

manual

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If you have any comments on how this product could be improved, please contact your local Velleman distributor or directly to VELLEMAN KIT N.V.

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HPCS64i - 1998 - ED1

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FCC information for the USA

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected .
- Consult the dealer or an experienced radio/TV technician for help .

Important

This equipment was tested for FCC compliance under conditions that include the use of shielded cables and connectors between it and the peripherals. It is important that you use shielded cables and connectors to reduce the possibility of causing Radio and Television interference.

If the user modifies the PCS64I unit or its connection cable in any way, and these modifications are not approved by Velleman, the FCC may withdraw the user's right to operate the equipment.

The following booklet prepared by the Federal Communications Commission may be of help: "How to identify and Resolve Radio-TV Interference problems". This booklet is available from the US Government Printing Office, Washington, DC20402 Stock No. 044-000-00345-4.

GENERAL

The PCS64i is a digital storage oscilloscope, using an IBM compatible computer and its monitor to display waveforms. All standard oscilloscope functions are available in the DOS or Windows program supplied. Its operation is just like a normal oscilloscope with the difference that most operations can be done using the mouse. The markers for indicating voltage and frequency also provide considerable ease of use and can be operated without difficulty using the mouse. Apart from being used as an oscilloscope, the unit can also be used as a spectrum analyzer up to 16 MHz, and as a transient signal recorder, for recording voltage variations or for comparing two voltages over a longer period (up to more than 1 year!).

Connection is through the computer's parallel port, the scope is completely optically isolated from the computer port.

The oscilloscope and transient recorder have two completely separated channels with a sampling frequency up to 32 MHz in real time, oversampling of 64MHz is possible in the Windows software. Any waveform displayed on the screen can be stored for later use in documents or for comparison of waveforms.

Technical data

General

- Two separate channels
- Input impedance: 1 MOhm/30pF
- Input bandwidth: 13MHz
- Maximum input voltage: 100V (AC + DC)
- Maximum readout error: 2.5%
- Input coupling: DC, AC and GND
- Vertical resolution: 8 bit
- Real time sampling frequency: 32MHz (max.)
- Oversampling: 64MHz (only in Windows)
- Memory: 4Kb/channel
- Supply voltage: 9 - 10VDC / 800mA
- Charger circuit for rechargeable batteries: 90mA
- Dimensions: 225 x 165 x 40mm

Minimum system requirements

- IBM compatible PC
- Windows 95 or 3.11 or MS_DOS
- VGA display card (min. 800x600 for Windows)
- Mouse
- Free printer port LPT1
- 480Kb free conventional memory (Dos software)
- Arithmetic coprocessor needed for RMS readout and spectrum analyzer

Optional accessories

- Battery pack: BP9
- Oscilloscope probes (2x): PROBE60S (isolated)
- Carry case: BAG21X19

Oscilloscope

- Timebase: 100ns to 100ms per division
- Trigger source: CH1, CH2 or free run
- Trigger edge: rising or falling
- Trigger level: adjustable in steps of ½ division
- Step interpolation: linear or smoothed
- Markers for voltage and frequency
- Input sensitivity: 10mV to 5V/division
- Pre-trigger function (not in 64MHz mode)
- True RMS readout (only AC component)

Spectrum analyzer

- Frequency range: 0 .. 800Hz to 16MHz
- Linear or logarithmic timescale
- Operating principle: FFT (Fast Fourier Transform)
- FFT resolution: 2048 lines
- FFT input channel: CH1 or CH2
- Zoom function
- Markers for amplitude and frequency


Transient recorder

- Timescale: 20ms/Div to 2000s/Div
- Max record time: 9.4hour/screen
- Automatic storage of data
- Automatic recording for more than 1 year
- Max. number of samples: 500/s
- Min. number of samples: 1 sample/20s
- Markers for time and amplitude
- Zoom function
- Record and display of screens
- Data format: ASCII

INSTALLATION AND CONNECTION


Connection


The unit is connected to the printer port LPT1 of the computer, using a parallel cable. Connect the mains voltage DC adapter to the unit : 9VDC / 800mA. (pin = positive). After switching on the unit, the LED on the front panel should lid.

 **ATTENTION:** Only use adapter with correct voltage otherwise the unit could be damaged. Using a wrong power supply could blow the internal fuse. The fuse is soldered onto the PCB, please contact an experienced service center, to replace the fuse. The best way is to cut the leads of the fuse , and to solder a new (2A PICO) fuse onto the old leads.

Rechargeable batteries (option)

The unit can operate with a rechargeable battery pack; our type BP9. Open the housing by loosening the screws underneath, mount the battery pack at the appropriate space under the strap then plug in the connector J15 (watch the position of the connector).


 **ATTENTION:** Make sure that the battery leads are not caught between the housing when tightening the screws.


 When the equipment is **switched off**, the charging time will be around 12 hours, the autonomy of the unit is around 1 hour. The LED at the back of the unit will come on while the batteries are charging. It is recommended to discharge the batteries before charging.

SOFTWARE INSTALLATION

Two types of software are supplied with the unit:

1. Software to run the unit under MS_DOS¹.
2. Software to run the unit under MS_Windows 3.11 or Windows 95¹

 Check our web site www.velleman.be for updates.


 If the software is supplied on **CD-ROM**, then see the instructions on the CD-ROM for installation.

Under MS_DOS

Insert the diskette into the disk drive.

Type A:setup.

The setup program will make a directory; PCS64 on the C: hard disk, where the program is then copied to.

 A DATA sub directory is also made where the subsequent graphic files and data files will be stored that are produced by the program. Do NOT remove this directory. If after leaving the program the stored pictures and/or ASCII text are not to be lost, then they have to be transferred from the DATA directory to another directory. If this is not done the next set of measurements will overwrite these files.

Under MS_Windows

Open the File Manager and run the "Install" program on the diskette.

A directory, WinDSO will be made on the hard disk. A program group will be made in Windows.

¹ MS_DOS and MS_Windows are trademarks of Microsoft Corporation


Running the program

Under MS DOS:

Type C:\PCS64\PCS64. The program will start in oscilloscope mode. At the top a selection can be made for Spectrum analyzer (FFT) or recorder (REC).

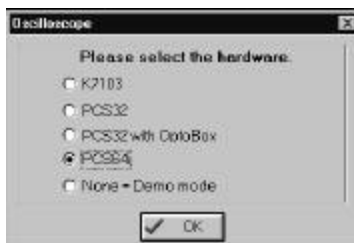
Under MS Windows:

Open the program group WinDSO

Double click the Oscilloscope icon  for the scope or spectrum analyzer, or double click the

Transient Recorder icon  for the recorder software.

REMARK: When starting the program for the first time, a box will appear to select your hardware. Choose the PCS64i .



IMPORTANT INFORMATION AND OPERATION

Check also the “readme” text for possible changes (only for Windows)

Before making measurements and for safety reasons, it is important to know some information about the measured unit.

Safe devices are:

- Battery operated equipment
- Equipment supplied via a transformer or adapter.

Unsafe devices are:

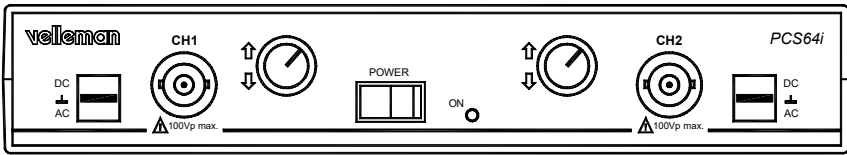
- Equipment directly connected to mains (e.g. old TV sets)
- Equipment that contains components that are directly connected to mains (dimmers...).

It is advisable, when measuring on above equipment, to use a isolation transformer.
Always be careful when measuring directly to the mains, please remember that the ground of both channels is interconnected !



IMPORTANT: Prior to measuring high voltages, set the probe to the X10 position.

Unit operation



The potentiometers control the vertical (Y) position on the display.

The input select switches, CH1 and CH2, have 3 positions:

AC: the input signal is capacitively coupled to the input amplifier/attenuator. Only the AC components are measured.

⏏: the input signal is broken and the input amplifier/attenuator is connected to earth. Use this position for selecting a reference point on the display.

DC: the input signal is directly connected to the input amplifier/attenuator. Both AC and DC voltage are measured.

DIGITAL STORAGE OSCILLOSCOPE "DSO"

PURPOSE

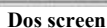
An oscilloscope is an indispensable instrument for viewing electrical signals. The advantage of a digital oscilloscope is that the measured signals can be frozen for subsequent examination or comparison with other signals. In digitizing the signal there is the additional advantage that it can also be scientifically analyzed. Thus the calculation of RMS values is no problem, although remember that the displayed RMS value is only for the AC component of the measured signal. By using the markers the signal frequency can be determined (by measuring the time of one period), and the voltage can also be measured between the two markers.

When using a digital oscilloscope, it should be remembered that the signal to be measured is split up piece-wise, i.e. into "samples". The result of such splitting is that certain signals may escape the sampling frequency, especially in the case of high frequency signals.

Operation

Run the PCS64 or WinDSO program. After it has started the oscilloscope screen will be displayed.

General: A setting can be selected by clicking on the button or desired number with the left hand mouse button.



Use

- Connect the signal to be examined to input 1 or 2 of the oscilloscope.
- Select the correct input channel on the screen (1, 2 or both).
- Adjust the Y potentiometers on the unit if needed.
- Select a suitable **VOLT/DIV** (voltage per division) setting so that the signal occupies the full screen.
- Set the **TIME/DIV** (time per division) switch to a suitable setting.



See explanation of the buttons for further operation.

NOTE: Always begin with as high as possible a setting for the timebase ($0.1\mu\text{s}$) and then reduce it until an appropriate display is obtained.

Explanation of the buttons on the screen

FFT

Switches to spectrum analyzer (Fast Fourier Transform)

REC (only in the DOS program)

Switches to transient recorder

VOLTS/DIV

Indication and selection of the peak-to-peak value required to fill a division per channel. The selected value can also be seen at the top of the display area.

CH1 - CH2

Buttons turn the display of the trace ON or OFF. To get the cursor measurements of CH2 voltage values switch CH1 off.

TRIGGER On/Off

Selects whether the signal is triggered (**ON**) or not (**OFF**).



TRIGGER Source

Selects the trigger source, channel 1 or channel 2.

TRIG LEVEL

Sets the triggering voltage level, a mark on the left hand of the screen indicates the level. In Windows a scrollbar is used.

EDGE

Chooses the trigger edge, rising edge  or falling edge .

RUN ON/OFF


Continuous display (**ON**) or frozen display (**OFF**).


SINGLE

Updates the display once when the trigger level is reached (only in **RUN Off** mode).


X-POSITION

To move the signal horizontally on the screen. A blue line shows the trigger reference level.

This way the signal can be shifted, to check the signal before the trigger point. Press  to return to the original position.

-  For Windows: use the scrollbar below the display.



-  For Dos: Use the large or small arrows, small or large steps can be taken, the button can also be kept pressed in.

TIME/DIV

Time indication between two divisions. The current setting is visible on the top right of the display area.

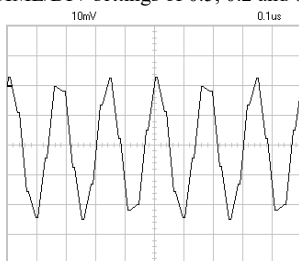


Zooming:

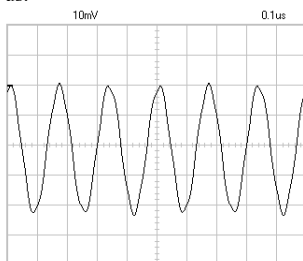
A frozen picture can be easily enlarged by adjusting the TIME/DIV switch.

L/S

As a digital signal consists of a series of points, it may be necessary to connect between two points in order to obtain a smooth curve. This button selects whether smoothed interpolation, **S** (best used for higher frequencies), or linear interpolation, **L**, (for slow signals) is used. The L/S select only works with TIME/DIV settings of 0.5, 0.2 and 0.1 us.



Linear interpolation



Smoothed interpolation

64MHz oversampling (available only in the Windows software)

This button activates the oversampling function. This means that the number of samples is doubled for the same time interval, resulting in a better signal reproduction.

The oversampling only works for repetitive signals and in the 0.1us/div and 0.2us/div ranges.



Triggering must be **on** to get stable waveform images, the refresh of the screen will also be somewhat slower.

No pre-trigger function in this mode.

The triggering point is at the left end of the displayed waveform.

Consider using the Smooth function (S/L button) instead of 64MHz oversampling, for signals lower than 5MHz.

SAVE (under File menu in the Windows soft.)

To save the current signal display (black & white) BMP format in Windows and TIFF format in DOS. Use **Save Image** in the Windows soft, and type in a name. For DOS a name is generated with an automatic numbering (DSOnr.TIF) each time a screen is saved.

Use **Open** in the Windows soft, to load and display a saved image. Use **Save DSO data** to save a text file of the 4096 measured points.

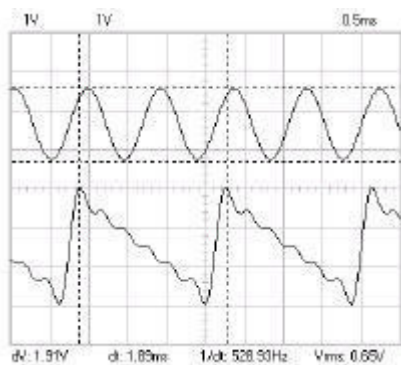
A DATA table could look like this:

TIME STEP: 160 = 0.5ms VOLTAGE STEP: CH1: 32 = 1V CH2: 32 = 1V			Table explanation: Maximum 4096 samples are stored for each screen, numbered from 0 to 4095. Next to the sample number, a value is displayed in absolute display value: 000 = is the bottom of the screen (0 can also mean that the measurement has stopped) 255 = is at the top of the screen TIME STEP: Used time to store a number of samples, in this example, it takes 0.5ms to store 160 samples. The time difference between sample 0 and sample 5 is: $5 \times (0.5/160) = 0.0156 \text{ ms}$. VOLTAGE STEP: Volts per division channel 1 and channel 2. In the example, value 32 equals 1V. A measured value of 154 equals: $154 \times (1/32) = 4.8\text{V}$
N	CH1	CH2	
0	155	94	
1	155	94	
2	154	94	
3	154	94	
4	153	94	
5	153	94	
6	153	94	
7	153	94	
8	152	94	
↓			
4093	208	107	
4094	207	107	
4095	207	107	

EXIT (for the DOS soft.)

To exit the program, Esc can also be pressed on the keyboard .


Use of the indication markers





Four markers are available: two horizontal for measuring voltage and two vertical for time and frequency

At the bottom of the screen, the voltage between the two markers is displayed dV:xx

The time between the two markers is displayed as well as the calculated frequency, dt:xx and 1/dt

 Note: The voltage markers give preference to channel 1 if both channels are being used.

The markers can be made to appear as follows:

-  For the DOS program:
 - For voltage:**
Move the mouse to the upper or lower edge of the signal display (only if markers are invisible).
Press on the left-hand mouse button and keep it pressed in, then drag the marker into the signal display area. The second marker can be made to appear in a similar way.
 - For time and frequency:**
Move the mouse to the left-hand or right-hand edge of the signal display.
Press on the left-hand mouse button and keep it pressed in, then drag the marker into the signal display area.. The second marker can be made to appear in a similar way.
-  For the Windows program:
 - Open the **View** menu
 - Click “**Markers (DSO)**”
 - Now the markers can be dragged by using the mouse, horizontal for voltage, and vertical for time.
 - Furthermore, in the view menu, it is possible to select **RMS value** readout.
 - The “**Bright Grid**” function, can be used to improve the grid visibility.

Extra's in the Windows software WinDso:

Edit Menu

Copy: Copy the current screen to the clipboard

Paste: Bring the contents of the clipboard into the screen. The Copy and Paste functions can also be used to bring (color) pictures to other Windows programs.

Options Menu

FFT Window: See spectrum analyzer

Hardware setup: Selection of the connected oscilloscope type (normal PCS64i), with the **Demo** selection, the program can be tested (Demo also works in Win NT)

Math Menu

The result of mathematical operation of channel 1 and 2 is displayed.

One of the following functions can be selected:

Ch1 + Ch2: Sum of both channels

Ch1 - Ch2: Substraction between both channels

XY Plot: Ch1 data is displayed on Y axis, Ch2 data is displayed on X axis

Invert Ch2: The second channel is inverted



A button is provided to toggle between Math mode and Normal mode.

How to avoid interference with the sampling frequency

It is possible for the displayed signal not to be at the correct frequency due to interference of the incoming signal with the sampling frequency. Therefore, with unknown signals set the timebase to the highest possible value (0.1µs). The sampling frequency must be at least twice that of the signal being measured, see table:

TIME/DIV setting	Displayed sampling frequency in RUN mode	Real sampling frequency (Sampling rate)
0,1 us	32 Mhz	32 Mhz
0,2 us	32 Mhz	32 Mhz
0,5 us	32 Mhz	32 Mhz
1 us	32 Mhz	32 Mhz
2 us	16 Mhz	32 Mhz
5 us	6,4 Mhz	32 Mhz
10 us	3,2 Mhz	16 Mhz
20 us	1,6 Mhz	8 Mhz
50 us	640 Khz	3,2 Mhz
0,1 ms	320 Khz	1,6 Mhz
0,2 ms	160 Khz	800 Khz
0,5 ms	64 Khz	320 Khz
1 ms	32 Khz	160 Khz
2 ms	16 Khz	80 Khz
5 ms	6,4 Khz	32 Khz
10 ms	3,2 Khz	16 Khz
20 ms	1,6 Khz	8 Khz
50 ms	640 Hz	3,2 Khz
100 ms	320 Hz	1,6 Khz

SPECTRUM ANALYZER "FFT"

Purpose

Only one fundamental frequency of a signal can be properly measured using an oscilloscope, the levels of other frequencies cannot be easily examined and compared simultaneously. The spectrum analyzer is the solution to this problem.

Because the incoming signal is digitized, it is possible for the signal to be scientifically converted into its frequency spectrum (using FFT - Fast Fourier Transforms).

With the spectrum analyzer program supplied, it is possible to view the signal in terms of its frequency spectrum. Thus, the harmonics in a distorted, imperfect sine wave (e.g., square wave) can be examined.

Furthermore the spectrum analyzer can also be used for measuring filter circuits, etc.

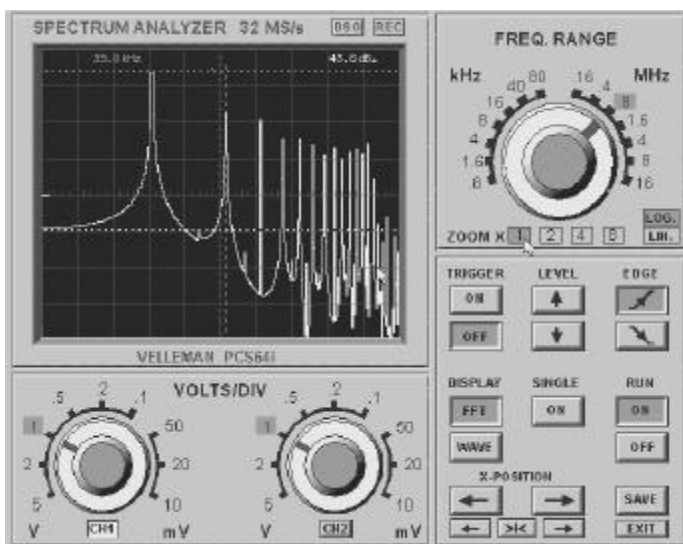
OPERATION

Start the PCS32 / DSO program if it is not already running.

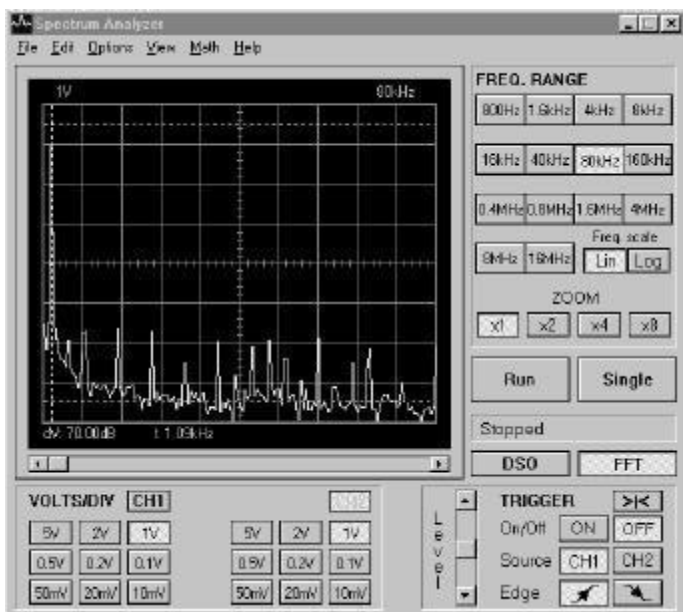
After starting, the oscilloscope screen will be displayed and then press on **FFT**.

General

A setting can be selected by clicking on the desired number or button with the left-hand mouse button.





Dos screen



Windows screen


Use

- Connect the signal to be examined to oscilloscope input 1 or 2.
- Set the input select switch to **AC** position.
- Select the correct input channel (1 or 2) on the screen.
-  For the DOS software:
Set the spectrum analyzer in **WAVE** position and ensure that the signal is 2 to 4 divisions large by adjusting **VOLT/DIV**.
-  For the Windows software:
Check the signal in oscilloscope setting and ensure that the signal is 2 to 4 divisions large by adjusting **VOLT/DIV**.

Adjust the Y position potentiometers on the unit if necessary.

Now switch over to **FFT**.

Set the **FREQ RANGE** (frequency range) to a suitable setting.

 See "explanation of the buttons" for further operations.

NOTE: Always begin with as high a frequency setting as possible and then reduce it until a suitable display is obtained.

Explanation of the buttons on the screen

DSO

Switches over to oscilloscope (**D**igital **S**torage **O**scilloscope).

REC (only in the DOS soft)

Switches over to transient recorder.

VOLTS/DIV

Indication of the peak-to-peak value needed to fill a division per channel (in Oscilloscope or WAVE display).

ON

Selects the FFT input channel.

TRIG ON/OFF

Choose between free run or "trigger"

TRIGGER Source (only in the Windows soft.)

Selects the trigger source, channel 1 or channel 2

In the DOS software, this is done automatically

TRIGGER EDGE

Select the trigger edge, rising edge  or falling edge 

TRIGGER LEVEL

Set the level that it triggers at, a mark on the left-hand edge of the screen indicates the level.

In the Windows program, a scrollbar is used.

RUN ON/OFF


Continually adjust screen (**R**UN) or freeze screen (**O**FF).



SINGLE

Adjust the screen once when the trigger level has been reached (only in **RUN OFF** position) .

X-POSITION

To move the signal horizontally on the screen.

Press  in order to return to the original position.

-  For DOS:
By using the large or small arrows it can be moved in large or small steps, the buttons can also be kept pressed in.
-  For Windows:
use the scrollbar below the display



DISPLAY FFT / WAVE (only in the DOS software)

Select spectrum analyzer display or normal signal display.

FREQ. RANGE

Frequency range of the display, it is necessary to slide the screen using X-POSITION in order to see the full range.

Log. / Lin.

To display the frequency on a linear or logarithmic scale.

ZOOM

In order to expand the screen X1, X2, X4 or X8

A frozen picture can be easily be expanded by selecting a ZOOM factor.

SAVE (in the File menu for Windows)

In order to save the current waveform in (black and white) BMP format for Windows and TIFF format for DOS

Use **Save Image** in the Windows soft, and type in a name. For DOS a name is generated with an automatic numbering (FFTnr.TIF) each time a screen is saved.

Use **Open** in the Windows soft, to load and display a saved image. Use **Save FFT data** to save a text file of the 160 measured points.

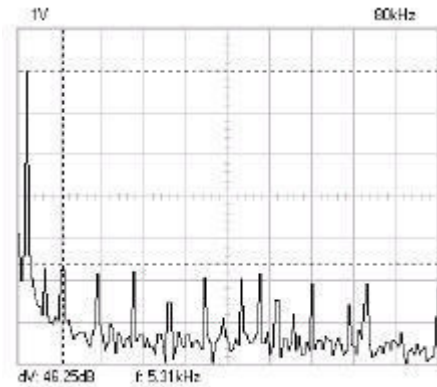
A DATA table could look like this:

N	f/[kHz]	V/[dBV]	Table explanation:
0	0.0000	-39.8	
1	0.3125	-50.5	160 samples are taken for each screen, numbered from 0 to 159
2	0.6250	-47.3	
3	0.9375	-4.4	The frequency and level are indicated.
4	1.2500	-49.2	
5	1.5625	-56.1	
↓			
156	48.7500	-72.1	
157	49.0625	-72.4	
158	49.3750	-67.7	
159	49.6875	-73.7	

EXIT (for the DOS software)

To exit the program, Esc can also be pressed.

Use of the indication markers



Three markers are available: two horizontal for measuring the level in decibels and a vertical one for measuring the frequency.

The markers can be made to appear as follows:

-  In the DOS software:

For level:

Move the mouse to the upper or lower edge of the signal display. (only when the markers are invisible)

Press on the left-hand mouse button and keep it pressed in, then drag the marker into the signal display area.

The second marker can be made to appear in a similar way.

The level between the 2 markers is displayed in decibels (dB).

For frequency:

Move the mouse to the left-hand or right-hand edge of the signal display. (only when the markers are invisible).


Press on the left-hand mouse button and keep it pressed in, then drag the marker into the signal display area.

The frequency is displayed.



Note:

When zooming in, it may be possible for the vertical markers to disappear off the left-hand or right-hand edge of the screen. In such a case, the marker can be brought back from the edge it disappeared into in a similar way as described above.

-  For the Windows software:

Open the **View** menu


For the spectrum analyser, there are two possibilities

Click "**Markers (DSO)**"

Now the markers can be dragged by using the mouse, horizontal for voltage, and vertical for time.

Furthermore, in the view menu, it is possible to select **RMS value** readout.

The "**Bright Grid**" function, can be used to improve the grid visibility.


NOTE: Regularly check that the signal amplitude has not become too high, by switching over the display using the WAVE or Oscilloscope function.

Extra's in the Windows software WinDso:

Edit Menu

Copy: Copy the current screen to the clipboard

Paste: Bring the contents of the clipboard into the screen. The Copy and Paste functions can also be used to bring (colour) pictures to other Windows programs.

Options Menu

FFT Window:

It is common practice to taper the original signal before calculating the FFT (Fast Fourier Transformation). This reduces any discontinuities at the edges of the signal. This is done by multiplying the signal with a suitable window function. The undesirable spectral leakage can be reduced using a tapered window. Many different windows have been designed for this purpose.

The choice of a suitable one depends on the nature of the signal or data, and on the type of information to be extracted from its spectrum. In general, a good FFT window has a narrow main spectral lobe to prevent local spreading of the spectrum, and low sidelobe levels to reduce 'distant' spectral leakage. In some cases it may be best to leave the data alone -- in effect, to use a **rectangular** window.

Other selections: **Barlett**, **Hamming**, **Hanning** and **Blackman**.

Hardware setup: Selection of the connected oscilloscope type (normal PCS64i), with the **Demo** selection, the program can be tested (Demo also works in Win NT)

TRANSIENT SIGNAL RECORDER "REC"

PURPOSE

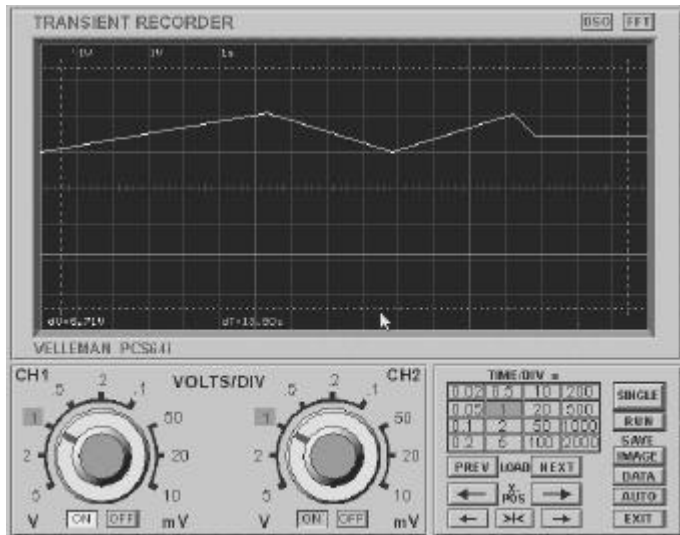
If short one time changes are to be recorded, then it is best to use a transient recorder. This device can best be compared to a tape recorder, but is used for recording electrical signals. The signal recorder is nothing other than an oscilloscope with a very slow timebase. The advantage of a digital recorder is that the signals can be stored on disk, so that they can be used for analysis at a later time. By making the timescale very slow, and by selecting the automatic save function, signals can be checked for up to 1 year, and on the two channels simultaneously. By using the markers it can also be accurately determined when a change has occurred and how large the change is.

OPERATION

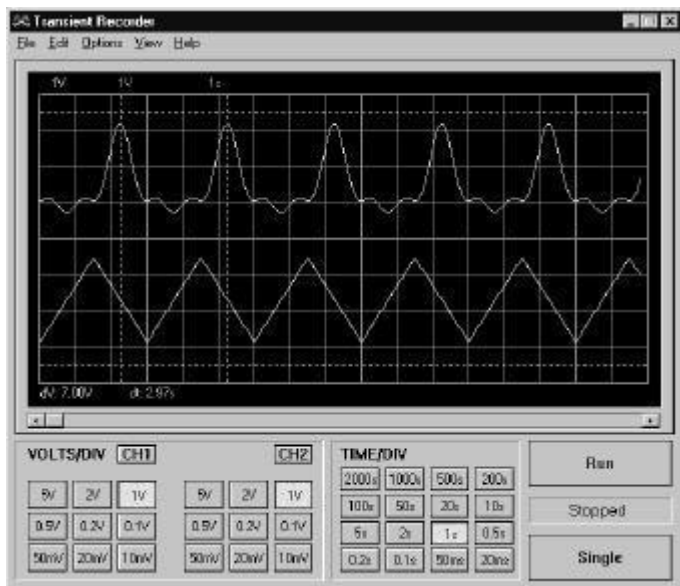
Start the WinDSO Transient recoder program if it is not already running.

After starting the PCS64 DOS program, you will come to the oscilloscope screen, then press **REC**.

General: A setting can be chosen by clicking on the button or desired number with the left-hand mouse button.



DOS screen



Windows screen

Use

- Set the input select switch to \perp (GND) position.
- Select the correct input channel on the screen (1, 2 or both).
- Set the **TIME/DIV** (time per division) setting to 0.02 sec .
- Press on **RUN** and if necessary adjust the Y potentiometers on the unit until a line is visible at the desired place.
- Connect the signal to be examined to the oscilloscope input 1, 2 or both.
- Select a suitable setting by adjusting the **VOLT/DIV** (voltage per division) setting.
- Set **TIME/DIV** to a suitable setting for your application.
- Set the input selection switch to **DC** position .



See explanation of the buttons for further operations.

Explanation of the buttons on the screen

FFT (only in the DOS software)

Switches to spectrum analyzer (Fast Fourier Transform).

DSO (only in the DOS software)

Switches to oscilloscope.

VOLTS/DIV

Indicates the peak-to-peak value required to fill a division per channel.

CH1 - CH2

Switches the given channel in or out (**ON/OFF** in the DOS software).

SINGLE

When pressed a screen recording will take place. By pressing on the left-hand mouse button the recording is interrupted. In the Windows program the **SINGLE** button must be pressed again, to stop.

RUN

Start a recording, when the end of the display is reached a new recording will be started. By pressing on the left-hand mouse button the recording will be interrupted. In the Windows program the **RUN** button must be pressed again, to stop.

NOTE: In RUN mode the lowest displayed speed is 0.2s/div, despite the fact that a higher speed may have been selected. After completion of the recording, the correct value is shown again.

SAVE (under File menu in Windows)

IMAGE

In order to save the current waveform in (black and white) BMP format for Windows and TIFF format for DOS

Use **Save Image** in the Windows soft, and type in a name. For DOS a name is generated with an automatic numbering (RECnr.TIF) each time a screen is saved.

Use **Open** in the Windows soft, to load and display a saved image.

DATA

To save a text table of the screen data.


In Windows after selecting **Save Data**, a name can be entered (see further for explanation of this table). In DOS, the name is automatically numbered RECnr.ASC.


A Data file could look like this:

START: 1/04/98 15:58:29			Table explanation: 1700 measurement values are taken per display, numbered from 1 to 1700. In addition to this, the measured values can be read off from channel 1 and channel 2. The measured value is presented in an absolute screen value. START: Date and time when starting the recording STOP: Date and time when the recording was stopped 000 = at the bottom of the screen (or when recording was stopped before the end of the screen was reached). 255 = at the top of the screen. TIME STEP: The time it takes to measure a number of samples. In the example it takes 1 sec to take 100 samples. At measurement point 212: Point in time: 212 x 1/100 = 2.12s (after start time) VOLTAGE STEP: Volt/division CH1 and CH2 Here value 32 is equal to 1V So value 80 at sample 211 is actually 2.5V, (80x1/32) = 2.5V
TIME STEP: 100 = 1s			
VOLTAGE STEP: CH1: 32 = 1V CH2: 32 = 1V			
N	CH1	CH2	
1	35	160	
2	36	161	
3	36	161	
4	37	161	
5	37	161	
↓			
211	80	222	
212	79	223	
213	79	224	
↓			
1700	90	228	
STOP: 1/04/98 16:00:18			

AUTO

After starting, each screen is automatically stored. And a new recording is started.

-  For DOS:

Each screen is automatically stored and numbered, (RECnr.ASC).
A maximum of 999 recordings can be stored, after this the recording returns to 000.
Each screen is also stored binary so the images can later be recalled through the LOAD, **PREV** and **NEXT** buttons. Each screen takes about 28K hard disk space (including binary file).
NOTE:
Re-examination of stored pictures is possible as long as the program has not been exited. The pictures are erased when EXIT is pressed.
For experienced computer users:
If you want to avoid this then the line "del \data.bin > nul" can be removed from the PCS64.BAT file (or place a REM before the line).*
-  For Windows (In File menu):

Through **AutoSave Data**, a name can be entered for the file.
This file will automatically be updated (grow) with the recordings. At the end of the file a stop time will be indicated. The number of recordings is only limited by the free disk space, each screen takes about 20K space.

EXIT (for the DOS software)

To exit the program, Esc can also be pressed.

TIME/DIV




Time between two divisions, from 0.02s to 2000s.

☞ Zooming and moving the display

A frozen picture can easily be enlarged by adjusting the TIME/DIV setting .

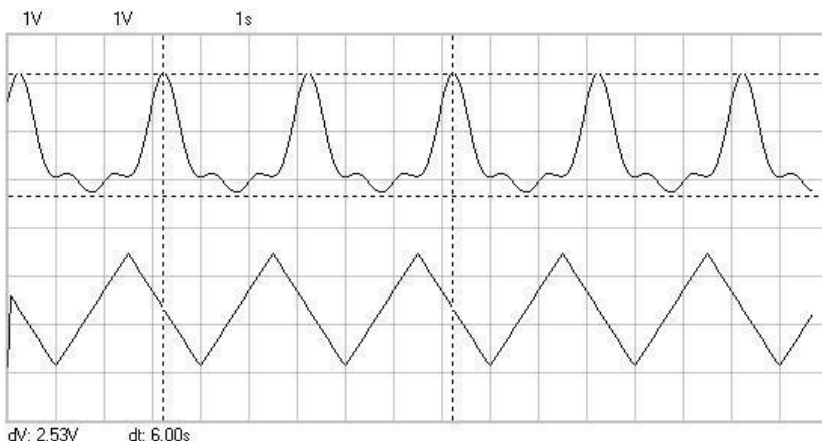
X-POSITION

To move the signal horizontally on the screen (useful after zooming, see above).

-  For DOS:
By using the large or small arrows, the signal can be moved in small or large steps, the button can also be kept pressed in. Press  to return to the original position.
-  For Windows:
Use the scrollbar below the display.



Use of the indication markers





Four markers are available: two horizontal ones for measuring voltage and two vertical for measuring time. The markers can be made to appear as follows:

☞ Note:

the voltage markers give preference to channel 1 if both channels are being used.

The markers can be made to appear as follows:

-  For the DOS program:
For voltage:
Move the mouse to the upper or lower edge of the signal display (only if markers are invisible). Press on the left-hand mouse button and keep it pressed in, then drag the marker into the signal display area. The second marker can be made to appear in a similar way.
For time:
Move the mouse to the left-hand or right-hand edge of the signal display. Press on the left-hand mouse button and keep it pressed in, then drag the marker into the signal display area.. The second marker can be made to appear in a similar way.

-  For the Windows program:
Open the **View** menu
Two possibilities are available for the markers
Markers dV&t: Markers are available for voltage and one for time.
Markers dV&dt: Markers are available for voltage and two for time, to measure also time difference.
The markers can be dragged by using the mouse, horizontal for voltage, and vertical for time.
Furthermore, in the view menu, the “**Bright Grid**” function, can be used to improve the grid visibility.

Extra's in the Windows software:

Edit Menu

Copy: Copy the current screen to the clipboard

Paste: Bring the contents of the clipboard into the screen. The Copy and Paste functions can also be used to bring (colour) pictures to other Windows programs.

Options Menu

Hardware setup: Selection of the connected oscilloscope type (normal PCS64i), with the **Demo** selection, the program can be tested (Demo also works in Win NT)

TROUBLESHOOTING

The program doesn't start. (DOS software)

- Not enough conventional memory (min. 460k)
- Start the program directly under DOS
- Are all files in the correct directory

No mouse pointer appears.

- No mouse driver installed

Storage of data and displays does not work (DOS software).

- The DATA directory is not in the PCS64 directory

RMS and Spectrum analyser display doesn't work.

- No arithmetic coprocessor in the computer (386 or lower processor).

No signal on the oscilloscope display

- No communication with the computer (check cable)
Check the printer port setting in the BIOS SETUP of the computer (best at normal or SPP if this choice is possible)
- Program is not in RUN ON
- The channel concerned is OFF
- TIME/DIV switch is in the wrong setting, try 1ms
- TRIG is ON, set TRIG OFF
- The unit input select switch is at GND.
- Y position potentiometer is wrongly adjusted.
- Input amplitude too large, adjust VOLT/DIV setting.



If the above tips have no effect, then test on a different computer or replace the printer port card.

Interference in the displayed signal.

- The computer cable is too long (max. 1.5m) or of poor quality. Use the cable supplied.

The voltage readout does not correspond to the actual value.

- The probe is in the X10 position
- Note, the RMS readout measures only the AC voltage.
- The oscilloscope must be calibrated.

No communication with the computer.

- Use printer port LPT1.
- Cable too long or bad connection.
- Program is not in RUN ON

With no input signal, the line jumps vertically on the screen after changing the VOLT/DIV setting.

- Offset adjustment not correct.

WARRANTY

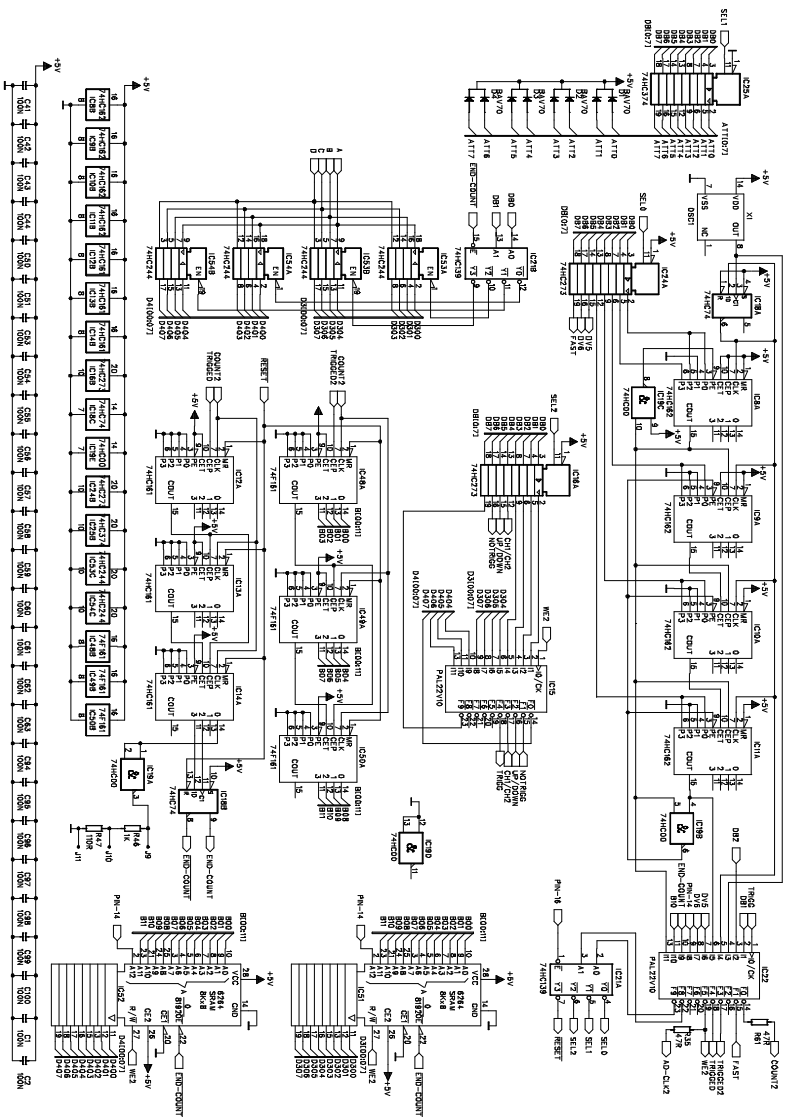
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DIAGRAMS & SERVICE INFO

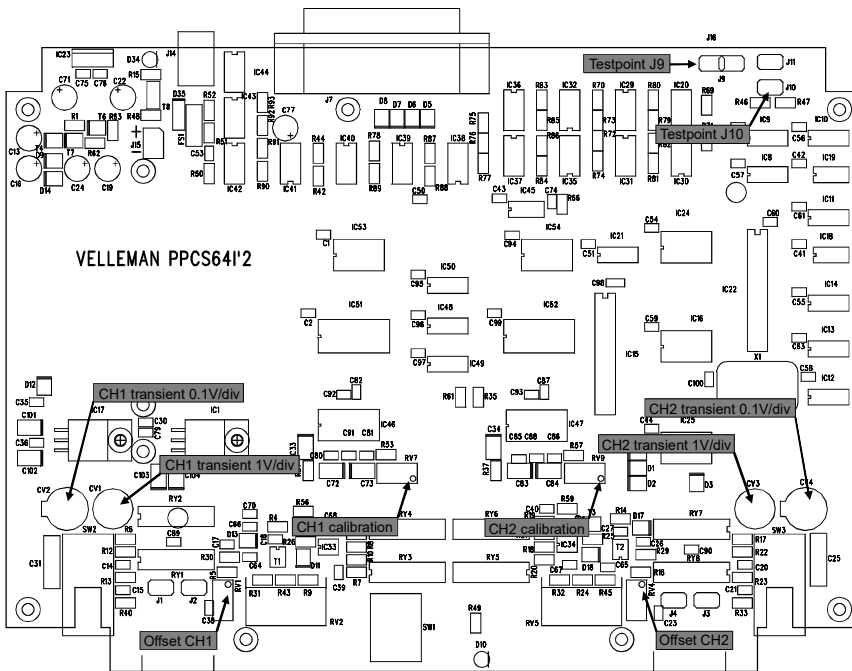


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DIGITAL CIRCUIT

All values are for reference only



SERVICE INFO

Adjustment	Signal setting	Adjust
CH1 transient 0.1V/DIV	Set at 0.1V/DIV & test signal J10	CV2
CH1 transient 1V/DIV	Set at 1V/DIV & test signal J9	CV1
CH1 offset	Switch between 1V & 5V/DIV	Adjust RV1 for stable signal
CH1 callibration	/	RV7 for correct readout
CH2 transient 0.1V/DIV	Set at 0.1V/DIV & test signal J10	CV4
CH2 transient 1V/DIV	Set at 1V/DIV & test signal J9	CV3
CH2 offset	Switch between 1V & 5V/DIV	Adjust RV4 for stable signal
CH2 callibration	/	RV9 for correct readout

