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## Instructor Corner

### How to Inspect and Properly Clean Optical Connectors

by Michael Scholten  
*Senior Product Marketing Manager AFL Test and Inspection*

In our previous newsletter, we outlined the problems that dirty or damaged optical connectors cause, demonstrated how to evaluate connector cleanliness, and showed how clean connectors should be. Now we will discuss how to properly inspect and clean optical connector end faces.

### How to Inspect Optical Connectors

Many customers today are requiring documentation that proves that connectors were inspected and passed IEC or their own custom criteria at the time of installation. Optical connector inspection scopes are an ideal tool to meet these requirements. These versatile scopes can perform an array of tasks:

- Capture a magnified image of the connector end face.
- Delineate the A/B/C/D pass/fail regions.
- Detect and measure scratches and defects in each of the regions.
- Apply the appropriate pass/fail criteria depending on fiber and connector type.

There are many types of scopes available, ranging from stand-alone units to scopes integrated into other test equipment to units that are view only or have auto pass/fail analysis.

Continued on pg. 2



## Fiber Optic Connectors Training DVD

Proper connectorization is critical to the success of a fiber link. This DVD covers the multiple types and key elements of fiber optic connectors. Inspection, cleaning, yield, and the importance of attenuation and reflection testing are also discussed. Special Price \$99 when you order online using discount code: **NEWS**. This offer is valid until December 31, 2015.

[Order Now](#)

## Did You Know...

### Better Broadband Boosts Home Values by 3.1 Percent!

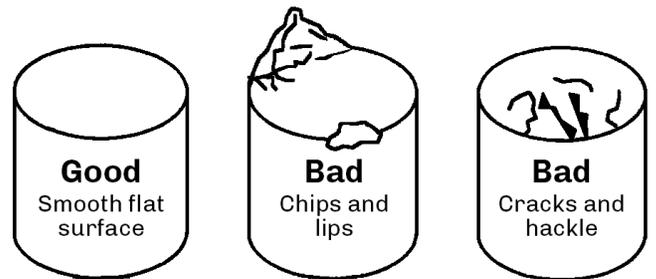
The FTTH Council recently released a study that demonstrated a positive correlation between home prices nationwide and fiber-delivered Internet. The study concluded that homes in neighborhoods with access to fiber had their value raised by as much as 1.3%. Gigabit speeds boosted the value another 1.8%. Put another way, that's a \$5,437 increase for the sample median home price, adding increased property value to the already long list of fiber benefits. ■

Source: Molnar, G., Savage, S. and Sicker, D., 2015, "Reevaluating the Broadband Bonus: Evidence from Neighborhood Access to Fiber and United States Housing Prices".

## Training Tidbits

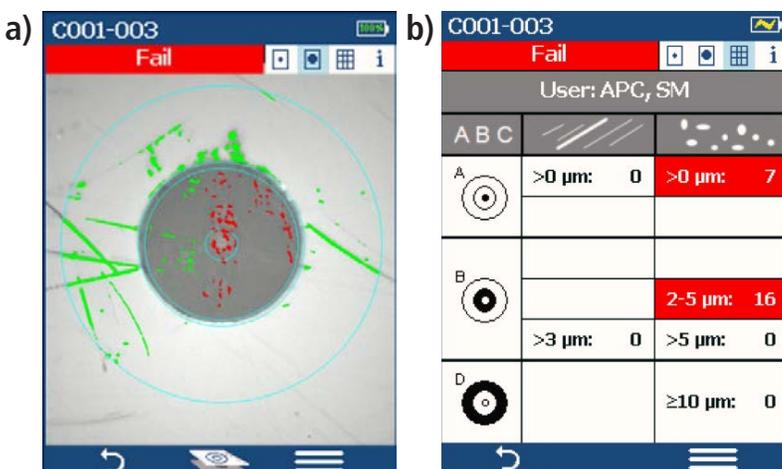
### Fiber Optic Cleaver Considerations

Proper cleaving is one of the first steps towards achieving a good, low loss splice. Precision cleavers are key for low loss single-mode splicing, producing a consistent cleave angle of <math><1</math> degree. The circular diamond blade in this type of cleaver can be good for several thousand cleaves when properly maintained. Cleavers are available for single fiber and ribbon fiber applications. Another cleaver option is the stapler type. This is more commonly used for multimode fiber or in applications where low loss is not as critical. These cleavers can be less consistent and often can produce a higher angle cleaved end. Finally, cleaving with a diamond tip hand scribe is used when preparing connectors for polishing. It is never recommended for cleaving bare fiber for a splice. ■



Source: Fiber Optics 1-2-3 Course Manual, Chapter 7

For more information on fiber optic products, please call us at (800) 451-7128



- a) Scratches and defects displayed on optical inspection scope.
- b) Specific pass/fail results for an APC connector.

### Continued from pg. 1

#### Cleaning Optical Connector End Faces

Harsh materials such as paper towels or toilet tissue or potentially dirty items such as shirt sleeves and pant legs should never be used to clean optical connectors. Popular one-click and cassette cleaners rapidly and easily dry wipe connector end faces, even those that are mounted in bulkheads, eliminating inconvenience as a barrier to optical connector cleaning. We recommend that field technicians carry a few different cleaning options to deal with different connector types as well as different types of dirt. Some oils and harsh contaminants should be cleaned with a wet then dry method for best results. ■

## Training Spotlight

### When a Negative is Actually a Positive

by Phil Shoemaker  
Senior Instructor Light Brigade

Basic loss testing and troubleshooting of a fiber optic network can be confusing if you do not have a good understanding of how an optical power meter (OPM) works. The OPM does exactly what its name implies: it measures optical power.

Optical power is expressed in dBm (or sometimes dBmW), which is the amount of measured power in decibels (dB) referenced to one milliwatt (mW). Because of its ability to express both very large and very small values in a short form, dBm is used in radio, microwave, and fiber optic networks as a convenient indicator of absolute power.

If the only function of a power meter was to read dBm, this would be the end of this discussion, but it isn't that simple. As 0 dBm equals 1 mW, anything greater than 1 mW is represented as a positive value and anything less than 1 mW as a negative value. Even though we can't have negative power, we can have a measurement that is less than 1 mW based on where the reference was set. For example, if a reading of -23 dBm

is displayed, the equivalent wattage would be 0.005 mW.

The majority of power meters also have a dB function, and this is where knowing your OPM is very important. The decibel (dB) is a logarithmic unit that expresses the ratio of two values of a physical quantity, often power or intensity. The basic formula we use in finding dB in an optical system is dBm minus dBm equals dB. For example, -10dBm - (-15dBm) = 5 dB. While a lot of OTDRs and power meters follow this logic, there isn't a standard or code that says it must be done that way. Some power meters will display

the exact same equation as a -5 dB result, and here lies the confusion.

I was recently asked to review a spreadsheet of data from an installed fiber optic system. In the last column, the dB column, there was a mix of positive and negative values. To my advantage, I knew the company was using different brands of power meters throughout their crews. One brand was showing loss as a positive value and another was showing the same results as a negative value. The engineers who were reviewing the test results weren't aware that the power meters were displaying the dB values differently, which initially created a lot of confusion. Had such issues been addressed or known prior to the report, it would have eliminated the confusion and the results would have been understood.

This is a great example of why it is so important to understand your test equipment and the basic technology within fiber networks. Inconsistencies and 'bad' data are not uncommon and the more you know, the more time you can save when troubleshooting these events. ■



## Staff Development Training DVD Sale!

Light Brigade fiber optic training on DVD is a great way to learn and to keep current on fiber optic technology and disciplines. All DVDs are eligible for BICSI CECs and SCTE RUs. 14 titles are available. For detailed descriptions and video previews [click here](#).

Any single DVD is \$99 – save \$26 (Discount code: **2015DVD**)

13 DVD set\* is \$995 – save \$205 (Discount code: **2015SET**)

Take advantage of our special year end pricing until December 31, 2015.

To order, go to [Light Brigade's website](#) or call (206) 575-0404.

\*Set does not include Introduction to Fiber Optics

## Upcoming Classes

[Click on Location to Register](#)

### Fiber Optics 1-2-3

<a href="#">Ontario, CA</a>	December 1-4
<a href="#">Jacksonville, FL</a>	December 1-4
<a href="#">El Paso, TX</a>	December 1-4
<a href="#">Salt Lake City, UT</a>	December 8-11
<a href="#">Portland, OR</a>	December 8-11
<a href="#">Omaha, NE</a>	December 8-11
<a href="#">Spartanburg, SC</a>	December 14-17
<a href="#">Seattle, WA</a>	December 14-17
<a href="#">Dallas, TX</a>	December 14-17
<a href="#">Huntsville, AL</a>	January 5-8
<a href="#">Little Rock, AR</a>	January 5-8
<a href="#">Boise, ID</a>	January 5-8
<a href="#">Vancouver, BC</a>	January 12-15
<a href="#">San Diego, CA</a>	January 12-15
<a href="#">Des Moines, IA</a>	January 19-22
<a href="#">Minot, ND</a>	January 19-22
<a href="#">Washington, DC</a>	January 26-29
<a href="#">Houston, TX</a>	January 26-29
<a href="#">San Jose, CA</a>	February 2-5
<a href="#">Long Island, NY</a>	February 2-5
<a href="#">Miami, FL</a>	February 9-11
<a href="#">Lowell, MA</a>	February 9-11
<a href="#">Austin, TX</a>	February 9-11
<a href="#">Atlanta, GA</a>	February 16-19

<a href="#">Springfield, IL</a>	February 16-19
<a href="#">Seattle, WA</a>	February 16-19
<a href="#">Frankfort, KY</a>	February 23-26

### Advanced Hands-on Training

<a href="#">Denver, CO</a>	December 1-4
<a href="#">Atlanta, GA</a>	December 8-11
<a href="#">Seattle, WA</a>	January 5-8

### Emergency Restoration

<a href="#">Spartanburg, SC</a>	January 19-21
<a href="#">Sacramento, CA*</a>	February 25-26

\* at CalCom Showcase and Tech Expo

### FTTx for Installers and Technicians

<a href="#">Madison, WI</a>	January 26-29
<a href="#">Kansas City, MO</a>	February 2-5

### FTTx OSP Design

<a href="#">Minneapolis, MN</a>	February 23-25
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### Fiber Characterization

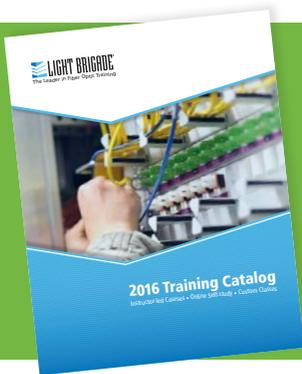
<a href="#">San Jose, CA</a>	December 8-10
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### Fiber Optics for Utilities

Level 1 Technician	
<a href="#">Dallas, TX</a>	January 26-28
Level 2 Designer	
<a href="#">Dallas, TX</a>	January 29

### Fiber Optics for ITS, Traffic, Fire Alarm, and Communication Systems

Technician Level I	
<a href="#">Seattle, WA</a>	January 11-12
<a href="#">Richmond, VA</a>	February 8-9
<a href="#">Houston, TX</a>	February 22-23
Field Technician Level II	
<a href="#">Seattle, WA</a>	January 13-14
<a href="#">Richmond, VA</a>	February 10-11
<a href="#">Houston, TX</a>	February 24-25
Design Technician Level II	
<a href="#">Seattle, WA</a>	January 15
<a href="#">Richmond, VA</a>	February 12
<a href="#">Houston, TX</a>	February 26



## 2016 Training Catalog

Take a look at the catalog featuring a complete schedule of 2016 training dates and locations throughout the United States and Canada for each of Light Brigade's 18 training courses.

[Download a Copy](#)

## Custom Fiber Optic Training

Light Brigade can develop and deliver a custom onsite course specific to your needs and application.

[Learn More](#)

## Upcoming Events

[Click on Any Event for More Information](#)

### Free Training Webinars

[Isolate, Test, and Troubleshoot FTTx Drops in the Last Mile](#)

[Improving OTDR Accuracy for Emergency Restorations](#)

### Trade Shows

[Montana Telecommunications Showcase](#)

### Date

November 18, 1:30pm EST

January 20, 1:30pm EST

### Date

December 2-3, 2015

### Host

[Lightwave](#)

[Lightwave](#)

### Location

Billings, MT