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V02 PROGRAMMING AID AVAILABLE

When early shipments of V02 software were made, the Programming Aid was not available. It is now in print and is being sent to all customers who have received TEK SPS BASIC V02. If you have V02 and have not received a programming aid, you can call your local Tektronix Field Office or representative and order part no. 070-2847-00 to get a copy.

This new programming aid serves as a good reference document for users already familiar with TEK SPS BASIC. It describes the purpose and syntax for all TEK SPS BASIC V02 commands (system software as well as package commands), provides a listing of error codes, and contains other helpful operating information in a handy 5.5 x 8.5 inch manual.
The SPS PROGRAMMING UPDATE is published periodically by the SPS (Signal Processing Systems) Documentation Group of Tektronix, Inc. This newsletter provides a listing of verified problems for current products, information for correcting or bypassing verified problems, listing of documentation corrections, notice of availability of corrected software and firmware, helpful programming hints, and a description of new products.

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Much of the material in this newsletter is developed from customer comments or from SPS Performance Reports (SPRs) which are of a general nature. As a result, we urge you as subscribers to send in any comments or report all apparent errors in the software, the instruments, or the manuals. Use the attached report form or send comments to the address below.

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TEK SPS BASIC V02 PROGRAMMING HINT

Fatal Errors, The GPIB, And The Low-Level Driver

It has come to our attention that, while TEK SPS BASIC recovers from fatal errors, the GPIB interface is not always so fortunate. It can be left in an unpredictable state, creating intermittent problems with subsequent GPIB communications (usually indicated by I-18 errors). To avoid this, execute the following two lines after fatal errors resulting from programs which use the low-level GPIB driver (GPI.SPS):

*SIFLIN @X,"IFC"
*SIFCOM @X,LA,SA,"SDC"

where:  X is the interface number,
LA is the listen address of the last instrument communicated with before the fatal error,
SA is secondary address of the last instrument communicated with.

These instructions will clear both the interface and the instrument to permit normal GPIB communication.

If identifying the last instrument addressed is a problem or if the last GPIB communication involved several instruments, substitute the following for the second command:

*SIFCOM @X,"DCL"

This will return all instruments on the bus to their initial state. However, this can have possible side effects. In a 7912AD configuration including programmable plug-ins, a DCL command will return both the mainframe and the plug-ins to power-up settings. If the timebase has been set for a very fast sweep speed and the intensity was not turned down before the DCL is sent, the return to power-up settings might cause a target burn on the digitizer.
Preventing Permanent Graticules

The GRAPH command normally displaces the graticule by a few points each time it is invoked. This prevents burning a pattern onto the terminal screen. However, if a SETGR VIEW statement precedes the GRAPH command, the graph will be in exactly the same place every time the following command sequence is invoked:

*SETGR VIEW
*GRAPH WA

This will eventually burn a permanent graticule into the screen.

To get around this problem, the viewport should be moved by a few points prior to each SETGR VIEW statement. In the following routine, JH and JV (horizontal and vertical displacement) are randomly set to some value between +5 and -5, and then added to the base viewport value. The program lines which accomplish this are lines 500 to 530. The remainder of the program provides an explanation and example of how the program can be used.

```plaintext
10 REM ***** FOR THOSE WHO USE VIEWPORT TO *****
20 REM ***, GRAPH AND DON'T WANT TO BURN *****
30 REM ***** THEIR SCREEN *****
40 REM
50 REM***** INSTEAD OF VIEWPORT X,Y,Z,W *****
60 REM***** VIEWPORT X+JH,Y+JH,Z+JV,W+JV *****
70 REM***** WHERE JH - HORIZONTAL JITTER *****
80 REM***** JV - VERTICAL JITTER *****
90 REM
100 REM
110 REM ***** SET UP AN ARRAY *****
120 DIM A(511)
130 A=INT(A)*A*SIN(44/7/512*A*5)
140 REM ***** INITIALIZE VIEWPORT VARIABLES X,Y,Z,W *****
```
160 X=300\Y=800\Z=150\W=650
165 VIEWPORT X,Y,Z,W
170 FOR I=1 TO 5
180 REM ***** ADJUST THE VIEWPORT *****
190 GOSUB 500
200 SETGR VIEW
210 GRAPH A
220 NEXT I
230 END
240 REM **** ROUTINE TO DISPLACE VIEWPORT ****
250 REM GET A HORIZONTAL JITTER FACTOR BETWEEN
260 REM -5 AND 5 SCREEN POINTS
270 REM GET A VERTICAL JITTER FACTOR BETWEEN
280 REM -5 AND 5 SCREEN POINTS
290 REM THEN ADD JITTER TO EXISTING VIEWPORT
300 REM
310 JH=ITP(11*RND(0)-5)
320 JV=ITP(11*RND(0)-5)
330 VIEWPORT X+JH,Y+JH,Z+JV,W+JV
340 RETURN

Hardcopy A shows several graphs overlapped when no jittering is performed. Used repeatedly, this will result in a permanent graticule on the screen. Hardcopy B shows the same graphs overlayed with jittering.
A Method To Get More Accurate Timing For WAIT and SIFTO

Due to the different types of memory available (including cache), the timing in the WAIT and SIFTO commands is not always as accurate as some applications demand. Here are some simple methods to calculate a calibration ratio specific to your system by using a stopwatch. The ratio can be used to adjust the WAIT and SIFTO commands for more accurate timing.

To calculate a ratio for the WAIT command, use the following program:

10 LOAD 'WAIT','PRINT'
20 PRINT 'WHEN YOU ARE READY, SIMULTANEOUSLY HIT A KEY'
30 PRINT 'AND TURN ON THE STOPWATCH'
40 PRINT 'WHEN THE TERMINAL BELL RINGS, TURN OFF THE STOPWATCH'
50 WAIT
60 WAIT 30000
70 PRINT '"G'
80 PRINT 'INPUT TIME FROM THE STOPWATCH'
90 INPUT T
100 PRINT 'THE WAIT-ADJUSTMENT RATIO= ';30/T

The timing portion of the program takes 20 to 40 seconds to complete; the exact time depends upon the computer type. Now, whenever you use the WAIT command with this system, multiply the time you want to wait by the WAIT Adjustment Ratio.

To calculate a ratio for the SIFTO command, use the following program. A GPIB instrument should be connected to the interface and turned on. Lines 20 and 80 should use the interface number your hardware is strapped for.

10 LOAD 'GPI','RASCI1','SIFTO','PRINT','ONERR','WAIT'
20 SIFTO @0,30000
30 ONERR Z GOTO 100
40 PRINT 'WHEN YOU ARE READY, SIMULTANEOUSLY HIT A KEY'
50 PRINT 'AND TURN ON THE STOPWATCH'
60 PRINT 'WHEN THE TERMINAL BELL RINGS, TURN OFF THE STOPWATCH'
70 WAIT
80 RASCI1 A$ FROM @0
90 RETURN
100 PRINT "G"
110 PRINT 'INPUT TIME FROM THE STOPWATCH'
120 INPUT T
130 PRINT 'THE SIFTO ADJUSTMENT RATIO= ';30/T
140 ONERR RETURN

The timing portion of the program takes 20 to 40 seconds to complete; the exact time depends upon the computer type. Now, whenever you use the SIFTO command, multiply the timeout value you want to specify by the SIFTO Adjustment Ratio.

A convenient way to implement these adjustment ratios in a program is to set a variable to the value of the calculated adjustment ratio. Then each time the command is used in the program, specify the time-out value by multiplying the desired time-out period by that variable. If the program is run on another computer, only the single line defining the variable needs to be changed.

---

PROGRAMMING REPORTS FOR TEK SPS BASIC V02 SOFTWARE

Programming reports 1 through 12 for TEK SPS BASIC V02 Software are included in this issue. If you are a current owner of this software, you may want to attach these reports to your manual or place them in a separate notebook for easy access.
SPS PERFORMANCE REPORT

(Product on back of yellow copy)

Options:

Version:

Reason for Report:
- Performance
- Documentation
- Suggestion
- Is performance reproducible?
- Yes
- No
- Intermittent

Priority:
- Low
- Standard
- High

System Configuration (include serial numbers):

Acquisition Units (include plug-ins):

Controller (include memory size and type):

Storage Devices:

Display Devices:

Software (versions/releases):

Description (attach listings or hard copies if available):

Reply
g

Comments:

Date:

Report #:

Signed

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Date: 15-JAN-80

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Minus sign in a string specifying an octal number does not cause the VARTST command to issue an error.

The first symbol is not printed when line plots are made using the DISPLAY Command.

SETDATE command does not allow leading zeroes or spaces in the date string.
TEK SPS BASIC V02 PROGRAMMING REPORT

NO: 1                                      DATE: 3-OCT-79

MODULE: TEK SPS BASIC Nonresident REPLACE  VERSION: V02-01
       Command

SPR NO:

DESCRIPTION:

If the REPLACE command causes an 0-2 error, the disk file being replaced might be cancelled and replaced with an empty one-block file.

EXAMPLE:

*DIM A(3000)
READY
*REPLACE 'PROG.BAS'
FATAL 0-2
READY
*DELETE A
READY
*DIR 'PROG.BAS'
PROG.BAS 1

SUGGESTION:

If this happens, delete an array that uses at least 260 words of storage or RELEASE any drivers or LOADed commands. Then try the REPLACE again.

DISPOSITION:

To be fixed in the next release of the REPLACE command.
DESCRIPTION:

If the INTO feature of the COPY command is used and the number of blocks stated is one block too small, no error is given although the new file is incorrect.

EXAMPLE:

*DIR 'PROG.BAS'
PROG.BAS  5
READY
*COPY 'PROG.BAS' TO 'PROG.FOO' INTO 4
READY
*DIR 'PROG.FOO'
PROG.FOO  4
READY
*

Even though PROG.FOO is listed in the directory as consisting of 4 blocks, the new file is incorrect since it was one block smaller than the original file PROG.BAS.

SUGGESTION:

If the INTO feature of the COPY command is going to be used, display a DIRECTORY of the file first to obtain the size of the file.

DISPOSITION:

To be fixed in the next release of the COPY command.
When a patch area is requested (by using the SYSBLD command), the monitor initialization program attempts to execute the following line of BASIC:

```
OLD "PATCH.FIX"
RUN
```

The OLD command, however, does not allow any commands to follow it on the same line. The PATCH.FIX program is brought into memory, but a C-5 error is issued and the program is not executed.

**EXAMPLE:**

```
TEK SPS BASIC V02-01--COPYRIGHT 1979--TEKTRONIX, INC.
FATAL C-5
ALL RIGHTS RESERVED. SERIAL NO. XXXXX.
YOU HAVE XXXXX WORDS OF FREE MEMORY

READY
* 
```

**SUGGESTION:**

Since there are no patches to the TEK SPS BASIC V02 Resident Monitor at this time, it should not be necessary to request a patch area for correcting the monitor. If you have some other reason to use the patch area, you must RUN the program yourself. Type RUN following the appearance of the fatal C-5 error message and the READY prompt.

**DISPOSITION:**

To be fixed in the next release of TEK SPS BASIC Monitor.
When the function argument is outside the range $-2 \, \pi$ to $+2 \, \pi$, the double-to-single precision conversion routine used by SIN and COS may inadvertently round an intermediate mantissa. This overflows its exponent, causing the function to advance by 1 quadrant. This can occur in approximately 1 of $2^{24}$ values entered outside the range of $-2 \, \pi$ to $+2 \, \pi$. This problem occurs only in controllers with FIS/EIS.

This error was fixed incorrectly in V02-01.

**EXAMPLE:**

```plaintext
5 REM *** LINE 10 PRINTS CORRECTLY
10 PRINT COS(-5/4*6.283184)
15 REM *** LINE 20 COMPUTES INCORRECTLY
20 PRINT COS(-5/4*6.283185)
RUN
1.49803E-06
 .0245412
```

**SUGGESTION:**

Test arguments to be sure they are in the range $\pm 2 \, \pi$.

**DISPOSITION:**

No user patch available. To be fixed in next release of TEK SPS BASIC Monitor.
No error is issued if zoned arrays given as arguments overlap. Since these commands store intermediate results in the various arrays, necessary values may be overwritten if zones overlap. Note that the autocorrelation capability in the CORR command is an exception since it is designed to work properly when the source arrays totally overlap.

EXAMPLE:

```
10 DIM A(100)
20 A=1
30 INT A(0:99),A(1:100)
```

Values in A do not increase in a linear fashion.

```
10 DIM A(511),B(256)
20 .
30 RFFT A,B,A(0:256)
```

The resulting arrays, B and A(0:256), will contain inaccurate values.

SUGGESTION:

Transfer one array zone to a temporary array unless you are performing an autocorrelation with totally overlapping source arrays.

DISPOSITION:

Will be corrected in next release of these commands.
If a program which was brought into memory by OVERLAY contains a statement such as:

10000 E9 = 0

where the line number is followed by a variable name composed of E followed by a number, a warning error (E-4) may occur during the first computational command following the OVERLAY command. The OVERLAY command uses an ASCII-to-integer conversion routine which accepts E as a valid numeric character. In the above example, the line number is decoded as 10000 E+09 which is too great a value for an integer.

EXAMPLE:

If a file, PROG.BAS, has the statement:

1000 E9=0

and the following program is executed:

100 OVERLAY "PROG"
110 X = 0

a warning error E-4 occurs at line 110. (NOTE: Warning error E-4 is set during line 100 but is not checked until the end of line 110.)

SUGGESTION:

This error does not cause the program to run incorrectly. The warning error should be ignored. To get rid of the warning error, specify the LET keyword before the destination variable (e.g., LET E9=0).

DISPOSITION:

To be corrected in next release of the OVERLAY command. Correction provided for the V01-02 OVERLAY command by user PATCH.010 in Vol. 2, No. 2 of the Software Maintenance Newsletter.
TEK SPS BASIC V02 PROGRAMMING REPORT

NO: 7                               DATE: 8-OCT-79

MODULE: TEK SPS BASIC Nonresident BOOT
        Command

VERSION: V02-02

SPR NO:

DESCRIPTION:

It is not possible to boot DX1:.

EXAMPLE:

*BOOT DX1:

The machine will halt.

SUGGESTION:

Do not try to BOOT from Drive 1 on the floppy disk drive.

DISPOSITION:

To be fixed in the next release of the BOOT command.
DESCRIPTION:

If a RESET is done after part of an array has been read, subsequent READs return invalid data.

EXAMPLE:

10 DIM A(10), B(3)
20 A=3
30 OPEN #1 AS 'TEST' FOR WRITE
40 WRITE #1, A
50 CLOSE #1
60 OPEN #1 AS 'TEST' FOR READ
70 READ #1, B
80 RESET #1
90 READ #1, A

After line 90 is executed, A will not contain 3's.

SUGGESTION:

When reading parts of arrays, use CLOSE followed by an OPEN instead of RESET.

DISPOSITION:

To be fixed in the next release of the RESET command.
A fatal H-Ø error can occur after re-ATTACHing a DPO. If a DPO was ATTACHed, then DETACHed, and finally re-ATTACHed, the processing of an interrupt from that DPO (e.g., a program call button is pressed) will corrupt the software.

EXAMPLE:

10 ATTACH #1 AS DPO:
20 DETACH #1
30 ATTACH #1 AS DPO:

After executing the above statements, pressing call button 14 will cause an H-Ø error indicating that the software is corrupted. (An H-Ø error may not occur when other call buttons are pressed, but the software is corrupted anyway.)

SUGGESTION:

If a DPO must be DETACHed and re-ATTACHed, the driver should be RELEASEd and re-LOADed between the DETACH and the ATTACH.

DISPOSITION:

To be fixed in the next release of the DPO driver.
The VARTST command does not give an error when a minus sign is used in the string specifying an octal number, even though the command was not designed to accept negative numbers as inputs.

EXAMPLE:

#VARTST X,\'-7\',Y
READY
#

SUGGESTION:

If you need to set the high-order bit, specify it along with the other bits to be set, as in VARCLR and VARSET.

DISPOSITION:

To be fixed in the next release of the VARTST command.
TEK SPS BASIC V02 PROGRAMMING REPORT

NO: 11 DATE: 3-DEC-79

MODULE: TEK SPS BASIC Non-resident

DISPLAY Command

VERSION: V02-01, (V01-01)

SPR NO:

DESCRIPTION:

When using the DISPLAY command, the line plot with squares and the line plot with triangles do not draw the square or triangle on the first point of the graph.

EXAMPLE:

RUN
10 DIM A(31)
15 LIST
20 A=INT A,A
30 VIEW:100:50:100,450
50 SET VIEW,VIEW,GRAT 2,3.2.3
60 GRAPHA,1
70 DISPLA 2.2.A,3.2.A:2

SUGGESTION:

If a symbol is required at the first point, MOVE to the position of the first point (e.g., MOVE 0,A(0) for the array in the example) and then DRAW the square or the triangle. For example:

MOVE 0,A(0)
RSMOVE -4,-4
RSDRAW 8,0,0,8,-8,0,0,-8

will draw a square at A(0) on the graph.

DISPOSITION:

To be fixed in the next release of the DISPLAY command.
DESCRIPTION:

The `SETDATE` command does not allow leading zeroes or spaces in the string argument. An S-22 error is returned.

EXAMPLE:

```plaintext
*SETDATE "03-OCT-79"
FATAL S-22
READY
*SETDATE " 3-OCT-79"
FATAL S-22
READY
*```

SUGGESTION:

When `SETDATE` is used in a program, edit a leading zero or space out of the date string by:

```plaintext
10 IF SEG(A$,1,1)<"1" THEN A$=SEG(A$,2,LEN(A$))
20 SETDATE A$
```

DISPOSITION:

To be fixed in next release of the `SETDATE` command.