histogram

keys:	**[from]**	*<number>*	source picture
	[to]	*<number>*	output histogram
	channels	*<number>*	number of histogram channels
	size	*<x>, <y>, <z>*	dimensions of subregion to be processed
	position	*<x>, <y>, <z>*	position/offset of subregion
	layer	*<number>* *<n1>,<n2>*	layer to be processed range of layers to be processed
	height	*<number>*	histogram height in framestore pixels
	times	*<number>*	display magnification factor
	aspect	*<number>*	if **type/log**, text aspect ratio
	width	*<number>*	if **type/log**, number of characters per line
options:	**preset**		set histogram channel limits from *min*, *max*
	left/right, bottom/top, near/far		position of subregion
	repeating		repeat histogram counts when magnifying, instead of interpolating
	letter		mark top of display partition with picture number and title
	border		mark picture border
	type/log		output histogram in character form to console or log output stream

The **histogram** command creates a picture intensity histogram, showing the intensity ranges of pixels in a picture.

Examples

```
display 4:23; xwires region; histogram 4:23 @region
```

This command displays a histogram of a subregion of picture 4:23. The subregion is marked out using the cursor (**xwires** command).

```
histogram channels 100 to 51
```

This command places a 100 channel histogram of the current picture in picture 51.

histogram

```
min=10 max=20 histogram preset type
```

This command creates a histogram of pixels between an intensity range of 10 and 20. The histogram is output to the console in character form.

Description

If you direct a histogram to a display partition, it is displayed in graphical form. Otherwise it is stored as a class *Histogram* picture, which you can display when required or use it to perform histogram equalisation with the **map** command.

To generate a histogram of a (multi-layer) subregion of a picture use the standard subregion keys and options, **size**, **position** etc. See *Appendix C: Semper Keys and Options* for further detail of subregion keys and options.

By default, the **histogram** command finds the actual range of pixel intensity, returning this range in the variables *min* and *max*. If you *abandon* during a range-finding scan an estimated range is used. However, if you use the option **preset** the existing range of values, held in *min* and *max* are used. The histogram channels are then spread evenly over this range; pixel intensities outside this range are not counted. Semper does not distinguish between imaginary parts of complex pixels from real parts for counting purposes.

If the range *min,max* lies in the range 20,256, it is used as a default for the number of channels (otherwise the default is 256). You can specify a number of channels using the **channels** key (up to the maximum row length for floating point pictures).

Note that the keys **height**, **times** and the options **repeating**, **letter**, **border**, **type** and **log** are relevant only if the histogram is displayed in graphical form rather than stored as a *Histogram* picture. The **aspect** and **width** keys are only relevant if you are outputing your graph in character form to the console or to the log output stream.

Notes

display marking:	scanned region
multi-layer pictures:	fully supported
forms used internally:	fp, complex
variables used:	*min, max* (if **preset**, pixel range shown by histogram channels)
variables set:	*min, max* (unless **preset**, pixel range of histogram channels)
see also:	**display**, **map**

histogram

Defaults and Ranges

keys/options	defaults	range
[from]	current picture, held in the variable *select*	valid picture number
[to]	current display picture, held in the variable *dispiay,* histogram shown in graphical form	valid picture number
channels	*max,min* if in range 20,256; otherwise 256	integer in range 1 to 256
size	whole picture	less than or equal to the size of the picture (integers)
position	0, 0, 0	within the bounds of the picture (integers)
layer	all unless variables *si3/po3* set	integers in range 1 to number of layers
height	lesser of half histogram width and half partition height	less than or equal to the height of the picture (integer)
times	1	positive integer
aspect	default given by the **page** command	positive integer
width	default given by the **page** command	positive real number
preset	lowest, highest pixel values	
repeating	interpolate between histogram counts when magnifying	
letter	lettering on	
border	bordering on	
type/log	histogram shown in graphical form on display	