

# Field Test Procedure for Measuring Optical Power Loss of MTP (Pinless) Links

## **AEN 78, Revision 2**

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### **General:**

This document outlines the field test procedure for an optical fiber link terminated with MTP pinless connectors, using hand held optical source and meter units. This test method will allow for measuring the loss level the system will experience when in operation, and will also ensure that proper system polarity is achieved. Differences in system architecture or test equipment may require deviations from this procedure.

This procedure addresses testing with a hand-held power meter and light source, each unit having a single-fiber connector interface. The example herein utilizes a light source and power meter that each have an SC connector interface; other single-fiber interface types work in a similar fashion.

Equipment required for this test:

1. Optical Source with SC optical port
2. Optical Meter with SC optical port
3. 12-fiber SC to MTP pinned universal harness – 2
4. 12-fiber MTP to MTP pinless universal test jumper – 1
5. SC-SC jumper – 3
6. MTP adapters – 2
7. SC adapters – 2

**Note:** Mandrel wrapping the test jumper at the transmitter is strongly recommended by TIA/EIA and by Corning Cable Systems, in order to reduce measurement variability and increase accuracy during multimode system testing. Refer to TIA/EIA-568-B.1 section 11.3.3 or Corning Cable Systems Application Engineering Note 68 for more information on mandrel wrapping during multimode testing.

## Section 1: Setting the Reference and Verification of the SC Jumpers

### Step 1.1: Checking the Output Power of the Source

- a) This step requires the use of an SC to SC cable assembly (jumper). Connect the ends of the jumper to the optical source and meter as shown in Figure 1.

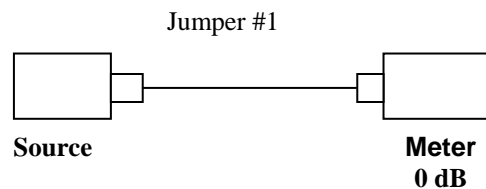


Figure 1: Referencing the output power of the source using one jumper.

- b) Verify that the output power level is within the test unit manufacturer recommended values and then press the reference button. The meter should read 0.0dB after referenced. See Figure 1.

**Note:** If the system under test is a multimode system, mandrel wrapping the source test jumper is recommended. Jumper #1 should be mandrel wrapped in this step and throughout the entire procedure.

### Step 1.2: Checking the Test Jumpers

**Note:** This step ensures that the connectors of the test jumpers are sound. As stated previously, do not disconnect jumper #1 from the source. Disconnect the jumper from the meter only.

- a) Insert a second SC to SC jumper into the setup as shown in Figure 2, connecting to test jumper #1 on one end and to the meter on the other.

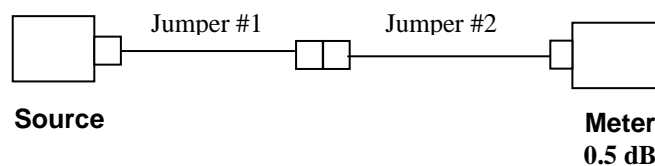
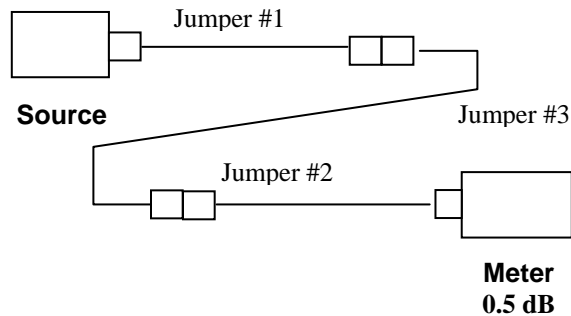


Figure 2: Checking the Test Connectors

**Note:** The 0.5 dB change in value shown in Figure 2 represents the loss of the connector pair formed by the test jumpers. The change in the loss reading should not be higher than the value specified for the test jumper connectors, typically 0.5 dB or less for factory-terminated SC connectors.

- b) Press the reference button. The meter should now display 0.0dB.
- c) De-couple the connector pair made in Step #2.
- d) Insert test jumper #3 between jumpers #1 and #2, as shown in Figure 3.

**Note:** Do not disconnect from the source or the meter with either test jumper. This will ensure a constant testing condition.



*Figure 3: Setting up the Reference Step with Three Jumpers*

**Note:** This 0.5 dB change represents the loss of the additional connector pairs formed by the 3 test jumpers. The loss reading should not be higher than the specification for the factory-terminated assemblies. A typical maximum change in the measured value would be on the order of 0.5 dB for one additional connector pair.

- d) If higher than expected losses are measured, clean the connectors and retest. If the jumpers continue to test high, replace each jumper with a new one until the measurement reading is in the appropriate range.

**Note:** Replace jumper #3 first and then jumper #2. If test jumper #1 is replaced then all steps must be redone.

- e) Press the reference button. The meter should now display 0.0dB

**Note:** Once a reference is taken, jumpers #1 should not be disconnected from the source. If a disconnection does occur, then all steps should be repeated.

## **Section 2: Checking the MTP Test Jumpers with Universal Polarity Management.**

- a) Remove the middle (#3) SC to SC jumper from the test set-up.
- b) Connect the leg number 1 of a 12-fiber SC to MTP PINNED harness to the SC jumper at the source and the leg number 2 of a second 12-fiber SC to MTP PINNED harness to the SC jumper at the meter, as shown in Figure 4 at the end of this document.
- c) Connect the test sets and test jumpers together with an MTP to MTP (both WITHOUT pins) test jumper. For proper polarity testing with universal test jumpers, the connections should be made as shown in Table 1.

<b>Testing Connections</b>	
<b>Connect Source SC test Jumper to fiber</b>	<b>Connect Meter SC test Jumper to fiber</b>
1	2
2	1
3	4
4	3
5	6
6	5
7	8
8	7
9	10
10	9
11	12
12	11

Table 1

**Note:** Inserting the jumper with a pinless MTP connector on each end into the test set-up as shown above will simulate two system joints. This step will ensure that the two SC to pinned MTP Harness used for testing will not add high loss to the testing process.

### Section 3:

**Note:** The meter should now display a negative value of  $\leq 1.0$  dB. **Do Not Reference Here** (Do not press the reference button on the meter). These values are obtained by using the maximum loss of 0.5 dB for each mated MTP pair. This value can be taken from the manufacturer's specification for maximum connector pair loss. The maximum resultant sum of two mated pairs would be a 1.0 dB loss.

- a) Disconnect leg number 1 of the SC to MTP pinned jumper and the fiber number 2 of the second SC to MTP pinned harness (as shown in figure 4) and continue testing the rest of the fibers in the order shown in table 1 for Universal Polarity Management.
- b) Test through all twelve SC connectors in sequence, ensuring that all connectors involved in the testing process are sound; each reading should be below the acceptable level.
- c) After verifying all twelve SC legs, remove the pinless MTP to MTP jumper from the set up.

**Note:** Do not disconnect the SC connectors at the source or the meter.

### Section 4:

The system is now ready to test. Without disconnecting from the units, take source and meter to the distant ends of the system (Figure 5 at the end of this document).

**Note:** Each test value represents the system loss along one run of fiber; this value includes the two connector pairs at the end of the link plus all other components in-between (interconnect connector pairs, splices, and fiber).

- a) Connect the leg number 1 of a 12-fiber SC to MTP PINNED harness to the SC jumper at the source and the leg number 2 of a second 12-fiber SC to MTP PINNED harness to the SC jumper at the meter. Connect the MTP pinned connectors of each SC to MTP jumper to the pinless MTP system connectors. Record the measurement for fiber 1.
- b) Disconnect leg number 1 of the SC to MTP pinned jumper and the fiber number 2 of the second SC to MTP pinned jumper (as shown in figure 5) and continue testing the rest of the fibers in the order shown in table 1. Record the measurement for the 12 fibers.
- c) After testing an entire twelve-fiber link, move to the next MTP link and start the process over for all twelve fibers of the link; repeat for all links in the system.

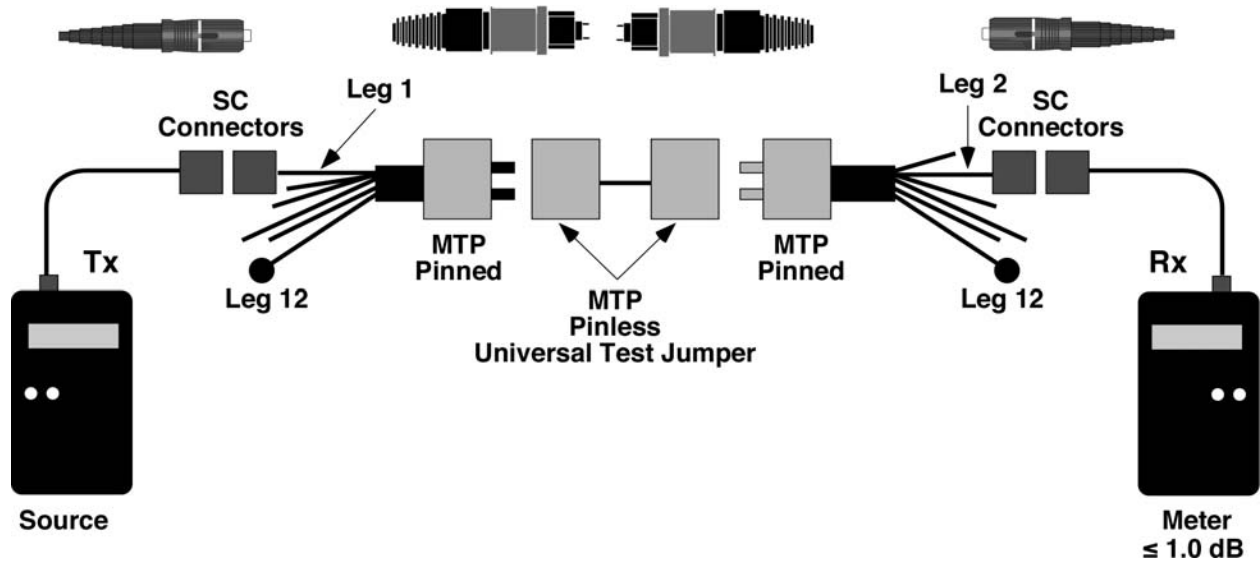


Figure 4: Set-Up and Verification of the Test Jumpers

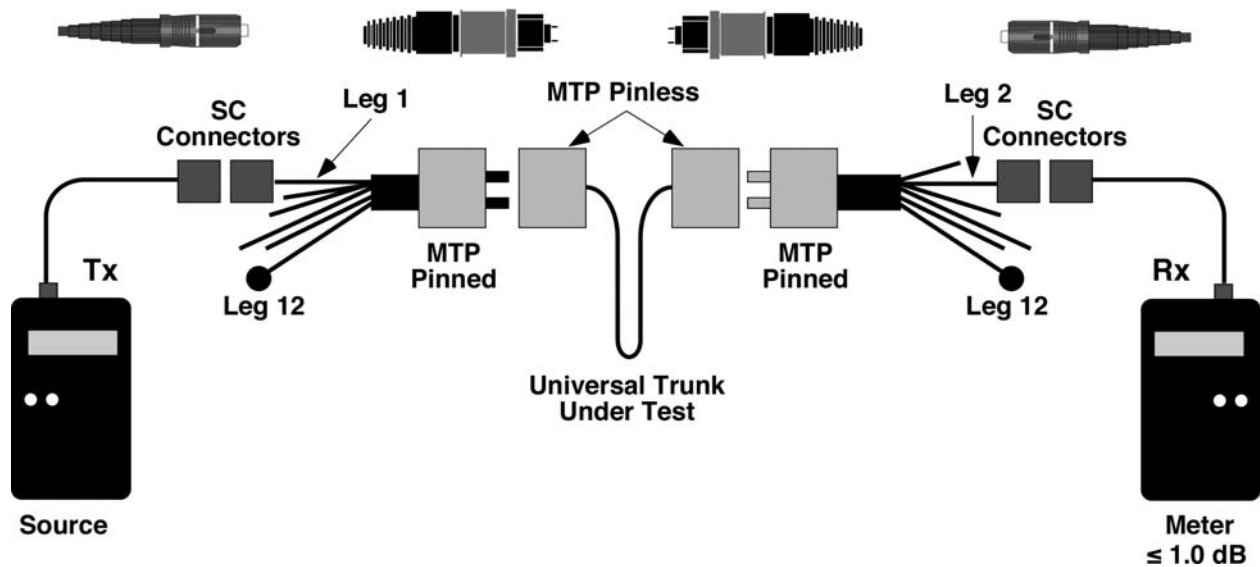


Figure 5: Testing the MTP Link, Starting with the Fiber 1-2