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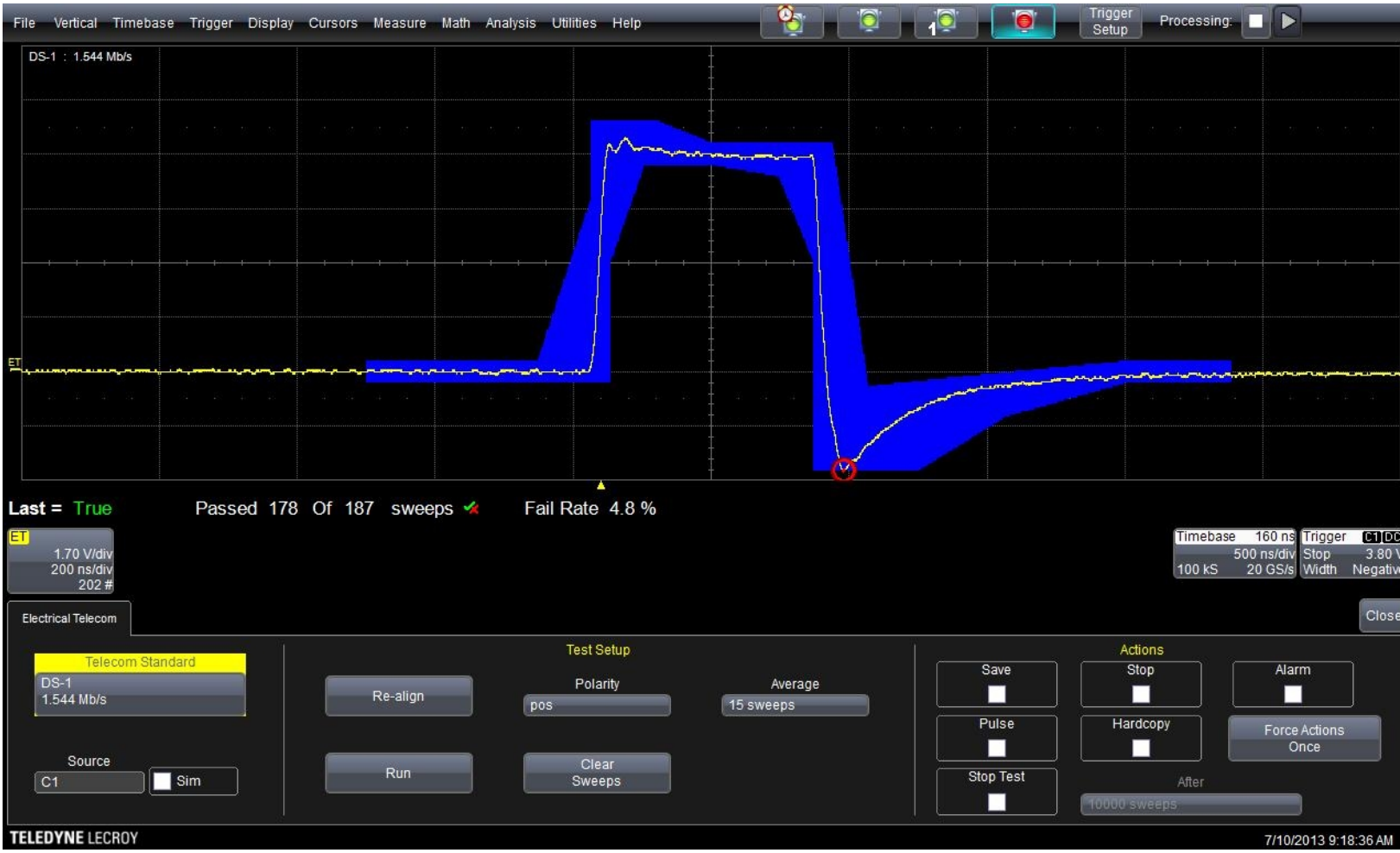

Instruction Manual

Electrical Telecom Pulse Mask Test Software

Electrical Telecom Pulse Mask Test Software Instructions

923136 Rev B
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ET-PMT Software Overview

ET-PMT is a software package that measures pulse mask compliance of electrical telecommunications signals. Pulse mask testing consists of acquiring the given signal in an oscilloscope and comparing the voltage vs. time waveform to a standard mask. The mask defines regions in V,t space where a compliant signal must remain.

Below is an example of an ET-PMT pulse mask test:

In cases where there are alignment criteria, such as a positive-going or negative-going pulse, the tests include settings to define these criteria, and the ET-PMT software will automatically find only those pulses.

Standards Supported

The ET-PMT package supports the following ANSI and ITU standards.

ANSI T1	ITU-T
DS1	E1 (twisted pair)
DS3	E1 (coax)
STS-1	E2
STS-3E	E3
----	E4
----	STM-1E

Test Fixtures

Telecommunications signals require specific load impedance for compliance testing to be accurate. The twisted pair standards require 100 Ohm and 120 Ohm terminations, and the other standards require 75 Ohm terminations. A set of adapters (test fixtures) for this purpose is available from Teledyne LeCroy (P/N TF-ET).

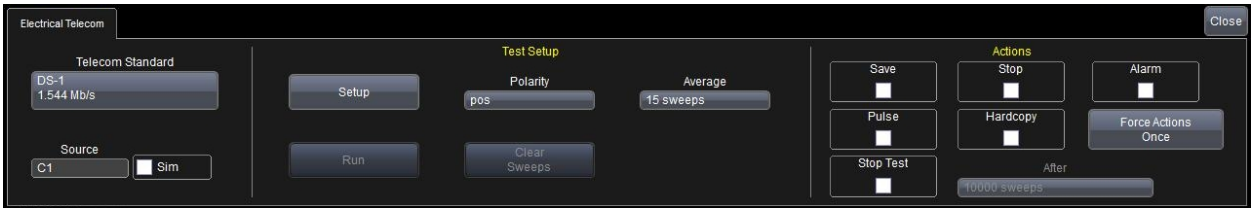
Note: These adapters require an additional LPA-BNC-ProLink adapter if they are being used with a WaveMaster, LabMaster, or SDA.

Telecom Standard	Required Termination	Teledyne LeCroy Adapter
E1 TP	120 Ohm	AP120
E1 coax	75 Ohm	PP090
E2	75 Ohm	PP090
E3	75 Ohm	PP090
E4	75 Ohm	PP090
STM-1E	75 Ohm	PP090
DS-1	100 Ohm	AP100
DS-3	75 Ohm	PP090
STS-1	75 Ohm	PP090
STS-3E	75 Ohm	PP090

ET Mask Test

Follow these steps to run an ET-PMT mask test. You may choose one of the pre-defined standard Telecom masks or use a custom mask.

1. From the menu bar, choose **Analysis > Electrical Telecom** to display the Electrical Telecom setup dialog.



2. Touch **Telecom Standard** and select the desired standard. This will automatically set the requisite bit rate, mask, and pulse isolation criteria for the measurement.
3. Touch **Source** and select the channel to which the signal is connected.
4. Optionally, modify settings for:
   - **Polarity** (positive or negative) to test. In many electrical standards, alternate "ones" are inverted (Alternate Mark Inversion).
   - **Attenuation** value to be applied to the test signal to allow for cable or other systematic losses. Attenuation can be set from 0.5 to 1 in steps of 0.01, with 1 meaning "no external attenuation" and 0.5 corresponding to an amplitude reduction of 50%.
   - **Offset**value for the correction of DC offsets in the signal under test. Offset can be set from -50 mV to 50 mV.
5. Select any of the following Actions to take when a test fails. You can select any number of actions.
   - **Save**failed waveform in a to a .trc file. When this option is selected, the Save Waveform tab appears in the main dialog. Touch this tab to set the file name and storage location.
   - **Stop**testing on the first failure.
   - Sound **Alarm** on each failure. To use this option, make sure Audible Feedback is enabled on the oscilloscope (Utilities > Preferences Setup > Preferences tab).
   - Generate **Pulse** at the auxiliary output BNC connector. When this option is selected, the Aux Output tab appears. Touch this tab to set the type of pulse.
   - **Stop Test** after a predetermined number of sweeps have been completed. When this option is selected, the **After** field alongside the checkbox becomes active. Touch After to set the number of sweeps by means of the Virtual Keypad.

   The **Force Actions Once** button immediately executes all of the selected actions when it is pressed.
6. Touch **Setup** to apply the test settings. This enables the Run and Clear Sweeps buttons, and Setup changes to Re-align.

Note: If an incorrect (or no) adapter is present, an error message will appear at the bottom of the screen. The test can be run without the specific adapter, but if the signal is out of range for the standard, the Run button will remain disabled. Although the signal appears on screen, no testing is possible.

7. When setup is complete, press **Run** to begin the test. The Run button changes to Pause as the test is running.

   The example below shows a stopped test with a failure identified (red circle).

8. To pause the test without resetting the counter, press **Pause**. Press Run again to resume testing.

   To stop the test and reset the counter, press **Clear Sweeps**.

Create Custom Mask

In addition to the standard masks, custom masks can be created by copying and modifying the mask definition files found in D:\Masks\.

- For 32-bit oscilloscopes, mask definitions are stored in proprietary Mask Definition Files (.mdf format), which can be edited using MS Access.
- For 64-bit oscilloscopes, mask definitions are stored in Sequel databases (.msk format). Use any SQL editor.

A complete mask definition includes:

- Mask definition properties
- Pulse alignment criteria
- Acquisition settings such as waveform averaging and persistence

Mask Definition Properties

Enter values for the properties indicated below:

ID—Index that is automatically generated. Do not enter a value in this field.

Old—For internal use only; leave blank.

Standard—Name of the standard to which the selected mask is associated. For a custom mask, enter a unique name, which will appear in the list of Standards available on the Electric Telecom dialog.

Legacy Standard—Leave blank.

Symbol—Defined mode within standard (pos, neg, one, zero, transmit, receive).

Bit rate—Bit rate of signal; defines period.

Required Bandwidth—Minimum bandwidth needed to accurately test signal.

Minimum Sample Rate—Minimum sample rate needed to accurately test signal.

Probe—Required probe or adapter; leave blank if none.

Type—Type of signal and how it will be aligned and tested. Valid entries are: Absolute, Absolute + Offset, Relative, and Relative Peak.

Coding—Type of coding (CMI code mark inversion, AMI alternate mark inversion, etc.); used for information only.

Pattern Isolation—Bit pattern used to isolate the pulse under test. The syntax is: bbbb/pp/aaa where bbbb is the symbol values before the desired pattern and aaa is the value of the bits after the desired pattern. For example, an isolated “one” would look like: 00/1/00. Bipolar pulses are defined as 1 and -1; and CMI is handled as two bits per unit interval. A CMI 0, for example, would look like: 1/01/0.

V div—The vertical scale required for nominal amplitude in the mask. This voltage is adjusted for relative masks.

Nom Ampl—The nominal amplitude of the pulse to be tested.

T div—Horizontal scale to have signal in mask.

ET Delay—The time in seconds between the center of the pulse (1/2 bit) and the edge where the trigger is set.

ET Center—The center of the mask in DIV (usually 5.0).

Base Point—Currently not used; leave blank.

Offset Tol (for "Absolute + Offset" type only)—The permitted tolerance to adjust the offset for a better mask fit.

Gate Start—The limit in DIV in the waveform data at which the mask test is started.

Gate Stop—The limit in DIV in the waveform data at which the mask test is stopped. This property and the one above it allow you to perform mask testing on specific pulses within a longer, more complex waveform.

Mask Data (optional) -- Hyperlink to an Access table that contains the mask data.

Mask File Name (optional)—Used if Mask Data is not specified; file name of the custom mask (*.msk file). This file type is created by Teledyne LeCroy's MaskMaker software.

Add Measurements to Mask Test

In addition to measuring pulse compliance relative to a given mask, a full set of parametric measurements are available. Measurements are made on the masked waveform as it appears on screen.

Note: Some measurements are incremental and will be reset if you Clear Sweeps during the test.

1. From the menu bar, choose **Measure > Measure Setup** and choose a parameter (P*n*).

2. Touch **Source** and select **ET**.
3. Touch **Measure** and select the desired measurement parameter. If subdialogs offer additional settings for the selected parameter, enter values on these dialogs.

   The measurement read out appears in a table beneath the grid.
4. To place markers exactly where on the waveform measurements are being made, choose a **Marker** type and check **Always On** in the Help section of the dialog.

You can repeat this setup with different parameters for as many locations as your instrument offers.

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