

CORNING

EDGE™ MTP® TAP Module Installation and Testing

P/N 003-128
Issue 4

related literature /

SRP-003-794, EDGE™ Solution

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1. General

This procedure describes EDGE™ MTP Tap Modules, which are available for both multimode and single mode applications. Compatible with all EDGE rack-mountable connector housings, MTP Tap modules have three MTP connectors per module, either one front-mounted and two MTP connectors in the back of the module or two MTP connectors on the front of the module and one MTP connector in the back (Figure 1).

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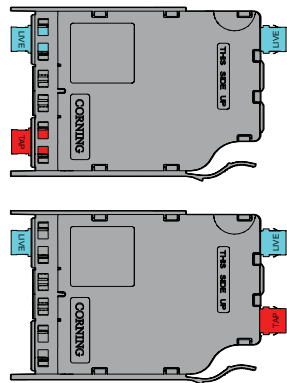


Figure 1

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 port 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 crafts person in another location when testing.

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

The following tools and materials are required for this procedure:

- Two (2) power meters with LC port adapters
- Two (2) LC-LC jumpers
- One (1) SC-LC jumper for the light source
- Three (3) LC-LC single-mode adapters
- Light source with SC port adapter
- At least one MTP to LC harness with Universal Polarity Wiring:
 - Multimode module harness (p/n H750512TE8-KW003F)
 - Single-mode module harness (p/n H900412GE8-KW003F)
- LC connector and port cleaning tool (p/n CLEANER-PORT-LC)
- MTP Connector and Port Cleaning Tool (p/n 2104466-01)

For multimode applications: Use Reference Grade test jumpers or test jumpers with legacy 50 micron fiber:

- Two (2) LC/SC jumpers (p/n 033901S21RF002M)
- Two (2) LC/LC jumpers (p/n 030301S21RF002M)
- Mandrel wrap suitable for testing 50 μ m fiber (p/n OTS-MANDREL-50)

4. Connector and Adapter Cleaning

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

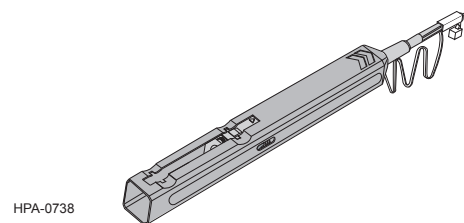


Figure 2

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).

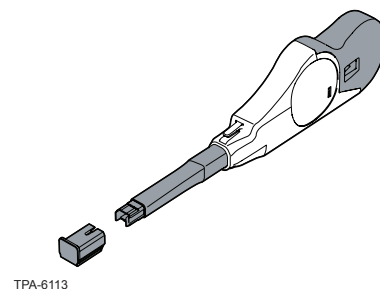


Figure 3

5. The Functionality of the Tap Module Splitters

Directionality

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

The module has two Live ports which interface with the network. Each of these ports have twelve fibers, of which six are TX and six are RX ports. In the case of TX fibers, these are the input to the splitters with the two outputs of the splitters going to the other Live port and Tap port as shown in Figure 4.

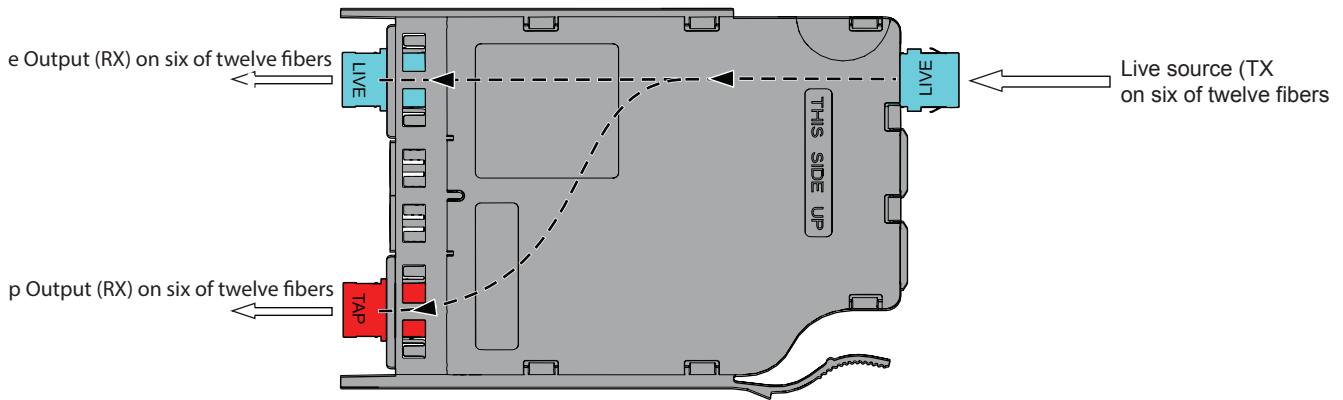


Figure 4

In the same fashion, the Live port on the front of the modules serves as an input for the six additional splitters. The output of those splitters route to the Live port in the rear of the module and the Tap port, as shown in Figure 5).

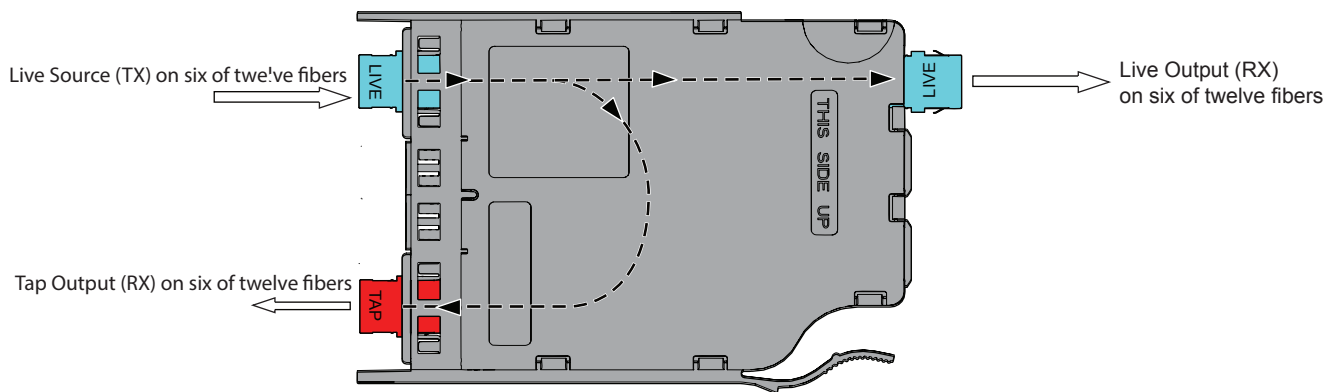


Figure 5

Tables 2 through 5 in Sections 8 and 9 provide a full representation of the source and output positions.

5.2 Tap modules **must** be tested with directionality in mind. The source must be always connected to the input of the splitter and a meter must be connected to at least one of the outputs of the splitter. Connecting a source to the output of a splitter will result in high attenuation. Likewise, connecting network transmitters to the output of a splitter can result in damage to the receiver port. Thus, it is important to understand the polarity of the system before connecting to the network gear.

Wavelength Considerations

5.3 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.

5.4 Single mode systems should be tested at 1310 nm. They may be tested at 1550 nm only when the electronics being monitored are using ER transceivers (up to 40 KM).

6. Installing EDGE™ MTP Tap Modules

EDGE MTP 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 chapter covers module installation, trouble shooting, and other module-related topics as well.

7. Referencing the Test Equipment for an MTP Tap Module

NOTE: *If using Fluke DTX tester, testing live-to-tap-out, use REMOTE END SETUP (FAR END SOURCE).*

7.1 Start by powering on the source and meter and allowing a minimum of 5 minutes for them to warm up and stabilize. This referencing procedure is if both outputs are being tested at the same time as shown in Figures 16 and 17. If the LIVE and TAP portions of the network will be tested at different times, only reference one source to a meter (7.2, Steps 1-3 and 6-7).

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

For single mode systems: Set the unit to the operating wavelength of the system, either 1310 or 1550 nm.

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 6).

For multimode only: Wrap the jumper 5 times and secure it in a 22 mm mandrel with tape (standard 50 μ m multimode procedure).

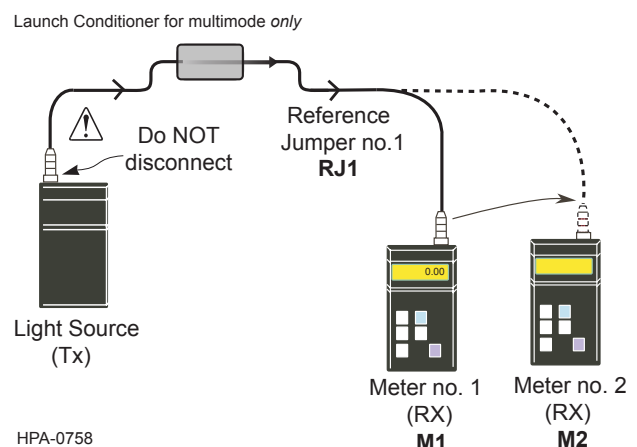


Figure 6

Step 3: Verify that RJ1 and the light source have an acceptable power level at your system's wavelength(s) and reference this power to 0.00 dB. See the test equipment manufacturer's instructions for acceptable power output of the source.

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 a single-mode LC adapter.

Step 6: Clean and install an LC to LC jumper- Reference Jumper no. 2 (**RJ2**) into **M1** and the LC adapter (Figure 7).

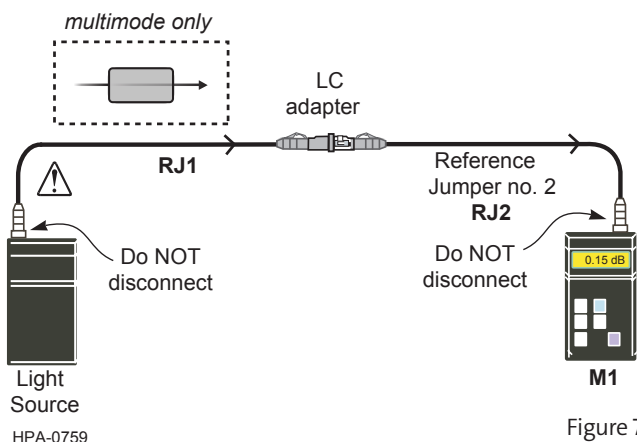


Figure 7

- Step 7:** Verify that the **RJ1/ RJ2** mated pair are acceptable with a loss ≤ 0.10 dB for multimode and ≤ 0.20 dB for single-mode.
- 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.

- Step 9:** Clean and install an LC to LC jumper-Reference Jumper no.3 (**RJ3**) into **M2** and the LC adapter (Figure 8).

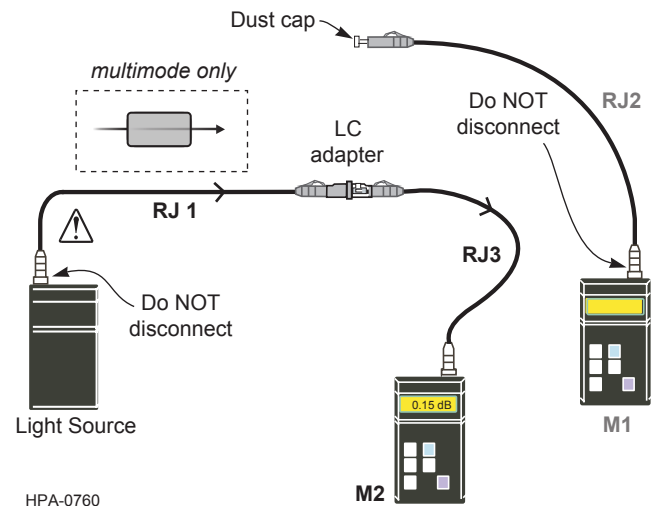


Figure 8

- Step 10:** Verify that the **RJ1/RJ3** mated pair are acceptable with a loss ≤ 0.10 dB for multimode and ≤ 0.20 dB for single-mode.
- 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.
- 7.3** Referencing is now complete.
- IMPORTANT:** From this step on, do NOT disconnect the connectors on either the Light Source or meter port adapters.

8. Testing the Live Portion of the System

8.1 This section describes how to calculate the loss budgets of the LIVE portion of a system using a EDGE MTP Tap Module and how to test that portion of the system. Note that you will need to calculate one loss budget for the LIVE system (Figure 9).

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

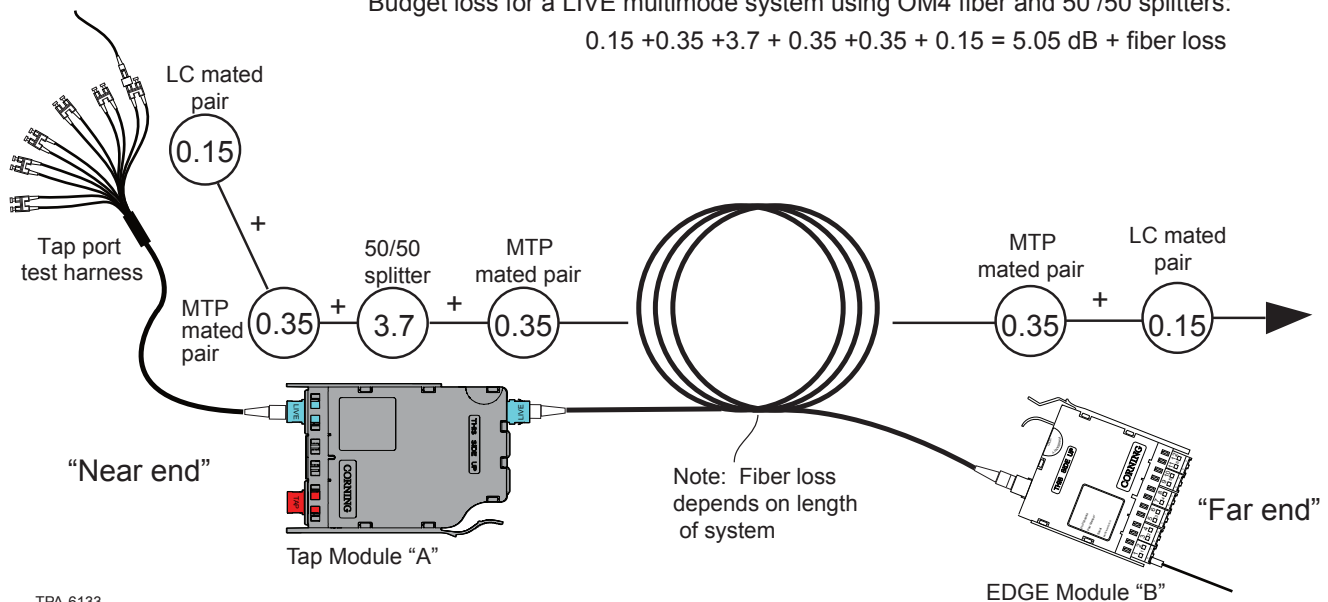
	Multimode Fiber	Single Mode Fiber
	OM4 Ultra-bendable optimized 50µm (850 nm)	Bend-improved single-mode (1310 nm)
Component	Loss, max (dB) ¹	Loss, max (dB) ¹
MTP® mated pair loss	0.35	0.75
LC mated pair loss	0.15	0.25
Splitter 50/50 (dB)	3.7	3.5
Splitter 70/30 (dB)	2.4 / 5.8	2.1 / 5.8
Fiber attenuation	2.8 dB/km	0.4 dB/km
¹ Insertion loss specifications when mated to other system components of a like performance specification		

Table 1: System Loss Values

8.2. To calculate the system loss for the LIVE system, add the loss values of the components that are in the system as illustrated in Figure 9.

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

$$0.15 + 0.35 + 3.7 + 0.35 + 0.35 + 0.15 = 5.05 \text{ dB} + \text{fiber loss}$$



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Figure 9

8.3. Table 2 provides a complete guide to the test sequence with a light source at the MTP Tap module “A” (“Near end”) and a meter at Module “B”, or the “Far end” of the system shown in Figure 10.

Source LC Position at “A”	Meter at Module “B” LC Position
A-2	B-1
A-4	B-3
A-6	B-5
A-8	B-7
A-10	B-9
A-12	B-11

Table 2: Test Sequence

8.4 To begin testing the Live Portion of the MTP Tap module (Figure 10):

Step 1: Install the **Light Source/RJ1 LC connector adapter** on the LC number 2 of a test harness plugged into the front-mounted LIVE Port of the MTP Tap module.

Step 2: Install **RJ2’s LC connector** into the number 1 port of the Edge module (Module “B” in Figure 10).

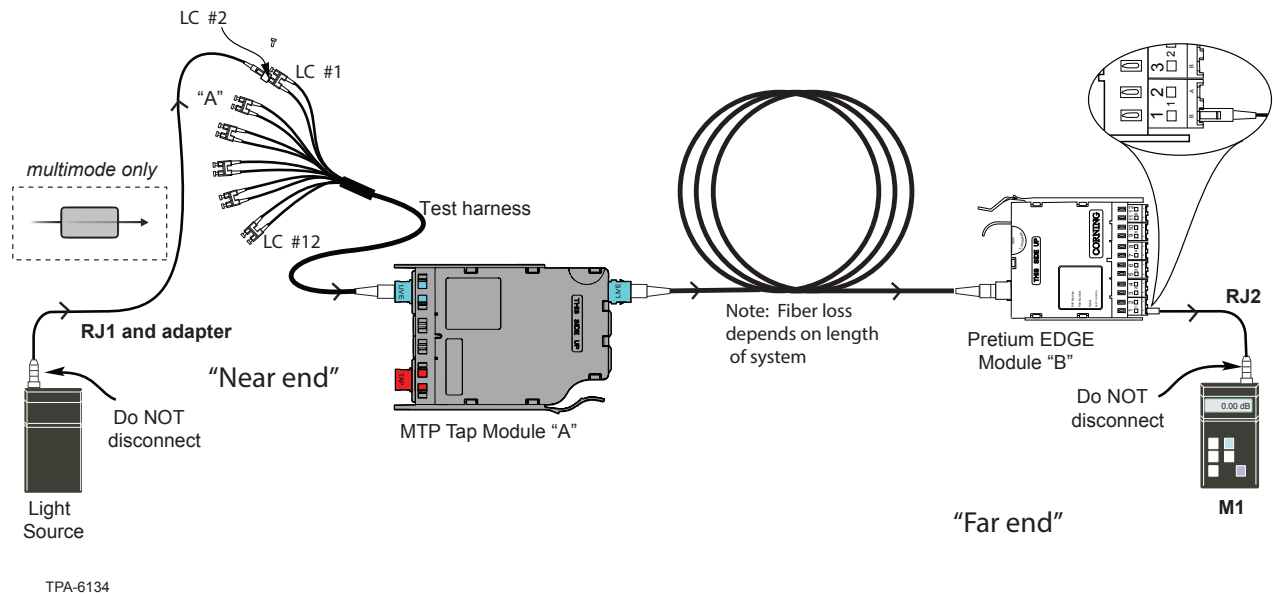


Figure 10

8.5. Table 3 provides a complete guide to the sequence for testing with the light source at Module “B”, or the “Far end” and the meter at the MTP Tap module “A” (“Near end”) of the system shown in Figure 11.

Source LC Position at “B”	Meter at LC Position at “A”:
B-2	A-1
B-4	A-3
B-6	A-5
B-8	A-7
B-10	A-9
B-12	A-11

Table 3: Testing Sequence

8.6 To begin testing the LIVE Portion of the MTP Tap module in the other direction (Figure 11):

Step 1: Install the **Light Source/RJ1 LC connector** into LC number 2 port of the Edge module (Module “B” in Figure 11).

Step 2: Install **RJ2’s LC connector adapter** on the number 1 LC connector of the harness plugged into the LIVE Port of the MTP Tap module.

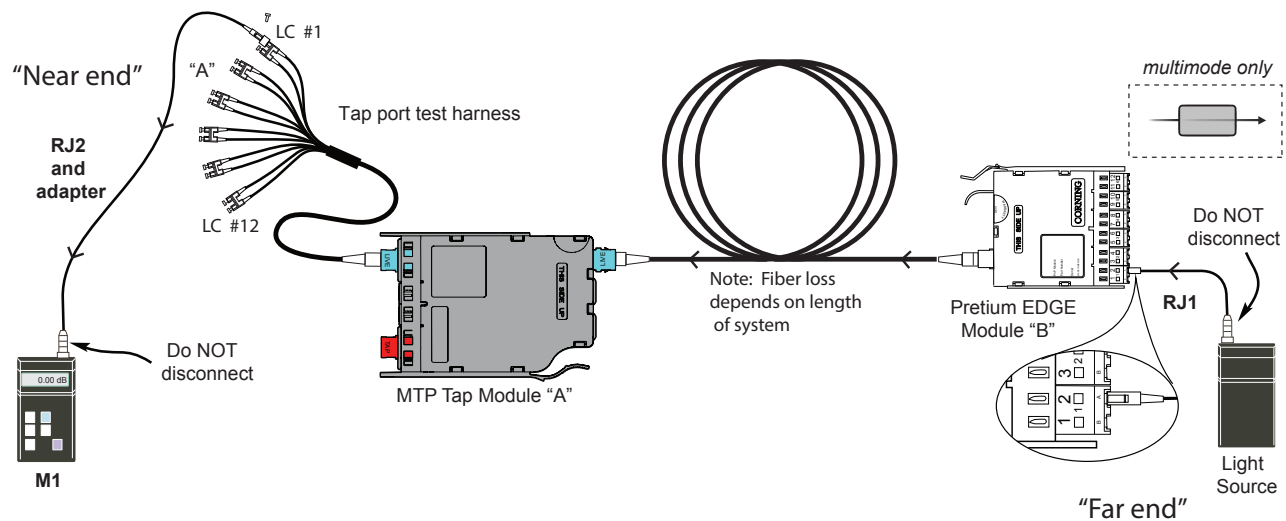


Figure 11

8.7 Note that steps 8.4 and 8.6 can be combined if using an optical test set with both a source and a meter on one unit. This will test two fibers at a time because there will be two sources and meters. It is important that the source is always plugged into the transmit/even fibers and that the meter is plugged into the receive/odd fibers.

9. Testing the Tap Portions of the System

NOTE: Testing of the TAP portions of a system is not required by Corning to obtain the extended warranty. The testing of the LIVE link confirms the post-installation condition of the of the trunk since the module itself is factory-tested and is not deployed like a trunk.

9.1 This section describes how to calculate the loss budgets of the TAP portions of a system using a EDGE MTP Tap Module and how to test that portion of the system. Note that you will need to calculate *two* loss budgets for the Tap portion system (Figures 12 and 13).

Table 1 above indicates the system loss values of the system components.

9.2. To calculate the system loss for the TAP system, add the loss values of the components that are in the system as illustrated in Figures 12 and 13.

Budget loss for a Tap multimode system using OM4 fiber and 50 /50 splitters: $0.15 + 0.35 + 3.7 + 0.35 + 0.15 = 4.7 \text{ dB}$

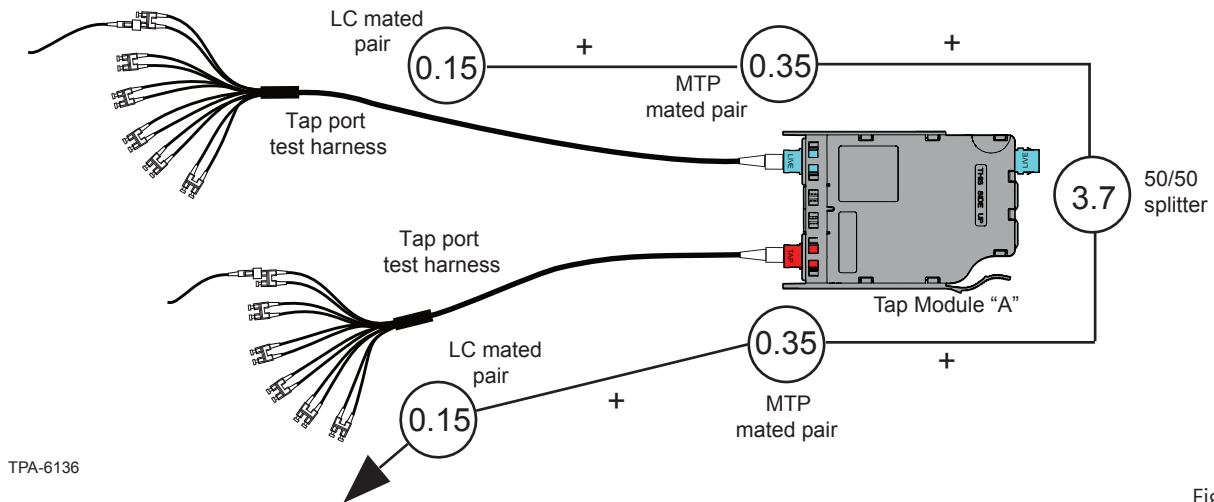


Figure 12

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

$$0.15 + 0.35 + 3.7 + 0.35 + 0.35 + 0.15 = 5.05 \text{ dB} + \text{fiber loss}$$

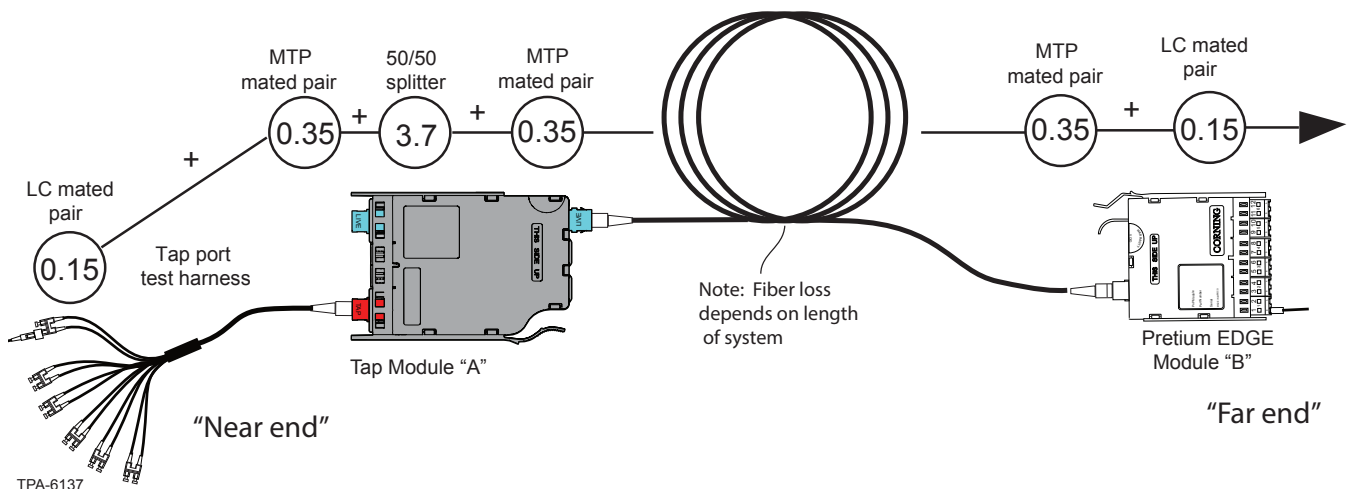


Figure 13

9.3. Table 4 provides a complete guide to the test sequence with a light source and test harness at the front-mounted TAP MTP connector and a meter and test harness at the front-mounted TAP MTP connector of the system shown in Figure 14.

Source LC Position at LIVE port test harness "A"	Meter # 1 and TAP port test harness at LC #
A-2	1
A-4	3
A-6	5
A-8	7
A-10	9
A-12	11

Table 4: Test Sequence

9.4 To begin testing the TAP portion of the MTP Tap module from the "A" LIVE Port harness to the module TAP port test harness (Figure 14):

- Step 1:** Install the **Light Source/RJ1 LC connector adapter** onto the LC number 2 connector of a test harness plugged into the LIVE port of the MTP Tap module.
- Step 2:** Install **RJ2's LC connector adapter** onto the LC number 1 connector of a harness plugged into the TAP port of the MTP Tap module.

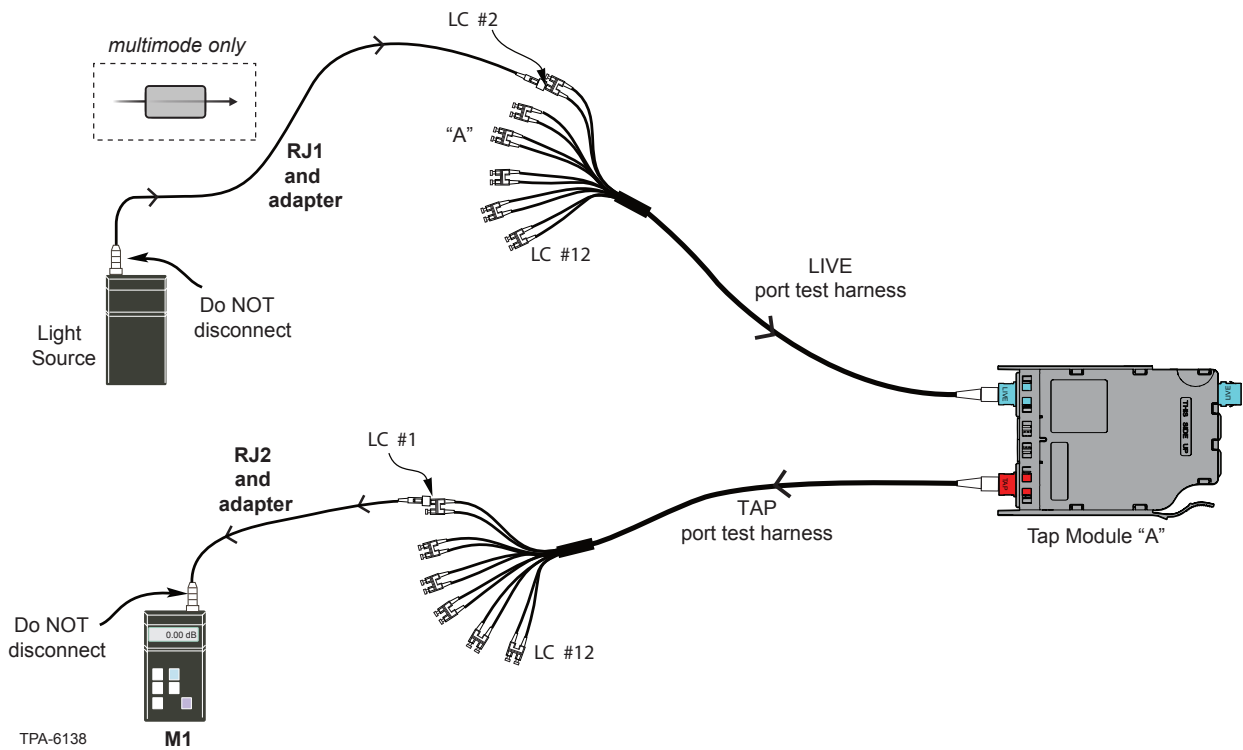


Figure 14

9.5 Table 5 provides a complete guide to the test sequence with the light source at Module “B”, or the “Far end” and the meter at the MTP Tap module “A” (“Near end”) tap port testing harness of the system shown in Figure 15.

Source LC Position at “B”	Meter # 1 and TAP port test harness at LC #
B-2	2
B-4	4
B-6	6
B-8	8
B-10	10
B-12	12

Table 5: Test Sequence

9.6 To begin testing the tap Portion of the MTP Tap module from Module “B”, or the “Far end”, to module “A” TAP port test harness (Figure 15):

- Step 1:** Install the **Light Source/RJ1 LC connector** into LC number 2 port of the Edge module “B” at the “Far End”.
- Step 2:** Install **RJ2’s LC connector adapter** onto LC number 2 of the harness plugged into the TAP port of the MTP Tap module, “Module A.”

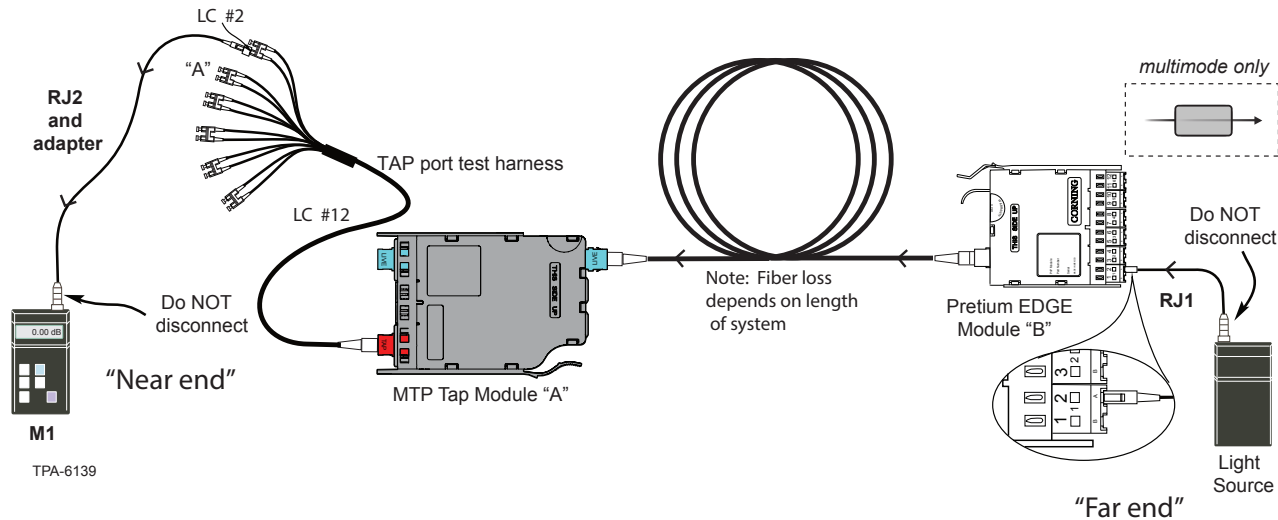


Figure 15

9.7 Note steps 9.4 and 9.6 CANNOT be combined if using an optical test set with both a source and a meter in one unit.

10. Simultaneous Testing of the Live and Tap Portions of an MTP Tap Module

10.1 This section describes how to test the entire system at once with one source and two meters. This is an alternative way to test compared to Steps 8 and 9. Note that this can only be done if all the permanent harnesses are installed or test harnesses are purchased to mimic the harnesses that will be installed. Also, three craft persons will be needed instead of two.

10.2 To calculate the system losses for the system use the values calculated above in Steps 8 and 9 and reference the test equipment as shown in Step 7.

10.3 To begin testing the system (Figure 16):

Step 1: Install the **Light Source/RJ1 LC connector** into the number 2 port of the Edge module, Module “B”.

Step 2: Install **Meter 1/RJ2’s LC connector adapter** onto LC number 1 of the harness plugged into the front-mounted LIVE Port of the MTP Tap module.

Step 3: Install **Meter 2/RJ3’s LC connector adapter** onto LC number 2 of the harness plugged into the TAP port of the MTP Tap module.

Step 4: Continue testing through on the even fibers of the EDGE module, Module “B,” using Tables 3 and 5 for testing sequences.

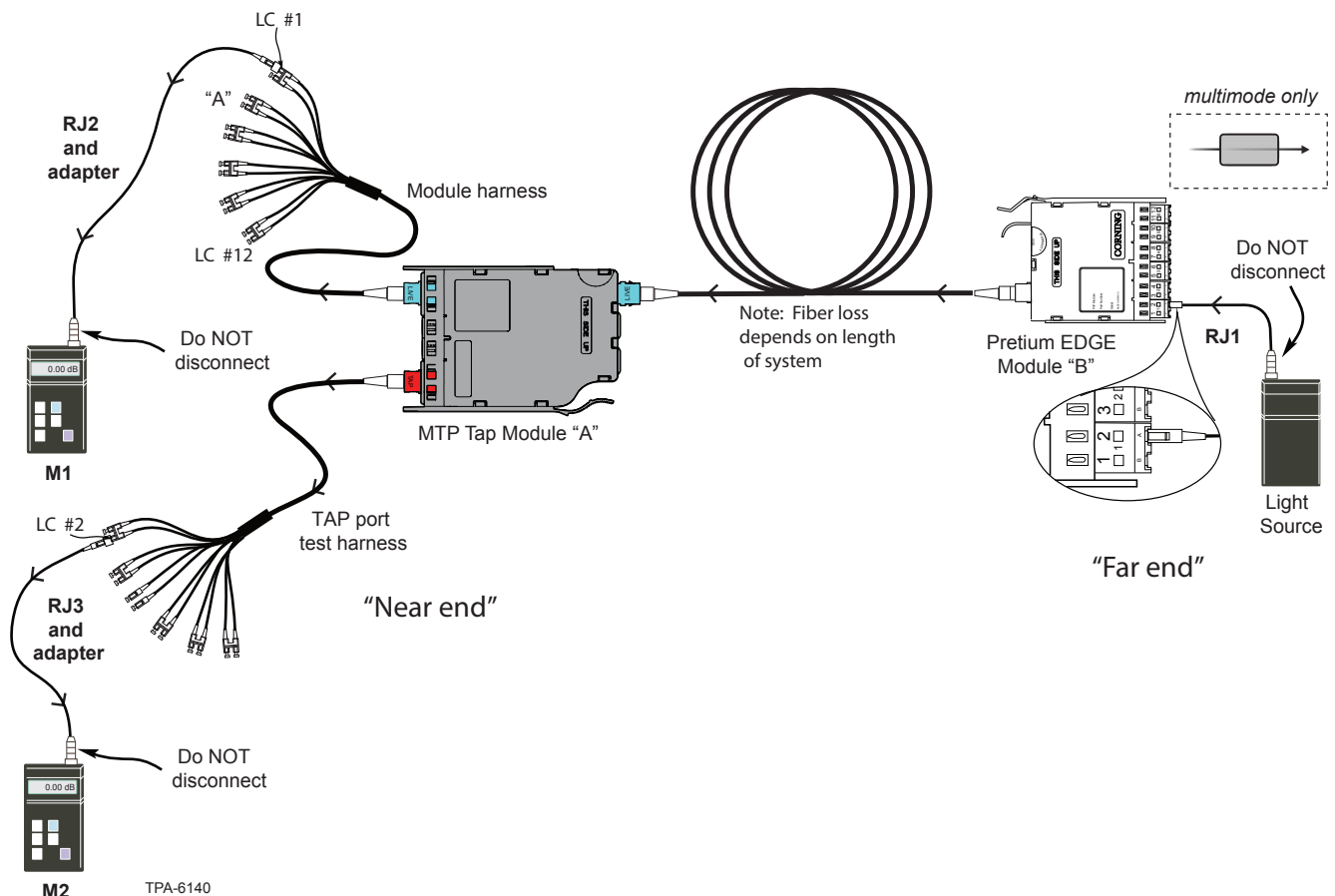


Figure 16

10.4. To test the remaining portions of the system (Figure 17):

- Step 1:** Install the **Light Source/RJ1 LC connector adapter** onto LC number 2 of the harness plugged into the LIVE Port of the MTP Tap module.
- Step 2:** Install **Meter 1/RJ2's LC connector** into the number 1 port of the Edge module, Module "B".
- Step 3:** Install **Meter 2/RJ3's LC connector adapter** onto LC number 1 of the harness plugged into the TAP port of the MTP Tap module.
- Step 4:** Continue testing through on the even fibers of the harness plugged into the front-mounted LIVE Port of the MTP Tap module using Tables 2 and 4 for testing sequences.

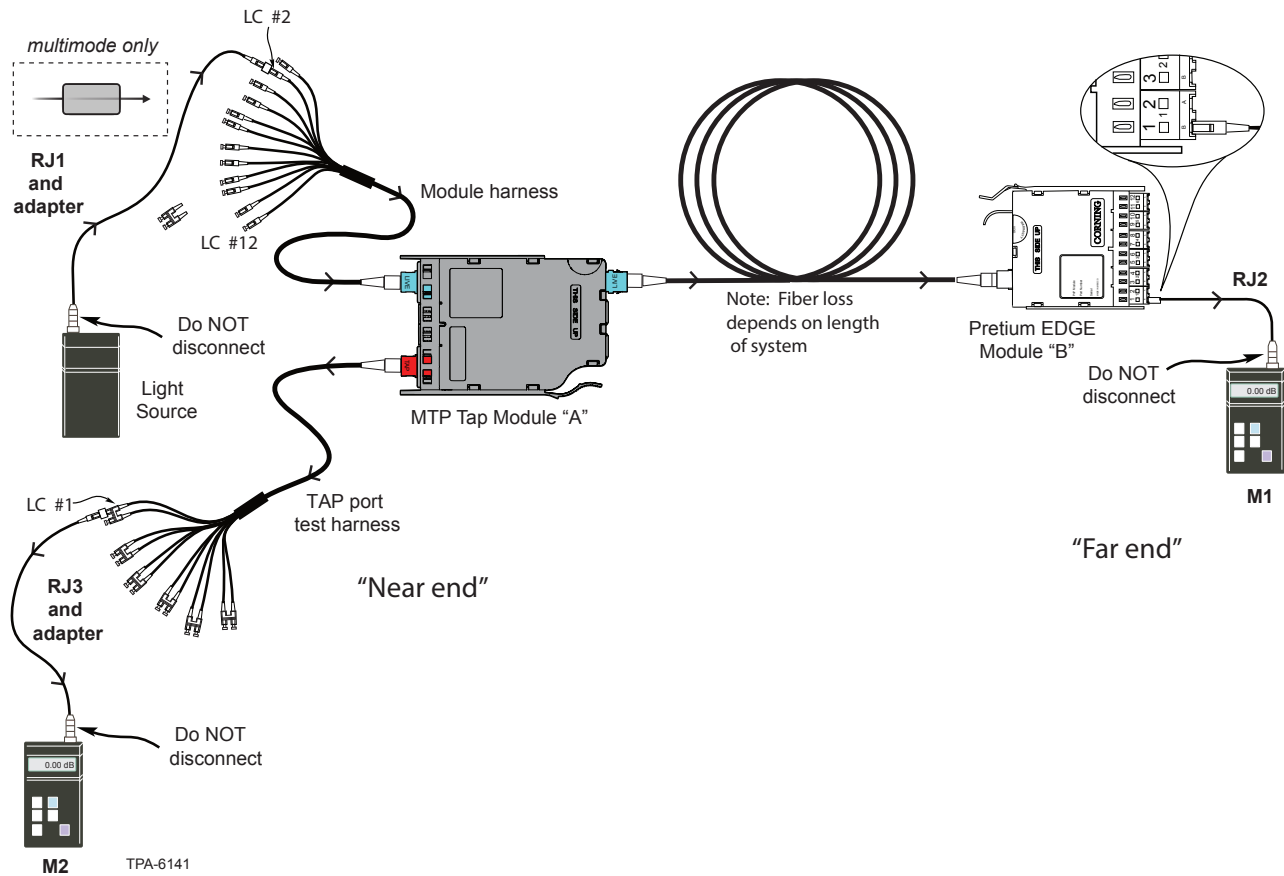


Figure 17