SARGE Software

VELADISC+

Introduction

The VELADISC+ is an extension of our VELADISC suite of programs for transfer and analysis of VELA data using a BBC microcomputer. It has been commissioned by I.S.L. to cope with the type of data produced by their four channel temperature measuring unit as well as the data for 'voltage measuring' or 'pulse counting' programs.

This page of instructions should be read as extensions to the relevant section of the standard VELADISC manual which follows.

Requirements

The temperature measurement unit plugs into the digital input/output port on the VELA. Since the VELA transmits its data to the BBC through the same parallel port, the temperature measuring unit must be disconnected and the VELA to BBC cable must be connected before data transfer can take place.

Initial setting up

Function keys are as for the standard VELADISC but f4 will now select 'volts', 'bytes' or 'temp' mode. If temperature data files are to be transferred or analysed then 'temp' mode must be selected before pressing f1 or f2. Example data for analysis are provided in files T.CH1, T.CH2 etc..

Analysis of data files

When the 'temp' mode is set the default filenames offered will be T.CH1 etc.. If a default filename is rejected then the input prompt for the user's filename will already contain the directory prefix T. which identifies data files in temperature format. No other directory can be used.

All drawing commands act as described but if you need to edit Q.PLOT to activate your screen dump then a similar change must also be made to Q.TPLOT.

Data Transfer

This is as described for VELADISC except that the default filenames T.CH1 etc. will be offered. If defining your own filenames then the obligatory use of the T. directory prefix restricts you to four-character filenames for use with the analysis program.

Format of datafiles

The preamble is saved, as for the standard VELADISC, allowing space for possible future expansion. The data therefore start at the 9th. byte in the file but now occupy two bytes per reading. The temperature (Celcius) could be printed by changing line 320 to:

```
320 PRINT ((256*BGET#F + BGET#F)-250)/10
```

(Again with suitable @% and B% settings)

SARGE Software

VELADISC

Introduction

This suite of programs allows the user to transfer any number of channels
of data from the VELA to BBC disc files. Data from up to four files can then be
drawn in the four-colour high-resolution mode 1 in a variety of layouts with
variable scaling on both axes. A cursor facility is used to display numeric
data at a particular point in each file. This information can be presented as
the byte value (0-255) or as the measured voltage.

Requirements

The user requires any model of VELA and a BBC model B micro with a disc
drive. The digital output port of the VELA must be connected to the user port
of the BBC by a suitable cable (as described in the VELA manual).

Initial setting up

Connect the VELA and the BBC, switch on and insert the VELADISC. (drive 0
if twin drives). Hold down the SHIFT key on the BBC while pressing and
releasing the BREAK key. The main menu should then be displayed.

Normally at this point you could press the red function key f1 to transfer
data from the VELA or f2 to analyse data from disc. You must first use f3 - f7,
however, to describe your system.

f3 - If you have an early VELA then it will send six preamble bytes describing
each channel of data. Later VELA's send an extra byte to specify the
voltage range of the input amplifier. You can check which model of VELA
you have by selecting program 0 and looking at the voltage on channel 1
while you move the range switch for channel 1. If the decimal point in the
display doesn't move then your VELA sends six bytes; if it does move then
it sends seven. Repeatedly pressing f3 will cause 6 or 7 to be displayed.
Set this to describe your VELA.

f4 - Pressing f4 sets 'volts' or 'bytes' mode. In the former case a single byte
will be interpreted as a voltage and in the latter the byte will be
interpreted as an integer (0-255). You would normally use 'volts' mode for
voltage measuring programs and 'bytes' mode for pulse counting etc. but it
is instructive to show that 'voltage' readings are encoded as single
bytes. For VELAS with a seven byte preamble the correct voltage will be
shown. Early VELAS with a six byte preamble do not transmit the input
range switch setting and it is therefore assumed to be 2.5 V. If a more or
less sensitive range is used then the displayed voltage must be scaled
appropriately.

f5 - Pressing f5 sets the drive for data files. The program disc must always be
in drive 0 and users with one single-sided drive MUST leave this set at 0.
Data files will then be stored on the program disc. The disc is not
protected and a security copy can be taken using *BACKUP. Do NOT use
*COPY *.* since this changes the order of files on the disc and will
result in longer delays in accessing files. Users with two double-sided
drives may use any drive for data files but others should note that
selecting a non-existent drive will cause the program to 'hang up' later.

f6 - Pressing f6 will allow you to choose the best vertical position of the display on your monitor.

f7 - When f3 to f6 are set, use f7 to save the settings. (They will be saved anyway if you use f1 or f2 but not if you immediately end with f8). Note that the programs frequently write to the file DEFAULT and the program disc must <u>not</u> be write protected. If the DEFAULT file is accidently corrupted or deleted then a new one can be created with the command CHAIN "B.CREATE".

You are now ready to transfer or analyse data but we suggest that you first TAKE YOUR BACKUP DISC COPY and then analyse the example data supplied in files CH1, CH2, CH3 and CH4.

Analysis of data files

First MAKE SURE that the correct drive is displayed in the menu (0 for initial examples) and then press f2. The display then changes to the first page of the analysis program.

The first requirement is to identify those files which you wish to use. You will be presented with numeric information for all of these files irrespective of whether they are displayed on the screen. You must first select the number of data files (say 4) and then name them. It is expected that the default names CH1, CH2, CH3 and CH4 will be used extensively and these names can be selected by simply pressing RETURN. (do this)

If a file is not found then you are given the opportunity to change the name. If an error occurs (e.g. Bad filename) then the error is reported and you can continue by pressing space or return to the main menu by pressing ESCAPE. This is a general error handling procedure used in all programs.

N.B. All data files must be on the same drive and this must be selected in the main menu before pressing f2. If, after pressing f2, you decide that you need to change the drive then ESCAPE takes you to the error handler and a further ESCAPE returns to the main menu. If a non-existent drive is specified then the program will hang-up when a file is searched for. You can then only exit with BREAK and start again.

When all the files have been named and found the display changes to the main graphics page. The white boxes identify various windows where data can be drawn and initially there will be as many windows as data files.

The header which you see always describes the next drawing operation and the red box identifies the window. You can draw CH1 by simply pressing D - try it.

As the data are drawn, information about the file is displayed and when drawing is complete you can obtain numeric information by pressing the arrow keys at the top right hand corner of the keyboard. The left and right arrows move the cursor one data point at a time and the up and down arrows move the cursor in larger steps.

You may find the action of the arrow keys a little difficult to get used to. They are only active when the selected window contains drawn data. The first touch of any arrow key merely calls up the cursor position display <u>without moving the cursor</u>. Holding the key down or pressing another arrow key then moves the cursor. When the cursor has been stationary for a short time the readings from each file at the current cursor position are displayed.

This mode of action has been chosen since printing values while the cursor is moving is too slow. All keys auto-repeat and by holding them down it is fairly easy to locate the required data point. Note, however, that to read the values at a series of adjacent points requires two presses on a left or right arrow key followed by a pause.

Pressing H prints a summary of the single key commands described below (try it). All these commands are active at any time but they are most obvious in their action if R is pressed first. This returns you to the drawing mode display (try it).

X - axis. Pressing X will select 'full scale', 'user-defined' or, (in a window with drawn data) 'current' as the method of setting the x-axis limits.

Y - axis. Pressing Y selects options as for X with the additional 'auto-range' option for the y-axis limits. This will automatically draw the data just fitting into the vertical axis. (Try it with the different data files. Note that labelling of y-axis is done to the same resolution as the measurement)

W - Window. Pressing W selects the window where drawing will next take place. (Red box moves to selected window)

F - File. Pressing F selects the file from which data are taken when D is pressed.

M - Mode. Pressing M selects 'points' or 'line' drawing mode.

R - Returns to the 'drawing mode display' (from help, file information or cursor displays). This is not strictly necessary as most keys return to this display after their action has taken effect. Using R, however, lets you review the last drawing parameters before making a change.

L - Layout. Pressing L lets you select a new layout of windows on the screen by entering a number (0-5). For example, if you wish to show a part of one file to maximum resolution the whole screen can be set to one big window by selecting layout number 1. It is then drawn and you confirm your choice by Y or N. Layouts 1-4 correspond to the screen being split by horizontal divisions into that number of windows. Layout 5 is an alternative 4-window layout with improved vertical resolution at the expense of horizontal resolution. Layout 0 is especially useful for showing portions of a data file in context. If the whole file is drawn in the lower window this can be kept in view while portions of it are investigated in the upper windows.

E - Exit from the analysis program and return to main menu.

The following keys are provided to run a user-supplied screen dump to printer. They are not listed in the help menu.

P - Print screen. This is only active if pressed immediately after S. To use this option the user must supply a suitable screen dump for his printer in a file called M.SCRDMP copied onto VELADISC. Any RAM between &900 and &CFF can be used for the routine and its workspace. The normal zero page locations are also free. If a ROM screen dump is to be used then LOAD "Q.PLOT" from VELADISC, locate the command *RUN M.SCRDMP in or near line 165, replace this with the appropriate ROM command and SAVE "Q.PLOT"

S - Screen dump enable. To avoid accidental use, P is not active unless S is pressed immediately before P.

General Comments

In general, any portion of any file can be drawn in any window. You can have parts of the same file in several different windows and you need not draw all files. You can only move the cursor when in a window with drawn data and then only within the current x-axis limits.

Any error (or pressing ESCAPE) takes you to an error handler which reports the error then allows you to continue by pressing space or to return to the main menu by pressing ESCAPE. The normal exit from the program is, however, simply to press E.

Data Transfer

When you are ready to try data transfer return to the main menu by pressing E, MAKE SURE that the drive for the new data files is correctly set and then press f1. The display will then change to the data transfer page which requests you to press the space bar WHEN THE VELA SHOWS 'O-P'.

You must have made a measurement on the VELA before you can continue (e.g. the pickup from your finger inserted into channel 1 input. Program 01 parameter ~1). When the measurement is made and the VELA shows O-P then press the space bar on the BBC and then the appropriate channel button and MICRO button on the VELA.

Data transfer takes less than one second. If nothing appears to happen then you have either done things in the wrong order or your connection is faulty! To check the former, press RESELECT DISPLAY on the VELA until O-P is displayed and send the data as before. If this works correctly or you see the screen being corrupted by transferred data it will prove that you merely pressed the space bar too early and you must press BREAK and start again. If it still fails then check that the interconnecting cable is plugged into the sockets in the correct orientation.

A correct transfer will leave the VELA showing O-P and the BBC plotting the data received. This initial full scale display is for checking purposes only. If the data are poor you can repeat the experiment without saving and analysing the data.

When the data are drawn you are asked if you wish to save the data. If you answer Y then you are offered the default filename CHn (where n corresponds to the channel sent). If you wish you can refuse this and enter your own filename. If a file already exists then the new data overwrites the old. It is advisable to use filenames of less than seven characters since the analysis program writes them above the numeric data in fields only seven characters wide.

You are next asked if you have any further data to transfer. If you answer Y then you return to 'Press space when VELA shows O-P' and can repeat the transfer for any number of data sets on any channel.

When you eventually respond N to 'Any more data to transfer ?' you proceed to the analysis page if you have saved any data or to the main menu if you have not.

As usual, an error (or the ESCAPE key) sends you to an error handler which reports the error. Pressing the space bar will then allow you to continue or pressing ESCAPE will return to the main menu.

Format of datafiles

The datafiles are written as single bytes using BPUT and are therefore
read with BGET. The first eight bytes of the file contain the six or seven byte
preamble in the normal order with extra space allowed for possible expansion.
The remaining bytes, starting from the 9th. byte in the file, are the
transferred data.

Consider the following program to print a data file:

```
  10 REM PRINT A VELADISC DATAFILE
  20 MODE7
  30 :
  40 REM Open desired file
  50 F=-1
  60 REPEAT *CAT
  70   IF F=0 THEN PRINT'"File "F$" not found"
  80   INPUT '"Filename "F$
  90   F=OPENIN(F$)
 100   UNTIL F<>0
 110 :
 120 REM Read preamble
 130 Nbytes%=256*BGET#F + BGET#F
 140 Prog%  =BGET#F
 150 Para%  =256*BGET#F + BGET#F
 160 Chan%  =BGET#F
 170 Gain%  =BGET#F
 180 Dummy% =BGET#F :REM not yet used
 190 :
 200 REM Now print header and B% bytes per line
 210 REM in a field of width @%
 220 B%=8: @%=4: CLS
 230 VDU14 :REM VDU 2 for printed output
 240 PRINT "Filename      "F$
 250 PRINT "No. of bytes ";Nbytes%
 260 PRINT "Program no.   ";Prog%
 270 PRINT "Parameter     ";Para%
 280 PRINT "Channel no.   ";Chan%
 290 PRINT "Gain byte     ";Gain%'
 300 FOR I%=0 TO Nbytes%-1
 310   IF (I% MOD B%)=0 THEN PRINT'I%+1;":";
 320   PRINT BGET#F;
 330   NEXT I%
 340 PRINT
 350 VDU 15 :REM VDU 3 if on printer
 360 CLOSE#F
 370 END
```

Note, in this simple serial example, that the Gain% and Dummy% bytes MUST
be read in order for the first data point to be read from the correct position
in the file.

The measured voltage, if appropriate, could be printed by changing line
320 to:

```
 320 PRINT 2.5*(BGET#F-128)*Gain%/1280
```

(this would also require changing @% and B% to a suitable value)

Use of the machine code data transfer

The machine code to transfer one channel of VELA data to the BBC RAM can easily be used in your own programs if required.

The code from the file M.Code01 is loaded into &C00 onwards. This is the region normally set aside for user defined characters so this facility must not be used by any program which uses the machine code transfer.

The code is written assuming that a high resolution screen mode will be in use with the bottom of screen memory at &3000. It therefore uses the memory from &2BF8 to &2BFF for the preamble and &2C00 to &2FFFF for the transferred data. Your BASIC program must therefore set HIMEM to &2BF8 to avoid corruption of the transferred data. As an example, the previous program could be rewriten to print the data directly it is transferred:

```
 10 REM PRINT DATA FROM MEMORY
 20 MODE1: HIMEM=&2BF8
 30 :
 40 REM Transfer Data
 50 PRINT '"Press space when VELA shows 'O - P'"
 60 REPEAT UNTIL GET=32
 70 *RUN M.Code01
 80 :
 90 REM Point L% to Preamble and D% to Data
100 L%=&2BF8: D%=&2C00
110 :
120 REM Read preamble
130 Nbytes%=256*L%?0 + L%?1
140 Prog%  =L%?2
150 Para%  =256*L%?3 + L%?4
160 Chan%  =L%?5
170 Gain%  =L%?6
190 :
200 REM Now print header and B% bytes per line
210 REM in a field of width @%
220 B%=8: @%=4: CLS
230 VDU14 :REM VDU 2 for printed output
250 PRINT "No. of bytes ";Nbytes%
260 PRINT "Program no.   ";Prog%
270 PRINT "Parameter     ";Para%
280 PRINT "Channel no.   ";Chan%
290 PRINT "Gain byte     ";Gain%'
300 FOR I%=0 TO Nbytes%-1
310   IF (I% MOD B%)=0 THEN PRINT'I%+1;":";
320   PRINT D%?I%;
330   NEXT I%
340 PRINT
350 VDU 15 :REM VDU 3 if on printer
370 END
```

For help or advice please write to the address below enclosing a stamped addressed envelope and full details of your VELA and BBC micro.