Although the software has been tested and the documentation reviewed, the programs are provided "as is", and the user is also specifically advised, and cautioned, to exercise careful engineering judgement in the correct interpretation of the final results.

STBLIN

An Interactive Data Preparation Program

for

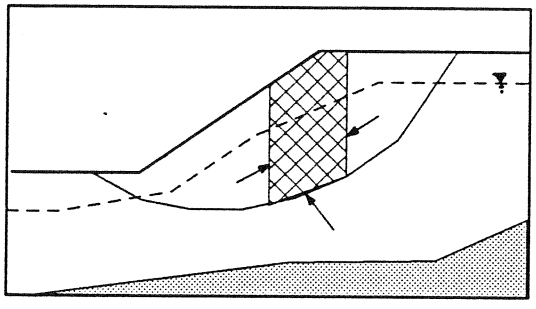
Slope Stability Program -- STABL

Prepared for

Idaho Transportation Department

P.O. Box 7129
Boise, ID 83707

Contract: 128 - K028



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INTRODUCTION

The program: **STBLIN**, has been developed to facilitate the data preparation phase for using the slope stability program, STABL. It is intended for use on an IBM-PC, or near compatible, suitably equipped for generating screen graphics. The program uses a suite of menus and data-tables to "guide" the potential user through the many options offered by the STABL program. The main advantages of using the data preparation program **STBLIN** are summarized below:

1. Options are selected via easy to understand menus,
2. All numeric data is entered through prompts into a data table,
3. These data tables provide a realistic view of the input,
4. The slope geometry may be readily viewed on the screen,
5. Previously entered data can be edited,
6. Previously saved files can be edited and saved as "new" files,
7. STABL input files on disk can be previewed,
8. Extensive error checking during the data entry phase,
9. Some context sensitive help is made available.

It is expected that the approach offered by using the program, **STBLIN**, will minimize potential errors and provide a more appropriate data preparation method for the less familiar user. The time expended in learning to use the program is expected to be nominal and users can be expected to generate input files almost immediately.

The **STBLIN** program generates a file with a format that is suitable for use with an enhanced version of the STABL program. These modifications, and the procedures necessary for reproducing screen graphics on a printer, are discussed in Appendix B.

This reference manual is intended mainly for providing a brief background and also as a guide to the structure and hierarchy of numerous menus and tables within the program. We feel that the simplicity (and ease) in using the **STBLIN** program precludes the use of a comprehensive manual for support during program operation.

HARDWARE REQUIREMENTS

In order to use the STBLIN program, the user will require:

1. An IBM-PC, or near compatible, with either two floppy disk drives or a hard disk (preferred) and one floppy disk drive and at least 384 kb RAM.

2. A floating point coprocessor (80x87) must be installed in the computer!

3. DOS 2.0 or later version,

4. An IBM Enhanced (EGA) or Color (CGA) graphics adaptor, or close compatible, with an appropriate monitor.
   (If requested, a special version of the program for the Hercules Graphics adaptor (HGA) can also be supplied.)

STBLIN COMPONENTS

The STBLIN and STABL programs are provided on two floppy disks along with supporting programs and files. The user should ensure that the package contains the following files :

1. STBLIN.EXE -- data preparation program,
2. STABL.EXE -- slope stability analysis program,
3. PLOT.EXE -- program for "hardcopy" plots,
4. SETUP1.STB -- program configuration file for STBLIN,
5. SETUP2.STB -- program configuration file for STBLIN and STABL,
6. EGA-1 and CGA-1 -- backup program configuration files,
7. CIRCL.DAT, BLOCK.DAT, IRREG.DAT, SURB.DAT -- Sample data files

The user should make a backup copy of these floppy disks if the program is to be used on a dual floppy disk system. Of these files, the three *.EXE programs and the two *.STB files (a total of five) are used to develop program input, perform STABL analyses and print slope geometries.

On a system with a hard-disk, a subdirectory (e.g. \STABL) should be created and the first FIVE files copied to that directory. The STBLIN and STABL programs read the setup files during execution and thus ALL program files must be located in this directory and execution of these programs must also be started in this same directory.

For a dual floppy disk system, the user should prepare two working diskettes containing the following :

DISK 1 -- STBLIN.EXE, STABL.EXE, SETUP1.STB and SETUP2.EXE,

DISK 2 -- PLOT.EXE.

With this approach, the first disk would be used for data preparation and slope analyses and the second would only be required for printing or plotting slope geometries.

Systems with an Enhanced Graphics Adaptor

The supplied **SETUP1.STB** file is the same as the CGA-1 file and supports systems based on a color graphics adaptor. However, if your system is capable of generating enhanced graphics (i.e. it has an EGA), then the EGA-1 file should be substituted for the supplied **SETUP1.STB** file. This operation should be performed from the directory (or floppy disk) that currently contains the **SETUP1.STB** file. With the floppy disk containing the EGA-1 file in drive A, type the following command :

COPY A:EGA-1 SETUP1.STB

This command copies the EGA-1 file form drive A to a file named SETUP1.STB. If this new configuration file fails to work, revert back to the original **SETUP1.STB** file and contact the author or call (208) 885-7529.

PROGRAM STRUCTURE OF STBLIN

The general structure of the numerous menus and tables that comprise the program are conceptually illustrated in Fig. 1. In this figure, the screen menus are shown boxed and are labeled A-G; the tables, labeled from 1 to 13, are shown on the right portion.

In order to start the program, the user must be in the same sub-directory as the program. At the DOS prompt, type : STBLIN . The program then reads the setup file, **SETUP1.STB**, which configures the program for the available hardware. If file: **SETUP1.STB** cannot be found, the program will inform the user that the file is is missing and then stop. To obtain an appropriate **SETUP1.STB** file, the user should contact the author or call (208) 885-7529.

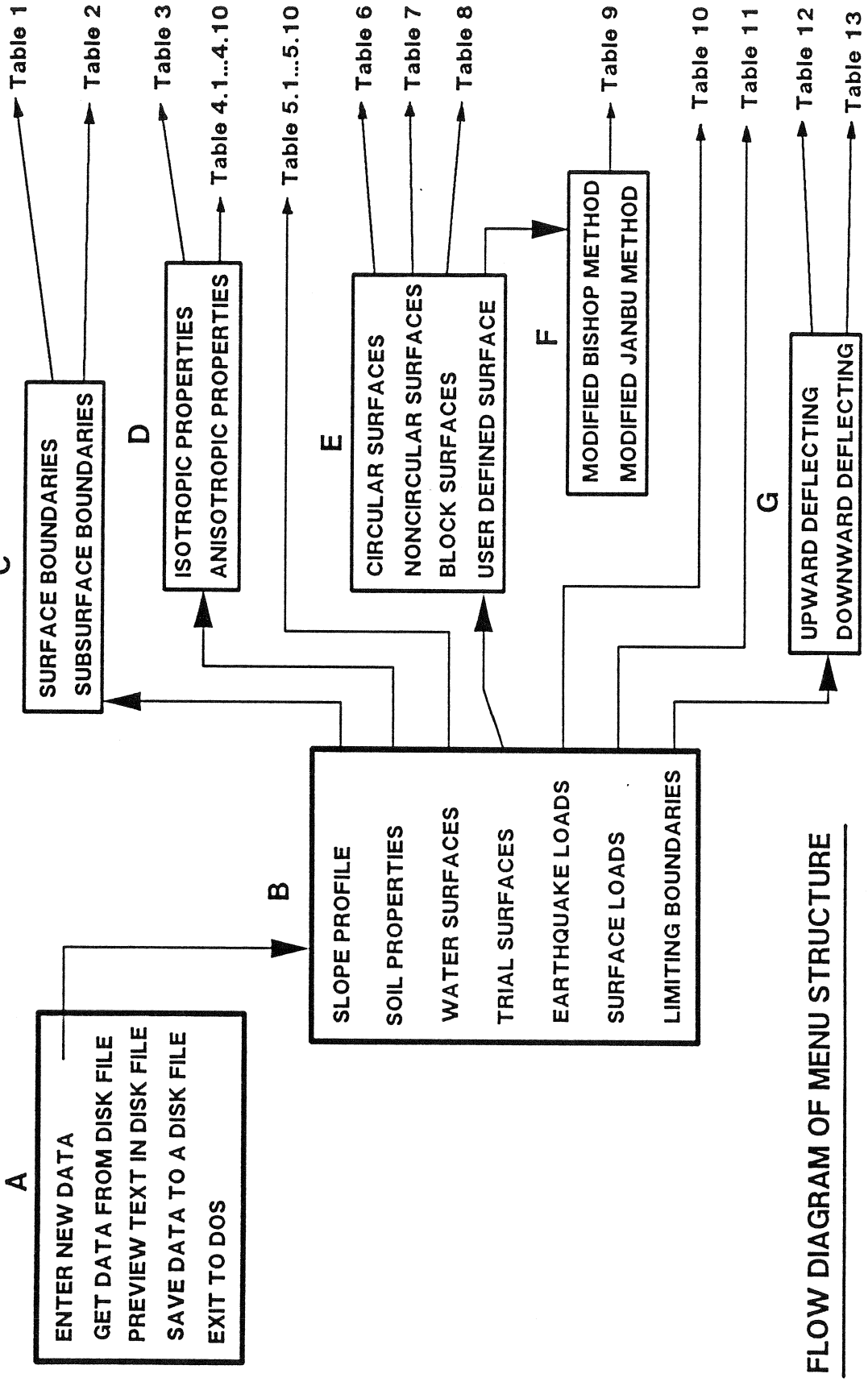


Figure 1, Hierarchy of MENUS and TABLES in program STBLIN

Once the setup file has been read, the program starts with the menu labeled A in Fig. 1. In each menu the user is offered a selection that is subsequently followed by a response. Each option is invoked by moving the Up/Down cursor to the appropriate selection, followed by the ENTER key. The overall philosophy of the program provides a structure where MENUS are used to select options, and TABLES are used for entering numerical data that is used to generate the input file for STABL.

DESCRIPTION OF MENUS

All menus rely on a few common features that are shown in Fig. 2. On the second row of each menu, the reader will find a title that is uniquely associated with that particular menu. In fig. 2, the menu is titled: Main Menu (see region labeled a). In each menu, the current filename (if assigned) will be shown at (b), and is provided as a reminder for the user. The labels presented in (c) are the available options. These options may be selected by highlighting the appropriate line and pressing ENTER. At any time, the user may obtain help by pressing the F1 key. Once a selection is made, the next screen will show another menu (or table) with a title that will be uniquely related to the option selected by the user. This will allow the user to be aware of the location of the current screen with respect to the program structure shown in Fig. 1.

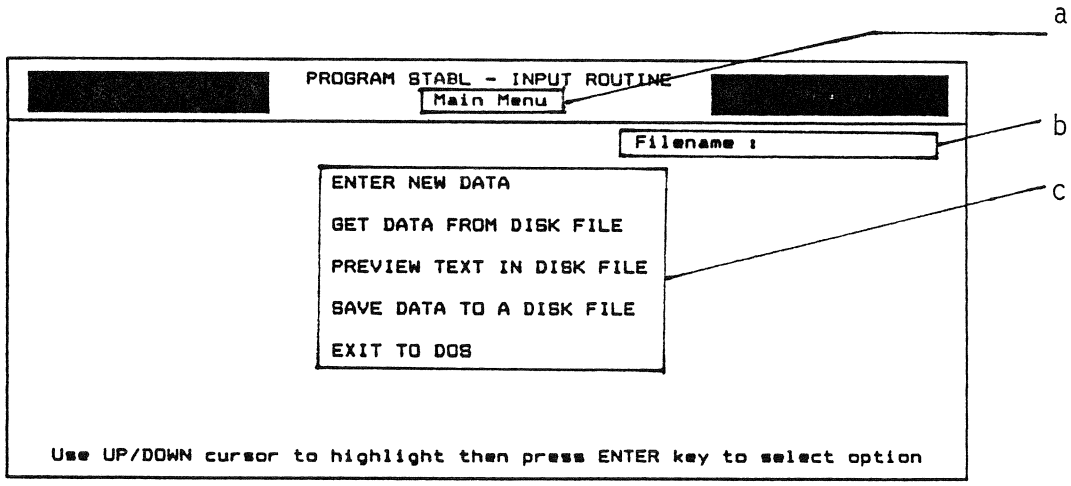


Figure 2, Menu A -- Main Menu

If the user selects the option : ENTER NEW DATA, the next menu will be the "Entering New data" menu shown in Fig. 3. One can see the compatibility with the original selection from the "Main Menu" and the current title. The menu in Fig. 3 shows the seven options that are available for use with the STABL program. These options are extensively described in the "STABL User Manual" (JHRP-75-9) available from Purdue University. The user may select any option from this menu and follow the sequence through to a table, as indicated in Fig. 1.

Once the user has completed an option, the ESC key is used throughout the program to return to the previous menu. Thus, if the user presses the ESC key in the menu shown in Fig. 3, the program will return to the menu shown in Fig. 2. The user should feel at ease throughout the interactive session, since the ESC key will allow for a "clean escape" to the previous menu.

An option to review the slope geometry is available from each menu by pressing the F3 key. The slope geometry displayed will be for the current data in the STBLIN program. If the user wishes to review the geometry of the slope in existing disk files, the data must be first read into the program using Option 2.

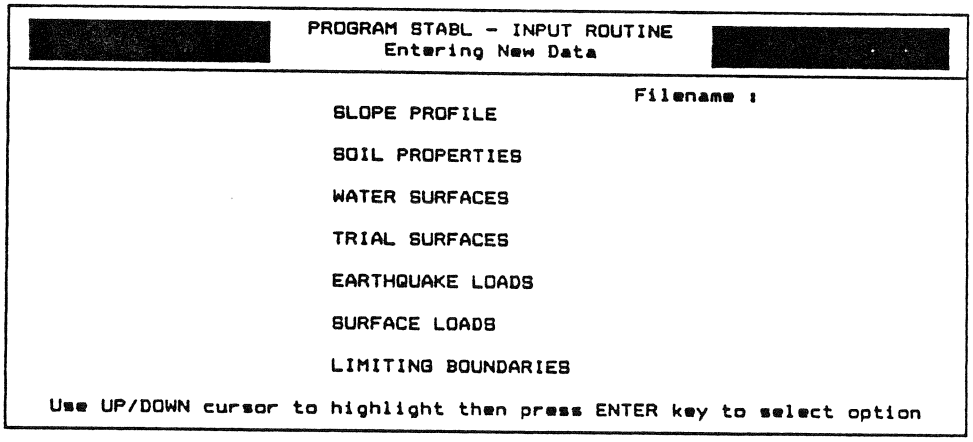


Figure 3, Menu B -- Entering New Data

The options available in the "**Main Menu**" (menu A in Fig. 1) and "**Trial Failure Surface Data**" (menu E) are described in the next section. The remaining menus, and the available options, are self explanatory and will not be described in detail. However, a complete summary of the screens corresponding to the menus A-G is included in Appendix A.

Main Menu (Menu A)

The options available in this menu permit the user to: (1) enter new data, (2) load data from an existing file for possible editing, (3) review data in file WITHOUT loading into program, (4) save entered data to a disk file, and (5) exit to the DOS environment. The first option is self explanatory, but the other option require further description.

(1) **ENTER NEW DATA**

(2) **GET DATA FROM DISK FILE** -- This option allows the user to read data into the STBLIN program for editing, review of on-screen geometry or possibly saving as file by another name. When using this option, the user must realize that upon reading the named file, ANY CURRENT DATA BEING EDITED WITHIN THE STBLIN PROGRAM WILL BE LOST. The next option should be used if the user merely wants to "browse" through another previously created file.

(3) **PREVIEW TEXT IN DISK FILE** -- This allows the user to preview the text in disk files WITHOUT loading the data into the STBLIN program. Thus any entered data will remain unchanged. An example of this option is shown in Fig. 4. This fig. shows the first 18 lines of a disk file named : STAB.DAT being previewed by the user.

(4) **SAVE DATA TO A DISK FILE** -- Any data that is generated using the STBLIN program MUST be saved if the user intends to use it with the STABL. The user should follow the on-screen prompts to ensure that the data is saved successfully. If for some reason the user wishes to obtain a paper copy of the data, the output file may be named prn or PRN. Then the "saved" file will be directed to the printer -- but will NOT be saved as 'prn' on the disk.

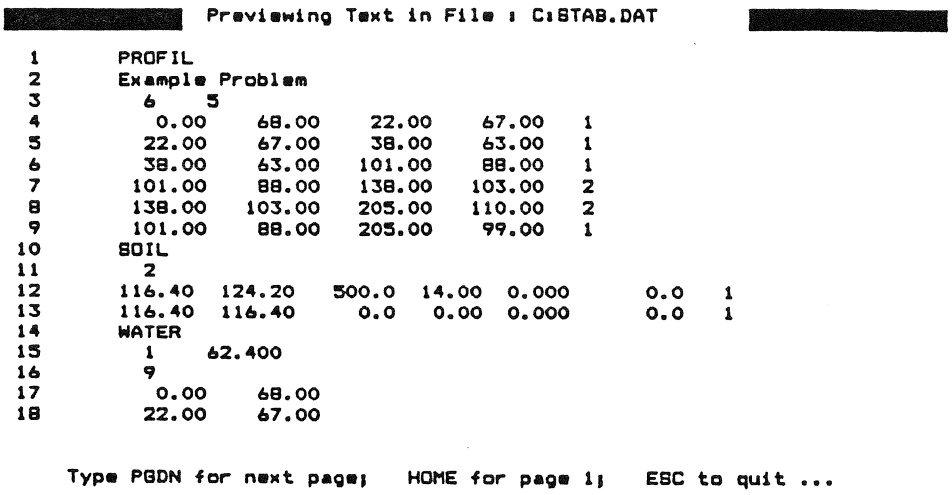


Figure 4, Previewing Text File: STAB.DAT

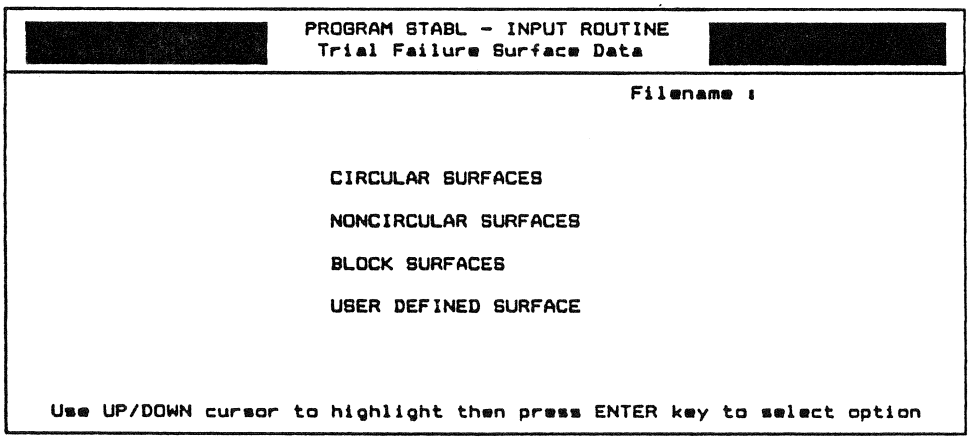


Figure 5, Menu E -- Trial Failure Surface Data

(5) **EXIT TO DOS** -- After entering the data and saving it to a disk file, the user can exit to the operating environment to execute the STABL program or perform other tasks. The user should note that upon exiting, ANY DATA THAT MAY NOT HAVE BEEN SAVED, WILL BE LOST!

Trial Failure Surface Data (Menu E)

This menu, shown in Fig. 5, is obtained by selecting the option : "TRIAL SURFACES", while in menu B (refer to Fig.1 and 3). From this menu, the user can select the type of potential failure surface that is to be used in the slope stability analysis. It should be noted that ONLY one type of analysis surface may be selected for each STABL data file. For cases where the user wants to examine the critical factor of safety for both "block" and "circular" surfaces, two files must be created separately to analyze the different conditions.

As an aid to the user, menu E will show the current failure surface that is part of the active file. Of course, the user may subsequently change to another type of failure surface. However, if such a change is made, parameters for the previous failure surface will be automatically erased to make way for the new values. Thus the user must exercise some caution before adopting a new failure surface, unless a copy of the file has been saved on disk.

DESCRIPTION OF TABLES

The tables are reserved for entering, editing and reviewing numeric data. They form the ultimate depth within the program structure and again the user should feel at ease as the ESC key will bring back the previous menu. A typical table, with data from a file:**STAB.DAT**, is shown in Fig. 6. Once again, the region labeled (a) will show a title associated with the type of data being entered into the table. Below each table, the user is informed about the availability of the **F1** key for "**Help**" and the current status of the data entry process by the following words:

"**Append**" --- for automatic, prompted data entry,

"**Editing**" -- for stage where screen editing is in effect.

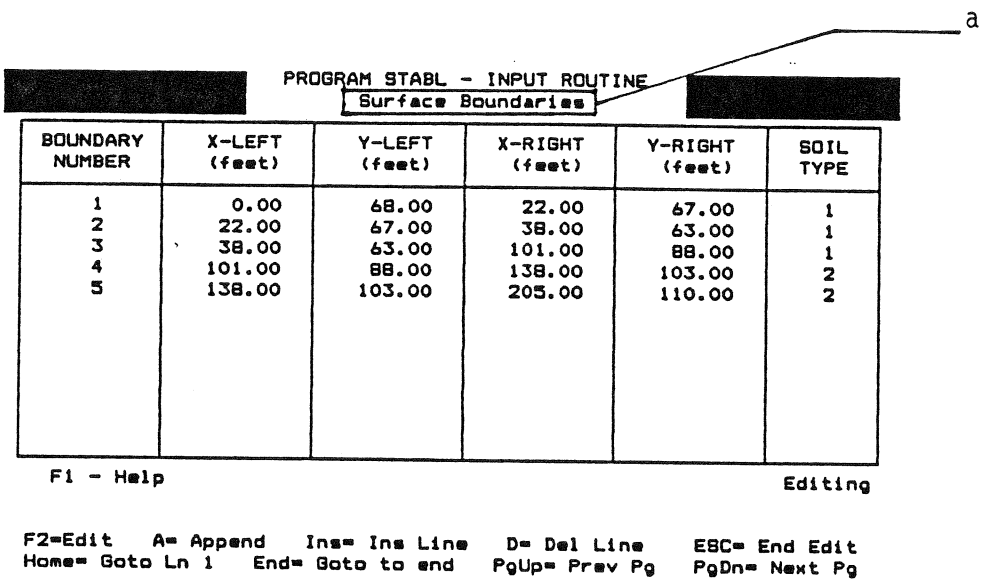


Figure 6, Table 1 -- Surface Boundaries

Several keys have been assigned special functions to aid the editing process. An on-screen summary of these functions may be obtained by pressing the F1 key. This will will reveal the items shown on the last two lines in Fig. 6. These describe the special keys that have been assigned various editing features and will be discussed in the next section. The F1 key acts as a toggle switch and may be pressed again to remove the "help" information.

Upon initial entry to a table, the program automatically assumes that the user want to add data and the "Append" feature will be in effect. Thus the program will prompt the user for data to be entered into each column. The user should type the appropriate numbers followed by ENTER to show that the data value is complete. At this stage, the program will ONLY accept numeric data (i.e. keys 0-9, the decimal point and the - or + algebraic sign) and will ignore any other keyed entries. If ENTER is pressed without typing any number, the data value will default to a zero. At the completion of each row of data, the prompt automatically locates to the next row. In case, the user notices erroneous entries later, there is no concern as the data may also be edited after exiting from the "Append" mode.

Once all the lines of data have been input, pressing the **ESC** key will return the user to the "**Editing**' mode. In this mode any value in the table may be accessed and changed, if necessary. Also, new lines may be inserted and/or deleted to develop a final set of data. This is the most powerful aspect of the STBLIN program. Once a data table is completed, the user can return to the previous menu by pressing **ESC**.

EDITING FEATURES

The following keys may be used to edit entries that have been entered into a data table :

F1 --- Help key, provides an index for the editing key assignments,

F2 --- This key allows a current entry to be changed. It is used by moving the highlighted window to the data in question, pressing **F2**, entering the new value followed by ENTER. We feel that the inconvenience of pressing **F2** for each change is offset by avoiding the possibility of entering data accidentally!

A or a - Pressing an upper or lower case letter "**A**" will place the program into an **APPEND** mode that is similar to the way data is entered initially. Thus the "**A**'-option should be used if the user wants to enter data at the end of the table. NOTE -- this is the only way for entering data beyond the current last line.

D or d - Pressing the letter "D (or "d") will delete the current line.

Ins -- Pressing the **Ins** key will insert a new line at the current cursor location. Zeroes will be entered into the corresponding line in the table and the user will be prompted to enter new values in the 'Append" mode for the current line.

Home -- Pressing the **HOME** key will automatically take the cursor to the first column entry in Line 1.

End -- Pressing the **END** key will automatically take the user to the first column of the last line of entry.

PgUp -- Pressing the **PgUp** key will take the user to the previous page of the table and place the cursor in column 1 at the top of the page.

PgDn -- Pressing the **PgDn** key will take the user to the next page of the table and place the cursor in column 1 at the top of the page.

The **up/left/down/right** cursor keys may be used to move within a page.

ACKNOWLEDGEMENTS

This program could not have been developed without the financial assistance provided by the **State of Idaho Transportation Department** and the screen graphics and printer software tools from **Microcompatibles, Inc.**, 301 Prelude Drive, Silver Spring, MD 20901 and **MicroGlyph Systems**, P.O. Box 474, Lexington, MA 02173, respectively. The assistance and useful discussions with John M. Gent, graduate assistant, and many others interested in the success of the project is also gratefully acknowledged.

APPENDIX A

PROGRAM STBLIN

DIRECTORY OF SCREEN MENUS AND TABLES

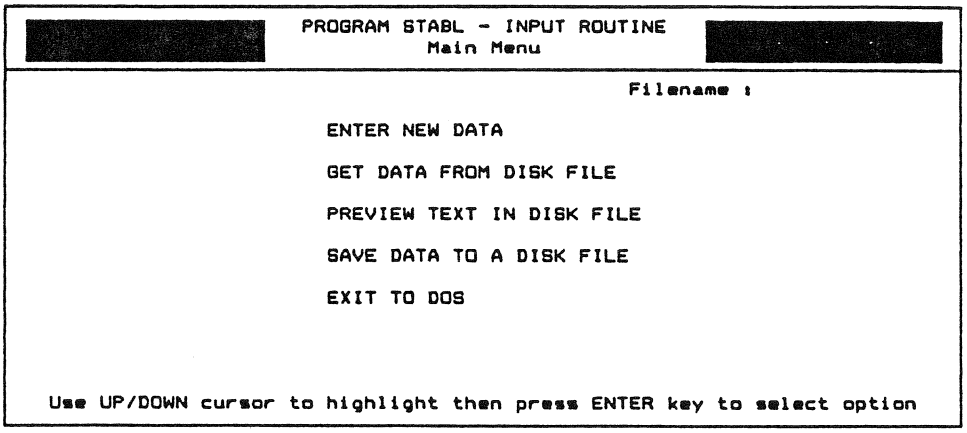


Figure A1, Menu A -- Main Menu

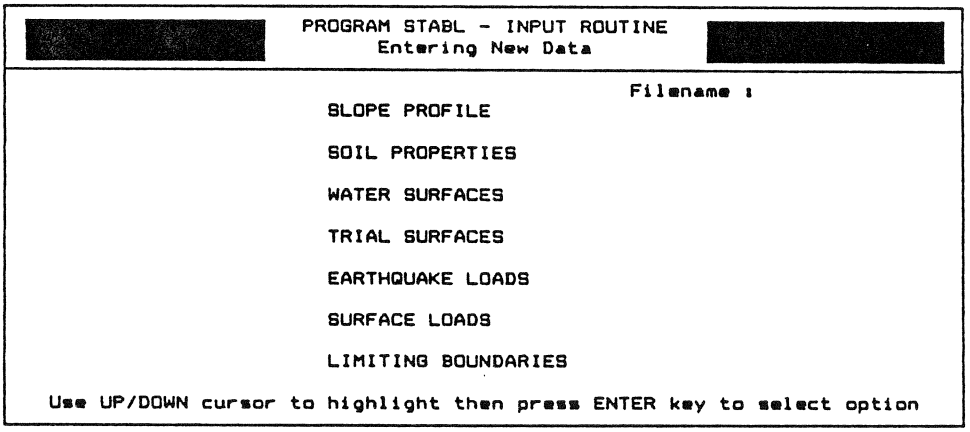


Figure A2, Menu B -- Entering New Data

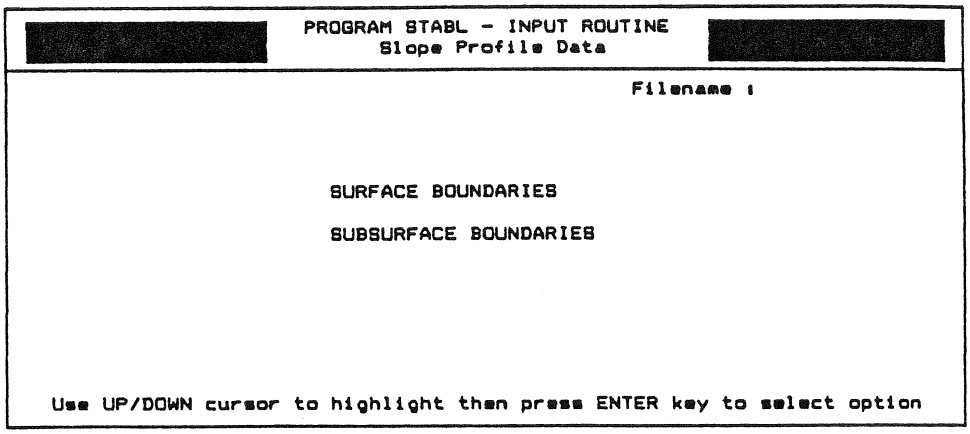


Figure A3, Menu C -- Slope Profile Data

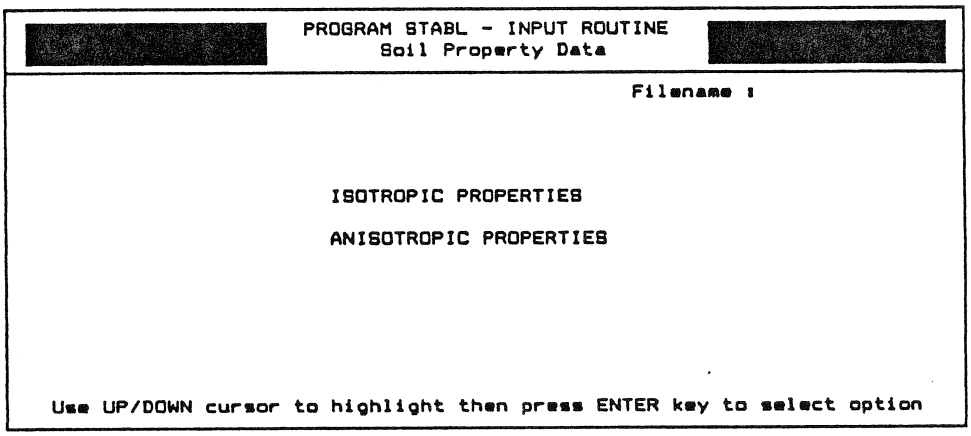


Figure A4, Menu D -- Soil Property Data

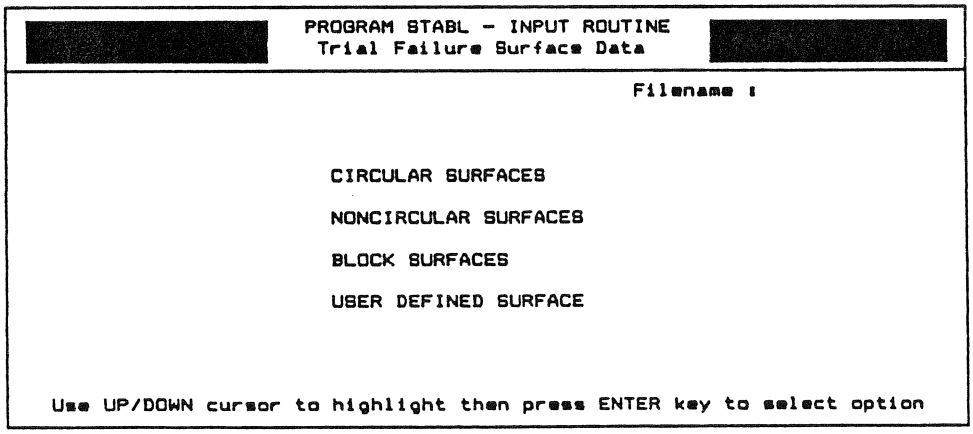


Figure A5, Menu E -- Trial Failure Surface Data

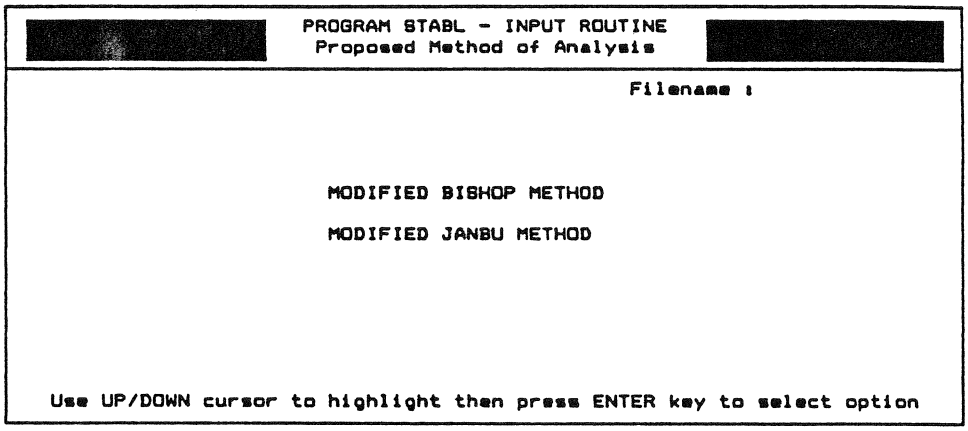


Figure A6, Menu F -- Proposed Method of Analysis

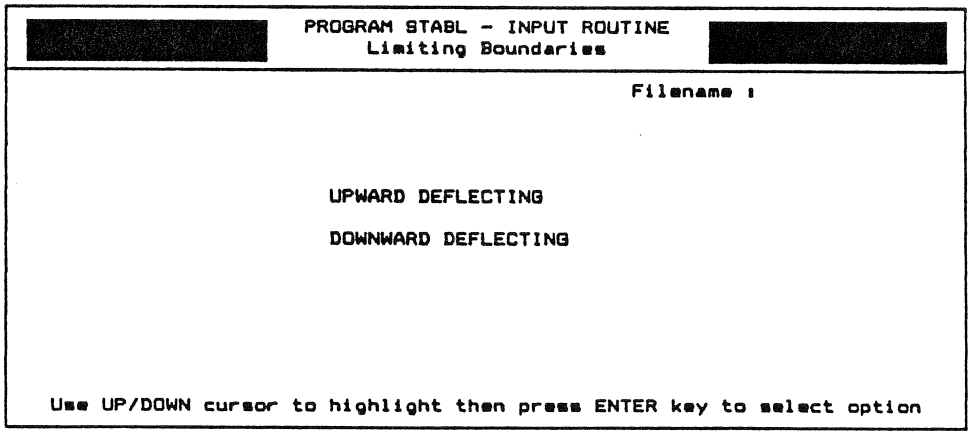


Figure A7, Menu G -- Limiting Boundaries

PROGRAM STABL - INPUT ROUTINE
Surface Boundaries

BOUNDARY NUMBER	X-LEFT (feet)	Y-LEFT (feet)	X-RIGHT (feet)	Y-RIGHT (feet)	SOIL TYPE
1	0.00	68.00	22.00	67.00	1
2	22.00	67.00	38.00	63.00	1
3	38.00	63.00	101.00	88.00	1
4	101.00	88.00	138.00	103.00	2
5	138.00	103.00	205.00	110.00	2

F1 - Help Editing

F2=Edit A= Append Ins= Ins Line D= Del Line ESC= End Edit
Home= Goto Ln 1 End= Goto to end PgUp= Prev Pg PgDn= Next Pg

Figure A8, Table 1 -- Surface Boundaries

PROGRAM STABL - INPUT ROUTINE
Subsurface Boundaries

BOUNDARY NUMBER	X-LEFT (feet)	Y-LEFT (feet)	X-RIGHT (feet)	Y-RIGHT (feet)	SOIL TYPE
1	101.00	88.00	205.00	99.00	1

F1 - Help Editing

Figure A9, Table 2 -- Subsurface Boundaries

PROGRAM STABL - INPUT ROUTINE
Soil Property Data

SOIL TYPE	WEIGHT MOIST (PCF)	WEIGHT SAT (PCF)	STRENGTH C (PSF)	STRENGTH ø (DEG)	PORE PRESSURE Ru	PORE PRESSURE CONST. (PSF)	WATER SURFACE INDEX
1	116.4	124.2	500.0	14.00	0.000	0.0	1
2	116.4	116.4	0.0	0.00	0.000	0.0	1

F1 - Help

Editing

Figure A10, Table 3 -- Soil Property Data

PROGRAM STABL - INPUT ROUTINE
Anisotropic Parameters : 1

Soil Type Index Number :

Number	CCW Direction Limit	c-value (psf)	ø

Figure A11, Table 4 -- Anisotropic Parameters

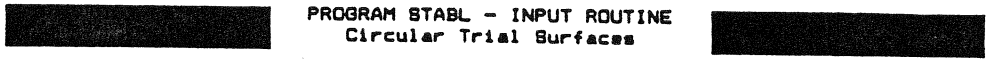
PROGRAM STABL - INPUT ROUTINE
Piezometric Surface Number : 1

POINT No.	X-coord (feet)	Y-coord (feet)
1	0.00	68.00
2	22.00	67.00
3	38.00	63.00
4	63.00	73.00
5	83.00	78.00
6	104.00	82.00
7	122.00	85.00
8	140.00	87.00
9	205.00	93.00

F1 - Help

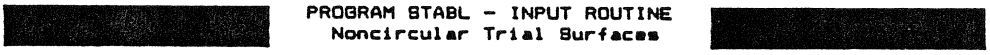
Editing

Figure A12, Table 5 -- Piezometric Surface Number:1



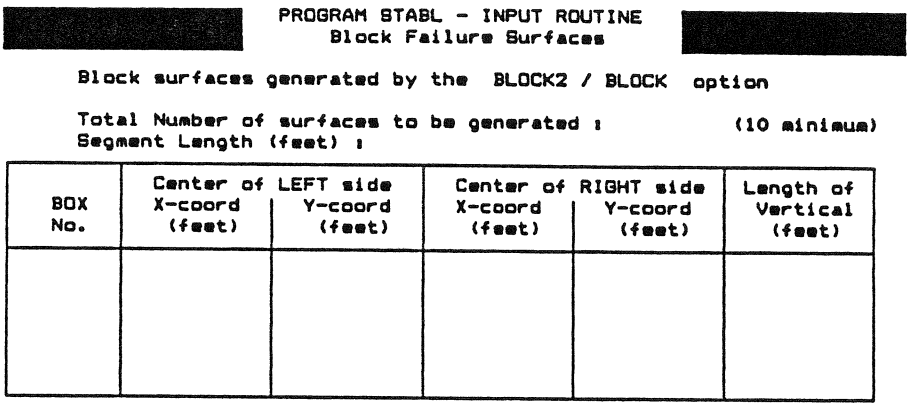
```
PROGRAM STABL - INPUT ROUTINE
Circular Trial Surfaces

Factor of Safety Computed Using  BISHOP / JANBU  Method

Number of initiation points :        1

Number of trial surfaces to be
generated from each initiation point :       10

Range of X-coordinates for --
  Initiation points              Termination points
    38.0  to     70.0              120.0  to   180.0

Minimum elevation of trial surface :      0.0

Length of trial surface segments :     10.0

Angle of limiting boundaries for
trial surface segments --
          Counterclockwise :      0.0     (0 defaults to -5 deg)
          Clockwise :     0.0             (0 defaults to -45 deg)

Use UP/DOWN to move cursor;   F2 to edit entry;   ESC to end
```

Figure A13, Table 6 -- Circular Trial Surface



```
PROGRAM STABL - INPUT ROUTINE
Noncircular Trial Surfaces

Factor of Safety Computed Using  JANBU  Method

Number of initiation points :

Number of trial surfaces to be
generated from each initiation point :

Range of X-coordinates for --
  Initiation points              Termination points
          to                             to

Minimum elevation of trial surface :

Length of trial surface segments :

Angle of limiting boundaries for
trial surface segments --
          Counterclockwise :           (0 defaults to -5 deg)
          Clockwise :                  (0 defaults to -45 deg)
```

Figure A14, Table 7 -- Noncircular Trial Surface



PROGRAM STABL - INPUT ROUTINE
Block Failure Surfaces

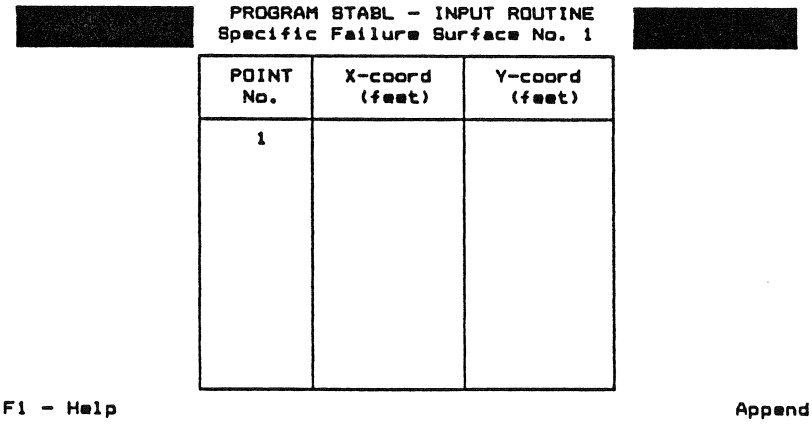
Block surfaces generated by the BLOCK2 / BLOCK option

Total Number of surfaces to be generated : (10 minimum)
Segment Length (feet) :

BOX No.	Center of LEFT side X-coord (feet)	Center of LEFT side Y-coord (feet)	Center of RIGHT side X-coord (feet)	Center of RIGHT side Y-coord (feet)	Length of Vertical (feet)

Use left/right cursor keys to highlight selection, then press ENTER

Figure A15, Table 8 -- Block Failure Surface



PROGRAM STABL - INPUT ROUTINE
Specific Failure Surface No. 1

POINT No.	X-coord (feet)	Y-coord (feet)
1		

F1 - Help

Append

Figure A16, Table 9 -- Specific Failure Surface

PROGRAM STABL - INPUT ROUTINE
Earthquake Loads

Horizontal Earthquake Coeffecient : 0.000
(defined positive leftwards)

Vertical Earthquake Coeffecient : 0.000
(defined positive upwards)

Use UP/DOWN to move cursor; F2 to edit entry; ESC to end

Figure A17, Table 10 -- Earthquake Loads

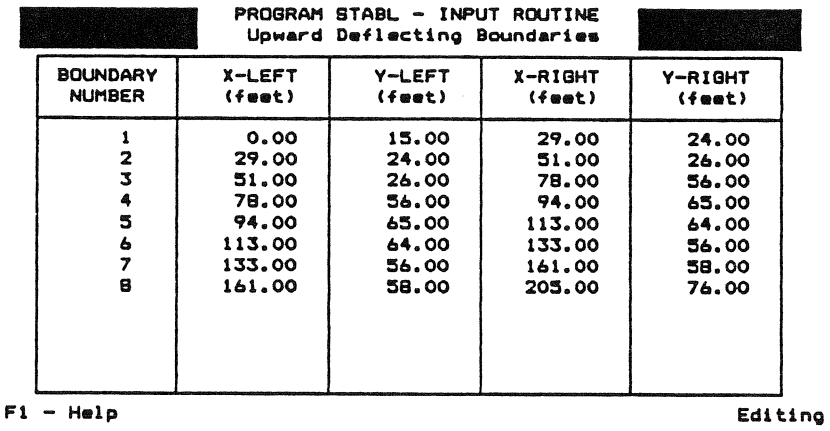
PROGRAM STABL - INPUT ROUTINE
Boundary Loads

LOAD NUMBER	X-LEFT (feet)	X-RIGHT (feet)	INTENSITY (psf)	ANGLE (deg)
1				

F1 - Help

Append

Figure A18, Table 11 -- Boundary Loads



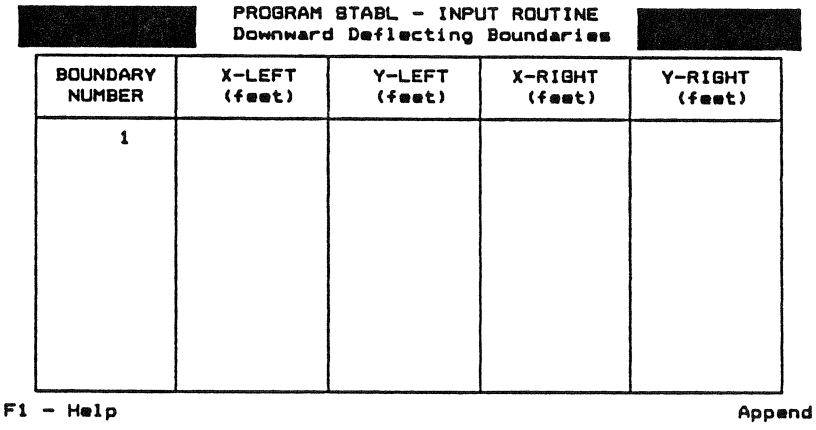
PROGRAM STABL - INPUT ROUTINE
Upward Deflecting Boundaries

BOUNDARY NUMBER	X-LEFT (feet)	Y-LEFT (feet)	X-RIGHT (feet)	Y-RIGHT (feet)
1	0.00	15.00	29.00	24.00
2	29.00	24.00	51.00	26.00
3	51.00	26.00	78.00	56.00
4	78.00	56.00	94.00	65.00
5	94.00	65.00	113.00	64.00
6	113.00	64.00	133.00	56.00
7	133.00	56.00	161.00	58.00
8	161.00	58.00	205.00	76.00

F1 - Help

Editing

Figure A19, Table 12 -- Upward Deflecting Boundaries



PROGRAM STABL - INPUT ROUTINE
Downward Deflecting Boundaries

BOUNDARY NUMBER	X-LEFT (feet)	Y-LEFT (feet)	X-RIGHT (feet)	Y-RIGHT (feet)
1				

F1 - Help

Append

Figure A20, Table 13 -- Downward Deflecting Boundaries

APPENDIX B

SLOPE STABILITY PROGRAM -- STABL

(IDAHO TRANSPORTATION DEPARTMENT VERSION)

INTRODUCTION

This manual provides technical information for successful use of the slope stability program: STABL on a Personal Computer. This version of STABL is essentially the same as the mainframe STABL4 that was made available to all state highway agencies via the FHWA implementation program during 1983-84 under a contract with Purdue University. Since 1984, numerous microcomputer versions of the program have been released by individual vendors without really offering any new features that effectively utilized the screen graphics available on IBM Personal Computers.

This version of the STABL program accomplishes all the options indicated in the original STABL User Manual (JHRP-75-9) and additionally, taking advantage of the PC environment, it offers the following :

1. Screen graphics for verifying input geometry and viewing the ten most critical surfaces;

2. All screen images may be saved in a file for later printing on IBM and Epson dot-matrix printers (or close compatibles), HP-Plotters, the HP Laserjet II printer and the Apple LaserWriter. All these plots are available in high resolution and may be readily used for publications;

3. The output from the program is confined to a 8.5 inch-wide area that is amenable for direct inclusion in reports;

4. The input data can be read in "true" free-format style with the only requirement being that values be separated by <u>at least one</u> space. This should allow users to prepare data in a more reliable columnar format and also permit the use of spreadsheet software to generate input files. It should be noted that previously generated files for use with STABL4 will remain compatible with the new version;

5. Abbreviation of output files to minimize duplication of information, e.g. the coordinates for the circular surfaces are omitted in favor of the more useful centers and radii of the circular failure arcs;

6. A user friendly environment.

All of the above features greatly enhance the versatility of the STABL program and should allow the geotechnical engineer to perform slope stability analyses in a friendly and convenient manner on a personal computer.

HARDWARE REQUIREMENTS

In order to operate the STABL program, the user will require:

1. An IBM-PC, or near compatible, with either two floppy disk drives or a hard disk (preferred) and one floppy disk drive and 320 kb,

2. A floating point coprocessor (80x87) must be installed in the computer!

3. DOS 2.0 or later version,

4. An IBM Enhanced (EGA) or Color (CGA) graphics adaptor, or close compatible, with an appropriate monitor.
   (If requested, a special version of the program for the Hercules Graphics adaptor (HGA) can also be supplied.)

5. One of the following devices for hardcopy output :

   (a) A dot-matrix printer capable of producing IBM graphics, e.g. IBM Proprinter, Epson MX80, Epson FX85 or FX85e.

   (b) A H.P. LaserJet Series II,

   (c) A H.P. Plotter (e.g. HP 7475A)

PROGRAM DESCRIPTION

The programs and supporting files that allow the above options to be used for slope stability analysis are :

1. **STABL.EXE, SETUP1.STB, SETUP2.STB** --- The STABL program is provided in an executable format and will require the two support files, **SETUP1.STB** and **SETUP2.STB**, to control the graphical output to the screen and plot files.

2. **PLOT.EXE** --- This program is used to print the saved graphical output on a conventional printer.

In addition, four example files - circl.dat, block.dat, irreg.dat and surb.dat - are included for validation and demonstration purposes. The

circl.dat file includes the data corresponding to the example problem discussed in the STABL User Manual (JHRP-75-9), pp. 61-80.

PROGRAM OPERATION

The STABL program has been modified to prompt the user for the names of the input and output data files that will be required during execution of the program. This approach is expected to minimize potential errors during the execution phase. Ideally, the user should maintain ALL working data files, the programs and supporting files in the same directory. However, the program may be executed from another directory using appropriate DOS pathnames. In this case, the setup files (**SETUP1.STB** and **SETUP2.STB**) must be available in the current working directory.

Upon executing the program STABL, the user is subsequently prompted for the following :

1. Name of INPUT FILENAME
2. Name of OUTPUT FILENAME

The above names must comply with DOS requirements, and are limited to a **maximum of 15 characters**. With such a limitation, pathnames should be avoided and work should be confined to a single working directory. In cases where the user want to send ALL output directly to a printer, and not save any to a disk file, the output file should be named: **prn** (or **PRN**)

At this stage the program will check for the following errors :

(a) If the input file cannot be found the user will notified and given the option to start again or terminate the program,

(b) If the name of the output file is the same as that of an existing file, the user is warned; at this stage the user may decide to terminate the program or overwrite the existing file.

The data file is read, and if there are no errors in the data, the screen is cleared and a plot of the slope geometry is drawn. The user is then prompted for :

3. Whether the current plot is to be saved ?

Here the user is given an option to enter "y" (yes) or "n" (no, the default value). If the user answers with a "y", then the next prompt requires :

3a. A FILENAME to be assigned to the saved graphic file of the input slope geometry

However, if the user does not request a file-save, the program continues with execution and performs the analysis on the requested number of potential failure surfaces. At the end of this analysis, the ten most critical surfaces are isolated and plotted on the screen. The minimum factor of safety for the critical surface is displayed and the user is again prompted by the same questions as in 3 and 3a, above :

4. Whether the current plot is to be saved ?

Here the user is given an option to enter "y" (yes) or "n" (no, the default value). If the user answers with a "y", then the next prompt requires :

4a. A FILENAME to be assigned to the saved graphic file showing the ten most critical surfaces and the minimum factor of safety.

If the user saves both screen graphics, three relevant output files will be saved on disk. These will be the OUTPUT file and two files containing data for the two screen plots.

OUTPUT OF GRAPHICS FILE

Screen plots that have been saved may be printed using the **PLOT.EXE** program provided on the disk. The program may be used interactively, or in a pseudo-batch mode.

Interactive Mode: The user should begin execution of "**PLOT**" using appropriate pathnames and then answer the prompts accordingly. For dot-matrix printers, the user will be typically prompted for the following data :

1. Console entry (**C**)
2. **NAME** of graphics file
2. Graphics printer (**G**)
3. Printer connection port, **3** (i.e. generally LPT1)
4. Plot resolution : **SL** for low resolution, draft quality, or
   DH for high resolution, report quality.

The answers for the other printer devices will be similar. An example of a high resolution, dot-matrix, plot created on an Epson FX85 printer is presented in Fig. B1. Additional examples of the quality of the printing are presented in Figs. B2-B4. The printing process for these plots required the following approximate times :

1. EPSON FX-85 printer, high resolution --- 18 minutes,
2. EPSON FX-85 printer, low resolution --- 4 minutes,
3. H.P. LaserJet printer --- 4 minutes,
4. H.P. 7475A Ink Plotter --- 4 minutes.

These times are intended only for a comparison between the various devices that may be used for a hardcopy output of the slope geometry. In general, printing times can be expected to be different for other slope geometries and output devices. In view of the non-productive time required for preparing these plots, it is advantageous to use the **PLOT** program in a batch mode format.

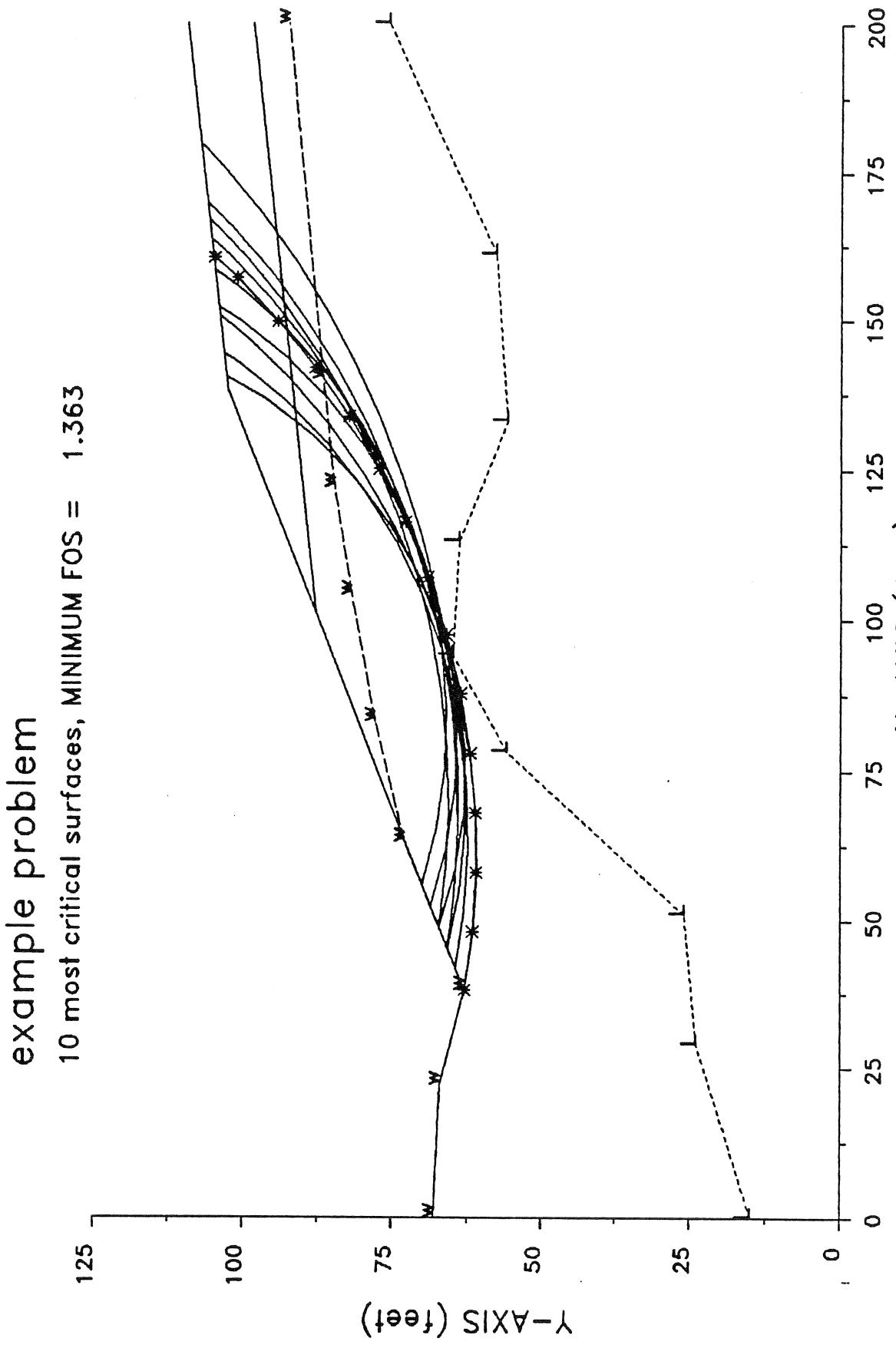


Figure B1, High Resolution Output from an Epson FX-85 dot matrix printer

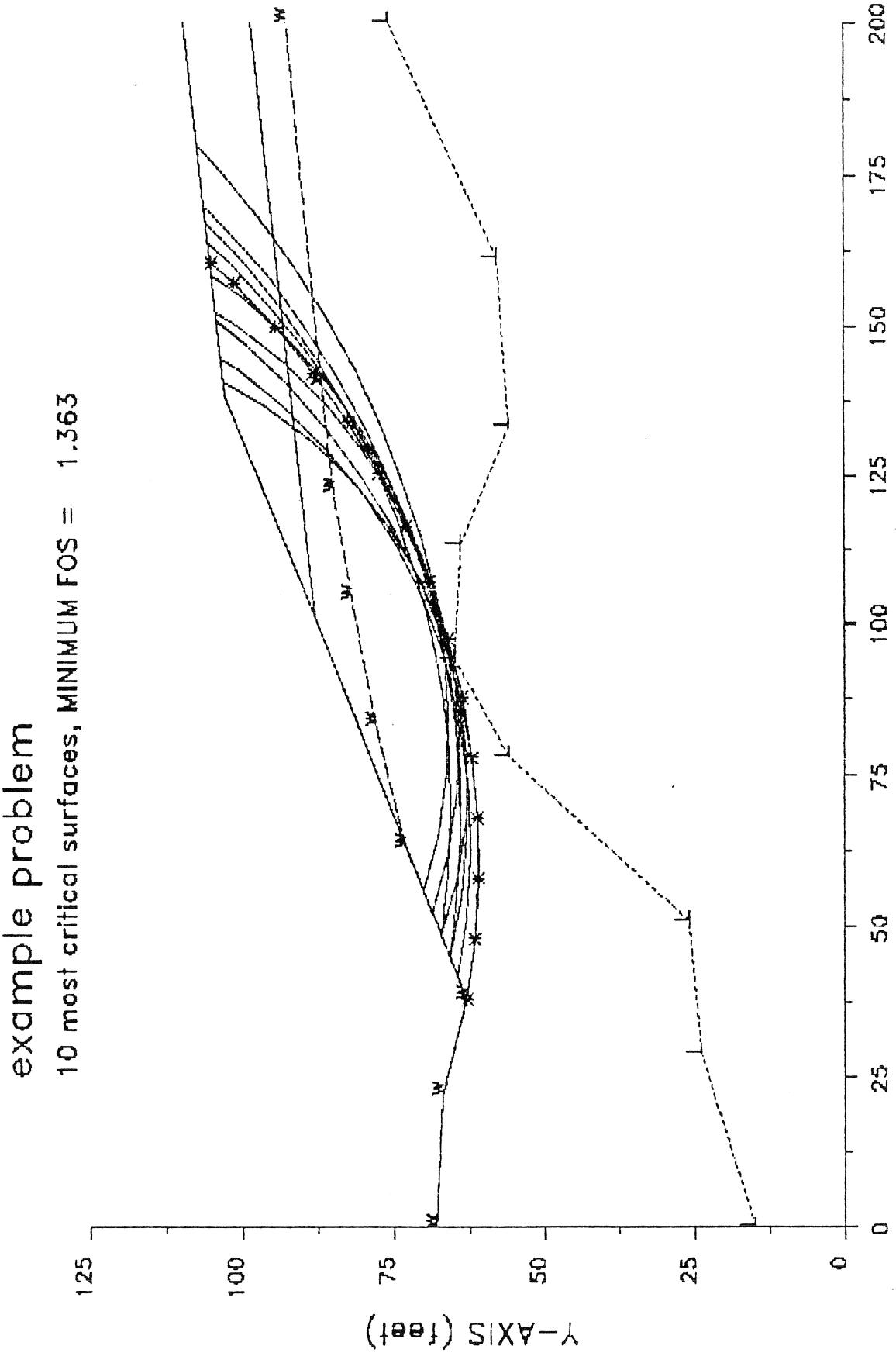


Figure B2, Low Resolution Output from an Epson FX-85 dot matrix printer

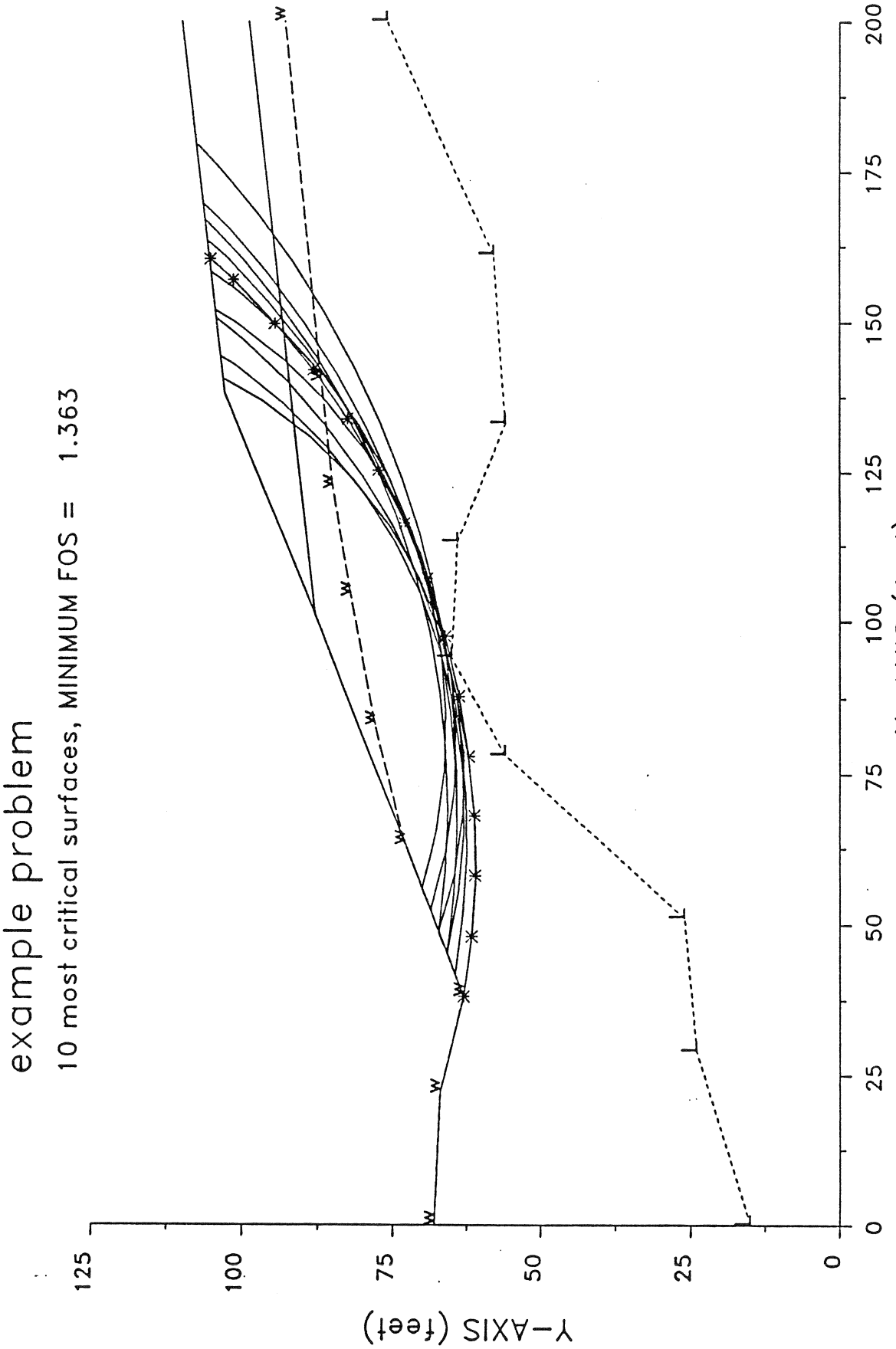


Figure B3, Output from a H.P. Laserjet Series II printer

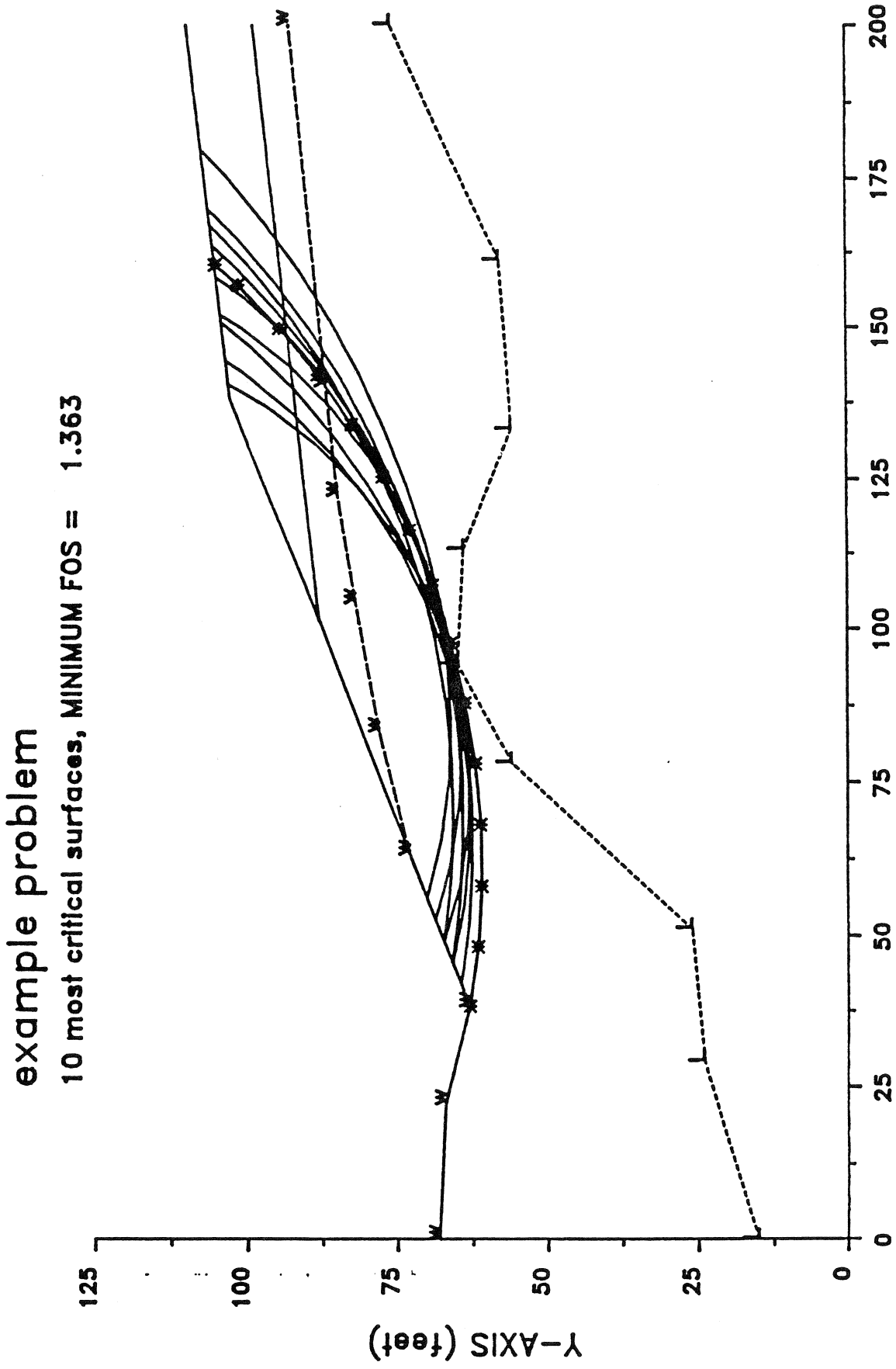


Figure B4, Output from a H.P. 7475A Graphics Plotter

Batch Mode: In this mode the user supplies answers to the anticipated interactive questions in a "batch" file which may then be read by the PLOT program. This file must be prepared according to the following format :

Line 1... FILENAME of the graphic file to be processed, include the drive and path names fully (e.g. c:\slope\plotfile1)

Line 2... DEVICE, PORT, HORIZONTAL RES., VERTICAL RES.
-- the line 2 values are ALL single characters and should NOT INCLUDE ANY BLANK SPACES between these values.

where : DEVICE = 'G' (IBM graphics printer)
'P' (HP Pen plotter)
'J' (HP LaserJet printer)
'L' (Apple LaserWriter printer)

PORT = '1' (COM1)
'2' (COM2)
'3' (LPT1)
'4' (LPT2)

HORIZONTAL RES. = 'D' (Double density)
'S' (Single density)

VERTICAL RES. = 'H' (High resolution)
'L' (Low resolution)

The above pairs of lines may be repeated, as many times as required, for each saved graphical file to be plotted on the printer.

If the user wanted to prepare a high resolution plot of the file C:\STABL\STABL.PLT on a dot-matrix printer connected to the LPT1 port, the following batch file (name = STBPLOT for example) may be used :

Line 1... C:\STABL\STABL.PLT
Line 2... G3DH

The commands are executed by invoking "PLOT", and then :

1. Type "d" in response to the first prompt to indicate that commands are to be read from a disk file;

2. Enter FILENAME of file that contains the commands for controlling the printer, e.g. STBPLOT, as discussed above.