What Can ORM Do?

The Optical Recording Measurement (ORM) Package for LeCroy digital oscilloscopes provides a set of waveform measurements and mathematical functions for the analysis of optical recording signals. Parameter measurements allow the categorizing and listing of measurement values in a variety of ways. The math functions (Histogramming and Trending) enable information to be revealed graphically.

In addition to all the capabilities of ORM, the Advanced Optical Recording Measurement (AORM) package provides parameter measurements for evaluating jitter due to intersymbol interface and emulation of DVD's equalizer, slicer, and PLL. This functionality helps you to perform clock and jitter measurements, independent of a specific Integrated Circuit, allowing you to concentrate on optical head or media performance only. It also provides you with a new Setup and View wizard, which simplifies the setup process and lets you see the waveforms and measurements — with a histogram, trend or XY plot of the measurements — at the press of a button. To support advanced optical recording drives that have constant angular velocity (CAV) or zone constant linear velocity (ZCLV), parameter measurements support automatic determination of the clock period.

Histogramming

Histograms can be created for any waveform parameter. They are displayed based on a set of user settings such as bin width or number of parameter events to be used. Histogram parameters are provided for measuring different histogram features such as standard deviation, number of peaks, and most populated bin. Histograms are selected by defining a trace (A, B, C, or D) as a math function, and selecting Histogram as the math function. As with other Zoom traces, histograms can be positioned and expanded by using the front panel POSITION and ZOOM knobs. See Chapters 6 and 7.

Trending

The Trend function allows you to create a graph containing successive waveform parameter measurement values. The trend function provides useful visual information on the variation of a waveform parameter within a sector, or even over multiple sectors.

The Trend functionality, coupled with other scope features, enables you to graph certain parameters against one another. See Chapter 5.

Model of Optical Recording Processing

In many applications, it is important to make timing and jitter measurements directly from the RF signal, independent of a specific DVD chip. The optical recording processing function in AORM can perform this processing and can let you view the equalized data, sliced data, threshold, and/or the recovered clock. You can control the cutoff frequency and boost of the equalizing filter, the closed loop bandwidth of the 1st order integrating slicer, and the bandwidth of the phase lock loop (PLL). See Chapter 8.

Parameter Measurements

Two measurement modes for waveform parameters are available in the Optical Recording Measurement Package. These are "Custom" and "List by nT." For each mode, you can select the parameter measurement(s) to be displayed.

Custom mode is a standard DSO parameter selection-and-display option in which up to five parameters can be selected and displayed simultaneously on individual lines. **List by nT** is a special waveform measurement mode specifically designed for ORM. One measurement at a time is selected, and a list of values is displayed (indexed by multiples of the clock period). The parameter measurement values in the AORM package can also be viewed in a table. See Chapters 2 and 3.

Selecting Parameters

Parameters are accessed by first pressing the MEASURE TOOLS or CURSORS/MEASURE button on the scope front panel. The "Measure" menu group will appear on screen. **Parameters** must then be selected in order to display the menus shown in Figure 1.1.

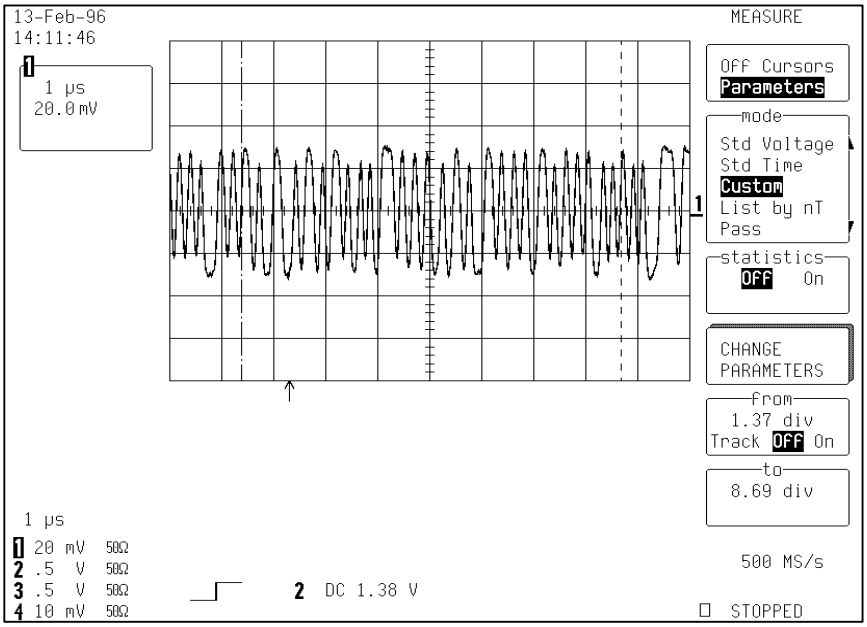

Figure 1.1

The **mode** menu enables you to select a variety of parameter measurement modes. But for ORM, the modes of interest are **Custom**, shown selected in the above figure, and **List by nT**.

Parameters allow measurements of the section of waveform lying between the parameter cursors, the broken vertical lines at left and right on the grid in Figure 1.1. The position of the parameter cursors is set by means of the **from** and **to** menus and is controlled by the associated rotary knobs on the front panel. When you set tracking **On**, you can move the parameter cursors across the waveform so that measurement results can be taken on different sections of the waveform.

Custom Parameters

With **Custom** selected, the **CHANGE PARAMETERS** submenu appears, which, when selected, produces the CHANGE PARAM menu panel shown in Figure 1.2.

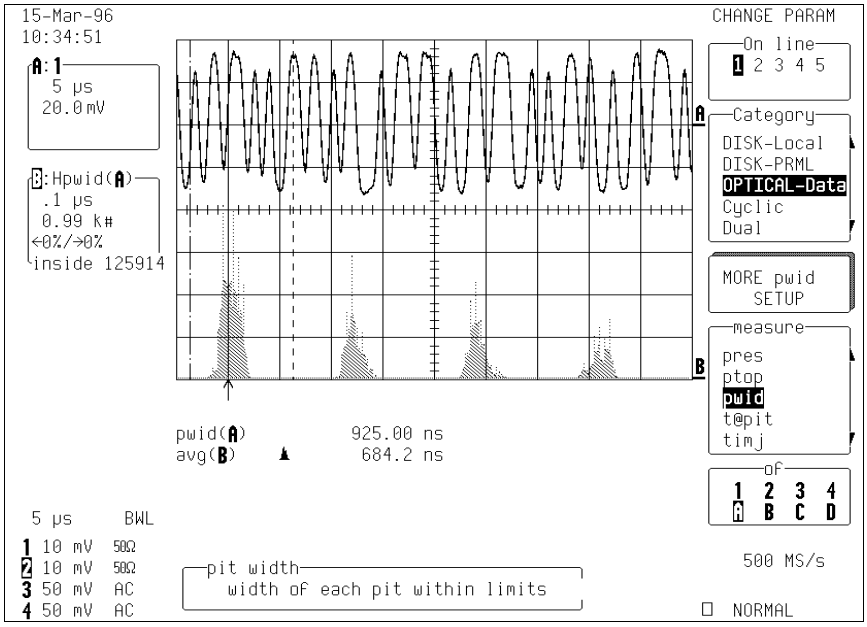

Figure 1.2

Up to five parameters can be selected, each displayed on its own line below the waveform display grid. Select a parameter display line from the “On line” menu.

Figure 1.2 has the Pit Width (pwid) parameter selected for line 1 and the Histogram Average (avg) parameter selected for line 2. The avg parameter provides the average value for the histogram between the parameter cursors. Notice that the parameter cursors are set in this example to surround the first histogram distribution. In this way the avg parameter displays the histogram average on the surrounded distribution only. No parameters are selected for lines 3 to 5.

Selecting from “Category” determines which set of parameter measurements is displayed in the “Measure” menu.

Figure 1.2 shows the **Optical-Data** category and the **pwid** parameter selected. For all custom parameter measurements in ORM, **Optical-Data** must be chosen as the category. If a parameter has settings needed for performing measurements, the "MORE xxxx SETUP" menu appears.

The same figure shows that the **pwid** parameter requires you to provide additional settings. If none is required, a "DELETE ALL PARAMETERS" menu appears. Pressing the associated menu button causes all five lines of parameters to be cleared.

***Note:** All parameters in the ORM package require configuration. See the scope Operator's Manual for a complete description of front panel operations, including menu selection.*

After you have selected a custom parameter, use the "of" menu to determine on which input channel (1, 2, 3, or 4) or trace (A, B, C, or D) the parameter measurement will be performed. Some parameters require two sources, with these appearing in the menu.

The results displayed for a selected parameter are dependent on whether **statistics** and the **Sequence** option have been selected. Depending on the parameter and these factors, results may be provided for a single acquisition (trigger) or multiple acquisitions. In all cases, only the waveform section between the parameter cursors is used in calculating a measurement value. If the waveform source is a memory (M1, M2, M3, or M4), loading a new waveform into memory acts as a new acquisition. Similarly, if the waveform source is a ZOOM of an input channel, and Sequence is on, selection of a new segment or the **All Segments** menu option acts as a new acquisition.

Waveforms with **statistics** off display the parameter results for only the last acquisition. Those acquired with the timebase set for **Sequence** give results for the last *segment* acquired. For zoomed traces of segmented waveforms, selecting an individual segment causes the parameter value for the selected segment to be displayed; whereas, here, selection of **All Segments** provides the parameter results from the trace's last segment. For zoomed traces of segmented waveforms the statistics for the selected segment are displayed. Selecting a new segment or **All Segments** acts as a new sweep and causes the parameter calculations for the new segment(s) to contribute to the statistics.

Depending on the parameter, a single calculation or multiple calculations may be performed per acquisition. One example is the

Pit Width parameter, which performs a calculation of the width of each pit and/or space when it is calculating a parameter value for a single acquisition. In this case, there will typically be many parameter results. With **statistics** off, if multiple values result from a parameter calculation, the parameter result displayed will be the average value of these calculations for the last DSO waveform acquisition*. With **statistics** on, the display will show the average, low, high, and sigma of all the values calculated for all DSO acquisitions since the last time you pressed **CLEAR SWEEPS**.

List by nT Mode

When you select **List by nT** from the "mode" menu, the "CHANGE MEASUREMENT" menu appears. Selecting this new choice causes the CHANGE MEAS menu panel to be displayed, as in Figure 1.3.

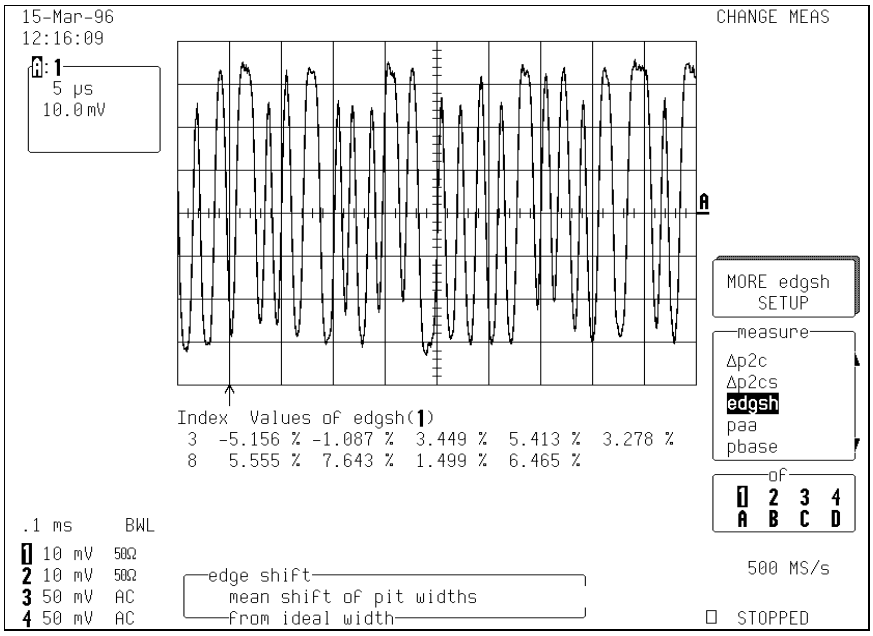

Figure 1.3

* There is one exception to this case, the **t@pit** parameter, which returns the value of the first calculation result.

One measurement type at a time is selected in this mode, its values displayed below the grid. Selection is made using the “Measure” menu. The values are displayed indexed up to 25 values. The column beneath the grid headed “Index” provides the first index value for the adjacent row of values.

Figure 1.3 shows Edge Shift (**edgsh**) selected, and the values for an index range of 3–11.

All measurements available in **List by nT** mode need to have configuration settings supplied in order to calculate values. Selecting the “MORE ‘xxxx’ SETUP” menu accesses the appropriate measurement configuration for the selected parameter.

The “of” menu determines the input channel (1, 2, 3, or 4) or trace (A, B, C, or D).

BES or EES Table

When the selected measurement is Begin Edge Shift (BES), End Edge Shift (EES), or their sigmas (BESS or EESS), the results can be shown in a table. Press the**Show Table** key to display a full-page table of the average value of BES or EES for each subject nT vs. each “preceded” or “followed” nT (see Figure 1.4). This menu has the following softkeys:

Accumulate on/off – All entries in the table may not be captured in a single acquisition. Therefore, you can accumulate data over many acquisitions by selecting accumulate on.

Print – When this button is pressed, the BES or EES table is sent as ASCII text to a currently defined hardcopy device.

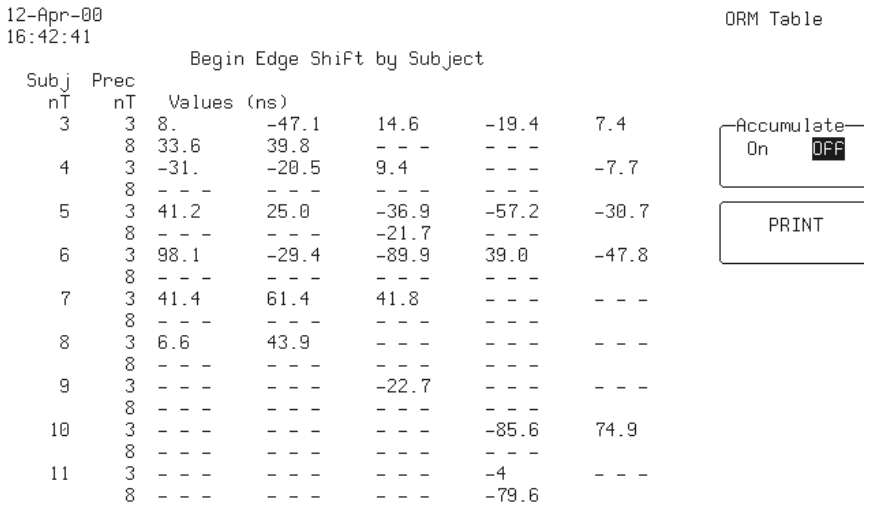

Figure 1.4

Scroll – Because the table can have 50 lines (1 to 25 T), a scroll knob is active when max*n* minus min*n* is greater than 8.

Note: For EES “Following nT” is displayed instead of “Preceding nT.” The nT is the range specified, starting from the low T. The subject T (i.e., s(n)) will also start from Low T to High T.

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