

# **TEKNIQUES**

## **VOL. 6 NO. 3 T1**

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**TEKNIQUES  
VOL. 6 NO. 3 T1  
062-6514-01**

**DOCUMENTATION**

Applications Library  
Group 451  
Tektronix, Inc.  
P.O. Box 500  
Beaverton, Oregon 97007



# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

| <b>TITLE</b>   |                      | <b>PART NUMBER</b>              |
|--|----------------------|---------------------------------|
| TEKNIQUES VOL. 6 No. 3 T1  |                      | 062-6514-01                     |
| <b>ORIGINAL DATE</b>   | <b>REVISION DATE</b> |                                 |
| August, 1982   |                      |                                 |
| <b>ABSTRACT</b>  |                      |                                 |
| <p>TEKniques Vol. 6 No. 3 T1 tape consists of 18 programs: five programming aids, one slidemaker, three CAD, one mapping, two recreational, two interfacing, and four educational/research.</p> <p>Three of the programs must be transferred to their own dedicated tapes. Complete instructions for accomplishing the transfers are included in the documentation.</p> <p>The individual abstracts describe the programs.</p> <p>Read the documentation before running!</p> |                      |                                 |
| <b>Program #/<br/>Title</b>  | <b>File<br/>#</b>    | <b>Documentation<br/>Page #</b> |
| Directory  | 1                    | --                              |
| Program 1<br>Simplot/Simpose   | 2                    | 1                               |
| Program 2<br>ASCII Program Comparison  | 3                    | 11                              |
| Program 3<br>Numerical Expression Evaluator  | 4                    | 13                              |
| Program 4<br>Syntax Diagrams   | 5-6                  | 15                              |
| Program 5<br>Pretty Page Listings  | 7                    | 19                              |
| Program 6<br>Viewgraph   | 8                    | 25                              |

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| TITLE  | PART NUMBER          |
|--|----------------------|
| TEKniques Vol. 6 No. 3 T1                            | 062-6514-01          |
| Program 7<br>Plot Digitize                           | 9 45                 |
| Program 8<br>Arrowhead Macro                         | 10 59                |
| Program 9<br>Drill Log Check                         | 11 65                |
| Program 10<br>49XP IEEE-488 I/F Functional Verif.    | 12 69                |
| Program 11<br>Computer Poker                         | 13 83                |
| Program 12<br>4050 Clock                             | 14 91                |
| Program 13<br>Granulometry                           | 15 95                |
| Program 14<br>Graphical Linear/Non-Linear Reg. Anal. | 16-17 103            |
| Program 15<br>Two Phase Simplex Method               | 18 111               |
| Program 16<br>Exercise Test Evaluation (Transfer)    | 19 117               |
| Program 17<br>Rdrafting                              | (Transfer) 20-29 125 |
| Program 18<br>Data Comm Utilities                    | (Transfer) 30-38 143 |

| TITLE                     | PART NUMBER |
|---------------------------|-------------|
| TEKniques Vol. 6 No. 3 T1 | 062-6514-01 |

TRANSFERRING FILES TO A NEW TAPE

PLOT 50 General Utilities Vol. 1 (TEKTRONIX Part #4050A08) contains a program to transfer any type of 4050 files (program/data/text) quickly and easily along with the header names; however, it requires a 4924 Tape Drive, as does TAPEDUPE program contained on TEKniques Vol. 5 No. 4 T1 tape.

Transferring ASCII or BINARY PROGRAMS without a transfer program

- Step 1. Do a TLIST of the MASTER program tape.
- Step 2. Record which files go with which program (they are all named) and the size of each file.
- Step 3. MARK your new tape to accept the respective files for that program, e.g.,

```
FIND 0
MARK 1,20000
FIND 2
MARK 1,4000
etc.
```

- Step 4. Insert the MASTER tape.

```
FIND a file
OLD for ASCII or CALL "BOLD" for BINARY
```

- Step 5. Insert the new tape

```
FIND the file to receive the file in memory
SAVE for ASCII or CALL "BSAVE" for BINARY
```

REPEAT Steps 4 and 5 until all files comprising that program are transferred to the new tape. Note: This procedure will not retain the file header names.

Transferring ASCII or BINARY DATA to a new tape

The 4051R06 Editor ROM could be used to transfer ASCII DATA files.

4050 Applications Library program "Binary Data File Duplicator" will transfer BINARY DATA files without any peripheral.

4050 Applications Library program "Tape Duplication" will transfer ASCII or BINARY DATA or PROGRAM files, but requires a 4924 Tape Drive.

Both of these programs are contained on the 4050 Applications Library UTILITIES T1 tape (TEKTRONIX Part #062-5974-01), and UTILITIES D1 disk (TEKTRONIX Part #062-5975-01).

| TITLE                     | PART NUMBER |
|---------------------------|-------------|
| TEKniques Vol. 6 No. 3 T1 | 062-6514-01 |



# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|   |  |  |
|---|--|--|
| TITLE<br><br>SIMPLOT/SIMPOSE  |  | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 1                          |
| ORIGINAL DATE<br>21 February 1982   |  | EQUIPMENT AND OPTIONS REQUIRED<br>16K (option 20)<br>4052R07 Signal Processing ROM |
| AUTHOR G. Marksteiner (617) 749-3550<br>Inteval Applied Physics Laboratories, Inc.<br>40 Industrial Pk. Rd., Hingham MA 02043 |  | PERIPHERALS Optional: 4662 plotter<br>4052R07, R08 Signal Processing ROMS          |

## ABSTRACT

SIMPLOT/SIMPOSE is a flexible graphics utility designed to quickly display the contents of one-dimensional arrays during program development and testing or during discrete data processing tasks. It may reside as a background subroutine which is accessible through the User keys.

Plotting is performed within a limited field on either the 4052 display or the 4662 plotter, depending on whether Ukey 1 or 2 is pressed. Adequate space on the lefthand side of the display is preserved for sequential data manipulation commands, and other calculations.

This utility uses a versatile command syntax that permits sectional plotting and superposition of arrays of varying size, and allows the user to perform array integration, differentiation and Fourier transformation, without disturbing data in the input array. Input arrays may be labelled from A(A $\emptyset$ ) - Z(Z $\emptyset$ ). Autoscaled plots can be constructed using linear segments, vertical lines, bars or any keyboard symbol which is appended to the plot command.

An error-tolerant monitor oversees user syntax and spacing, and permits liberal use of abbreviation. An abbreviated listing of available forms supported by the utility is displayed when Ukey 3 is pressed.

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TITLE

SIMPLOT/SIMPOSE

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 1

## 2. DATA TAPE STRUCTURE

- a. Type of tape data files: binary and ASCII.
- b. Files used: files 1 through 4 (files 1 and 2 ASCII, files 3 and 4 binary).

## 3. INTERNAL DATA STORAGE

| a. | Variable | Used to Store...           | Type            |
|----|----------|----------------------------|-----------------|
|    | I9(J9)   | Internal Arrays            | Array Variable  |
|    | In       |                            |                 |
|    | Jn       |                            |                 |
|    | Kn       | Internal Control Variables | Variable        |
|    | I\$      |                            |                 |
|    | J\$      |                            |                 |
|    | K\$      |                            |                 |
|    | Z\$      | Internal Labels            | String Variable |
|    | Z9       | GPIB Address               | Variable        |

## 4. METHODS

N/A

LOADING INSTRUCTIONS

Load the program into memory. On the TEKniques Vol. 6 No. 3 T1 tape,

FIND 2

OLD

TITLE

SIMPLOT/SIMPOSE

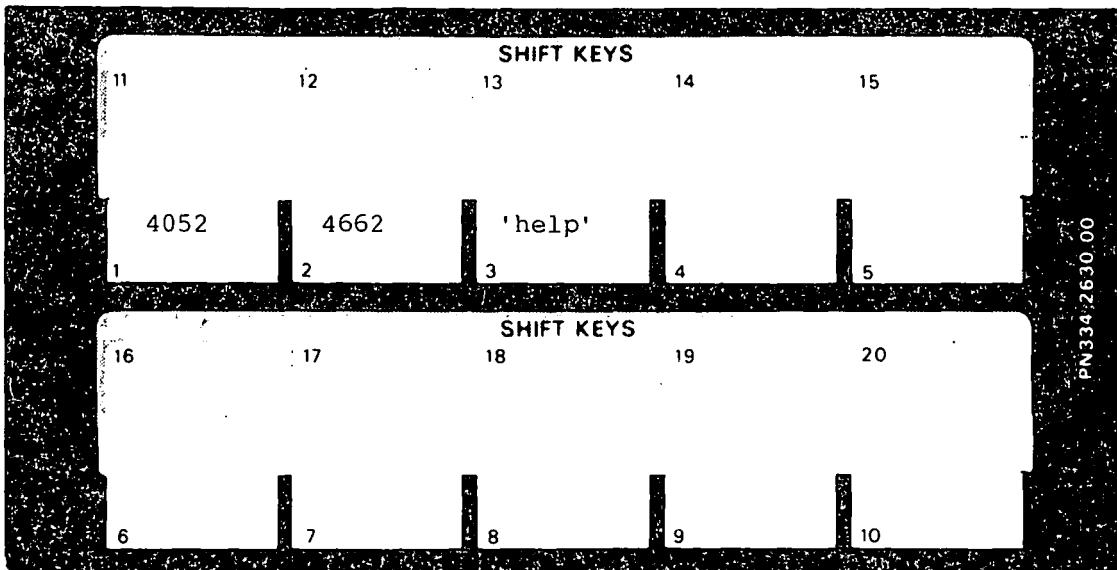
ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 1

TITLE

TAPE #

FILE #



## 5. OPERATING INSTRUCTIONS

## a. Ukey Engages Program for...

|   |                          |
|---|--------------------------|
| 1 | Plotting on 4052 Screen  |
| 2 | Plotting on 4662 Plotter |

|   |  |
|---|--|
| 3 | Displays Abbreviated Listing of Input Syntax |
|---|--|

## b. Program Execution

Program is engaged when either Ukey 1 or 2 is pressed. Pressing RETURN exits to the system.

Arrays labelled A(A $\emptyset$ ) - Z(Z $\emptyset$ ) stored in RAM memory can be displayed by first entering the variable (e.g. A through Z) and then pressing RETURN. A variable (e.g. A $\emptyset$  through Z $\emptyset$ ) must be stored in the system equal to the size (dimension) of the displayed array.

Example:

Q is a 100 element array.

Q $\emptyset$  = 100

To display Q on the 4052 screen press Ukey 1.

Enter Q and press RETURN.

Instead of the values of Q being displayed a connected line segment plot will be drawn of array Q on the right-hand side of the screen.

Press RETURN to exit to the system.

| TITLE           | ABSTRACT NUMBER                        |
|-----------------|--|
| SIMPLOT/SIMPOSE | TEKniques Vol. 6 No. 3 T1<br>Program 1 |

5. OPERATING INSTRUCTIONS

b. Program Execution

Example: (continued)

(Pressing Ukey 2 directs the plot to the 4662 Plotter when connected.)

This utility uses a versatile command syntax that permits sectional plotting and superposition of arrays of varying size, and allows the user to perform array integration, differentiation and Fourier transformation, without disturbing data in the input array. Input arrays may be labelled from A(A $\theta$ ) - Z(Z $\theta$ ). Autoscaled plots can be constructed using linear segments, vertical lines, bars or any keyboard symbol which is appended to the plot command.

An abbreviated listing of available forms supported by the utility is displayed when UKey 3 is pressed.

6. REFERENCES

None.

TITLE

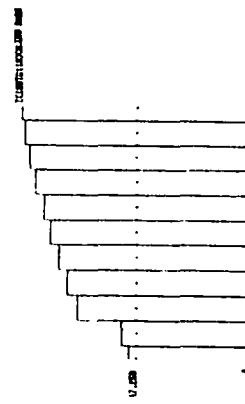
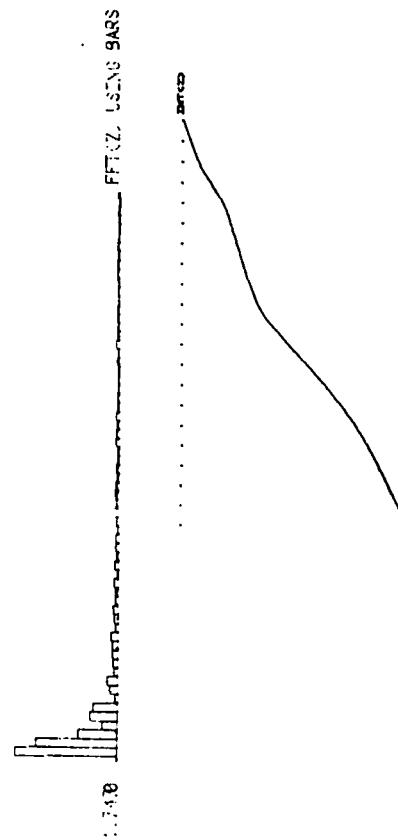
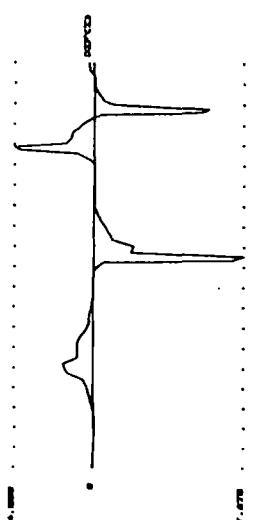
SIMPLOT/SIMPOSE

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 1

See following two pages for plotter-size copy

SIMPLOT/SIMPOSE



INTELAB  
Applied Physics Laboratories, Inc.  
40 Industrial Park Road  
HINGHAM, MA 02043

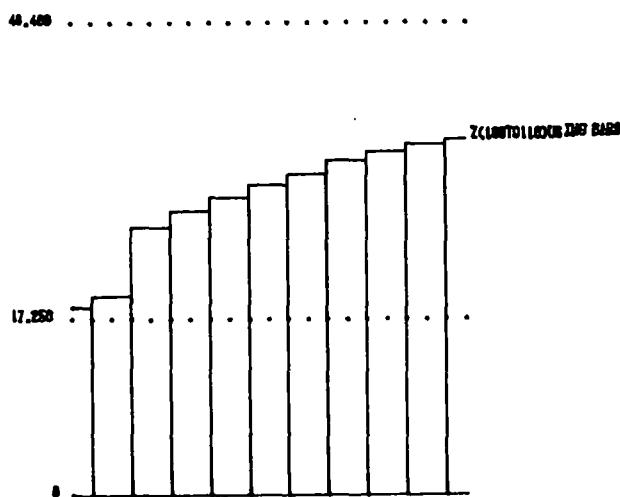
TITLE

SIMPLOT/SIMPOSE

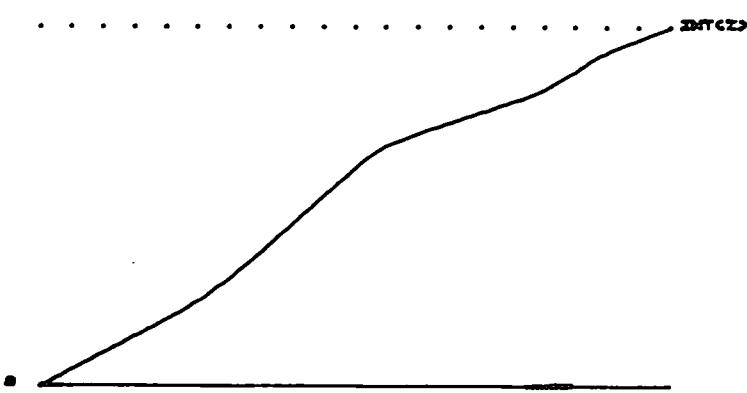
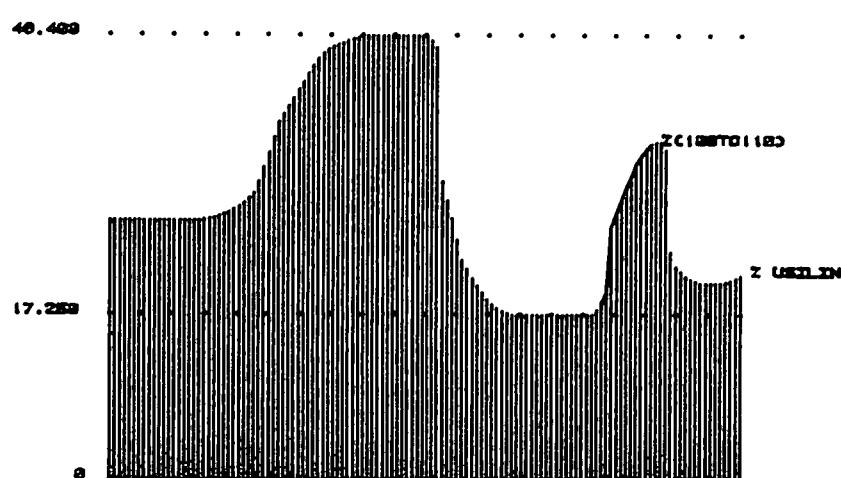
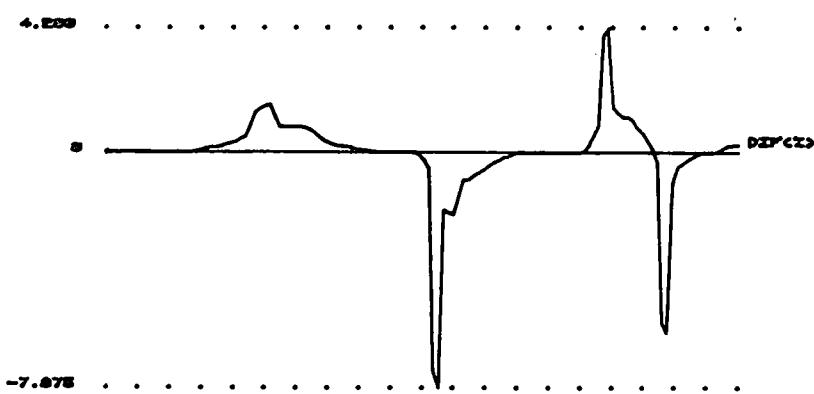
ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 1

## SIMPLOT/SIMPOSE



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40 Industrial Park Road  
HINGHAM, MA 02043



TITLE

SIMPLOT/SIMPOSE

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 1

See following two pages for plotter-size copy

SIMPLOT/SIMPOSE ASSAY PLOTTER DRAWINGS TEK 4002

Z(1T040)USING LINES

Z(90T0106)USING BARS

Z(106T0128)

USING "

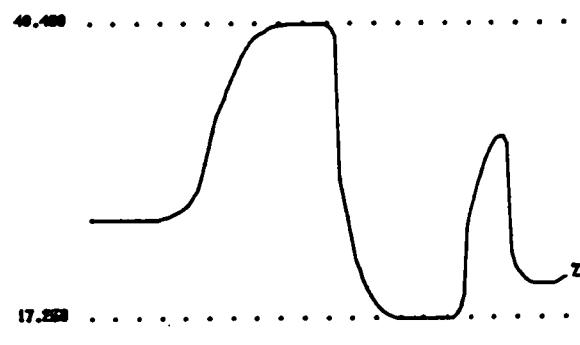
Z(48T090)

INTELAB  
Applied Physics Laboratories, Inc.  
40 Industrial Park Road  
HINGHAM, MA 02043

TITLE

SIMPLOT/SIMPOSE

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 1

Z C 1 TO 40) USING LINES

000-6405-02

PAGE NUMBER 10

USING " "

Z C 40 TO 92) Z C 106 TO 128:

**DESKTOP COMPUTER  
APPLICATIONS LIBRARY PROGRAM**

|                              |                                    |   |
|------------------------------|------------------------------------|---|
| TITLE                        |                                    | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 2 |
| ORIGINAL DATE<br>April, 1979 |                                    | EQUIPMENT AND OPTIONS REQUIRED<br>16K                     |
| AUTHOR<br>Barbara Garbarino  | Tektronix, Inc.<br>Wilsonville, OR | PERIPHERALS<br>4924 Tape Drive                            |

## ABSTRACT

1 ASCII Program

Statements: 157

This program will make a line-by-line comparison of two ASCII programs and display the changes necessary to make the two identical. The programs to be compared must reside on two different tapes, with the same file number.

The program will prompt for the master program and the program to be compared to it and instruct which to place in the 4050 internal tape drive and which in the 4924 Tape Drive.

The changes may be displayed on the 4050 screen or sent to the printer.

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| TITLE                    | ABSTRACT NUMBER                        |
|--------------------------|--|
| ASCII Program Comparison | TEKniques Vol. 6 No. 3 T1<br>Program 2 |

#### OPERATING INSTRUCTIONS

Load the ASCII Program Comparison into memory either through the tape directory, or FIND 3 and OLD.

Insert the tape containing your original (older) program into the internal 4050 tape drive. Insert the tape containing the updated (modified) version of the program into the 4924 tape drive.

Key in RUN and follow the instructions.

Any statements in the program residing on the tape in the 4924 tape drive which don't correspond to the same numbered statements on the tape in the internal drive, will be printed to the screen or printer.

If statements in the original tape don't have corresponding statements in the modified version, their line numbers will be printed to the screen or printer.

#### PROGRAM LIMITATIONS

The files to be compared must be ASCII Programs--no binary files and no data files.

The programs to be compared must have the same file numbers.



# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|  |  |   |  |
|--|--|---|--|
| TITLE  |  | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 3 |  |
| Numerical Expression Evaluator   |  | EQUIPMENT AND OPTIONS REQUIRED<br><br>8K                  |  |
| ORIGINAL DATE  | REVISION DATE                          |   |  |
| September, 1981  |  | PERIPHERALS   |  |
| AUTHOR<br>Seymour Hatch  | CR Industries<br>Elk Grove Village, IL |   |  |
| <p><b>ABSTRACT</b></p> <p>Files: 1 ASCII Program</p> <p>Statements: 74</p> <p>Frequently when inputting parameters during the execution of a computer program, it is convenient to be able to enter simple numerical expression in place of pure numbers. When an expression is entered, it is evaluated and its value used as a pure number would normally be used. This subroutine may be called by any program to allow simple numerical expressions to be inputted as if they were pure numbers. A sample main program is included to demonstrate operation.</p> |  |   |  |

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TITLE

Numerical Expression Evaluator

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 3

```

100 REM *** MAIN PROGRAM
110 INIT
120 SET DEGREES
130 PRINT "ENTER FIRST PARAMETER ";
140 GOSUB 1000
150 A1=VAL(A$)
160 PRINT "FIRST PARAMETER = ";A1
170 PRINT "ENTER SECOND PARAMETER ";
180 GOSUB 1000
190 A2=VAL(A$)
200 PRINT "SECOND PARAMETER = ";A2
210 PRINT "ENTER THIRD PARAMETER ";
220 GOSUB 1000
230 A3=VAL(A$)
240 PRINT "THIRD PARAMETER = ";A3
250 END

```

RUN

ENTER FIRST PARAMETER 25\*SIN (10)  
 FIRST PARAMETER = 4.34120444168

ENTER SECOND PARAMETER 3.14159\*10  
 SECOND PARAMETER = 31.4159

ENTER THIRD PARAMETER 25  
 THIRD PARAMETER = 25

LOADING INSTRUCTIONS

The subroutine is located on File 4 of the TEKniques Vol. 6 No. 3 T1 Program tape.

FIND 4

OLD



# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|   |                             |   |
|---|-----------------------------|---|
| TITLE   |                             | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 4 |
| Syntax Diagrams   |                             | EQUIPMENT AND OPTIONS REQUIRED<br>32K                     |
| ORIGINAL DATE<br>November, 1980   | REVISION DATE<br>June, 1981 | PERIPHERALS<br>Optional-4662/3 Plotter                    |
| AUTHOR<br>Bennet Yee  |                             | Tektronix, Inc.<br>Beaverton, OR                          |
| ABSTRACT  |                             |   |
| <p>Files: 1 ASCII Program<br/>1 ASCII Data (example)<br/>Statements: 713</p> <p>The program allows you to generate a syntax diagram, store it on tape and do limited editing (delete last entry) and graph the diagram on the screen or plotter.</p> <p>Graphics operations are based on two points: the predefined point and the current point. For example, when constructing a line, you will move the cursor to one end of the line, define that point (UDK 1), then move the cursor to the other end and press the LINE key (UDK 5). A line is drawn between the points.</p> <p>Predefined constructs such as arrow, bypass, rectangles, circle and parallelogram will automatically update the predefined point to convenient positions, i.e., CIRCLE will move predefined point to right-hand edge of the circle). Characters may be inserted in the graph.</p> <p>Graph titles may be saved on tape. These do not show on the graph itself, but serve to identify the graph. The extended header is used to store this title.</p> |                             |   |

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TITLE

Syntax Diagrams

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1

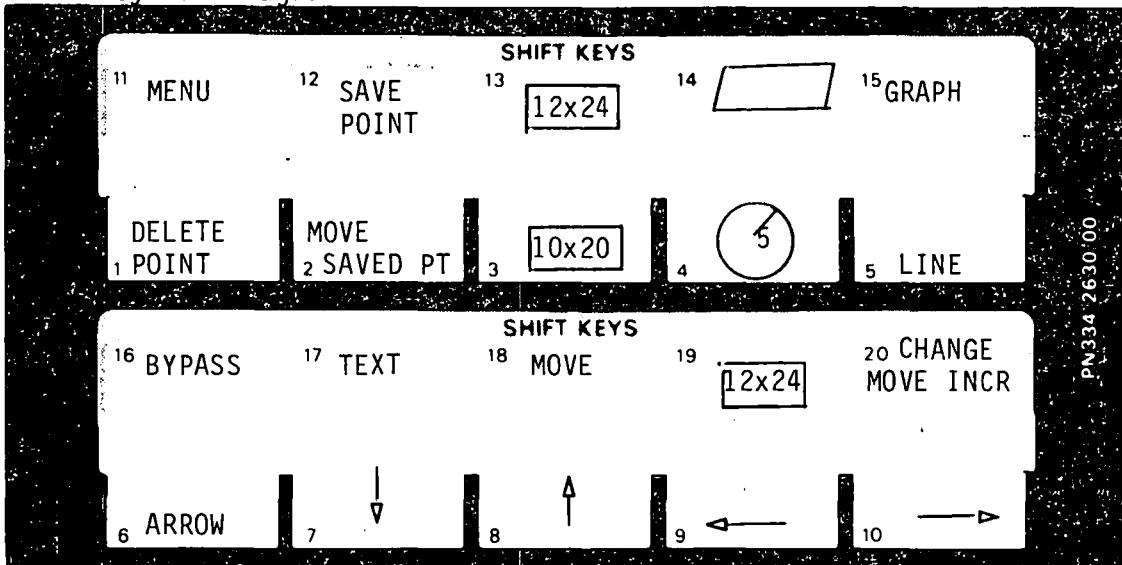
Program 4

TITLE

Syntax Diagrams

TAPE #

FILE #

KEY #      FUNCTION

- 1 Defines current point as predefined point.
- 2 Move cursor to saved point. (This is different from predefined point--this is just a convenience for generating diagrams--see #12).
- 3 Draw 10 by 20 rectangle with current position as center of left edge. Update predefined point to center of right edge.
- 4 Draw circle of radius 5. Bell prompts for CR; LF, SP, ", , , ;, or rubout. Rubout draws empty circle. CR or the other listed characters draws corresponding symbols.
- 5 Draw straight line from predefined point to current cursor position. Predefined point is updated to current position.
- 6 Draw arrow from predefined point to current position. VERT/HORIZ only. Update as in (#5). Head of arrow at current position.
- 7-10 Move cursor
- 11 Menu - recall new graph  
save current graph  
draw graph on plotter  
delete entries from latest and back  
exit menu - continue drawing  
exit program
- 12 Save point (See #2).

TITLE

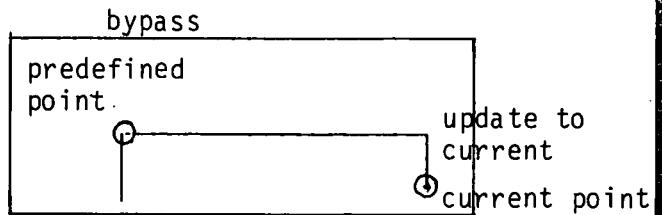
Syntax Diagrams

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 4

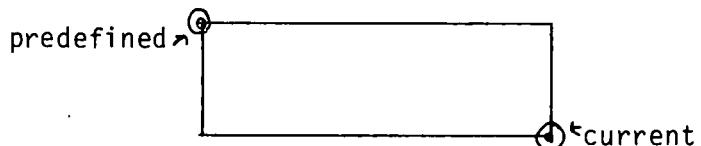
- 13 Draw 12 by 24 rectangle (see #3).
- 14 Draw parallelogram, see #3 about updating predefined.
- 15 Redraw entire graph on screen.

- 16 Draw bypass path. Example:



- 17 Insert ASCII at current position - no update.

- 18 Move to predefined point.



- 19 Draw rectangle.

- 20 Change move increment.

| TITLE           | ABSTRACT NUMBER                        |
|-----------------|--|
| Syntax Diagrams | TEKniques Vol. 6 No. 3 T1<br>Program 4 |

LOADING INSTRUCTIONS

The program occupies file 5 on the TEKniques Vol. 6 No. 3 T1 tape.

FIND 5

OLD

The example occupies file 6 on the program tape.

# **DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM**

|                                  |  |   |
|----------------------------------|--|---|
| TITLE                            |  | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 5 |
| Pretty Page Listings             |  | EQUIPMENT AND OPTIONS REQUIRED                            |
| ORIGINAL DATE<br>September, 1981 | REVISION DATE<br>March, 1982             | 32K   |
| AUTHOR<br>Thomas A. Price        | Lorillard div of Loews<br>Greensboro, NC | PERIPHERALS<br>4641 Printer                               |

**ABSTRACT**

Files: 1 Program

Statements: 182

This program produces compiler-like listings for 4050 BASIC programs. The enhanced listing includes loop nesting and a complete variable cross-reference listing. The source program must reside in an ASCII file on either the internal tape unit or a 4907 disk drive. Output is directed to a 4641 printer.

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TITLE

PPL

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 5INTRODUCTION

One disadvantage of using the LIST command with programs is that the output is not in the "finished" form required for most final documentation. This program enhances listings as follows:

The listing appears on numbered, titled pages.

If the system has a 4907 disk, the date and time also appear on the page.

FOR/NEXT loops are indented.

Leading zeros are added to the line numbers so that all statements begin in the same column.

A single line is skipped before each section of code following a RETURN or END statement. Usually this code is a subroutine of some type.

A complete list of the variables used in the program and the statements in which they were referenced is printed. This is particularly useful for maintenance.

INTERNAL DATA STORAGE

A\$---Device status messages and the current line      String  
of the program being processed.

B\$---The three letter command in the current line      String

C----Count of line number references on this line of Simple  
output

C\$---Current character being mapped to a printable      String  
one

F\$---Name of the file being listed. Also used to hold String  
format for top of form routine

G\$---First character of file name                          String

I----Loop index    Simple

I\$---Indention characters                                  String

J----Loop index     Simple

J1---Location of the current name in the linear list Simple

|                      |  |
|----------------------|--|
| TITLE                | ABSTRACT NUMBER                        |
| Pretty Page Listings | TEKniques Vol. 6 No. 3 T1<br>Program 5 |

INTERNAL DATA STORAGE (continued)

|  |        |
|--|--------|
| K----Scratch   | Simple |
| K\$---Key of current record for insertion sort   | String |
| L----Count of lines printed on current page  | Simple |
| L\$---Scratch  | String |
| L1---Line number reference   | Simple |
| M\$---Scratch  | String |
| N\$---Scratch  | String |
| P----Page number   | Simple |
| P1---Pointers for each name in Z\$. P(X,1) is the start pointer. P(X,2) is the end pointer | Array  |
| P2---Scratch   | Simple |
| R----Pool for linked list of references  | Array  |
| R1---Pointer to the start of free space in R   | Simple |
| R2---Scratch   | Simple |
| R3---Current line number   | Simple |
| R9---Device being read from 0=tape, 1=4907   | Simple |
| T----Scratch   | Simple |
| T\$---Title of the program   | String |
| V\$---Name of the current variable (scratch)   | String |
| Y----Position of first character after line number   | Simple |
| Z\$---Linear list of variable names found  | String |

|                      |  |
|----------------------|--|
| TITLE                | ABSTRACT NUMBER                        |
| Pretty Page Listings | TEKniques Vol. 6 No. 3 T1<br>Program 5 |

METHODS

One line of the source program is processed at a time. The program extracts the variable names and searches for the names in an unsorted linear list. If a name is not found, it is appended to the list. Each entry in the list has two pointers associated with it. The first pointer points to the start of a linked list of line number references. The second pointer points to the end of the linked list. Each time that a variable is encountered, the end of the list is examined to determine if there is already a reference to that variable in the line. If not, it is appended to the list.

Control characters are mapped into printable ones using standard Tektronix convention. Leading zeros are added to line numbers so that each line number has a total length of five digits. For/Next loops are indented four spaces for each level of nesting; encountering any FOR statement increases the nesting by four characters and any NEXT statement decreases it by four.

Page breaks are inserted so that the total page length is approximately sixty lines.

When end of file is reached, the unsorted linear list of variable names and their associated pointers is sorted using straight insertion sort. The sorted lists are traversed and references printed.

LIMITATIONS

The program to be listed must reside in one file on either the internal tape or the 4907 disk drive. If the 4907 disk is used, the program must be in an ASCII file on drive zero.

The program will not accept more than 2000 references in a program. If more than that are encountered they will be ignored.

Programs to be listed should conform to accepted programming style. Improperly nested For/Next loops or FOR statements with multiple associated NEXT statements, although accepted by Tektronix BASIC, will not be handled properly.

Syntactically incorrect code such as that created by a text editor may not be handled properly.

|                      |   |
|----------------------|---|
| TITLE                | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 5 |
| Pretty Page Listings |   |

OPERATING INSTRUCTIONS

Load the program from the storage medium\* and type RUN.

The program will request the file containing the source code. If the first character entered is a number, the program will look at the internal tape unit. If it is a letter of the alphabet, the 4907 disk will be used. Names containing any other first character will not be accepted. As soon as the name is entered, the program will attempt to open the proper file and make sure that it is of the proper type. Files to be processed by the program must be ASCII. This type of file can be created with the SAVE command on the internal tape or with the SAVE 'Progname', 'A' on the 4907. If any type of error is detected, a message will appear and the file will be requested again.

The program will request the title to be associated with the listing. This title appears at the top of each page. The title can be omitted by pressing return without entering anything.

Output is directed to a 4641 printer using an option 10 with device number 51. The device can be changed by altering the value of IO in line 180. Page length is determined by conditional GOSUBs in lines 790 and 1400 and by an IF THEN in line 1540.

The program does not make use of the user-definable keys.

\*The program resides on file 7 of TEKniques Vol. 6 No. 3 T1 program tape.

FIND 7  
OLD

| TITLE                | ABSTRACT NUMBER                        |
|----------------------|--|
| Pretty Page Listings | TEKniques Vol. 6 No. 3 T1<br>Program 5 |

## EXAMPLES

The following portions of this program were done by Pretty Page Listings.

```

01340 REM---Print the tree---
01350 GOSUB 1650
01360 GOSUB 1600
01370 FOR I=1 TO LEN(Z$)/2
01380 V$=SEG(Z$,I*2-1,2)
01390 GOSUB L>48 OF 1600
01400 PRINT @IO: USING "/fa";V$
01410 L=L+2
01420 C=0
01430 P2=P1(I,1)
01440 IF P2=0 THEN 1570
01450 L1=INT(R(P2)/10000)
01460 PRINT @IO: USING "6ds";L1
01470 P2=R(P2)-L1*10000
01480 C=C+1
01490 IF C<12 THEN 1440
01500 C=0
01510 L=L+1
01520 PRINT @IO:
01530 IF L<=50 THEN 1440
01540 GOSUB 1600
01550 PRINT @IO;V$;" (con't.)"
01560 GO TO 1440
01570 NEXT I
01580 PRINT @IO:
01590 RETURN

```

|     |      |      |      |      |      |      |      |      |      |      |      |      |  |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|--|
| L1  | 1450 | 1460 | 1470 |      |      |      |      |      |      |      |      |      |  |
| M\$ | 980  | 1010 | 1060 | 1120 | 1140 | 1170 |      |      |      |      |      |      |  |
| N\$ | 990  | 1070 | 1100 | 1110 | 1120 |      |      |      |      |      |      |      |  |
| P   | 230  | 820  | 900  |      |      |      |      |      |      |      |      |      |  |
| P1  | 170  | 200  | 1200 | 1210 | 1220 | 1290 | 1430 | 1720 | 1730 | 1790 | 1800 | 1870 |  |
|     | 1880 |      |      |      |      |      |      |      |      |      |      |      |  |
| P2  | 1430 | 1440 | 1450 | 1470 |      |      |      |      |      |      |      |      |  |
| R   | 170  | 1260 | 1280 | 1300 | 1450 | 1470 |      |      |      |      |      |      |  |

|                               |                     |  |
|-------------------------------|---------------------|--|
| TITLE                         |                     | ABSTRACT NUMBER  |
| Viewgraph                     |                     | TEKniques Vol. 6 No. 3 T1<br>Program 6                         |
| ORIGINAL DATE<br>24 July 1981 | REVISION DATE<br>NA | EQUIPMENT AND OPTIONS REQUIRED<br>Memory Requirement: 4051 32K |
| AUTHOR<br>Michael J. Nusca    |                     | PERIPHERALS<br>4662  |

## ABSTRACT

The program makes use of the Tektronix 4051 mini-computer and the 4662 interactive digital plotter in the design and printing of professional viewgraphs. By using the user definable keys on the 4051, the user is provided ample instructions and various options to create a viewgraph design on the 4051 screen, edit the viewgraph for errors, preview the completed work, and print the viewgraph on paper to be transferred to acetate. The programming includes regular and bold face lettering for titles, automatic centering of text, geometric figures -- boxes, lines, diamonds -- bullets and placement of figures such as plots and photographs on the viewgraph. All viewgraph designs are quickly made and easily edited before final printing on the 4662 plotter. Lettering is large enough so that viewgraphs can be used in technical presentations and all viewgraphs are made to fit a standard frame.

Files: 1 ASCII Program

Statements: 1049

The program material contained herein is supplied without warranty or representation of any kind. Tektronix, Inc., assumes no responsibility and shall have no liability, consequential or otherwise, of any kind arising from the use of this program material or any part thereof.

| TITLE                        | ABSTRACT NUMBER  |        |
|------------------------------|--|--------|
| Viewgraph                    | TEKniques Vol. 6 No. 3 T1<br>Program 6                     |        |
| <u>Internal Data Storage</u> |  |        |
| VARIABLE                     | FUNCTION   | TYPE   |
| B                            | Number of boxes to be drawn                                | Simple |
| B1                           | Initiates box figure option when B1 = 1                    | Simple |
| B2                           | Initiates bullets option when B2 = 1                       | Simple |
| D                            | Number of diamonds to be drawn                             | Simple |
| D1                           | Initiates diamond option when D1 = 1                       | Simple |
| D4                           | Initiates geometric fig. option when D4 = 1                | Simple |
| D5                           | Temporary storage of x-coord. for geometric figures        | Simple |
| D6                           | Temporary storage of y-coord. for geometric figures        | Simple |
| D7                           | Temporary storage of x-coord. for geometric figure editing | Simple |
| D8                           | Temporary storage of y-coord. for geometric figure editing | Simple |
| D9                           | Keyboard input for geometric figures                       | Simple |
| F                            | Counting variable used to draw grid                        | Simple |
| F1                           | Initiates geometric figure option when F1 = 1              | Simple |
| F5                           | Temporary storage of B variable                            | Simple |
| F7                           | Initiates geometric figure editing when F7 = 1             | Simple |
| G1                           | Graphic input for line placement, x-coord.                 | Simple |
| G2                           | Graphic input for line placement, y-coord.                 | Simple |
| I                            | Counting variable for text creation                        | Simple |
| I1                           | Counting variable for bullet option                        | Simple |
| J                            | Number of lines of text on viewgraph                       | Simple |
| J1                           | Number of figures on viewgraph                             | Simple |
| J2                           | Used in text editing                                       | Simple |
| K                            | Counting variable used in update                           | Simple |
| L                            | Number of lines to be drawn                                | Simple |
| L1                           | Initiates lines option                                     | Simple |
| M                            | Initiates print menu option when M = 1                     | Simple |
| P1                           | P1 = 2; number of GDU's per horizontal space               | Simple |
| P2                           | P2 = 2.944; number of GDU's per vertical space             | Simple |
| R                            | Variable used in drawing bullets                           | Simple |
| S                            | Devise number for printing viewgraphs                      | Simple |
| T5                           | Initiates BRL logos and address option                     | Simple |
| X2                           | X-coord. in GDU at the end of a line of text               | Simple |
| X9                           | Temporary storage of X array elements                      | Simple |
| Y2                           | Y-coord. in GDU at the end of a line of text               | Simple |
| A\$                          | Keyboard input - line of text no. 1                        | String |
| B\$                          | Keyboard input - line of text no. 2                        | String |
| C\$                          | Keyboard input - line of text no. 3                        | String |
| D\$                          | Keyboard input - line of text no. 4                        | String |
| E\$                          | Keyboard input - line of text no. 5                        | String |
| F\$                          | Keyboard input - line of text no. 6                        | String |
| G\$                          | Keyboard input - line of text no. 7                        | String |
| H\$                          | Keyboard input - line of text no. 8                        | String |
| I\$                          | Keyboard input - line of text no. 9                        | String |
| J\$                          | Keyboard input - line of text no. 10                       | String |
| K\$                          | Keyboard input - line of text no. 11                       | String |
| L\$                          | Keyboard input - line of text no. 12                       | String |
| M\$                          | Storage of Z\$ for A\$ line of text                        | String |
| N\$                          | Storage of Z\$ for B\$ line of text                        | String |
| O\$                          | Storage of Z\$ for C\$ line of text                        | String |
| P\$                          | Storage of Z\$ for D\$ line of test                        | String |

TITLE

Viewgraph

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 6

| <u>VARIABLE</u> | <u>FUNCTION</u>                                  | <u>TYPE</u>  |
|-----------------|--|--------------|
| Q\$             | Storage of Z\$ for E\$ line of text              | String       |
| R\$             | Storage of Z\$ for F\$ line of text              | String       |
| S\$             | Storage of Z\$ for G\$ line of text              | String       |
| T\$             | Storage of Z\$ for H\$ line of text              | String       |
| U\$             | Storage of Z\$ for I\$ line of text              | String       |
| V\$             | Storage of Z\$ for J\$ line of text              | String       |
| W\$             | Storage of Z\$ for K\$ line of text              | String       |
| X\$             | Storage of Z\$ for L\$ line of text              | String       |
| Y\$             | Temporary storage of A\$ thru L\$                | String       |
| Z\$             | Temporary storage of each line of text           | String       |
| X               | X-coord. for each line of text in user units     | Array (12,1) |
| X0              | Storage variable for conversion of user to GDU   | Array (12,1) |
| X1              | X-coord. for beginning of line of text in GDU    | Array (12,1) |
| X3              | X-coord. of lower left corner of box in GDU      | Array (12,1) |
| X4              | X-coord. of upper right corner of box in GDU     | Array (12,1) |
| X5              | X-coord. for beginning of straight line in GDU   | Array (12,1) |
| X6              | X-coord. for end of straight line in GDU         | Array (12,1) |
| X7              | X-coord. for top of diamond in GDU               | Array (12,1) |
| X8              | X-coord. for right corner of diamond in GDU      | Array (12,1) |
| Y               | Y-coord. for each line of text in user units     | Array (12,1) |
| Y1              | Y-coord. for beginning of line of text in GDU    | Array (12,1) |
| Y3              | Y-coord. of lower left corner of box in GDU      | Array (12,1) |
| Y4              | Y-coord. of upper right corner of box in GDU     | Array (12,1) |
| Y5              | Y-coord. for beginning of straight line in GDU   | Array (12,1) |
| Y6              | Y-coord. for end of straight line in GDU         | Array (12,1) |
| Y7              | Y-coord. for top of diamond in GDU               | Array (12,1) |
| Y8              | Y-coord. for right corner of diamond in GDU      | Array (12,1) |
| U               | X-coord. for location of bullets in user units   | Array (12,1) |
| U1              | X-coord. for lower left corner of figure in GDU  | Array (12,1) |
| U2              | X-coord. of an array used in drawing bullets     | Array (18,1) |
| U3              | X-coord. for location of bullets in GDU          | Array (18,1) |
| V               | Y-coord. for location of bullet in user units    | Array (12,1) |
| V1              | Y-coord. for upper right corner of figure in GDU | Array (12,1) |
| V2              | Y-coord. of array used in drawing bullets        | Array (12,1) |

METHODS

The program employs the user definable keys in providing the user with a step-by-step procedure that results in easy viewgraph design. These keep set-up routines that can be used to perform designated functions for the user. While the simple viewgraph design employs very few routines and so a small fraction of the programming, the more complex designs will utilize all available options as well as the editing and preview routines. The program is therefore a group of option routines accessible through the user definable keys, that also require subroutines which contain procedures used throughout.

TITLE

Viewgraph

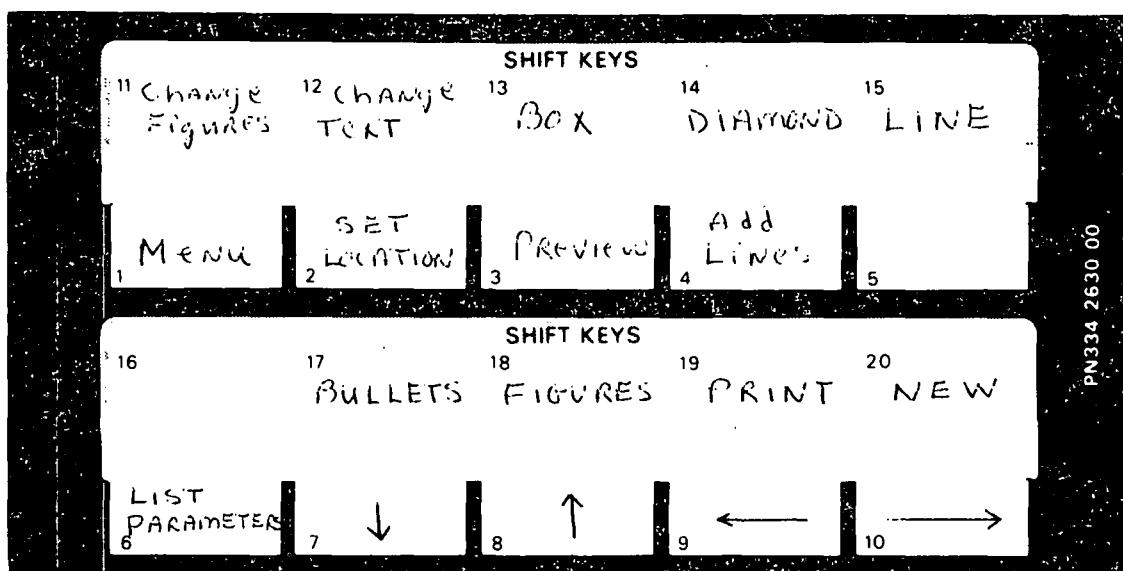
ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 6

TITLE

TAPE #

FILE #

Operating InstructionsOVERLAY:

| <u>KEY</u> | <u>FUNCTION</u>  |
|------------|--|
| 1          | Prints menu.   |
| 2          | Used in setting the location of a line of text, figure, bullet, etc., in graphic data units.   |
| 3          | Used in previewing a design. The viewgraph will be constructed on the screen with instructions in editing.                               |
| 4          | Additional lines of text can be placed on the viewgraph design.  |
| 5          | No function.   |
| 6          | Will list all lines of text along with their classification - user positioned automatically centered, or bold face and centered (title). |
| 7          | Moves cursor down.   |
| 8          | Moves cursor up.   |
| 9          | Moves cursor left.   |
| 10         | Moves cursor right.  |
| 11         | Changes the location of a geometric figure - box, line, diamond.   |
| 12         | Changes the text of a line.  |
| 13         | Draws a box.   |
| 14         | Draws a diamond.   |
| 15         | Draws a line.  |
| 16         | No function.   |
| 17         | Will print bullets (●) in selected locations.  |
| 18         | Will assist the user in placing pre-designed plots or photographs on the viewgraph. The figure can then be labeled and titled.           |
| 19         | Will print the viewgraph on the 4662 Digital Plotter at devise number 1.   |
| 20         | The program initializes and the user is set up for a new design.   |

|  |   |
|--|---|
| TITLE<br>Viewgraph   | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 6 |
| <u>PROGRAM LOADING:</u>  |   |
| The entire program can be stored on one ASC II Program file and loaded into 4051 memory with the FINE X, OLD sequence. The program will almost fill a 32 K memory.   |   |
| <u>PROGRAM EXECUTION:</u>  |   |
| The program is initiated either by using a FIND X, OLD, RUN sequence or by using the AUTOLOAD key if the program has been stored on file no. 1 of the magnetic tape. Once initiated, the user is given a menu and some special operating instructions. The keyword "GO" is entered and the user is given a grid on which to design a viewgraph. Ample instruction and user prompting are given for each phase until the viewgraph design is ready to be printed. |   |
| <hr/> <p>*The program resides on file 8 of the TEKniques Vol. 6 No. 3 T1 program tape.</p>   |   |
| FIND 8   |   |
| OLD  |   |

EXAMPLE 1: Demonstrating o Bold face type o Automatic centering o Preview o Logos option

TITLE  
Viewgraph

PAGE NUMBER 30

ABSTRACT NUMBER  
TEKniques Vol. 6 No. 3 T1  
Program 6

## USER DEFINABLE KEY (UDK) DEFINITIONS

- (1)....RETURN TO MENU
- (2)....SET LOCATION
- (3)....PREVIEW VIEWGRAPH
- (4)....ADD LINES TO VIEWGRAPH
- (5)....(NO FUNCTION)
- (6)....LIST LINE PARAMETERS
- (7)....MOVE CURSOR DOWN
- (8)....MOVE CURSOR UP
- (9)....MOVE CURSOR LEFT
- (10)....MOVE CURSOR RIGHT
- (11)....CHANGE LOCATION OF GEOMETRIC FIGURES
- (12)....CHANGE LINE TEXT
- (13)....DRAW BOX
- (14)....DRAW DIAMOND
- (15)....DRAW LINE (VERTICAL OR HORIZONTAL)
- (16)....(NO FUNCTION)
- (17)....PRINT 'BULLETS' IN SELECTED LOCATIONS
- (18)....PLACEMENT OF FIGURES ON VIEWGRAPH
- (19)....PRINT SLIDE ON PEN PLOTTER (DEVICE #1)
- (20)....START NEW VIEWGRAPH

ENTER THE NUMBER OF LINES FOR THIS VIEWGRAPH: 1  
PLEASE NOTE:

- (1) The 4662 plotter must be powered up before the 4051.
- (2) The pen plotter must be on default area (power up condition).
- (3) Please center your paper on the pen plotter.
- (4) All viewgraphs will be made to fit a standard frame.
- (5) Please create: 1.lines of text, 2.geometric figures, 3.bullets.

TYPE 'GO' TO BEGIN. GO

TITLE

Viewgraph

PAGE NUMBER 31

ABSTRACT NUMBER

TEKnikes Vol. 6 No. 3 T1  
Program 6

Instructions for line placement:  
FIND A LOCATION : UDK#7-10  
REGISTER THE LOCATION : UDK#2  
TYPE IN THE LINE  
PRESS RETURN

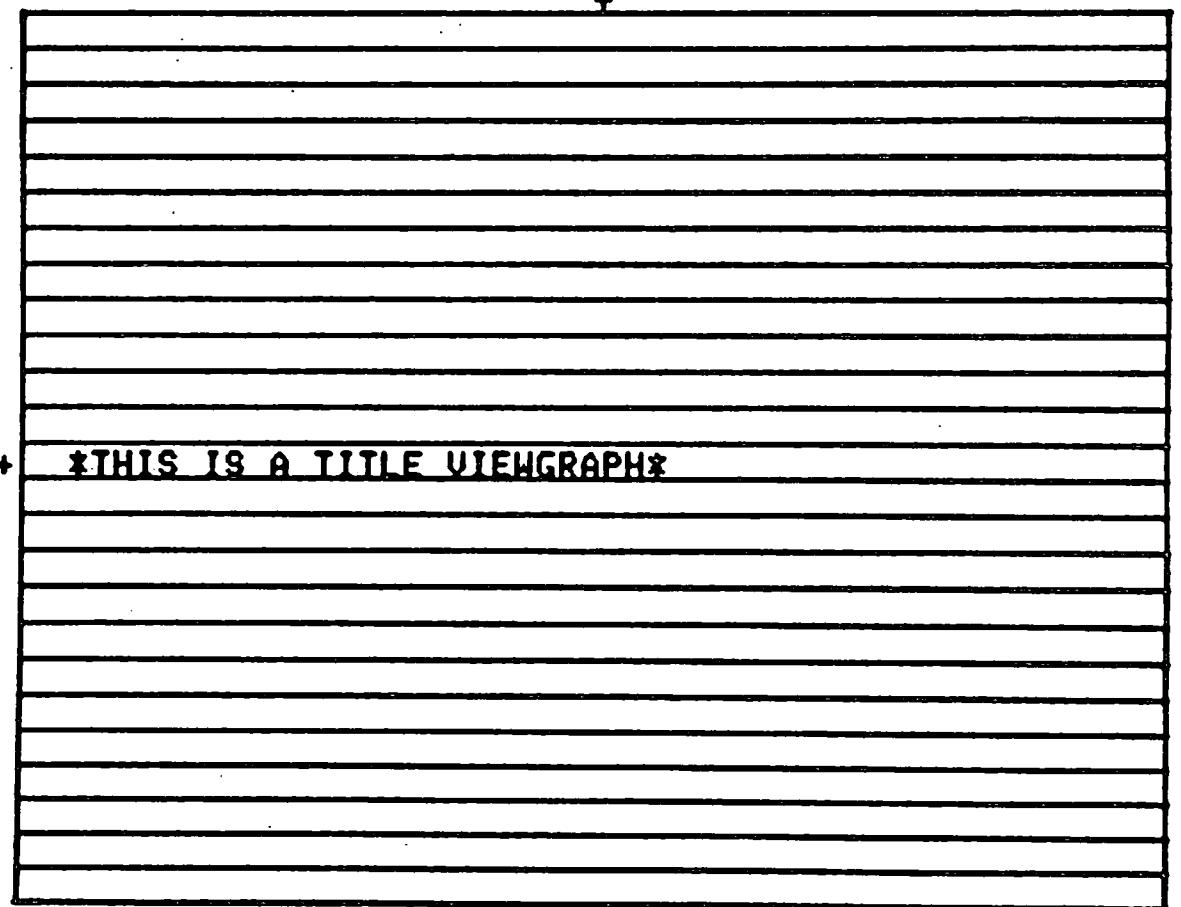
For a title :  
begin and end the  
line with a \*

Title lines are  
not to exceed 28  
characters.

For a centered  
line : begin and  
end the line with  
a +

Line length is not  
to exceed 48 char.

(Pointer >



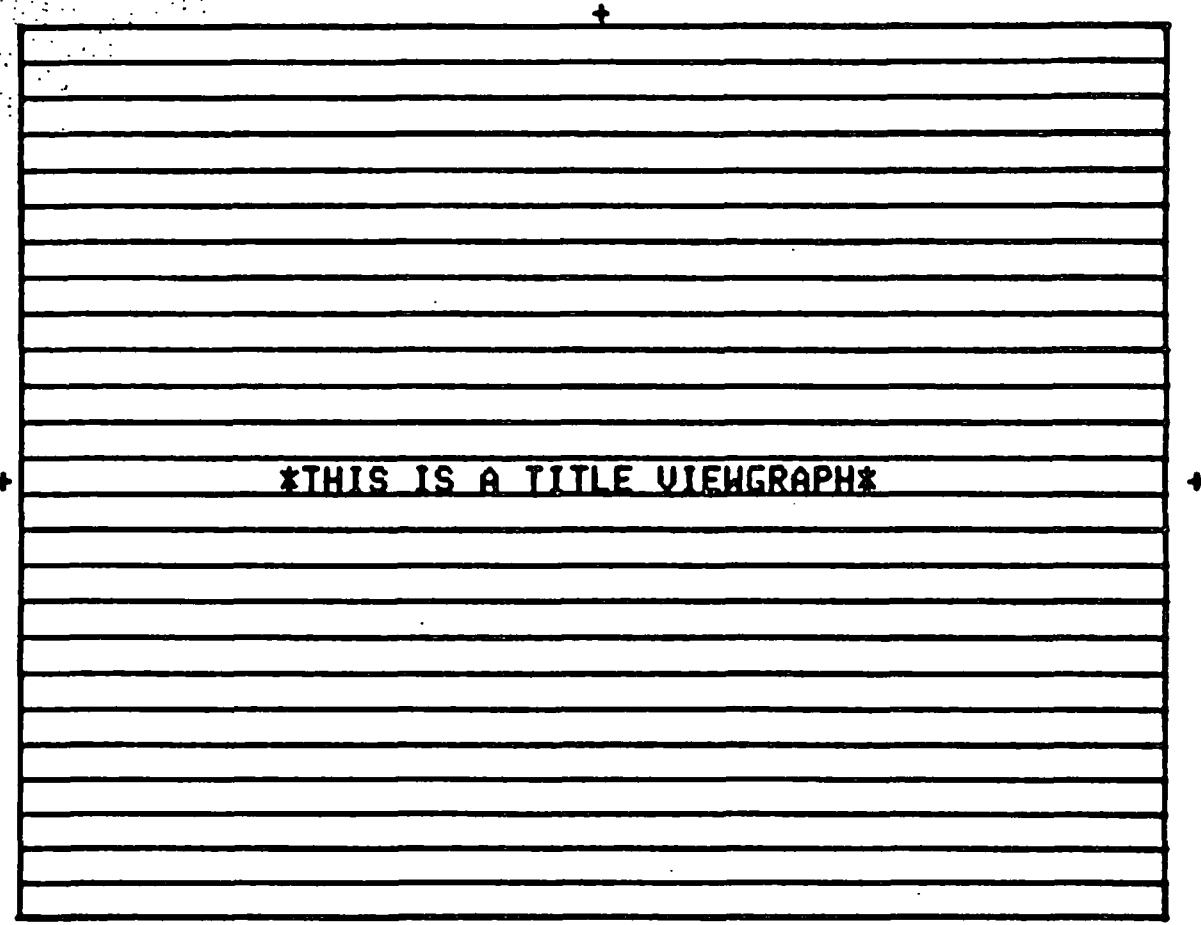
Instructions for line placement:  
FIND A LOCATION : UDK#7-10  
REGISTER THE LOCATION : UDK#2  
TYPE IN THE LINE  
PRESS RETURN

For a title :  
begin and end the  
line with a \*

Title lines are  
not to exceed 28  
characters.

For a centered  
line : begin and  
end the line with  
a +

Line length is not  
exceed 40 char.



TITLE  
Viewgraph

PAGE NUMBER 32  
ABSTRACT NUMBER  
TEKniques Vol. 6 No. 3 T1  
Program 6

TITLE

Viewgraph

PAGE NUMBER 33

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1

Program 6

**PREVIEW OF VIEWGRAPH**

\*\*\*\*\*

Title lines to be printed in BOLD FACE are indicated by \*

Centered lines are indicated by +

Refer to the MENU (UDK#1) if changes must be made.

Press UDK#19 to print the viewgraph.

**\*THIS IS A TITLE VIEWGRAPH\***

TITLE

Viewgraph

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 6

THIS IS A TITLE VIEWGRAPH

EXAMPLE 2: Demonstrating • Bold face type • Automatic centering • Box figure • Diamond figure • Lines  
• Preview

## USER DEFINABLE KEY (UDK) DEFINITIONS

- (1)....RETURN TO MENU
- (2)....SET LOCATION
- (3)....PREVIEW VIEWGRAPH
- (4)....ADD LINES TO VIEWGRAPH
- (5)....(NO FUNCTION)
- (6)....LIST LINE PARAMETERS
- (7)....MOVE CURSOR DOWN
- (8)....MOVE CURSOR UP
- (9)....MOVE CURSOR LEFT
- (10)....MOVE CURSOR RIGHT
- (11)....CHANGE LOCATION OF GEOMETRIC FIGURES
- (12)....CHANGE LINE TEXT
- (13)....DRAW BOX
- (14)....DRAW DIAMOND
- (15)....DRAW LINE (VERTICAL OR HORIZONTAL)
- (16)....(NO FUNCTION)
- (17)....PRINT 'BULLETS' IN SELECTED LOCATIONS
- (18)....PLACEMENT OF FIGURES ON VIEWGRAPH
- (19)....PRINT SLIDE ON PEN PLOTTER (DEVICE #1)
- (20)....START NEW VIEWGRAPH

ENTER THE NUMBER OF LINES FOR THIS VIEWGRAPH: 6

PLEASE NOTE:

- (1) The 4662 plotter must be powered up before the 4051.
- (2) The pen plotter must be on default area (power up condition).
- (3) Please center your paper on the pen plotter.
- (4) All viewgraphs will be made to fit a standard frame.
- (5) Please create: 1.lines of text, 2.geometric figures, 3.bullets.

TYPE 'GO' TO BEGIN. GO

TITLE  
Viewgraph

|                           |    |
|---------------------------|----|
| PAGE NUMBER               | 35 |
| ABSTRACT NUMBER           |    |
| TEkniques Vol. 6 No. 3-T1 |    |
| Program 6                 |    |

Instructions for line placement:  
 FIND A LOCATION : UDK#7-10  
 REGISTER THE LOCATION : UDK#2  
 TYPE IN THE LINE  
 PRESS RETURN

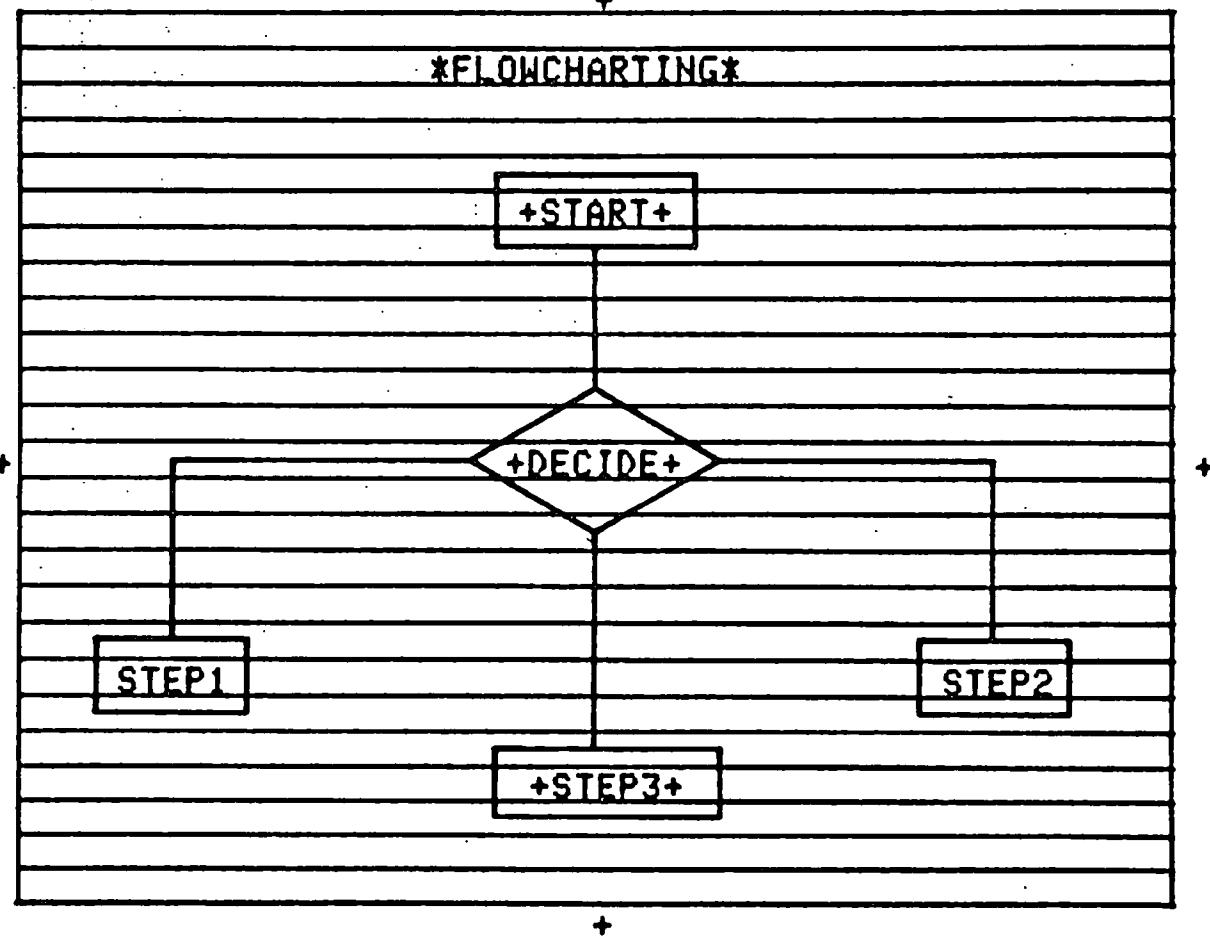
For a title :  
 begin and end the  
 line with a \*

Title lines are  
 not to exceed 28  
 characters.

For a centered  
 line : begin and  
 end the line with  
 a +

Line length is not  
 exceed 40 char.

BOX: LOCATE LOWER LEFT, THEN UDK#2  
 LOCATE UPPER RIGHT, THEN UDK#2  
 LINE: LOCATE START, THEN UDK#2  
 LOCATE END, THEN UDK#2  
 DIAMOND: LOCATE TOP, THEN UDK#2  
 LOCATE R. CORNER, THEN UDK#2



## PREVIEW OF VIEWGRAPH

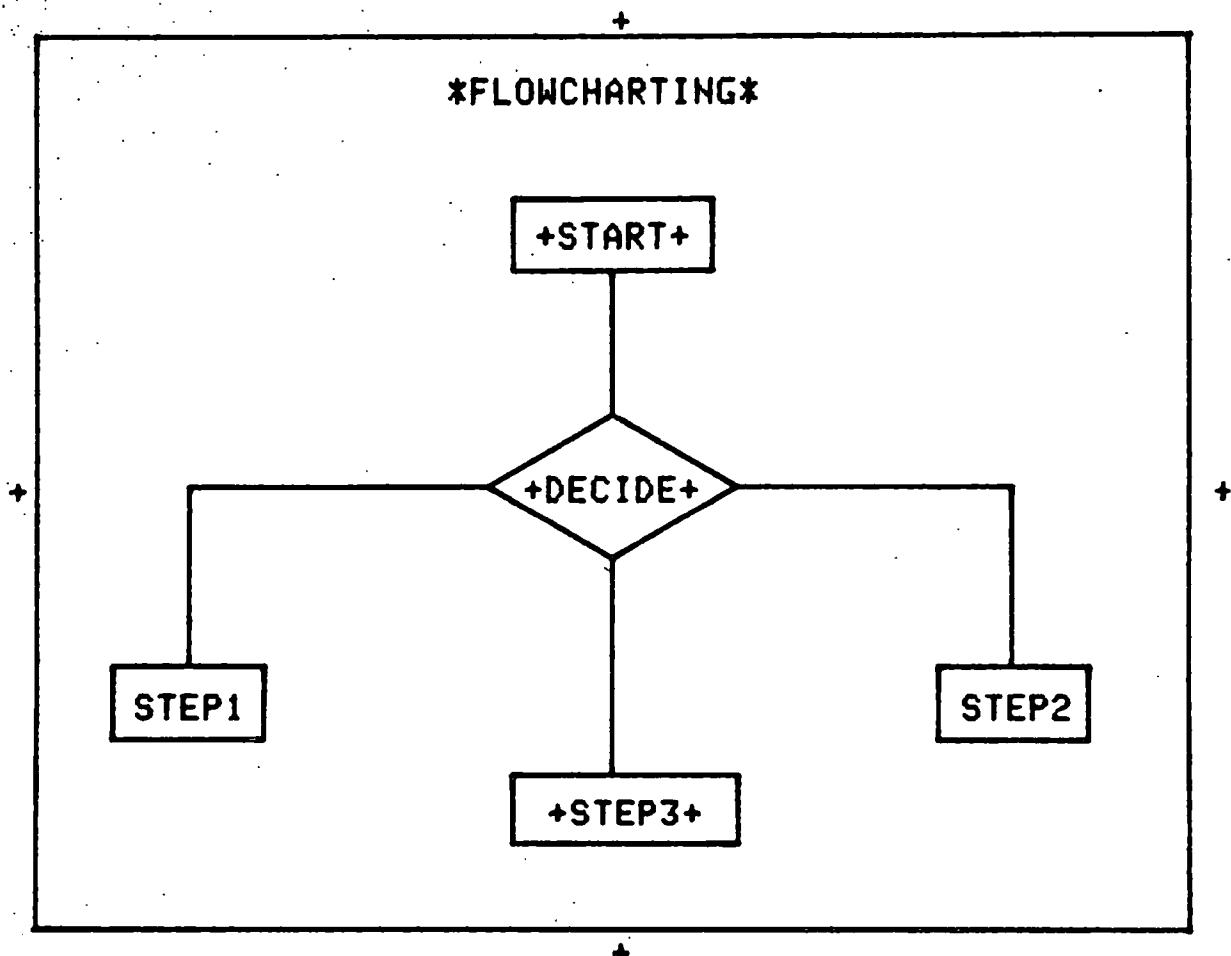
\*\*\*\*\*

Title lines to be printed in BOLD FACE are indicated by \*

Centered lines are indicated by +

Refer to the MENU (UDK#1) if changes must be made.

Press UDK#19 to print the viewgraph.



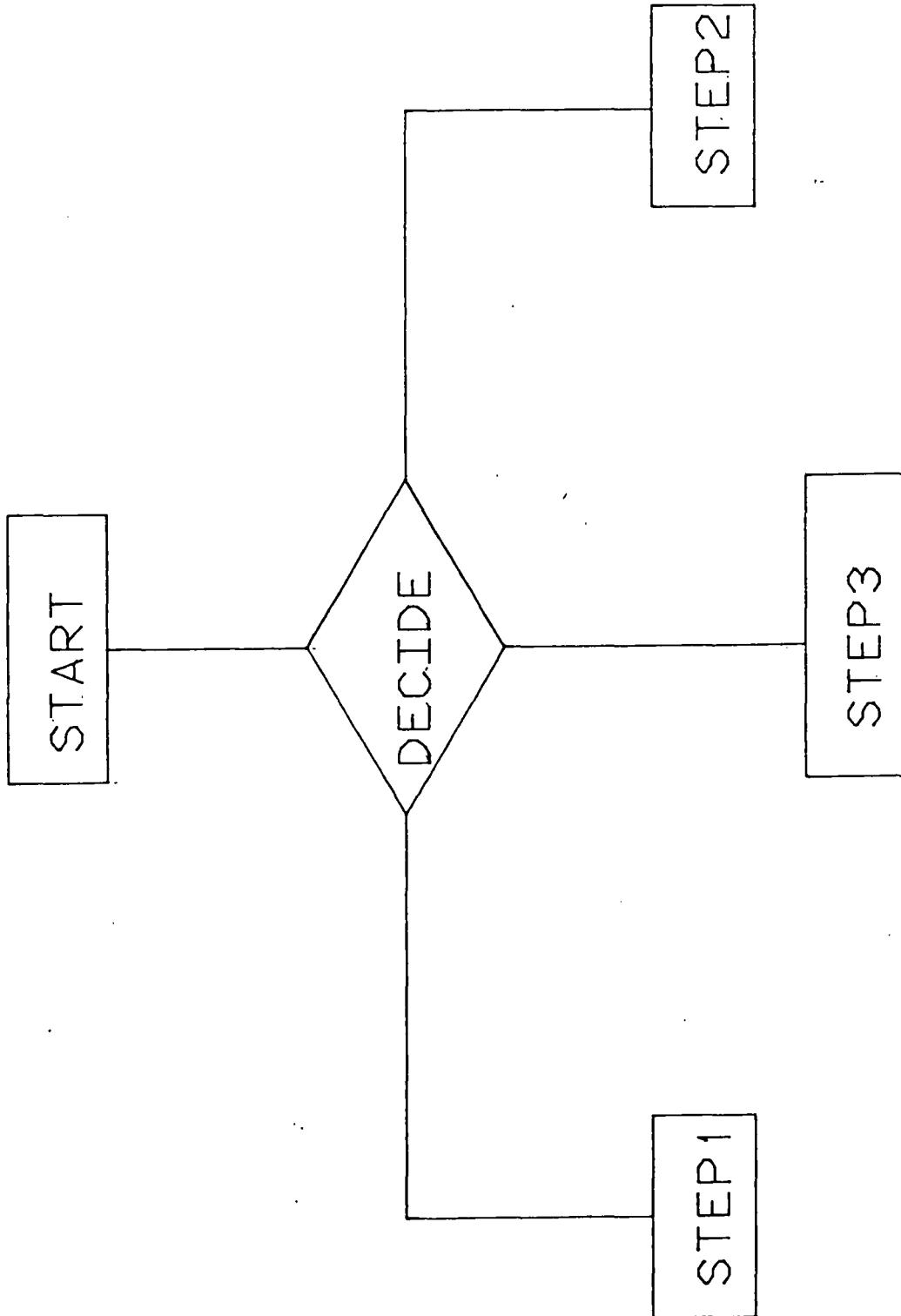
TITLE

Viewgraph

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 6

# FLOWCHARTING



EXAMPLE 3: Demonstrating • Bold face type • Automatic Centering • User-Positioned Figures  
 • Labeling of these figures • Bullets • Preview • Correction of Text Errors

TITLE

Viewgraph

PAGE NUMBER 39

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1

Program 6

## USER DEFINABLE KEY (UDK) DEFINITIONS

- (1)....RETURN TO MENU
- (2)....SET LOCATION
- (3)....PREVIEW VIEWGRAPH
- (4)....ADD LINES TO VIEWGRAPH
- (5)....(NO FUNCTION)
- (6)....LIST LINE PARAMETERS
- (7)....MOVE CURSOR DOWN
- (8)....MOVE CURSOR UP
- (9)....MOVE CURSOR LEFT
- (10)....MOVE CURSOR RIGHT
- (11)....CHANGE LOCATION OF GEOMETRIC FIGURES
- (12)....CHANGE LINE TEXT
- (13)....DRAW BOX
- (14)....DRAW DIAMOND
- (15)....DRAW LINE (VERTICAL OR HORIZONTAL)
- (16)....(NO FUNCTION)
- (17)....PRINT 'BULLETS' IN SELECTED LOCATIONS
- (18)....PLACEMENT OF FIGURES ON VIEWGRAPH
- (19)....PRINT SLIDE ON PEN PLOTTER (DEVICE #1)
- (20)....START NEW VIEWGRAPH

ENTER THE NUMBER OF LINES FOR THIS VIEWGRAPH: 6  
 PLEASE NOTE:

- (1) The 4662 plotter must be powered up before the 4051.
- (2) The pen plotter must be on default area (power up condition).
- (3) Please center your paper on the pen plotter.
- (4) All viewgraphs will be made to fit a standard frame.
- (5) Please create: 1.lines of text, 2.geometric figures, 3.bullets.

TYPE 'GO' TO BEGIN. GO

Instructions for line placement:  
FIND A LOCATION : UDK#7-10  
REGISTER THE LOCATION : UDK#2  
TYPE IN THE LINE  
PRESS RETURN

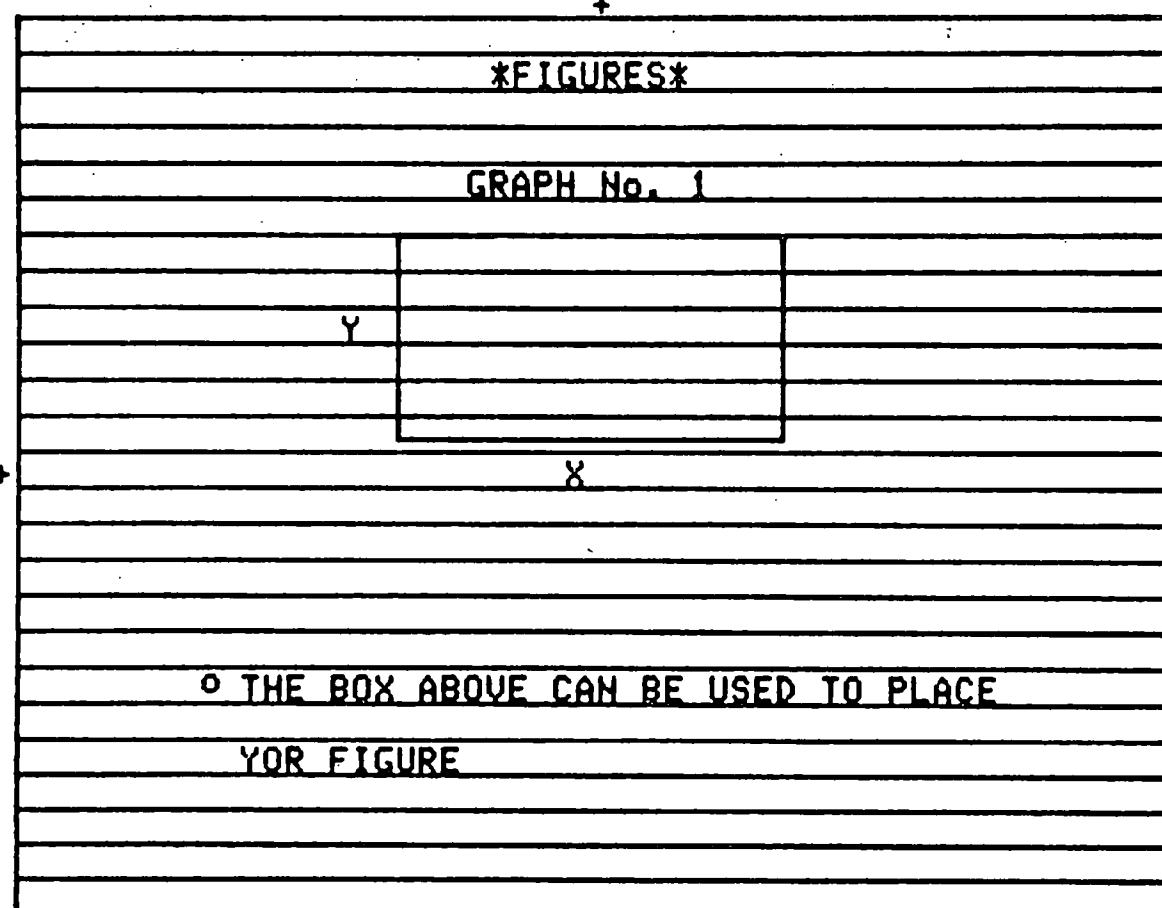
For a title :  
begin and end the  
line with a \*

Title lines are  
not to exceed 28  
characters.

For a centered  
line : begin and  
end the line with  
a +

Line length is not  
exceed 40 char.

Find a location and press UDK#2



|  |                   |
|--|-------------------|
| TITLE<br>Viewgraph                           | PAGE NUMBER<br>40 |
| ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1 | Program 6         |

|   |   |
|---|---|
| TITLE<br>Viewgraph  | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 6 |
| <p>LINE#1: *FIGURES*<br/>LINE#2: GRAPH No. 1<br/>LINE#3: Y<br/>LINE#4: X<br/>LINE#5: THE BOX ABOVE CAN BE USED TO PLACE<br/>LINE#6: YOUR FIGURE</p> <p>ENTER LINE No. TO BE CHANGED: 6<br/>ENTER LINE: YOUR FIGURE<br/>USE UDK #12 FOR FURTHER CHANGES.</p> |   |

TITLE

Viewgraph

PAGE NUMBER

42

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 6

PREVIEW OF VIEWGRAPH  
\*\*\*\*\*

Title lines to be printed in BOLD FACE are indicated by \*

Centered lines are indicated by +

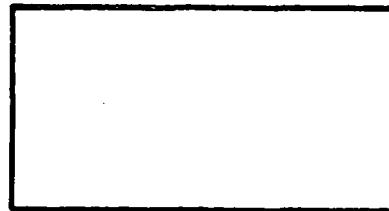
Refer to the MENU (UDK#1) if changes must be made.

Press UDK#19 to print the viewgraph.

+

\*FIGURES\*

GRAPH No. 1



+

+

- THE BOX ABOVE CAN BE USED TO PLACE  
YOUR FIGURE

+

TITLE

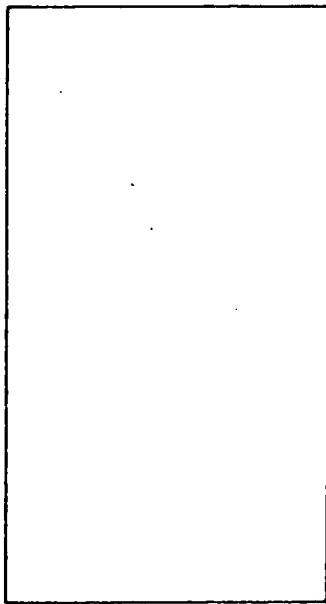
Viewgraph

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 6

# FIGURES

GRAPH No. 1



Y

X

- THE BOX ABOVE CAN BE USED TO PLACE YOUR FIGURE

| TITLE     | ABSTRACT NUMBER                        |
|-----------|--|
| Viewgraph | TEKniques Vol. 6 No. 3 T1<br>Program 6 |

**DESKTOP COMPUTER  
APPLICATIONS LIBRARY PROGRAM**

|                               |  |  |
|-------------------------------|--|--|
| TITLE                         |  | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 7      |
| ORIGINAL DATE<br>28 July 1981 |  | EQUIPMENT AND OPTIONS REQUIRED<br>Memory Requirement: 4051 32K |
| AUTHOR<br>Michael J. Nusca    |  | PERIPHERALS<br>4662  |

## ABSTRACT

The program will digitize -- convert plotted points to user data units -- a plot drawn on any set of cartesian axis -- no semi-log or logarithmic scales. Plots can be digitized from paper or photographs, but plots must fit the 4662 Interactive Digital Plotter plotting surface -- 16 x 10-1/2".

Accuracy of the digitizing depends on the accuracy of the user in locating each data point. For this reason it is recommended that the eyepiece made for the 4662 plotter is used.

When the plot has been digitized in x,y data points, the user has several options. The user may: replot the data to check for accuracy; list the data; write the data on a magnetic tape file; or transfer the data to a Cyber 173 host computer.

The speed at which plots can be digitized is dependent only on the speed at which the user can locate each data point and depress a single switch on the 4662 plotter.

Files: 1 ASCII Program

Statements: 362

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| TITLE  | ABSTRACT NUMBER  |               |
|--|--|---------------|
| Plot Digitize  | TEKniques Vol. 6 No. 3 T1<br>Program 7                                   |               |
| <u>DATA FILE STRUCTURE</u>   |  |               |
| <p>Data files are only needed in the program if the user chooses the option of saving the digitized data on a magnetic tape. If this option is chosen, the user can indicate which pre-MARKed file number is to be used, by a keyboard input. If the magnetic tape has not been MARKed the program prompts the user in quickly performing this task. All data files must be ASCII.</p> |  |               |
| <p>The format used in storing the data on tape is indicated in the programming lines below.</p> <pre>FOR I = 1 to L     PRINT @ 33: X(I), Y(I) NEXT I</pre>  |  |               |
| <p>The program stores the data in twelve digits.</p>   |  |               |
| <u>INTERNAL DATA STORAGE</u>   |  |               |
| VARIABLE   | FUNCTION   | TYPE          |
| A  | X-coord. of the origin for the plot in GDU                               | Simple        |
| B  | Y-coord. of the origin for the plot in GDU                               | Simple        |
| C  | X-coord. of selected x axis reference point in GDU                       | Simple        |
| D  | Y-coord. of selected y axis reference point in GDU                       | Simple        |
| E  | X-coord. of the origin for the plot in user units                        | Simple        |
| F  | Y-coord. of the origin for the plot in user units                        | Simple        |
| G  | X-coord. of selected x axis reference point in user units                | Simple        |
| H  | Y-coord. of selected y axis reference point in user units                | Simple        |
| I  | Counting variable  | Simple        |
| J  | Counting variable/file number to save data on magnetic tape              | Simple        |
| J5   | Counting variable  | Simple        |
| K  | Number of bytes to mark on the magnetic tape file                        | Simple        |
| L  | Number of data points digitized  | Simple        |
| M  | Number of additional points beyond L                                     | Simple        |
| S  | XMAX for replot option   | Simple        |
| S1   | YMAX for replot option   | Simple        |
| S2   | X tic interval for replot option   | Simple        |
| S3   | Y tic interval for replot option   | Simple        |
| S4   | Number of user units per x tic interval                                  | Simple        |
| S5   | Number of user units per y tic interval                                  | Simple        |
| S6   | Keyboard input for line type in replot option                            | Simple        |
| S7   | Magnetic tape file number for replot option                              | Simple        |
| S9   | Number of tic labels for replot option                                   | Simple        |
| U  | X-coord. of digitized data in GDU  | Array (200,0) |
| V  | Y-coord. of digitized data in GDU  | Array (200,0) |
| X  | X-coord. of digitized data in user units                                 | Array (200,0) |
| Y  | Y-coord. of digitized data in user units                                 | Array (200,0) |
| Z  | Dummy variable   | Simple        |
| A\$  | X,Y axis labels in replot option/contains CDC commands in catalog option | String        |

|  |  |                                      |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
|--|--|--------------------------------------|---------------------|-----|---------------------|---|--|---|--|---|--|---|--|-----|--------------------|-------|--------------------|
| TITLE<br>Plot Digitize   | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 7  |                                      |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
| VARIABLE   | FUNCTION   | TYPE                                 |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
| C\$<br>D\$<br>F\$<br>Z\$   | Keyboard input<br>Contains commands in catalog option<br>Permanent file name for data in catalog option<br>Axis and tic labels for replot option | String<br>String<br>String<br>String |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
| <u>METHODS</u>   |  |                                      |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
| <p>The program uses a series of routines that are accessible through the user definable keys to prompt the user in the digitizing procedure and options.</p> <p>The transfer of information between the 4051 and the 4662 is done by use of the address number one.</p> <p>Data is transformed from graphic data units (GDU) to user data units (UDU) by using the information gathered in the initialization procedure and the formula below.</p> <table> <tbody> <tr> <td>A,B</td><td>Plot origin in GDU.</td></tr> <tr> <td>E,F</td><td>Plot origin in UDU.</td></tr> <tr> <td>C</td><td>X-coordinate of selected point on X axis in GDU.</td></tr> <tr> <td>G</td><td>X-coordinate of selected point on X axis in UDU.</td></tr> <tr> <td>D</td><td>Y-coordinate of selected point on Y axis in GDU.</td></tr> <tr> <td>H</td><td>Y-coordinate of selected point on Y axis in UDU.</td></tr> <tr> <td>X,Y</td><td>Data point in GDU.</td></tr> <tr> <td>X',Y'</td><td>Data point in UDU.</td></tr> </tbody> </table> $X' = [(X-A)/((C-A)/(G-E))] + E$ $Y' = [(Y-B)/((D-B)/(H-F))] + F$ |  | A,B                                  | Plot origin in GDU. | E,F | Plot origin in UDU. | C | X-coordinate of selected point on X axis in GDU. | G | X-coordinate of selected point on X axis in UDU. | D | Y-coordinate of selected point on Y axis in GDU. | H | Y-coordinate of selected point on Y axis in UDU. | X,Y | Data point in GDU. | X',Y' | Data point in UDU. |
| A,B  | Plot origin in GDU.  |                                      |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
| E,F  | Plot origin in UDU.  |                                      |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
| C  | X-coordinate of selected point on X axis in GDU.   |                                      |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
| G  | X-coordinate of selected point on X axis in UDU.   |                                      |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
| D  | Y-coordinate of selected point on Y axis in GDU.   |                                      |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
| H  | Y-coordinate of selected point on Y axis in UDU.   |                                      |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
| X,Y  | Data point in GDU.   |                                      |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |
| X',Y'  | Data point in UDU.   |                                      |                     |     |                     |   |  |   |  |   |  |   |  |     |                    |       |                    |

## TITLE

Plot Digitize

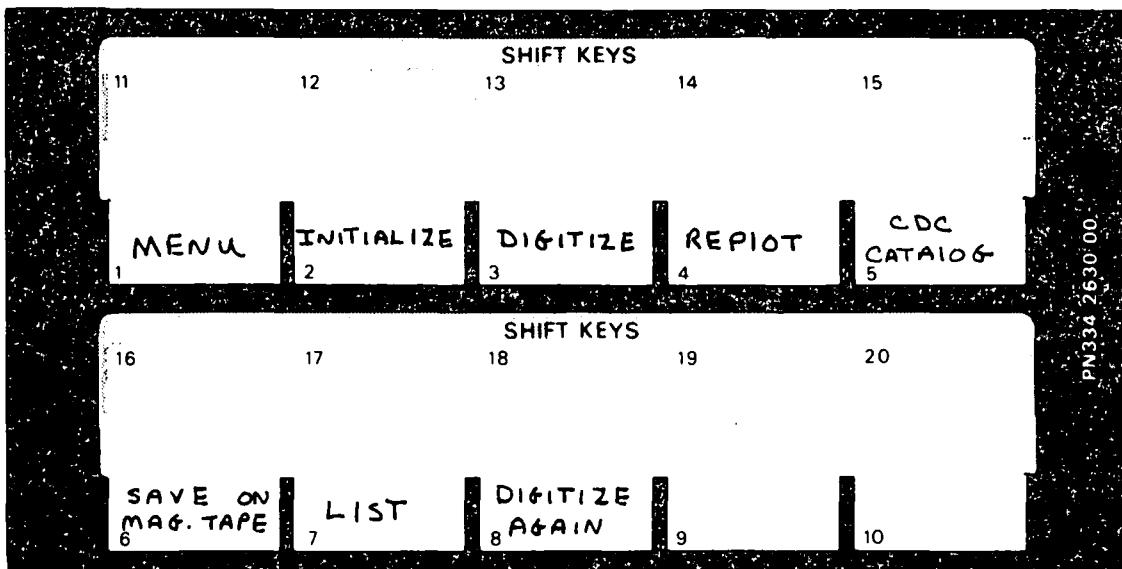
## ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 7

## TITLE

## TAPE #

## FILE #

Operating InstructionsOVERLAYKey NumberFunction

- 1 Return to menu display.
- 2 Begins initialization procedure. User is asked install plot on 4662 plotter and provide information as to the scaling used for the curve.
- 3 Begin digitizing procedure. Instructions are issued and the system is set up to digitize a plot.
- 4 Data can be replotted with or without axis.
- 5 Digitized data will be saved as a permanent file on a CDC 7600 host computer using NOS1 command language.
- 6 Digitized data will be saved on a magnetic tape file.
- 7 Digitized data will be listed on the display.
- 8 The user can digitize the plot again without having to use the initialization procedure (Key 2).

PROGRAM LOADING

The program can be loaded into memory by simply finding its storage file and entering, (On the TEKniques program tape, Plot Digitize is located on FILE 9.)

OLD  
RUN

The AUTOLOAD option on the 4051 could also be used if the program is stored on the first file of the tape.

The following example shows all displays for all options on the menu.

This program makes use of the Tektronix 4662 Digital Plotter to digitize a plot. Before this program is executed, the 4662 plotter must be powered up. If this has not been done turn the 4051 off and power up the 4662 plotter first.

The plotter should be set on the default plotting area. Check this before continuing.

Please follow the menu displayed below:

- (1).....RETURN TO MENU.
- (2).....INITIALIZATION PROCEDURE.
- (3).....BEGIN DIGITZING.
- (4).....CHECK ACCURACY OF PROCEDURE--REPLOT.
- (5).....CATALOG DATA ON THE CDC HOST COMPUTER.
- (6).....WRITE DATA ON A MAGNETIC TAPE FILE.
- (7).....LIST DATA.
- (8).....DIGITIZE THE PLOT AGAIN (EXCLUDING INITIALIZATION PROCEDURE)

Menu numbers refer to the USER DEFINABLE KEYS.

Menu numbers 1,4,5,6, and 7 are options provided the user

Menu numbers 2 and 3 must be followed in order for each plot to be digitized.

Menu number 8 will allow the plot to be re-digitized using the same data on the x,y axis gathered in the initialization procedure

Press USER DEFINABLE KEY 2 to continue.

**PLEASE FOLLOW THESE STEPS:**

1. PRESS LOAD BUTTON ON THE 4662 PLOTTER.
2. CENTER PLOT ON THE PLOTTING PATTEN.
3. INSTALL AN EYEPIECE TO LOCATE POINTS.
4. RELEASE LOAD BUTTON.

TYPE 'READY', AND PRESS RETURN  
R

LOCATE THE ORIGIN OF YOUR PLOT AND PRESS THE CALL BUTTON.  
INPUT THE COORDINATES OF THE ORIGIN (e.g. 0,0)  
0,0

LOCATE A POINT ON THE X AXIS OF YOUR PLOT; FOR EXAMPLE  
1,0 or .1,0 AND PRESS CALL.  
INPUT THE COORDINATES OF THIS POINT (e.g. 1,0)  
90,0

LOCATE A POINT ON THE Y AXIS OF YOUR PLOT; FOR EXAMPLE  
0,1 or 0,.1 AND PRESS CALL.  
INPUT THE COORDINATES OF THIS POINT (e.g. 0,1)  
0,0.1

PRESS USER DEFINABLE KEY 3 FOR INSTRUCTIONS IN DIGITIZING.

TITLE

Plot Digitize

PAGE NUMBER 51

ABSTRACT NUMBER

TEKniks Vol. 6 No. 3 T1

Program 7

DIGITIZING WILL NOW BEGIN.

THE PROCEDURE IS AS FOLLOWS:

1. LOCATE A DATA POINT USING THE JOYSTICK.
2. DEPRESS FULLY THE CALL BUTTON ON THE 4662 PLOTTER.
3. LOCATE THE NEXT POINT AND CONTINUE.

\*\*\*\*\*

WHEN DIGITIZING IS COMPLETE:

1. PRESS LOAD BUTTON.
2. PRESS CALL BUTTON.

\*\*\*\*\*

TYPE 'GO' ,PRESS RETURN , AND BEGIN DIGITIZING.

GO

IS DIGITIZING COMPLETE? (Y or N)

Y

PRESS USER DEFINABLE KEY 1 FOR MENU.  
PRESS USER DEFINABLE KEY 4 TO REPLOT DATA FOR ACCURACY CHECK.  
PRESS USER DEFINABLE KEY 5 TO CATALOG DATA ON THE CDC.  
PRESS USER DEFINABLE KEY 6 TO WRITE DATA ON MAG. TAPE.  
PRESS USER DEFINABLE KEY 7 TO LIST DATA.

DATA WILL BE RE-PLOTTED TO CHECK FOR ACCURACY.

PLEASE FOLLOW THESE STEPS:

1. REPLACE THE EYEPIECE WITH A PEN.
2. PRESS LOAD BUTTON ON THE 4662.
3. PLACE NEW PAPER ON THE PLOTTING PATTEN.
4. RELEASE THE LOAD BUTTON.
5. ENTER LINE TYPE FOR REPLOT (1=SOLID LINE, 2=DASHED LINE, 3=NO LINE): 3  
IS THE DATA TO BE REPLIED STORED ON MAG. TAPE (Y or N) N  
IF YOU WANT THE AXES OF YOUR PLOT DRAWN ALSO, ENTER 'Y' Y
6. ENTER XMAX, YMAX: 360,0.4
7. ENTER X TIC INTERVAL, Y TIC INTERVAL: 90,0.1

ENTER ORIGIN LABEL : 0  
ENTER X TIC LABELS :

90

180

270

360

ENTER Y TIC LABELS :

0.1

0.2

0.3

0.4

IF YOU WANT AXIS LABELS, ENTER 'Y' Y

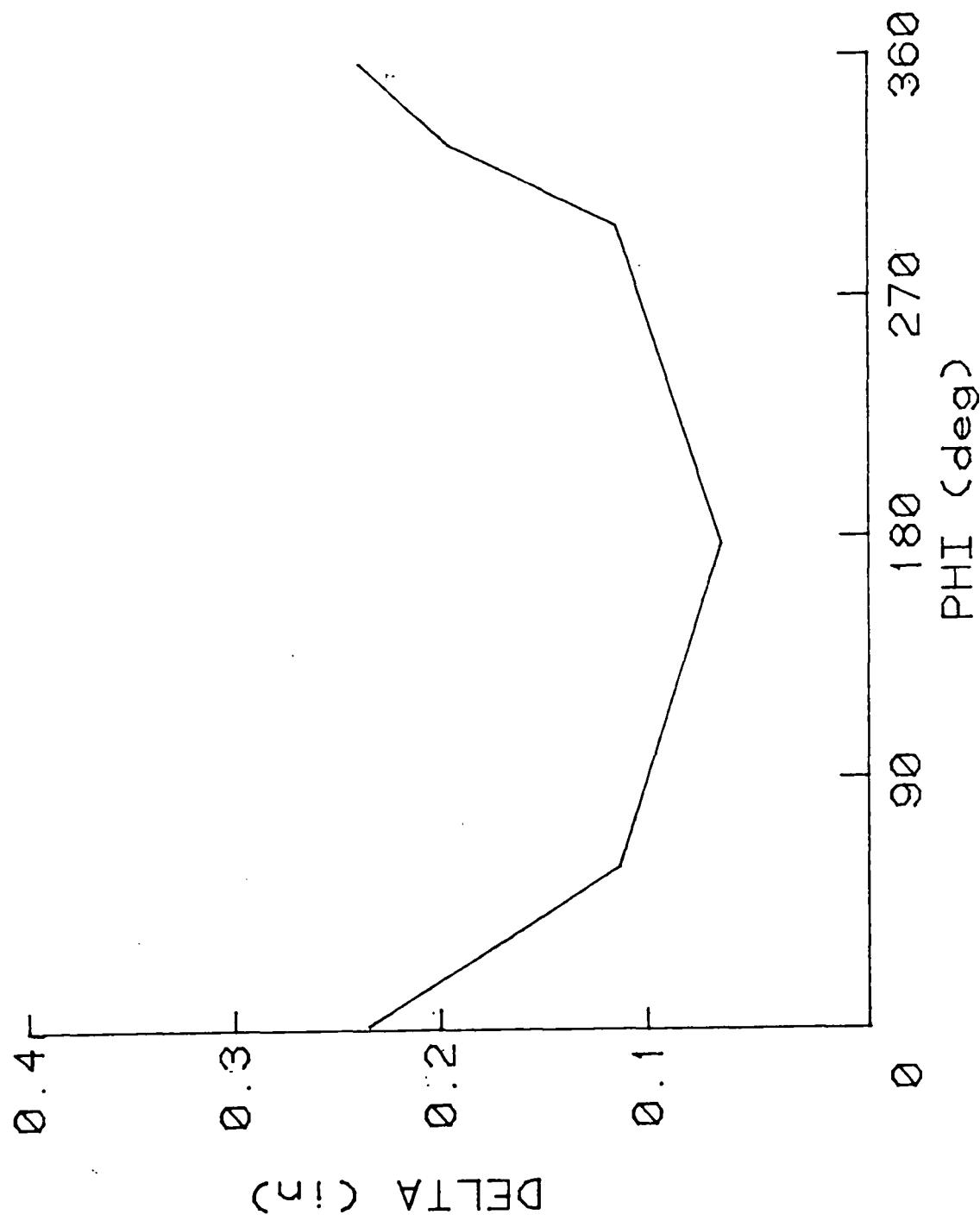
ENTER X-AXIS LABEL: PHI (deg)

ENTER Y-AXIS LABEL: DELTA (in)

TITLE

Plot Digitize

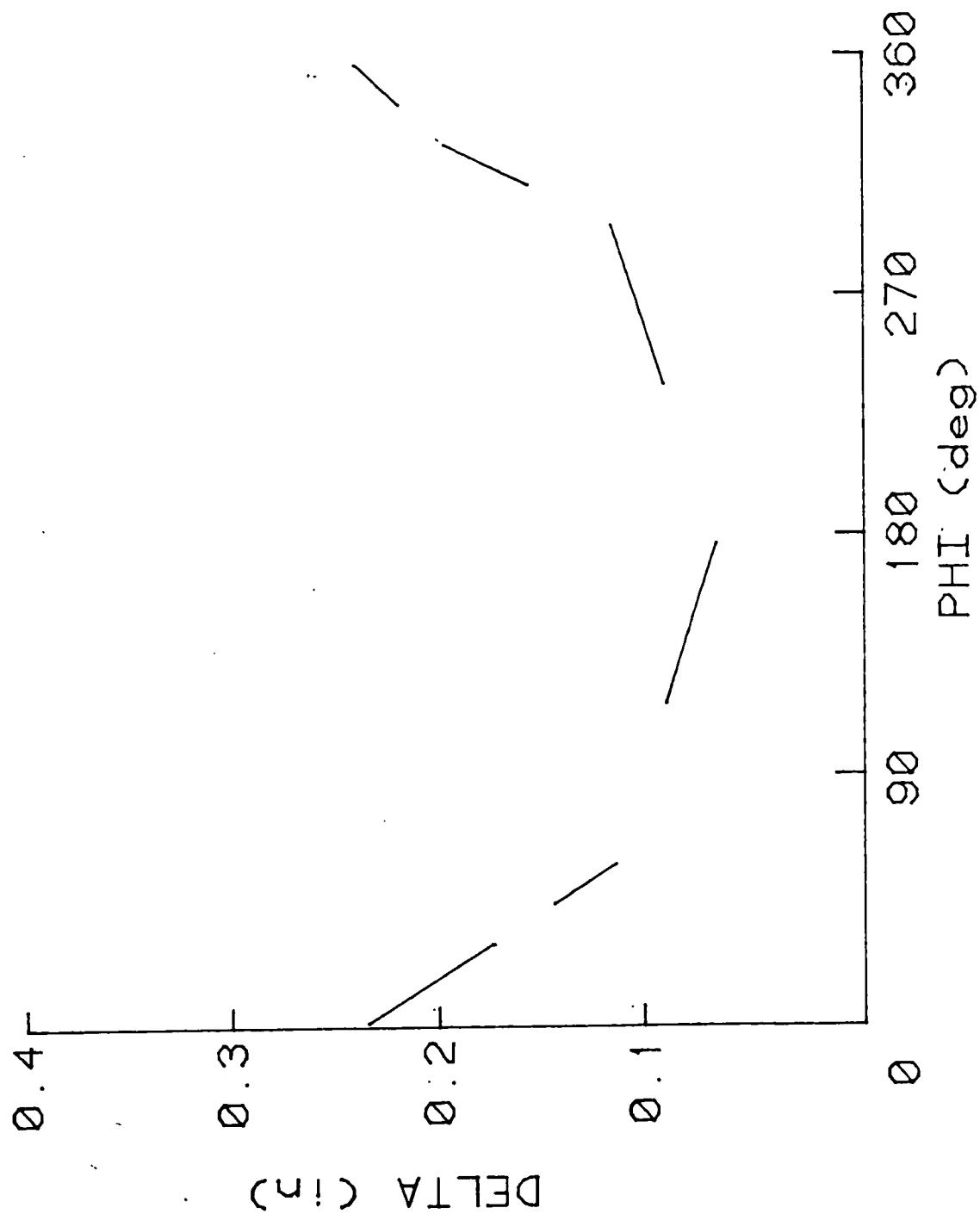
ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 7

TITLE

Plot Digitize

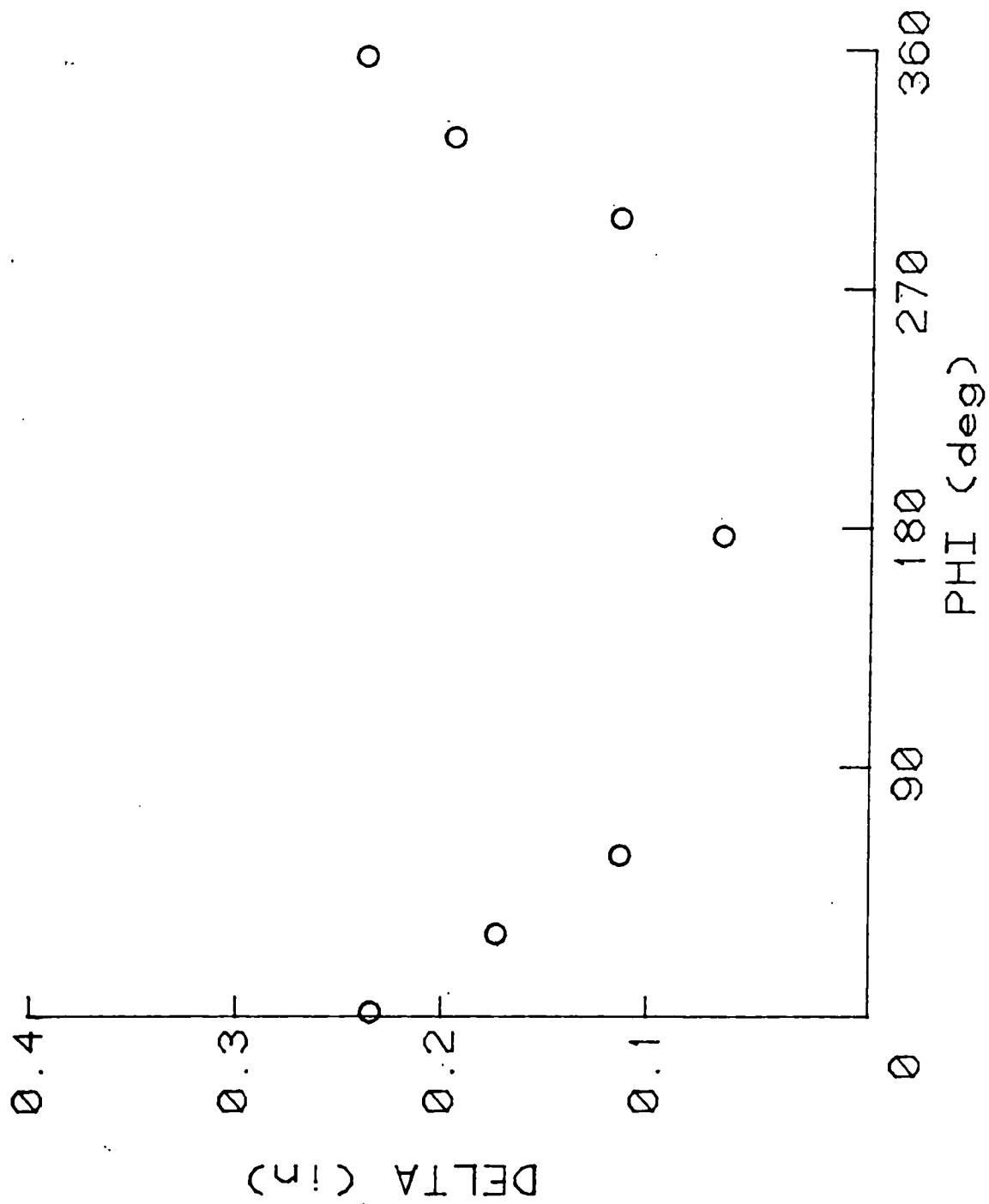
ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 7

TITLE

Plot Digitize

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 7

TITLE

Plot Digitize

PAGE NUMBER 57

ABSTRACT NUMBER  
TEKniques Vol. 6 No. 3 T1  
Program 7

DIGITIZED DATA WILL NOW BE CATALOGED ON THE CDC.

ENTER PERMANENT FILE NAME FOR THE DATA\_DIGIT9

INSTRUCTIONS: ENTER CDC USER NAME, PASSWORD, AND CHARGE  
UPON REQUEST, THEN WAIT FOR THE PROMPT: /  
EACH TIME THIS PROMPT APPEARS, PRESS USER  
DEFINABLE KEY #5.

81/07/16. 14.21.06. TM1424

\* BRL CYBER 173 MFA 001 \*

USER NAME:

PASSWORD:

TERMINAL: 34, NAMIAF

RECOVER/ CHARGE:

NOS 1.4-531

PACK COMPLETE.

EXIT TEXT MODE.

CATALOG OF DATA COMPLETE.

TITLE

Plot Digitize

TO WRITE DATA ON A MAGNETIC TAPE FILE:

1. INSERT MAGNETIC TAPE CARTRIDGE.
2. HAS A TAPE FILE BEEN MARKED ? (Y or N)  
Y
3. INPUT THE FILE NO. FOR THE DATA.  
2

THE DIGITIZED DATA HAS BEEN DEPOSITED IN MAG. FILE:  
2 OF THE CURRENT TAPE.

LISTING OF DIGITIZED DATA:

| X              | Y               |
|----------------|-----------------|
| 0.622837370243 | 0.240322580645  |
| 38.2076124567  | 0.179032258065  |
| 60.7266435986  | 0.11935483871   |
| 180.62283737   | 0.0697580645161 |
| 301.453287197  | 0.119758064516  |
| 331.349480969  | 0.199596774194  |
| 362.179930796  | 0.242741935484  |

|                           |    |
|---------------------------|----|
| PAGE NUMBER               | 58 |
| ABSTRACT NUMBER           |    |
| TEKniques Vol. 6 No. 3 T1 |    |
| Program 7                 |    |



# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|  |               |  |
|--|---------------|--|
| TITLE  |               | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 8                          |
| Arrowhead Macro  |               | EQUIPMENT AND OPTIONS REQUIRED<br>8K 4052 Graphics System<br>4663 (with Option 31) |
| ORIGINAL DATE<br>29 January 1982   | REVISION DATE | PERIPHERALS  |
| AUTHOR Terry L. McCain<br>Entomology Department<br>Purdue University<br>West Lafayette, IN 47907 |               |  |

## ABSTRACT

The Arrowhead Macro is a short program which loads a macro into the 4663 Plotter (plotter must have Option 31--Circular Arcs and Programmable Macros). When expanded directly or from the user's program, the macro will draw an arrowhead at the current pen location. The orientation of the arrowhead will be the orientation of the last line drawn by the plotter.

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## TITLE

Arrowhead Macro

## ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 8Description

This program assumes:

- \*\* That the desired window has been set by the user prior to running the Arrowhead Macro program.
- \*\* That the plotter is connected to the terminal via the GPIB interface.

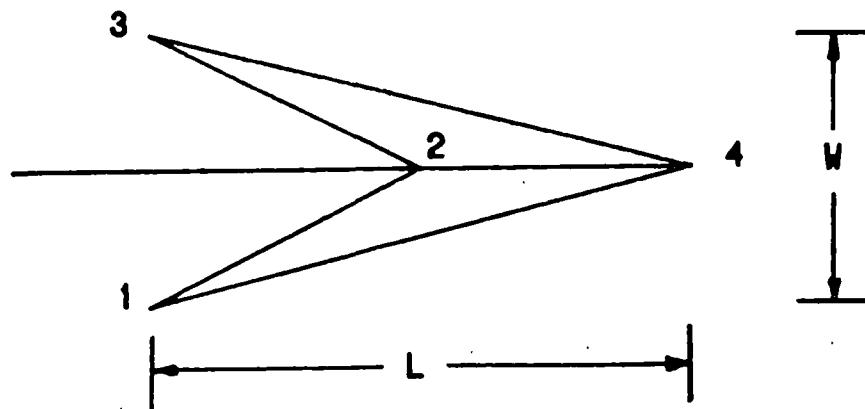
The program will ask the user to enter the plotter address, macro number, and length and width of arrowhead desired. As stated above, the program does not reset the window. The window in use at the time the program is executed determines the actual physical size of the arrowhead--subsequent window commands will not alter the size of the arrowhead. The user may store several different sizes of arrowheads by changing the macro number each time the program is executed.

Internal Data Storage

| Variable | Used to Store... | Type   |
|----------|------------------|--------|
| D        | Plotter address  | Simple |
| L        | Arrowhead length | Simple |
| N        | Macro number     | Simple |
| W        | Arrowhead width  | Simple |

Methods

Arrowhead format:



## TITLE

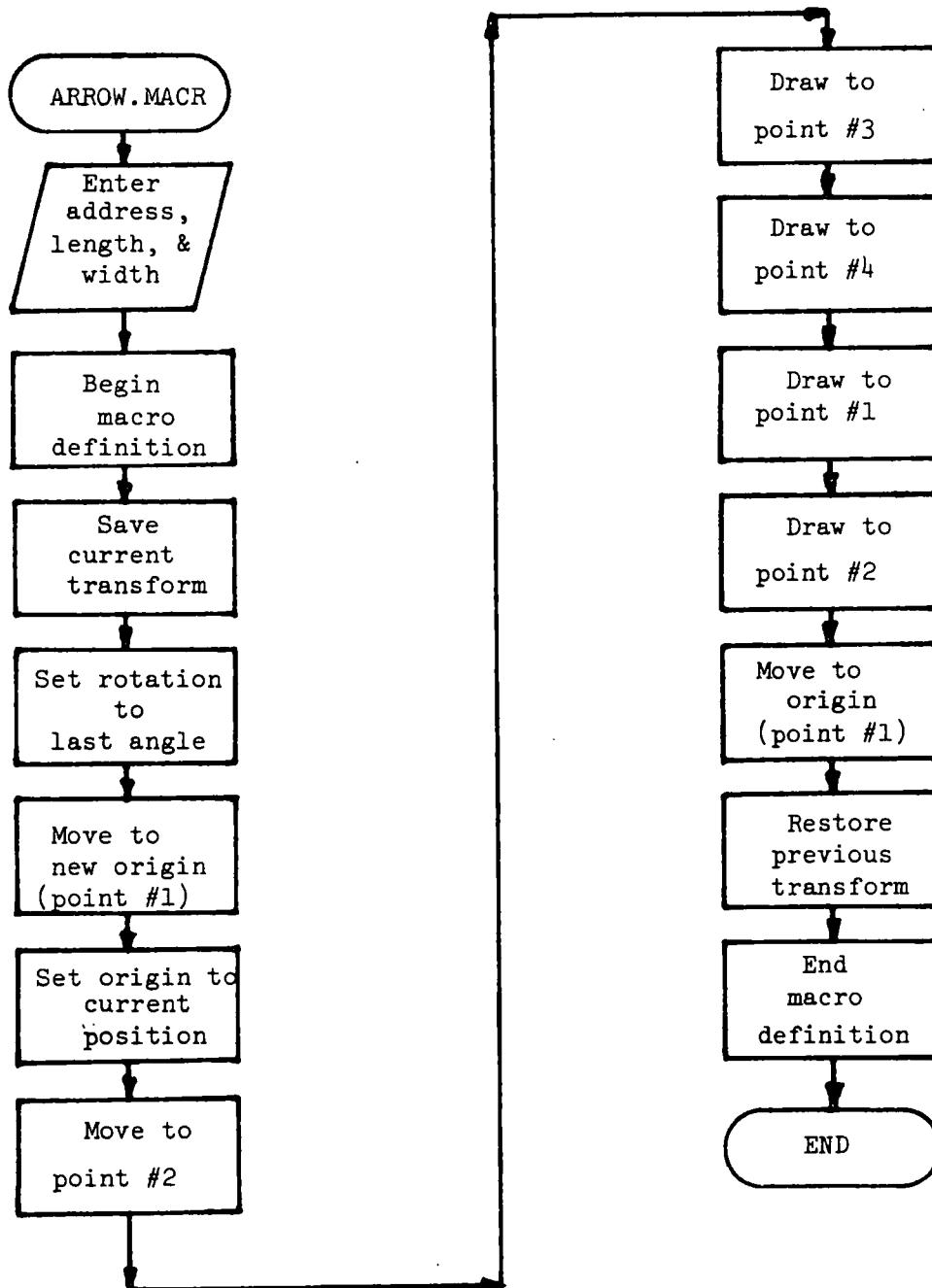
Arrowhead Macro

## ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 8Point      Coordinates (in units of L and W)

- |   |                            |
|---|----------------------------|
| 1 | 0,0 (See flow chart below) |
| 2 | 0.5L,0.5W                  |
| 3 | 0,W                        |
| 4 | L,0.5W                     |

Program logic:



## TITLE

Arrowhead Macro

## ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 8Operating Instructions

1. Load "ARROW.MACR" from tape or disk.\*
2. Run program:
  - a. Enter the plotter address.
  - b. Enter the macro number (see page 3-79 of 4663 manual).
  - c. Enter length of arrowhead (see diagram above).
  - d. If not using default values, enter width of arrowhead (this part is skipped if using default values--a "0" entered for the length).

- e. Program will print:

"ARROWHEAD MACRO IS LOADED"  
 "MACRO # n"

(where n is the number entered in (b.) above)

3. To use Arrowhead Macro:

- a. Make certain that the window is the window desired so that the size of the arrowhead is correct.
- b. Load and execute the "ARROW.MACR" program as described in #2 above.
- c. To draw arrowheads:
  - (1). Singly:
    - (a). Draw line at plotter.
    - (b). Expand macro (page 3-80 of 4663 plotter manual)
  - (2). Automatically:
    - (a). Set auto macro (page 3-81 of 4663 plotter manual).
    - (b) Macro will be executed automatically at end of each subsequent DRAW, ARC, or CIRCLE command.

---

\*On TEKniques Vol. 6 No. 3 T1 program tape, the program occupies file #10.

|  |   |
|--|---|
| TITLE<br><br>Arrowhead Macro   | ABSTRACT NUMBER<br><br>TEKniques Vol. 6 No. 3 T1<br>Program 8 |
| <u>References</u>  |   |
| 4663 Interactive Digital Plotter Operator's Manual, part no.<br>070-267-00, Tektronix Inc., Beaverton, OR October 1980.  |   |
|  |   |
| <u>Example</u>   |   |
| DEMO.MACR  |   |
| <br>100 PAGE<br>110 REM SET WINDOW AND VIEWPORT<br>120 WINDOW 0, 130, 0, 100<br>130 VIEWPORT 0, 130, 0, 100<br>140 PRINT "ENTER MACRO # : ";<br>150 INPUT N<br>160 IF N<256 THEN 180<br>170 GO TO 140<br>180 IF N>0 THEN 140<br>190 REM PLOTTER ADDRESS = 1<br>200 D=1<br>210 REM<br>220 REM SET AUTO MACRO - SEE 4663 PLOTTER MANUAL<br>230 PRINT @D, 32; "EN", N<br>240 REM DRAW TRIANGLE<br>250 MOVE @D, 30, 30<br>260 DRAW @D, 90, 30<br>270 DRAW @D, 55, 80<br>280 DRAW @D, 30, 30<br>290 REM TERMINATE AUTO MACRO<br>300 PRINT @D, 32; "EN"<br>310 END |   |

TITLE

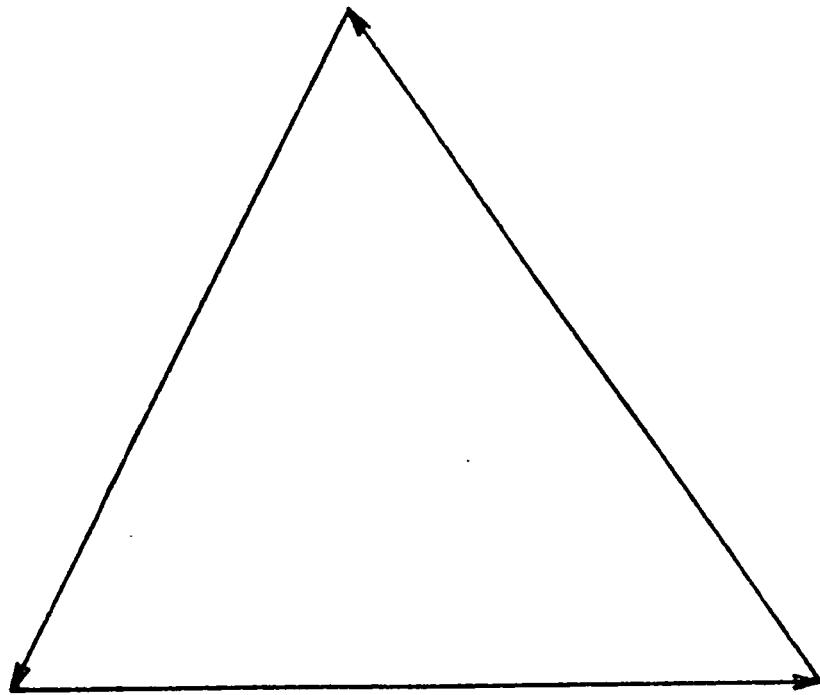
Arrowhead Macro

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 8

To use DEMO.MACR: (Turn plotter and prepare to plot)

1. Type in program and save.
2. Load ARROW.MACR and run.
3. Load DEMO.MACR and run.
4. Resulting plot should look like this:





# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|   |               |   |
|---|---------------|---|
| TITLE   |               | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 9 |
| Drill Log - Error Checking  |               | EQUIPMENT AND OPTIONS REQUIRED<br>8K                      |
| ORIGINAL DATE<br>September, 1981  | REVISION DATE | PERIPHERALS   |
| AUTHOR<br>Don DeJarnette  |               |   |
| Geological Survey of Alabama<br>University, AL  |               |   |
| ABSTRACT  |               |   |
| <p>Files: 1 ASCII Program<br/>       Statements: 168</p> <p>This program checks the math associated with manual drill log entry. You enter lithology intervals directly into the computer in feet and inches/100 or feet/100. The program increments each interval to calculate the depth and decrements each interval from the surface elevation to calculate the top of the lithology elevation.</p> <p>The display lists the interval thickness, the top of the lithology elevation (tle) and the depth.</p> <p>There is no provision to store data.</p> <p>If using a 4054, you may choose character size 1 or 4. The screen page will be calculated automatically.</p> |               |   |

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TITLE

Drill Log - Error Checking

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 9

## DRILL LOG - ERROR CHECKING PROGRAM

This program checks the math associated with manual drill log entry. Lithology intervals (thicknesses) are entered directly into the computer in feet/inches/100 or feet/100. The program increments each interval to calculate the depth and decrements each interval from the surface elevation to calculate the top of the lithology elevation. The display lists the interval thickness, the top of the lithology elevation and the depth.

The following is a step by step summary of the data entry procedure.

1. In response to the menu enter a (1) for feet/100 or a (2) for feet/inches/100.
2. Enter surface elevation. The proper entry procedure for feet/inches/100 is to enter the feet, a comma, and inches with fractions indicated with a decimal. For example, to enter 46'3 $\frac{1}{4}$ " the correct form would be 46, 3.25.
3. Enter thickness. The resulting display is shown in the example. Two display modes are possible with the two programs. When the screen has filled with thicknesses (6 for large type, 14 for small type) the audible alert is sounded and the user is prompted to enter 9999 for a PAGE command. After the PAGE command, the last entry is wrapped-around and displayed at the top of the new page. To stop operations the user is prompted to enter a 9999, 0 (feet/inches/100) or a 9999 (feet/100).

Method of Operation

This program primarily consists of two counters, one incrementing and one decrementing, conversion, rounding, fill page and print routines. From the menu the program branches to one of two locations depending upon the menu item chosen (feet/100 or feet/inches). At both of these

| TITLE                      | ABSTRACT NUMBER                        |
|----------------------------|--|
| Drill Log - Error Checking | TEKniques Vol. 6 No. 3 T1<br>Program 9 |

locations the user is prompted for a surface elevation. This is converted (or entered) in decimal. Next, the user is prompted to enter the thickness. The thickness is converted (or entered) in decimal and travels to the calculation routines. The calculation routines increment or decrement the counters and sense whether the top of the lithology elevation is above, at, or below sea level. The data, at this point, is converted back to feet/inches/100 (if necessary) and fed through a 4/5 rounding routine. A print routine and the fill page routine (incremental counter) complete the program.

#### OPERATING INSTRUCTIONS

Load the program through the directory on the TEKniques Vol. 6 No. 3 T1 tape, or FIND 11, OLD and RUN.

|                                     |   |
|-------------------------------------|---|
| TITLE<br>Drill Log - Error Checking | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 9 |
|                                     |   |



# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|  |                                  |  |
|--|----------------------------------|--|
| TITLE<br><br>49XP IEEE-488 Interface Functional Verification |                                  | ABSTRACT NUMBER<br><br>TEKniques Vol. 6 No. 3 T1<br>Program 10                   |
| ORIGINAL DATE<br><br>Jan. 12, 1981                           | REVISION DATE                    | EQUIPMENT AND OPTIONS REQUIRED<br><br>4050 controller, 492P Opt. 2<br>GPIB cable |
| AUTHOR<br>Craig Bryant<br>Dave Green                         | Tektronix, Inc.<br>Beaverton, OR | PERIPHERALS<br><br>None  |

**ABSTRACT**

This program allows a 49XP programmable spectrum analyzer user to functionally verify the IEEE-488 interface in that instrument.

All interface lines are checked for functionality, as well as all interface messages, with the exception of Parallel Poll Configure and Parallel Poll Unconfigure. The instrument's interface is checked for operation on other primary addresses, as well as in the talk only and listen only mode. Correct selection of Input/Output delimiter via a rear panel switch is also verified.

Faults in the interface are diagnosed only to the level that they affect normal communications with a 4050 controller. Detailed conformance to the IEEE standard is not checked.

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| TITLE   | ABSTRACT NUMBER                         |
|---|---|
| 49XP IEEE-488 Interface Functional Verification | TEKniques Vol. 6 No. 3 T1<br>Program 10 |

PROGRAM INTRODUCTION

This program allows a 49XP programmable spectrum analyzer user to functionally verify the IEEE-488 interface in that instrument.

All interface lines are checked for functionality, as well as all interface messages, with the exception of Parallel Poll Configure and Parallel Poll Unconfigure. The instrument's interface is checked for operation on other primary addresses, as well as in the talk only and listen only mode. Correct selection of Input/Output delimiter via a rear panel switch is also verified.

Faults in the interface are diagnosed only to the level that they affect normal communications with a 4050 controller. Detailed conformance to the IEEE standard is not checked.

The program is written in TEKTRONIX 4050 BASIC, and is divided into individual tests, each for a specific interface line, message, or function. The tests start on even 1000 line numbers to allow easy modification of the program.

The following describes the function of each test in the program.

Lines 1-5000: Interfaces to user definable keys for recovery from a failed test.

Lines 5000-6000: Inputs the primary address of the 492P under test (1 should be used).

Lines 6000-7000: ID query response test. The instrument must be able to talk and listen, to send out its ID? response and manipulate all eight of the DIO lines for the test to be successful.

Lines 7000-8000: Local lock-out test. Tests correct operation of the interface message that should disable all programmable front panel controls.

Lines 8000-9000: Go to LOCAL test. Tests correct operation of the interface message that should enable all front panel controls.

Lines 9000-10000: Group Execute Trigger test. Checks that a GET message does cause the 492P to abort the present sweep and re-arm the trigger, causing a sweep to start and end, sending out an End-of-Sweep SRQ. Thus the SRQ line, as well as the GET message, is verified.

Lines 10000-11000: Selected Device Clear Test. This test verifies that an SDC message does indeed reset the 492P's GPIB output buffer clearing out it's ID? response.

Lines 11000-12000: Device clear test. This test is identical to the selected device clear test, except the universal command DCL is used instead.

| TITLE   | ABSTRACT NUMBER                         |
|---|---|
| 49XP IEEE-488 Interface Functional Verification | TEKniques Vol. 6 No. 3 T1<br>Program 10 |

Lines 12000-13000: Addressed as listener, talker test. This test checks to see that the 492P microprocessor correctly recognized that the GPIA chip has been addressed to listen, or talk, and sends the appropriate character to the crt readout (L or T).

Lines 13000-14000: Serial Poll test. This checks correct operation of the serial poll enable (SPE) and serial poll disable (SPD) interface messages. The status byte is read, and if anything other than ordinary operation is indicated, the instrument fails the test.

Lines 14000-15000: GPIB rear panel switch test. All five primary address switches are checked for correct operation. Three subroutines are called in the process of testing one address switch. The first two send a formatted message to the 4050 display, and the third performs the address switch test.

Lines 15000-16000: Line feed or EOI switch test. Checks for correct selection of line feed as a termination when selected by this switch, by sending an ID? terminated only by a line feed.

Lines 16000-17000: Talk-only mode test. When selected, this mode should cause the instrument to send a SET? response and (optionally) a CURVE? response whenever the RESET-TO-LOCAL button is pressed. The string received from the instrument is, thus, examined for existence of a portion of the correct SET? response after the RESET-TO-LOCAL button is pressed.

Lines 17000-18000: Listen only mode test. When selected, this mode will cause the instrument to respond to any message on the bus, since it is always addressed to listen. The command "REF Ø" is sent to the bus without addressing the instrument, then the listen only mode is deselected and the instrument interrogated to see if it did respond to the REF command while in the listen only mode.

Lines 18000-19000: Interface clear and Remote Enable test. The IFC line on the GPIB will unaddress the instrument's interface. This fact is verified by noting that the "L" is not present in the crt readout, indicating that the IFC line worked. The REN line will be unasserted when the end statement is executed (except for some early 4052 and 4054's). Thus, a front panel in the local mode is evidence that the REN line was successfully unasserted. (Evidence that it was asserted in the 1st place is in the fact that the instrument was able to execute commands sent to it by previous tests.)

| TITLE   | ABSTRACT NUMBER                         |
|---|---|
| 49XP IEEE-488 Interface Functional Verification | TEKniques Vol. 6 No. 3 T1<br>Program 10 |

**Lines 19000-end:** Utility routines. "Rear panel interface switch test text routine" puts headers on the interface switch test display. The "rear panel test text routine" tells the operator what to do after changing the address switches. "Test address switch" acquires an ID? response from the instrument on it's new address during the address switch test. The "SRQ handler" will handle any 49X SRQ's that occur, although none, except the power-up SRQ, would be expected. (The end of sweep SRQ during the GET test is handled by another SRQ handler). "Delay Generator" generates delays for other tests. The "Failure Decision Handler" allows the program to be restarted with the user definable keys if any test fails.

The program uses 25560 Bytes of memory, as well as the following variables;

#### STRING VARIABLES

S\$ - input string for 49XP ERR? response  
 T\$ - general string variable  
 V\$ (400), W\$ (400) - general string variables

#### NUMERIC VARIABLES

A1 - primary address of 49XP  
 R, I7 - general numeric variables  
 T6 - number of seconds for delay routine and the 49XP response during the D108, and GTL test.  
 I9 - scratch variable for delay routine  
 B2 - flag set when UDK's are pressed  
 Z1 - used in POLL statement in SRQ handler

A flowchart will not be given. Each test merely falls into the next test, unless that test fails, in which case, the Failure Decision Handler is called. Here, the user can restart the entire program, or end it via the user definable keys.

#### LOADING INSTRUCTIONS

Load the program into memory. On TEKniques Vol. 6 No. 3 T1 program tape, it occupies file 12. Therefore, FIND 12, OLD and RUN.

## TITLE

49XP IEEE-488 Interface Functional Verification

## ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 10USER INSTRUCTIONS

To run the program, make sure the 49XP address switch settings are as follows:

| Listen Only | Talk Only | LF or EOI | 16 | 8 | 4 | 2 | 1 |
|-------------|-----------|-----------|----|---|---|---|---|
| 0           | 0         | 0         | 0  | 0 | 0 | 0 | 1 |

Then connect the 49XP to the controller with a GPIB cable and apply power to the spectrum analyzer.

Type RUN on the 4050 keyboard followed by return and then watch the 4050 screen for further instructions.

To help in interpreting the errors found by the program, the following lists each failure and the possible causes for each. The possible causes listed assume that the tests are run in order, and that later tests are not run without earlier tests having been run. It is also assumed that the micro-processor self check has been run and that no firmware problems due to faulty ROM or RAM exist. (See the 492/492P service manual for a description).

ID QUERY RESPONSE \*\*\*FAIL\*\*\*

Since this is the 1st attempt by the 4050 to communicate with the 49XP, a number of things can go wrong. The 49XP may not be able to listen or talk over the bus because of problems related to one of the Bus control Lines, in which case, we won't even get this message during the ID Query Response test. But if we do, chances are a Data line is faulty since the 492P was able to receive the Query, but somewhere the message was garbled.

DIO 8 TEST \*\*\*FAIL\*\*\*

Since the ID Query response tests DIO 0 through DIO 7, this message indicates a problem-only with DIO 8. Since the test uses digital storage, there is a chance for a problem there to cause the error.

LOCAL LOCKOUT ... LLO \*\*\*FAIL\*\*\*  
GO TO LOCAL ... GTL \*\*\*FAIL\*\*\*

Failure of these tests indicates a possible problem with the 9825 GPIA on the GPIB board.

| TITLE   | ABSTRACT NUMBER                         |
|---|---|
| 49XP IEEE-488 Interface Functional Verification | TEKniques Vol. 6 No. 3 T1<br>Program 10 |

GROUP EXECUTE TRIGGER ... GET \*\*\*FAIL\*\*\*

Since this message is supposed to arm the sweep trigger, a failure in the 49XP sweep circuitry could cause this error. Also, since the test uses an end of sweep SRQ to indicate that the sweep was started, an SRQ line problem is a possibility. Also, the GPIA may not be decoding the GET message correctly, although this is less likely.

SELECTED DEVICE CLEAR ... SDC \*\*\*FAIL\*\*\*DEVICE CLEAR ... DCL \*\*\*FAIL\*\*\*

A possible GPIA error is indicated here.

ADDRESSED AS LISTENER \*\*\*FAIL\*\*\*ADDRESSED AS TALKER \*\*\*FAIL\*\*\*

Actually, this test has been substantially performed in the ID Query response test, so should not fail. However, the "addressed as talker" test uses the sweep in the instrument as a timer, and thus could cause the error if not working properly.

SERIAL POLL \*\*\*FAIL\*\*\*

A GPIA problem is indicated, or it is possible that the 49XP has responded in the status Byte with something other than "ordinary operation". (See the programming summary in the 492P or 496P programmer's manual).

GPIB INTERFACE REAR PANEL SWITCH TEST

The error received here will be a 4050 GPIB interface error message, and indicates a problem with the particular switch or associated circuitry.

LF OR EOI SWITCH \*\*\*FAIL\*\*\*

Indicates a problem with the LF/EOI switch, or its associated circuitry.

| TITLE  | ABSTRACT NUMBER                         |
|--|---|
| 49XP IEEE-48 Interface Functional Verification | TEKniques Vol. 6 No. 3 T1<br>Program 10 |

TALK ONLY MODE \*\*\*FAIL\*\*\*

Two possible problems here: either the back panel switch wasn't recognized or the closure of the Reset to Local switch on the front panel (which initiates the talk only transfer) was not recognized.

LISTEN ONLY MODE \*\*\*FAIL\*\*\*

This message indicates a problem with the Listen only switch on the rear panel, or its associated circuitry.

INTERFACE CLEAR AND REMOTE ENABLE TEST

An "L" in the 49XP CRT readout indicates that the IFC line was not recognized by the instrument, and so it is still addressed. Thus, IFC is probably stuck high somewhere.

If the front panel is still locked out REN is probably still asserted (stuck low), otherwise when the 4050 quit running it's program, it should have unasserted REN, and caused the 49XP to go back to the local mode.

NOTE: Some early 4052, 4054 controllers do not release REN when program execution ends. This test should be ignored in that case.

Note that any time a test is failed, with the exception of the Address switches tests, the user has the option of ending the entire verification, or starting the entire verification again. To start the individual test over, one would need to stop the program and type "RUN" and the line number of the test desired. (See the listing).

|  |  |
|--|--|
| TITLE<br>49XP IEEE-488 Interface Functional Verification   | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 10 |
| <u>EXAMPLE PROGRAM OUTPUTS</u>   |  |
| The following is a copy of the information presented by the program on the 4050 screen, as it would be encountered during a run of the program with no failures encountered. |  |
| Information entered by the user of the programmer is enclosed in a circle,<br>e.g. carriage return is (CR.)  |  |

|   |  |
|---|--|
| TITLE<br>49XP IEEE-488 I/F Functional Verification  | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 10 |
| <b>ENTER 49XP'S PRIMARY ADDRESS (DEFAULT = 1) ① (CR)</b>  |  |
|   |  |
|   |  |
|   |  |
| <p>*** 'ID' QUERY RESPONSE ***<br/>     *** LOCAL LOCK-OUT.....LL0 ***</p> <p>49XP IN LOCAL LOCK-OUT MODE (LL0)<br/>     ATTEMPT TO USE 49XP CONTROLS<br/>     PRESS RETURN &lt;CR&gt; WHEN DONE (CR)</p> <p>*** GO TO LOCAL.....GTL ***<br/>     *** GROUP EXECUTE TRIGGER...GET ***<br/>     *** SELECTED DEVICE CLEAR...SDC ***<br/>     *** DEVICE CLEAR.....DCL ***<br/>     *** 49XP ADDRESSED AS LISTENER...***<br/>     *** 49XP ADDRESSED AS TALKER...***<br/>     *** SERIAL POLL.....SPD/SPE ***</p> |  |

TITLE

49XP IEEE-488 I/F Functional Verification

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 10

## SET GPIB ADDRESS SWITCHES TO:

|                |              |              |            |
|----------------|--------------|--------------|------------|
| LISTEN<br>ONLY | TALK<br>ONLY | LF or<br>EOI | ADDRESS    |
| -----          | -----        | -----        | 16 8 4 2 1 |
| 0              | 0            | 0            | -----      |
|                |              |              | 0 0 0 1 0  |

AFTER CHANGING THE SWITCHES, PRESS THE REMOTE/LOCAL BUTTON ONCE

(NOTE: IF YOU GET A GPIB INTERFACE ERROR MESSAGE,  
 IT MEANS THAT THE SWITCH(ES) WERE'NT  
 READ CORRECTLY. TO RE-TEST, TYPE  
 'RUN' FOLLOWED BY THE LINE NUMBER IN THE  
 ERROR MESSAGE)

PRESS RETURN <CR> WHEN DONE (CR)

## SET GPIB ADDRESS SWITCHES TO:

|                |              |              |            |
|----------------|--------------|--------------|------------|
| LISTEN<br>ONLY | TALK<br>ONLY | LF or<br>EOI | ADDRESS    |
| -----          | -----        | -----        | 16 8 4 2 1 |
| 0              | 0            | 0            | -----      |
|                |              |              | 0 0 1 0 0  |

AFTER CHANGING THE SWITCHES, PRESS THE REMOTE/LOCAL BUTTON ONCE

(NOTE: IF YOU GET A GPIB INTERFACE ERROR MESSAGE,  
 IT MEANS THAT THE SWITCH(ES) WERE'NT  
 READ CORRECTLY. TO RE-TEST, TYPE  
 'RUN' FOLLOWED BY THE LINE NUMBER IN THE  
 ERROR MESSAGE)

PRESS RETURN <CR> WHEN DONE (CR)

TITLE

49XP IEEE-488 I/F Functional Verification

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 10

## SET GPIB ADDRESS SWITCHES TO:

|                        |                      |                      |                |
|------------------------|----------------------|----------------------|----------------|
| <b>LISTEN<br/>ONLY</b> | <b>TALK<br/>ONLY</b> | <b>LF or<br/>EOI</b> | <b>ADDRESS</b> |
| -----                  | -----                | -----                | 1 6 8 4 2 1    |
| 0                      | 0                    | 0                    | 0 1 0 0 0      |

AFTER CHANGING THE SWITCHES, PRESS THE REMOTE/LOCAL BUTTON ONCE

(NOTE: IF YOU GET A GPIB INTERFACE ERROR MESSAGE,  
IT MEANS THAT THE SWITCH(ES) WERE'NT  
READ CORRECTLY. TO RE-TEST, TYPE  
'RUN' FOLLOWED BY THE LINE NUMBER IN THE  
ERROR MESSAGE

PRESS RETURN &lt;CR&gt; WHEN DONE

(CR)

## SET GPIB ADDRESS SWITCHES TO:

|                        |                      |                      |                |
|------------------------|----------------------|----------------------|----------------|
| <b>LISTEN<br/>ONLY</b> | <b>TALK<br/>ONLY</b> | <b>LF or<br/>EOI</b> | <b>ADDRESS</b> |
| -----                  | -----                | -----                | 1 6 8 4 2 1    |
| 0                      | 0                    | 0                    | 1 0 0 0 0      |

AFTER CHANGING THE SWITCHES, PRESS THE REMOTE/LOCAL BUTTON ONCE

(NOTE: IF YOU GET A GPIB INTERFACE ERROR MESSAGE,  
IT MEANS THAT THE SWITCH(ES) WERE'NT  
READ CORRECTLY. TO RE-TEST, TYPE  
'RUN' FOLLOWED BY THE LINE NUMBER IN THE  
ERROR MESSAGE

PRESS RETURN &lt;CR&gt; WHEN DONE

(CR)

|  |  |
|--|--|
| TITLE<br>49XP IEEE-488 I/F Functional Verification | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 10 |
|--|--|

SET GPIB ADDRESS SWITCHES TO:

| LISTEN<br>ONLY | TALK<br>ONLY | LF or<br>EOI | ADDRESS    |
|----------------|--------------|--------------|------------|
| ---            | ---          | ---          | 16 8 4 2 1 |
| 0              | 0            | 1            | 0 0 0 0 1  |

AFTER CHANGING THE SWITCHES, PRESS THE REMOTE/LOCAL BUTTON ONCE

(NOTE: IF YOU GET A GPIB INTERFACE ERROR MESSAGE,  
IT MEANS THAT THE SWITCH(ES) WERE'NT  
READ CORRECTLY. TO RE-TEST, TYPE  
'RUN' FOLLOWED BY THE LINE NUMBER IN THE  
ERROR MESSAGE)

PRESS RETURN <CR> WHEN DONE (CR)

TESTING 'LF' OR 'EOI' SWITCH

SET GPIB ADDRESS SWITCHES TO:

| LISTEN<br>ONLY | TALK<br>ONLY | LF or<br>EOI | ADDRESS    |
|----------------|--------------|--------------|------------|
| ---            | ---          | ---          | 16 8 4 2 1 |
| 0              | 1            | 0            | 0 0 0 0 1  |

AFTER CHANGING THE SWITCHES, PRESS THE REMOTE/LOCAL BUTTON ONCE

(NOTE: IF YOU GET A GPIB INTERFACE ERROR MESSAGE,  
IT MEANS THAT THE SWITCH(ES) WERE'NT  
READ CORRECTLY. TO RE-TEST, TYPE  
'RUN' FOLLOWED BY THE LINE NUMBER IN THE  
ERROR MESSAGE)

PRESS RETURN <CR> WHEN DONE (CR)

TESTING TALK ONLY

TITLE

49XP IEEE-488 I/F Functional Verification

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 10**SET GPIB ADDRESS SWITCHES TO:**

**LISTEN  
ONLY**  
-----  
**1**

**TALK  
ONLY**  
-----  
**0**

**LF or  
EOI**  
-----  
**0**

**ADDRESS**  
**16 8 4 2 1**  
-----  
**0 0 0 0 1**

**AFTER CHANGING THE SWITCHES, PRESS THE REMOTE/LOCAL BUTTON ONCE**

(NOTE: IF YOU GET A GPIB INTERFACE ERROR MESSAGE,  
IT MEANS THAT THE SWITCH(ES) WERE'NT  
READ CORRECTLY. TO RE-TEST, TYPE  
'RUN' FOLLOWED BY THE LINE NUMBER IN THE  
ERROR MESSAGE)

**PRESS RETURN <CR> WHEN DONE** (CR)**TESTING LISTEN ONLY****SET GPIB ADDRESS SWITCHES TO:**

**LISTEN  
ONLY**  
-----  
**0**

**TALK  
ONLY**  
-----  
**0**

**LF or  
EOI**  
-----  
**0**

**ADDRESS**  
**16 8 4 2 1**  
-----  
**0 0 0 0 1**

**AFTER CHANGING THE SWITCHES, PRESS THE REMOTE/LOCAL BUTTON ONCE**

(NOTE: IF YOU GET A GPIB INTERFACE ERROR MESSAGE,  
IT MEANS THAT THE SWITCH(ES) WERE'NT  
READ CORRECTLY. TO RE-TEST, TYPE  
'RUN' FOLLOWED BY THE LINE NUMBER IN THE  
ERROR MESSAGE)

**PRESS RETURN <CR> WHEN DONE** (CR)

|  |  |
|--|--|
| TITLE<br>49XP IEEE-488 Functional Verification | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 10 |
|--|--|

**TESTING IFC(INTERFACE CLEAR), AND REN(REMOTE ENABLE)**

CHECK THE 49XP CRT, FOR AN 'L' BETWEEN THE VERTICAL DISPLAY AND THE MIN RF ATTEN READOUTS.

PRESS RETURN TO CONTINUE. *(CR)*

IF AN 'L' IS STILL PRESENT, THE IFC LINE IS FAULTY,  
IF THE 'L' VANISHED, IFC TESTED OK.

CHECK ALSO THE 49XP FRONT PANEL FOR PROPER LOCAL CONTROL  
IF THE FRONT PANEL IS LOCKED OUT, THE REN LINE IS FAULTY, IF  
NOT, REN TESTED OK

GPIB VERIFICATION COMPLETE



# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|                             |                            |  |
|-----------------------------|----------------------------|--|
| TITLE                       |                            | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 11 |
| COMPUTER POKER              |                            | EQUIPMENT AND OPTIONS REQUIRED                             |
| ORIGINAL DATE<br>APRIL 1980 | REVISION DATE<br>SEPT 1980 | 4051 (OPTION 22)   |
| AUTHOR<br>LOUIS A. MATEJ    | PERIPHERALS<br>NONE        |  |

**ABSTRACT**

This poker program will allow from 1 to 5 players to play a regular-standard game of poker. Each player receives 5 cards, can bet up to \$50.00, can fold before or after any bet is made, and can discard 1 to all 5 cards for new ones. Each player is addressed by name. All hands are examined and recorded on the screen and the winner is determined. \$300.00 is given initially to all players and their balance is adjusted as the game progresses with the pot given each time to the winner. The program will record any player who busts. The only difference from regular poker is that all cards can be seen by all players and no more than one bet is allowed. Also ties are resolved or the pot is divided.

Files: 1 ASCII Program

Statements: 903

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|                         |  |
|-------------------------|--|
| TITLE<br>COMPUTER POKER | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 11 |
|-------------------------|--|

This poker program is played by one to five players with different rules for one player and more than one player. Each player starts out initially with \$300.00. Names are entered and cards are dealt. The initial ante for one player is \$45.00 and \$5.00 if more than one is playing. If one is playing, he cannot fold but if more than one are playing, any player can fold forfeiting his ante. All players will be asked to bet or fold. The players can bet up to \$45.00 over their ante for a maximum bet of \$50.00. No further betting is called for.

After betting, any player can fold. All remaining players must bet the highest bet made.

Next, each player can discard any or all cards to obtain new ones by pressing the appropriate UDK or keep all cards. After this, no additional entries are necessary since the computer will evaluate each hand, determine the winner, resolve or determine ties, and give the pot of money to the winner.

Any player not able to ante the next game automatically busts and is out. Any player with little funds left will be allowed to redeem himself if he can win the next pot. This means if he has only --lets say \$10.00 left--, all players must bet this low amount. If any player bets over his remaining amount, his remaining amount becomes his bet.

When one is playing, his final hand will be evaluated and if it is a pair or above, he will paid on a times basis. The better the hand, the higher the amount paid times his bet.

If all but one player folds, the antes go to him. If one player is left after all others have busted, he is declared the winner.

After each hand, the computer will list the balances of each player.

"Remark" statements have been placed in the program to facilitate the understanding of various block functions.

TITLE

COMPUTER POKER

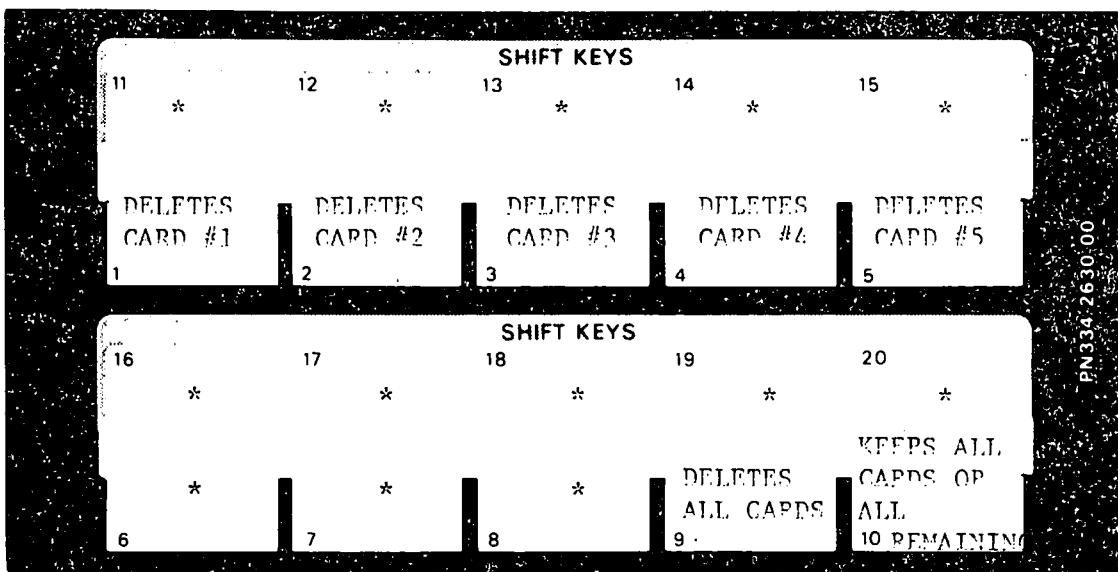
ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 11

TITLE

TAPE #

FILE #



\* --- NON-FUNCTIONAL.

UDK'S

1-----DELETES CARD #1  
 2-----DELETES CARD #2  
 3-----DELETES CARD #3  
 4-----DELETES CARD #4  
 5-----DELETES CARD #5

9-----DELETES ALL CARDS  
 10-----KEEPS ALL CARDS OR KEEPS ALL REMAINING CARDS.

FOR EVERY CARD DELETED, A NEW CARD IS CHOSEN TO REPLACE IT.

| TITLE          |  | ABSTRACT NUMBER   |
|----------------|--|---|
| COMPUTER POKER |  | TEKniques Vol. 6 No. 3 T1<br>Program 11   |
| VARIABLE       | USAGE  | RANGE   |
| A              | Denotes number of a particular player. Example: the winner, the player with the better hand when solving ties, or a player with a limited amount of money to bet.  | 1 thru 5  |
| AS             | The name of each player.   |   |
| B              | Amount of the bet, also a flag for a busted or folded player.  | Ret=0, \$5 to \$50<br>B=0 Busted<br>B=5 Folded  |
| C              | Random # from 1 to 13 gives card value.<br>C=1="ace", C=13="king", C=10="10", etc.   | C= 1 to 13  |
| C2             | This variable denotes the result of each players' hand and ultimately for the winning hand. Example:<br>C2=1=royal flush,C2=6=straight, etc.   | C2=1 to 11<br>C2=20 initially   |
| C7             | When there is a tie between 2 or more players, both with 2 pairs, this variable denotes the value of the first or highest pair for each player.  | C7=2 to 14<br>where 14= ace   |
| C8             | When C7 is the same for 2 players, each having 2 pairs, this variable denotes the value of the second or lower pair. If C7 and C8 are the same for 2 players, the fifth card resolves the tie. If the fifth card is the same, we have an ultimate tie. | C8=2 to 13<br>where 13=king   |
| C\$            | String variable for a particular card. Example: "K","Q","A","10","3", etc.   | 2,3,4,5,6,7,8,<br>9,10,J,Q,K,A<br>any one of these  |
| D              | Represents card 1 thru 5 for each player   | D=1 thru 5  |
| D2             | Variable in card sorting routine to identify card and move card according to highest card (T2) value.  | D2= 2 thru 13   |
| D\$            | String variable for array of all card values.<br>D\$="A 2 3 4 5 6 7 8 9 10 J Q K".   | see usage   |
| F              | Flag variable in card number interval routine. F denotes no interval or one card is the same as the next card for determining pairs or 3 or 4 of a kind.   | F=0 to 3<br>F=0,no interval of one.<br>F=1,1 interval of one.<br>F=2,2 intervals of one. etc. |
| F0             | Floating flag variable used various times in the routine for resolving ties.   | F0=0,1,2  |
| F1             | Flag for 2 or more players having the same kind of hand; tells of ties in first, second,etc. cards.  | F1=0 or 1   |
| F2             | Flag variable used in sorting routine to sort cards according to higher value.   | F2=0 or 1   |

| TITLE          | ABSTRACT NUMBER   |   |
|----------------|---|---|
| COMPUTER POKER | TEKniques Vol. 6 No. 3 T1<br>Program 11   |   |
| VARIABLE       | USAGE   | PANGE   |
| F3             | Flag variable in card number interval routine.<br>F3 denotes and interval of 1 from one card to the next<br>If F3=4---straight or straight flush  | F3=0,1,2,3, <b>or</b> 4   |
| F5             | Flag variable for determining whether the amount bet should be the highest made of all players or since one or more players have only a small amount of money left, whether the bet should be the smaller amount. If one player does not have enough money to bet with the highest bet, he bets all and all others must bet his amount. | F5= 0 or 1  |
| G              | Number of tieing players.   | G=0,1,2,3, or 4   |
| H\$            | String variable telling a player how much he earned. This variable is used only when one person is playing. H\$ tells how much times the bet the player earns or loses. Example:<br>H\$= "8 times" your bet.<br>H\$= "2 times" your bet.<br>H\$= "you lose" your bet.   | see example in usage catagory.  |
| I              | Floating variable in for-next loops usually identifying which player from 1 to 5.   | I= 1 to 5<br>usually  |
| J1             | Denotes a winner in a tieing situation.   | J1=0,eliminated<br>J1=1,one who ties  |
| J              | Floating variable for random for-next loops inside "I" for-next loops.  | J=1,2,3,etc.  |
| K              | Length of the name of each player.  | K=1,2,3,4,etc.  |
| K\$            | String variable denoting all names of players from 1 to X.  | Random string   |
| K8             | Flag variable denoting the elimination of a player from winning if K8=1 or if K8=0 the player is still capable of winning depending on the sequence of cards. K8 is used in the tie resolving routine.  | K8=1, eliminates player from winning.<br>K8=0, player is either the winner or still capable of winning. |
| L              | Designates starting point for displaying each name from K\$.  | Random  |
| M              | Variable-M(C,S)-identifies each card by suit and number. Flag for use of card.  | M=0,card not used yet.<br>M=1,card has been used.   |

| TITLE          | ABSTRACT NUMBER  |  |
|----------------|--|--|
| COMPUTER POKER | TEKniques Vol. 6 No. 3 T1<br>Program 11  |  |
| VARIABLE       | USAGE  | RANGE  |
| N              | Controls user definable key function--when deleting cards and getting new ones.  | N=1,UDK#1,card#1<br>N=2,UDK#2,card#2<br>N=3,UDK#3,card#3<br>N=4,UDK#4,card#4<br>N=5,UDK#5,card#5<br>N=6,UDK#0,all cards<br>N=7,UDK#10,go to next player. |
| N1             | Number of folded players.  | N1=1 to 4  |
| N2             | Number of busted players + folded players.   | N2=1 to 4  |
| P              | Amount of money in the pot.  | Pmax.=\$250.00   |
| V              | Variable which gives units to divide the screen depending on the number of players.  | V=75/V   |
| PS             | Floating string variable for yes-no questions.   | yes,no,v,n   |
| PS             | P5 is the counter which is used to count the number of deleted cards. If 5 cards have been deleted, the program moves to the next player.  | P5=1 to 5  |
| P7             | This flag assistes in skipping the deleting routine after it has been carried out.   | P7=0,don't skip<br>P7=1,skip   |
| S              | Random number from 1 to 13 giving card number--card m(C,S).  | S=1 to 13  |
| T              | Total amount of money for each player--balance.  | random   |
| T1             | Denotes the number representing each suit for each card for each player.<br>Ex.-T1(3,1)=2,player3,card1=2="heart".   | T1=1or2or3or4  |
| T2             | Denotes the number of each card for each player.<br>Ex.-T2(2,4)=6,player2,card4 is a six.  | T2=1 to 14   |
| T5             | This flag will allow the printing of the possible hands(scale) at the beginning or end depending on T5.  | T5=0,at beginning<br>T5=1,st end   |
| T8             | This flag allows the program to be returned to the correct point after 1st,2nd, and 3rd display of the cards. Mainly for display of correct totals of balance, etc. Also it tells when one player has won all or most of the money and is the winner of poker. | T8=-5, original<br>T8=0,after 1st display<br>T8=3,after 2nd display<br>T8=50, winner   |
| V              | Identifies each particular card by a 3 digit # for each player. V(T,D)=#/#,=#suit,#card number.  | V=101 to 113<br>V=201 to 213<br>V=301 to 313<br>V=401 to 413   |
| VS             | String variable telling result of each hand.<br>Ex. "pair","flush",etc.  | "Titles of poker hands"  |
| W              | Denoting # of a player who is folding.   | #=1,2,3,4,or 5   |
| Y              | Number of players.   | Y=1 to 5   |
| Y              | Y-axis coordinate.   | Y=0 to 100   |
| YS             | Null string variable for "Press return" statements   | null   |
| Z              | Y-axis coordinate.   | Z= 0 to 130  |

|   |  |
|---|--|
| TITLE<br><br>COMPUTER POKER   | ABSTRACT NUMBER<br><br>TEKniques Vol. 6 No. 3 T1<br>Program 11 |
| <u>OPERATING INSTRUCTIONS</u>   |  |
| Load the program from the tape. On the TEKniques Vol. 6 No. 3 T1 program tape, Computer Poker occupies File #13. Therefore, |  |
| FIND 13   |  |
| OLD   |  |
| RUN   |  |

|                             |  |
|-----------------------------|--|
| TITLE<br><br>COMPUTER POKER | ABSTRACT NUMBER<br><br>TEKniques Vol. 6 No. 3 T1<br>Program 11 |
|-----------------------------|--|

REFERENCES:

The card design was taken from your computerland Blackjack program; however the cards were make larger and the card values were placed more in the corner of each card. Some other functions may be similar to other parts of the Blackjack program but some changes may have been made.



# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|                       |                               |   |
|-----------------------|-------------------------------|---|
| TITLE                 |                               | ABSTRACT NUMBER                             |
| 4050 Series Clock     |                               | TEKniques Vol. 6 No. 2 T1<br>Program 12     |
| ORIGINAL DATE         |                               | EQUIPMENT AND OPTIONS REQUIRED              |
| October, 1981         | REVISION DATE                 | 8K  |
| AUTHOR<br>Ron Boerger | SARPMA/ACD<br>San Antonio, TX | PERIPHERALS<br>Optional - 4907 File Manager |

## ABSTRACT

Files: 1 ASCII Program

Statements: 105

This program draws either a 24- or 12-hour clock on the screen of a 4050 Series Desktop Computer. The user may also choose to draw the clock on another device such as a plotter.

The time is normally drawn from the Tektronix 4907 disk driver; however, a modification is included for those who do not have disk drives. This modification will allow the user to directly enter the time on the keyboard.

This program is fairly straightforward. The listing includes many REMarks to help the user who would like to tailor the program for his own use.

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TITLE

4050 Series Clock Program

TEKniques Vol. 6 No. 3 T1  
Program 12**I. VARIABLES USED IN PROGRAM** (in order of appearance)

- C(180,2) - This array variable stores the coordinates for a circle of center(65,50) and radius 50. It is used to 'quick-draw' the plate of the clock.
- X - This variable is used in FOR-NEXT loops as a counter; it is also used as a dummy variable in POINTER statements.
- Q - Device number. This variable is used to indicate where the clock is to be drawn (32=screen).
- Y - Dummy variable used in POINTER statements.
- Z\$ - Variable used in POINTER statements; gets type of clock.
- Z - Decoded type of clock (1=12 hour, 2=24 hour)
- A\$ - Time value from 4907 is placed into this variable.
- H,M,S - Hour, minute, and second, respectively. These values are obtained after decoding the string variables H\$, M\$, and S\$.
- H\$,M\$,S\$ - Strings representing hour, minute, and second. These are SEGments of A\$.

**II. OPERATING INSTRUCTIONS**

1. To load the program from the TEKniques Vol. 6 No. 3 T1 tape, press AUTO LOAD and choose "Clock" from the tape directory, or FIND 14, OLD and RUN.

The program may also be saved to disk "@CLOCK".

2. The following series of questions will be presented:

Enter Device (IE, 32 for screen) : 32  
12 hour(1) or 24 hour(2) clock? 1

After this, the clock will be drawn on the device the user specified.  
The user will then receive the prompt,

Press any key for the new time.

Whenever a key is pressed, a clock will be drawn showing the current time.

3. This series will continue until the user presses the ESC key after the 'Press any key...' prompt. When the ESC key is pressed, the user will be returned to command mode.

**III. REFERENCES**

A good trigonometry text will help in understanding some of the principles embodied in this program.

## TITLE

4050 Series Clock Program

## ABSTRACT NO:

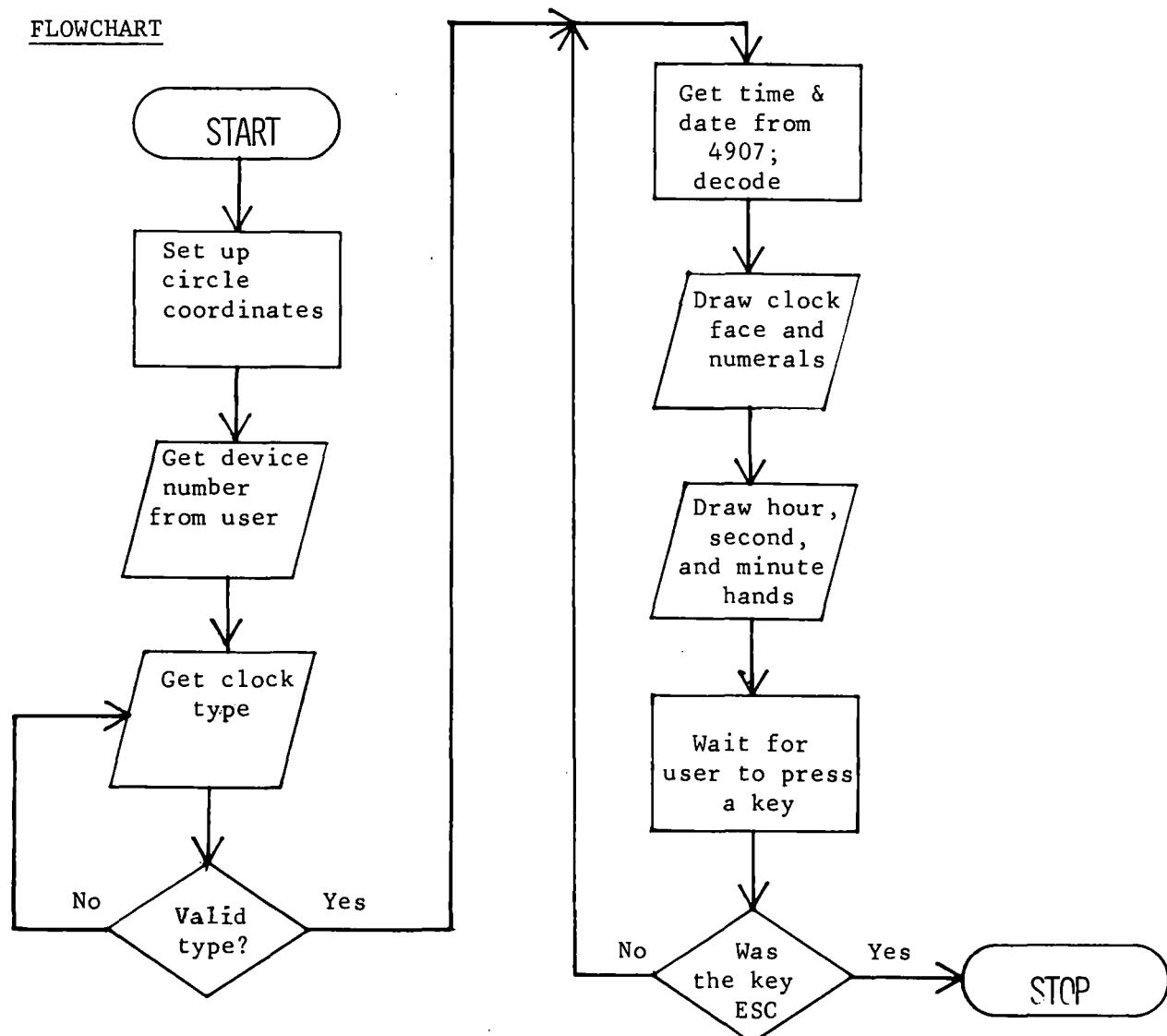
TEKniques Vol. 6 No. 3 T1  
Program 12IV. NON-4907 MODIFICATION

The following modification will allow the user to enter time directly from the keyboard. Note that the only check for data validity made is to make sure the data entered is of the correct length.

DELETE 490,520

```

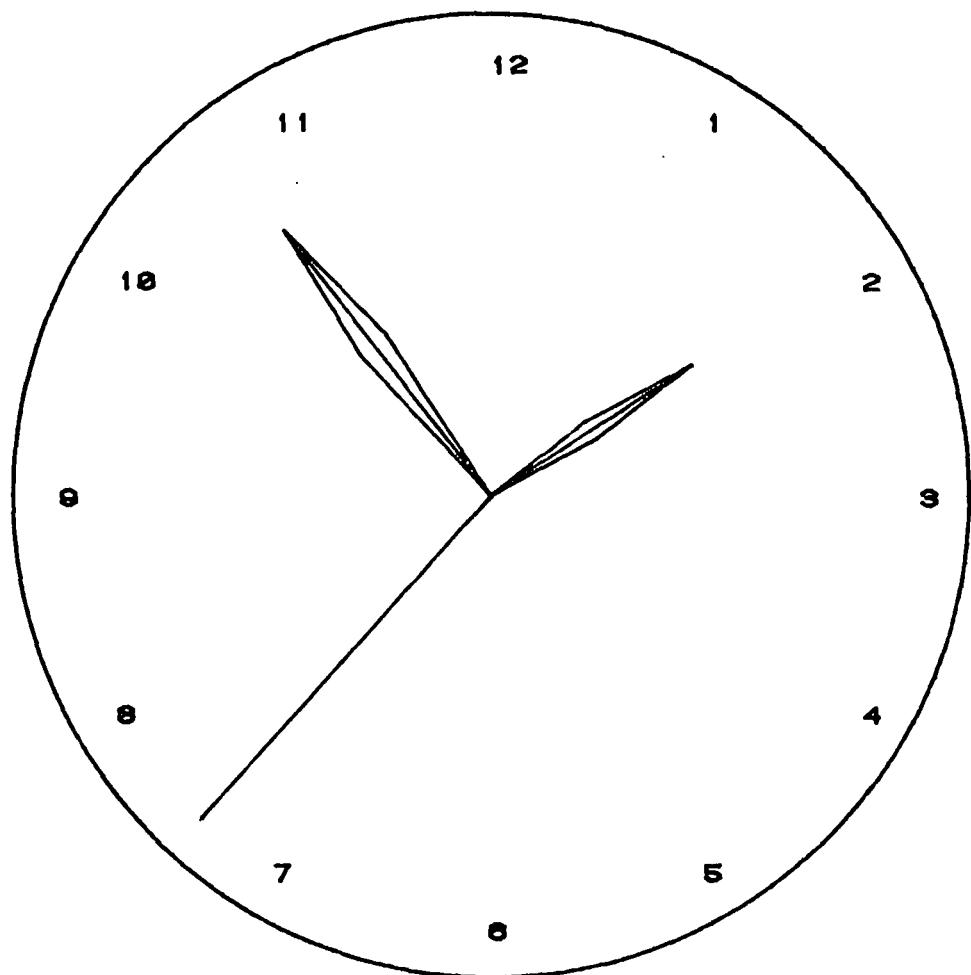
490 REM *** GET TIME FROM KEYBOARD
500 PRINT "Enter the current time as HH:MM:SS, i.e. 12:34:13 :";
510 INPUT A$
520 IF LEN(A$)<>8 THEN 500
525 A$="XX-XXX-XX "&A$
```

V. FLOWCHART

## TITLE

4050 Series Clock Program

## ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 12VI. SAMPLE OUTPUT - 12 hour clock, showing the time 1:57.

# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|  |  |  |
|--|--|--|
| TITLE<br><b>GRANULOMETRY</b>                                   |  | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 13 |
| ORIGINAL DATE<br>Nov. 6, 1981                                  |  | EQUIPMENT AND OPTIONS REQUIRED<br>NONE                     |
| AUTHOR<br>G.L. Kirkpatrick<br>Dept. of Geology, Fla. St. Univ. |  | PERIPHERALS<br>SEE BELOW                                   |

#### ABSTRACT

This program uses raw weights in equally spaced size classes of sieve data and calculates the following statistical parameters; Mean, Standard Deviation, Skewness, Kurtosis, weight percent and cumulative weight percent (by size class), total sample weight, and nine important percentile values for the sample.

Four separate pages of output are produced by this program. The first contains moment measures and weight percent data. The second contains percentile information. The third is a frequency percent by size class histogram. The last is a probability plot of cumulative frequency percent data. All input and output are designed to be in grams (for weight) and phi units (for size).

---

#### MEMORY REQUIREMENTS

24K 4050

Statements: 360

Files: 1 ASCII Program

#### PERIPHERALS

4641 Printer (optional)

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TITLE

GRANULOMETRY

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 13INTERNAL DATA STORAGE

| VARIABLE | STORAGE USE                     | TYPE        |
|----------|---------------------------------|-------------|
| E        | raw weight for size class       | array (25)  |
| H        | wt. % for given size class      | array (25)  |
| J        | cum. wt. % for given size class | array (25)  |
| J1       | interval wt. % for percentiles  | array (26)  |
| X1       | class limits for given interval | array (26)  |
| P1       | horizontal graphic axis measure | array (20)  |
| B1       | probability plot values         | array (121) |
| D1       | probability plot value distance | array (121) |
| H1       | graphic axis label              | string      |
| P2       | percentile score of sample      | array (9)   |
| P        | percentile to calculate         | array (9)   |
| D        | class midpoints                 | array (25)  |
| K        | weight percent calc. counter    | simple      |
| C1       | moment measure calc. counter    | simple      |
| B        | class size interval             | simple      |
| A        | number of intervals             | simple      |
| C        | interval starting point         | simple      |
| B9       | beaker weight                   | simple      |
| T        | total sample weight             | simple      |
| S1       | sum for 1st moment              | simple      |
| S2       | sum for 2nd moment              | simple      |
| S3       | sum for 3rd moment              | simple      |
| S4       | sum for 4th moment              | simple      |
| M1       | first moment value (mean)       | simple      |
| M2       | second moment value (st. dev.)  | simple      |
| M3       | third moment value (skewness)   | simple      |
| M4       | fourth moment value (kurtosis)  | simple      |
| L        | maximum class midpoint          | simple      |
| L1       | corrected standard deviation    | simple      |
| W        | minimum class midpoint          | simple      |
| Q\$      | sample label                    | string      |
| H\$      | graphic axis label              | string      |
| X\$      | graphic axis label              | string      |
| E\$      | graphic axis label              | string      |
| C\$      | graphic axis label              | string      |
| Y\$      | graphic axis label              | string      |
| P\$      | graphic axis label              | string      |

|                       |  |
|-----------------------|--|
| TITLE<br>GRANULOMETRY | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 13 |
|-----------------------|--|

METHODS

The program uses standard moment measure calculations to calculate the first four statistical moments of grouped data. This program represents an adaption of the algorithm written by Dr. J.P. May, of a granulometry program written for a ForTran IV compiler. The due credit for his development of computational procedures is hereby acknowledged.

Standard deviation values are corrected values, compute using the formula reported by Folk (1966). Percentile values are calculated using a method of linear interpolation between respective cumulative frequency percent (by weight) values. The plotted points for the probability graph are produced in a similair manner.

Since sedimentologists work, usually in phi size units as reported by Krumbein (1936), the program is presently designed to be used with these units. The program user is reminded that the phi unit is defined as;

$$\text{Phi} = -\log_2 (\text{particle avg. diameter in mm.})$$

OPERATING INSTRUCTIONS

## A. Program Loading

FIND (Program File #) On TEKniques Program tape, file #15.

OLD

## B. Program Execution

RUN

1. NUMBER OF SIEVES ?

Input total number of sieves (size classes)

2. INTERVAL SIZE ?

Input class size in phi units

3. INTERVAL STARTING POINT ?

Input the first size class containing sediment.

4. INPUT BEAKER WEIGHT :

Input beaker weight, note that if tarr weight has been subtracted, enter 0.00

TITLE

GRANULOMETRY

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 13OPERATING INSTRUCTIONS (CONTD.)5. INPUT A SAMPLE LABEL FOR THIS DATA :

Input a one line sample label, identifying the data you are about to process

6. ENTER RAW WEIGHT DATA FOR EACH SIEVE....

At this point, the program will prompt the user by displaying a size value, and requesting the input of the corresponding raw weight values, in grams.

7. DATA OUTPUT

The data will be output on four separate pages. At the end of each page, ? will appear in the lower left hand corner. To continue the output, the user presses the RETURN key. If all 25 values are used PAGE must accompany the RETURN command.

The PAGE key must be pressed after the histogram output to initiate the construction of the probability plot. This requirement is necessary to insure that the histogram, which fills the window, will be removed from the screen.

After the four pages of output, no ? will appear. To process another sample, simply type RUN.

REFERENCES

Folk, Robert L., 1966, A review of grain size parameters, Sedimentology, V.6, p. 73-93.

Krumbein, William C., 1936, Application of logarithmic moments to size frequency distributions of sediment, Jour. Sediment. Petrology, V. 6, p. 35-47.

GREAT SAND DUNES #1  
 TOTAL SAMPLE WEIGHT  
 SAMPLE MEAN  
 STANDARD DEVIATION  
 SAMPLE SKEWNESS  
 SAMPLE KURTOSIS

=59.381 GRAMS  
 =2.30424293966  
 =0.467219280182  
 =0.18162000166  
 =3.41102022734

| MIDPOINT | WEIGHT | WEIGHT %         | CUMULATIVE %     |
|----------|--------|------------------|------------------|
| 0.5      | 0.002  | 0.00336808069921 | 0.00336808069921 |
| 0.75     | 0.03   | 0.0505212104882  | 0.0538892911874  |
| 1.0      | 0.12   | 0.202084841953   | 0.25597413314    |
| 1.25     | 0.728  | 1.22598137451    | 1.48195550765    |
| 1.5      | 0.871  | 4.93487984372    | 6.31693535138    |
| 1.75     | 0.977  | 10.0655091696    | 16.392344521     |
| 2.0      | 12.479 | 21.0151395227    | 37.3974840437    |
| 2.25     | 12.487 | 21.0286118455    | 58.4260958893    |
| 2.5      | 11.106 | 18.7029521227    | 77.129048012     |
| 2.75     | 7.143  | 12.0291002172    | 89.1581482292    |
| 3.0      | 3.139  | 5.28620265742    | 94.4443508866    |
| 3.25     | 2.23   | 3.75540997962    | 98.1997608663    |
| 3.5      | 0.728  | 1.22598137451    | 99.4257422408    |
| 3.75     | 0.187  | 0.314915545376   | 99.7406577862    |
| 4.0      | 0.087  | 0.146511510416   | 99.8871692966    |
| 4.25     | 0.067  | 0.112830703424   | 100              |

TITLE  
 Granulometry

PAGE NUMBER 99  
 ABSTRACT NUMBER  
 TEKniques Vol. 6 No. 3 T1  
 Program 13

TITLE

Granulometry

ABSTRACT NUMBER  
TEKniques Vol. 6 No. 3 T1  
Program 13

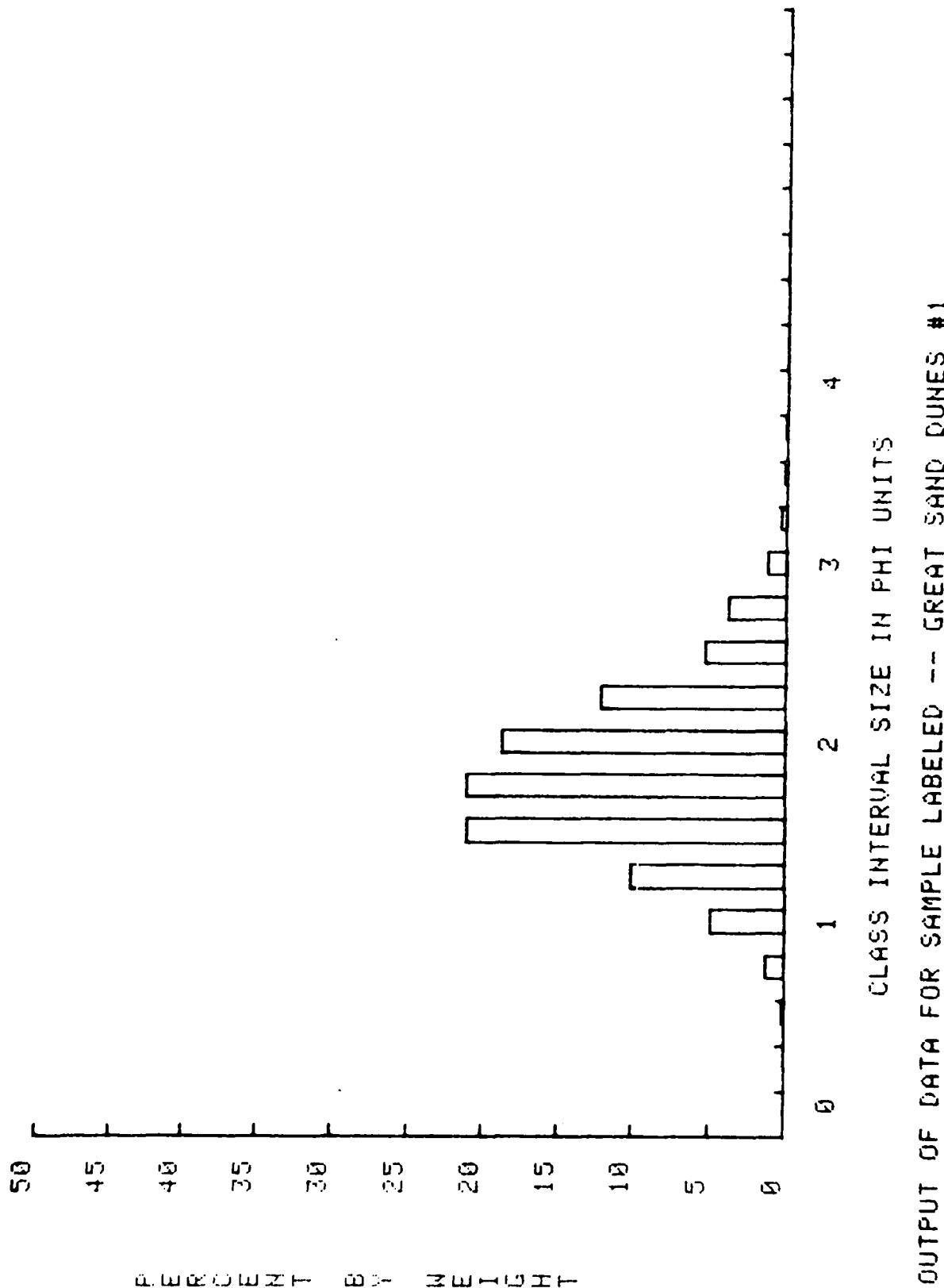
## OUTPUT OF PERCENTILE DATA FOR -- GREAT SAND DUNES #1

| PERCENTILE | PHI VALUE      |
|------------|----------------|
| 1          | 1. 27672046703 |
| 5          | 1. 55690961338 |
| 16         | 1. 86550359712 |
| 25         | 1. 97751722894 |
| 50         | 2. 27482581885 |
| 75         | 2. 59654128399 |
| 94         | 2. 76779854403 |
| 95         | 3. 16198991031 |
| 99         | 3. 53818337912 |

TITLE

Granulometry

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 13

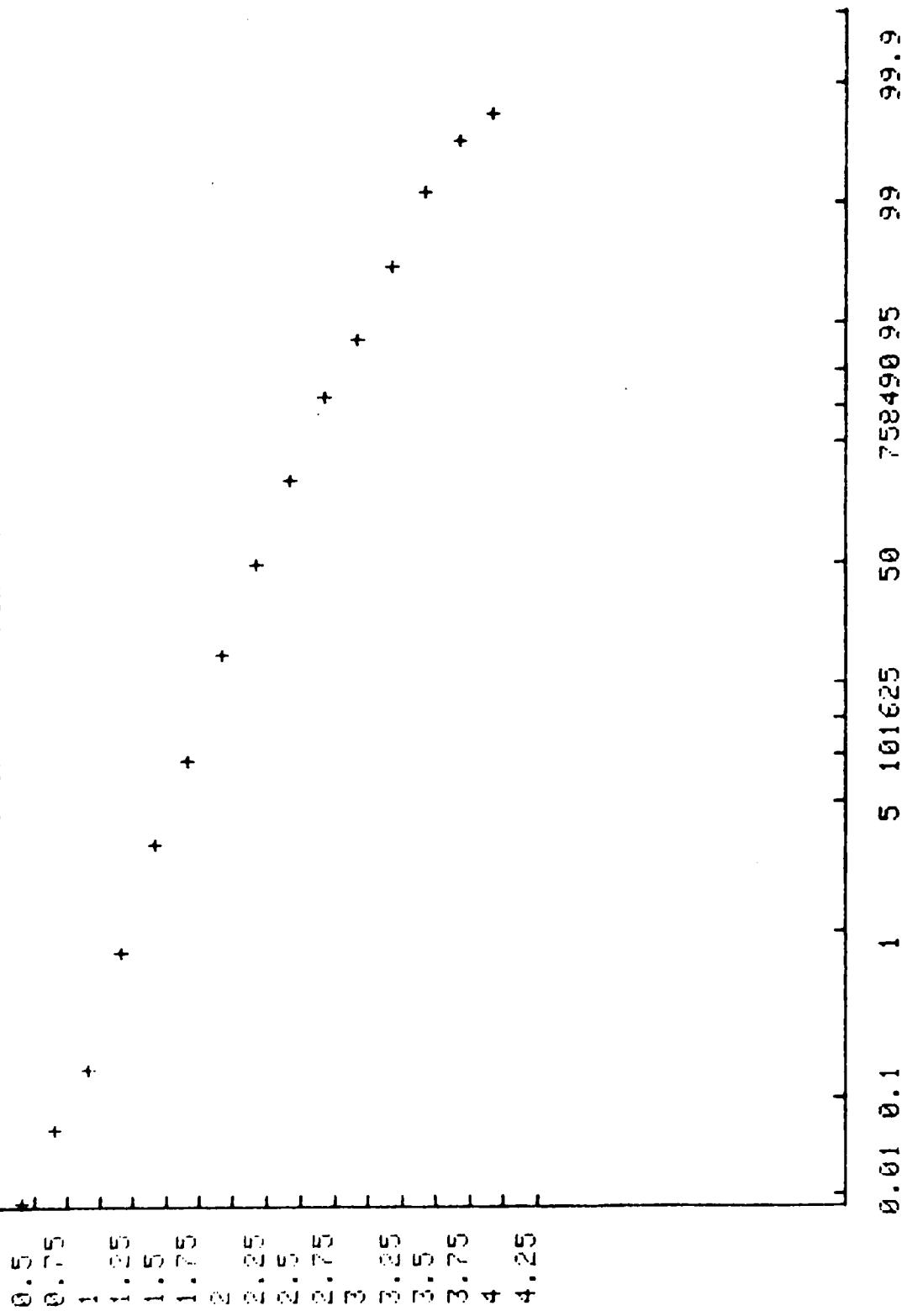
TITLE

Granulometry

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 13

FREQ. DIST. OF GRN SIZE US. % BY WT.



OUTPUT FOR SAMPLE LABELED -- GREAT SAND DUNES #1

# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|   |                                     |  |
|---|-------------------------------------|--|
| TITLE<br>Graphical Linear/Nonlinear Regression Analysis |                                     | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 14 |
| ORIGINAL DATE<br>May, 1981                              |                                     | EQUIPMENT AND OPTIONS REQUIRED<br>32K                      |
| AUTHOR<br>Khiem Ho<br>George Tzitzikalakis              | Columbia University<br>New York, NY | PERIPHERALS<br>4662 Plotter                                |

## ABSTRACT

Files: 1 ASCII Program      Statements: 900  
1 ASCII Text

This program can

- a) plot two- or three-parametered functions defined by the user.
- b) analyze data by nonlinear least squares fit to an arbitrary function, linear least squares fit to a polynomial, or linear regression with confidence bands.
- c) plot scatter diagram as well as the best-fitted curve.

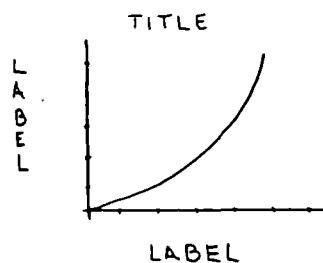
## DESCRIPTION

We will describe the three different functions of this program separately.

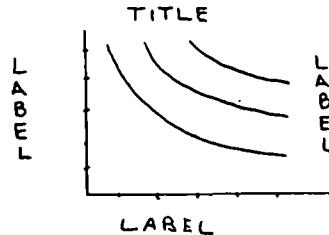
### a) User-defined function plotting.

The user will define a function by the "DEFINE FNA(X)" statement; and select the appropriate dimensions for the X- and Y-axes, as well as necessary labels and title. The program will plot the function in the following format:

#### i) two parameters:



#### ii) three parameters:



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TITLE  
GRAPHICAL LINEAR/NONLINEAR REGRESSION  
ANALYSIS

ABSTRACT NO:

TEKniques Vol. 6 No. 3 T1  
Program 14

## b) Data regression analysis.

## i) Nonlinear least squares fit to an arbitrary function:

The user will determine which type of function is appropriate for his/her data, and define the function by the "DEFINE FNA(X)" statement with unknown coefficients in an array A. The program will find the values of coefficients which make that function best fitting to the data (ie. with the smallest CHI value). The method used is successive approximation as suggested by reference #1.

## ii) Linear least squares fit to a polynomial:

The user will select which order of polynomial is appropriate for his/her data. The program will find the best coefficients for the polynomial. For details of the algorithm, please see reference #1.

$$Y = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$$

## iii) Linear regression with confidence bands:

The user will decide which confidence bands (ie. .95, etc.) he/she will need for his/her data. The program will find the best fitted curve and its appropriate confidence limits by the following formulae from Reference #2:

\*best-fit line:  $\hat{Y} = \hat{B}_0 + \hat{B}_1 \hat{X}$

where  $\bar{X} = (\sum_{i=1}^N X_i)/N$

$\bar{Y} = (\sum_{i=1}^N Y_i)/N$

$\hat{B}_1 = \frac{\sum_{i=1}^N (X_i - \bar{X})(Y_i - \bar{Y})}{\sum_{i=1}^N (X_i - \bar{X})^2}$

$\hat{B}_0 = \bar{Y} - \hat{B}_1 \bar{X}$

## \*confidence bands (for a sample):

$$Y = \hat{Y}_{X_0} \pm (t_{n-2, 1-\alpha/2}) s_{Y|x} \sqrt{\frac{1/N + \frac{(X_0 - \bar{X})^2}{\sum_{i=1}^N (X_i - \bar{X})^2}}{}}$$

$$s_{Y|x}^2 = (1/(N-2)) \sum_{i=1}^N (Y_i - \hat{Y}_i)^2$$

Note that for the confidence bands of a population, a value of 1 should be added to the sum under the square root term of the confidence formula above.

## TITLE

GRAPHICAL LINEAR/NONLINEAR REGRESSION  
ANALYSIS

## ABSTRACT NO:

TEKniques Vol. 6 No. 3 T1  
Program 14c) Plotting.

The user has the freedom to select the format of the plotting: parameters of the axes, labels, connection of data points, symbols for data. The user can also select the necessary plotting: two- or three-parametered function, scatter diagram with/without the best-fitting curve, linear regression with confidence bands, etc.

REFERENCES

- 1) Wilbert Hubin, "Basic Programming for Scientists and Engineers", Prentice-Hall, Englewood Cliffs, NJ 1978.
- 2) Kleinbaum and Kupper, "Applied Regression Analysis and Other Multivariable Methods", Duxbury Press, Mass., 1978.

TITLE  
GRAPHICAL LINEAR/NONLINEAR REGRESSION  
ANALYSIS

TEKniques Vol. 6 No. 3 T1  
Program 14

DATA TAPE STRUCTURE:

One data file is required for the T-table. The T-table file accompanied this program contains data for  $\theta$  at .05, .025, .01 and .005. This table was taken from the last four columns of TABLE A-2 of reference #2 (p. 495).

LIST OF VARIABLES

|             |  |
|-------------|--|
| F1          | flag for drawing axes                                    |
| F2          | type of plotting   |
| F3          | flag to present menu                                     |
| F4          | flag whether data is present.                            |
| F7          | type of symbols  |
| F8          | type of data point connection                            |
| F9          | flag for calculation of default axis parameters          |
| L           | desired dash length for data connection                  |
| N           | number of data points                                    |
| O9          | selection of output device                               |
| X,Y         | arrays containing X and Y data coordinates respectively. |
| S\$         | character symbol for data                                |
| X\$         | X-axis' label  |
| Y\$         | Y-axis' label  |
| Z\$         | Z-axis' label  |
| T\$         | title  |
| FNA(X)      | function to be plotted.                                  |
| O6, O7      | flags for confidence bands                               |
| W1,W2,W3,W4 | window's parameters                                      |
| V1,V2,V3,V4 | position's (or viewport's) parameters                    |

TITLE  
GRAPHICAL LINEAR/NONLINEAR REGRESSION  
ANALYSIS

ABSTRACT NO:  
TEKniques Vol. 6 No. 3 T1  
Program 14

**FLOWCHART**

The flowchart is done by line numbers since the program is built on various subroutines.

|             |  |
|-------------|--|
| 100 - 220   | initialization                                       |
| 225 - 315   | Management level                                     |
| 320 - 420   | Plotting level                                       |
| 430 - 560   | Axis level   |
| 600 - 825   | routine to plot                                      |
| 830 - 875   | accept position of plot                              |
| 880 - 940   | accept symbols for data points                       |
| 945 - 982   | accept type of connection of data                    |
| 984 - 1245  | input of ranges of axes                              |
| 1250 - 1300 | accept type of plot                                  |
| 1305 - 1350 | accept all labels                                    |
| 1355 - 1415 | find default axis interval                           |
| 1420 - 1640 | draw axes  |
| 1645 - 1775 | enter data   |
| 1780 - 1855 | change data  |
| 1860 - 1945 | delete data  |
| 1950 - 2080 | insert data  |
| 2085 - 2125 | list data  |
| 2130 - 2245 | load data from tape                                  |
| 2250 - 2390 | store data from tape                                 |
| 2395 - 2555 | prompt for mnemonic input                            |
| 2560 - 2610 | instruction to define a function for plotting        |
| 2615 - 3030 | linear least squares fit to a polynomial             |
| 3035 - 3615 | nonlinear least squares fit to an arbitrary function |
| 3620 - 3815 | various routines to draw symbols for data            |
| 5000 - 5320 | dash line routine                                    |
| 6000 - 6420 | linear regression w/confidence bands                 |
| 6600 - 6810 | t-table look-up.                                     |

TITLE

Graphical Linear/Nonlinear Regression Analysis

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 14LOADING INSTRUCTIONS

Load the program through the tape directory or FIND 16, OLD and RUN.

The Table is located on file 17.

TITLE  
GRAPHICAL LINEAR/NONLINEAR REGRESSION  
ANALYSIS

ABSTRACT NO:  
TEKniques Vol. 6 No. 3 T1  
Program 14

### OPERATION OF PROGRAM

There are three levels of command in this program. At each level, the user must issue mnemonics, in response to the prompt, for various tasks which he/she wants. Once a task is performed, the user will be prompted for another mnemonic at the present level. The three levels and their connections are as follows:

#### 1. Management:

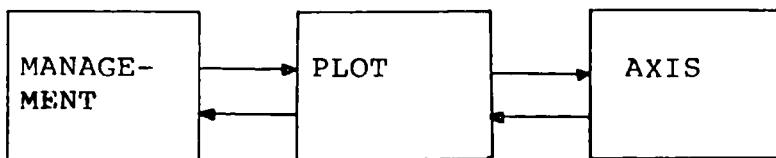
This level accepts, changes, deletes, inserts, stores data; and performs linear as well as nonlinear fitting of data to a function. This level can go to Plotting level only.

#### 2. Plotting:

This level accepts format for the plotting of the function and/or data, and performs the plotting. This level can go to both the Management and Axis levels.

#### 3. Axis:

This level accepts the format for the axes to be drawn, as well as labels and title. This level can go to Plotting level only.



The Mnemonics for each level are self-explanatory in the respective menu.

Note that the user can quit the present task by entering a mnemonic at a numerical input prompt. In this case, all previously entered data in that task are still effective.

To execute this program, load the program onto memory in BASIC mode, and press KEY #1 from left to run the program. Initially, the program will always be at MANAGEMENT level. Enter the appropriate mnemonics for different type of plotting and data analysis which the user desires.

TITLE  
GRAPHICAL LINEAR/NONLINEAR REGRESSION  
ANALYSIS

TEKniques Vol. 6 No. 3 T1  
Program 14

Following are typical descriptions of steps to follow for different types of plotting.

a) User-defined function (3 parameters)

- go straight to PLOT level from MANAGEMENT level.
- Enter FUN to get instructions for defining a function,
- and to define the function as instructed.
- press key #2 and enter AXI to format the axes.
- format the axes by entering appropriate mnemonics
- enter PLO to go back to PLOT level
- enter SCR or PRI to see the plot.

b) Nonlinear regression

- Enter ENT to enter data.
- Enter FIT to perform the nonlinear regression, and follow the steps as requested.
- Once the FIT task is performed, enter PLO to go to PLOT level.
- Enter AXI to format the axes.
- Enter PLO to go back to PLOT level.
- Enter appropriate mnemonics at this PLOT level to format the plotting (eg. TYP, SYM, LIN)
- Enter SCR or PRI for output.

c) Linear regression with confidence bands

- Enter ENT to enter data.
- Enter CON to perform the linear regression w/ confidence bands.
- Enter PLO to go to PLOT level.
- Enter AXI to enter AXIS level.
- Enter appropriate mnemonics to format the axes.
- ENter PLO to go back to PLOT level.
- Enter TYP to tell the program that this is confidence band plot, ie. #5 plot.
- Enter appropriate mnemonics to format the plotting.
- Enter SCR or PRI for output.

# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|  |  |  |
|--|--|--|
| TITLE  |  | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 15         |
| ORIGINAL DATE<br>2/25/82   |  | EQUIPMENT AND OPTIONS REQUIRED<br>Standard and options 20,21,or 22 |
| AUTHOR<br>Paul J. Ossenbruggen - Department of CIE, UNH<br>Durham NH 03824 |  | PERIPHERALS<br>Matrix ROM pack, line printer                       |

## ABSTRACT

This program is an educational tool designed to eliminate tedious mathematical calculations and allow a student to focus his or her attention upon the methodology of solving optimization problems consisting of a linear objective function and a set of linear constraints by the two phase simplex method.

## DESCRIPTION

The simplex method is a technique for finding the optimum solution of a mathematical model consisting of a linear objective function and a set of linear constraint equations of the form:

$$\begin{aligned} \text{minimize } z &= c_1x_1 + c_2x_2 + \dots + c_nx_n \\ a_{i1}x_1 + a_{i2}x_2 + \dots + a_{in}x_n &\quad \{ =, \geq, \leq \} b_i \end{aligned} \quad \text{Eq (1)}$$

where  $i = 1, 2, \dots, m$

$$x_1 \geq 0 \quad x_2 \geq 0, \dots \quad x_n \geq 0$$

where  $n > m$ , the number of variables of  $x, x_1, x_2, \dots, x_n$ , is greater than the number of constraint equations  $m$ .

In matrix notation, this model is represented as:

$$\begin{aligned} \text{minimize } z &= \underline{c}' \cdot \underline{x} \\ \underline{A} \cdot \underline{x} &\quad \{ =, \leq, \geq \} \underline{b} \\ \underline{x} &\geq \underline{0} \end{aligned}$$

By introducing slack, surplus, and artificial variables, the model is transformed into a model consisting of two linear objective functions and a set of linear constraint equations with strict equalities. The transformed mathematical model has the form:

$$\begin{aligned} \text{minimize } z &= \underline{c}' \cdot \underline{x} \\ \text{minimize } (w - w^0) &= \underline{d}' \cdot \underline{x} \\ \underline{A} \cdot \underline{x} &= \underline{b} \end{aligned} \quad \text{Eq (2)}$$

The program material contained herein is supplied without warranty or representation of any kind. Tektronix, Inc., assumes no responsibility and shall have no liability, consequential or otherwise, of any kind arising from the use of this program material or any part thereof.

## TITLE

Two Phase Simplex Method

## ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 15

where the  $x$  vector consists of the original variables plus the slack, surplus and artificial variables. The second objective function is equal to the sum of the artificial variables. The two phase simplex method is an efficient method of finding the optimum solution.

The program presented here is an interactive program designed to be used by students learning the two phase simplex method. The student must know how to transform the original model, Eq. (1) to the standard two phase simplex form, Eq. (2). The parameters of the model,  $c$ ,  $d$ ,  $b$ ,  $w^0$  and  $A$  are introduced and stored in the computer as constants, vectors and matrices. By eliminating tedious mathematical calculations, the student is able to focus his or her attention on learning the rules of the method. The use of the program is most easily illustrated by example.

INTERNAL DATA STORAGE

The following are input parameters

| Variable | Used to Store                      | Type           |
|----------|------------------------------------|----------------|
| N        | Number of variables in $x$ vector  | Simple         |
| M        | Number of constraint equations $m$ | Simple         |
| C        | Parameters of the $c$ vector       | C (1, N) array |
| B        | Parameters of the $b$ vector       | B (M, 1) array |
| A        | Parameters of the $A$ matrix       | A (M, N) array |
| W        | The value of $w^0$                 | W (1, 1) array |
| D        | Parameters of the $d$ vector       | D (1, N) array |
| E        | Element of the basic vector        | E (M) array    |
| F        | Element of the nonbasic vector     | F (N-M) array  |

OPERATING INSTRUCTIONS

This program is interactive; therefore, the user inputs this information as listed above when requested. The user must follow the rules of the simplex method. These rules are found in the reference textbook or in basis texts on operations research and systems analysis. After the optimum solution is found, the program is terminated by pressing the "Break" button.

EXAMPLE

Given: minimize  $z = -2x_1 - x_2$

$$2x_1 + 3x_2 \geq 6$$

$$2x_1 + x_2 \leq 6$$

$$-x_1 + x_2 \geq 0$$

$$x_1 \geq 0 \quad x_2 \geq 0$$

| TITLE   | ABSTRACT NUMBER                         |
|---|---|
| Two Phase Simplex Method  | TEKniques Vol. 6 No. 3 T1<br>Program 15 |
| <b>Formulation of the model:</b>  |   |
| Introduce a slack variable $x_4$ and surplus variables, $x_3$ and $x_5$ , to remove the inequality constraints. The model becomes   |   |
| $\begin{aligned} \text{minimize } z &= -2x_1 - x_2 \\ 2x_1 + 3x_2 - x_3 &= 6 \\ 2x_1 + x_2 + x_4 &= 6 \\ -x_1 + x_2 - x_5 &= 0 \\ x_1 \geq 0, x_2 \geq 0, \dots, x_5 \geq 0 \end{aligned}$  |   |
| Introduce artificial variables in the first and third equations, $x_6$ and $x_7$ .  |   |
| The artificial objective function is:   |   |
| $w = x_6 + x_7 \Rightarrow (w-6) = -x_1 - 4x_2 + x_3 + x_4$   |   |
| The model becomes   |   |
| $\begin{aligned} \text{minimize } (w-6) &= -x_1 - 4x_2 + x_3 + x_5 \\ \text{minimize } z &= -2x_1 - x_2 \\ 2x_1 + 3x_2 - x_3 + x_6 &= 6 \\ -x_1 + x_2 + x_4 &= 6 \\ -x_1 + x_2 - x_5 + x_7 &= 0 \\ x_1 \geq 0, x_2 \geq 0, \dots, x_7 \geq 0 \end{aligned}$ |   |
| In matrix notion  |   |
| $\text{minimize } (w - w^0) = \underline{d}' \cdot \underline{x}$   |   |
| $\text{minimize } z = \underline{c}' \cdot \underline{x}$   |   |
| $\underline{A} \cdot \underline{x} = \underline{b}$   |   |
| $\underline{x} \geq 0$  |   |

## TITLE

Two Phase Simplex Method

## ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 15

where

$$\underline{c}' = [-2 \ -1 \ 0 \ 0 \ 0 \ 0 \ 0]$$

$$\underline{b}' = [ \ 6 \ 6 \ 0 \ ]$$

$$\underline{A} = \left| \begin{array}{ccccccc} 2 & 3 & -1 & 0 & 0 & 1 & 0 \\ 2 & 1 & 0 & 1 & 0 & 0 & 0 \\ -1 & 1 & 0 & 0 & -1 & 0 & 1 \end{array} \right|$$

$$\underline{d}' = [-1 \ -4 \ 1 \ 1 \ 0 \ 0 \ 0]$$

$$w^0 = 6$$

## PROGRAM EXECUTION

The parameters of  $\underline{c}$ ,  $\underline{b}$ ,  $\underline{A}$ ,  $\underline{d}$ ,  $w^0$  are input to the program. The initial basis variables are 6, 4, and 7 and the nonbasic variables are 1, 2, 3, 5. The variables are input when requested. The model is output on the screen or on a line printer. (change line 120, P = 32 for screen output). See attached sample output sheet.

The optimum solution is found in three iterations. The necessary steps are shown on the attached sample output sheet. The optimum solution is

$$z^* = 6$$

$$x_1^* = 2$$

$$x_2^* = 2$$

$$x_3^* = 4$$

$$x_4^* = x_5^* = x_6^* = x_7^* = 0$$

REFERENCE

Paul J. Ossenbruggen "Systems Analysis for Civil Engineers", John Wiley & Sons, to be published in the fall of 1982.

TITLE

Two Phase Simplex Method

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 15LOADING INSTRUCTIONS

On the TEKniques Vol. 6 No. 3 T1 program tape, this program occupies File #18. To load the program, auto load the tape and choose from the directory file, or

FIND 18

OLD

RUN

TITLE

Two Phase Simplex Method

ABSTRACT NUMBER  
TEKniques Vol. 6 No. 3 T1  
Program 15

| BASIS | 1      | 2      | 3      | 4     | 5      | 6      | 7      | B      |
|-------|--------|--------|--------|-------|--------|--------|--------|--------|
| 6     | 2.000  | 3.000  | -1.000 | 0.000 | 0.000  | 1.000  | 0.000  | 6.000  |
| 4     | 2.000  | 1.000  | 0.000  | 1.000 | 0.000  | 0.000  | 0.000  | 6.000  |
| 7     | -1.000 | 1.000  | 0.000  | 0.000 | -1.000 | 0.000  | 1.000  | 0.000  |
| z row | -2.000 | -1.000 | 0.000  | 0.000 | 0.000  | 0.000  | 0.000  | 0.000  |
| w row | -1.000 | -4.000 | 1.000  | 0.000 | 1.000  | 0.000  | 0.000  | 6.000  |
|       |        | ↑      |        |       |        |        |        |        |
| BASIS | 1      | 2      | 3      | 4     | 5      | 6      | 7      | B      |
| 6     | 5.000  | 0.000  | -1.000 | 0.000 | 3.000  | 1.000  | -3.000 | 6.000  |
| 4     | 3.000  | 0.000  | 0.000  | 1.000 | 1.000  | 0.000  | -1.000 | 6.000  |
| 2     | -1.000 | 1.000  | 0.000  | 0.000 | -1.000 | 0.000  | 1.000  | 0.000  |
| z row | -3.000 | 0.000  | 0.000  | 0.000 | -1.000 | 0.000  | 1.000  | 0.000  |
| w row | -5.000 | 0.000  | 1.000  | 0.000 | -3.000 | 0.000  | 4.000  | 6.000  |
|       |        | ↑      |        |       |        |        |        |        |
| BASIS | 1      | 2      | 3      | 4     | 5      | 6      | 7      | B      |
| 1     | 1.000  | 0.000  | -0.200 | 0.000 | 0.600  | 0.200  | -0.600 | 1.200  |
| 4     | 0.000  | 0.000  | 0.600  | 1.000 | -0.800 | -0.600 | 0.800  | 2.400  |
| 2     | 0.000  | 1.000  | -0.200 | 0.000 | -0.400 | 0.200  | 0.400  | 1.200  |
| z row | 0.000  | 0.000  | -0.600 | 0.000 | 0.800  | 0.600  | -0.800 | -3.600 |
| w row | 0.000  | 0.000  | 0.000  | 0.000 | 0.000  | 1.000  | 1.000  | 0.000  |
|       |        | ↑      |        |       |        |        |        |        |
| BASIS | 1      | 2      | 3      | 4     | 5      | 6      | 7      | B      |
| 1     | 1.000  | 0.000  | 0.000  | 0.333 | 0.333  | 0.000  | -0.333 | 2.000  |
| 3     | 0.000  | 0.000  | 1.000  | 1.667 | -1.333 | -1.000 | 1.333  | 4.000  |
| 2     | 0.000  | 1.000  | 0.000  | 0.333 | -0.667 | 0.000  | 0.667  | 2.000  |
| z row | 0.000  | 0.000  | 0.000  | 1.000 | 0.000  | 0.000  | 0.000  | -6.000 |
| w row | 0.000  | 0.000  | 0.000  | 0.000 | 0.000  | 1.000  | 1.000  | 0.000  |

SAMPLE OUTPUT



# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|  |               |  |
|--|---------------|--|
| TITLE  |               | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 16 |
| Exercise Test Evaluation   |               | EQUIPMENT AND OPTIONS REQUIRED                             |
| ORIGINAL DATE<br>February 9, 1982  | REVISION DATE | 32K  |
| AUTHOR<br>Glenn Street<br>Cleveland Clinic Foundation<br>Cleveland, Ohio |               | PERIPHERALS<br>Optional - 4611 Printer                     |

## ABSTRACT

1. Description. This product graphically displays a patient's heart rate, blood pressures (systolic & diastolic) and rate pressure product responses to an exercise or stress test. The following data is entered via the keyboard before the plot can be generated:

- a. Patient's Name
- b. Patient's Clinic Number
- c. Date
- d. Identify Type of Test (Treadmill, Bicycle, Step)
- e. Workload Labels:
  - a. Speed (mph) and % grade of treadmill, or
  - b. Kpm/min, if using bicycle ergometer, or
  - c. Steps/min, if conducting a step test
- f. Selection of optional rest and/or recovery(ies) interval; to be included on exercise graph.
  - a. If recovery interval/s are selected, the recovery minute numbers(s) must be specified by user.
- g. Heart rates and blood pressures (systolic & diastolic) for each interval of test (workloads and, if selected, rest and/or recovery(ies).intervals).

The rate pressure product is calculated for the user. The following data can be easily edited at any time using the keyboard.

1. Workload labels
2. Heart rates
3. Blood pressures (systolic & diastolic)

If your lab uses the same protocol(s) (treadmill, bicycle & step) regularly, the program allows you to store your protocols on tape for future recall; hence, eliminating the need to enter workload labels each time you plot a patient's test results.

The program material contained herein is supplied without warranty or representation of any kind. Tektronix, Inc., assumes no responsibility and shall have no liability, consequential or otherwise, of any kind arising from the use of this program material or any part thereof.

| TITLE  | ABSTRACT NUMBER                         |
|--|---|
| Exercise Test Evaluation   | TEKniques Vol. 6 No. 3 T1<br>Program 16 |
| <u>PRELIMINARY OPERATING INSTRUCTIONS</u>  |   |
| <p>The Exercise Test Evaluation program file must be transferred from TEKniques tape to a dedicated tape.</p> <p>Following the instructions on page iii, transfer file 19 from TEKniques Vol. 6 No. 3 T1 program tape to a tape dedicated to Exercise Test Evaluation.</p> |   |

|                          |  |
|--------------------------|--|
| TITLE                    | ABSTRACT NUMBER                        |
| Exercise Test Evaluation | TEKnikes Vol. 6 No. 3 T1<br>Program 16 |

## 2. Data Tape Structure

The tape must have one file (#2) pre-marked. Additional files are formed through program execution as the user stores protocols.

The files on tape are as follows:

| <u>File No</u> | <u>Type of Data</u> | <u>Storage Space</u> |
|----------------|---------------------|----------------------|
| 1              | ASC II Prog         | 19200                |
| 2              | Binary Data         | 1024                 |
| 3              | Binary              | 1024                 |
| :              | :                   | :                    |

### File 2

The names of the protocols are stored in this file. This list of protocol names is formed by program control as user enters protocol. The two variables stored in File 2 are:

N = Number of protocols stored by user.  
N = Ø until user stores a protocol.

N\$ = Name of protocol(s) stored.

### Files 3 thru 20

These binary files are marked during program control to allow the user to store a protocol in each file. The variables in each file are:

| <u>Variable</u> | <u>Used to Store</u>          | <u>Type</u>     |
|-----------------|-------------------------------|-----------------|
| W               | Intervals in protocol         | Simple          |
| W\$             | Workload labels               | String (W\$x15) |
| WØ              | Position of substrings in W\$ | Array (W)       |
| WI              | Length of substrings in W\$   | Array (W)       |
| A\$             | Type of test                  | String          |
| S\$             | Units of measure              | String          |
| * I\$           | Units of measure              | String          |

\* Only stored with treadmill protocols.

All files are designed to reside on one tape (program tape).

| TITLE                           | ABSTRACT NUMBER                         |           |
|---------------------------------|---|-----------|
| Exercise Test Evaluation        | TEKniques Vol. 6 No. 3 T1<br>Program 16 |           |
| <b>3. Internal Data Storage</b> |   |           |
| <u>Variable</u>                 |   |           |
| D                               | Diastolic BP's                          | Array (W) |
| F                               | Flag                                    | Simple    |
| G                               | Menu choice                             | Simple    |
| H                               | Heart rates                             | Array (W) |
| J                               | Loops                                   | Simple    |
| K                               | Loops                                   | "         |
| L                               | Editing choice                          | "         |
| N                               | Number of stored protocols              | "         |
| P                               | Reuseable                               | "         |
| Q                               | Counter in Loops                        | "         |
| R                               | Rate Pressure Products                  | Array (W) |
| S                               | Systolic BP's                           | Array (W) |
| W                               | No of plotted intervals                 | Simple    |
| Z                               | Reuseable                               | "         |
| DØ                              | Horizontal distance                     | "         |
| D1                              | Vertical distance                       | "         |
| D2                              | Distance between points                 | "         |
| JØ                              | No of recovery minutes                  | "         |
| RØ                              | Editing RPP                             | Array (W) |
| SØ                              | Editing Systolic                        | Array (W) |
| S1                              | Horizontal User Data Units              | Simple    |
| S2                              | Vertical User Data Units                | "         |
| UØ                              | Edit W\$                                | Array (W) |
| U1                              | " "                                     | " "       |
| WØ                              | Position of substrings in W\$           | " "       |
| W1                              | Length " " " "                          | " "       |
| V1                              | Viewport X-min                          | Simple    |
| V2                              | " X-max                                 | "         |
| V3                              | " Y-min                                 | "         |
| V4                              | " Y-max                                 | "         |
| A\$                             | Type of test                            | String    |
| C\$                             | Clinic number                           | "         |
| D\$                             | Date                                    | "         |
| E\$                             | Editing                                 | "         |
| I\$                             | Elevation of treadmill                  | "         |
| J\$                             | Reuseable                               | "         |
| K\$                             | Reuseable                               | "         |
| L\$                             | "                                       | "         |
| N\$                             | Name                                    | "         |
| O\$                             | Reuseable                               | "         |
| S\$                             | Single workload units                   | "         |
| U\$                             | Reuseable                               | "         |
| W\$                             | Workloads                               | " (15xW)  |

|   |  |
|---|--|
| TITLE<br>Exercise Test Evaluation   | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 16 |
| <p>4. Methods</p> <p>The program was written to allow the user to store their protocol(s). Whether they choose to store a protocol, the program is set up to allow the user to enter post-exercise patient information to have it plotted. No use of user defineable keys is required (all menu selection).</p> |  |
| <p>5. Operating Instructions</p>  |  |
| <p>b. Program loading.</p>  |  |
| <p>Find 1</p>   |  |
| <p>Old</p>  |  |
| <p>Run</p>  |  |
| <p>The flow of the program is both natural and flexible. Examples of menus, questions and the final graph are included.</p>   |  |

TITLE

Exercise Test Evaluation

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 16

## MENU

- 
- 1.....ENTER TEST RESULTS
  - 2.....PRINTOUT GRAPH
  - 3.....EDIT DATA
  - 4.....STORE YOUR LAB`S PROTOCOL(S)

Please enter a number.1

What is the patient's name? JIMMY JONES

What is their clinic number? 1-283-938

What is the date? 9-FEB-82

Is the above data correct (Y or N)? Y

TITLE

Exercise Test Evaluation

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 16

## PROTOCOL ENTRY

1. MANUALLY ENTER PROTOCOL
2. RECALL PROTOCOL FROM TAPE

Please enter a number. 1

What type of exercise or stress test was performed?

1. Treadmill
2. Bicycle ergometer
3. Step test

Please enter a number. 1

Did you want to enter a RESTING heartrate and blood pressure  
(Y or N)? Y

During how many WORK LOADS did you take measurements(HR's & BP's) ? 5

Did you take RECOVERY (post exercise) blood pressures and heart-  
rates (Y or N)? Y

How many times did you take blood pressures and heartrates  
during RECOVERY? 2

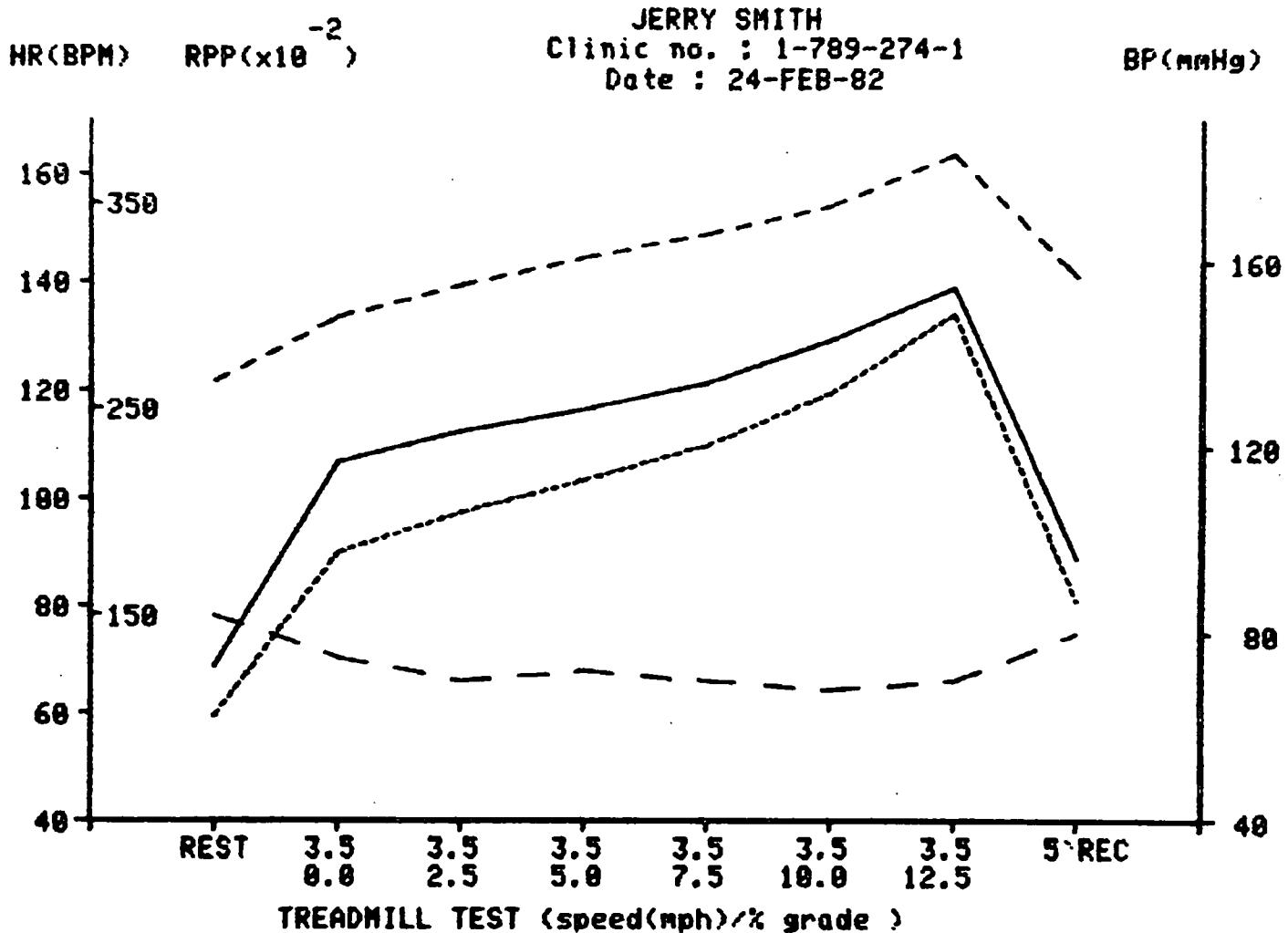
What minutes during RECOVERY did you take the blood pressures and  
heartrates?

1. RECOVERY MINUTE NUMBER? 1
2. RECOVERY MINUTE NUMBER? 3

TITLE

Exercise Test Evaluation

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 16

Heartrate : ——— Systolic BP : - - -  
 Rate Pressure Product : ----- Diastolic BP : - - -

**DESKTOP COMPUTER  
APPLICATIONS LIBRARY PROGRAM**

|                                       |                       |   |
|---------------------------------------|-----------------------|---|
| TITLE                                 |                       | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 17  |
| RDrafting                             |                       | EQUIPMENT AND OPTIONS REQUIRED<br>4054 w/Opt. 30/31 - 64K   |
| ORIGINAL DATE                         | REVISION DATE<br>V3.4 | PERIPHERALS<br>Optional-4907 File Manager<br>4662/3 Plotter |
| AUTHOR<br>Steve Duncan<br>John Carter | Tektronix, Inc.       |   |

ABSTRACT

Files: 7 Binary Programs  
1 Binary Data

Statements: 1600

The Refresh Drafting program enables you to create drawings on the 4054 (with Option 30/31) that can be output to a plotter in color and saved on tape or disk.

The program takes advantage of the refresh graphics capability of the 4054 allowing you to pick a graphic object (any symbol previously defined by you or a standard symbol provided by the program) from a menu, and scale or rotate the object and place the object anywhere in the workspace of the 4054 screen.

A zoom feature allows finite control over detailed drawing in the workspace.

Vectors, labels, editing, status, trim, plotter output, reference grid, and circle/arc drawing are included.

The 4054 screen is divided into three sections. The topmost part, one inch high across the length, contains the menu within which the symbols (or objects) are displayed for picking. Just below is a half-inch space across the screen that contains the program prompt and status message area. The rest of the screen is the workspace where you may develop a drawing of any design or character.

The program material contained herein is supplied without warranty or representation of any kind. Tektronix, Inc., assumes no responsibility and shall have no liability, consequential or otherwise, of any kind arising from the use of this program material or any part thereof.

|                    |  |
|--------------------|--|
| TITLE<br>RDrafting | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 17 |
|--------------------|--|

PRELIMINARY OPERATING INSTRUCTIONS

The files comprising RDrafting must be transferred from TEKniques Vol. 6 No. 3 T1 tape to a tape dedicated to this program, or to a disk.

TRANSFERRING FILES TO TAPE

Following the instructions on page iii, transfer the following files from the TEKniques tape to a new tape:

| FROM<br><u>TEKniques Vol. 6 No. 3 T1</u> |                | TO<br><u>RDrafting Dedicated Tape</u> |                  |               |
|--|----------------|---------------------------------------|------------------|---------------|
| <u>File #</u>                            | <u>Type</u>    | <u>Bytes Required</u>                 | <u>File Name</u> | <u>File #</u> |
| 20                                       | ASCII Program  | 768                                   | RDauto           | 1             |
| 21                                       | BINARY Program | 24064                                 | RDmain           | 2             |
| 22                                       | Binary Data    | 2560                                  | RDhelp           | 3             |
| 23                                       | Binary Program | 2304                                  | RDSave           | 4             |
| 24                                       | Binary Program | 2304                                  | RDold            | 5             |
| 25                                       | Binary Program | 768                                   | Obj0             | 6             |
| 26                                       | Binary Program | 5120                                  | ObjI             | 7             |
| 27                                       | Binary Program | 5120                                  | ObjII            | 8             |
| 28                                       | Binary Program | 5120                                  | ObjIII           | 9             |

MARK Files 10 through 15 on the dedicated tape for 5120 each. These will contain future defined object sets.

MARK Files 16 through 25 for size 15104. These will contain the drawings.

Transfer file 29 on TEKniques tape to File 16 on the dedicated tape if you wish to see the example. It's a binary data file.

TRANSFERRING FILES TO DISK

Mount your disk and insert the TEKniques program tape into your 4050 and key in:

|                                     |                            |
|-------------------------------------|----------------------------|
| FIND 21                             | FIND 23                    |
| CALL "BOLD"                         | CALL "BOLD"                |
| SAVE "RDRAFTING"                    | SAVE "@DRAFTING/OLY/SAVE"  |
| CREATE "@DRAFTING/OLY/HELP";2540,0  | FIND 24                    |
| OPEN "@DRAFTING/OLY/HELP";1,"F",A\$ | CALL "BOLD"                |
| FIND 22                             | SAVE "@DRAFTING/OLY/OLD"   |
| (write a small program)             | FIND 25                    |
| FOR I = 1 to 68                     | CALL "BOLD"                |
| REA @33:K\$                         | SAVE "@DRAFTING/OBJECT/F0" |
| WRI #1:K\$                          | FIND 26                    |
| NEXT I                              | CALL "BOLD"                |
| CLOSE 1                             | SAVE "@DRAFTING/OBJECT/F1" |
| (run the program and the            |                            |
| data file will be transferred)      |                            |

| TITLE     | ABSTRACT NUMBER                         |
|-----------|---|
| RDrafting | TEKniques Vol. 6 No. 3 T1<br>Program 17 |

```
FIND 27
CALL "BOLD"
SAVE "@DRAFTING/OBJECT/F2"
```

```
FIND 28
CALL "BOLD"
SAVE "@DRAFTING/OBJECT/F3"
```

To save the example data file on file 29, load the main program into memory.

After you have chosen the objects you want and they are displayed on the screen, input CTRL-O for the command. You will be prompted for T/D for the file. Input T followed by CR. When prompted for the number, input 29 followed by CR.

The data will be brought in from tape. Once it's displayed and you are prompted for another command, key in CTRL-S. When prompted for T/D, press CR without entering anything. When prompted for a name, input ORIENT. The data will be stored on disk in the file:

@DRAFTING/PLOT/ORIENT

|   |  |
|---|--|
| TITLE<br>RDrafting                            | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 17   |
| <u>Command Summary</u>                        |  |
| A -- Grid On                                  | ESC - Erase, Redraw, Continue  |
| B -- Grid Off                                 | *CTRL-O - Old Plot from Storage  |
| C -- Capture Object                           | CTRL-Q - Quit  |
| D -- Discard Current Object                   | *CTRL-S - Save Plot to Storage   |
| E -- Edit (requires additional key O, V or L) |  |
| F -- Fix Object and Retain for Use            |  |
| G -- Fix Object and Discard                   |  |
| H -- List These Commands                      |  |
| L -- Insert Labels                            | *If you are olding or saving a plot to tape, when prompted for T/D, enter T followed by pressing RETURN key. |
|   | Enter 1, 2, 3 or 4 to scale text   |
|   | Enter CTRL-A to Abort  |
| O -- Plot Objects                             | When prompted for file #, enter file # and follow by pressing RETURN key.                                    |
| P -- Output to Plotter at Device Address #1   |  |
| Q -- Redraw without reference dots or menu    |  |
| S -- Status                                   |  |
| T -- Trim Plot                                |  |
| V -- Create Vectors                           |  |
|   | A - Abort  |
|   | L - Last Point   |
|   | M - Move to Point  |
|   | Other - Draw to Point  |
| X -- Invert Object in X Axis                  |  |
| Y -- Invert Object in Y Axis                  |  |
| Z -- Zoom                                     |  |
| 1 -- Rotate Object Left                       | ↑ -- Scale +10 GDU, Rotate + 90 Degrees  |
| 2 -- Decrease Vertical Scale                  | / -- Scale + 1 GDU, Rotate + 45 Degrees  |
| 3 -- Rotate Object Right                      | * -- Scale + 0.1 GDU, Rotate + 5 Degrees   |
| 4 -- Decrease Horizontal Scale                | - -- Scale + 0.01 GDU, Rotate + 1 Degree   |
| 5 -- Reset Scale, Rotate, Increment           | + -- Scale + 0.001 GDU, Rotate +0.1 Deg.   |
| 6 -- Increase Horizontal Scale                |  |
| 7 -- Decrement Arc End Angle                  |  |
| 8 -- Increment Vertical Scale                 |  |
| 9 -- Increment Arc End Angle                  |  |

TITLE

RDrafting

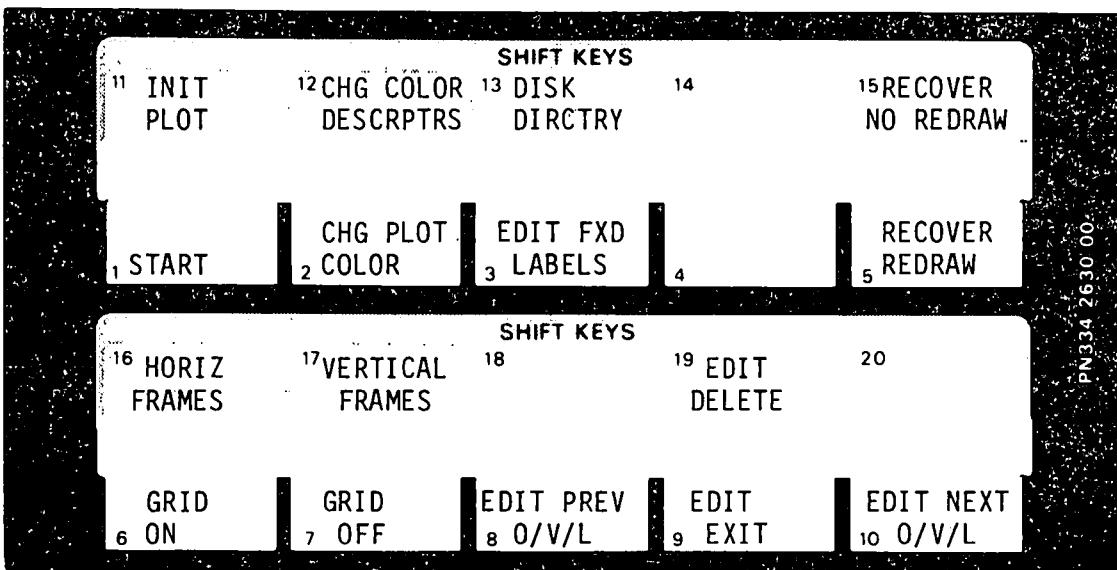
ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 17

TITLE

TAPE #

FILE #



NOTE: Keys 3 - 19 May only be used in EDIT Mode.

TITLE

RDrafting

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 17FILE STRUCTURE - Tape

Once RDrafting has been transferred to your dedicated tape, the file structure will be:

File 1 - The ASCII auto load file.

File 2 - The program file

File 3 - The help message

Files 4 - 13 are reserved for object file subroutines.

File 4 is the SAVE overlay.

File 5 is the OLD overlay.

File 6 is reserved exclusively for the Standard Object set.

Files 7 - 15 are for user-defined object sets.

Files 7, 8 and 9 contain already-defined objects for schematic drafting logic and schematic drafting and facilities layout.

Files 16 - 25 are reserved for saving drafting plots.

FILE STRUCTURE - Disk

Once RDrafting has been transferred to your disk, the file structure will be:

|                       |                             |
|-----------------------|-----------------------------|
| RDRAFTING             | (main program)              |
| @DRAFTING/OLY/HELP    | (help data file)            |
| @DRAFTING/OLY/OLD     | (OLD overlay)               |
| @DRAFTING/OLY/SAVE    | (SAVE overlay)              |
| @DRAFTING/OBJECT/F0   | (standard objects)          |
| @DRAFTING/OBJECT/F1   | (schematic objects)         |
| @DRAFTING/OBJECT/F2   | (schematic & logic objects) |
| @DRAFTING/OBJECT/F3   | (facilities objects)        |
| @DRAFTING/PLOT/ORIENT | (example drawing)           |

TITLE

RDrafting

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 17FEATURESGraphic Entities

Labels: Four character sizes are available using the hardware-generated characters of the 4054. Up to 130 characters may be entered at one time and fully edited. The string may then be scaled (character sizes 1-4) and moved around in refresh before fixing.

Vectors: MOVE, DRAW, LAST and ABORT are the commands available in this routine. Rubber-banding is used to connect the last point fixed with the current cursor position for operator convenience. A small bomb-site is used as the cursor. The 4952 joystick or the keyboard thumbwheels are used to move the bomb-site.

Objects: During a session, up to 15 graphic objects are selected from a menu. Menu picking is done with the crosshairs and a keyboard command. Objects may be scaled, rotated, and translated. Commands for use with objects are: CAPTURE; FIX and REPEAT; FIX and RELEASE; RELEASE.

Zoom

Graphics may be windowed for zeroing in on the detail of any portion of the original scale. Labels are displayed only when the Zoom control factor is set to 1. Labels should not be inserted in any environment other than with a Zoom control factor of 1, otherwise undesirable results will be obtained. Zoom control is in any increment, however, a unit that is divisible by two is recommended (see Reference Grid). Practical zoom control limits are from 2 to 0.001. A refresh window frame (sized relative to the current window) is displayed and the operator may place this frame anywhere in the current window, and change its size if necessary, before executing the zoom command.

Status

A refreshed line of text is displayed beneath the workspace area to show the current graphic environment. Status conditions reported are: Scale (with increment); Rotate (with increment); Zoom factor; Last character size selected; and Current window parameters. Status may be displayed any time on command and is always displayed with any scale command. Any other command deletes the status message from the screen.

Scale

Scaling is incremental in units of 10, 1, .1, .01, and .001 GDU's. Increments are selectable from the keyboard at any time. Selecting Scale increment factors also offsets the Rotate increment factors.

| TITLE     | ABSTRACT NUMBER                         |
|-----------|---|
| RDrafting | TEKniques Vol. 6 No. 3 T1<br>Program 17 |

### Rotate

Rotation is incremental in units of 90, 45, 5, 1, and .1 degrees. Increments are selectable from the keyboard at any time. Selecting the Rotate increment factors also affects the Scale increment factors.

### Editing

Any of the graphic entities may be edited. Editing is performed by calling up the graphic entity type to be edited. The last graphic entity of that type which was fixed will be blinked at a .25 second interval for identification. The operator may delete that entity, and/or step through the list of graphic entities in either direction, wrapping around at the end of the list if necessary, and continue to delete entities on the way as needed. When all editing of the entity type selected is finished, the operator exits from the edit mode.

When editing labels, the label may be called back into the line editor for modification or translation to another coordinate.

### Trim

If graphic entities were deleted, the graphic entity lists will be left with holes in them. The Trim command will compress the graphic entity lists. A Save command will automatically execute a Trim command. Trim is recommended any time a number of graphic entities have been edited out to allow the next edit operation to proceed without any hesitation and ensure reliability.

### Reference Grid

For those operations where the operator may wish to reference all points to a given grid, the operator may select to display a reference grid which consists of points placed in the workspace every two GDU's apart, or, if a Zoom control other than 1 is selected, every two divisions of the current window size. Regardless of the windowing (zoom) selected, the operator will always be using a reference grid of the same relative spacing to the current workspace area.

### Save Plot

The entire current graphic drawing in the workspace may be saved to any file. If the save is to disk, then the program will create the file automatically. If a file of the same name already exists, the operator is warned and allowed to write over the existing file if desired. If the save is to tape, then the tape must be pre-marked to at least 15000 bytes (a maximum of 28000 is required if the drawing is extremely complex) and the program will determine if the file selected already contains a plot, in which case the operator is prompted to write over it or try again.

|           |   |
|-----------|---|
| TITLE     | ABSTRACT NUMBER                         |
| RDrafting | TEKniques Vol. 6 No. 3 T1<br>Program 17 |

Old Plot

At any time, the operator may choose to Old an existing file into the workspace. This operation will delete any existing drawing in the workspace. If the workspace is not cleared (erased) then the new plot will display over the old plot. This is to permit one plot to have registration or alignment with another. The old plot is not available for editing even though it is being displayed. Once the workspace is cleared or redrawn, the old plot that may have been left in the workspace is deleted from view. To redisplay the old plot, it must be OLDed back in, which will delete the present plot, if any exists. Once a file is in the workspace, it may be edited or modified in any way desired and saved again.

## Plotter output:

The graphic workspace in the screen is sized to correspond exactly to the default plotter tablet area of 15 x 10 inches. If it is desired to use a standard 8.5 x 11 inch paper in the horizontal position, remember to select the lower left and upper right window area in the paper so that a 10 x 6.66 inch area is selected to avoid distortions in the plot. This will also allow for at least a one inch margin to one side for a three-hole punch. If the same paper is to be placed in the vertical position, then leave the plotter in the default settings, place the paper at either the left or right edge of the plotter tablet, and use the corresponding half of the workspace for the drawing.

Color

Up to eight different colors may be programmed into the plot for any object, vector, or label. The current pen color to be plotted is displayed in refresh at the upper left in the message area (e.g., PLOT COLOR = 1, BLACK). All vectors, objects, and labels placed will be assigned the current color as shown. To change the current plot color, press UDK #2 followed by RETURN (it's the only way to execute a function key while the 405X is executing a POINTER command) and the program will prompt you to enter the color (1-8) that you want for the current plot color.

The assignment of descriptors to the color numbers are:

| COLOR | DESCRIPTOR |
|-------|------------|
| 1     | BLACK      |
| 2     | BROWN      |
| 3     | RED        |
| 4     | ORANGE     |
| 5     | YELLOW     |
| 6     | GREEN      |
| 7     | BLUE       |
| 8     | PURPLE     |

The color descriptors may be changed at any time and the new descriptors will be saved with the plot.

|           |   |
|-----------|---|
| TITLE     | ABSTRACT NUMBER                         |
| RDrafting | TEKniques Vol. 6 No. 3 T1<br>Program 17 |

The plotter will draw the plot one color at a time, searching the plot list for each color of vector, object, and label, and when the list is scanned completely for one color, it goes on to the next color. If the plot is void of a color, the program skips to the next color in the list. The operator is prompted to change pen color as required.

### Object Set Selection

At the beginning of a session, the operator may select from a variety of object sets that will be available for picking from the menu area of the screen. The object set will always be composed of five standard objects and ten user-defined objects.

The standard objects are:

DOT: The dot is not scalable. It is used as a connecting dot in schematics or for any similar usage.

SMALL ARROW: The small arrow may be rotated, but not scaled.

LARGE ARROW: The large arrow may be rotated and scaled in the horizontal and vertical axes. The large arrow is open at the tail.

CIRCLE: The circle may be scaled with the horizontal control only. Rotation affects the beginning angle position of the circle.

ARC: The arc may be scaled with the horizontal control only. Rotation affects the beginning angle of the arc. The arc's beginning angle is always 0 degrees. The default ending angle is 90 degrees. The ending angle may be incremented in units of 90, 45, 5, 1, and .1 degrees.

The user-defined objects may be of any design desired. See the section in Designing a User-Defined Object for more detail. The operator may select to have only the standard objects in the menu.

### X/Y invert

After capturing an object in refresh from the menu, the object may be inverted in either the X or the Y (or both) axis for a mirror image of the object.

### Special Feature

A circle drawing routine is available to the user for creation of objects that require arcs or circles of any size. The user need only position the graphic cursor at the center of the arc or circle (using a relative move or draw), specify the radius, starting angle, and ending angle, and then branch to the circle subroutine at line 10010 in the main program. All objects thus created will be capable of full rotation, scaling, and X,Y invert.

|           |   |
|-----------|---|
| TITLE     | ABSTRACT NUMBER                         |
| RDrafting | TEKniques Vol. 6 No. 3 T1<br>Program 17 |

OPERATING INSTRUCTIONS

CAUTION: Be sure you have transferred the files comprising this program to its own dedicated tape, or disk. See PRELIMINARY OPERATING INSTRUCTIONS section.

Tape Load

Insert the tape into the 4050 system and press AUTO LOAD. The first file will CALL "BOLD" on file 2 where the program resides.

Disk Load

Key in: OLD "RDRAFTING"

First Time Operation

All program prompts have default responses. Pressing the RETURN key will select the default response. All default responses are shown with each prompt message.

The first prompt is to identify where the program is--on tape or disk.

The operator is then prompted to enter the object set to use in creating a plot (this is the only prompt that doesn't have a default). Enter the number which corresponds to the object set desired. Object set 0, the standard set, displays only five objects in the menu area (a user-defined object set is not displayed). Creation of user-defined object sets will be discussed later.

The next prompt asks if you want to display the help message. If the help message is displayed, the next prompt is "Press RETURN to continue . . .". Press the RETURN key and answer the next rprompt: "DO YOU WANT A REFERENCE GRID (Y/N, DEF=Y)" with a Y or N. The reference grid will be displayed whenever the logical flag that represents the presence of the grid is set to ON. This flag can be set ON or OFF with either the User-Definable Function Keys (UDK) 6 (ON) and 7 (OFF), or with the command keys A (ON) and B (OFF).

The screen will not clear and display the object set menu and border for the drafting workspace. If it is desired to draw the plot on the plotter using other than a "B" size paper, such as the standard 8.5" x 11" paper, then please keep the proportioning of 150 x 100 clearly in mind when setting up the lower left and upper right corners of the plotter viewport. For the 8.5" x 11" paper positioned horizontally, you will probably have the margins set .5" from the sides and bottom of the paper and approximately 1.4" from the top. This allows for punching holes in the wider border and primarily maintains the proportions of the plot. If drawing is preferred with the paper in the vertical rather than the horizontal position, then keep your plot in one-half of the screen workspace, and place your paper to the same half of the plotter table keeping the default plotter viewport.

|           |   |
|-----------|---|
| TITLE     | ABSTRACT NUMBER                         |
| RDrafting | TEKniques Vol. 6 No. 3 T1<br>Program 17 |

If a reference grid was asked for, then the workspace will be filled with dots placed two GDU's apart. The reference grid, when logically present, will attach vectors and objects at the nearest dot intersection from the current crosshairs or cursor position. A dot intersection includes the dots that can be seen and the dots which are not shown at the alternate GDU locations.

To create a drawing, you may either select from the object set, draw vectors as desired, or place labels as desired anywhere within the frame of the workspace. There is no sequence that you must follow. Objects, vectors, and labels may be inserted in any order. When the program redraws the graphics, it will display vectors, objects, and labels in that order. Further, it will display or plot all color 1 graphic entities, then all color 2 entities, etc., or skip over those colors for which there are no graphic entities created.

The ENTER COMMAND rprompt will blink in the message prompt area to tell the operator that the program is waiting for a keyboard input. The 4054 is then busy processing a POINTER command. A single character input is all that is required to execute a routine. No RETURN is required to terminate any command. Illegal commands are rejected.

#### DRAWING VECTORS

Press the V character on the keyboard. Place the crosshair of the bomb-site that appears at the first coordinate to start vectors from. The following characters will affect the display of vectors as described:

A - Will abort the vector command and return the full screen crosshairs. Any vectors placed up to this point are saved. This is an alternate method of exiting from the vector mode.

M - The current coordinate is connected to the previous coordinate with a dark vector, or MOVE. Repeated consecutive M commands saves only the last coordinate pair. The "Rubber-Band" connecting the previous coordinate to the current coordinate goes away, leaving just the bomb-site. Moving the bomb-site displays the "Rubber-Band" from the current coordinate (which is now the previous coordinate) to the bomb-site crosshairs. The vector mode continues.

L - Fixes the current coordinate, connects the previous coordinate to the current coordinate with a light vector, or draw, and exits from the vector mode. The bomb-site is deleted and the ENTER COMMAND refresh prompt reappears.

Any other character will fix the current coordinate, connect the previous coordinate to the current coordinate with a light vector, or draw, the bomb-site remains, and the "Rubber-Band" is displayed between the now previous coordinate and the bomb-site crosshairs. The vector mode continues.

| TITLE     | ABSTRACT NUMBER                         |
|-----------|---|
| RDrafting | TEKniques Vol. 6 No. 3 T1<br>Program 17 |

If the reference grid is ON, then the coordinate that is fixed will be the nearest grid point to the bomb-site crosshairs. To fix a coordinate at other than a grid point, the reference grid must be turned OFF. To turn off the reference grid, press UDK #7. To turn the reference grid back ON, press UDK #6. Pressing keys A or B while in the vector mode does not affect the grid state, rather they function as described above. The display of the reference grid will not be changed by pressing these keys. To change the display, press key ESC on the keyboard to redraw the display. The display will be redrawn in accordance with the current state of the reference grid.

### PLACING OBJECTS

Press the 0 key to enter the object select mode and to bring up the full-screen crosshairs. Place the full screen crosshairs in the section of the menu area that contains the object to be placed in the drawing area. Press the C key on the keyboard. The object selected will be displayed in refresh and replace the full screen crosshairs as the graphic cursor. Locate the refreshed object in the desired position in the drawing area.

### ROTATING AN OBJECT

To rotate the object, press the 1 character key to rotate the object left (counter-clockwise) or the 3 character key to rotate the object right (clockwise). The default rotation increment is 45 degrees. To change the increment value, the keys ↑, /, \*, -, and + are used as follows:

- ↑ - sets the rotation increment to 90 degrees
- / - sets the rotation increment to 45 degrees
- \* - sets the rotation increment to 5 degrees
- - sets the rotation increment to 1 degree
- + - sets the rotation increment to 0.1 degree

### SCALING AN OBJECT

If the object can be scaled (determined by how the user-defined object or standard object is designed), then to increase the object's size in the horizontal axis, press the 4 character key. To decrease the object's size in the horizontal axis, press the 6 character key. To increase the object's size in the vertical axis, press the 8 character key. To decrease the object's size in the vertical axis, press the 2 character key. The default scale increment in either axis is 1 GDU. To change this increment value, the keys ↑, /, \*, -, and + are used:

- ↑ - sets the scale increment to 10 GDU's
- / - sets the scale increment to 1 GDU
- \* - sets the scale increment to 0.1 GDU
- - sets the scale increment to 0.01 GDU
- + - sets the scale increment to 0.001 GDU

TITLE

RDrafting

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 17

These keys are common to both the rotate and scale increment settings. Setting a rotation increment of 5 degrees also sets a scale increment of 0.1 GDU.

### STANDARD OBJECTS

**ARC:** The standard object ARC is displayed as a 90 degree arc (default value). The angle of this arc can be increased by using key 7 or decreased by using key 9. The default angle increment is 45 degrees. The increment value can be changed as in setting the rotation increment and uses the same increment factors. The effective radius of the arc can be increased with the 4 key and decreased with the 6 key. The beginning angle of the arc is affected by the rotation keys 1 and 3. The origin of the arc is at the center.

**DOT:** The standard object DOT cannot be rotated or scaled. The origin of the dot is at the center.

**SMALL ARROW:** The standard object SMALL ARROW cannot be scaled. The object can be rotated. The origin of the small arrow is at the point.

**LARGE ARROW:** The standard object LARGE ARROW can be scaled in both the horizontal and vertical axes. The object can also be rotated. The origin of the large arrow is at the geometric center.

**CIRCLE:** The standard object CIRCLE can be scaled by changing its effective radius with the keys 4 and 6. The Origin of the circle is at the center. The 0 degree point of the circle is affected by rotation, but has not display value.

### MISCELLANEOUS OBJECT OPERATIONS

**Fixing an Object:** Pressing the F key will cause the object selected to be fixed and remain in refresh as the graphic cursor so it can be fixed again anywhere.

**Fix and Release:** Pressing the G key will cause the object selected to be fixed and released as the graphic cursor and the full screen crosshairs will return.

**No Fix and Release:** Pressing the D key will cause the object selected to be released; the graphic cursor and the full screen crosshairs will return. The object will not be fixed.

**Capturing New Objects:** The object currently being used as the graphic cursor may be replaced by any other object by placing the current object over the new object in the menu area and pressing the C key.

If any object is scaled and fixed, and another object is selected, the new object will be scaled the same as the old object.

If an object is rotated and fixed, and another object is selected, the new object is not rotated at all, but set to 0 degrees.

|           |   |
|-----------|---|
| TITLE     | ABSTRACT NUMBER                         |
| RDrafting | TEKniques Vol. 6 No. 3 T1<br>Program 17 |

If an object is inverted in either the X or Y axis and fixed, and another object is selected, the new object is not inverted at all but set to normal.

If ZOOM is in effect and an object is selected, the size of the object will be set relative to the current window and the current scale factor. Hence, if an object were scaled to twice its size while the ZOOM was set to 1, and the ZOOM was changed to .5, the new object selected will appear to be four times its size in the new window.

Reset Graphic Transforms: To reset the INVERT, SCALE, and ROTATE environments to the default settings, press key 5.

If the reference grid is ON and an object is fixed in the display, the origin of the object (the first RMOVE or RDRAW in the list) will be positioned at the nearest grid point in the display. To fix an object at other than a grid point, press UDK 7 or key B to turn the reference grid OFF. The reference grid is turned back ON again by pressing UDK 6 or pressing key A. These keys will not affect the appearance of the display until the ESC key is pressed to cause a redraw.

Placing Labels: Press the L key on the keyboard. In the top of the message area there will be a question mark in refresh. Type in the label. The question mark will advance to the next available character position as the characters are typed in. A maximum of 132 characters can be input for one line. Only one line at a time can be operated on. The RUBOUT or BACKSPACE key will delete the last character displayed in the line and move the question mark back one character space. Pressing RETURN terminates the line input. If a CONTROL-A is present anywhere in the line, then the label mode is aborted, the input ignored, and the full screen crosshairs returned. This is a method of exiting from the label mode prematurely without affecting the display.

After a line has been input, the label will appear in the workspace at the cursor position where the crosshairs were last positioned and in the current character size. The size of the characters may be changed to any of the four 4054 hardware character sizes by pressing key 1, 2, 3, or 4. Key 1 is for character size 1, the smallest, and key 4 is for character size 4, the largest.

The line of input may be positioned anywhere in the display when the label is in the workspace and in refresh. The color assignment of the label should be made prior to entering the label mode or during the label edit mode, otherwise you may experience some disturbing effects.

The origin of the label is the lower left corner of the first character cell in the line. Labels are fixed by pressing any key other than 1 - 4. Labels are fixed regardless of the state of the reference grid and assumes the grid to be OFF.

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|-------|--|
| TITLE | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 17 |
|-------|--|

Editing Vectors: Press the E key on the keyboard. The program will prompt you to press key O, L, or V. Press the V key. The last vector drawn will be blinked at 0.25 second interval. If this is the vector to be deleted, then press UDK 19. If UDK 19 was pressed, the vector is deleted from the list and the previous vector drawn will be blinking. You may continue to delete vectors until there are none left in the list to delete, at which time the full screen crosshairs will return automatically. If the current blinking vector is not to be deleted, press UDK 8 to go to the next previous vector, or press UDK 10 to go to the next succeeding vector in the list. This search process ignores any deleted vectors that may be in the list. If a vector is deleted while the search is from last to first, the search will continue in that direction. If a vector is deleted while the search is from first to last, the search will continue in that direction. If the search reaches either end of the list, it will wrap around and continue. To exit from the edit mode, press UDK 9. Press ESC to redraw the display.

Editing Labels: Press key E on the keyboard. The program will prompt you to press key O, L, or V. Press key L. The last line of text entered will blink at an 0.25 second interval. Editing operations for labels are the same as for editing vectors.

Editing Objects: Press key E on the keyboard. The program will prompt you to press key O, L, or V. Press key O. The last object placed will blink at an 0.25 second interval. Editing operations for objects are the same as for editing vectors. One word of caution: complex objects require time to be prepared before they can be displayed after each search. Do not step through the list too fast or you will step over some objects.

## ZOOM

Often it is desired to display a smaller portion of the drawing in the total drawing area than under normal conditions. This allows fine detail work to be handled quite easily. To create a smaller window, press the Z key on the keyboard. The program will prompt you to enter a value for the ZOOM factor. Enter a ZOOM factor from (for practical purposes) 2 to 0.001 and press RETURN.

A ZOOM factor greater than the current ZOOM factor will make the contents of the display smaller. A ZOOM factor less than the current ZOOM factor will make the contents of a specific area of the display larger. If the ZOOM factor entered was less than the current ZOOM factor, then a frame will appear in the display. This frame is proportional to the current window parameters and the new window parameters (e.g., if the current window parameters are set for a ZOOM factor of 1 and the new ZOOM factor is .5, then the frame will be half the size of the current drawing area). The frame replaces the graphics cursor and can be placed anywhere in the display. When the frame is placed where desired, press any key and the display will erase and the new display will be drawn showing just the area that was outlined by the frame in the old display. No labels will be displayed at any other than a ZOOM factor of one.

All other operations of this program have been explained in the FEATURES section or have user prompts and no further detail is warranted here.

| TITLE     | ABSTRACT NUMBER                         |
|-----------|---|
| RDrafting | TEKniques Vol. 6 No. 3 T1<br>Program 17 |

CREATING USER-DEFINED OBJECTS

The user-defined object set consists of subroutines in a subprogram within an appropriate file. For the disk version, these files are located in the library named @DRAFTING/OBJECT. Each user-defined object set file shall be named "Fn" where n represents a number greater than 3.

The filenames from F0 to F3 inclusive are already defined and stored in the library. For the tape version, these files are stored in the pre-marked files beginning at file 6.

All subprograms written should be devoid of REMARK statements if at all possible except as noted below. The memory space available for any subprogram is about 5000 bytes. One line within the main program needs to be modified to accommodate the new object set(s) to the program. This is line #370 which read:

```
370 IF POS("0,1,2,3",F$,1)=0 then 360
```

The list of numbers within the quotes should include the number(s) of the new object set(s) added to the program.

Also, after line #350, add any new lines similar to line #350 that will identify the new object sets to the user. The tape version is limited to ten user-defined object sets total due to the storage capacity of the tape (allowing for ten drawings that can be stored on the tape also). Several lines of the program must be modified to overcome this limitation if desired. (The user is left to his own abilities here.) The disk version is basically unlimited and depends solely on the need of the subprograms to reside in drive unit 0.

Ten symbols, or objects, may be defined by the user in straightforward subroutines. No knowledge of the special refresh (Option 30) primitives is needed as those primitives are contained within the main program.

Object definition subroutines begin at lines 11000, 12000, 13000, 14000, 15000, 16000, 17000, 18000, 19000, and 20000. If no object definition is given for any one of these lines then the subprogram must have a REMARK at that line followed by a RETURN.

An object must be totally confined to a window of 0-10 horizontal GDU's and 0-8 vertical GDU's. This corresponds to the space available in each section of the menu area. The main program positions the graphic cursor at the center of this window area (5x, 4y relative). All moves and draws in the subroutines must be relative. To center an object in the menu area section, locate the origin of the object at its geometric center (the first move or draw is from this perspective). No combination of moves or draws shall exceed the limitation of +/- 5 horizontal GDU's or +/- 4 vertical GDU's from the center of the given area.

Very complex patterns should be avoided if the final display in the workspace will cause a close grouping of vector segments as this may result in the refreshed object "sticking" on the screen in these areas.

TITLE

RDrafting

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 17

Each RMOVE and RDRAW statement must have as its output address, the scalar variable S (e.g., RDRAW @S:). If it is desired to cause the object to be inverted in the X or Y axis, then the X and Y coordinates must be multiplied by the scalar variables I1 and I2 respectively (e.g., RDRAW @S:2\*I1,2\*I2). If it is desired to scale the object in the X or Y axis, then the X and Y coordinates must be multiplied by the scalar variables S1 and S2 respectively, e.g., RDRAW @S:2\*I1\*S1,2\*I2\*S2.

To use the circle/arc subroutine in the main program, the scalar variables R1, A1, and A2 are used. R1 is set to the radius of the circle/arc. A1 is set to the beginning angle of the circle/arc. A2 is set to the ending angle of the circle/arc. A1 may be larger than A2 (to draw an arc from, say, 320 degrees to 20 degrees through 0 degrees). The user subroutine must position the graphic cursor (using RMOVE or RDRAW) to the center of the circle/arc and then GOSUB 10010. Scaling and inverting of the circle/arc are performed entirely within the main program. Scaling of the circle/arc is a function of the scale increment factor on the radius of the circle/arc.

To define a box, for example, as object #1, the subroutine might look like:

```

11000 RMOVE @S:-2*S1,-2*S2
11010 RDRAW @S:4*S1,0
11020 RDRAW @S:0,4*S2
11030 RDRAW @S:-4*S1,0
11040 RDRAW @S:0,-4*S2
11050 RETURN

```

The above subroutine does not allow for inverting the object (this is unnecessary since the object is symmetrical).

Adding an arc or circle to the above subroutine is easy (beginning at line 11050):

```

11050 RMOVE @S:2*S1,0
11060 R1=2
11070 A1=180
11080 A2=360
11090 GOSUB 10010
11100 RETURN

```

This results in a semi-circle being added to the bottom edge of the box and extending downwards. The maximum Y axis deviation is -4 and this is the limit to which any object should be drawn. It may be desired to either relocate the origin or change the size of the object to achieve an aesthetically appealing image in the menu. Don't forget that the origin is the focal point at which a fix is made in the workspace. With the reference grid ON, this could produce some surprising results if the origin is not where you would like it to be relative to a grid point.

Playing with the ZOOM control offers a variety of fixed grid points relative to the actual location in the drawing that you may want to fix an object or vector to.



# DESKTOP COMPUTER APPLICATIONS LIBRARY PROGRAM

|  |                      |  |  |
|--|----------------------|--|--|
| <b>TITLE</b>   |                      | <b>ABSTRACT NUMBER</b><br>TEKniques Vol. 6 No. 3 T1<br>Program 18            |  |
| <b>4050 Data Comm Utility</b>  |                      | <b>EQUIPMENT AND OPTIONS REQUIRED</b><br>4051/52/54 24,32,64K-Options 1 or 3 |  |
| <b>ORIGINAL DATE</b><br>May, 1981  | <b>REVISION DATE</b> | <b>PERIPHERALS</b><br>Optional - 4662/3 Plotter                              |  |
| <b>AUTHOR</b><br>Stephanie Ranney  |                      | Tektronix, Inc.<br>Woodbridge, NJ  |  |
| <b>ABSTRACT</b><br><br>Files: 6 ASCII Program<br><br>Statements 1230   |                      |  |  |
| <p>The Data Communications Interface program will facilitate the Tektronix 4050 users with interfacing the 4051/52/54 with any host computer that supports an ASCII asynchronous terminal. By utilization of the Data Communications Interface, the user has essentially the capabilities of two terminals in one. The 4050 can be used as an intelligent desktop computer to do stand-alone processing. With the Data Communications Interface, the 4050 emulates a 4012 or 4014 style terminal to interact with a host computer. Along with this capability, the Data Communications Interface provides additional features.</p>   |                      |  |  |
| <p>One of these features is the ability to transmit data from the host computer and record that data on the magnetic tape in the 4050. This process is called "Downloading." The user may then disconnect from the host and process that data locally while the 4050 is in an intelligent mode. The user may author his/her own BASIC program to read the data from the tape and create a graphical representation of that data. Also, several application programs have already been developed in the Applications Software Library and the PLOT 50 Software Library to read data from the 4050 Mag tape that contained downloaded data from the host. Locally, solutions through graphics may be obtained through the intelligence of the 4050 Series.</p> |                      |  |  |
| <p>Conversely, through the Data Communications Interface the user has the ability to transmit data from the Mag tape of the 4050 to a file resident on the host computer. This process is called "Uploading." An example of this application is that a user may run a BASIC program to do statistical or forecasting routines with the 4050 as a stand-alone desktop computer, and store the results on the Mag tape. The results of these calculations may then be transmitted back to the host computer to be stored in some host-resident database or perhaps consolidated with other analysis done on the host.</p>  |                      |  |  |
| <p>The documentation of the Data Comm Utility is divided into three separate sections:</p> <ul style="list-style-type: none"> <li>(1) General Host Parameters</li> <li>(2) Downloading</li> <li>(3) Uploading</li> </ul>   |                      |  |  |
| <p>Each of the three modules of code is independent of any other.</p>  |                      |  |  |
| <p>The program material contained herein is supplied without warranty or representation of any kind. Tektronix, Inc., assumes no responsibility and shall have no liability, consequential or otherwise, of any kind arising from the use of this program material or any part thereof.</p>  |                      |  |  |

TITLE

Data Comm Utility

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 18PRELIMINARY OPERATING INSTRUCTIONS

The files comprising this program must be transferred to a separate dedicated tape. Use the instructions on page iii to accomplish the transfer of the following files from the TEKniques tape.

From TEKniques Vol. 6 No. 3 T1 tapeTo Dedicated Tape

| <u>File #</u> | <u>Type</u>   | <u>Bytes Required</u> | <u>File #</u> |
|---------------|---------------|-----------------------|---------------|
| 30            | ASCII Program | 5376                  | 1             |
| 31            | ASCII Program | 6656                  | 2             |
| 32            | ASCII Program | 6144                  | 3             |
| 33            | ASCII Program | 9216                  | 4             |
| 34            | ASCII Data    | 768                   | 5             |
| 35            | ASCII Data    | 1024                  | 6             |
| 36            | ASCII Data    | 1024                  | 7             |
| 37            | ASCII Program | 7680                  | 8             |
| 38            | ASCII Program | 1792                  | 9             |

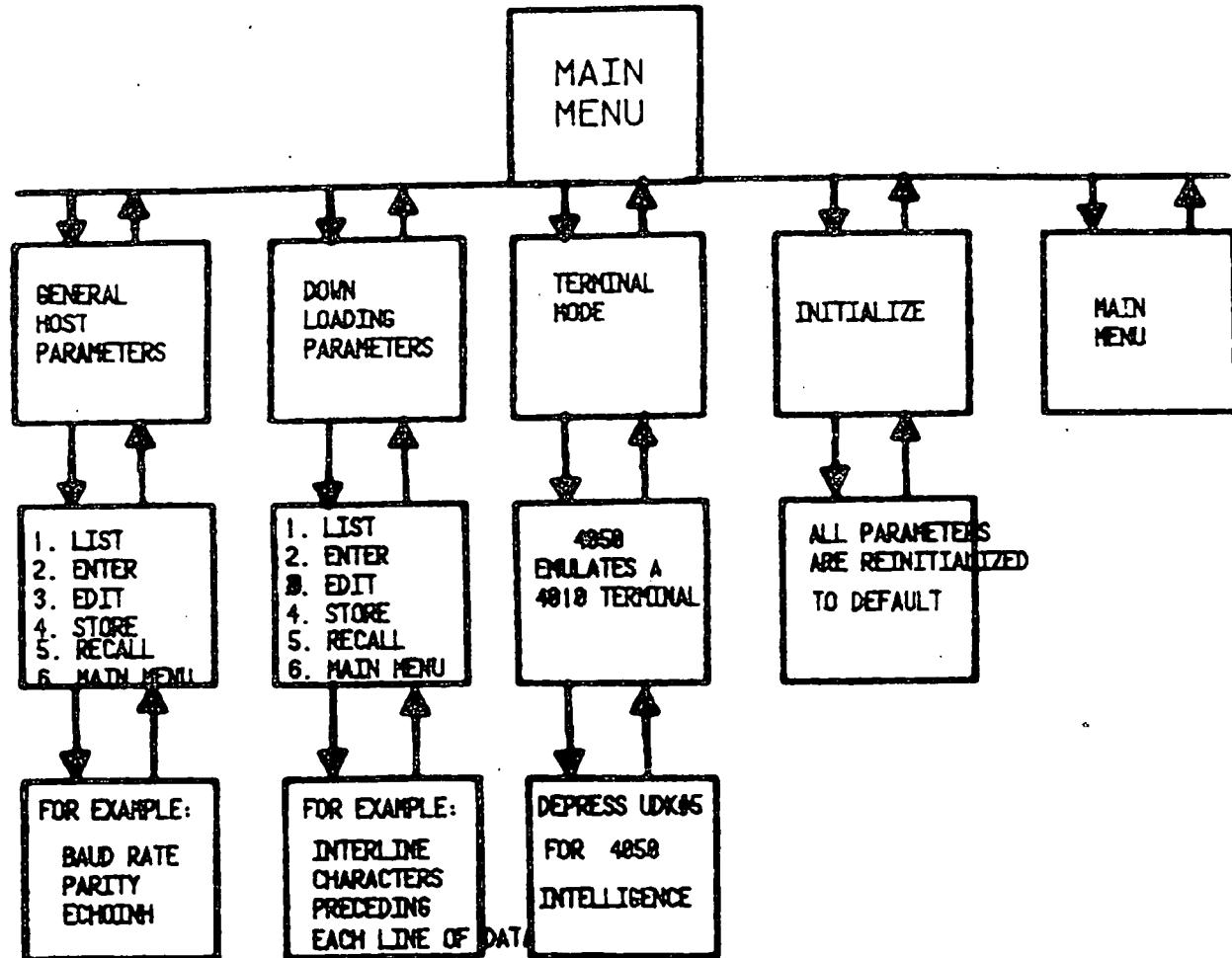
| TITLE<br><br>Data Comm Utility  | ABSTRACT NUMBER<br><br>TEKniques Vol. 6 No. 3 T1<br>Program 18   |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
|---|--|--------------------|-----------------|-------------------|---|-------------------|--|-------------------|---|-------------------|---|----------------|---|----------------|--|----------------|--|-------------------|--|-------------------|--|
| <p>The "General Host" section will discuss such pieces of information as baud rate and parity. The "Downloading" and "Uploading" sections address only the parameters required for each respective process. Included in the documentation are sample Option 1 Worksheets. Each worksheet should be completed prior to the running of the Data Comm Utility Program. This program also provides the capability of storing the appropriate parameters for Downloading, Uploading and General Host to the 4050 Mag tape to be recalled during a later terminal session with the host computer.</p>   |  |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
| <p><u>Tape File Description:</u></p>  |  |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
| <table> <thead> <tr> <th><u>File Number</u></th><th><u>Function</u></th></tr> </thead> <tbody> <tr> <td>1 - ASCII Program</td><td>Autoloading program that initializes all variables, produces Main Menu, and puts 4050 into terminal mode.</td></tr> <tr> <td>2 - ASCII Program</td><td>Code for listing, entering, editing, storing, recalling parameters to describe General Host environment.</td></tr> <tr> <td>3 - ASCII Program</td><td>Code for listing, entering, editing, storing, recalling parameters for the Downloading process.</td></tr> <tr> <td>4 - ASCII Program</td><td>Code for listing, entering, editing, storing, recalling parameters for the Uploading process.</td></tr> <tr> <td>5 - ASCII Data</td><td>Parameters describing General Host. Parameters are automatically stored by program to file 5.</td></tr> <tr> <td>6 - ASCII Data</td><td>Parameters describing Downloading process are stored by program to file 6.</td></tr> <tr> <td>7 - ASCII Data</td><td>Parameters describing the Uploading process are stored by program to file 7.</td></tr> <tr> <td>8 - ASCII Program</td><td>Program for producing the worksheets. Output goes to a plotter only.</td></tr> <tr> <td>9 - ASCII Program</td><td>Program that will produce a diagram describing the Data Communications Interface. Output can be produced on screen or plotter.</td></tr> </tbody> </table> |  | <u>File Number</u> | <u>Function</u> | 1 - ASCII Program | Autoloading program that initializes all variables, produces Main Menu, and puts 4050 into terminal mode. | 2 - ASCII Program | Code for listing, entering, editing, storing, recalling parameters to describe General Host environment. | 3 - ASCII Program | Code for listing, entering, editing, storing, recalling parameters for the Downloading process. | 4 - ASCII Program | Code for listing, entering, editing, storing, recalling parameters for the Uploading process. | 5 - ASCII Data | Parameters describing General Host. Parameters are automatically stored by program to file 5. | 6 - ASCII Data | Parameters describing Downloading process are stored by program to file 6. | 7 - ASCII Data | Parameters describing the Uploading process are stored by program to file 7. | 8 - ASCII Program | Program for producing the worksheets. Output goes to a plotter only. | 9 - ASCII Program | Program that will produce a diagram describing the Data Communications Interface. Output can be produced on screen or plotter. |
| <u>File Number</u>  | <u>Function</u>  |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
| 1 - ASCII Program   | Autoloading program that initializes all variables, produces Main Menu, and puts 4050 into terminal mode.                      |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
| 2 - ASCII Program   | Code for listing, entering, editing, storing, recalling parameters to describe General Host environment.                       |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
| 3 - ASCII Program   | Code for listing, entering, editing, storing, recalling parameters for the Downloading process.                                |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
| 4 - ASCII Program   | Code for listing, entering, editing, storing, recalling parameters for the Uploading process.                                  |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
| 5 - ASCII Data  | Parameters describing General Host. Parameters are automatically stored by program to file 5.                                  |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
| 6 - ASCII Data  | Parameters describing Downloading process are stored by program to file 6.   |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
| 7 - ASCII Data  | Parameters describing the Uploading process are stored by program to file 7.   |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
| 8 - ASCII Program   | Program for producing the worksheets. Output goes to a plotter only.   |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |
| 9 - ASCII Program   | Program that will produce a diagram describing the Data Communications Interface. Output can be produced on screen or plotter. |                    |                 |                   |   |                   |  |                   |   |                   |   |                |   |                |  |                |  |                   |  |                   |  |

|                   |  |   |
|-------------------|--|---|
| <b>TITLE</b>      |  | <b>ABSTRACT NUMBER</b>                  |
| Data Comm Utility |  | TEKniques Vol. 6 No. 3 T1<br>Program 18 |
| <b>Variable</b>   | <b>Used to Store . . .</b>   | <b>Type</b>                             |
| A\$               | ROPEN - Character preceding Download Data<br>Character preceding Upload prompt   | String                                  |
| B\$               | RCLOSE - Character following Download Data<br>Character following Upload prompt  | String                                  |
| C\$               | REND - Character indicating end of a Download file   | String                                  |
| D\$               | SNDSTRG- Download-command to list file<br>Upload-command to create new file  | String                                  |
| P\$               | PCHAR - Prompt character from host-upload  | String                                  |
| U\$               | TOPEN - Upload-character preceding each line of data   | String                                  |
| V\$               | TCLOSE - Upload-character following each line of data  | String                                  |
| W\$               | Working string variable  | String                                  |
| X\$               | TEND - Upload-character to indicate end of new file  | String                                  |
| I(9)              | Pointer array into following "G" arrays  | Array                                   |
| G1(8)             | Array with all possible responses for baud rates   | Array                                   |
| G2(3)             | Array with all possible responses for Error Action   | Array                                   |
| G3(3)             | Array with all possible responses for Margin Location  | Array                                   |
| G4(3)             | Array with all possible responses for Duplex   | Array                                   |
| G5(2)             | Array with all possible responses for echoing  | Array                                   |
| G6(2)             | Array with all possible responses for pagfull action   | Array                                   |
| G7(3)             | Array with all possible responses for parity   | Array                                   |
| G8(4)             | Unused   | Array                                   |
| G9(4)             | Unused   | Array                                   |
| P                 | PMODE - indicates yes/no prompt mode   | Simple                                  |
| J (7,10)          | Array to store responses to Download and Upload<br>Parameters. String variables are converted as an<br>ASCII Decimal Equivalent and stored numerically on<br>tape. | Array                                   |

TITLE

Data Comm Utility

ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 18

TITLE

Data Comm Utility

ABSTRACT NUMBER

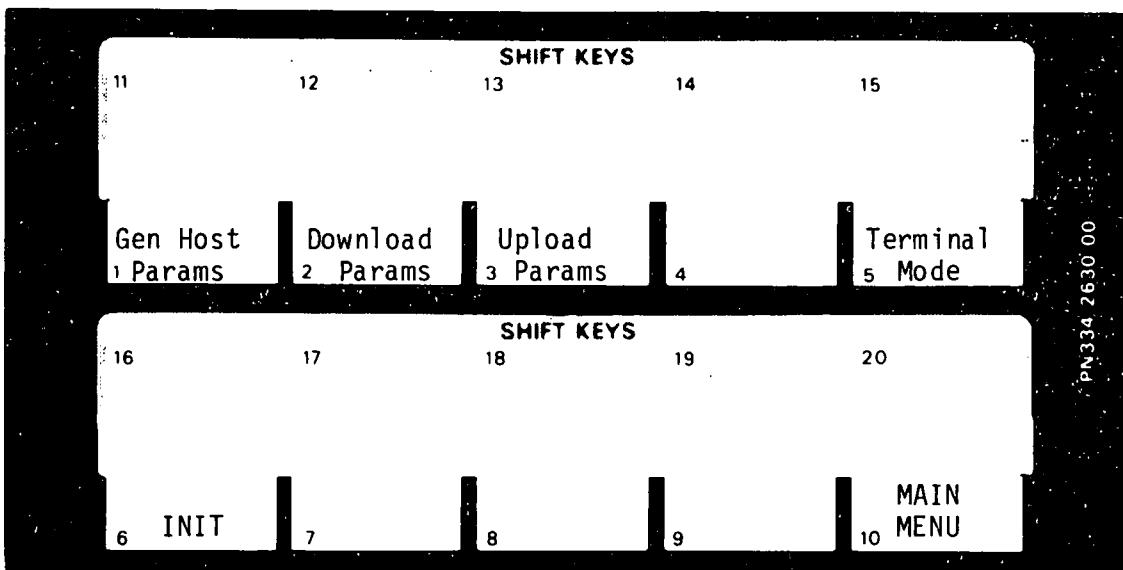
TEKniques Vol. 6 No. 3 T1  
Program 18OPERATING INSTRUCTIONS

1. Insert 4050 Data Comm Utility tape into 4051/52/54.
2. Depress AUTOLOAD key. The Main menu will appear.
3. To access the General Host parameters which describe the host environment, depress UDK #1.
4. The sub-menu will appear to either list, enter, edit, store, or recall from tape file #5 the parameters for general host.
5. To return to the Main Menu, enter selection #6.
6. To access the parameters for Downloading, depress UDK #2 to either list, enter, edit, store or recall from tape file #6 the Downloading parameters.
7. To return to the Main Menu, enter selection #6 from the keyboard as a response to the sub-menu.
8. To access the parameters for Uploading, depress UDK #3 to either list, enter, edit, store or recall from tape file #7 the Uploading parameters.
9. To enter terminal mode, depress UDK #5. The I/O and BUSY status lights will begin flashing until the 4050 has received a carrier signal from the modem.
10. Log-on to your host computer to Download or Upload data.
11. To return to 4050 Intelligent Mode, depress UDK #5. You will then be returned to the Main Menu. To return to terminal mode, depress UDK #5 again.
12. In 4050 Intelligent mode, depress UDK #10 to list out the Main Menu at any time.
13. After logging off from the host computer, depress UDK #5 and you will return to the Main Menu.

TITLE

TAPE #

FILE #



## TITLE

4050 Data Communications Interface

## ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1

Program 18

General Host Parameter Section:

In order to communicate with the host computer, certain pieces of information are necessary for the Data Communications Interface. That general information includes the following:

1. Baud rate code
2. Error Action code
3. Margin Location code
4. Duplex code
5. Parity code
6. Action for pagefull condition code
7. Echo code

Baud Rate

This parameter is a measure of bits per second on a data communications channel. The possible data rates for the 4051 are 110, 150, 300, 600, 1200 and 2400. The baud rates for the 4052 and 4054 are the same plus 4800 and 9600 baud.

Error Action Code

On received parity errors in the Data Communications Interface the user may chose by selecting the appropriate code to stop upon encountering a parity error count them and do not stop or take no action and ignore errors. The codes for each option are listed on the Worksheet.

Margin Location Code

One of the 3 possible options are continuous writing with 2 columns on the screen each containing 35 lines. No pagefull busy occurs and if the page is full, writing on the screen continues over the writing already on the screen beginning in column one. The second alternative is to set a pagefull condition after 35 lines are filled on the screen. The user must then manually depress the "Page" key to clear the screen and continue processing on the host. The third choice is to set a pagefull condition after 2 columns each 35 lines are filled. The user must then depress the "Page" key to clear the screen and continue processing.

Duplex Code

The communications mode may be set to either Full Duplex, Half Duplex, or Half Duplex with Supervisor Channel. Normally, if the baud rate is high, the communications mode is Half Duplex, as the lower baud rates are typically Full Duplex.

Parity Code

An eighth bit, called a parity bit, is sometimes used to detect errors in transmission. Terminals and hosts can be set for even or odd parity, meaning the parity bit is a 1 for an even or odd total of 1's respectfully. If the eighth bit is not checked, then no parity may be a valid answer.

|   |  |
|---|--|
| TITLE<br>4050 Data Communications Interface | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 18 |
|---|--|

Pagefull Condition Code

If the user has selected a pagefull condition to be set after filling the screen in column 1 or column 1 and 2 by selecting the appropriate response for Margin Location, the user may or may not select to automatically have a hard copy taken of the screen and then paged automatically also.

Echo Code

The 4050 Option 1 may be set for local echoing. Local echo is an echo occurring at the terminal or modem and is typical of a half duplex mode where a computer echo is not available.

In order to chose the appropriate code for each of the general host parameters, it may be helpful to consult with a systems person supporting the host computer being accessed. Complete the Worksheet for General Host Parameters and enter each parameter code from the keyboard into the program. After the user has entered the parameters for signing onto the host, the user may select to store them on the magtape and recall them at a later terminal session, which will save the user time when signing onto the host. See the following pages for sample execution of running the code for General Host parameters.

|                                    |   |
|------------------------------------|---|
| TITLE                              | ABSTRACT NUMBER                         |
| 4050 Data Communications Interface | TEKniques Vol. 6 No. 3 T1<br>Program 18 |

### Downloading:

The process of transmitting data from a host computer to the magtape of the 4050 Series is known as Downloading. In order for the 4050 to execute this process, four pieces of information must be known:

1. What character(s) precede each line of data coming from the host
  2. What character(s) follow each line of data from the host
  3. What character(s) denote the end of the file
  4. What command is issued to the host to list the contents of that file to the terminal for visually viewing the contents.

These 4 pieces of information will vary with every different host and operating system. In order to find what these parameters are for your particular host, follow these instructions:

1. Sign onto your host computer
  2. Call out the existing file that you wish to Download by bringing that file into the Editor

For example, on some hosts it is required to enter the command "EDIT" filename or "OLD" filename.

3. Depress the User Definable #11, which represents "Print Control Characters". This action will allow the user to see control characters that are not normally displayed as the host is transmitting.
  4. Enter the command to your host which is necessary to view its contents. Typically, this command may be "LIST" or "PRINT" or "TYPE". This command is in fact the fourth piece of necessary information for downloading as specified above. You will see characters that look like "J", " ", "@", "D". The Data Comm Program will accept the following control characters:

| <u>Control Character</u> | <u>How to enter as response in Option 1 Demo Program</u> |
|--------------------------|--|
| @                        | NUL  |
| D                        | EOT  |
| J                        | L/F  |
| M                        | C/R  |
| Q                        | DC1  |
| R                        | DC2  |
| S                        | DC3  |
| T                        | DC4  |
| ↓                        | R/B  |

5. One or more of these control characters will precede each line of data from the host. The right column in the above table specifies how to respond to the Data Comm program.

The M or carriage return will not print when listing out the file. However, on most host computers, the character that follows each line of data is a carriage return and should be entered into the Data Comm program as "C/R".

## TITLE

4050 Data Communications Interface

## ABSTRACT NUMBER

TEKniques Vol. 6 No. 3 T1  
Program 18

6. When the file has completed listing at the terminal, the host should send some string of character(s) to denote the end of file. If the host does not send any indication of end of file, the user may specify the end of file to be some unique string such as "XXX" by entering it to be the last line of data in that file.
7. Now that the four necessary parameters are known for Downloading, complete the Downloading Worksheet. Enter the appropriate responses from the worksheet when running the Data Comm Program for Downloading.

|   |  |
|---|--|
| TITLE<br>4050 Data Communications Interface | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 18 |
|---|--|

Uploading:

The process of transmitting data from the magtape of the 4050 to a host computer is known as "Uploading". In order to perform this process, the Option 1 of the 4050 Series requires some information which is:

1. When creating a file on the host from the keyboard, what character(s) must be typed before each line of data.
2. When creating a file, what character(s) are entered at the end of each line of data.
3. When creating a file, what command or character(s) are issued to the host to designate that you have completed creating that file.
4. What command or character(s) are issued to the host to inform it that the user is creating a new file on the host computer.
5. When the user is creating a new file on the host, does the host issue a prompt character to inform the user that the host is ready to accept another line of data. Examples of such a prompt character may be a ">", or ":". If the host does not issue a prompt character, the user may now complete the worksheet with just the above five pieces of information, and begin the process of Uploading. If the user responded "YES" to question #5, the 4050 requires the following 3 additional pieces of information:
6. What control character(s) precede the prompt character?
7. What control character(s) follow the prompt character?
8. What is the prompt character that the host issued to inform the user that the host is ready to accept another line of data.

The sequence of these characters are:

COMMAND TO INFORM HOST TO CREATE NEW FILE OR APPEND TO EXISTING FILE

| Character<br>Preceding<br>Prompt | PROMPT<br>CHARACTER | Character<br>Following<br>Prompt | Character<br>Preceding<br>Data | Character<br>Following<br>Data |
|----------------------------------|---------------------|----------------------------------|--------------------------------|--------------------------------|
|                                  |                     |                                  | DATA...                        | Following<br>Data              |

COMMAND TO INFORM HOST THAT DATA FILE IS COMPLETED,

In order to find out what these characters are for any given host, follow this procedure:

1. Sign onto host computer
2. Enter the command to instruct the host to create a new file. An example is "NEW FILE".
3. Depress User Definable Key #11 on the 4050 keyboard. This will enable all control characters to be displayed on the screen. By viewing the control characters, the user will be able to find what characters precede and follow the prompt character.

//.

|   |  |
|---|--|
| TITLE<br>4050 Data Communications Interface | ABSTRACT NUMBER<br>TEKniques Vol. 6 No. 3 T1<br>Program 18 |
|---|--|

4. From the keyboard, enter a few lines of data. Preceding or following the prompt character may be control characters such as the following:

| <u>Control Character</u> | <u>How entered into Option 1 Program</u> |
|--------------------------|--|
| @                        | NUL                                      |
| D                        | EOT                                      |
| J                        | L/F                                      |
| M                        | C/R                                      |
| Q                        | DC1                                      |
| R                        | DC2                                      |
| S                        | DC3                                      |
| T                        | DC4                                      |
| ↓                        | R/B                                      |

5. One or more of these control characters may precede and follow the prompt character. The right column in the above table specifies how to respond to the Data Comm Program. The M or carriage return will not print on the screen. However, on most host computers, the carriage return character is usually the character issued after entering each line of date.

6. An important note to make is that the 2 parameters for Uploading (control character before the prompt and control character after the prompt) are acknowledge by Option 1 to be the same two parameters in Downloading, (control character preceding a line of data and control character following a line of data). The significance of this is when Downloading and Uploading data in the same terminal session, enter the parameters for Downloading from tape or keyboard first. Then go into terminal mode and perform an actual Downloading of data. When the user is ready to Upload data, depress User Definable Key #5, which returns the user to BASIC or Intelligent 4050 mode. Enter the parameters for Uploading either from the keyboard or 4050 Magtape and return to Terminal mode by depressing User Definable Key #5 again.

7. By completing the Uploading Worksheet, the user may respond to each question asked by the Data Comm program for Uploading data to the host.

| TITLE                              | ABSTRACT NUMBER                         |
|------------------------------------|---|
| 4050 Data Communications Interface | TEKniques Vol. 6 No. 3 T1<br>Program 18 |

How To Produce the Option 1 Worksheet:

In order to produce additional copies of the Option 1 Worksheet for General Host, Downloading and Uploading parameters, a 4662 or 4663 plotter are required; assume device address 1.

Type in the following commands:

1. FIND 8
2. OLD
3. RUN

Lay the paper on the plotter surface and define graphing area (lower left and upper right). The program will prompt the user when the first side of the worksheet is completed and allow the user to turn the paper over to complete the backside of the page for Downloading parameters. The program then instructs the user to change the paper on the plotter to produce the worksheet for the Uploading parameters.

How to produce a sample diagram explaining the Data Com Interface . . .

1. FIND 9
2. OLD
3. RUN

After the user types "RUN", a flashing "?" will appear. The user will enter from the keyboard

1. 1- indicates device address 1 for the plotter
2. 32- indicates the 4050 screen

13.

| TITLE             | ABSTRACT NUMBER                         |
|-------------------|---|
| Data Comm Utility | TEKniques Vol. 6 No. 3 T1<br>Program 18 |

# OPTION 1 DEMO WORKSHEET

## GENERAL HOST PARAMETERS

### PARAMETER CHOICES

### YOUR SELECTION

#### BAUD RATE

- |         |                        |
|---------|------------------------|
| 1. 110  | 7. 4800 (4052/54 ONLY) |
| 2. 150  | 8. 9600 (4052/54 ONLY) |
| *3. 300 |                        |
| 4. 600  |                        |
| 5. 1200 |                        |
| 6. 2400 |                        |

#### ERROR ACTION CODE

- \*1. TAKE NO ACTION AND CONTINUE PROCESSING
- 2. STOP PROCESSING ON ANY ERROR ENCOUNTERED
- 3. COUNT ERRORS AND CONTINUE PROCESSING

#### MARGIN LOCATION

- \*1. CONTINUOUS WRITING ON THE SCREEN
- 2. PAGE FILLS WITH 35 LINES ON LEFT SCREEN AND PAGEFULL
- 3. PAGE FILLS WITH 2 COLUMNS OF 35 LINES AND PAGEFULL

#### COMMUNICATIONS MODE

- \*1. FULL DUPLEX
- 2. HALF DUPLEX WITH SUPERVISOR CHANNEL
- 3. HALF DUPLEX

#### LOCAL ECHO

- \*1. LOCAL ECHO
- 2. NO LOCAL ECHO

#### ACTION FOR PAGEFULL CONDITION

- \*1. NO AUTOPAGE OR HARDCOPY. USER WILL MANUALLY DEPRESS THE HOME/PAGE KEY TO CLEAR THE SCREEN
- 2. AUTOPAGE AND AUTO HARDCOPY IF HCU IS PRESENT

#### PARITY

- \*1. EVEN
- 2. ODD
- 3. NONE

-- INDICATES THE DEFAULT PARAMETER UPON POWERING UP  
THE 4051/4052/4054.

| TITLE             | ABSTRACT NUMBER                         |
|-------------------|---|
| Data Comm Utility | TEKniques Vol. 6 No. 3 T1<br>Program 18 |

## OPTION 1 DEMO WORKSHEET DOWNLOADING PARAMETERS

1. WHAT CHARACTER(S) PRECEDE EACH LINE OF DATA BEING TRANSMITTED FROM THE HOST TO THE 4050? \_\_\_\_\_
2. WHAT CHARACTER(S) FOLLOW EACH LINE OF DATA BEING TRANSMITTED FROM THE HOST TO THE 4050? \_\_\_\_\_
3. WHAT CHARACTER(S) DESIGNATE THE END OF A FILE BEING TRANSMITTED FROM THE HOST COMPUTER? \_\_\_\_\_
4. WHAT COMMAND IS ISSUED TO YOUR HOST TO OBTAIN A LISTING OR PRINT OUT OF THAT FILE TO THE 4050 SCREEN? \_\_\_\_\_

# OPTION 1 WORKSHEET

## UPLOADING PARAMETERS

ABSTRACT NUMBER

TEKniques Vol. 5 No. 3 T1  
Program 13

1. WHAT CHARACTER(S) DO YOU TYPE BEFORE EACH LINE OF DATA WHEN CREATING A FILE ON YOUR COMPUTER? \_\_\_\_\_
2. WHAT CHARACTER(S) DO YOU TYPE AFTER EACH LINE OF DATA WHEN CREATING A FILE ON YOUR COMPUTER? \_\_\_\_\_
3. WHAT COMMAND DO YOU ENTER TO YOUR COMPUTER TO INSTRUCT YOUR HOST THAT YOU ARE CREATING A NEW FILE? \_\_\_\_\_
4. WHAT CHARACTER(S) DO YOU ISSUE TO YOUR HOST COMPUTER TO INFORM IT THAT YOU HAVE COMPLETED CREATING A FILE? \_\_\_\_\_
5. AS YOU CREATE A FILE ON YOUR COMPUTER, DOES YOUR HOST PROVIDE A PROMPT CHARACTER TO INFORM YOU THAT YOUR HOST IS READY TO ACCEPT ANOTHER LINE OF DATA? \_\_\_\_\_

IF YOU HAVE ANSWERED 'YES' TO QUESTION 5, TURN THIS WORKSHEET OVER AND COMPLETE THE REVERSE SIDE.  
IF YOU ANSWERED 'NO' TO QUESTION 5, YOU HAVE COMPLETED THIS WORKSHEET.

| TITLE             | ABSTRACT NUMBER                         |
|-------------------|---|
| Data Comm Utility | TEKniques Vol. 6 No. 3 T1<br>Program 18 |

## OPTION 1 WORKSHEET UPLOADING PARAMETERS

6. WHAT IS THE PROMPT CHARACTER THAT YOUR HOST COMPUTER IS SENDING OUT TO INDICATE THAT IT IS READY TO ACCEPT ANOTHER LINE OF DATA?

7. WHAT CHARACTER(S) PRECEDE EACH PROMPT CHARACTER THAT IS BEING SENT FROM THE HOST?

8. WHAT CHARACTER(S) FOLLOW EACH PROMPT CHARACTER THAT IS BEING SENT FROM THE HOST?

| TITLE             | ABSTRACT NUMBER                         |
|-------------------|---|
| Data Comm Utility | TEKniques Vol. 6 No. 3 T1<br>Program 18 |

\*\*\*\*\*4050 OPTION 1 DEMO PROGRAM\*\*\*\*\*

MAIN MENU

PRESS ANY ONE OF THE FOLLOWING USER DEFINABLE KEYS

1. GENERAL HOST PARAMETERS
2. TRANSFER DATA FROM HOST TO 4050 TAPE  
DOWNLOAD
3. TRANSFER DATA FROM 4050 TAPE TO HOST COMPUTER  
UPLOAD DATA
5. TERMINAL MODE
6. INITIALIZE
10. MENU