

Optical-Recording Measurement Package

MAIN FEATURES

- **Optical Recording Applications**
 - CD-ROM - PD - DVD
 - Magnetic-Optical

- **Optical Recording Parameters**

Fourteen optical-recording specific measurements, 6 timing parameters and 8 amplitude parameters, including pit width, time from pit edge to clock, resolution...

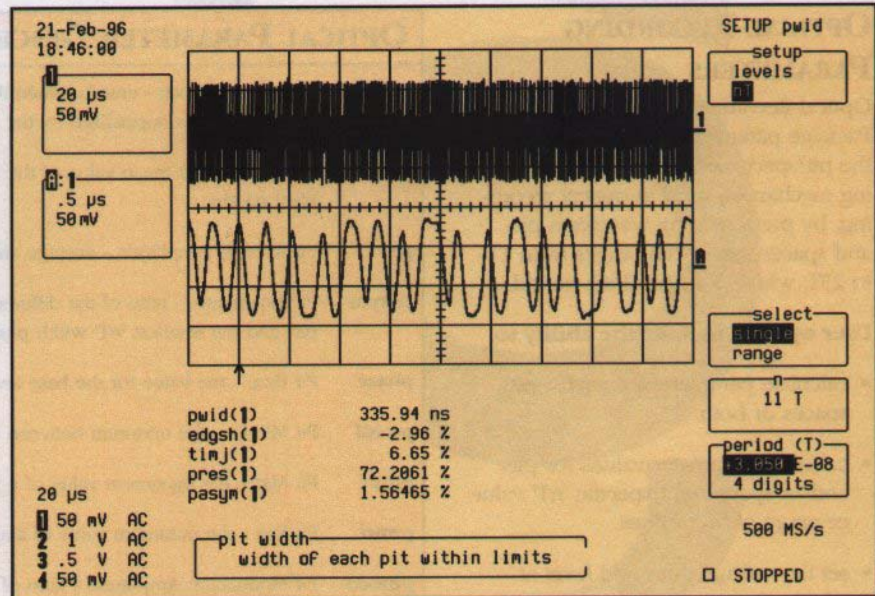
- **List by nT Display Mode**
Display a list of optical-recording measurement values indexed by each (nT) pulse width.

- **Histograms of Measurements**

Generate histogram bar charts for analysis of parameter value distributions.

- **Trend Analysis of Measurements**

Generate trend lines of parameter measurement values to study sector variations, modulation and other time ordered dependencies.



Trace 1 is a captured CD waveform. Trace A is a zoom expansion of Trace 1. Measurements performed on Trace 1 are Pit Width (pwid), Edge Shift (edgsh), Timing Jitter (timj), Resolution (pres) and Pit Asymmetry (pasym).

OPTICAL-RECORDING MEASUREMENT PACKAGE

LeCroy's Optical-Recording Measurement Package provides the ability to perform automated measurements of optically recorded data waveforms. The combination of automated Optical-Recording measurements, long DSO memory, advanced triggering features and a large screen waveform display provides previously unavailable Optical Recording analysis capabilities.

Fourteen optical-recording waveform specific parameter measurements are provided.

Up to five different parameter values can be displayed simultaneously with statistics such as average, maximum, minimum and sigma.

Also provided is a unique "List by nT" display mode, which simultaneously provides for each group of 'nT' width pits/spaces, the values of measurements such as edge shift, timing jitter, etc.

Histogram graphs of parameter measurements can be selected to observe statistical anomalies not normally identifiable by calculating, for example, a parameter's average or sigma.

Trend graphs of parameter measurements can also be selected to observe the variation of successive parameter measurements within a sector or even around a track.

These measurements can be made by adding the Optical-Recording Measurements Package to either a 9300 or LC Series DSO.

OPTICAL-RECORDING

PARAMETERS

Optical-Recording Measurement Package parameters directly support the pit/space width-based, data-encoding mechanism used in optical recording, by pre-screening waveform pits and spaces into width ranges from 1T to 25T, where T is the clock period.

User options include the ability to:

- calculate parameter values for pits, spaces or both.
- calculate parameter values for pits and/or spaces of a specific 'nT' value or range of 'nT' values.
- set the voltage threshold level at which to measure pits/spaces widths.

and many more....

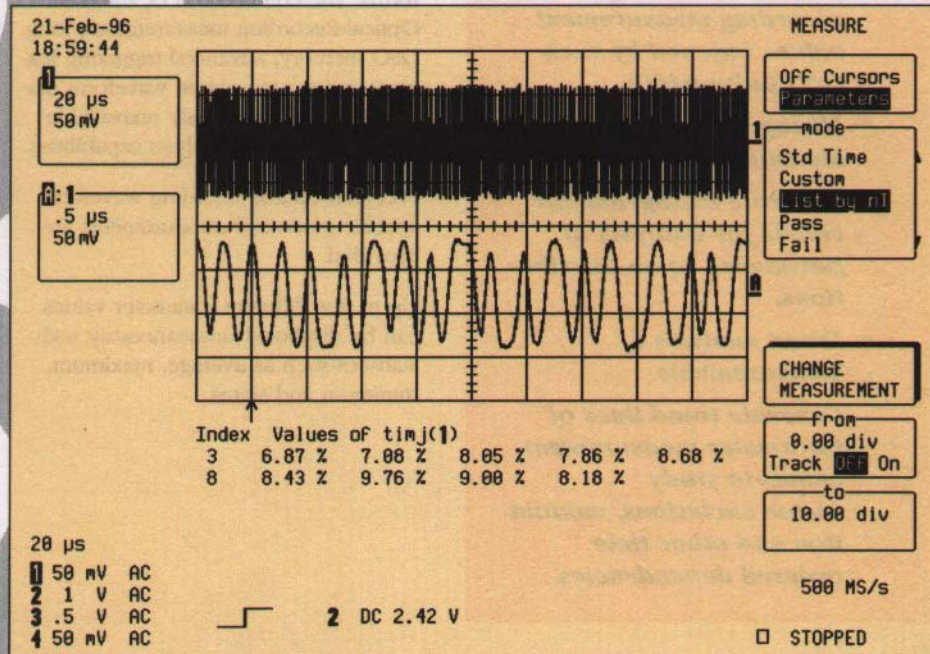
OPTICAL RECORDING 'LIST BY nT' DISPLAY MODE

Often, it is desirable to view a measurement value for each 'n' value for all possible 'nT' width ranges simultaneously. The List by nT display is provided to accommodate this need. Up to 25 'nT' values can be displayed simultaneously in this mode. Measurements that can be displayed in the List by nT mode are:

- Time from Pit to Clock
- Pit Width
- Edge Shift
- Timing Jitter
- Pit Top
- Pit Base
- Pit Maximum
- Pit Minimum
- Pit Number
- Pit Average Amplitude

OPTICAL PARAMETER DESCRIPTION

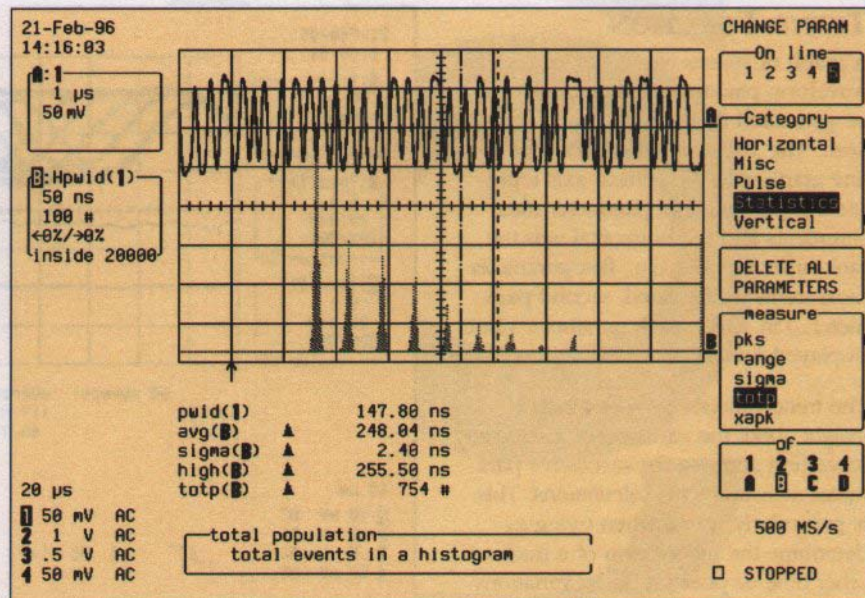
dp2clk	Delta Pit to Clock - time between the pit or space edges and the next clock edge. The measurement is normalized by the period of the clock signal.
edgsh	Edge Shift - the mean value of the difference between pits or space widths and their ideal widths.
paa	Pit Average Amplitude - average amplitude of pits in a waveform.
pasym	Pit Asymmetry - ratio of the difference between the amplitude of the largest 'nT' width pits and the smallest 'nT' width pits to the amplitude of the largest 'nT' width pits.
pbase	Pit Base - the value for the base level of a space.
pmidl	Pit Middle - the midpoint between the top and base of pits.
pmax	Pit Max - the maximum value of a pit.
pmin	Pit Min - the minimum value of a space.
pmoda	Pit Modulation Amplitude - ratio of the amplitude of pits of the smallest 'nT' width to the top of pits of the largest 'nT' width.
pnum	Pit Number - the total number of pits and/or spaces in a waveform.
pres	Pit Resolution - ratio of the amplitude of pits of the smallest 'nT' width to pits of the largest 'nT' width.
ptop	Pit Top - the value for the top level of a pit space.
pwid	Pit Width - the width of pits and/or spaces measured at a user defined threshold.
timj	Timing Jitter - the standard deviation of the difference between pit and/or space widths and their ideal widths.



List by nT mode display of Timing Jitter (timj) measurement of CD-ROM Data Waveform with separate values displayed for each 'nT' mark/space width (3T-11T)

HISTOGRAM FUNCTION

A histogram of any waveform parameter measurement can be displayed. The histogram function produces a bar graph with the vertical axis in units of 'Events' and the horizontal axis in the unit of the parameter being histogrammed (i.e., volts, nanoseconds, etc.). Histograms graphically represent the distribution of parameter measurements providing insights often not available through standard statistical measurements such as the average and standard deviation.



CD-ROM Data Waveform with Histogram of Pit Width (pwid) parameter. Notice the distinct peaks resulting from pits/spaces all being an integral number of clock periods in width. Statistical analysis of histograms is performed using histogram parameters. For the above figure the histogram peak representing 8T pits and spaces is selected, and the average (avg) sigma, the highest value (high) and population of the peak (totp) are displayed.

HISTOGRAM PARAMETERS

Histogram parameters provide the ability to obtain numeric values for the statistics or other features of a histogram distribution. When combined with the 9300 or LC Series parameter cursors, the statistics or other characteristics of a selected section of interest in a histogram, such as a specific histogram peak, can be directly measured.

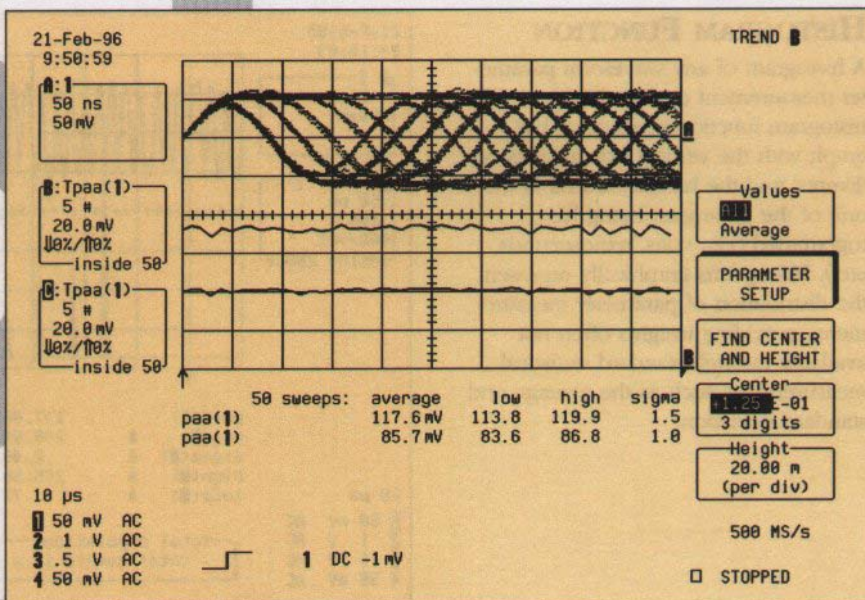
HISTOGRAM PARAMETER DESCRIPTION

Low	Minimum horizontal axis value in a histogram.
High	Maximum horizontal axis value in a histogram.
Range	High - Low.
FWHM	The width of the largest peak in a histogram at half the peak's amplitude.
Maxp	Population of the highest bin in a histogram.
Average	The mean value of a histogram.
Sigma	The standard deviation of the values in a histogram.
Tpop	The total number of parameter measurement values displayed in a histogram.
XAPK	The horizontal axis value of the selected histogram peak.
Pks	The number of distinct peaks (modes) in a histogram.
Median	The horizontal axis value which divides the histogram population into two equal populations.
Mode	The horizontal axis value of the most populated histogram bin.
Percentile	Horizontal position separating a histogram population such that the population on the left is equal to the selected percentile of the total population.

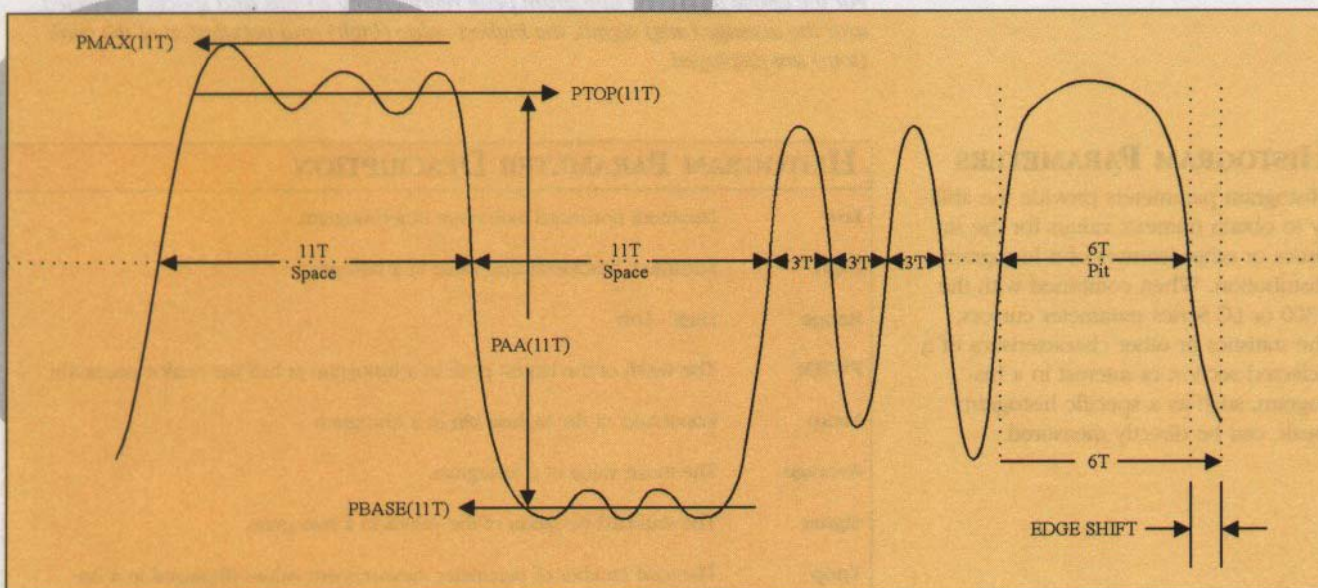
TREND FUNCTION

A graph of successive values of any waveform parameter measurement may be generated through the Trend function. The Trend function produces a line graph with the vertical axis representing the values of parameter measurements and the horizontal axis the rank order number (i.e., first parameter measurement calculated, second parameter measurement calculated, second parameter...) in which each parameter value displayed was calculated.

The trend function provides instant insight about the variation of a selected waveform attribute for successive parameter measurements calculations. This is particularly useful when trying to determine the modulation of a track or other time or position based variations of interest.



Trace A shows an eye diagram of a CD signal. Trace B is a trend of the Pit Amplitude of 11T pits and Trace C is a trend of the Pit Amplitude of 3T pits. Notice the similarity of the variation in the two trend lines.



SOFTWARE OPTIONS - ORDERING INFORMATION

SOFTWARE OPTIONS:

Optical Recording Measurements Package
Optical Recording Measurements Package

PRODUCT CODE

93XX-ORM
LCXX-ORM

PRICE

\$ 3,000
3,000