CORNING

EDGE™ LC-MTP® Tap Module Installation and Testing

003-126-AEN, Issue 6

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003-794	EDGE™ Solution

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1. General

1.1 This procedure describes EDGE™ LC-MTP Tap Modules, which are available for both multimode and single mode applications. Compatible with all EDGE rack-mountable connector housings, LC-MTP Tap modules have twelve front-mounted shuttered LC adapters and two rear-mounted MTP connectors (Figure 1).

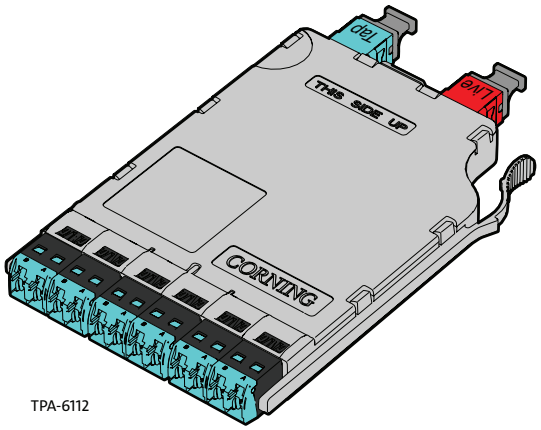

Figure 1

1.2 The module contains 12 fiber optic splitters which divide the incoming optical signals into two outputs, one for live link traffic and one for monitoring. The monitor traffic is routed via the “TAP”-labeled MTP connector to a monitoring device which filters the data and sends it to various software tools for analysis, where it is then viewed in application-layer software for security threats, performance issues, or system optimization.

IMPORTANT: Please note that Tap module systems have two outputs for each input, which may require two power meters, and depending on the system configuration, possibly require an additional craftsperson in another location.

2. Precautions

2.1 Laser Precautions

WARNING: DO NOT use magnifiers in the presence of laser radiation. Diffused laser light can cause eye damage if focused with optical instruments. Should accidental eye exposure to laser light be suspected, arrange for an eye examination immediately.

2.2 Cable Handling Precautions

CAUTION: Fiber optic cable is sensitive to excessive pulling, bending, and crushing forces. Consult the cable specification sheet for the cable you are installing. Do not bend the cable more sharply than the minimum recommended bend radius. Do not apply more pulling force to the cable than specified. Do not crush the cable or allow it to kink. Doing so may cause damage that can alter the transmission characteristics of the cable; the cable may have to be replaced.

3. Tools and Materials

3.1 The following tools and materials are required for this procedure:

- Power meters with LC port adapters (2)
- LC-LC jumpers (2)
- SC-LC jumper for the light source (1)
- LC-LC adapter (1)
- Light source
- MTP to LC harness (1)
- LC port cleaner (p/n CLEANER-PORT-LC)
- MTP Connector and port cleaning tool (p/n 2104466-01)

4. Connector and Adapter Cleaning

4.1 Cleaning the LC adapters with an LC port cleaner before each mating is recommended (Figure 2).

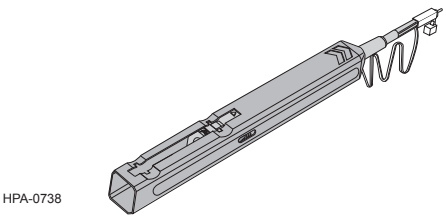

Figure 2

4.2 The use of an MTP Connector and Port Cleaning Tool to clean MTP connectors and ports before each mating is recommended (Figure 3).

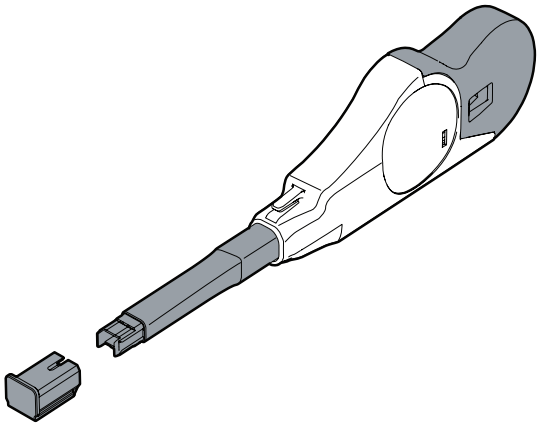

Figure 3

5. Calculating System Loss Budgets

5.1 This section describes how to calculate the loss budgets of a system using an EDGE™ Tap Module. Note that you will need to calculate one loss budget for the LIVE system (Figure 4) and *two* different loss budgets for the Tap output (Figure 5 and 6).

Table 1 indicates the system loss values of the system components:

	Multimode Fiber	**Single Mode Fiber**
	OM4 Ultra-bendable optimized 50µm (850 nm)	Bend-improved single-mode (1310 nm)
Component	Loss, max (dB)[1]	Loss, max (dB)[1]
MTP® mated pair loss	0.35	0.75
LC mated pair loss	0.15	0.5
Splitter 50/50 (dB)	3.7	3.5
Splitter 70/30 (dB)	2.4 / 5.8	2.1 / 5.8
[1] Insertion loss specifications when mated to other system components of a like performance specification		

Table 1: System Loss Values

5.2 To calculate the system losses, add the loss values of the components as illustrated in the examples shown in Figures 4, 5, and 6.

Budget loss for a LIVE multimode system using OM4 fiber and 50 /50 splitters:

0.15 +3.7 + 0.35 +0.35 + 0.15 = **4.7 dB + fiber loss**

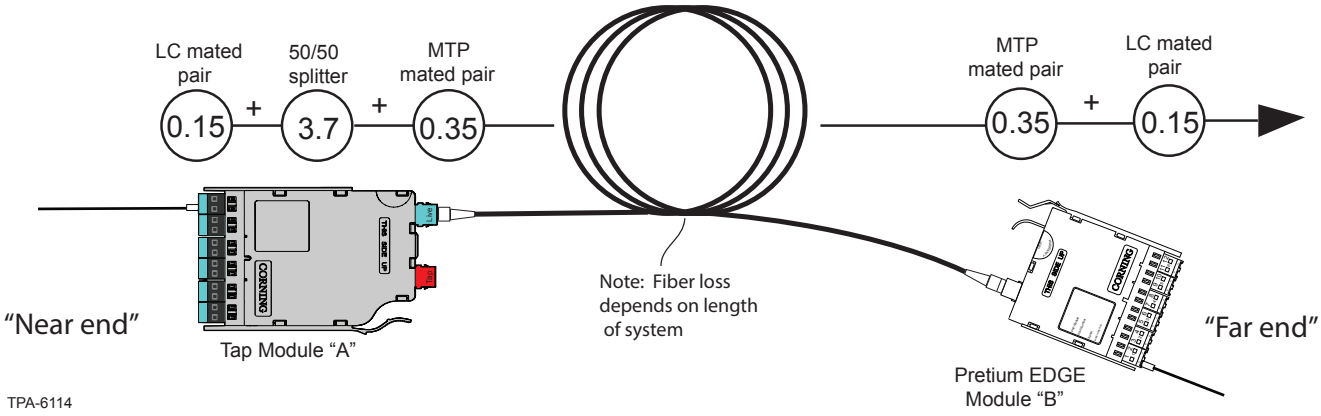

Figure 4

Budget loss for a “Near end” Tap port test harness multimode system using OM4 fiber and 50 /50 splitters:

0.15 +3.7 + 0.35 + 0.15 = **4.35 dB + fiber loss**

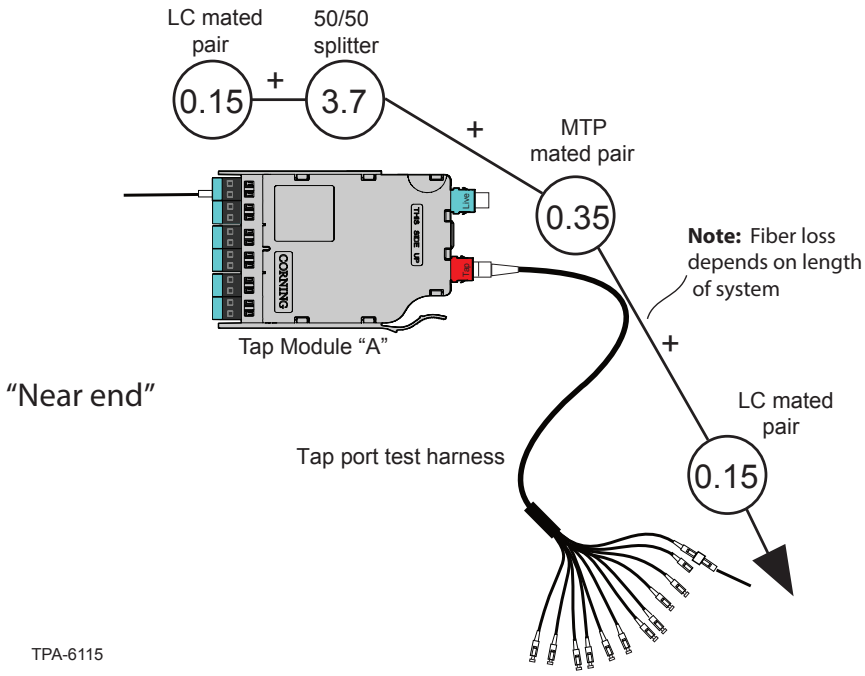

Figure 5

Budget loss for a “Far end” to Tap Port harness multimode system using OM4 fiber and 50 /50 splitters:

0.15 +3.7 + 0.35 + 0.35 + .035 + 0.15 = **5.05 dB + fiber loss**

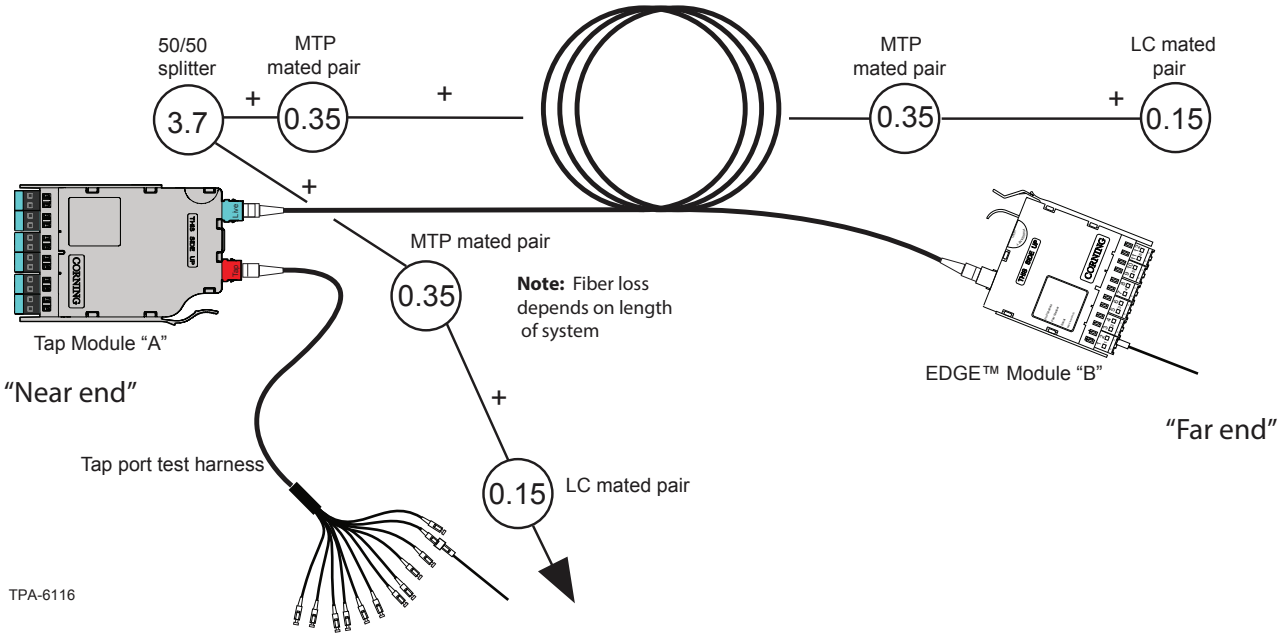

Figure 6

6. The Functionality of the Tap Module Splitters

Directionality

6.1 In simplest terms, the splitters inside a Tap module act like a divider of a one-way traffic flow – in this case, light.

The **even-numbered** LC connectors in a Tap module serve only for source input and their traffic is split between the LIVE and TAP outputs (Figure 7, top).

In the same fashion, the Tap module's odd-numbered LC connectors receive live traffic from the LIVE MTP input port. The input traffic from the LIVE input port is split between the LIVE LC odd fibers and the MTP TAP port (Figure 7, bottom).

Tables 2 and 3 in Section 9 provide a full representation of the source and output positions

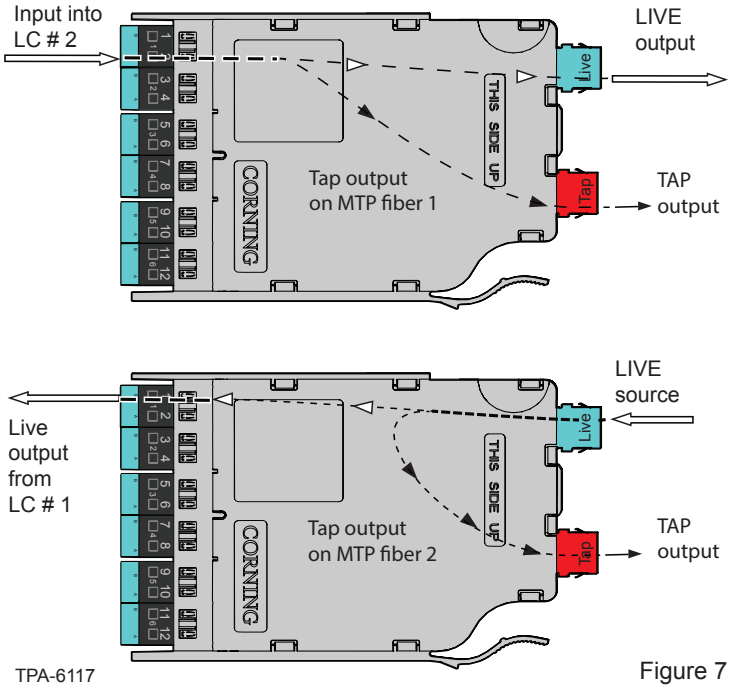

Figure 7

6.2 Tap modules therefore *must* be tested with directionality in mind. The source must be always connected to the input of the splitter and the meter must be connected to the output of the splitter. Connecting a source to the output of a splitter will result in high attenuation.

Wavelength Considerations

6.3 The splitters on multimode modules are optimized for 850 nm VCSEL (Vertical-cavity Surface-emitting Lasers), thus when testing multimode systems, use only the 850 nm wavelength.

6.4 Single mode systems may be tested at both 1310 and 1550 nm.

7. Installing an EDGE™ LC-MTP Tap Module

NOTE: EDGE Tap modules are installed just like their normal EDGE module counterparts. Refer to the Installation chapter in SRP-003-794, *EDGE Solution*, for complete instructions. This procedure covers module installation, trouble shooting, and other module-related topics as well.

Install the Tap module and its Tap MTP harness into your system housing.

8. Referencing the Test Equipment for an LC-MTP Tap Module

NOTE: If using Fluke DTX tester, testing live-to-tap-out, use REMOTE END SETUP (FAR END SOURCE). Refer to "How to Use the DTX-MFM2 Fiber Modules to Test Installed Corning Multimode EDGE™ Tap Modules," at http://www.flukenetworks.com/findit/en-us/9830231.

8.1 Start by powering on the source and meter and allowing a minimum of 5 minutes for them to warm up and stabilize.

For multimode systems: set the unit to the 850 nm wavelength.

For single mode systems: Set the unit to auto-switch between 1310 and 1550 nm wavelengths.

8.2 To reference the source and two meters:

Step 1: Clean and insert the SC-end of the SC to LC jumper (Reference Jumper no. 1, or **RJ1**) into the output of the light source.

Step 2: Clean and insert the LC end of **RJ1** jumper into the LC port adapter of Meter no. 1 (**M1**) (Figure 8).

For multimode only: Wrap the jumper 5 times and secure it in a 25 mm mandrel with tape (standard 50 µm multimode procedure).

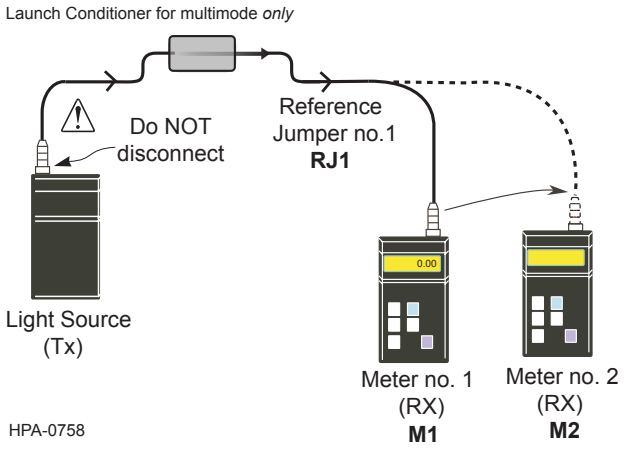

Figure 8

Step 3: Verify that **RJ1** is acceptable at your system's wavelength(s) and reference this power to 0.00 dB.

Step 4: Disconnect and move the meter-end LC of **RJ1** to Meter no. 2 (**M2**) and repeat Step 3. Disconnect M2 after this step.

Step 5: Clean and insert the LC end of **RJ1** into an LC adapter.

Step 6: Clean and install an LC to LC jumper-Reference Jumper no. 2 (**RJ2**) into **M1** and the LC adapter (Figure 9).

Step 7: Verify that the **RJ1/ RJ2** mated pair are acceptable with a loss ≤0.15 dB.

Step 8: Disconnect **RJ2's** LC connector from the LC adapter and protect it with a clean dust cap until you are ready to start the system testing.

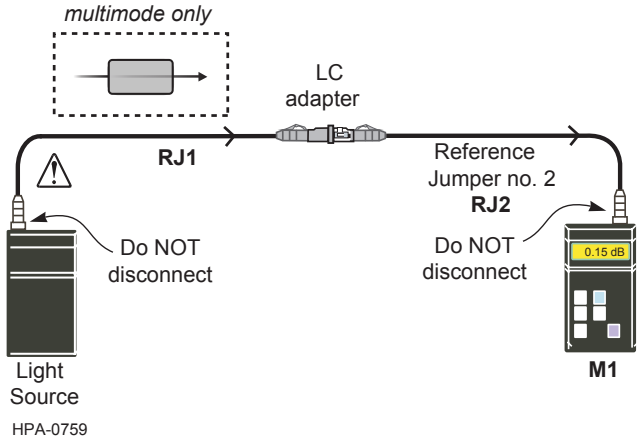

Figure 9

Step 9: Clean and install an LC to LC jumper-Reference Jumper no.3 (**RJ3**) into **M2** and the LC adapter (Figure 10).

Step 10: Verify that the **RJ1/RJ3** mated pair are acceptable with a loss ≤0.15 dB.

Step 11: Disconnect **RJ1's** LC connector from the LC adapter and protect it with a clean dust cap.

Step 12: Leave the LC adapter on the end of **RJ3** for the remainder of this procedure since it will be required for mating to the TAP port test harness.

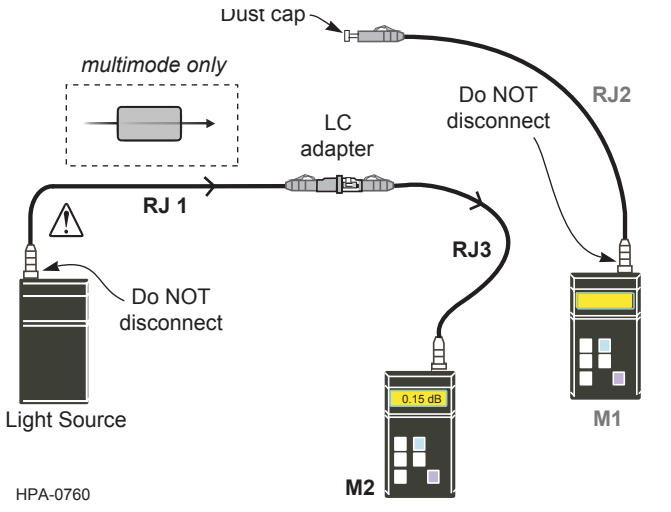

Figure 10

8.3 Referencing is now complete. Move the **Light Source** and **RJ1** to the front of the Tap module; move **M2**, **RJ3, and the LC adapter** to the end of the Tap harness; and move **M1** and **RJ2** to the EDGE™ modules at the far end of the system (See Figure 11).

IMPORTANT: From this step on, do NOT disconnect the connectors on either the Light Source or meter port adapters.

9. Testing EDGE LC-MTP Tap Modules

9.1 Table 2 provides a complete guide to the testing sequence for testing with the light source at the Tap module "A" ("Near end") and a meter at Module "B", or the "Far end" of the system shown in Figure 11.

Source LC Position at "A'	Module "B" LC Position	Meter no. 2 -TAP Port Test Harness
A-2	B-1	1
A-4	B-3	3
A-6	B-5	5
A-8	B-7	7
A-10	B-9	9
A-12	B-11	11

Table 2: Testing Sequence with Light Source at the Tap Module

9.2 To begin testing a Tap module (Figure 11):

Step 1: Install the Light Source/RJ1 LC connector into LC number 2 port of the Tap module.

Step 2: Install **RJ2's** LC connector into the number 1 port of the EDGE module (Module "B" in Figure 11).

Step 3: Install LC connector number 1 from the Tap port test harness into the LC adapter on the end of **RJ3**.

Step 4: Save or record the first fiber's measurements. The reading will be the total system loss.

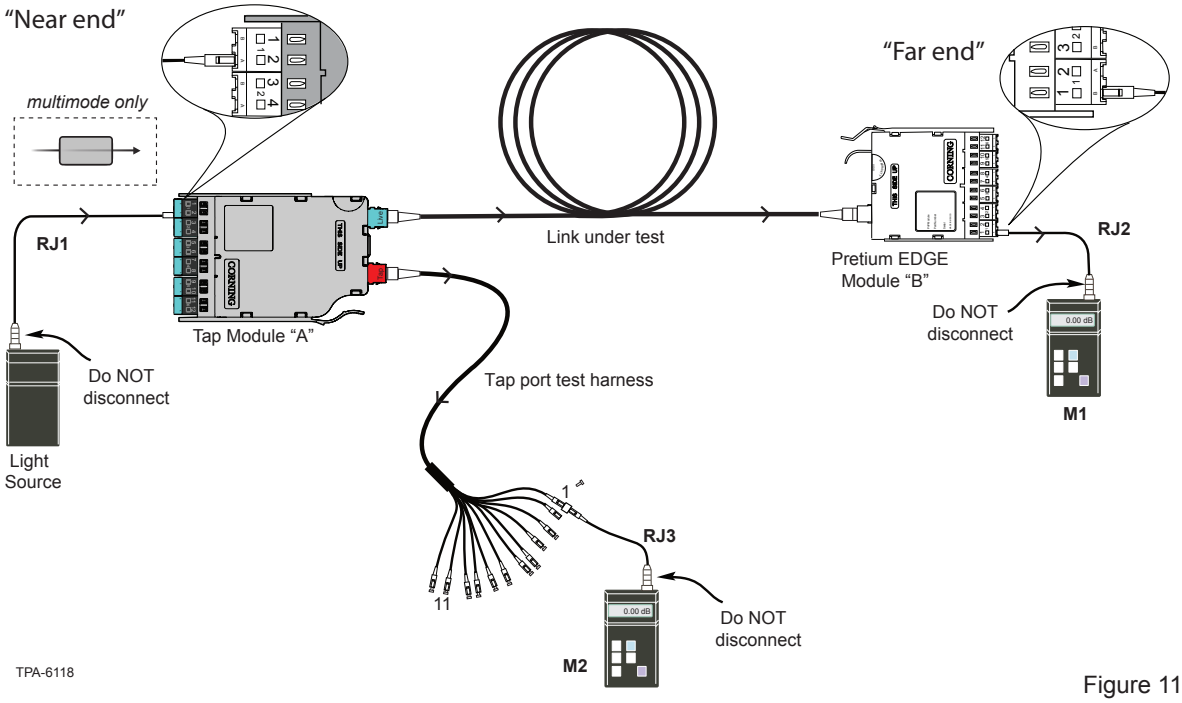

Figure 11

9.3 Table 3 provides a complete guide to the testing sequence for testing with the Light Source at the “B” module (“Far end”) and a meter at Tap module “A” (“Near end”) of the system as shown in Figure 12.

Source LC Position at “B”	Meter no.1 LC Position at “A”:	Meter no. 2 -TAP Port Test Harness
B-2	A-1	2
B-4	A-3	4
B-6	A-5	6
B-8	A-7	8
B-10	A-9	10
B-12	A-11	12

Table 3: Testing Sequence with Light Source at the “B” Module

9.4 To test the odd-numbered ports at the front of the Tap Module, switch the “Near” and “Far” locations of the **Light Source/RJ1** and **M1/RJ2**. At the end of the Tap cable assembly, move the LC adapter on **M2**/**RJ3** to connector number 2 (Figure 12).

9.5 To complete the testing of the first Tap module, save or record each fiber’s measurements as you follow the sequence shown in Table 3.

9.6 Repeat the steps in this section on the remaining Tap modules.

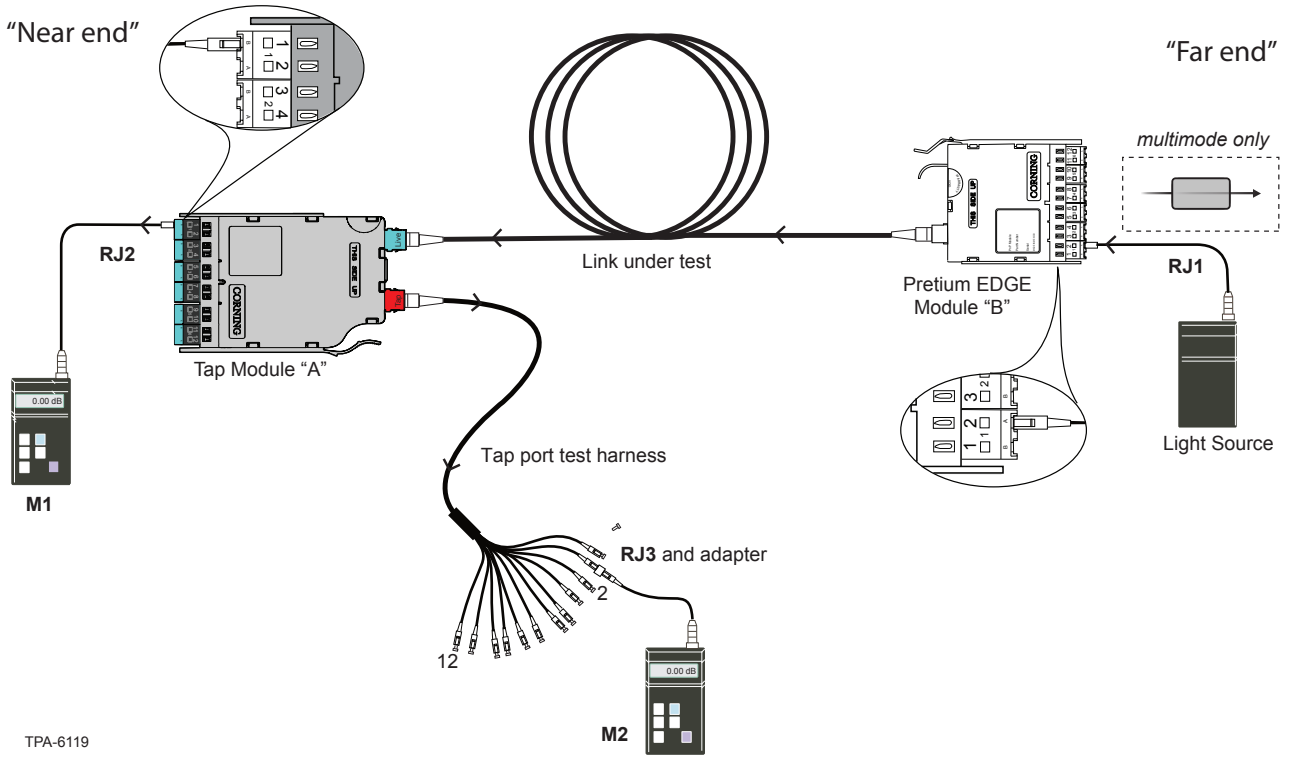

Figure 12

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