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SL987

SL957

SL937

SL917

Product Specifications [1]

1. These models include: an oscilloscope, a spectrum analyzer, a data recorder, a frequency & phase meter, an arbitrary waveform/ function generator, a logic analyzer, and a pattern generator.

Oscilloscope/ Spectrum Analyzer/ Data Recorder

Model	SL987	SL957	SL937	SL917
Oscilloscope (Typical)				
Bandwidth (Max at probe tip) [2]				
@ 500 mV/ Div with 10X probe	1 GHz	500 MHz	300 MHz	100 MHz
@ 50 mV/ Div with 1X probe	1 GHz	500 MHz	300 MHz	100 MHz
@ 1 V/ Div with 10X probe	500 MHz	400 MHz	200 MHz	75 MHz
@ 100 mV/ Div with 1X probe	500 MHz	400 MHz	200 MHz	75 MHz
@ 2 V/ Div with 10X probe	250 MHz	200 MHz	100 MHz	50 MHz
@ 200 mV/ Div with 1X probe	250 MHz	200 MHz	100 MHz	50 MHz
@ 5 V/ Div with 10X probe	250 MHz	200 MHz	100 MHz	50 MHz
@ 500 mV/ Div with 1X probe	250 MHz	200 MHz	100 MHz	50 MHz
@ 20 V/ Div with 10X probe	200 MHz	200 MHz	100 MHz	50 MHz
@ 2 V/ Div with 1X probe	200 MHz	200 MHz	100 MHz	50 MHz
Rise time	0.5 nS	1.0 nS	2.5 nS	5.0 nS
Input channels	2			
Vertical resolution	8 bits			
DC accuracy	< ±3%			
Input characteristics	1 MΩ in parallel with 5 pF			
CMRR (Common Mode Rejection Ratio)	> 70 dB (@ 100 MHz)			
Channel-to-Channel Crosstalk	< -70 dB			
Input type	Single-ended, BNC connector			
Input coupling	Software selectable AC/DC			
Input ranges (full scale) 10x probe 1x probe	±80 mV to ±80 V in 10 ranges ±8 mV to ±8 V in 10 ranges			
Overload protection	±150 V (DC+AC peak)			
Sampling rate (each channel) Real / per channel Effective / per channel	125 MHz 100 GHz			100 MHz 25 GHz
Vertical Sensitivity 1x probe 10x probe	2 mV - 2 V / DIV 20 mV - 20 V / DIV			

Buffer memory size One channel in use Two channels in use	1024 KB 512 KB			
Time base	1 ns/div to 100 ms/div			5 ns/div to 100 ms/div
Time base (Data Recorder)	500 nS to 365 days with data recorder			
Timing accuracy [3]	50 ppm	100 ppm	200 ppm	
Trigger modes	Normal, auto, one shot, single, Ch1, CH2			
Trigger threshold Internal External	Adjustable, \pm range setting (variable) 8 bits 1.2 Volts			
Basic triggers	External/ CH1/ CH2/ Alternative Rising edge/ Falling edge/ Auto/ Normal/ Single			
External trigger bandwidth	1 GHz	500 MHz	300 MHz	100 MHz

Notes:

2. The bandwidth indicates the highest frequency at which a sine wave can be represented by the oscilloscope with a 10 dB loss. This also applies for narrow band signals. For non-periodical wide band signals the bandwidth is limited by the Nyquist criteria. For the specified real time sampling rate of 120 MHz, the bandwidth is limited to about 50 MHz.
3. For a better performance, please contact the factory.

Model	SL987	SL957	SL937	SL917
Spectrum Analyzer (Typical) [4]				
Common features between the oscilloscope and the spectrum analyzer have the same specifications.				
Frequency Bandwidth [5]	1 GHz	500 MHz	300 MHz	100 MHz
Display Span (Default)	204.8 KHz to 60 MHz			
Minimum Span (at selected Display Bandwidth)	100 KHz (display bandwidth of 51.2 MHz) 5 KHz (display bandwidth of 2.56 MHz) 400 Hz (display bandwidth of 204.8 MHz)			
Resolution	(Span / 2^{18}) 0.78 Hz to 195 Hz			
Spectrum Flatness	1 dB			
Frequency Error [6]	50 ppm	100 ppm	200 ppm	
Relative Frequency Accuracy	> 1 ppm			
Maximum number of bins	1M			
Dynamic Range	8 bits (< 65 dB)			
Spurious Free Range	< 70 dB (@ 10 MHz, 2 V range)			
Frequency Response	± 0.5 dB			
Reference Levels (10 ranges) 1x Probe 10x Probe	- 35 dBV to 25 dBV (0.6 to 5.623 VRMS) - 25 dBV to 35 dBV (0.06 to 56.23 VRMS)			
Display modes	Sampling, peak hold, average, history			
Windowing types	Rectangular, Bartlett, Gaussian (2.5, 3.5, 4.5), Triangular, Blackman, Blackman–Harris, Hamming, Hanning, Welch, Kaiser Bessel, Flat Top,			

Model	SL987	SL957	SL937	SL917
Frequency Analyzer (All Models, Typical) [4]				
The same specifications apply to the common features of the oscilloscope and the frequency and phase analyzer in the model.				
Bandwidth [5]	1 GHz	500 MHz	300 MHz	100 MHz
Resolution	0.1 Hz			
Tolerance [6]	50 ppm	100 ppm	200 ppm	
Relative Tolerance	0.01 ppm	0.1 ppm	1 ppm	

Data Recorder (All Models, Typical) [4]				
The same specifications apply to the common features of the oscilloscope and the data recorder in the model.				
Sampling Interval	102 MHz to 10 pHz			
Time base	500 nS to 365 days			
Timing Accuracy [6]	50 ppm	100 ppm	200 ppm	

Notes:

4. The relevant specifications for the oscilloscope also apply to the spectrum analyzer, frequency analyzer, and data recorder of the corresponding model.
5. The bandwidth indicates the highest frequency at which a sine wave can be represented by the instrument with a 10 dB loss. This also applies for narrow band signals. For non-periodical wide band signals the bandwidth is limited by the Nyquist criteria. For the specified real time sampling rate of 120 MHz, the bandwidth is limited to about 50 MHz.
6. For a better performance, please contact the factory.

Arbitrary Waveform Generator

General (Typical)				
Specifications	SL987	SL957	SL937	SL917
Arbitrary waveform length	2 to 64K adjustable			
Ram (Memory)	64K (Optional: Bigger Memory [7])			
Amplitude resolution	12-bits (with 14-bits optional)			
Sample rate (sine wave)	400 MHz	300 MHz	200 MHz	100 MHz
Sample rate	100 MHz			50 MHz
Sample rate (Arbitrary)	1 MHz to 100 MHz			1 MHz to 50 MHz
Frequency adjustment resolution	10 mHz (with 1 μ Hz optional)			
Standard waveforms	<p>DC, Sine, square, pulse, triangle, rising ramp, falling ramp, noise, rising exponent, falling exponent, sinc, cardiac, gated burst, single burst, log continuous sweep, linear continuous sweep, gated ASK, gated FSK, gated PSK</p> <p><i>AM (modulating signals; pulse, square, rising ramp, falling ramp, triangle, sinc, cardiac, rising exponent, falling exponent, noise, edited waveforms)</i></p> <p><i>FM (modulating signals; pulse, square, rising ramp, falling ramp, triangle, sinc, cardiac, rising exponent, falling exponent, noise, edited waveforms)</i></p> <p><i>burst (carrier signals; pulse, square, rising ramp, falling ramp, triangle, sinc, cardiac, rising exponent, falling exponent, noise, edited waveforms)</i></p>			

<p>Output Amplitude (Frequencies < 5MHz) Open circuit 50 Ω</p> <p>(5MHz > Freq. < 15MHz) Open circuit 50 Ω</p> <p>(15MHz > Freq. < 50MHz) Open circuit 50 Ω</p> <p>(50MHz > Freq. < 100MHz) Open circuit 50 Ω</p> <p>(100MHz > Freq. < 150MHz) Open circuit 50 Ω</p> <p>Accuracy (up to 100 kHz) Adjustment resolution</p>	<p>0 to ±3.5V(7 Vpp) 0 to ±1.75V(3.5 Vpp)</p> <p>0 to ±3.0V(6 Vpp) 0 to ±1.5V(3.0 Vpp)</p> <p>0 to ±2.0V(4 Vpp) 0 to ±1.0V(2.0 Vpp)</p> <p>0 to ±1.5V(3 Vpp) 0 to ±0.75V(1.5 Vpp)</p> <p>0 to ±1.0V(2 Vpp) 0 to ± 0.5V(1.0 Vpp)</p> <p>.1% of the specified output ± 5mV 3 digits (1mv)</p>
<p>Output Offset Open circuit 50 Ω Accuracy Adjustment resolution</p>	<p>0 to ± 2.2V(7 Vpp) 0 to ± 2.2V(3.5 Vpp) 2% ± 5mV (0.1% Optional) 3 digits(1mv)</p>
<p>Output impedance</p>	<p>50 Ω (Optional: 0 to 75 Ω)</p>
<p>Output Current</p>	<p>60 mA (With the standard 50 Ω impedance)</p>
<p>Sync</p>	<p>TTL compatible</p>

Frequencies Ranges

Sine Wave	10 mHz to 150 MHz	10 mHz to 100 MHz	10 mHz to 50 MHz	10 mHz to 10 MHz
Square Pulse Triangle Ramp Sinc Noise (White) Bandwidth AM (Carrier) FM (Carrier) Sweep Burst (Burst Rate) Digital (shift keying rate) Exponent Cardiac	10 mHz to 15 MHz 10 mHz to 15 MHz 10 mHz to 100 KHz 10 mHz to 100 KHz 1 Hz to 5 MHz 25 MHz 1 Hz to 5 MHz 1 Hz to 5 MHz DC to 15 MHz (start & stop frequency) 100 Hz to 2 MHz 1 kHz to 2 MHz 1 Hz to 5 MHz 1 Hz to 1 MHz	10 mHz to 5 MHz 10 mHz to 5 MHz 10 mHz to 100 KHz 10 mHz to 100 KHz 1 Hz to 1 MHz 10 MHz 1 Hz to 1 MHz 1 Hz to 1 MHz DC to 5 MHz 100 Hz to 1 MHz 1 kHz to 1 MHz 1 Hz to 1 MHz 1 Hz to 1 MHz		
Resolution	10 mHz (1 μ Hz optional)			
Accuracy	2% \pm 5mV (.1% optional) At room temperature			
Temp Coefficient	20 ppm/ $^{\circ}$ C			
Aging	10 ppm/yr			

Waveform Characteristics - 50 Ω Termination

<p>Sine Wave Output Flatness</p> <p>< 1 MHz < 10 MHz < 150 MHz</p>	<p>0.1 dB 0.5 dB 1 dB</p>	<p>0.1 dB 0.2 dB -</p>
<p>Sine Wave (2Vpp) Adjustment resolution</p> <p>Harmonic Distortion Dc to 100 kHz 100 kHz to 1 MHz 1 MHz to 10 MHz 10 MHz to 50 MHz 50 MHz to 100 MHz 100 MHz to 150 MHz</p> <p>Spurious Dc to 100 kHz 100 kHz to 1 MHz 1 MHz to 10 MHz 10 MHz to 50 MHz 50 MHz to 100 MHz 100 MHz to 150 MHz</p> <p>Noise Dc to 100 kHz 100 kHz to 1 MHz 1 MHz to 10 MHz 10 MHz to 50 MHz 50 MHz to 100 MHz 100 MHz to 150 MHz</p> <p>Phase noise</p>	<p>10 mHz (1 μHz optional)</p> <p>-70 dBc -65 dBc -60 dBc -55 dBc (when applicable) -50 dBc (when applicable) -45 dBc (when applicable)</p> <p>-70 dBc -60 dBc -60 dBc -55 dBc (when applicable) -55 dBc (when applicable) -50 dBc (when applicable)</p> <p>-60 dBc -60 dBc -55 dBc -50 dBc (when applicable) -40 dBc (when applicable) -35 dBc (when applicable)</p> <p>< -60 dBc in a 50 kHz band</p>	
<p>Square Wave (2Vpp) Frequency Adjustment resolution Rise/ Fall time Overshoot Settling time Asymmetry Duty cycle adjustment resolution Jitter</p>	<p>10 mHz - 15 MHz 10 mHz (1 μHz optional) < 4 nS 1% 10 nS to .5% of final value < 2 nS 5% to 95% (1MHz) 10nS < 10pS (rms)</p>	<p>10 mHz - 5 MHz</p>

Triangle, Ramp (2Vpp) Frequency Adjustment resolution Linearity Asymmetry Duty cycle Adjustment resolution Jitter	10 mHz- 15 MHz 10 mHz (1 μ Hz optional) .1% of peak output < 2 nS 5% to 95% 10nS < 10pS (rms)	10 mHz- 5 MHz
Exponential (2Vpp) Frequency Adjustment resolution Rise / Fall time Damping factor Jitter	10 mHz- 5 MHz 10 mHz (1 μ Hz optional) < 4 nS -1,000 to 1,000 < 10pS (rms)	10 mHz- 1 MHz
Sinc (sin(x) / x) (2Vpp) Frequency Adjustment resolution Zero crossings	10 mHz- 5 MHz 10 mHz (1 μ Hz optional) 2 to 1,000	10 mHz- 1 MHz
Cardiac (2Vpp) Frequency Adjustment resolution Zero crossings	10 mHz- 1 MHz 10 mHz (1 μ Hz optional) 2 to 1,000	
Noise Type Bandwidth	White 50 MHz	White 20 MHz
AM (2Vpp) Carrier (-3dB) Modulating signal Frequency Modulation depth Source	10 mHz to 5 MHz any internal waveform including Arb 10 mHz to 1MHz 0% to 150% internal (external optional)	10 mHz- 1 MHz
External AM modulation	Optional	
FM (2Vpp) Carrier (-3dB) Modulating signal Frequency Modulation depth Source	10 mHz to 5 MHz any internal waveform including Arb 10 mHz to 1 MHz 0% to 100% internal (external optional)	10 mHz- 1 MHz
External FM modulation	Optional	

ASK (2Vpp) Frequency Modulating signal Frequency Gating signal	10 mHz to 5 MHz any internal waveform including Arb 10 mHz to 5 MHz 5 (TTL, CMOS) to 1.2 V (CMOS, TTL, LVTTTL)	10 mHz - 1 MHz 10 mHz - 1 MHz
FSK (2Vpp) Frequency Modulating signal Frequency Gating signal	10 mHz to 5 MHz any internal waveform including Arb 10 mHz to 5 MHz 5 (TTL, CMOS) to 1.2 V (CMOS, TTL, LVTTTL)	10 mHz - 1 MHz 10 mHz - 1 MHz
PSK (2Vpp) Frequency Modulating signal Frequency Gating signal	10 mHz to 5 MHz any internal waveform including Arb 10 mHz to 5 MHz 5 (TTL, CMOS) to 1.2 V (CMOS, TTL, LVTTTL)	10 mHz - 1 MHz 10 mHz - 1 MHz
Burst (2Vpp) Carrier (-3dB) Source Rate Count Gate source Trigger	10 mHz 5 MHz any internal waveform including Arb 100 Hz to 2 MHz variable internal (external optional) single, internal rate, external(optional)	10 mHz - 1 MHz 10 mHz - 1 MHz
Sweep Type Direction Start frequency Stop frequency Sweep time	linear or log (exponential) up or down 0 to 15MHz 0 to 15MHz 1 uS to 1 mS	0 to 1 MHz 0 to 1 MHz 1 uS to 1 mS

Editing tools

Signal processing	
Math operation	addition, subtraction, multiplication, gain, clip, absolute, resize, invert, mirror, expand to fit
Filtering	smoothing, ideal low pass, first order low pass
Windowing	Gaussians, Blackman, Blackman-Harris, Cosine, Hanning, Hamming, Flat-Top, Kaiser-Bessel, Welch, Triangular
Signal library	sine, square, triangle, falling ramp, rising ramp, rising exponent, falling exponent, sinc, cardiac, noise
GUI Editors	pen, line, manual, insert
Options	save / recall in .txt & .csv format
Units	
Frequency	Hz, kHz, MHz
Amplitude	mVpp, Vpp
Offset	mV, V
Protection	short circuit
Configuration time	
Arbitrary save	10 mS
Arbitrary Recall	100 mS
Setting save	10 mS
Setting Recall	100 mS
Function	100 mS

7. For a bigger memory size, please contact the factory.

Logic Analyzer/ Pattern Generator

Model	SL987, SL957	SL937, SL917
Logic Analyzer (Typical)		
<p>Internal Clock</p> <p><i>The internal clock makes the memory address counter follow the rising edges of the internally generated programmable clock.</i></p> <p>Range Resolution Period Period Accuracy</p>	<p>100 KHz - 100 MHz 1 Hz 10 nS - 1 uS ±0.01%</p>	<p>100 KHz - 50 MHz 5 Hz 20 nS - 1 uS ±0.1%</p>
<p>External Clock</p> <p><i>The external clock makes the memory address counter follow the rising edges of the externally generated clock.</i></p> <p>Range Logic</p>	<p>100 KHz - 100 MHz</p>	<p>100 KHz - 50 MHz</p>
<p>Input Logic</p>	<p>TTL, CMOS (1.8 V, 2.5 V, 3.3 V, 5 V)</p>	
<p>Maximum Sample Rate</p> <p>8 Channels 16 Channels</p>	<p>200 MHz 100 MHz</p>	<p>100 MHz 50 MHz</p>
<p>Minimum Sample Rate</p> <p>Internal Clock External Clock</p>	<p>1 MHz 100 KHz</p>	<p>1 MHz 100 KHz</p>
<p>Minimum Detectable Pulse Width</p>	<p>15 nS</p>	<p>25 nS</p>

Input/ Output Channels Number of Channels Input Levels Output Levels - Logic Analyzer Channel-to-Channel Skew Input Impedance Maximum External Voltage Coupling	16 TTL, CMOS (1.8 V, 2.5 V, 3.3 V, 5 V) 1.8 LVCMOS 1 nS 100 k Ω , parallel 2 pF -2V to 5 V DC
Pulse / Level Parameters Output Amplitude Accuracy Offset Accuracy Overshoot / pre-shoot / ringing Rise / Fall Time Source Impedance Short Circuit Current	1.8 LVCMOS \pm (5% Amplitude + 10 mV) \pm 20 mV \pm 2% \pm 10 mV < 2ns 200 Ω [7] \pm 30mA
Timing accuracy	100 ppm
Trigger Types	Edge, pattern, pulse width, pattern width
Memory/ Channel Parameters Number of Input Channels Data Length (16 channels) Data Length (8 channels)	16/ 8 524 K 1048 K
Protocols	I2C, SIM, 1-Wire,SPI, Quad SPI (includes data wizard)

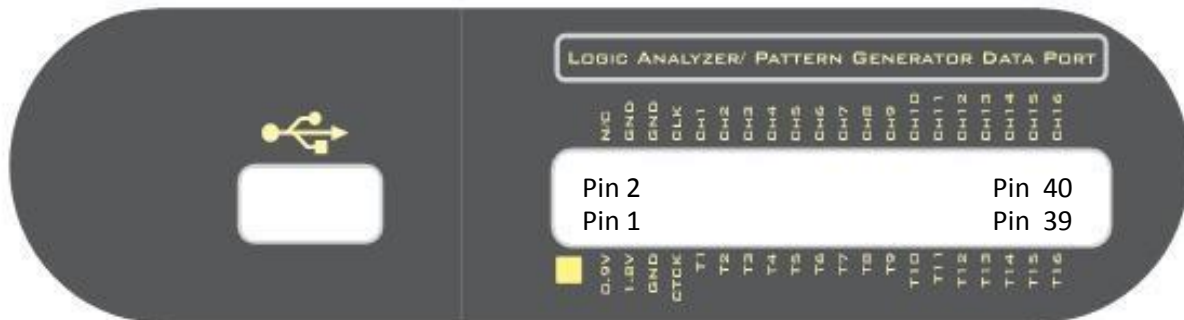
Pattern Generator (Typical)

Model	SL987, SL957	SL937, SL917
<p>The output is a pattern event. The pattern is programmable, or may be selected from a library of pre-configured patterns. The graphical and the math editor enables the user to seamlessly create any desired pattern.</p>		
<p>Internal Clock <i>The internal clock makes the memory address counter follow the rising edges of the internally generated programmable clock.</i></p> <p>Range Resolution Period Period Accuracy</p>	<p>100 KHz - 100 MHz 1 Hz 10 nS - 1 uS ±0.01%</p>	<p>100 KHz - 50 MHz 5 Hz 20 nS - 1 uS ±0.1%</p>
<p>External Clock <i>The external clock makes the memory address counter follow the rising edges of the externally generated clock.</i></p> <p>Range Logic</p>	<p>100 KHz - 100 MHz</p>	<p>100 KHz - 50 MHz</p>
Input Logic	TTL, CMOS (1.8 V, 2.5 V, 3.3 V, 5 V)	
<p>Maximum Sample Rate 16 Channels</p>	<p>100 MHz</p>	<p>50 MHz</p>
<p>Minimum Sample Rate Internal Clock External Clock</p>	<p>1 MHz 100 KHz</p>	<p>1 MHz 100 KHz</p>
Minimum Detectable Pulse Width	<p>15 nS</p>	<p>25 nS</p>

Input/ Output Channels Number of Channels Source Impedance Output Levels Input Levels	16 200 Ω , selectable 1.8 LVCMOS TTL, CMOS (1.8 V, 2.5 V, 3.3 V, 5 V)
Channel-to-Channel Skew Input Impedance Maximum External Voltage Coupling	1 nS 100 k Ω parallel 2 pF -2V to 5 V DC
Pulse / Level Parameters Output Amplitude Accuracy Offset Accuracy Overshoot / pre-shoot / ringing Rise / Fall Time Source Impedance Short Circuit Current	1.8 LVCMOS \pm (5% Amplitude + 10 mV) \pm 20 mV \pm 2% \pm 10 mV < 2ns 200 Ω [8] \pm 30mA
Timing accuracy	100 ppm
Trigger Types	Edge, pattern, pulse width, pattern width
Memory/ Channel Parameters Number of Output Channels Data length (16 channels)	16/ 8 524 K
Protocols	I2C, SIM, 1-Wire,SPI, Quad SPI (includes data wizard)
Editor - Pattern Generator	Graphical, Line, Math, and function

8. For other impedance values, please contact the factory.

Logic Analyzer/ Pattern PIN ASSIGNMENT



Logic Analyzer/ Pattern Generator Back panel

Pin NO.	Pin Name	Pin Assignment	Pin No.	Pin Name	Pin Assignment
1	0.9V	Open	2	N/C	Ground [8]
3	1.8V	Open	4	GND	Ground
5	GND	Ground	6	GND	Ground
7	CTCK	Clock In/ Out [9]	8	CLK	Clock In/ Out
9	T1	Channel 1	10	CH1	Channel 1
11	T2	Channel 2	12	CH2	Channel 2
13	T3	Channel 3	14	CH 3	Channel 3
15	T4	Channel 4	16	CH 4	Channel 4
17	T5	Channel 5	18	CH 5	Channel 5
19	T6	Channel 6	20	CH 6	Channel 6
21	T7	Channel 7	22	CH 7	Channel 7
23	T8	Channel 8	24	CH 8	Channel 8
25	T9	Channel 9	26	CH 9	Channel 9
27	T10	Channel 10	28	CH 10	Channel 10
29	T11	Channel 11	30	CH 11	Channel 11
31	T12	Channel 12	32	CH 12	Channel 12
33	T13	Channel 13	34	CH 13	Channel 13
35	T14	Channel 14	36	CH 14	Channel 14
37	T15	Channel 15	38	CH 15	Channel 15
39	T16	Channel 16	40	CH 16	Channel 16

1. Pin 2 can be configured to be an external trigger to allow the user to synchronize the data capture with the rising edge of an external event. For this option, please contact the factory.
2. From pin 7 to pin 40, all odd pins are internally connected to the corresponding even pins.

Physical Properties	
Dimensions	128.0 x 77.0 x 31.6 (mm), 5.0 x 3.0 x 1.2 (inches)
Weight	340 grams, 12 Ounces
Other	
PC Requirements Recommended	Operating system: 32/ 64-bit edition of Microsoft Windows XP (SP3), Vista, Windows 7/ Windows 8/ Windows 10 Ports: USB 2.0/ 3.0 compliant port
Environmental Operating environment Temperature range Humidity Storage environment Temperature range Humidity	0 °C to 40 °C for normal operation 15 °C to 32 °C for quoted accuracy 5% to 80% RH, non-condensing -20 °C to +60 °C 5% to 95% RH, non-condensing
Software	Save setting, recall setting, save plot, recall/print plot, zoom in vertical, zoom in horizontal, pen editor, line editor, DSP, variable sampling rate