MP1570A/A1

SONET/SDH/PDH/ATM Analyzer

Application Note

MP1570A/A1 2.5 G Jitter Application Note

Version 0.2

MP1570A/A1 SONET/SDH/PDH/ATM Analyzer

Section 1 Jitter Generation

A jitter generation measurement is the measure of the amount of jitter being produced by a Device Under Test (DUT). Of the 3 types of jitter tests, jitter generation is the least complicated to perform. First, determine and minimize the intrinsic jitter of the MP1570. Second, connect the MP1570 to the Device Under Test and make the measurement. The procedure is as follows:

Step 1-1

Connect the MP1570 to itself through an optical attenuator as illustrated in Figure 1-1.

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(Figure 1-1) Jitter Generation Setup (Loopback)
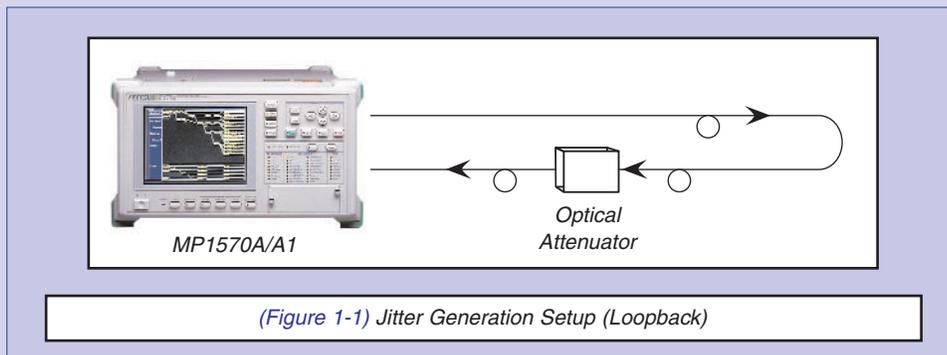
Step 1-2

Configure the MP1570 to test the jitter generation. Ensure that the bit rate and mapping structure are correctly set so that traffic continuity through the DUT is established. The screen capture in the following diagram may be used as an example to configure the MP1570.

Ensure Bandwidth is set on Wide for Jitter Testing

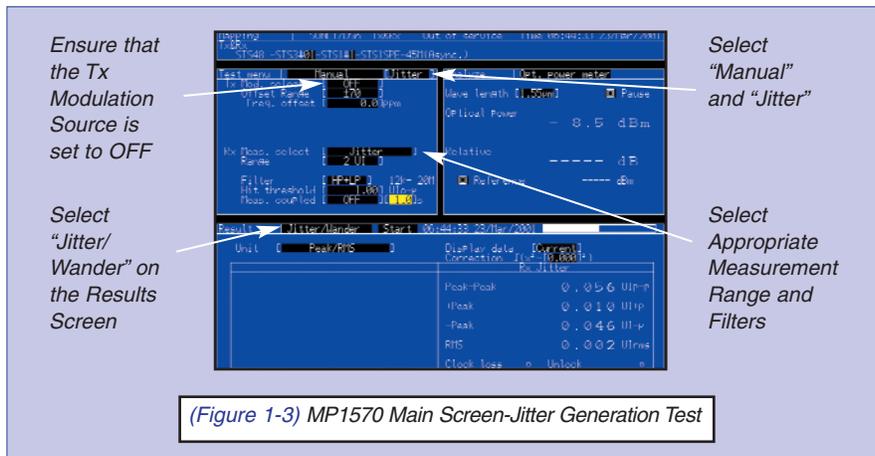*Select Appropriate Mapping for Device Under Test (if Applicable)*

(Figure 1-2) MP1570 Mapping Menu

Step 1-3

Switch to the appropriate menus on the MP1570 for jitter generation testing. Under the "Test" Menu, select "Manual" and "Jitter". Select the appropriate range and internal filters required for the test. Under the "Results" menu, select "Jitter/Wander" and "Peak/RMS" under "Unit" for the test. Under the "Analysis" menu, display the optical power meter.

Please refer to Figure 1-3 for an example of what the MP1570 screen should look like.

Ensure that the Tx Modulation Source is set to OFF

Select "Manual" and "Jitter"

Select "Jitter/ Wander" on the Results Screen

Select Appropriate Measurement Range and Filters

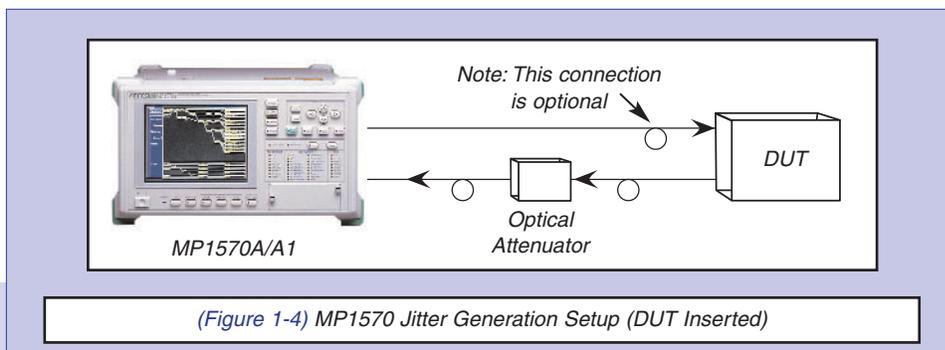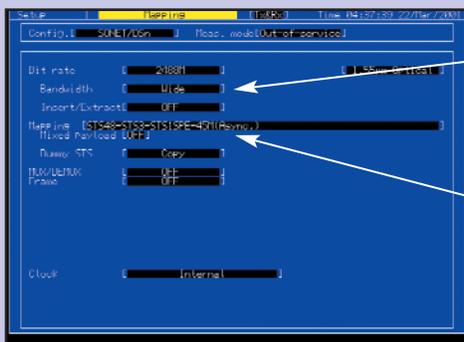*(Figure 1-3)* MP1570 Main Screen-Jitter Generation Test

Step 1-4

Adjust the attenuation of the optical signal until the jitter being measured is at a minimum. Ensure that the jitter measurement result is not flashing. A flashing jitter measurement result is not valid (the MP1570 has not locked to the incoming clock signal). When the jitter measurement is the lowest achievable reading, take note of the optical power level.

Step 1-5

Connect the MP1570 to the Device Under Test (DUT)(see Figure 1-4.). Ensure that the optical power level from the DUT to the MP1570 is the same as measured in step 1-4. Allow the MP1570 to establish traffic continuity. When the jitter result value stops flashing, obtain the jitter generation value.


Note: This connection is optional

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(Figure 1-4) MP1570 Jitter Generation Setup (DUT Inserted)

Ensure Bandwidth is set on Wide for Jitter Testing

Select Appropriate Mapping for Device Under Test (if Applicable)

(Figure 2-1) *MP1570 Mapping Screen*

Section 2 Jitter Transfer

Measuring jitter transfer involves injecting a data signal into a DUT with a known amount of jitter and measuring the amount of jitter on the return data signal. The procedure to perform this test is to first minimize the intrinsic jitter of the unit, calibrate the unit, and then make the measurement. This is as follows:

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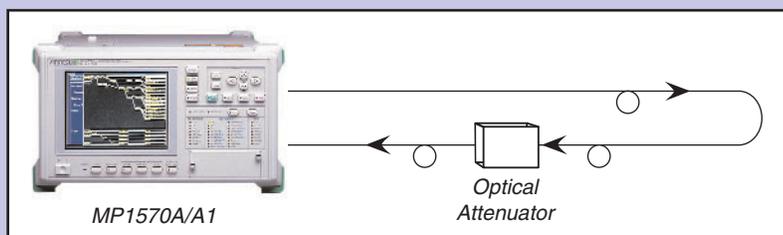
(Figure 2-2) *Jitter Transfer Test Setup (Loopback)*

Step 2-1

Ensure that the MP1570 is running at the right bit rate, the mapping required for the Device Under Test is selected, and the bandwidth are set to "Wide".

Step 2-2

Connect the MP1570 in loopback through an attenuator as illustrated in Figure 2-2. Adjust the attenuation of the optical signal returning to the MP1570 until the jitter generation measurement is minimum (see Jitter Generation Procedure Step No. 1-4). Take note of the optical power level.

Step 2-3

Under the "Jitter Transfer" submenu of the "Setup" Menu, select the appropriate bit rate, jitter transfer table, and jitter transfer mask table. A number of jitter transfer and jitter transfer mask tables are predefined. A user defined jitter transfer and jitter transfer mask table can also be programmed if necessary. Figure 2-3 illustrates the "Jitter Transfer" submenu.
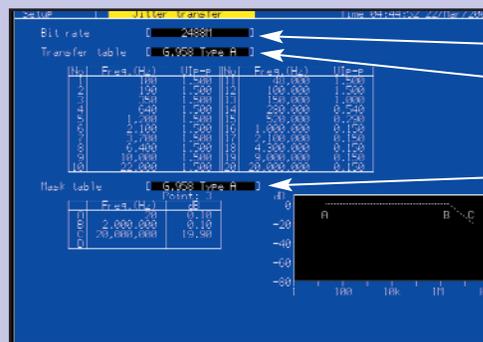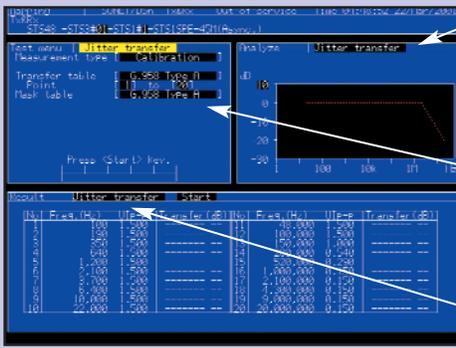

Select Bit Rate

Select Appropriate Transer Table

Select Appropriate Transfer Mask Table

(Figure 2-3) *Jitter Transfer Submenu*

Display Jitter Transfer Mask under "Analyze" Screen

Select Calibration and Appropriate Transfer and Mask Tables

Display "Jitter Transfer" result under "Result" Screen

(Figure 2-4) MP1570 Jitter Transfer Screen Configuration (Calibration Mode)
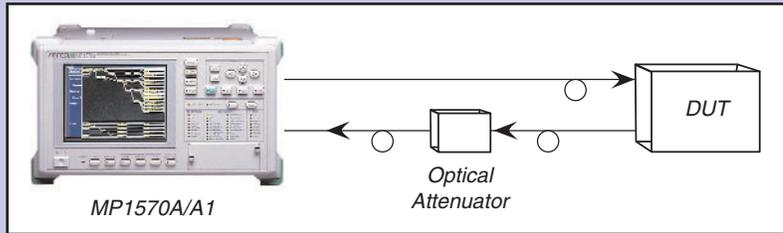
Step 2-4

Select the "Jitter Transfer" submenu under the "Test" menu. Select the "calibrate" measurement type and the appropriate transfer and mask tables and push the Start/Stop button on the front of the MP1570A/A1.

The MP1570A/A1 will now calibrate itself by injecting jitter at the frequencies and amplitudes defined in the Jitter Transfer table and measuring the return signal jitter amplitudes. This calibration must be completed before a jitter transfer measurement can be done. This calibration will take some time to complete. A "Calibration Complete" message will be displayed at the bottom of the MP1570 display screen when the calibration routine has finished.

Under the "Result" menu, display the "Jitter Transfer" results. Under the "Analyze" menu, display the "Jitter Transfer" mask as illustrated in Figure 2-4.

Step 2-5

Connect the MP1570 to the Device Under Test. Ensure that the optical signal power level being connected to the Rx port of the MP1570 is identical to that measured in Step 2-1. Figure 2-5 illustrates this setup.

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(Figure 2-5) Jitter Transfer Configuration (DUT Connected)

Step 2-6

Select the "Measurement" test mode on the MP1570 Test menu as illustrated in Figure 2-6. Then press the "Start/Stop" button on the front of the MP1570 to start the test. As the test progresses, the results of the test will be displayed on the "Results" screen and the "Analyze" screen.
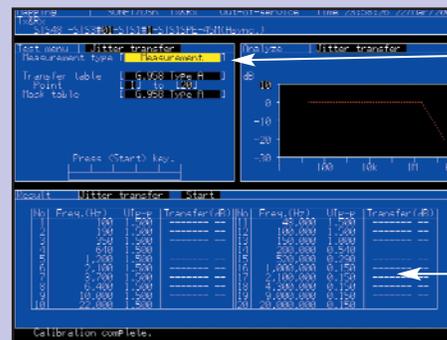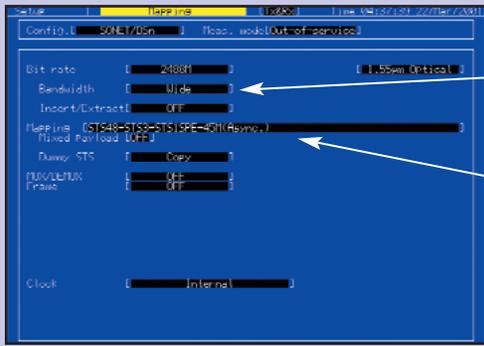

Select Measurement Type to "Measurement"

Jitter Transfer Graph will be Displayed Here

Jitter Transfer Results will be Displayed Here

(Figure 2-6) MP1570A Jitter Transfer Configuration Screen (Measurement Mode)

Ensure Bandwidth is set on Wide for Jitter Testing

Select Appropriate Mapping for Device Under Test (if Applicable)

(Figure 3-1) MP1570 Mapping Screen
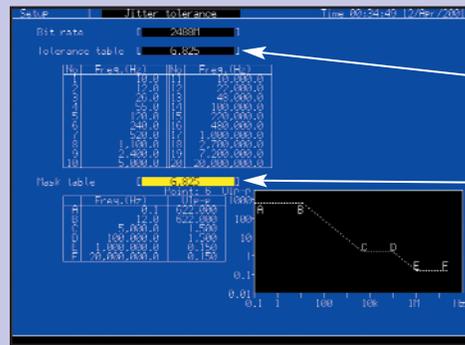
Section 3 Jitter Tolerance

Measuring Jitter Tolerance involves injecting jitter at known frequencies and amplitudes into a Device Under Test until bit errors are detected. This test is done by first determining the optical input power level where errors are detected and decreasing the attenuation of the optical input power by 1 dB, then making the measurement. The procedure for this test is as follows:

Step 3-1

Ensure that the MP1570 is running at the right bit rate, the mapping required for the Device Under Test is selected, and the bandwidth are set to "Wide".
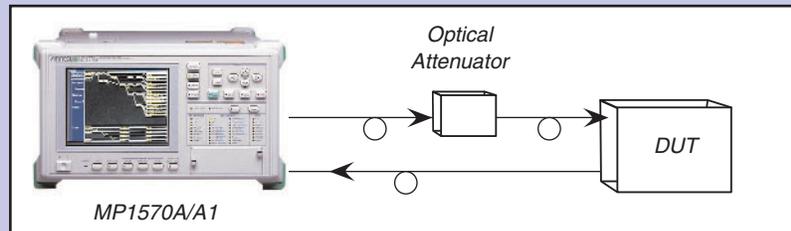
Step 3-2

Under the Setup – Jitter Tolerance menus, select the appropriate jitter tolerance table and mask for the measurement. A number of predefined tables and masks are programmed, but a user defined table and mask can be selected and programmed if necessary. See Figure 3-2.

Select Appropriate Jitter Tolerance Table

Select Appropriate Jitter Tolerance Mask

(Figure 3-2) Setup – Jitter Tolerance Menu

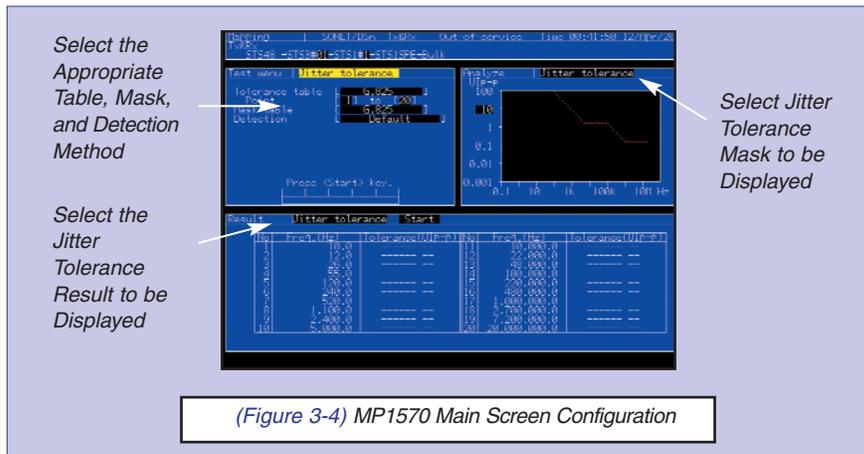

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(Figure 3-3) Jitter Tolerance Test Setup

Step 3-3

Connect the MP1570 to the Device Under Test. Display the Error/Alarm data on the Results screen. Adjust the attenuation of the optical signal until bit errors are detected by the MP1570. At this point, decrease the attenuation by 1 dB.

Step 3-4

Display the Test, Analyze, and Results Screens on the MP1570 as illustrated in Figure 3-5. On the Test screen, ensure that the proper jitter tolerance and mask tables are selected. Also ensure that the proper method of detection is selected for the test (default [2 sec detection time], 1 sec error). If selecting 1 sec error, ensure that the appropriate error, unit (rate or count) and threshold are set. On the Analyze Screen, display the Jitter Tolerance mask. On the Result screen, display the Jitter Tolerance data. When this is complete, press the Start/Stop button on the MP1570 front panel to start the test.

Select the Appropriate Table, Mask, and Detection Method

Select Jitter Tolerance Mask to be Displayed

Select the Jitter Tolerance Result to be Displayed

(Figure 3-4) MP1570 Main Screen Configuration

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