

## CSW VIEWER V33

CSW Viewer is for viewing the pulse lengths graphically of CSW files and Commodore TAP files. Its main use is to get data and timing values from sound sample files after converting them to CSW files, preferably V2.0 files. A user of CSW Viewer can indirectly call the CSW.exe program to convert multiple WAV files to CSW.

CSW Viewer is also useful for determining why CSW files won't load, often because the waves are not regular enough. Spectrum tapes with '1' bit waves the length of '0' bit waves X 1.5 will require the waves in a CSW file to have particularly regular waves.

### IMPORTANT POINTS

The program will run with a resolution of 1024x768 with font scaling at 112% or less. Higher resolution can have larger font scaling.

A selected range is inclusive of the last point.

The left and right mouse buttons can set the values in the range edit boxes by clicking on a point. The left button sets the start box value and the right button sets the end box value.

The time elapsed before the first point displayed on the pulse lengths graph is displayed.

All whole number values calculated are rounded.

Mean pulse lengths are given in T States at 3.5MHz for use with TZX files.

The time span of a range of points is given in milliseconds for use with TZX files.

The 'Create CSW file' page will create files with the CSW format V2.1, which is not official yet but it complies with the format update specifications of V2.0.

Wave lengths from TAP files are split into 2 equally lengthed pulses.

The overflow pulse length for TAP V0 files is set at 3000.

### INSTRUCTIONS FOR COMMON USES

#### Creating good CSW files:

See an additional document with CSW Viewer.

#### Converting WAV files to CSW files:

Select the 'Create CSW file' tab. See an additional document with CSW Viewer. The CSW.exe program must be in the same directory as CSW Viewer. Do not use excessively long directory paths. The converted files can be loaded into CSW Viewer with the 'Open File' button.

Sometimes CSW.exe does not record the number of pulses and inserts 0. CSW Viewer will report the number of pulses that the value is short by if you try to open the file. You can fix a CSW file with a hex file editor.

#### Finding the quantity of carrier tone pulses and a mean carrier tone pulse length:

Look for the start of the carrier tone, which you recognise by many pulses of roughly equal size. Enter the X-axis value for the first carrier tone pulse in the range start edit box. Find the end of the carrier tone and enter the X-axis value of the last pulse in the end edit box. Press the 'Calculate mean carrier tone pulse length' button to see the mean length in T states and samples. The quantity of pulses in the range is automatically shown.

#### Colouring pulses of Spectrum bytes:

After the carrier tone is a synchronisation wave. Colour it as sync pulses. Enter the X-axis value of the first data pulse in the range start edit box. Find the end of the file by finding the start of a pause or carrier tone of the following file. Enter the X-axis value of the last data pulse in the end edit box. The 'Total Spectrum bytes in range' should be a whole number. If it isn't a whole number you have got something wrong or the data does not finish with a whole byte (uncommon). Press 'Colour pulses in range as Spectrum bits and bytes'. The data bits are coloured from blue for bit 0 to red for bit 7.

#### Colouring pulses of Acorn bytes:

Set an estimated baud rate in the edit box for it, by obtaining the baud rate as described below. Select a range of, the first pulse of the first start bit of an 8N1 data block to the last pulse of the last byte of the data block. It is difficult to know where the last byte ends but this does not matter. Press 'Colour pulses in range as Acorn bits and bytes'. The start bits will be coloured white and the stop bits will be coloured black. The data bits are coloured from red for bit 7 to blue for bit 0.

#### Saving and loading point colours:

After highlighting Spectrum or Acorn data pulses press the 'Point colours to file' button and the point colours will be saved. The file will have the same name as the file loaded from and the extension COL. This file will hold the number of pulses which will be checked against the number of pulses when you try to load from a saved COL file.

#### Finding a gap length:

Find the first pulse of a gap by seeing where pulses do not look a similar size to the coupled pulses at the end of the preceding data and/or are not the typical size. Enter the X-axis value of the first pulse of the gap in the range start edit box. Find the end of the gap, which is the pulse before the first pulse of a following carrier tone (usually) and enter its X-axis value in the range end edit box. The time span is automatically shown.

#### Finding Spectrum data quantity in bytes:

Find the first pulse of data, which is the first pulse after the synchronisation wave pulses and is the third pulse after the carrier tone. Enter its X-axis value in the range start edit box. Find the last pulse of the data before where the pulses are from a pause or carrier tone and enter its X-axis value in the range end edit box. The total number of bytes in the range is automatically shown. It must be an even number. If it isn't a whole number you have got something wrong or the data does not finish with a whole byte (uncommon).

#### Finding synchronisation pulse lengths of Spectrum files in T states:

There is only one pulse to use to get the length of a synchronisation pulse so the value is not very accurate. Enter the X-axis value in both range edit boxes for the required synchronisation pulse and press the 'Calculate mean carrier tone pulse length' button.

#### Finding data bit pulse lengths in T states/Finding baud rate of Acorn files:

Select first and last pulses of a data block. The total number of pulses should be an even number. Press the 'Calculate mean bit lengths' button. Do not select multiple data blocks because the wave coupling will be wrong if there is an uneven number of carrier tone pulses between the data blocks. For 3 wave lengths data press 'Calculate means'.

### CSW.EXE

You may also want to download the CSW.exe V2.0 utility:

<http://www.ramsoft.bbk.org/maketzx.html#DOWNLOAD>

<ftp://ftp.worldofspectrum.org/pub/sinclair/tools/pc>

<http://www.acornpreservation.org/makeuef/index.html>

The CSW format and the CSW.exe utility are both excellent and will accurately preserve any computer cassettes readable waves. Only a minority of cassettes will require a wider frequency range than the default range. CSW.exe is a DOS program but will use long file names if used with Windows.

### KNOWN BUGS WITH CSW V2.0

Known bugs with CSW V2.0:

The 'number of pulses' is sometimes set to 0.

The 32-bit 'number of pulses' in the header of CSW files only has a 24-bit number written. This bug does not appear often with tapes less than 45 minutes.

The 'number of pulses' is short by 1 if an extremely short WAV file is converted and compression is not used.

The output file name sometimes turns to all lowercase.

Directory path lengths and file name lengths are limited in length if called by CSW Viewer because of a limitation with the Windows API function CreateProcess.

CSW files are created with the name of the WAV file up to the first dot instead of the last.

## **KNOWN BUGS WITH CSW V1.3 (USES FORMAT REVISION V1.1)**

Files often finish with a special code for a 32-bit value without a following value.  
Polarity is often recorded wrongly.

## **TAP FORMAT**

The similar TAP format used by the Commodore community I have found is slightly less accurate due to conversion from one sampling rate to another, one wave at a time, discarding the fractional part of the converted value. MTAP does this even though rounding only requires adding 0.5 before disregarding the fractional part. It stores only wavelengths in V0 and V1 files. V2 files store pulselengths. It makes larger files because there is no compression. Some converters clean gaps unnecessarily, often altering the sizes of gaps. V0 files do not attempt to record gap lengths.

## **KNOW PROGRAMS SUPPORTING CSW V2.0**

MakeTZX	V2.33+,
RealSpectrum	V0.97.08+,
Spectaculator	V6.0+,
Electrem Future	2 <sup>nd</sup> binary release+,
MakeUEF	V1.2+.
SpecEmu	V2.3+
TZX2WAV	V0.1+
WinTZX	V0.5A+
B-Em	V1.2+
BeebEm	V3.4+
CSW.dll by Fraser Ross	V1.1+
CSW.dll by Mark Woodmass	
Tape2WAV	V1.2+
ZXSpin	V0.1d+

Any bug reports or suggestions for enhancements should be sent to [fraserross@f2s.com](mailto:fraserross@f2s.com).

CSW Viewer author:  
Fraser Ross

## **CHANGE LOG**

24/9/08 Release 33

Fixed a bug that prevented release 32 from loading V1.1 CSW files.

Fixed a bug with loading the point colours from a COL file which is present in release 32.

Fixed a bug with the initial time, 00.00, not being displayed on the graphical display page after loading a file.

Fixed some minor bugs with the TZX chunk writing buttons which are present in releases 29, 30, 31 and 32.

Relaxed checking of TAP file headers for potential compatibility with future format changes.

4/6/08 Release 32

Fixed a bug that displayed 1 too many data analysis chart pages when the number of counts is an increment of 50.

Fixed page increment size on data analysis chart track bar.

Increased font size on data analysis chart legend.

Made the data analysis chart invisible when not displaying data.

Added file summary fields for machine type and video standard from TAP files.

Changed input file label to a memo using separate lines for directories.

Improved CSW file loading time for large files.

Short CSW files load slightly slower.

Improved exception handling.

Allowed all minor versions of the TZX format V2.  
Allowed unknown blocks with TZX files.  
Added controls for the TZX signal level block.

#### 24/9/06 Release 31

Fixed a bug that prevented phase shift removal from working sometimes.  
Fixed a minor bug with gap pulse finding which did not start from the next page with V29 and V30.  
Fixed minor bugs with messages returned from the DLL files.  
Fixed a minor bug with displaying the creators signature.  
Fixed a minor reading, buffer overrun bug with calculating time span at the last pulse of the file.  
Fortunately no erroneous data was seen by the user.  
Made colouring of Spectrum data pulses require an even number of pulses.  
Improved detection of mean bits values. This is not a bug fix.  
Reduced the font size for the file name and directory.  
Added a 'Small Monitor' button to reduce some font sizes for small monitor users.  
The program had more rewriting done for this version.

#### 23/6/06 Release 30

Fixed the writing of an incomplete last byte to TZX files.  
Fixed the compression type label which always said "RLE".  
Fixed checking of minor version number of CSWViewer.dll.  
Improved behaviour for files with 0 pulses.  
Removed the need for package files.  
Added support for Commodore TAP files.  
Added new controls for the mean value finding graph.  
The program had more rewriting done for this version.

#### 18/4/06 Release 29

Fixed the button for 3 wave data, which gave inaccurate calculations due to bugs.  
Fixed a bug that prevented TZX files of the V1.13 specification from opening.  
Fixed phase shift removing for some WAV files.  
Added the missing files TeeUI7C6.bpl and VCLX60.bpl to Borland-BCB6.zip.  
Added a bookmark feature to the search page.  
Changed time span in milliseconds to time span in samples.  
Improved the behavior when opening WAV files that are 16 bit or stereo, for conversion to CSW.  
Made many minor user interface improvements.  
Put the main program code in a DLL file.  
The program had a big rewriting for this version.

#### 18/8/05 Release 28

Fixed a bug with bits mean finding and Acorn baud rate.  
Added new pulse colouring buttons for Atom cassettes and 300 baud BBC cassettes.  
Linked with zlib V1.2.3, which fixes more security vulnerabilities.  
The package files in Borland-BCB6.zip in the directory:  
<ftp://ftp.worldofspectrum.org/pub/sinclair/tools/pc/drivers/> are now required.

#### 10/6/05 Release 27

Linked with zlib V1.2.2 which fixes:  
    Potential security vulnerability when decoding invalid compressed data,  
    Fix bug when decompressing dynamic blocks with no distance codes,  
    Do not return an error when using gzread() on an empty file.  
Removed the need for package support files.

#### 4/4/05 Release 26

Allowed opening of a CSW file in CSW Viewer by associating the extension with CSW Viewer and opening a file with a file manager.  
Improved the problem handling with memory allocation.  
Made the displayed tab sheet the file summary after loading a new file.  
Fixed TZX support, which does not work with V24 and V25.  
Made TZX buttons always available after opening a TZX file.

Now adds an extension to new TZX files if one is not typed.

#### 4/3/05 Release 25

Corrected ticks on bottom axis of both graphs.  
Rearranged the file summary page.  
Changed bits pulse mean length in samples to wave mean length in samples.  
Added a new button for 3 wave data.

#### 19/1/05 Release 24

Reduced the font size on the graphical view page legend.  
Improved the "How to record" document.  
Made many improvements to the graphs.  
Improved speed of file loading and the speed in general.  
Changed the required package files.

#### 12/12/04 Release 23

Fixed a bug with phase shift removing, which only affected WAV files with a particular end to the samples.  
Added the necessary file (since release 16): BCBSMP40.BPL to borland-win.zip.

#### 19/11/04 Release 22

Increased maximum creator's signature size to 150 characters.  
Made a change to the recommended method of smoothing gaps in the "How to record" document.  
Fixed loading of CSW V1.1 files which have not worked since release 20.  
Changed wavelength toleration for detecting Acorn waves to be equal to MakeUEF V1.2.

#### 20/10/04 Release 21

Put back the option to select multiple WAV files for conversion to CSW.  
Simplified phase shift removing to only -90 degrees on the whole file.  
Made new 'remove phase shift' check box state held in registry.  
Removed recording of phase shifts in CSW files.  
Created a new document on recording WAV files for conversion to CSW files.  
Changed default low cut-off frequency to 1000Hz.

#### 11/10/04

I removed release 20 from WOS due to rethink on CSW file creation.

#### 2/10/04 Release 20

Added creators signature facility for creating CSW files.  
Fixed a small inaccuracy with TZX block 11 trailing gaps.  
Improved the file opening dialog box settings.  
Disallowed files with sampling rate of 0.  
Began phase shift keying of waves in WAV files before passing a temporary WAV file to CSW.exe.  
Added number of samples information to file summary.  
Made the time span in the file summary appear sooner.  
Reduced the size of the font for the file name and directory and changed the colour to maroon.  
Changed the name of some tabs.  
Changed recommended filter ranges.  
Changed wavelength toleration for detecting Acorn waves.  
Changed an initial edit box value for searching for a pulse.  
Removed the option to select multiple WAV files for conversion to CSW because of the 'number of pulses' bug with CSW.exe.

#### 7/8/04 Release 19

Changed code for pure data and file TZX blocks so any inaccuracy is carried onto the optional trailing gap.  
Fixed bug with tolerated wavelength of data bits when using TZX output buttons for pure data and file.  
Fixed font size of Values Finder graph title which is bugged in release 18.

#### 20/7/04 Release 18

Completed TZX file output page with support for TZX blocks 11, 12, 13, 14, 20, 2A and 30.  
Added a gap finding button that uses pulse colour codes.  
Changed the time span on the File summary page to show minutes and seconds.  
Changed the time span on the Graphical display page to show minutes and seconds.  
Changed name of Pulse colouring page to Pulse colour coding.  
Changed words on mean pilot finding panel.

#### 22/6/04 Release 17

Fixed bug with CSW V1.01 format files, which have not loaded since release 10.  
Improved the error checking with reading and writing of files.  
Added a new pulse colouring button for sync pulses or a sequence of pulses (maroon).  
Changed the default point colour to the gap colour.  
Joined range time span and range selection panels.  
File summary headings now removed when not in use.  
Added time span to the file summary.  
Made minor changes to the file summary headings.  
The file summary now works better with zero sized files.  
Improved the wording and layout of Values finder page.  
Cleared the window of old values etc. when opening a new CSW file.  
Started TZX file output page.

#### 22/5/04 Release 16

Added new pulse colouring buttons for: pilot (grey), gap (yellow) and special pulses (any chosen colour).  
Changed ordering of the tabs.  
Fixed bug where CSW files could not be read after reading an uncompressed CSW file.

#### 30/4/04 Release 15

Removed time span calculation button and made the time span automatically calculated.  
Added two buttons for saving and loading of the point colours.  
Fixed minor bug where the file was not closed when the number of pulses is incorrect.

#### 26/3/04 Release 14

Invalid CSW V1.01 files with a 0 byte, at the end of the file, have not been accepted since release 11.  
Added frequency filter range to CSW file creator tab.  
Improved the Acorn bits coupling.  
Made minor changes to words on application.  
Some error handling possibly does not work because of compiler bugs.

#### 11/2/04 Release 13

Made a workaround to make calling of CSW.exe work with some versions of Windows.  
Extended the size of the digits in the edit boxes.  
Added Go to seconds and Go to point buttons.  
Added Pulse coupling page and moved the Spectrum bytes coupling button to it.  
Added standard Acorn start bits, bytes, and stop bits coupling button.  
Added a Searching page and pulse finding button mainly for finding gaps.  
Added About page.  
Changed the font in the File summary page.

#### 30/1/04 Release 12

Fixed incorrectly enabled buttons after using CSW file creator with no file loaded for viewing.  
Now closes files after reading data.  
Added the files TeePro6C4.bpl and TeeUI6C4.bpl to Tee6C4.zip.

#### 16/1/04 Release 11

Fixed initial polarity message, which has been wrong since release 1.  
Added a new tab for control of CSW.exe with multiple file selection. The output file name cases are preserved as with the input file. Why are they not when running in a command prompt window?  
Loading of data is now faster.  
'1' bit mean length detection now less often reports 'not found.'

Fixed checking of the number of pulses in the header which was not done if the final pulse length was greater than 255.

Added TeePro6C4.bpl to used runtime packages.

19/12/03 Release 10

Added displaying of time elapsed before the first point on the graph.

28/11/03 Release 9

Fixed slightly incorrect baud rate reporting for Acorn files.

Improved CSW file reading.

Fixed incorrectly enabled button.

Changed some user interface writing.

30/10/03 Release 8

Fixed 'loading data' message.

Add use of graph with pilot pulse mean length button.

Added pause size displaying in seconds with more accuracy than ms.

Added displaying of total of '0' and '1' bits after using mean finding button.

Added displaying of baud rate for Acorn tapes after using mean finding button.

14/10/03 Release 7

Fixed multiplication constant for calculating mean T states for pilots and 0s and 1s bug. It was being held from use with the first file loaded and used with a later loaded file, which might have a different sample rate.

Improved the exception handling.

2/10/03 Release 6

Fixed time span calculation bug. The bug only affected CSW files not with a sample rate of 44100.

Fixed mean '0' and '1' bit pulse lengths in samples bug. Previously they were 0.5 too much.

Fixed almost unnoticeable mistake with the wavelength counts graph.

Added 'exception handling' to the program.

30/9/03 Release 5

Changed to a tabbed interface.

Added '0' and '1' bits mean pulse length finder with graph.

Added a feature for coupling pulses, so as to view the pulses as bytes.

Added total bytes in range information.

Added automatic updating of total pulses in range.

Increased file summary information. (Polarity information is omitted for V1.01 files.)

24/9/03 Release 4

Added selecting of range using mouse.

Changed the word average to mean.

17/9/03 Release 3

Pulses coupling feature added.

Brought back non-rounding of pulse length in samples.

Added instructions.

15/9/03 Release 2

Time span calculation added.

Changing of files enabled.

Removed figures of calculated values after the decimal point.

Calculated values rounded to whole number.

Improved user interface.

Moved TEE6C4.BPL from zip file to WOS driver's directory.