

**NAME**

wtsum – weighted sums of traces

**SYNOPSIS**

**wtsum** [runfile]

**DESCRIPTION**

*Wtsum* allows you to produce weighted sums of traces from a run of captured or averaged data. The traces are read from the specified *runfile*. If no *runfile* is specified, you will have to select one later. For good results, it is best to use averaged data, as the noise in the data tends to accumulate in the sum. Because *wtsum* expects you to work with averaged runs, it uses the terms "bin" and "frame" interchangeably. You can, however, use raw runs.

At the bottom of the display, *wtsum* prints the following menu prompt line:

```
Bin-select Clear-all Display Erase File-select Go Interpolate List Plot Quit Save Text Weighted-  
sum
```

An operation is initiated by typing a single letter, the first letter of an item in the menu line. You can also step through the menu using the space bar and the backspace (or erase) key, to highlight the item you want, then press RETURN to select that item.

**Bin-select**

This selection allows you to pick one of the frames from the current *runfile*, (and the current trace) and store it in a *waveform variable*, for later use. If no file has yet been selected, or if the current trace number hasn't yet been selected, you will be prompted for them, as for *File-select* below.

You are then prompted to select the desired waveform. This is done by typing the single letter which corresponds to the waveform variable you wish to use, then hitting RETURN. Next, you are prompted to enter a list of frame numbers, which must be in the range indicated in the prompt. If you enter a valid frame number list, the current trace associated with the selected frame(s) will be read and stored in variable(s), starting with the selected variable. If no input is entered, or an invalid frame number list is specified, the variable(s) will not change, i.e. no new frame(s) will be selected. The format for this list is the same as the *frame list* format in *frmsel*(1).

**Clear-all**

This selection allows you to quickly delete all the stored waveforms. It can be used when you wish to start working with a new set of waveforms, without having to restart the program.

If you have loaded any bins, or made any changes to the waveform variables, and you have not saved the data, you will be asked whether you want to do so now. If you answer **Y**, a *Save* operation (below) is performed, prompting you for a new *runfile* name, in which it will save all data. It will prompt for verification before proceeding to clear all data, as a safeguard against unfortunate accidents.

**Display**

This selection allows you to display any one of the stored waveforms. You are prompted to select the desired waveform, by typing the single letter which identifies the waveform variable you wish to display.

The selected waveform will be displayed. The next *Go* or *Plot* selection will repeat this display, using the selected waveform variable.

**Erase**

This selection allows you to delete any one of the stored waveforms. You are prompted to select the desired waveform, by typing the single letter which identifies the waveform variable you wish to delete. If the selected variable contains a waveform, this waveform will be deleted.

**File-select**

This selection allows you to choose a new *runfile* so you can include some of its traces in the weighted sum. You are prompted to enter the name of the file. Type in this name, then hit RETURN. If the file is a valid *runfile*, the traces will be read from it whenever you use the *Bin-select* operation.

Next, you are prompted to select a trace number, since *wtsun* deals only with one trace at a time. If the number you enter is a valid trace number, you will then be able to read data from that trace.

You should be careful, when taking data from several files or several different traces, to ensure that the data are compatible, i.e. that the signal source, sampling rate (and its divisor), and calibration are the same in all files and all traces used. *Wtsun* does not check this, therefore the weighted sum produced may be meaningless if the data are not compatible.

### **Go**

This selection redisplay the last graph that was shown, either by the *Display* selection, or the *Weighted-sum* selection.

### **Interpolate**

This selection allows you to set the *interpolation* option. If this option is enabled, the data points of the displayed traces will be connected by line segments. If disabled, only the data points are displayed. Initially, this option is disabled.

### **List**

This selection allows you to get a list of the contents of each waveform variable. One line is printed for each stored waveform, giving the waveform code (single letter), the bin number, the trace number, the number of data points, the number of sweeps averaged together, and the name of the *runfile* from which the data were obtained.

### **Plot**

This selection brings you to the plotting sub-system, which presents you with a secondary menu. See *PLOTTING* below.

### **Quit**

This selection allows you to exit the program. If you have loaded any bins, or made any changes to the waveform variables, and you have not saved the data, you will be asked whether you want to do so now. If you answer **Y**, a *Save* operation (below) is performed, prompting you for a new *runfile* name, in which it will save all data.

### **Save**

This selection allows you to save all currently defined variables in a new *runfile*, for later analysis by *wtsun*, *peel*, *raster*, or *qm*. You are prompted to enter the name of the file. Type in this name, either with or without the **.frm** suffix, then hit RETURN. The frame file will be created if it does not already exist, or overwritten with the new data if it does exist. A corresponding frame description file is also created, to store the waveforms' text descriptions, as well as information about where the data originated.

### **Text**

This selection allows you to change the line of text displayed beside a waveform. You are prompted to select the desired waveform, by typing the single letter which identifies the waveform variable you wish to modify. The old text line is shown, and you are prompted to enter a new line of text. If a non-empty line is entered, it will replace the old text.

### **Weighted-sum**

This selection allows you to obtain a weighted sum or difference using any or all of the stored waveforms. All of the stored waveforms are first displayed. Then, for each of these waveforms, you are prompted to enter a weight. This weight can be any real value, including zero if you want this waveform to be ignored. (Zero is the default.)

Instead of entering a weight for any of these waveforms, you can enter a **D**, an **N**, or an **X**. This will not only exclude the waveform in question from the sum, but will remove it entirely from the final display.

The waveforms are then redisplayed, with the waveform for the weighted sum appearing at the bottom. The equation used to produce this waveform is displayed at the left of the waveform. Next, you will be asked if you want to keep the weighted sum in a waveform variable. If you answer with an **N**, meaning "no", you will be returned to the main menu. If you answer with a **Y**, meaning "yes", you will then be prompted to select the waveform variable, by typing the single letter which identifies the variable in

which you want to save the sum. You should pick an unused variable, to avoid clobbering any of the waveforms currently on the display.

The next *Go* or *Plot* selection will repeat the display just produced.

#### **!command**

Whenever the menu line has just been printed, instead of typing a letter to select a menu item, you can type an exclamation point, followed by any UNIX command, then hit RETURN. A UNIX shell is invoked to interpret and execute this command. You can recall and edit the last command entered, by hitting the "up arrow" key, or Control-K, after typing the exclamation point.

#### **\$ or %**

Whenever the menu line has just been printed, you can also type either a dollar sign (\$), to invoke an interactive Bourne shell, or a percent sign (%), to invoke an interactive C shell. In either case, the shell will continue accepting commands until you type a **Control-D**, to exit from the shell, and return to *wtsun*.

#### **? or /**

Whenever the menu line has just been printed, you can also type either a question mark (?), or slash (/), to get a short description of all choices available in the current menu.

### **PLOTTING**

The *Plot* selection is used to produce a plot similar to what would be displayed on the screen by the *Go* operation. A new menu is presented, allowing you to change certain plotting parameters. The choices are:

Axes Data File Interpolation Markers Plotter Quit Screen Text Video

Selections are made by typing the first letter of an item in this menu.

#### **Axes, Data, and Markers**

These selections allow you to change the pen numbers used to plot axes, data points, and markers, respectively. You will be prompted to enter a pen number, an integer from **0** to **8**. The three pen numbers are initially set to **1**. Selecting pen number 0 suppresses plotting of those items.

#### **File**

This selection allows you to store the HPGL commands used to plot the graph in a file. You will then be able to plot this graph, at a later time, by invoking *hardcopy*(1). You will be prompted to enter the file name. If you enter a file name, the graph will be stored in this file. If the file already existed, it will be overwritten.

#### **Interpolation**

This selection allows you to change the plot interpolation option. If this option is enabled, the data points of the plotted graph will be connected by line segments. If disabled, only the data points are plotted. This is similar to the "Interpolate" option for the screen display, but is maintained as a separate option because it is common to want interpolation enabled for plotting, but not for the screen display.

Plotting with interpolation enabled allows the plotter to work much faster, with less wear on the pen.

#### **Plotter**

This selection allows you to plot the graph directly to the plotter. The *hardcopy* program is invoked to plot the displayed graph. Before beginning this operation, make sure the plotter is powered up, on-line, and that a clean sheet of paper has been loaded. Also make sure the plotter's *autoload* option is enabled.

#### **Quit**

This selection returns you to the previously displayed menu.

#### **Screen**

This selection allows you to change the screen redraw option. If this option is enabled, the graph will be redrawn on the screen while it is being sent to the file or the spooler. If disabled, the current contents of the screen will remain, while the plot is generated.

**Text**

This selection allows you to change the plot text option. If this option is disabled, the generated plot will not contain any text; all titles and labels will be stripped from it, leaving only the axes, tick marks, data points, etc. This is useful when the plot is reduced in size to the point where the text would be illegible. If enabled, the generated graph will be complete with all titles and labels.

**Video**

This selection does not affect the pen plotter, but instead produces a printed copy of the video display's current contents – a screen dump – by invoking *sdump(1)*. The same thing can be accomplished by pressing the *quit* key, normally **Control-B**. The *Plot/Video* operation has the advantage that it can be used even when the program is reading its commands from a file, rather than the terminal. Also, the *Plot/Video* operation clears the menu area before performing the screen dump.

**X WINDOW SUPPORT**

When the X Window version of this program is run on an X Window terminal, a new window will be shown for displaying program output. Unless the input was redirected from a file, it will be taken from the keyboard when this window is the "input focus", i.e. the active window. When running this way, it is essentially detached from the *xterm* window from which you run the command, and it can be run in the background.

As for most other X Window programs in this package, the following X command line options are accepted:

**-cursor** *num*

You can specify any cursor number (not cursor names) in the Standard Cursor Symbols described in the *X Window System User's Guide* using the **-cursor** or **-curs** option. The default value is 68, the left pointer symbol. This can also be specified using the **CURSORS** environment variable.

**-display** [*host*]:*server*[,*screen*]

By default, the host, server and screen, which identify your X terminal, are obtained from the environment variable **DISPLAY**. However, you can also specify them using the **-display** or **-disp** option. The *host* is the name of the machine or terminal, on which the window is to be created, *server* is the server number, and *screen* is the screen number (default is 0).

**-fn** *font*

You can specify any fixed-width font to be used for text display using the **-fn** or **-font** option. The default value is **9x15** if the window is at least 900 pixels wide initially, and **fixed** otherwise. This can also be specified using the **SCRFONT** environment variable.

**-geometry** *geometry*

By default, the program will create a window that covers most of the display. However, you can specify custom window dimensions and location using the **-geometry** or **-geom** option. The format of the *geometry* string is described in the *X Window System User's Guide*. This can also be specified using the **GEOMETRY** environment variable.

**-iconic**

This option will cause the program to start up in an iconified state, which can be reactivated by double-clicking on the icon.

**-rev** This option will cause the program to use reverse video in its display window.

**-title** *name*

This option will change the name shown on the window's title bar, which is usually just the program name. It can also be given as **-name** *name*.

**NOTES**

*Wtsum* should be run from a graphics terminal, or X terminal, in order to view generated graphs. It can be run from other types of terminals, to plot out graphs, but no graphs will be generated on screen.

**SEE ALSO**

*analysis(1)*, *peel(1)*, *raster(1)*, *qm(1)*, *frmsel(1)*, *hardcopy(1)*, *sdump(1)*