TEK-222 Curves to PC: Manual

01. Connection of the TEK-222 to the PC (2 different cables can be used):

    Cable 1: SUB MIN D 9 poles (DE-9) female to the PC RS232 socket
             SUB MIN D 9 poles (DE-9) male to the TEK-222 RS232 socket
             3 wires: Pin 2 to Pin 2 (RxD)
                      Pin 3 to Pin 3 (TxD)
                      Pin 5 to Pin 5 (GND)
             Do not cross Pin 2 and Pin 3, more than 3 wires are useless. A shield is not neccessary (length: 2m).

    Cable 2: USB-RS232 Adapter. Example: ELV No.: 40-05 52 34, Art. No.: 40055235, € 14,95
             The distance pins of the RS232 plug have to be removed, so that it fits into the RS232 socket of the TEK-222.
             The software has to be installed. It comes with an eight cm CD.

    Not any of the cables has an advantage compared to the other. If your PC is not equipped with a RS232 socket,
    than you have to use an USB-RS232 adapter (Cable 2).

02. Set the TEK-222 to 9600 Baud:
    1. Switch it on
    2. Push the button "AUX FUNCT"
    3. Push the button next to the display "CONFIG"
    4. Push the button next to the display "BAUD"
    5. Push the button next to the display "9600"

03. If you use the Cable 1, set the PC COM1 to "9600,8,NONE,1,NONE".
    If you use the Cable 2, set the "Prolific USB-to-Serial Comm Port (COMx)" to the same values.
    (COMx) may be (COM1) until (COM9). This will be mentioned during the sotware installation.
    Take care, that not any other program tries to communicate with the COM Port!

04. Download and install the Program "HTerm 0.8.1beta", for instance from "http://www.heise.de/download/hterm.html".

05. Configure "HTerm" (from left to right, from top to down):
    The TEK-222 must be switched on, the RS232 connection cable must be installed
    01. Click <Connect>
    02. Select the Port (e.g. COM1)
    03. Select Baud: 9600
    04. Select Data: 8
    05. Select Stop: 1
    06. Select Parity: None
    07. Unselect Ascii, Dec and Bin
    08. Select: Hex
    09. Click on the arrow beside <Save output>, select "Hex" in the dropdown list, click <OK>
    10. In the textfield beside "Newline every ...characters" write the number 50
    11. Extend the horizontal size of the HTerm window, so that you can see 50 signs in the ruler below "Received Data"
    12. TEK-222: Take care, that a curve will be displayed in CH 1
    13. In the long textfield, right from "Type..." write "CURV? CH1 Chr(13)" (without the quotation marks)
    14. Click <ASend>
    15. Click "Start"

16. Extend the vertical size of the HTerm window, so that you can see all the received data:
    21 lines each 50 two digit Hex characters, 1 line with 4 or 5 two digit Hex characters
    (see the picture "3. HTerm Received Data.pdf").
17. Click <Clear received>
18. Click <ASend> and <Start> again. Check the received data: The content may be much shorter than
    the correct content described in point 05.16. In this case click <Clear received>, <ASend> and <Start> again,
    until you achieve the correct result. This will usually happen every second time.
    I do not have an explanation for this problem nor any way, how to avoid it.
    Can somebody help me?
19. Click on "Save output". The output name may be "output_2012-11-21_15-28-44.log". You can change this name,
    but take care to keep ".log" at the end of the name.
    Example: The TEK-222 screen shows a square wave, 5 V DC, 50 mS; You may save the file like:
    C:\TEK-222\TEK-222 3. Output\1600 Examples CURVES\CH1 RECTANGLE 5 V DC 50 mS CALB'D.log
20. Double click on this file: The editor shows the same content as in the "Received Data" field of HTerm
21. HTerm: Right from <Clear received> click on the check box <Ascii>. You will see:

```
 1  2  2  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 etc. (Ruler)
 C  U  R  V     C  H  1  :  0  9  B  9  1  2  4  8  D  8  0  0  0  2  0  0  A  F  A  F  A etc. (Askii)
43 55 52 56 20 43 48 31 3A 30 39 42 39 31 32 34 38 44 38 30 30 30 32 30 30 41 46 41 46 41 etc. (Hex)
```

    This is an example only. The real values vary of cource according to your curve on the TEK-222.
    In this example the first 9 signs give information about the TEK-222 channel. The signs under 10 until 25
    are codes for the parameters like VOLS/DIV, SEC/DIV, CPLG etc. The signs from 26 until 1051 are the
    curve Y values. The last three signs are   3B = ";",   0D = CR,   0A = LF (HEX)
    which is equal to   Chr(59) = ";", Chr(13) = CR, Chr(10) = LF (DEZ)

22. TEK-222: Pusch the button <SAVE> then pusch the button next to the display "1". With this procedure you
    save the curve into the memory named "REF1" of the oscilloscope.

23. HTerm: Write "CURV? REF1 Chr(13) into the textfield (see point 05.13), click <Clear received>, click <ASend>,
    click <Start>. Now you will see:

```
 1  2  2  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 etc.
 C  U  R  V     R  E  F  1  ;  0  9  B  9  1  2  4  8  D  8  0  0  0  2  0  0  A  F  A  F  A etc.
43 55 52 56 20 52 45 46 31 3A 30 39 42 39 31 32 34 38 44 38 30 30 30 32 30 30 41 46 41 46 41 etc.
```

    This file is 1 sign longer than the file in point 05.20. This will be considered in the VB6 programm TEK-222.exe.

24. HTerm: Click on <File>, click on <Safe config as...> and print a useful name, for instance:
    "COM 9 USB-RS232 Adapter ELV 40055235.cfg". If you open HTerm the next time, then click <File> and
    <Load Config...> and select the *.cfg file with a double click.

06. Copy the directory "TEK-222.zip" to "C:\TEK-222\TEK-222.zip" and unzip it here.

```
C:\TEK-222\TEK-222 1. VB6                                  : Visual Basic 6 Prof program with sources
          \TEK-222 2. Path                                 : "txtPath.Text"
          \TEK-222 3. Output\1100 Parameter   CH1          : Curves for the check of parameters
                             \1200 Parameter   CH2
                             \1300 Parameter   TIME vs DIV
```

```
                \1400 Parameter   TRIG
                \1500 Parameter   DIVERSE
                \1600 Examples    CURVES       : Curves as examples
                \1700 Calibration CALIB        : Curves for calibration
        \TEK-222 4. Data                       : Textfiles with the curve dates (signs and numbers)
        \TEK-222 5. Pictures                   : Pictures as examples
        \TEK-222 6. Manuals                    : 2 Tektronix manuals, HTerm manual, this manual
```

07. Double click on the file "C:\TEK-222\TEK-222 3. Output\1600 Examples CURVES\TEK-222.exe".
    This starts the program "TEK-222.exe".

    If you have VB6 Prof installed on your computer, you can also select
    "C:\TEK-222\TEK-222 1. VB6\TEK-222.vbp". That calls VB6 and loads all the program files. In this case, you are
    in the programming mode of VB6. Push F5 on the keyboard to start TEK-222.vbp in the programming mode.

    If you do not have VB6, nevertheless you can view the content of a file, if you open it with an editor.
    The files *.vbp, *.vbw, *.frm and *.bas are clearly understandable textfiles.

    TEK-222.exe: The use of this program is very simple. Here is a brief list of the functions:

    01. The window will be opend in the centre of the monitor. With the mouse it can be moved to another position.
    02. A click on the option button <Set Form Centre> sets it into the centre of the monitor.
    03. The position will be displayed in the textfields of "Top" and "Left" if you move the mouse over the form.
    04. If you change the numbers in these textfields, then the window follows to the new position.
    05. A click on <Show Background> lets the other icons on the monitor disappear. A click on <Hide Background>
        lets them reappear. A click on this option button forces the grid to appear and any curve to disappear.
        Please see examples in C:\TEK-222\TEK-222 5. Pictures\4. TEK-222 with Background.pdf and
        \5. TEK-222 without Background.pdf
    06. A click on <Clear Window> forces the grid to appear and any curve to disappear.
    07. A click on <Color 1> until <Color 4> preselects the color for the next curve.
    08. A click on <Exit Program> saves the current path in the file "C:\TEK-222\TEK-222 2. Path\txtPath.Text".
        The program will be finished then.
        If you do not want to save the current path but to keep the former path in this file:
        Click on <Show Background>, then double click on that background. The program will be finished without saving
        the current path.
    09. In order to open the program, double click on the file "TEK-222.exe". It will open and display the last
        saved path.
        "TEK-222.exe" may be saved anywhere on the HDD, an USB-stick or on any other memory. It has not to be installed.
        I suggest, to copy "TEK-222.zip" to the directory of C:\TEK-222\ and to unzip it there, see point 06.
        The size is less than 10 MBytes.

        You find "TEK-222.exe" in "C:\TEK-222\TEK-222 1- VB6\TEK-222.exe"
                          and in "C:\TEK-222\TEK-222 3. Output\1600 Examples CURVES\TEK-222.exe"

        For the first time please use "C:\TEK-222\TEK-222 3. Output\1600 Examples CURVES\TEK-222.exe" for starting
        the program.

    10. There are 3 windows in the form of TEK-222.exe which replace an explorer in VB6:
        1. The drive

2. The path
3. The files with the curve data

The use of this "VB6 Explorer" is similar to the use of a windows explorer. There is one difference: If you want to get access to a file of another computer in your net, then the drive of this net-computer must have a letter (A until Z) on your computer, otherwise it will not appear in the window "drive".

08. Display of curves:

01. Click on <Show Background>
02. Click on <Color 2>
03. Click on "1601 CH1 SINEWAFE UNCAL 0.2 V AC 50 µS.log"
04. Click on <Export Data>, keep the filename in your mind (it is mentioned in a message box). Click on <OK>
05. Click on <Color 3>
06. Click on "1604 CH2 TRIANGLE CAL 1 V DC 50 µS.log"
07. Click on <Export Data>, keep the filename in your mind (it is mentioned in a message box). Click on <OK>
08. Click on <COLOR 1>
09. Click on "1607 REF1 RECTANGLE CAL 5 V DC 50 µS.log"
10. Click on <Export Data>, keep the filename in your mind (it is mentioned in a message box). Click on <OK>

With these 10 simple clicks you createt the same picture that you can find in
C:\TEK-222\TEK-222 5. Pictures\2. TEK-222 A4.pdf

and you createt the curve data files that you can find in
C:\TEK-222\TEK-222 4. Data\TEK-222 Data File 20.11.2012 19-50-08.txt. The date and the time within the filename will be different.
The program TEK-222.exe creates those files with names like "TEK-222 Data File DD.MM.YYYY hh-mm-ss.txt".

09. Creating pictures (TEK-222.exe is open and <Show Background> is activ):

01. Push the keyboard buttons <ALT> and <PRINT> (<ALT> und <DRUCKEN>)
02. Double click on C:\TEK-222\TEK-222 5. Pictures\TEK-222 A4.doc
03. If the page shows a picture already, then click on it and push the keyboard button <DEL> (<ENTF>), this removes the picture.
04. Place the mouse pointer right from the flashing cursor
05. Push the right mouse button, click in the drop down list on "Paste" ("Einfügen")
06. Double click on the text below the picture
07. Change the name from "TEK-222 A4" to another name for the picture, don't change "Page 1 from 1 pages" and the date.
08. Click on "Close" ("Schließen")
09. Save the document

10. Open problems

Due to bad explanations in the Tektronix "222 RS-232 Interfacing Guide", but also due to difficulties, which I have in the understanding of the explanations, there are still problems open. These problems all depend to the values which I called "Parameters".

I would be very grateful, if somebody, who understands it better than me, would explain it to me, so that I may be able, to understand it also.

My problems depend to the following sides and tables in the above mentioned document:

Page	12	13	15	17	19
Table	Table 2	Table 3	Table 4	Table 5	Table 6

I simply cannot find the bit combinations as they are written in the document. Otherwise, my interpretation of the dates seems to be correct. Please see pages 3 and 4 of the Tektronix document:

<frame>	"CURV CH1:", "CURV CH2:", "CURV REF1:", "CURV REF2:", "CURV REF3:", "CURV REF4:"
(no problem)	In the first 2 cases they consist of 9 characters, the others of 10 characters. Because of this circumstance the VB6 program sets a blank (Chr(32)) in front of the string in the case of "CURV CH1:" or "CURV CH2:" so the strings have equal length and have equal start points for the Parameter values and the curve values. Signs No.: 1 to 10
<fp data>	There are 10 characters for the values, which I called "Parameters"
(problem)	In the decoding of these characters I do have the major problems because I cannot find the bit combinations. Signs No.: 11 to 20
<frame nr>	2 characters. They should represent conditions, which I do not really understand. What is a
(problem)	RO (readout) frame? In all my trials I got always 30 30 (HEX) = 0 0 (ASKII) = 048 048 (DEZ) = 0*16^1 + 0*16^0 = 0 (Chr(48)="0", Chr(50)="2") Signs No.: 21 and 22
<byte count>	4 characters. The byte count represents the maximum value for the X axis of the TEK-222 monitor
(no problem)	and also for the display of the curve on the PC monitor. It is always 30 32 30 30 (HEX), 0 2 0 0 (ASKII), 048 050 048 048 (DEZ) = 0*16^3 + 2*16^2 + 0*16^1 + 0*16^0 = 512 This is correct. Signs No.: 23, 24, 25, 26
<wafeform data>	1024 charachters. 2 characters are used for each of the 512 X coordinates. Each of the
(no problem)	X dates can have the values 0 0 until F F (HEX) = 000 000 until 015 015 (DEZ) = 0 until 255 in the Y axis. This is correct. Size of the TEK-222 monitor and also for the PC field for the display of the curves: X * Y = 512 * 256. Signs No.: 27 until 1051

If somebody helps me in the cases "(problem)", I would be very grateful.

11. TEK-222.exe program: The Parameters (from top down) "CH 1 VOLTS/DIV" until "SEC/DIV" seem always to be correct. I tried to decode the Parameters from "X10 MAG" to "TRIG POS", but they do not always appear correctly. The Parameters "AUTO TRIG ENEBL'D" until "TIME OUT" receive default values only. For these values I cannot find information how to enforce the wanted values. Example: Two times the same curve without any changes. I only want for the Parameter "VALID STORE" first a "YES" and second a "NO". I cannot find out, how to enforce that.

    In order to make the program useful in spite of the problems with the Parameter values you can select your own value. Click on the unwanted value. A list of all possible values appears. The selected value appears in red color. See the picture "6. Change of 'SEC vs DIV'.pdf".

12. TEK-222.exe program: Below "DATA" you can find a list with all the HEX values and their decoded values into DEZ, BIN and SIGN.

13. TEK-222.exe program: You can safe all data of a curve in a file. The name of the file is a combination:

    "TEK-222 Data File" + Date + Time + ".txt". Example: "TEK-222 Data File 20.11.2012 19-50-08.txt"

    It will be saved like "C:\TEK-222\TEK-222 4. Data\TEK-222 Data File 20.11.2012 19-50-08.txt"

    If you wish to safe the dates of a curve, click the option button <Export Data>. Only the dates of the last curve will be saved. The path and the name of the file is displayed in a message box. Click <OK> to close it.