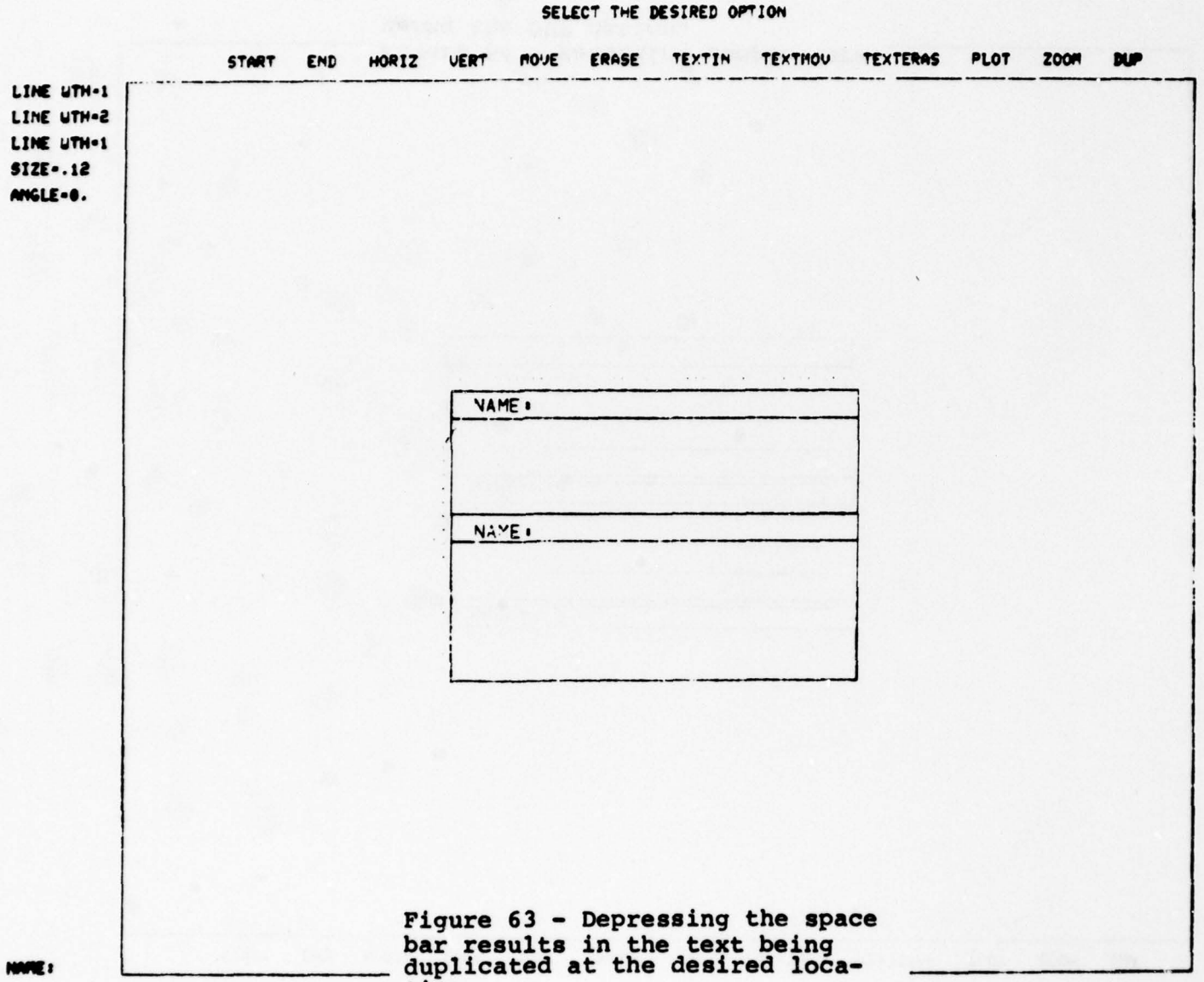

Figure 63 - Depressing the space bar results in the text being duplicated at the desired location.

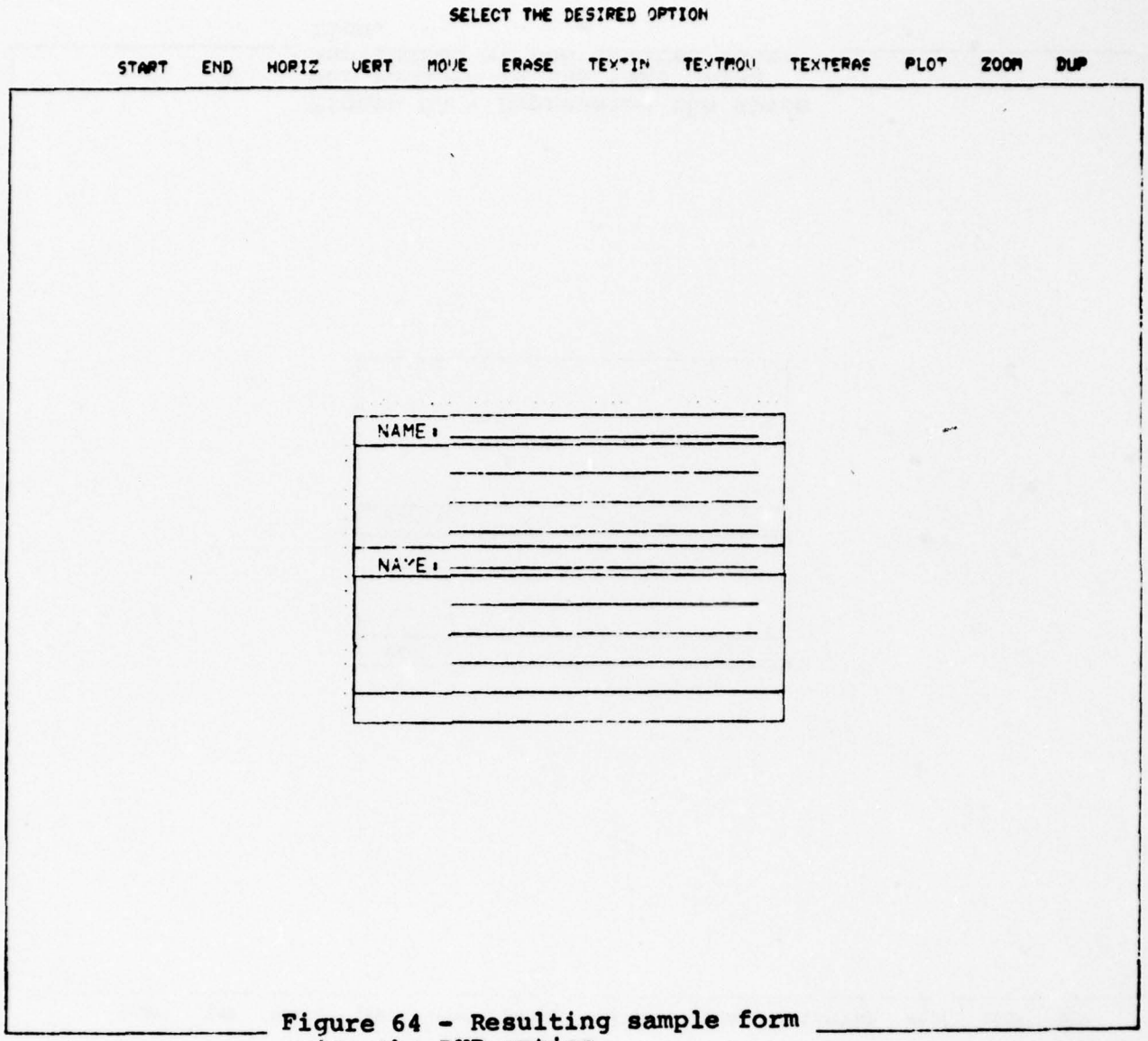

Figure 64 - Resulting sample form using the DUP option.

I. Using the ZOOM option

Zooming in DASF can be defined as scaling up or down (windowing) by a user specified integer value with the center of the window selected by the user with the cross hairs. The zoom option can be used in conjunction with other options to make it easier to: draw, move, or erase lines; enter, move, or erase text; and finally duplicate items as illustrated in the following figures (65 thru 90).

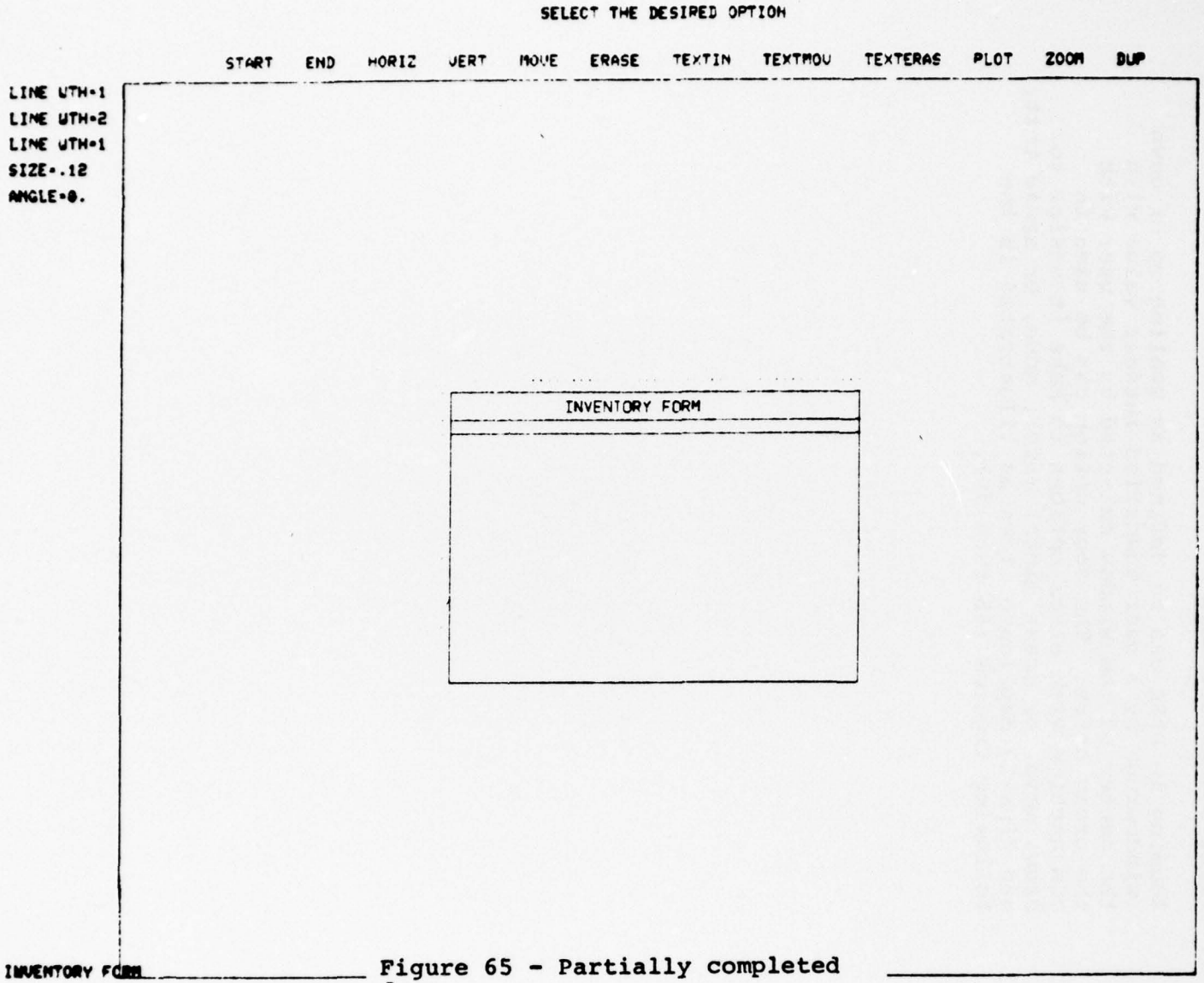

Figure 65 - Partially completed form.

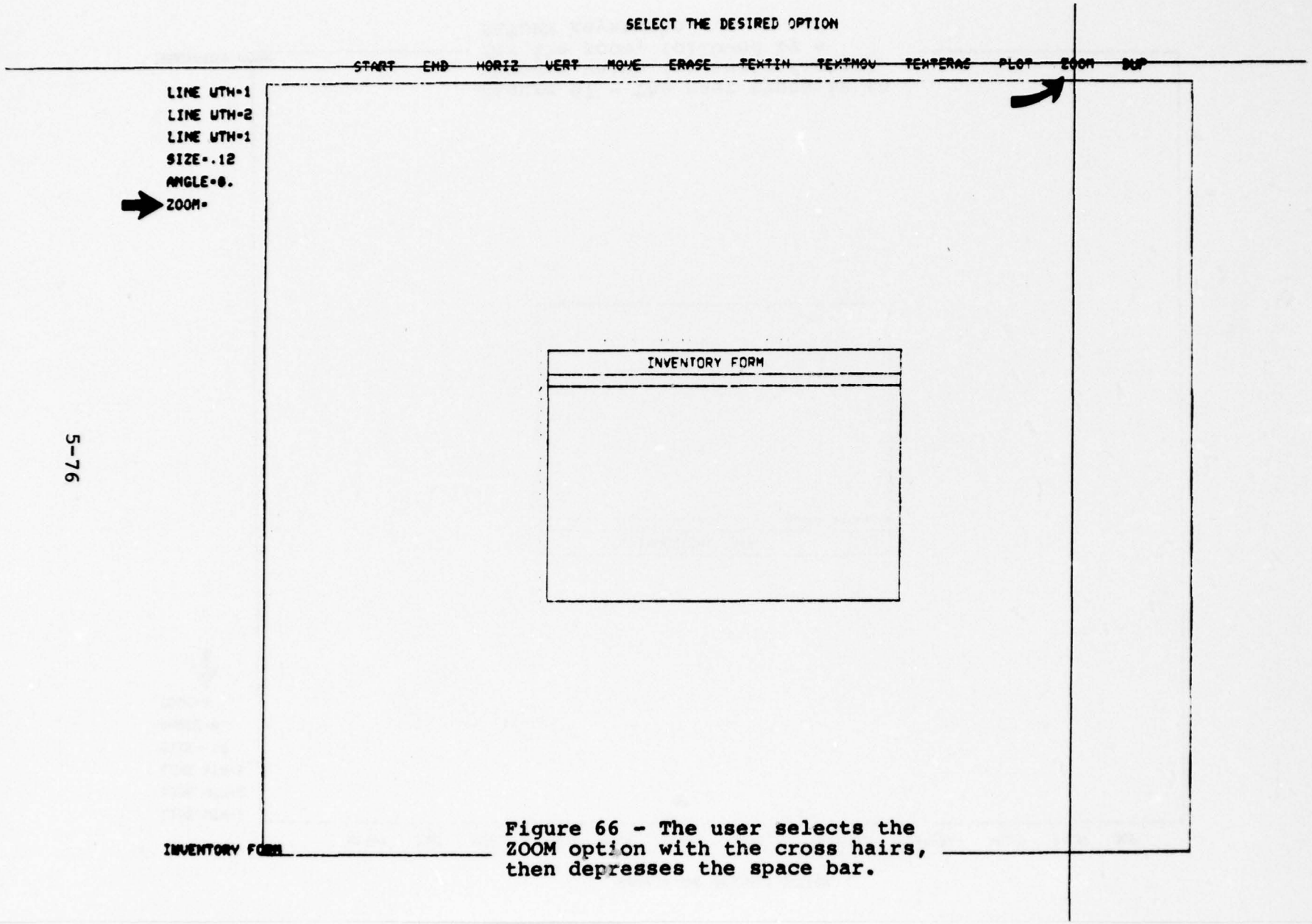

Figure 66 - The user selects the ZOOM option with the cross hairs, then depresses the space bar.

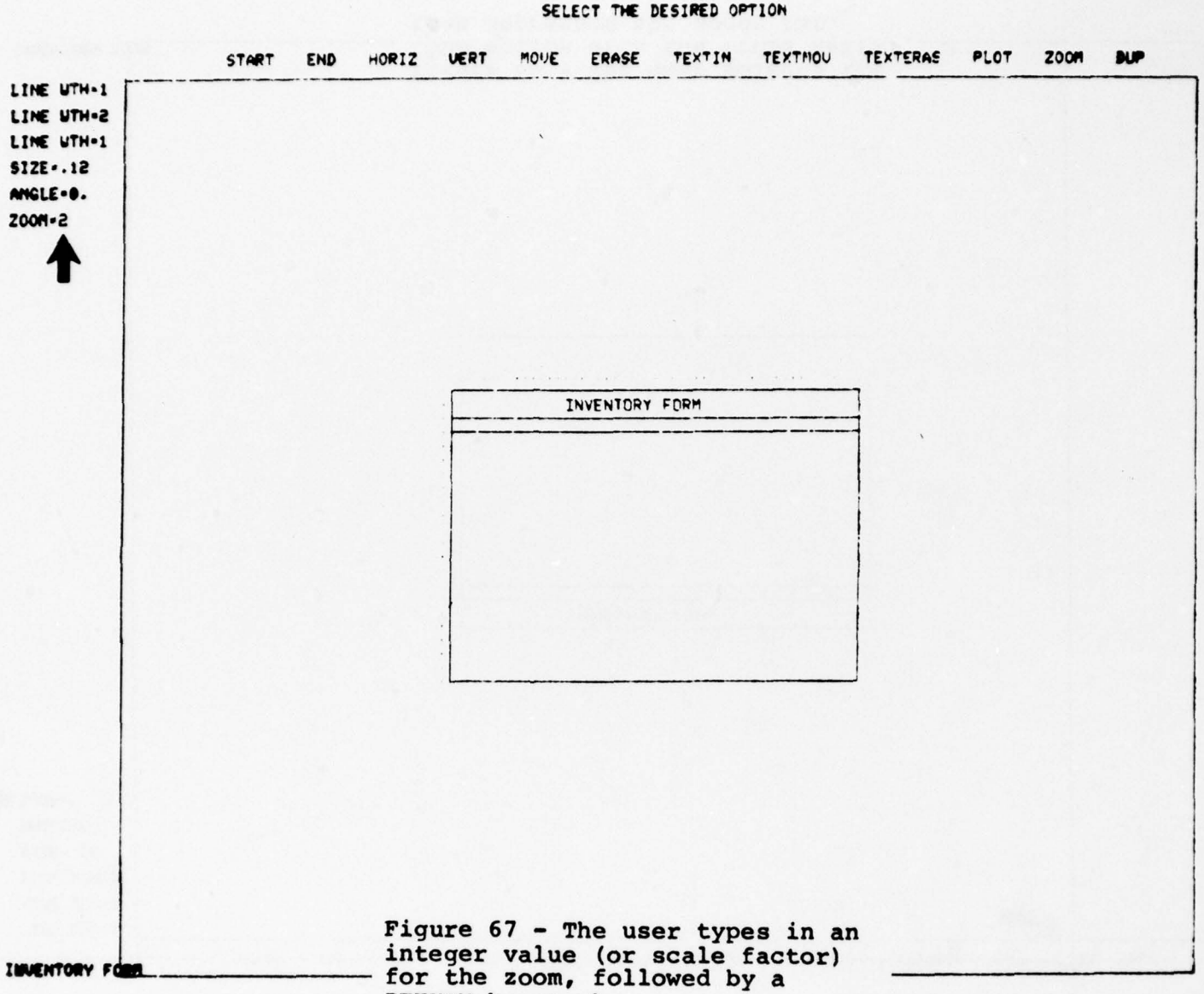

Figure 67 - The user types in an integer value (or scale factor) for the zoom, followed by a RETURN keystroke.

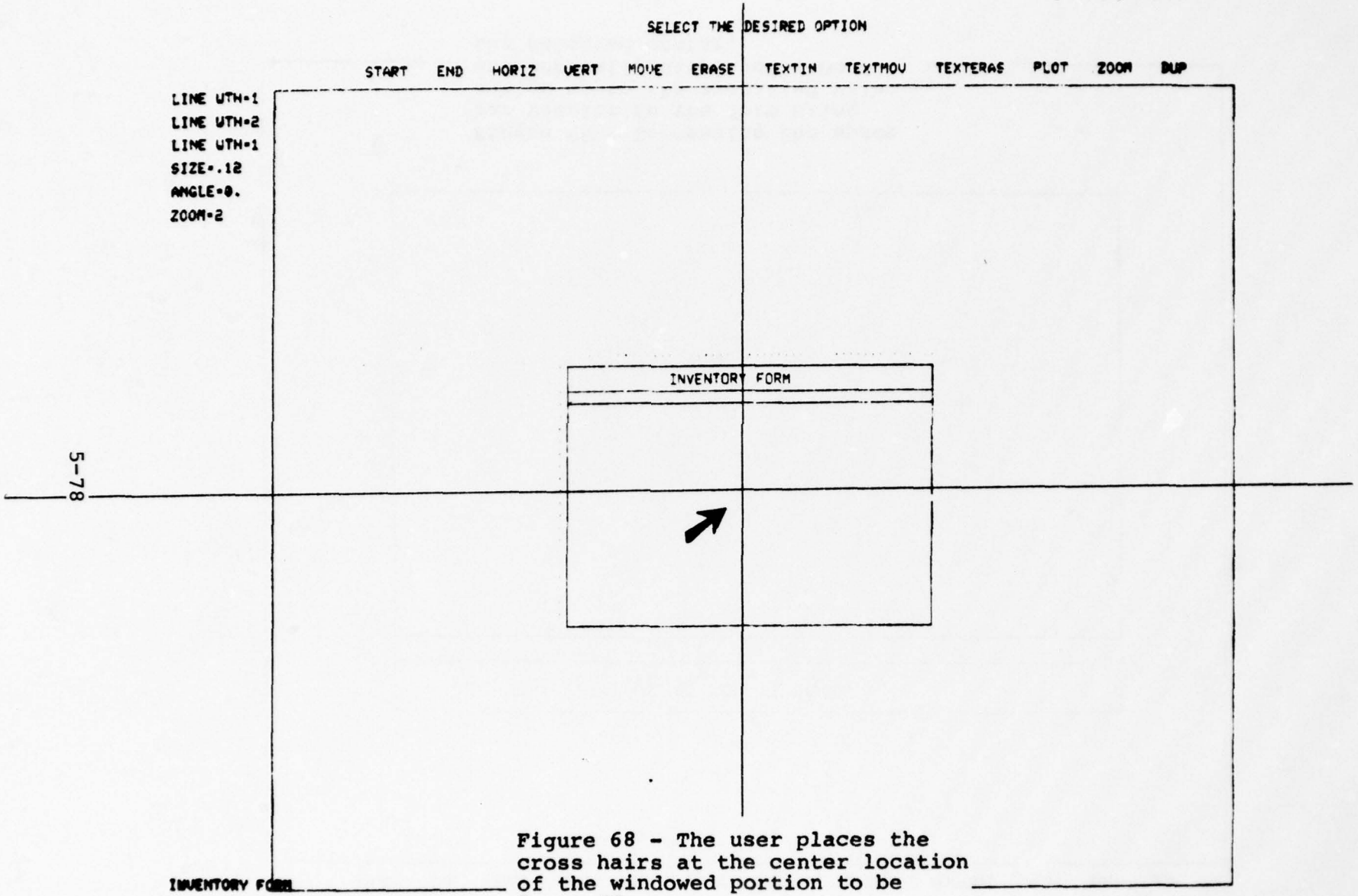

Figure 68 - The user places the cross hairs at the center location of the windowed portion to be "zoomed".

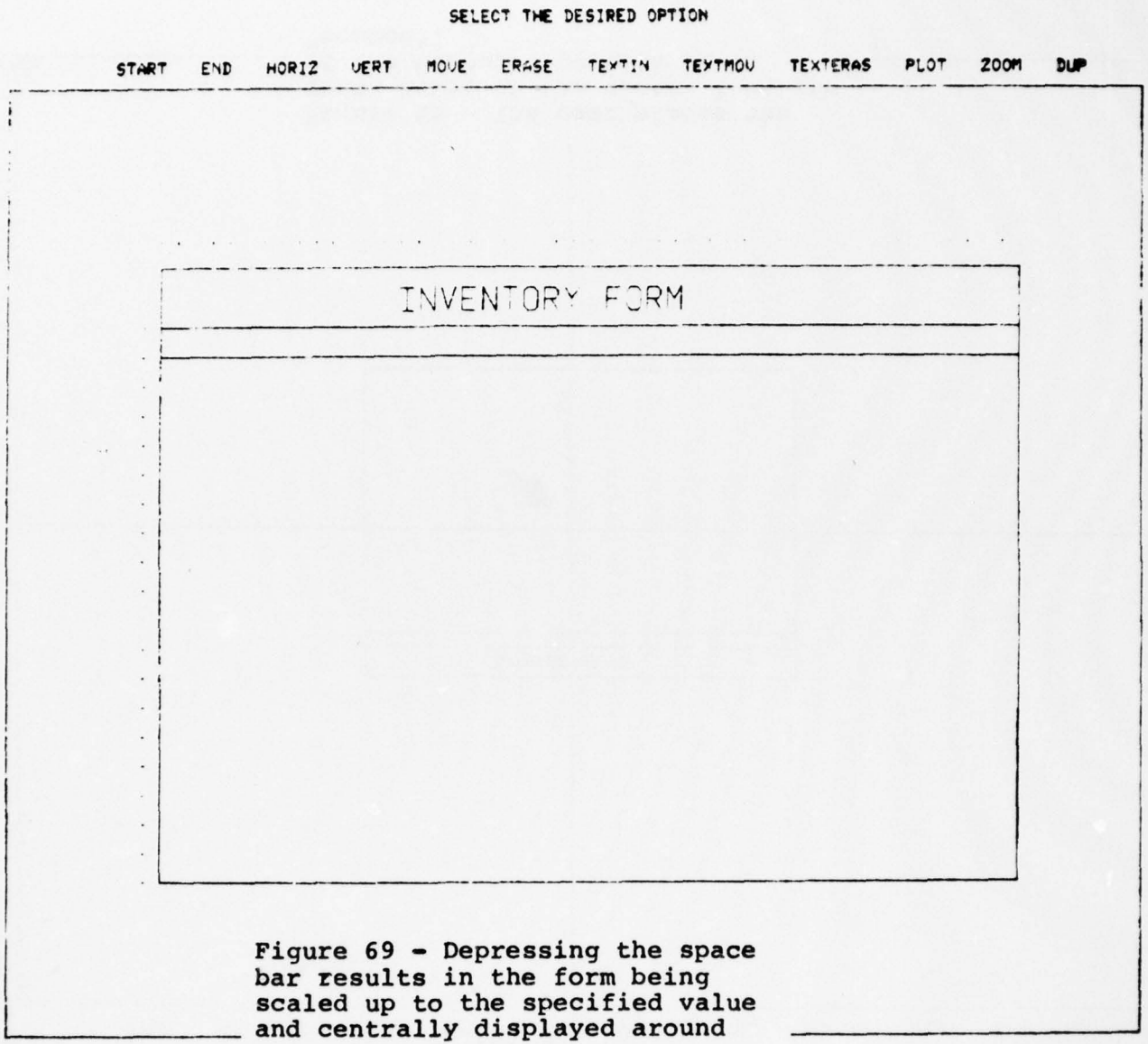

Figure 69 - Depressing the space bar results in the form being scaled up to the specified value and centrally displayed around the selected center.

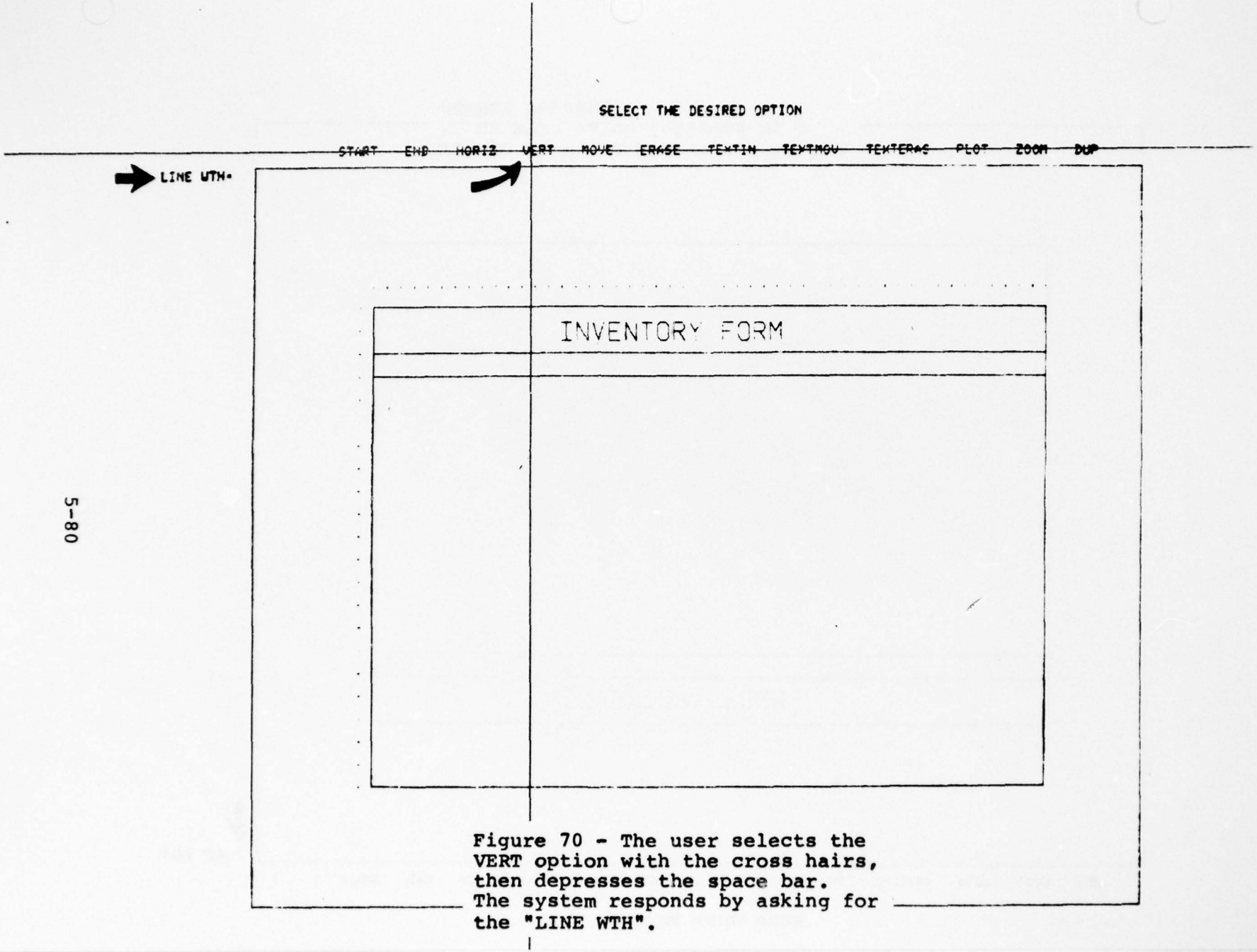

Figure 70 - The user selects the VERT option with the cross hairs, then depresses the space bar. The system responds by asking for the "LINE WTH".

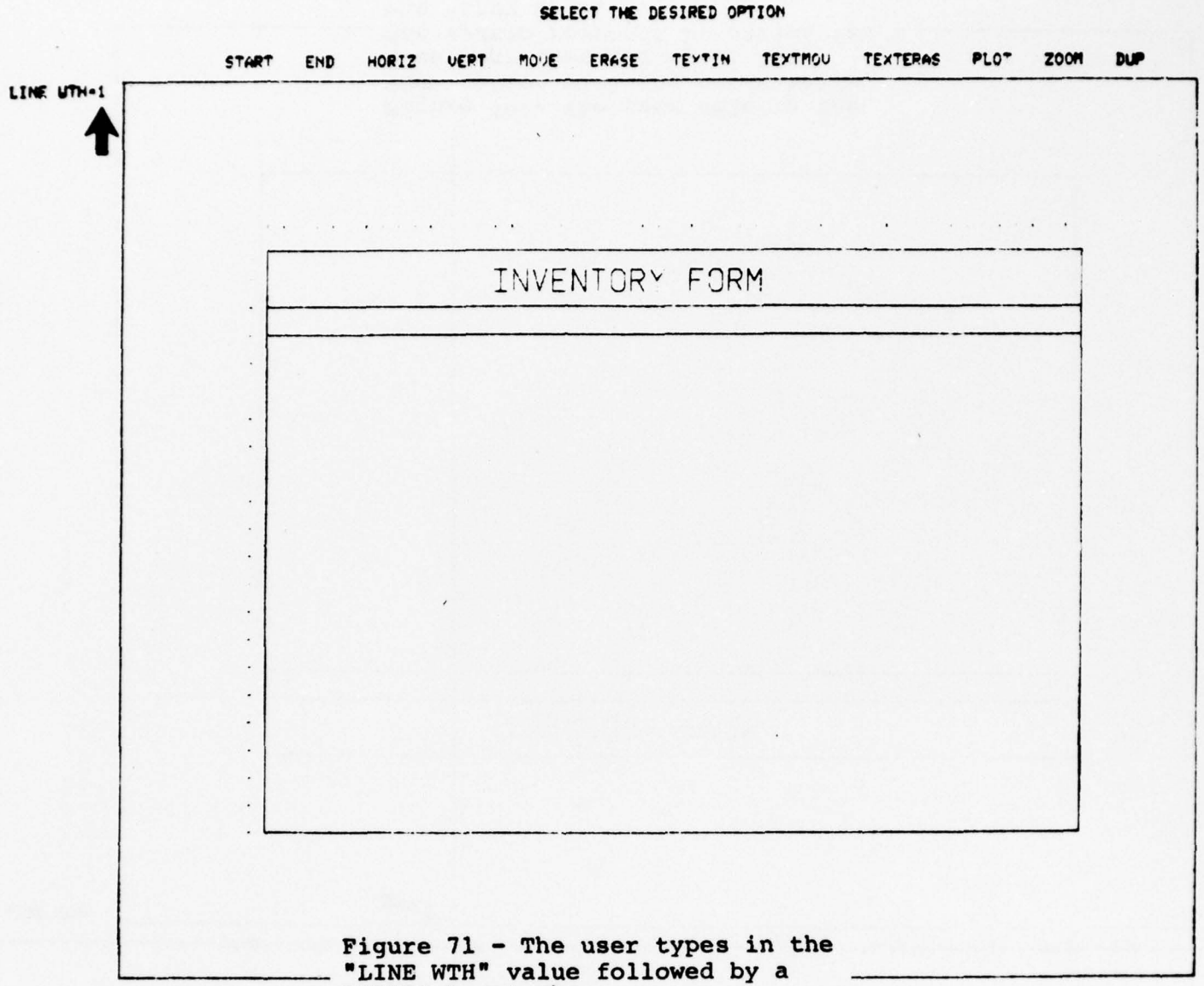

Figure 71 - The user types in the "LINE WTH" value followed by a RETURN keystroke.

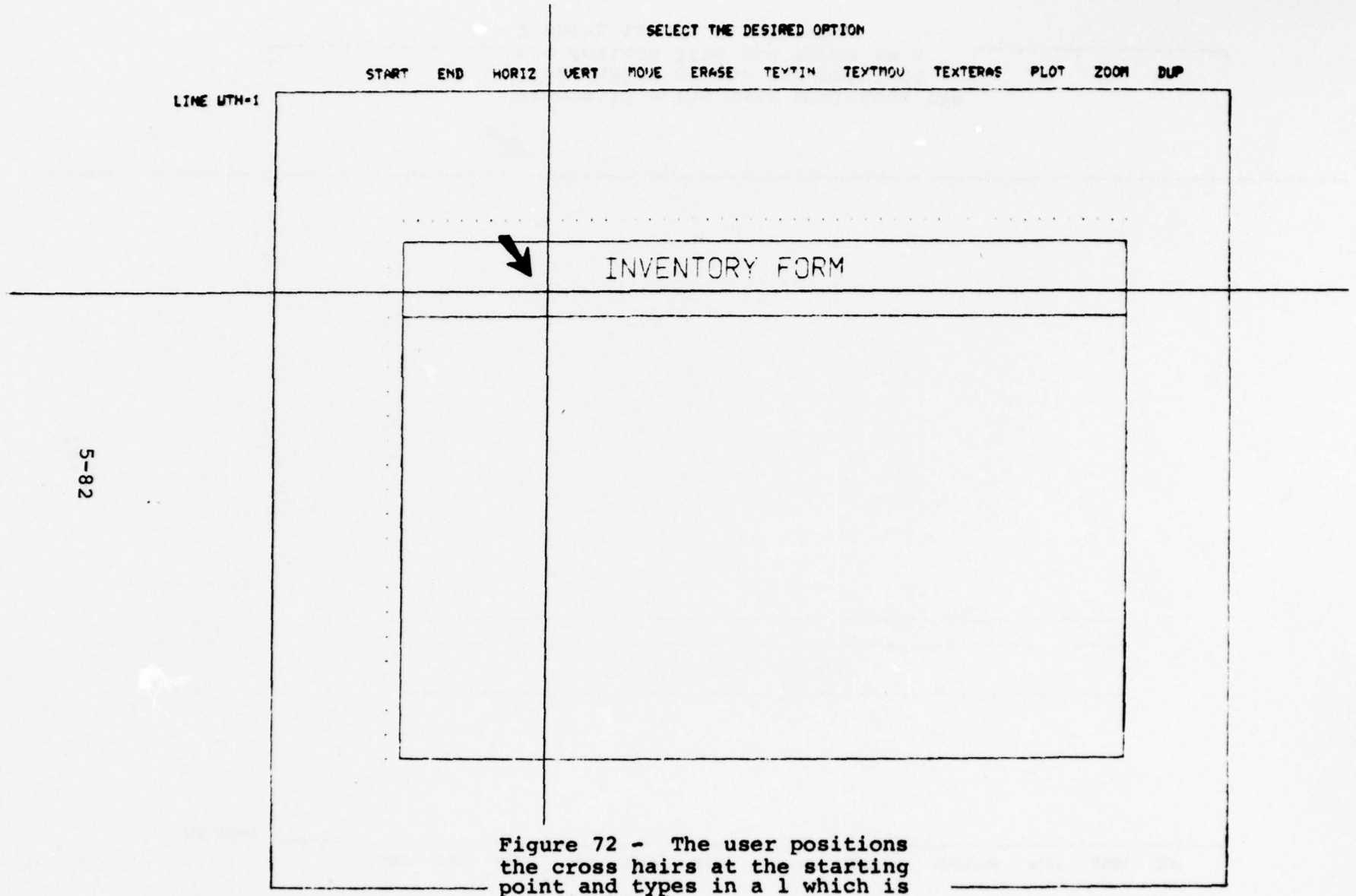

Figure 72 - The user positions the cross hairs at the starting point and types in a 1 which is not displayed.

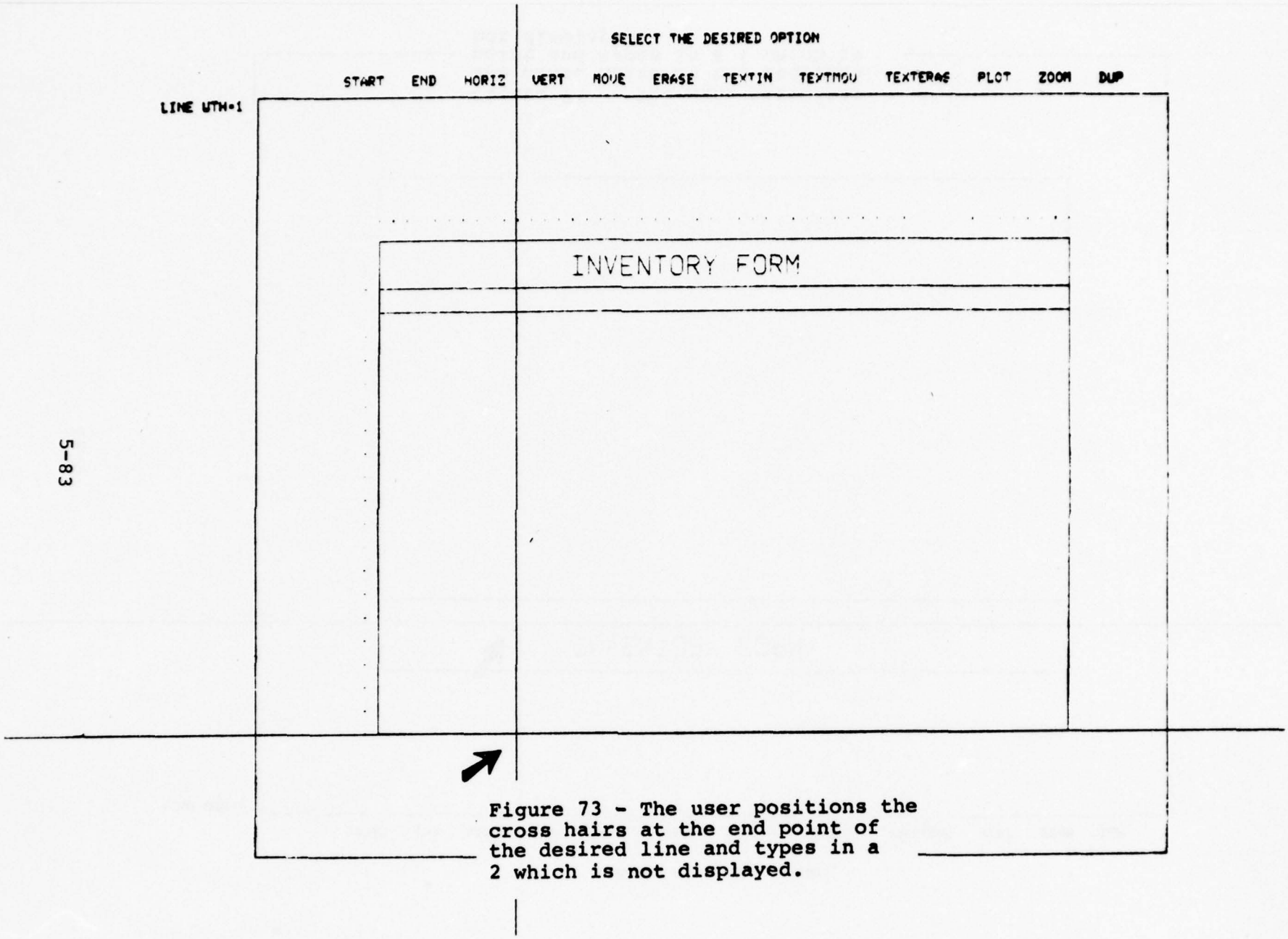

Figure 73 - The user positions the cross hairs at the end point of the desired line and types in a 2 which is not displayed.

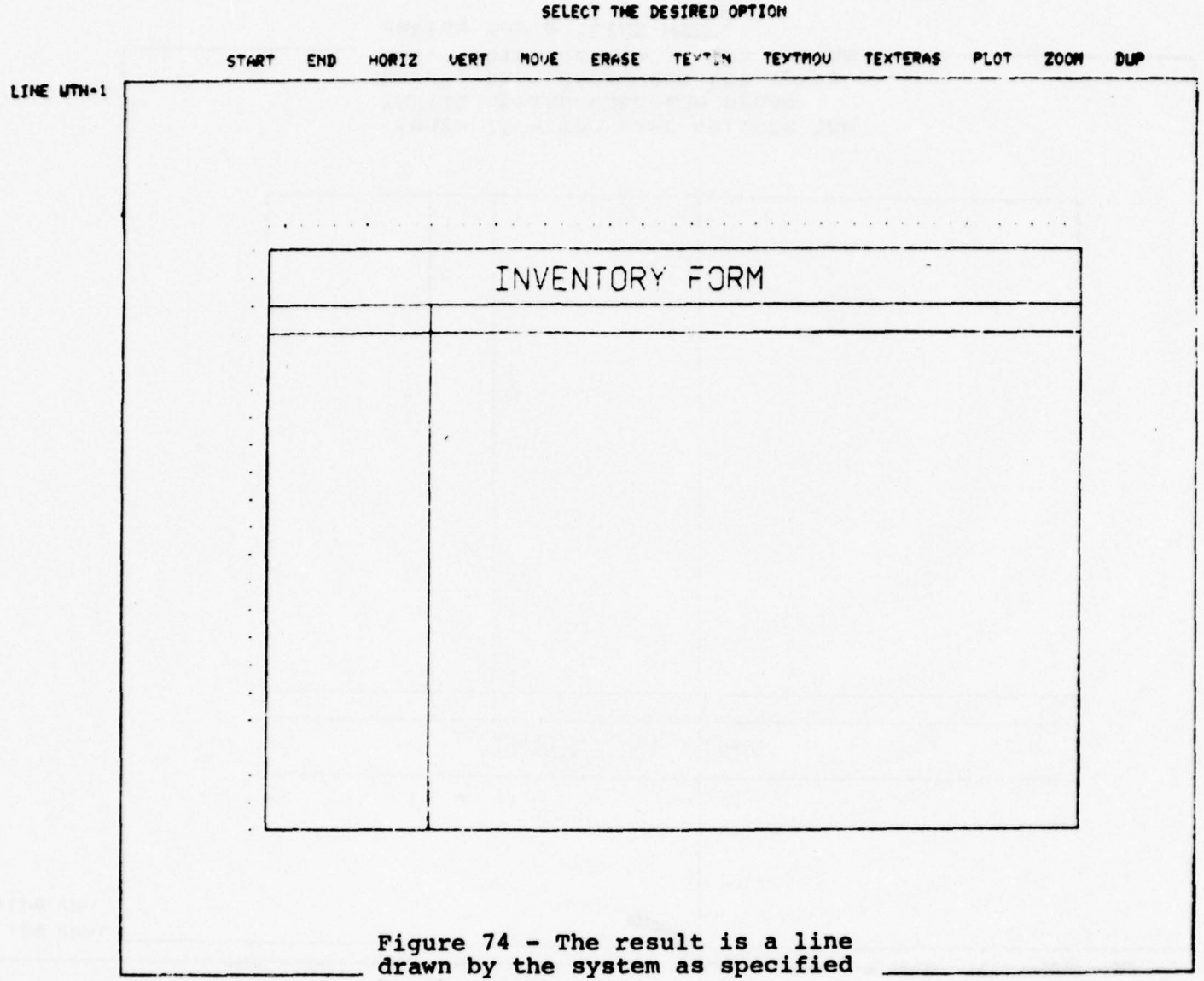

Figure 74 - The result is a line drawn by the system as specified by the user.

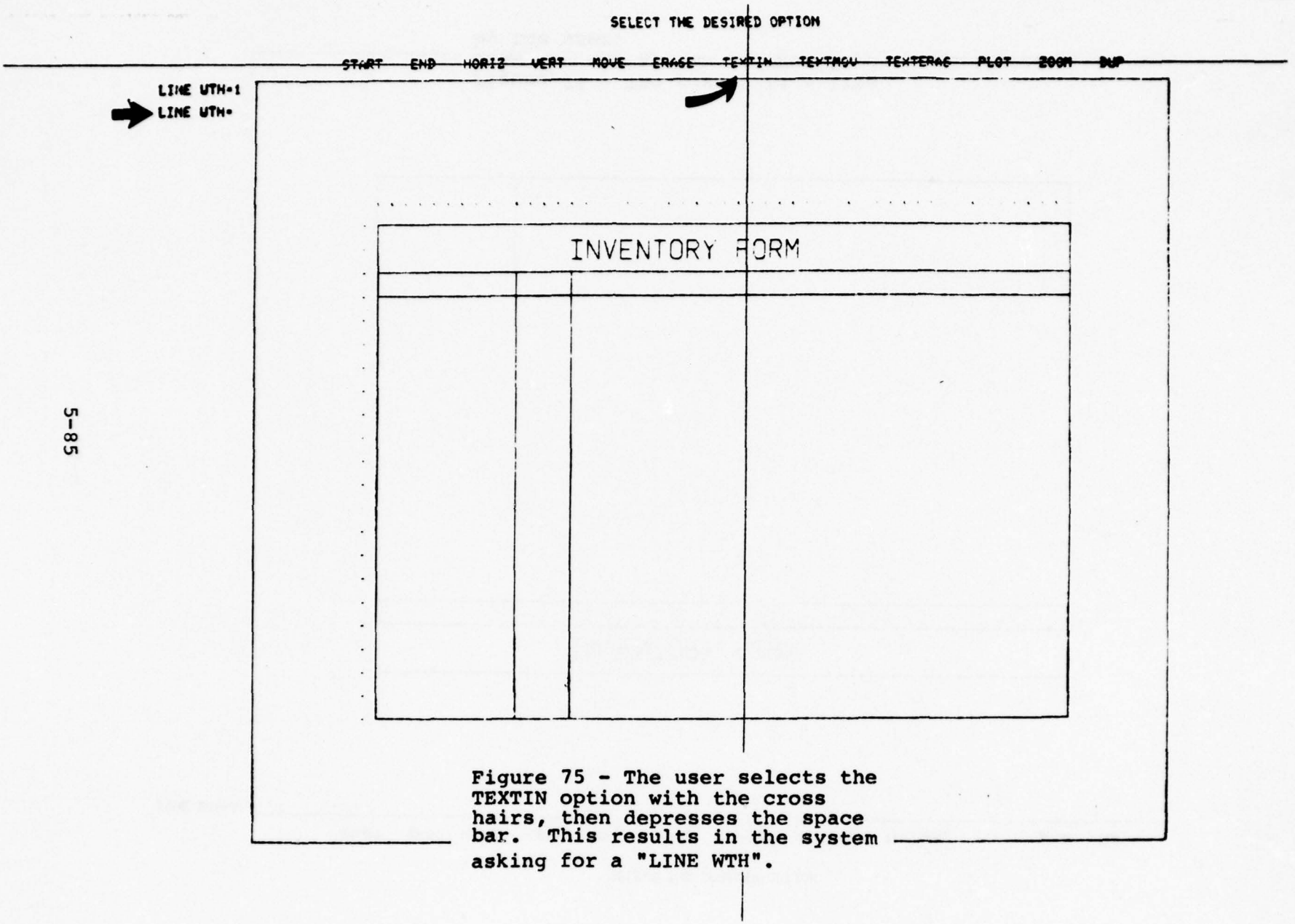

Figure 75 - The user selects the TEXTIN option with the cross hairs, then depresses the space bar. This results in the system asking for a "LINE WTH".

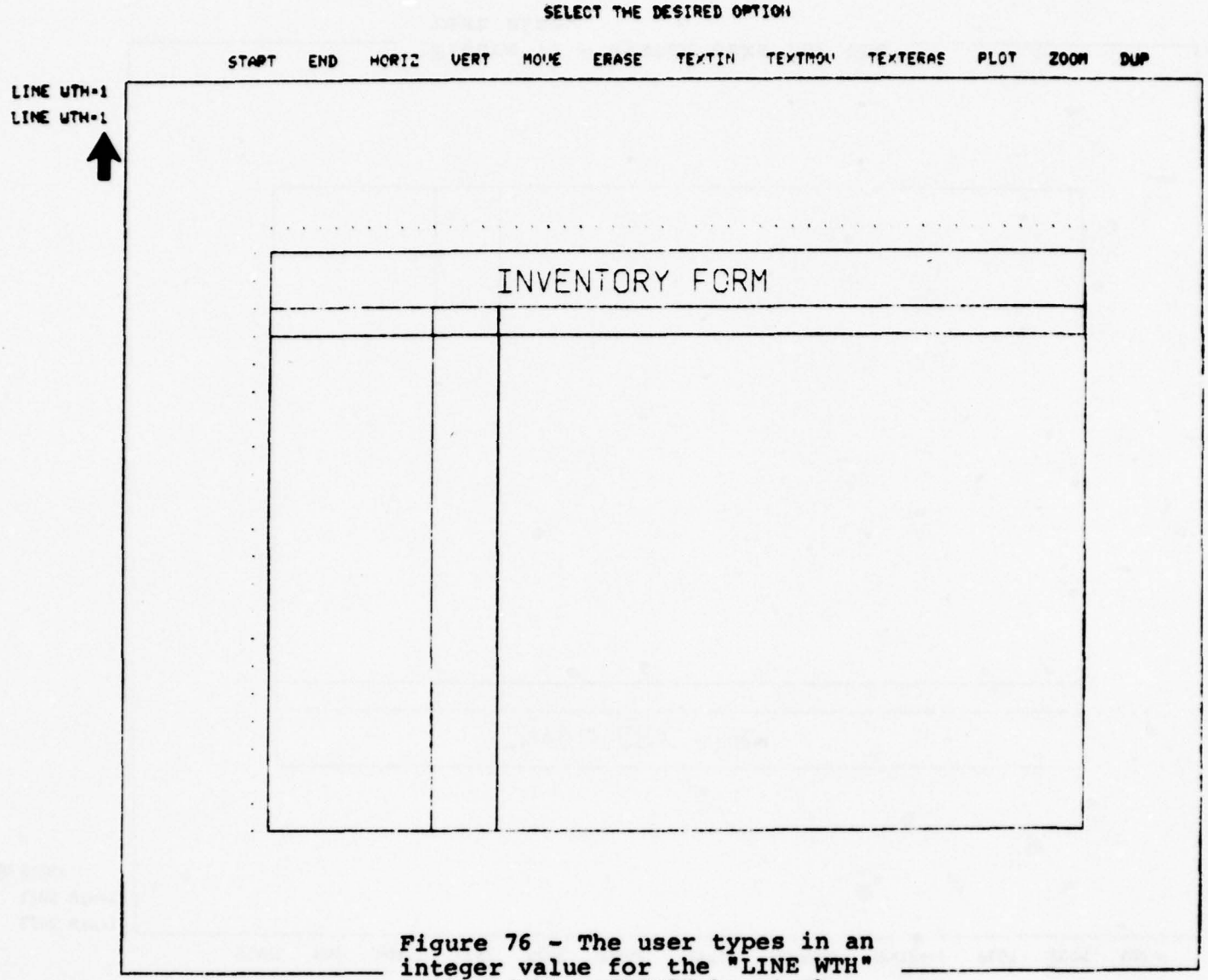

Figure 76 - The user types in an integer value for the "LINE WTH" followed by a RETURN keystroke.

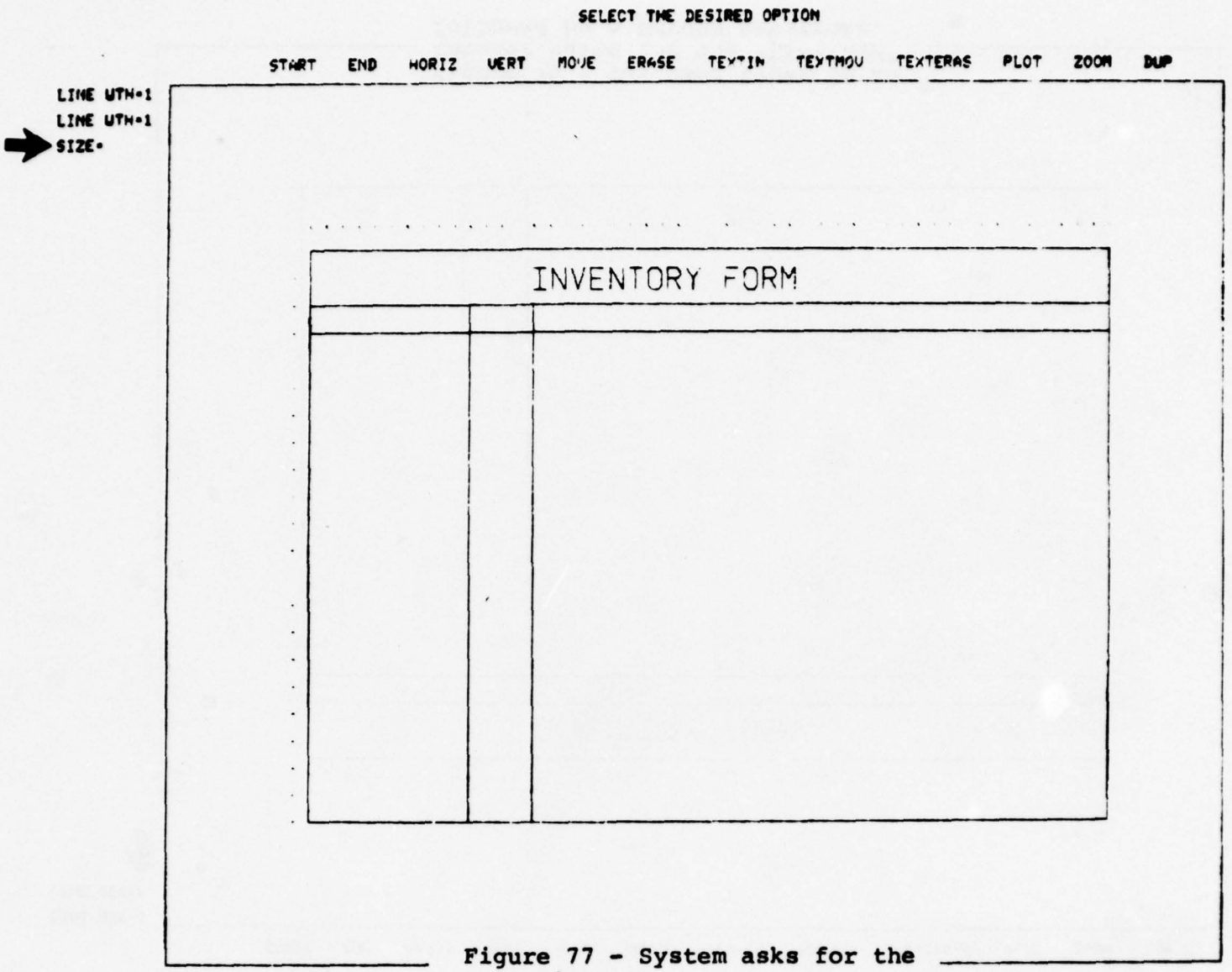

Figure 77 - System asks for the text size.

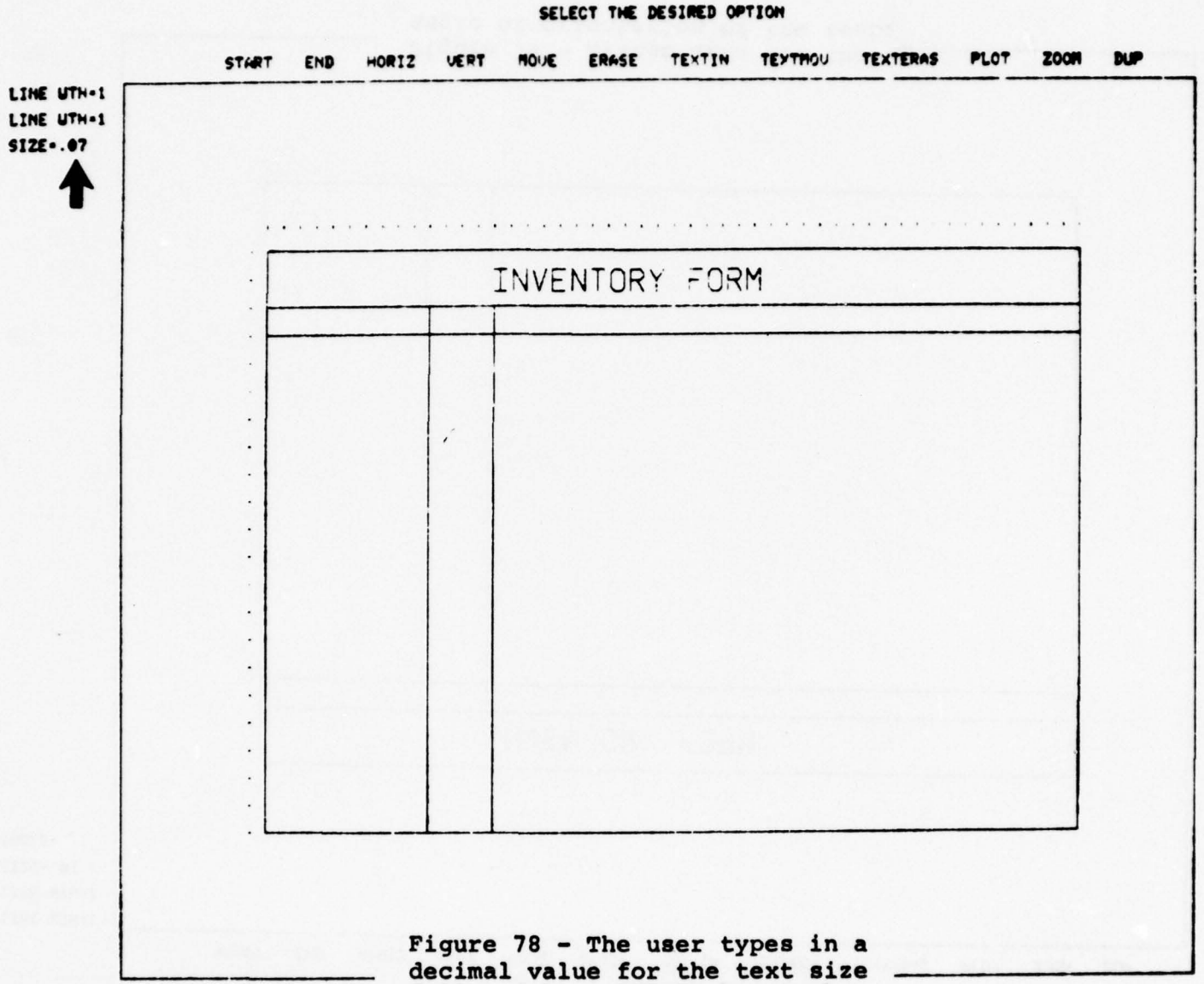

Figure 78 - The user types in a decimal value for the text size followed by a RETURN keystroke.

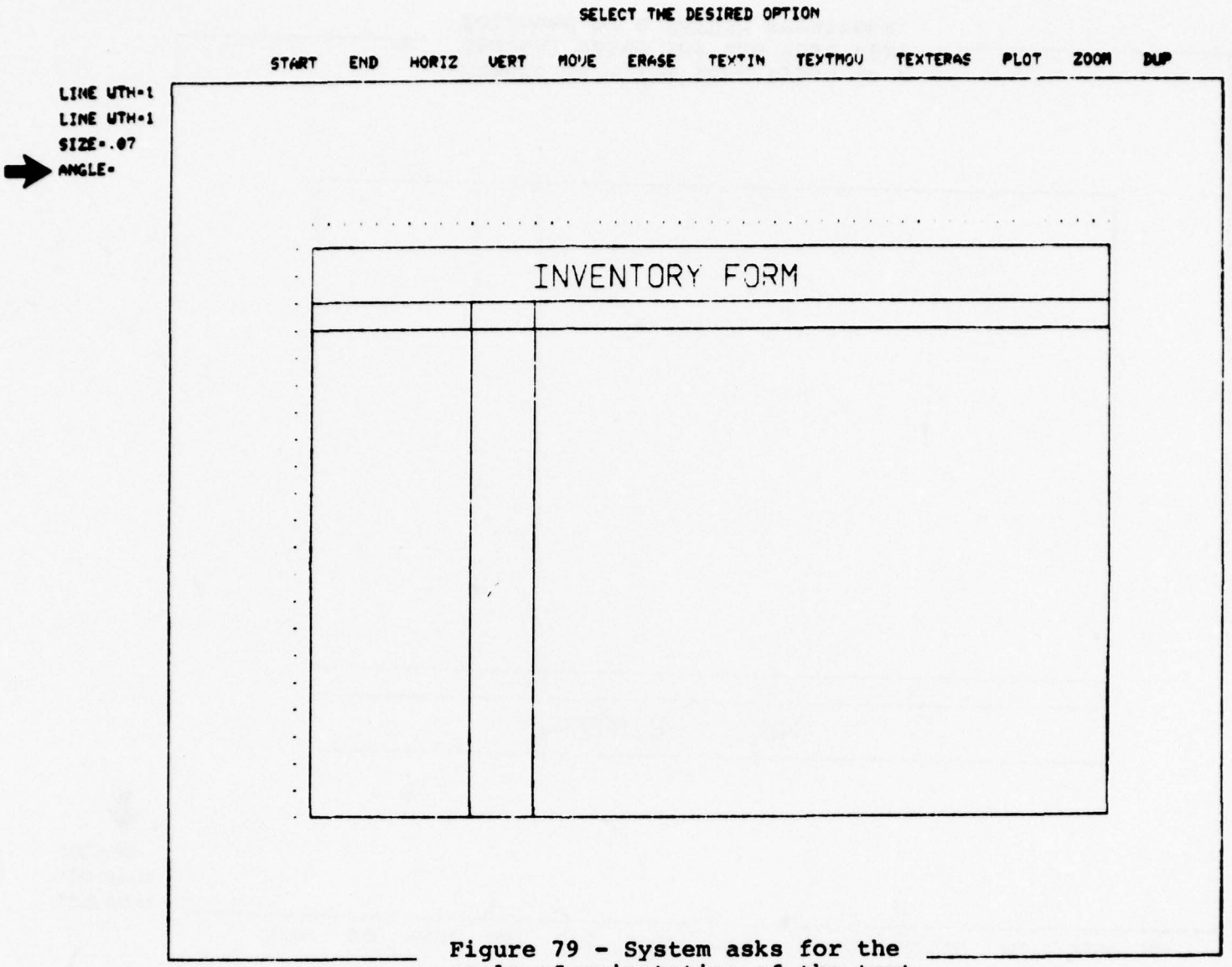

Figure 79 - System asks for the angle of orientation of the text.

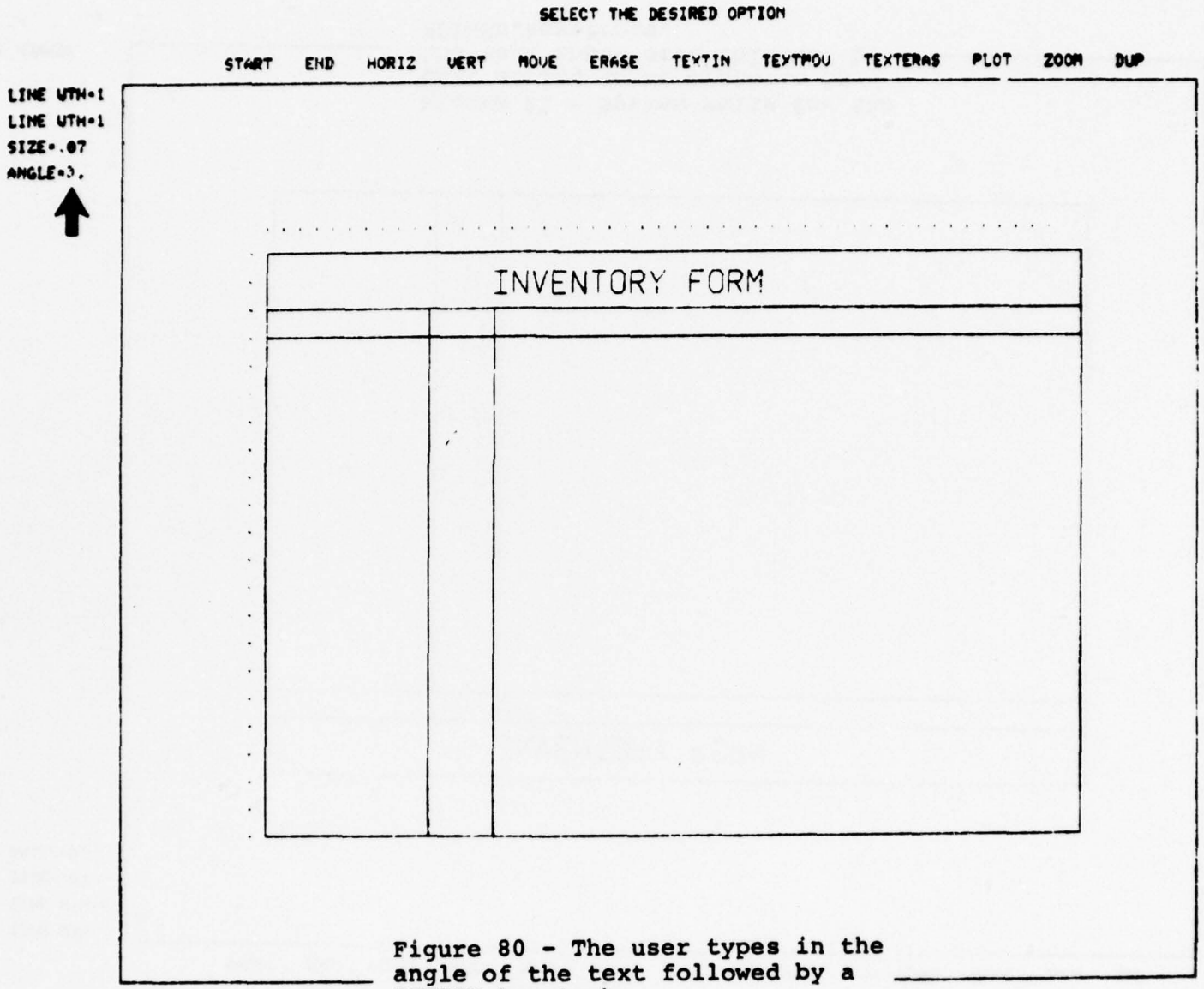

Figure 80 - The user types in the angle of the text followed by a RETURN keystroke.

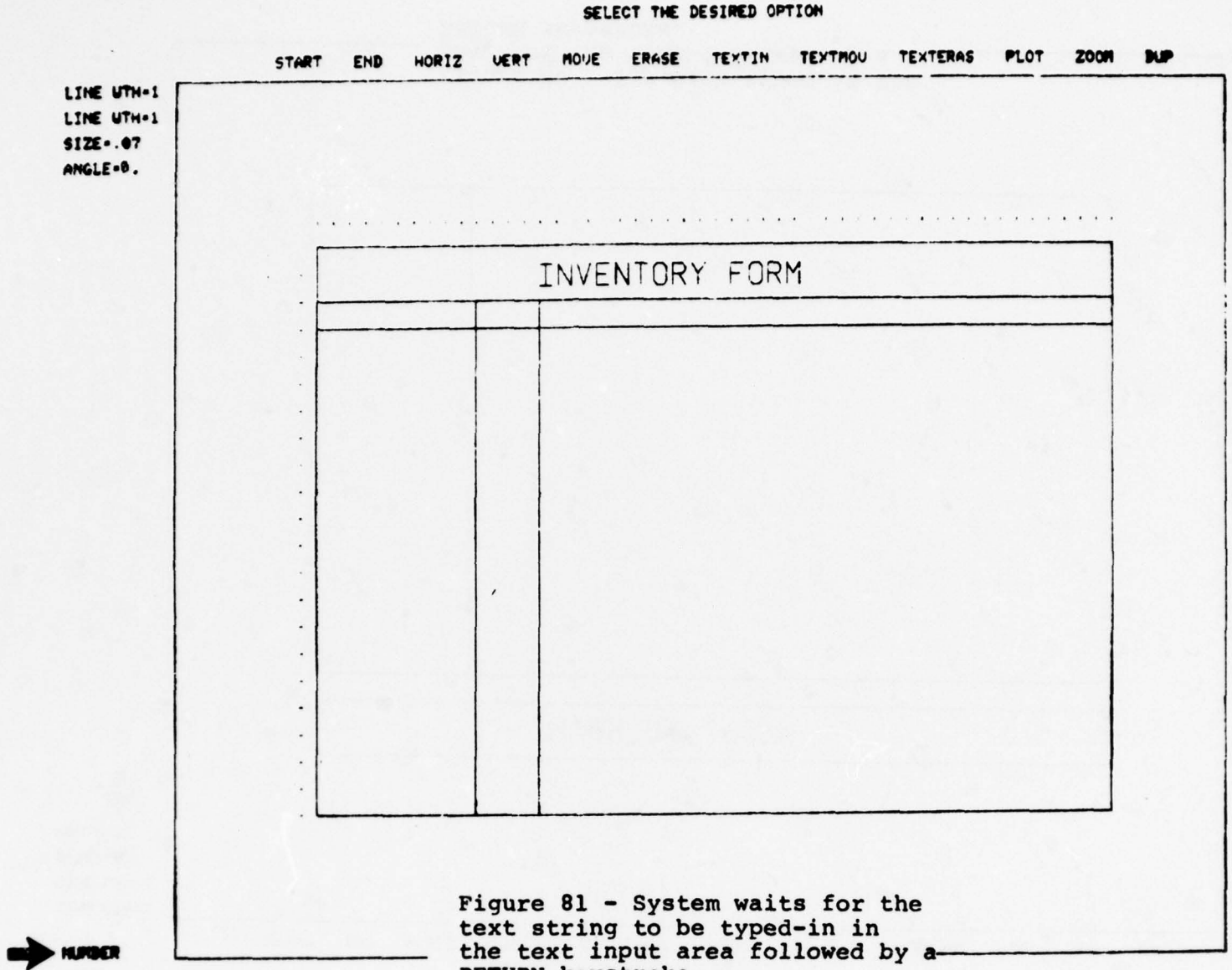

Figure 81 - System waits for the text string to be typed-in in the text input area followed by a RETURN keystroke.

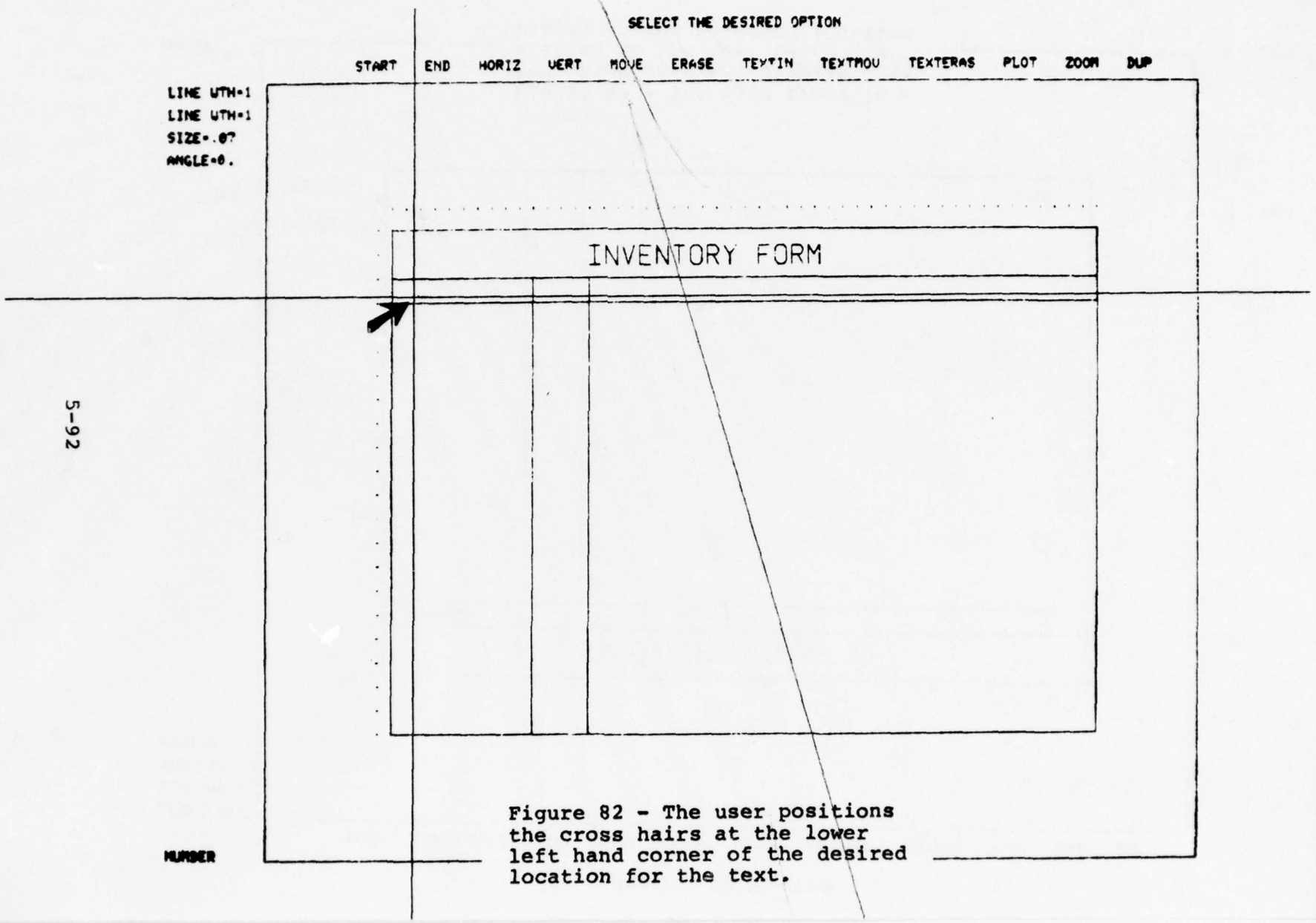

Figure 82 - The user positions the cross hairs at the lower left hand corner of the desired location for the text.

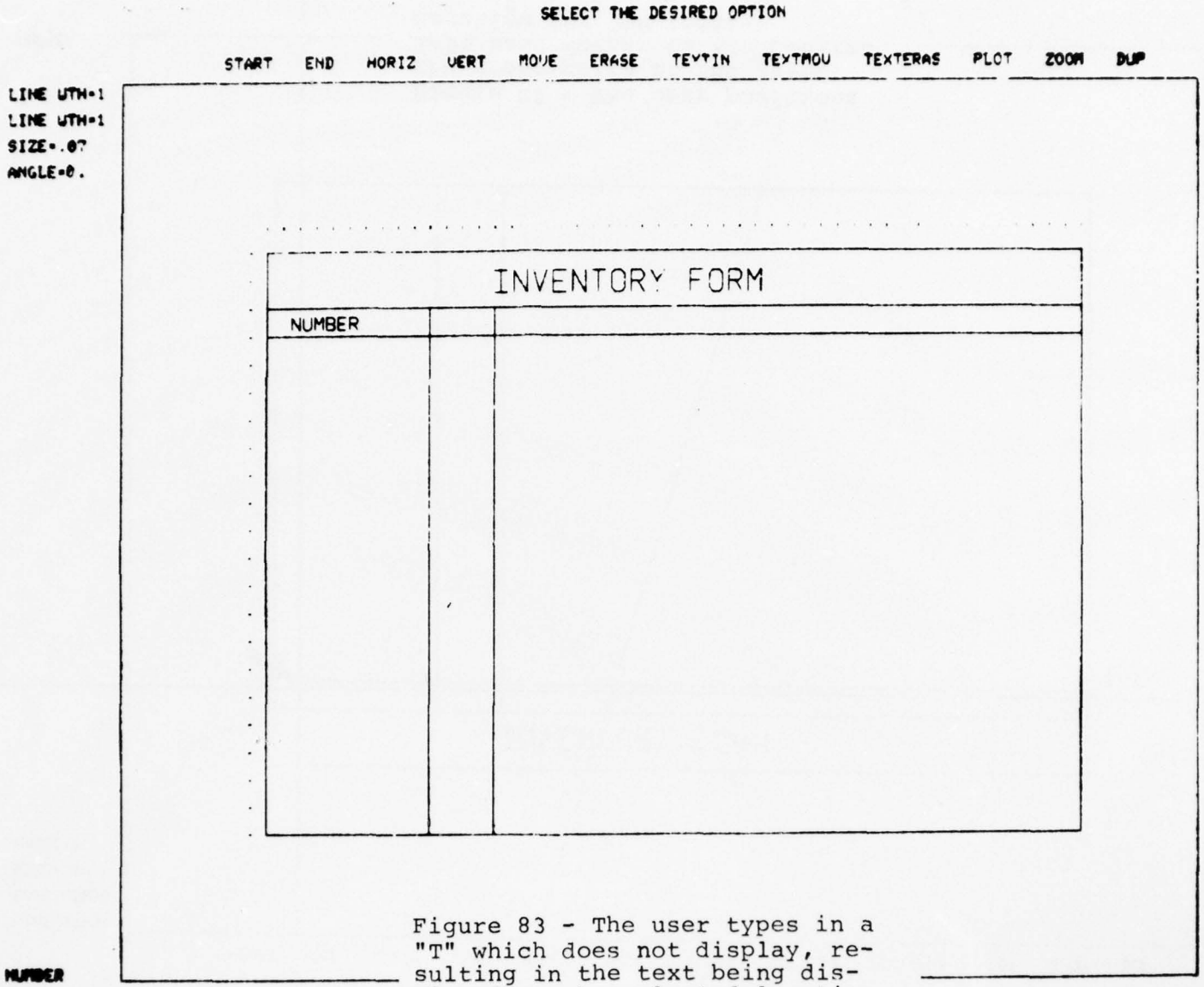

Figure 83 - The user types in a "T" which does not display, resulting in the text being displayed at the selected location.

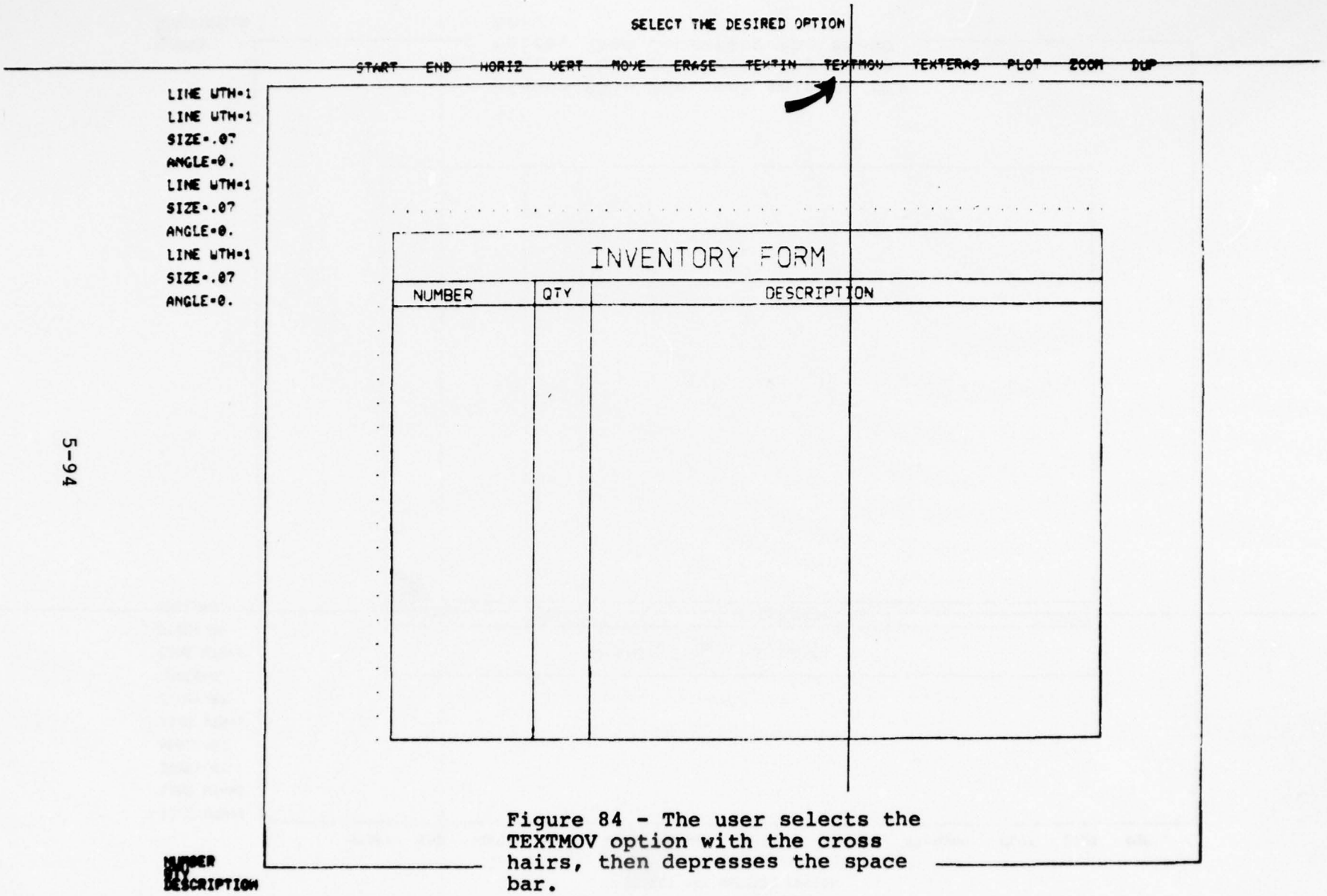

Figure 84 - The user selects the TEXTMOV option with the cross hairs, then depresses the space bar.

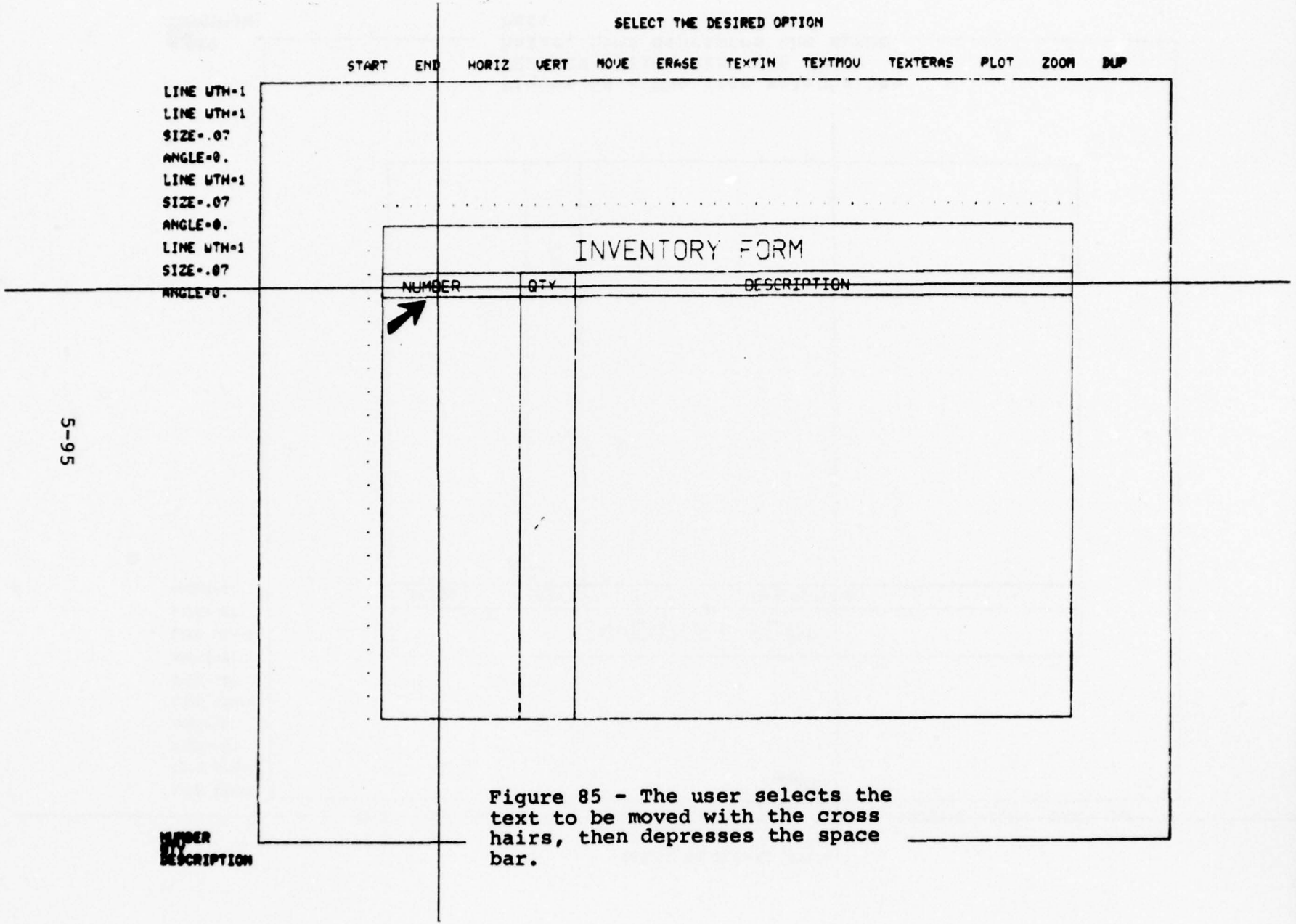

Figure 85 - The user selects the text to be moved with the cross hairs, then depresses the space bar.

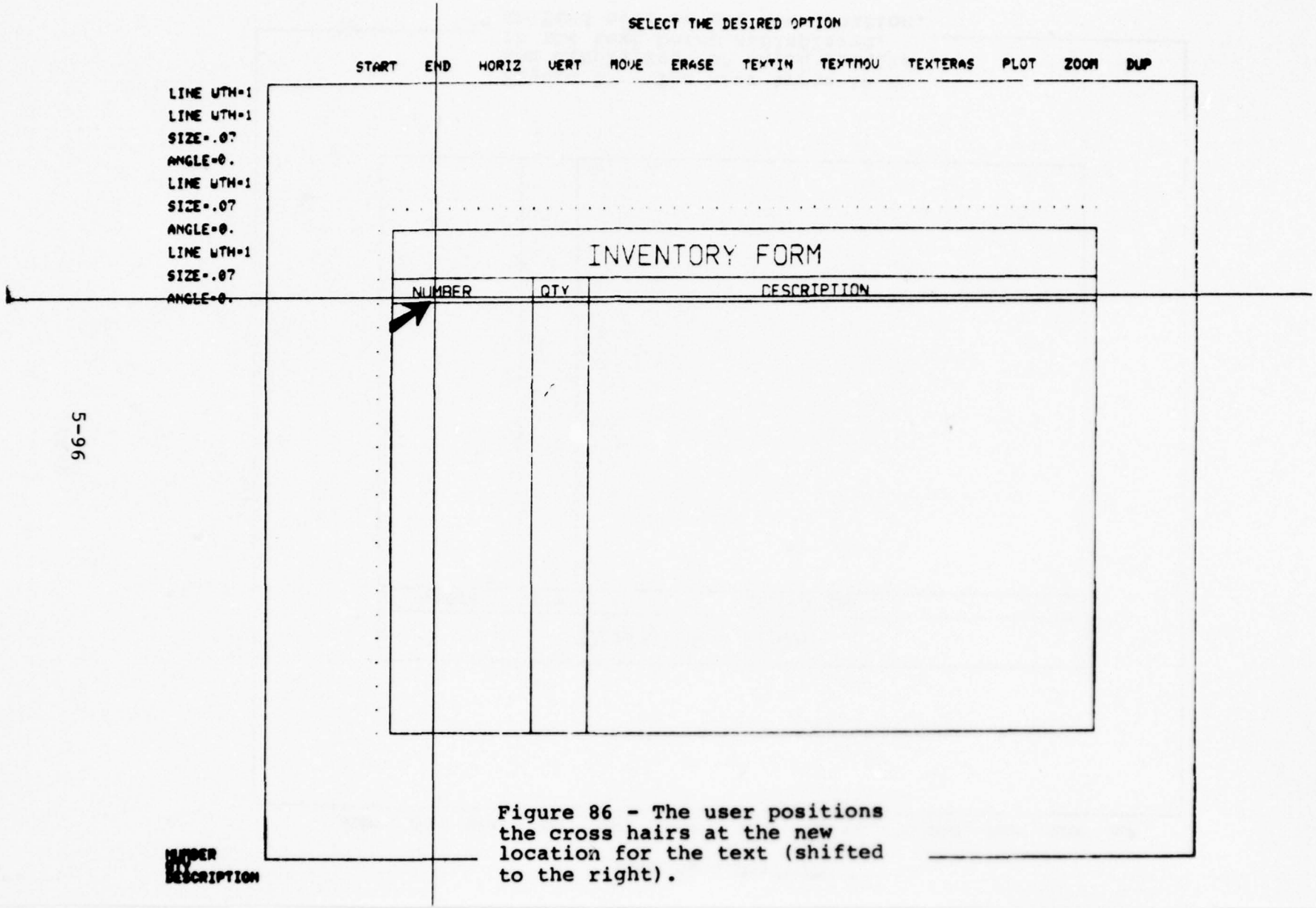

Figure 86 - The user positions the cross hairs at the new location for the text (shifted to the right).

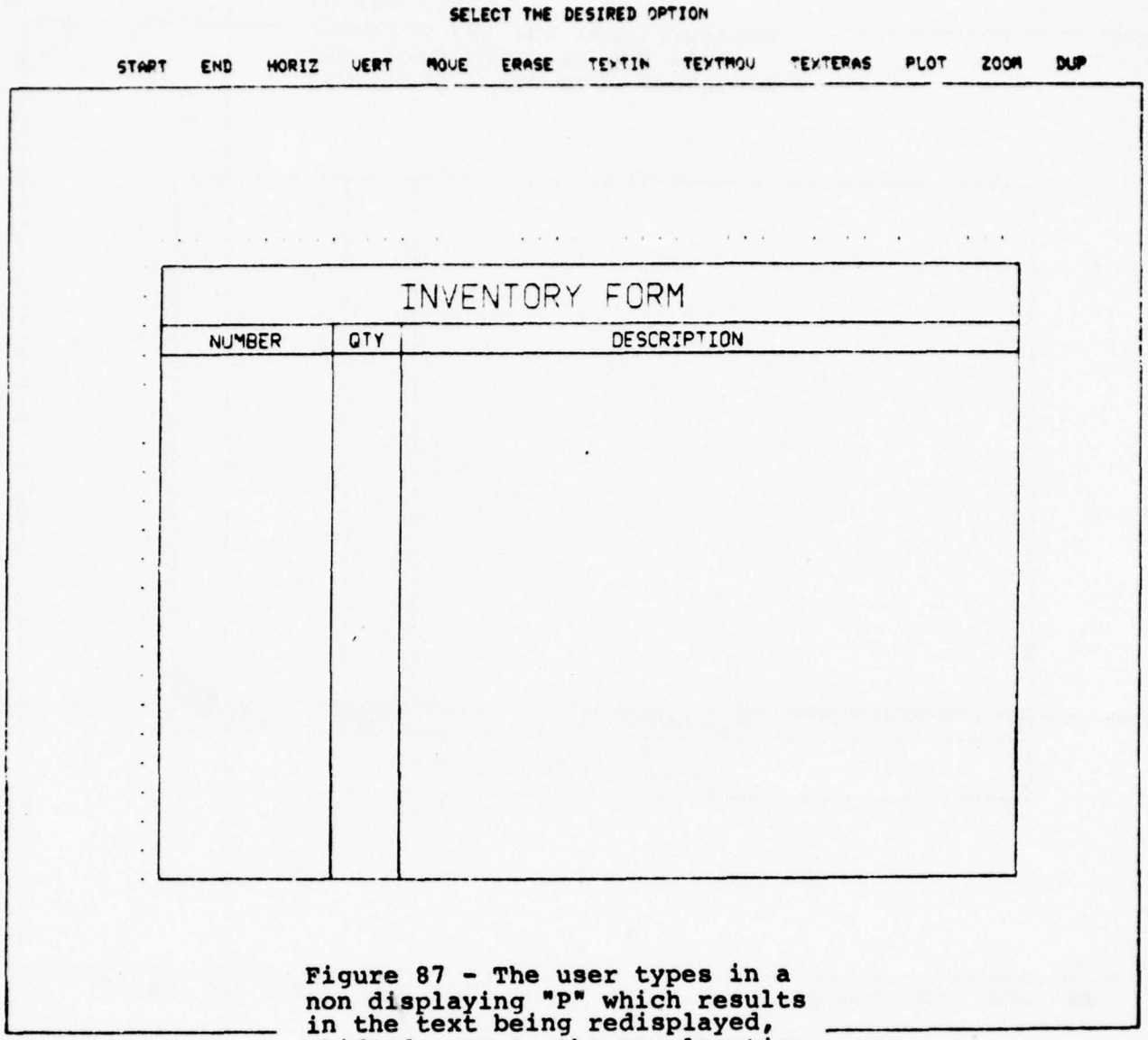

Figure 87 - The user types in a non displaying "P" which results in the text being redisplayed, shifted over to the new location.

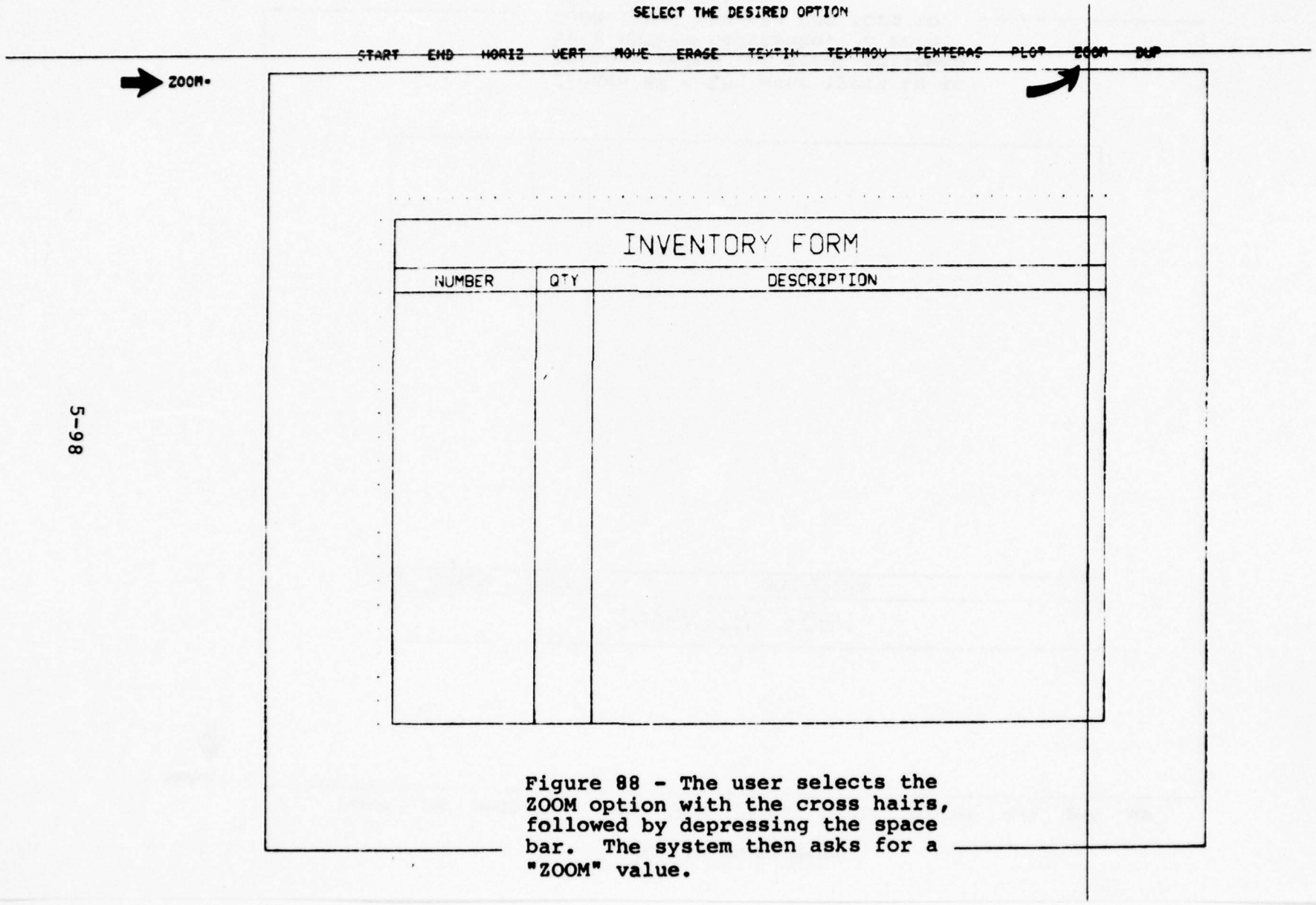

Figure 88 - The user selects the ZOOM option with the cross hairs, followed by depressing the space bar. The system then asks for a "ZOOM" value.

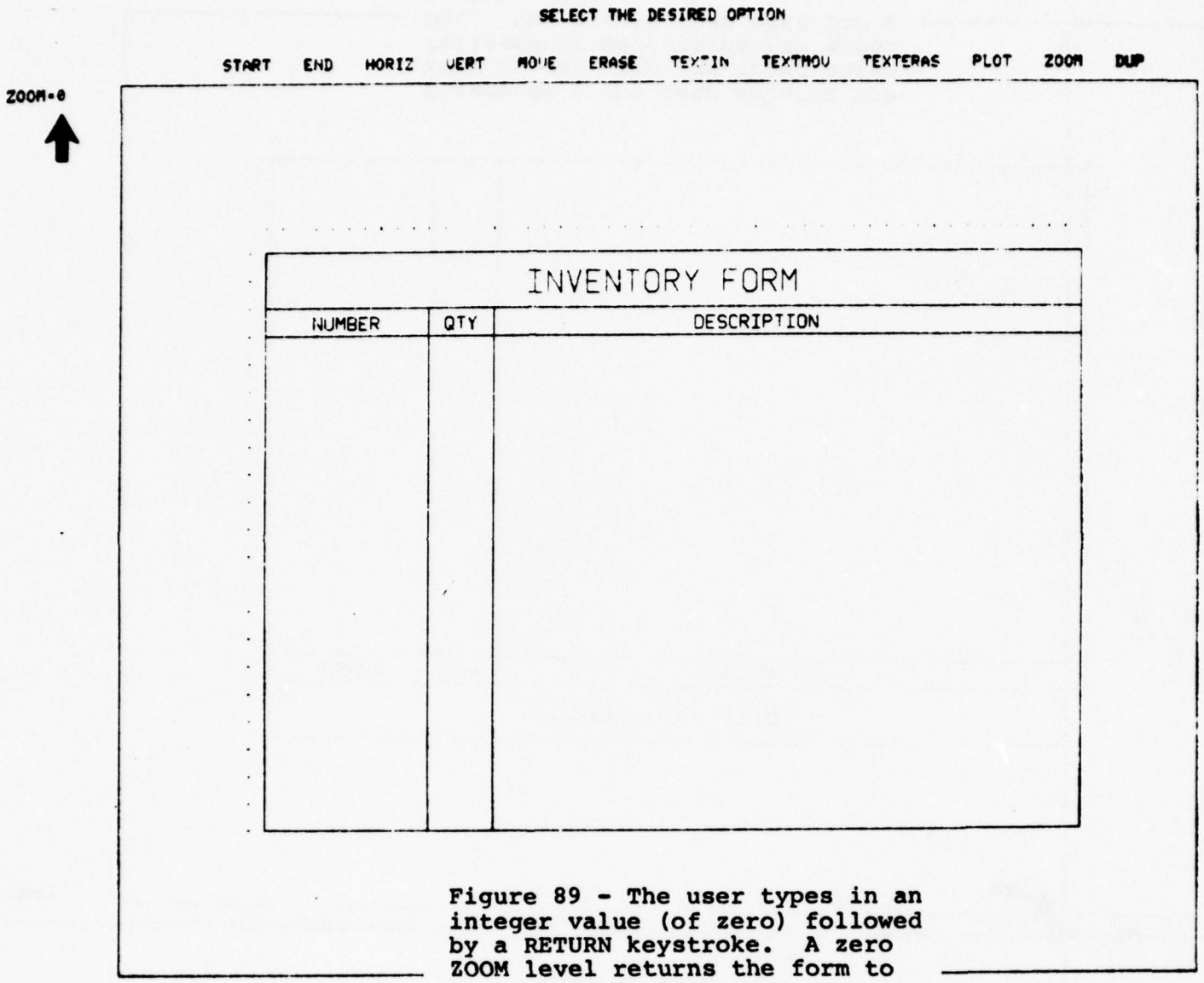

Figure 89 - The user types in an integer value (of zero) followed by a RETURN keystroke. A zero ZOOM level returns the form to the original size.

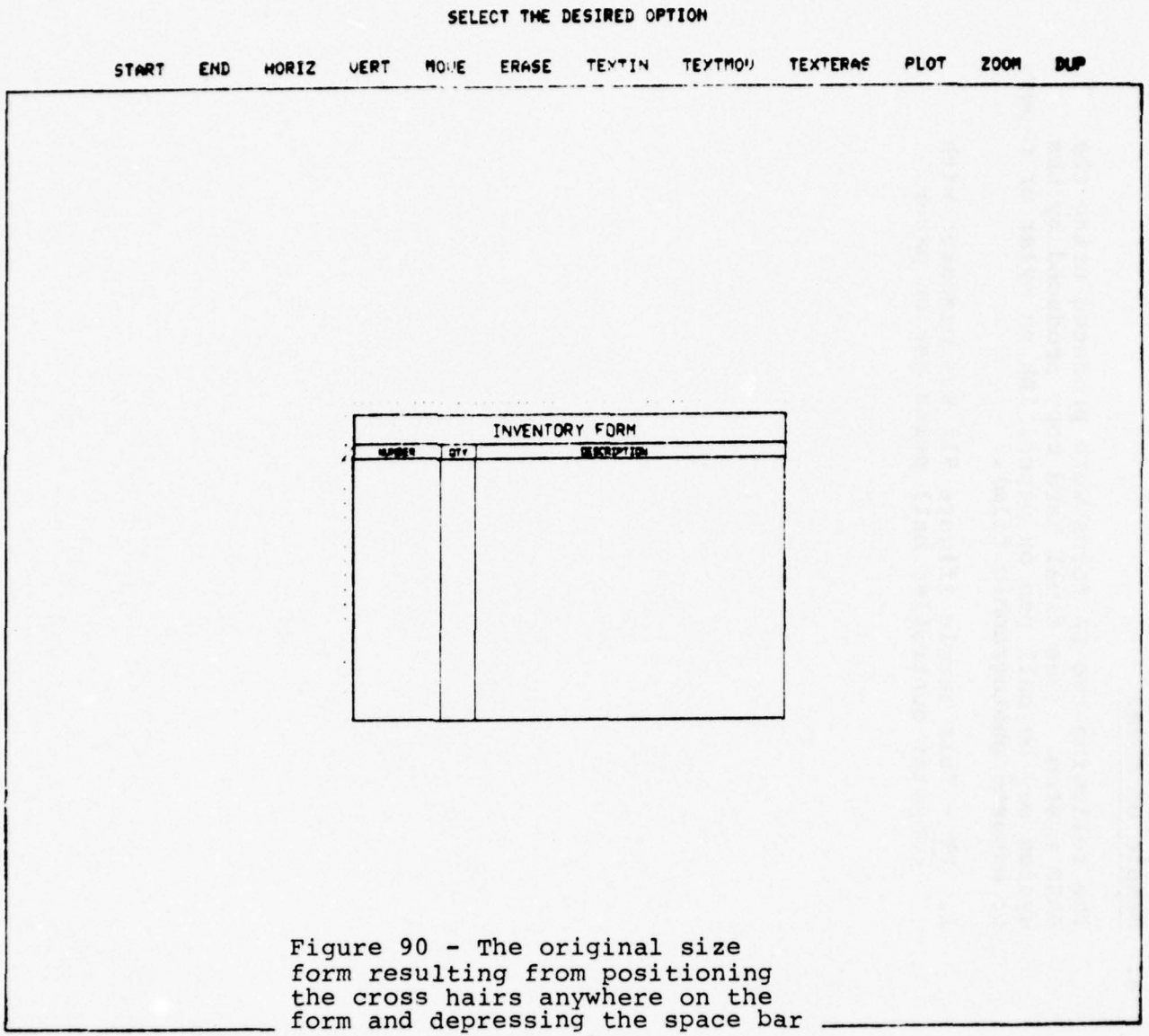

Figure 90 - The original size form resulting from positioning the cross hairs anywhere on the form and depressing the space bar with a zero ZOOM value.

J. Sample DA Forms

The following two DA forms were produced using the DASF system. (The final hard copy produced by the system may be ball pen on paper, ink on mylar or paper, or exposed photographic film).

1. DF - This sample (figure 91) was prepared with computer controlled ball point pen on paper.

DISPOSITION FORM

FOR USE OF THIS FORM.SEE AR 340-15; THE PROPONENT AGENCY IS THE ADJUTANT GENERAL4S OFFICE

REFERENCE OR OFFICE SYMBOL	SUBJECT

TO	FROM	DATE	CMT1

Figure 91 - Sample DF

FORM
DA 1 FEB 62 2496

JJS 1976

2. SDA 23A - The next sequence of figures (92-96) shows the generation of SDA Form 23A. The final figure (96) was printed from the form artwork mster which was made using the light head on the flatbed plotter to expose photographic film. The line sizes are 0.006,0.015, and 0.020 of an inch. The light head settings were 5,6, and 8.

Figure 92 - Almost completed
SDA 23A form.

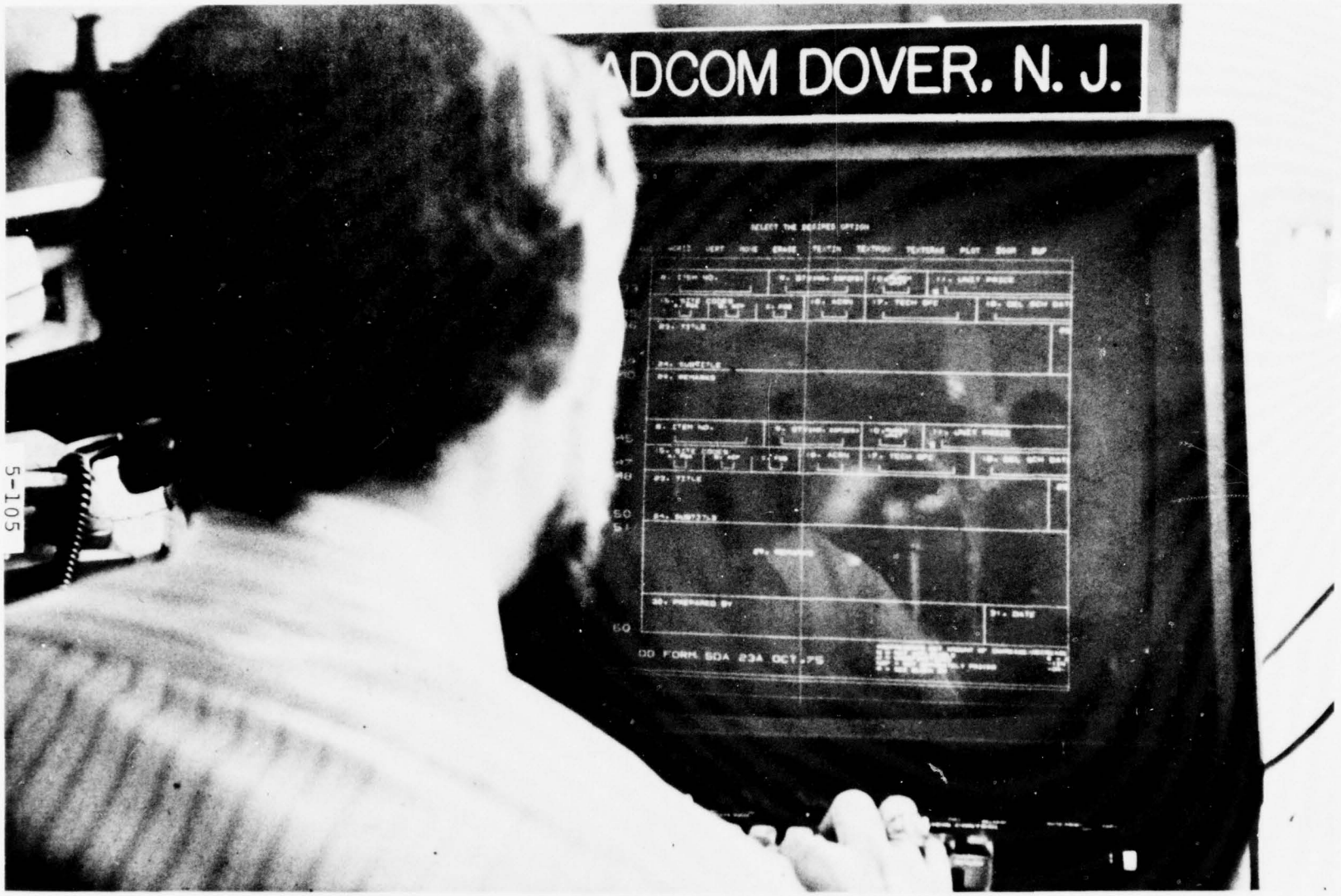

Figure 93 - Zooming in on lower left hand corner of SDA 23A.

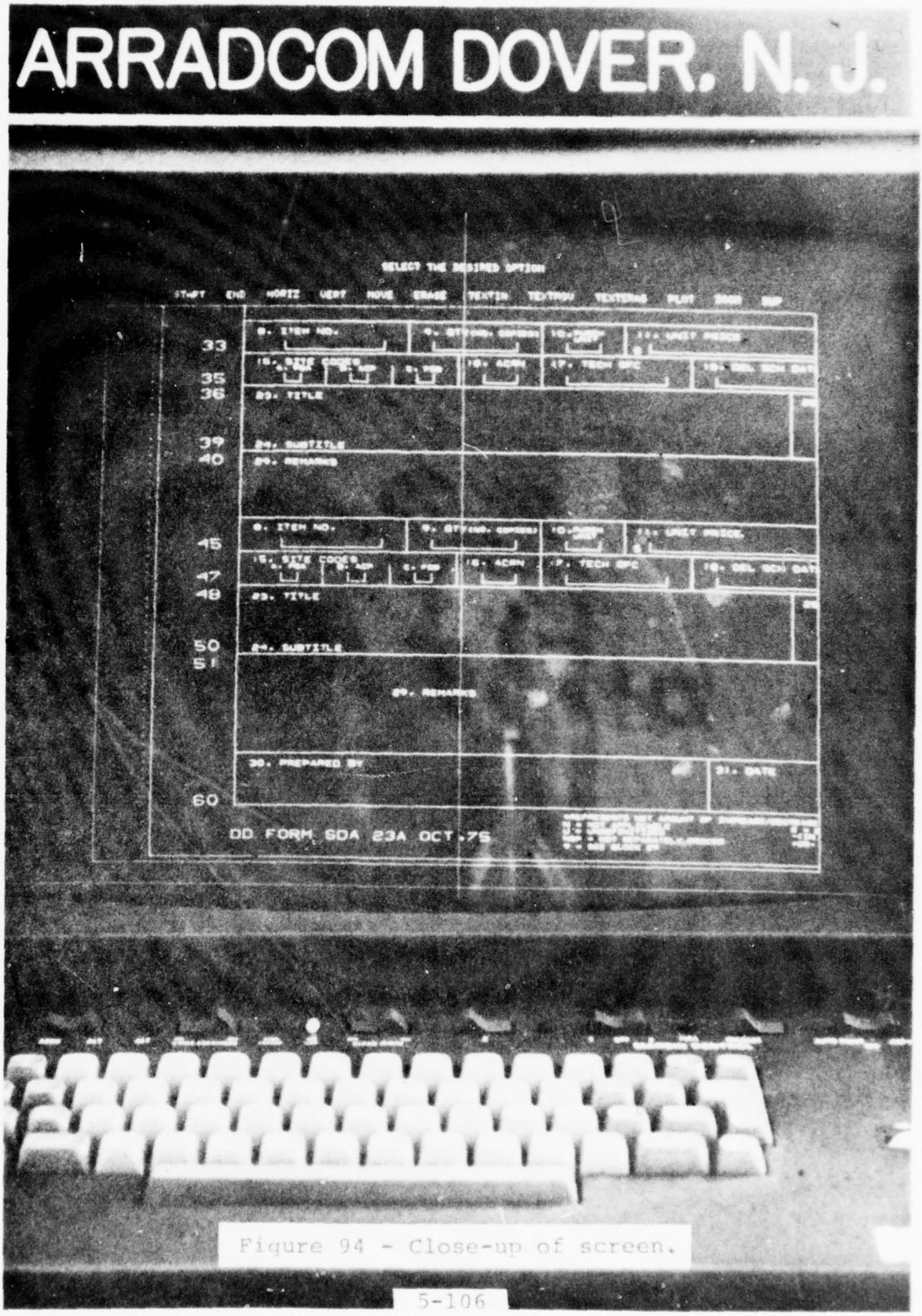

Figure 94 - Close-up of screen.

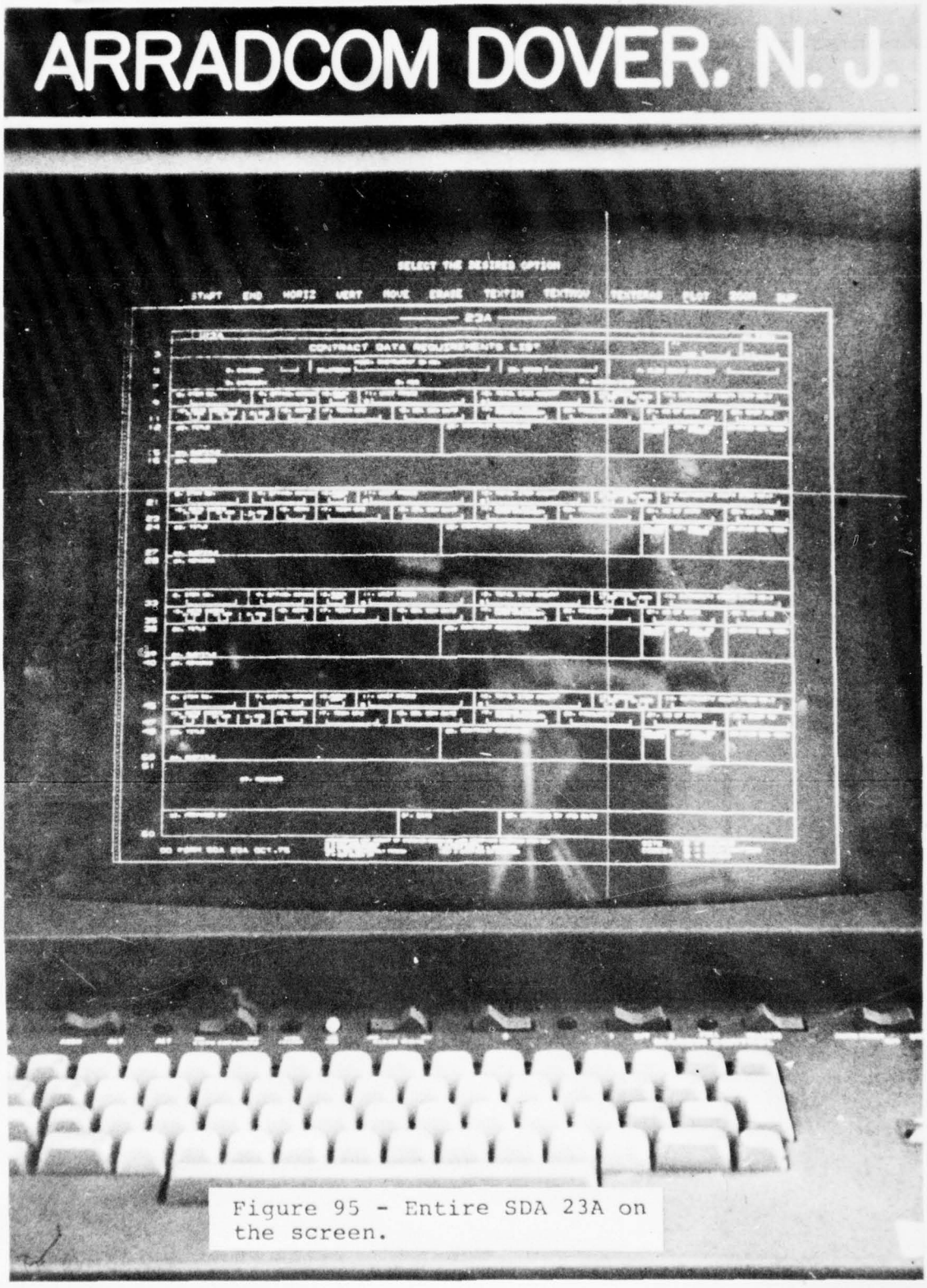

Figure 95 - Entire SDA 23A on the screen.

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23A ALIGN

CONTRACT DATA REQUIREMENTS LIST

1. PAGE ___ OF ___

2. EXHIBIT | PROC. INSTRUMENT ID NO. 3A. (PIIN) | 3B. SPIN | 4. CLIN IDENT EXHIBIT

5. CATEGORY | 6. MCS | 7. SYSTEM/ITEM

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29. REMARKS

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29. REMARKS

30. PREPARED BY

Figure 96 - Final print from SDA 23A artwork master.

*REPRESENTS NET AMOUNT OF INCREASE OR DECREASE IN EXISTING ITEM NO.
N = NOT APPLICABLE
U = UNDEFINITIZED
NSP = NOT SEPARATELY PRICED
S = SEE BLOCK 29

5-108

+OR- = ADDITION OR DELETION

SITE CODES: S = SOURCE, D = DESTINATION, O = OTHER

DD FORM SDA 23A OCT.75

VI. Plotting Options and Their Use to Create Form Artwork Masters.

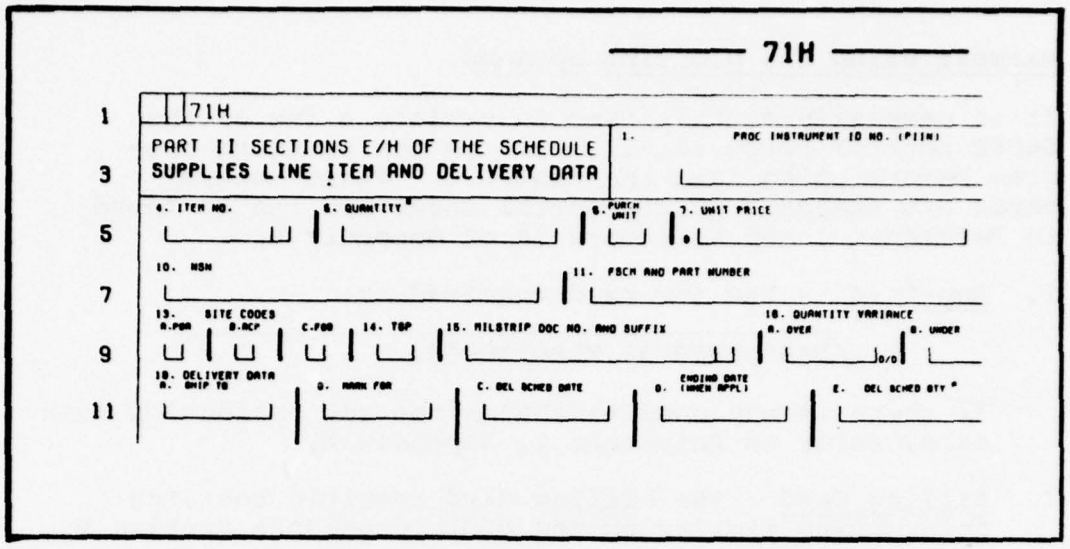
Now that the form data base is stored on the CDC 6000, the user has many options for plotting the form artwork master. First, let's review the options and then go into examples using the plotting program with various options.

A. Plotting Options

The user must prepare one data card for the plotting program. The data card contains the following information and plotting options:

Data Card Variable	Format	Description
1. Data base name (Cols. 1-10)	A10	This is the name the user assigned to the form data when it was created. It should also appear on the ATTACH card as described in the examples to follow.
2. Plot size (Cols. 11-20)	F10.4	This is the ratio of the final size for the plotted form to the size used at the graphics screen. If, for example, the form was drawn twice actual size, then "plot size" would equal 0.5. Normally if the plot were drawn actual size, this value would be 1.0.
3. Text font (Col. 21)	I1	The values necessary to select the two fonts are: 1 - the CALCOMP font 2 - the drafting font (fig. 97).
4-7 Values for pen setting or light head (Cols. 22-25)	4I1	These are the original values that the user specified when creating the form. The only reasons to specify them again are: 1) if they were set for a multiple pen plot and now the user is ready for a light head plot, 2) if they were set for a light head plot and a checkout pen plot is desired, or 3) if a mistake was made and a new value has to replace an old value.

Data Card Variable	Format	Description
8-11 New values for pen settings or light head (Cols. 26-29)	4I1	These are the replacment values for 4 to 7 above.



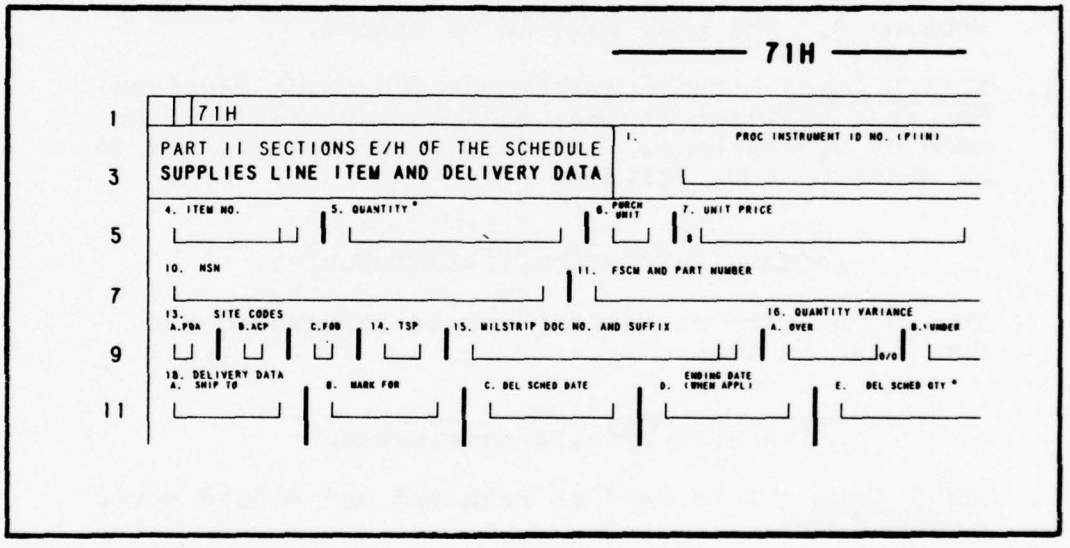


Figure 97 - Sample of the standard CALCOMP font (top) and the optional drafting font (bottom).

B. Example using the plotting options

It is necessary at this time to explain a few of the SCOPE control cards required to run the plotting program before going into the examples. These control cards are standard SCOPE control cards and can be found in Reference 1 and Reference 10 of Appendix A.

1. Job Card - The job card required is:

```
/DASF,CM60000,T100,IO300.
```

If there is any need to change the run options on this card, refer to Reference 1, Appendix A.

2. Billing Card - The billing card required contains information similar to the LOGIN procedure Section V. It looks like this:

```
/COMMENT.(xxx-yyy,04000V),user name
```

The values for xxx,yyy are the same as those in Section V. The user name is as stated.

3. ATTACH Cards - There are two attach cards required: one that will not change, and another that must be made up by the user. The first card that is not to be changed is as follows:

```
/ATTACH,X,FORMPLOT,ID=SIEROD,MR=1.
```

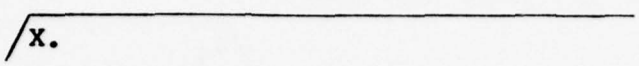
The second card contains the same information as specified in Section V.

```
/ATTACH,lfn,pfn,ID=name,PW=xxx.
```

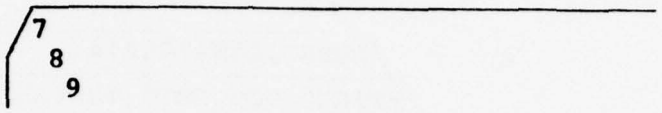
4. LDSET Card - This card is required and should never change from:

```
/LDSET,LIB=IGS274.
```

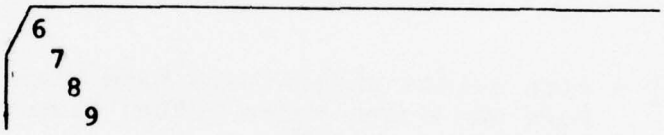
5. Execute Card - This card is required and will never change. It looks like:



6. EOR Card - This card is required and will never change. It is a multiple punch card with a 7,8,9 punched in column 1. For this report, it will be designated as a 789 card in all the examples to follow.



7. EOF Card - This card is required and will never change. It also is a multiple punch card with a 6,7,8,9 punched in column 1. It will be designated as a 6789 card in all the following examples.



Example I - Plot the existing form data base with no changes. Form was drawn full size and pens 1-4 were specified.

```
6789
Joe   1.0  1
789
X.
LDSET,LIB=IGS274.
ATTACH,JOE,DATA,ID=SIEROD,PW=J.
ATTACH,X,FORMPLOT,ID=SIEROD,MR=1.
COMMENT.(xxx-yyy,04000V),JDOE
DASF,CM60000,T100,IO300,NT1.
```

Example II - Plot existing form data base with no changes. Form was drawn twice actual size and pens 1-4 were specified.

```
6789
ZZZ    0.5    1
789
X.
LDSET,LIB=IGS274.
ATTACH,ZZZ,DATA,ID=SMITH,PW=ABC.
ATTACH,X,FORMPLOT,ID=SIEROD,MR=1.
COMMENT.(xxx,yyy,04000V),JSMITH
DASF,CM60000,T100,IO300,NT1.
```

Example III - Plot the same file as Example I but with the use of the drafting font.

```
6789
JOE                1.0  2
789
X.
LDSET,LIB=IGS274.
ATTACH,JOE,DATA,ID=SIEROD,PW=J.
ATTACH,X,FORMPLOT,ID=SIEROD,MR=1.
COMMENT.(xxx-yyy,04000V),JDOE
DASF,CM60000,T100,IO300,NT1.
```

Example IV - Plot the same file as Example II with this change: the pen settings 1-4 to lighthead settings 5-8. Also, the drafting font is used.

```
6789
ZZZ                0.5  212345678
789
X.
LDSET,LIB=IGS274.
ATTACH,ZZZ,DATA,ID=SMITH,PW=ABC.
ATTACH,X,FORMPLOT,ID=SIEROD,MR=1.
COMMENT.(xxx-yyy,04000V),JSMITH
DASF,CM60000,T100,IO300,NT1.
```

Example V - Plot existing form data base changing settings (lighthead) 5-8 to (pen) 1-4. Form was drawn in full size.

```
6789
ABC        1.0  156781234
789
X.
LDSET,LIB=IGS274.
ATTACH,ABC,DFORM,ID=WILLIAMS,PW=EW.
ATTACH,X,FORMPLOT,ID=SIEROD,MR=1.
COMMENT.(xxx,yyy,04000V),WILLIAMS
DASF,CM60000,T100,IO300.
```

VII. How To Store A Form Data Base

A. Cataloging a Plot File

At the end of a working session using DASF, the user may wish to store the form data base which was created and/or modified during that session. The user should already have picked the PLOT and END buttons in DASF and the message to "CATALOG DATA FILE TO SAVE FOR PLOTTING" should have appeared on the screen. The DASF program has now terminated, returning the user to INTERCOM or the interactive (conversational) mode. INTERCOM is now waiting for the user to type in a COMMAND. The following SCOPE command will store or catalog the user's form data base and will allow the user to modify and extend (add to) the data base at some time in the future.

CATALOG Command - the user types in the following:

CATALOG, lfn,pfn,ID=name,RD=xxx,MD=xxx,EX=xxx

lfn - file containing the form data base

pfn - the permanent file name under which the user wishes to catalog the data base.

name - the user's name, up to nine (9) letters.

xxx - up to a nine (9) character name the user chooses to protect the data base. These names may be different but it is suggested that the user keep them the same. It makes life easier.

For further information on this command see Reference 1 Appendix A. Now that the CATALOG command has been typed in, followed by a RETURN, INTERCOM responds and asks for another COMMAND. At this point, the user can type LOGOUT, followed by a RETURN, to terminate the design sesssion. The procedure for shutting the terminal off, Section II.C.2 should be followed now.

B. An Example of Cataloging a Plot File

Figure 98 illustrates the above COMMAND.

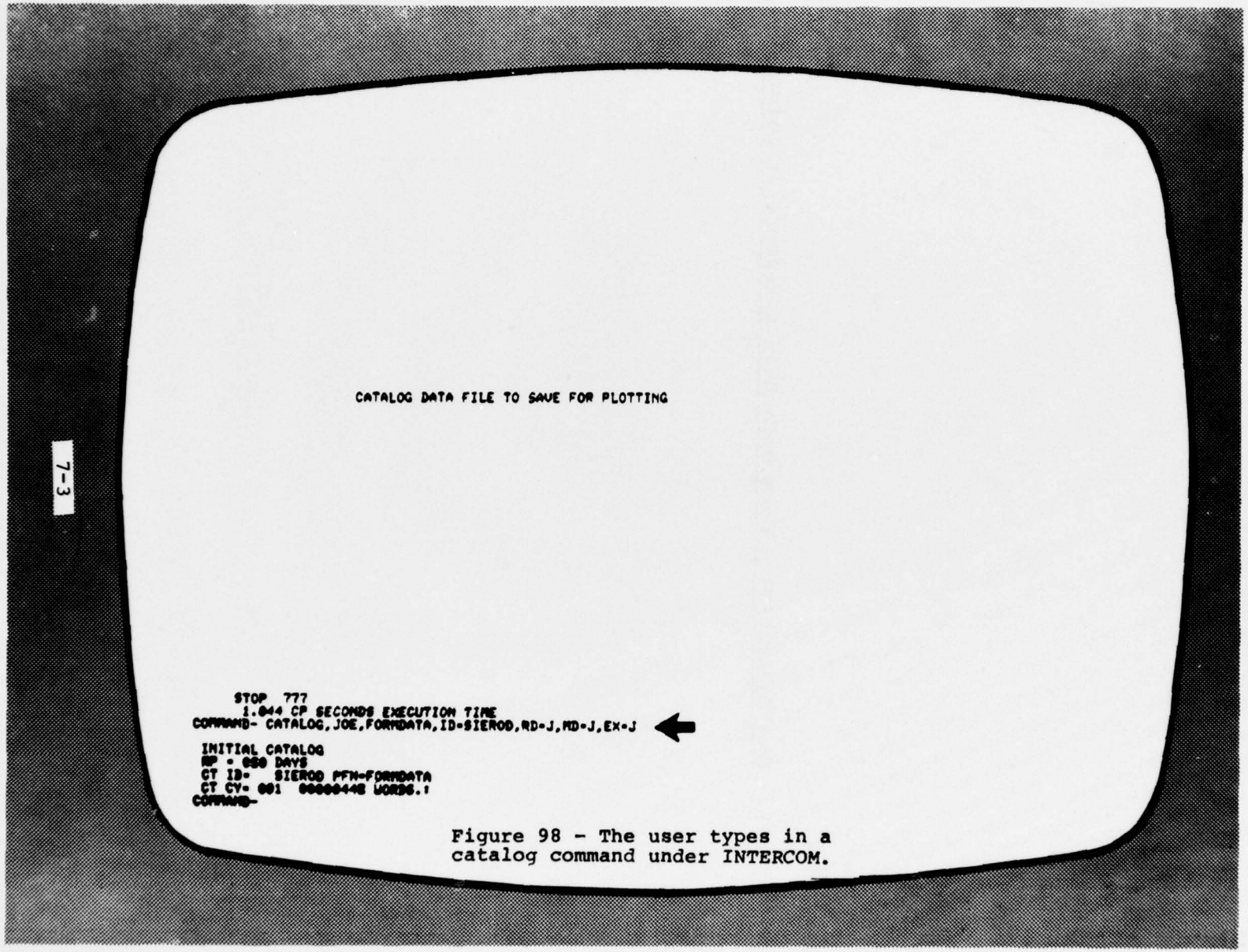


Figure 98 - The user types in a catalog command under INTERCOM.

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VIII. How To Archive A Form Data Base & Restore It Later.

A. Archiving the data base

The following deck of cards will copy the form data base from "permanent" storage on disk to magnetic tape for archival purposes.

```
6789
RETURN,TAPE1.
COPYBF(lfn,TAPE1)
REWIND,TAPE1,lfn.
ATTACH,lfn,pfn,ID=name,RD=xxx,MD=xxx,EX=xxx.
REQUEST,TAPE1.      NEWTAPE/SAVE/name
COMMENT.(xxx,yyy,04000V),name
DASF,MT01.
```

B. Restoring the data base

The following deck of cards will copy the form data base from magnetic tape and store it on "permanent" file for the user. The user will have to prepare the CATALOG card. See Section VII A for details.

```
6789
CATALOG,lfn,pfn,ID=name,RD=xxx,MD=xxx,EX=xxx.
REWIND,lfn.
RETURN,TAPE1.
COPYBF(TAPE1,lfn)
REWIND,TAPE1,lfn.
REQUEST,lfn,*PF.
REQUEST,TAPE1.          Bin#/Reel#
COMMENT.(xxx-yyy,04000V),name
DASF,MT01.
```

APPENDIX A

Ref. No.	Title	Publication No.
1.	CDC SCOPE 3.4 Reference Manual	60307200
2.	CDC INTERCOM Reference Manual	60307100
3.	CDC FORTRAN Extended V4 Reference Manual	60305600
4.	CDC Data Handler VI Reference Man.	17322100
5.	Tektronix Terminal Control System User's Manual	062-1474-00
6.	Picatinny Arsenal's Tektronix Display Terminal (4014) & Terminal Control System (TCS) Reference Man.	Rough Draft
7.	Tektronix 4631 Hand Copy Unit User's Manual	070-1830-00
8.	Tektronix 4014 & 4014-1 Computer Display Terminal Instruction Man.	070-1647-00
9.	Tektronix Synchronous Data Communications Instruction Manual	021-0135-01
10.	MISD Digital Systems Handbook for Scientist and Engineers	MISD IR 71-21

APPENDIX B

LIGHTHEAD SETTINGS

The following table is provided as a guide to determining the proper pen settings for the lighthead on the CALCOMP model 745 flatbed plotter. The left hand column is a list of all available round and square aperatures that can be inserted into the lighthead in any of the eight possible "pen" positions. The right hand portion of the table contains the resulting line widths for each of the aperatures when they are placed in the different "pen" positions indicated along the top of the table. For example, suppose that it was determined that the desired line widths on the new form are to be 0.005, 0.010, 0.018 and 0.025. The user would have the following possible choices:

for 0.005 pens 5,6,7,8

0.010 pens 4,5,6,7,8

0.018 pens 5,6,7,8

0.025 pens 1,2,3,5,6,7,8

A problem arises if the user selects pen 5 for 0.005, pen 4 for 0.010 and pen 3 for 0.025. They all take the same round aperature of 0.05 but there is only one available on the plotter. So the only solution would be pen 5 for 0.005, pen 6 for 0.010, pen 7 for 0.018 and pen 8 for 0.025. For additional guidance in the use of the lighthead, contact Mr. Ralph Lombardi or William Schultz of the Technical Services Directorate, ARRADCOM, Dover, N.J. 07801.

Using Round Aperatures	Resulting line thickness in inches for PEN 1,2,3	for PEN 4	for PEN 5,6,7,8
.050	.025	.010	.005
.060	.030	.012	.006
.080	.040	.016	.008
.100	.050	.020	.010
.150	.075	.030	.015
.180	.090	.036	.018
.200	.100	.040	.020
.250	.125	.050	.025
.300	.150	.060	.030
.350	.175	.070	.035
.370	.185	.074	.037

Square Aperatures			
.050	.025	.010	.005
.100	.050	.020	.010
.150	.075	.030	.015
.200	.100	.040	.020
.250	.125	.050	.025

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3. RECIPIENT'S CATALOG NUMBER: Final rept.	
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	6. PERFORMING ORG. REPORT NUMBER: MISD UM 77-5
7. AUTHOR(s): JOSEPH J. SIERODZINSKI	8. CONTRACT OR GRANT NUMBER(s)
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graphics	storage	store	source	film	
standard	precision	data	automation		
forms	plotter	bases	paper	photographic	
artwork	create	conversational		typewriter	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

ARRADCOM has developed an interactive computerized system called **Design of Artwork for Standard Forms (DASF).** It was written to standardize forms design by using today's state-of-the-art graphics technology and equipment. With TEKTRONIX 4014 graphics storage tubes, Control Data series 6000 computers and a CALCOMP model 745 precision flatbed plotter, ARRADCOM is able to create, modify and store form artwork masters in their associated data bases in conversational sessions at a computer terminal. (CONT)

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