

## Field Optical Inspection Recommendations

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### Table of Contents

1.0	General Product Description .....	1
2.0	Reference Documents .....	1
3.0	Caution and Warnings .....	1
4.0	Tools, Supplies and Equipment .....	2
5.0	Cabinet Inspection Recommendations .....	2
5.1	Connector Inspection .....	2
5.2	Optical Performance Inspection .....	2
5.3	Fiber Path Inspection .....	3
6.0	Summary .....	3
7.0	Customer Information and Assistance .....	3

### 1.0 General Product Description

The family of CSX centralized splitter cabinets is well suited to various FTTP and PON network applications. The cabinet is an environmentally secure enclosure for splitting and redistributing, as well as cross connecting, optical power from feeder fibers to distribution fibers. The feeder and distribution connector fields are attached to cable stub(s) so that cabinets can be placed in the field with reduced installation time. The connector fields contain SC/APC or UPC GR-326 rated connectors. They also provide the benefits of a subscriber interconnect facility and a test access location for the cable plant.

In addition, fiber radius and slack management controls combine to form a fiber management system that greatly minimizes the potential for improper pigtail routing while preventing the possibilities of minimum bend radius violations.

### 2.0 Reference Documents

CSX Cabinet Installation Instructions  
CSX Cabinet Accessory Instructions

### 3.0 Caution and Warnings

- Warning: Laser radiation is invisible and can damage the eye. Never look directly at the connector end face or into a bulkhead receptacle.
- Dust caps and dust covers MUST be left in place on all non-terminated bulkhead receptacles and on the end of every un-used connector.
- Always ensure, before making any connection that the connector end face polishes match the cabinet connectors. This can be determined by the color of the strain relief boot, connector housing, and the bulkhead receptacle [i.e. Green = APC, Blue = UPC]. Connector endface damage may result from mating Blue UPC connectors to Green APC connectors.
- Tyco Electronics strongly recommends that all corporate and OSHA safety procedures be observed when working with this product.

## 4.0 Tools, Supplies and Equipment

There are a number of suppliers offering products that perform the same inspection and test functionality. It is recommended to evaluate the different products to determine which best fit personal preferences and are most economical to use. The methods to isolate the trouble may vary depending on the individual situation; however, the equipment needs to evaluate optical performance issues in the field are typically the same. A list of basic equipment is below:

OTDR – With a laser module designed for metro/access or FTTx applications

Connector Inspection Scope – With SC/APC adapter, 200x & 400x mag. A magnification of at least 200x is recommended for singlemode connectors

Connector cleaning supplies:

- Lint Free Wipes - test leads and/or cabinet connectors
- Lint Free Swabs - cabinet connectors and bulkhead receptacles
- Optical grade solvent – used for wet cleaning connectors with hard-to-remove residue on the end face
- Launch lead jumper - ~200 ft minimum to allow the OTDR to recover from the initial dead zone event. See Figure 1
- Visual Fault Locator – Visible red light source for detecting fiber breaks and macro-bends

immediately dry clean the connector end face because any dust and dirt that are in the solvent will leave behind a filmy deposit once the solvent has evaporated.

When inserting a connector into the bulkhead receptacle, ensure that the end face does not touch the outside of the adjacent connector or receptacle. Otherwise, the end face can rub against an unsuitable surface, producing scratches and dirt deposits on the fiber. After insertion, reposition the fiber slack behind the bulkhead receptacles.

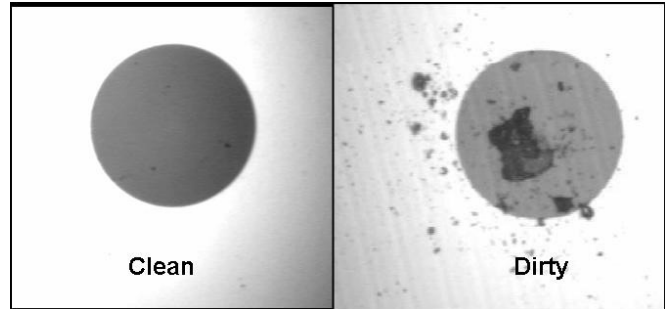


Figure 2: Examples of clean and dirty connector end faces as viewed with an inspection scope.

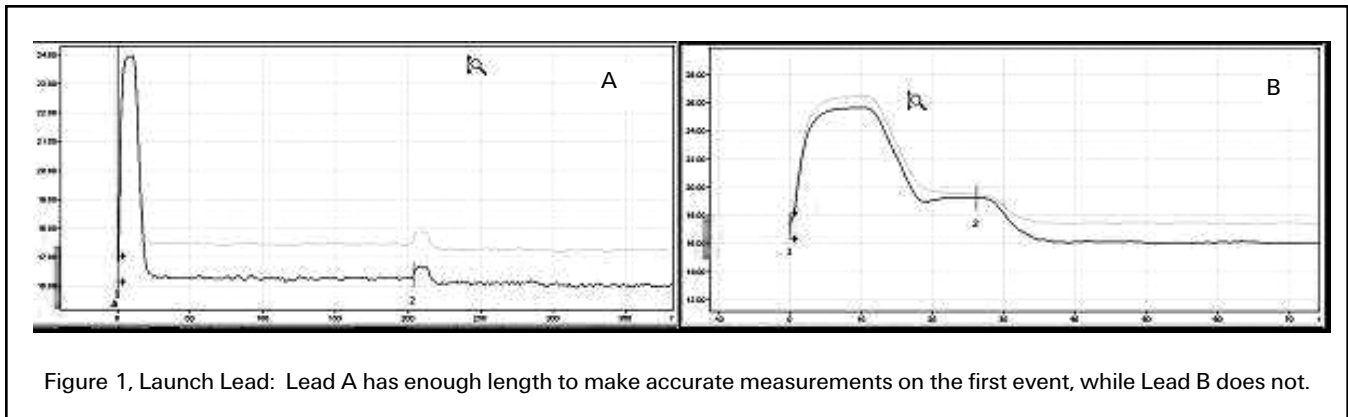


Figure 1, Launch Lead: Lead A has enough length to make accurate measurements on the first event, while Lead B does not.

## 5.0 Cabinet Inspection Recommendations

### 5.1 Connector Inspection

Remove only the protective cap of the port of interest. No more than six at a time. This will reduce the possibility of contaminating connectors with airborne dirt. When removing the protective caps, be sure to place them where they will not get contaminated. With the inspection scope, inspect each connector and clean as required. Re-inspect after cleaning to confirm dirt was removed. Replace all dust caps after cleaning. See Figure 2

- Clean connector end faces via dry wipe cleaning. If stubborn dirt remains on the end face, a wet/dry cleaning should be performed. It is imperative that all dirt is removed from the fiber core zone of the connector end face.
- For wet/dry cleaning, the connector is removed from the bulkhead receptacle. Use caution when getting enough fiber slack, so that the minimum fiber bend radius is not violated. After wet cleaning a connector it is important to

### 5.2 Optical Performance Inspection

Inspect the connector of the launch lead with the inspection scope to ensure it is free of pits, scratches, and contaminants. Replace if necessary or clean as instructed above. To ensure accurate readings of insertion and return losses, it is important that fiber ends and optical ports be clean at all times. After setting up the OTDR with the launch lead jumper, take a measurement of the jumper to confirm its length and condition. Use the auto setting mode of the OTDR and allow the software to set the optimized launch settings.

Connect the OTDR launch lead jumper to the port and take a measurement. The OTDR measurements are an approximation of optical transmitting characteristics. The displayed traces are based on statistical analysis of backscattering measurements and extrapolates the best possible characterization of a given fiber span. Thus, it is important to recognize the effects of

different launch parameters. These parameters include distance range, pulse width, samplings points, signal to noise ratio, and averaging time. For example; lengthening the pulsewidth will increase the dead zone and hide events close together. See Figure 3. If the auto settings do not allow enough detail or resolution, reference the OTDR's operation instructions when manually optimizing these settings.

### 5.3 Fiber Path Inspection

If excess attenuation has been identified within the cabinet, a visual fault locator can be used to find the cause of attenuation along the optical path. When possible, use the same OTDR launch lead jumper. Visible light will be injected into the fiber and will escape out of the fiber at locations where the fiber is severely bent, pinched, or broke. Starting at the bulkhead receptacle, follow the fiber path all the way to the cable.

## 6.0 Summary

This introduction to cabinet field inspection highlights some recommendations to assist with basic troubleshooting when testing an optical network. The most common problems found in the field relate to dirty connectors. Keeping connectors clean is a vital step to prevent connector damage, obtain accurate test results and reduce testing time. The following list of "Do's and Don'ts" are useful reminders to help with CSX field inspections

#### Do

- keep all connectors clean
- inspect for dirt before making any connection
- keep connectors and bulkhead receptacle protected from dirt with dust caps
- use proper optical cleaning supplies and techniques
- become familiar with testing equipment and their features

#### Don't

- look directly at the connector end face or into a bulkhead receptacle
- mix connector types [i.e. APC to UPC]
- use damaged connectors when testing

## 7.0 Customer Information and Assistance

For product assistance or questions, please contact your local Tyco Electronics Sales Associate or the Tyco Electronics Telecom Outside Plant Service Center at 1-800-233-7635.

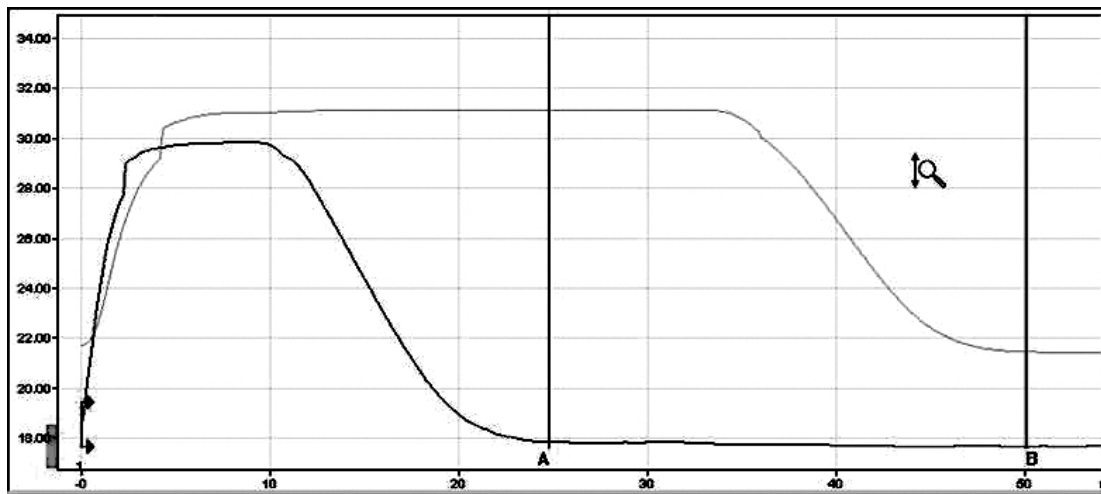


Figure 3: Example of different dead zone lengths per pulsewidth [A=30ns; B=100ns].

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