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# Connector Maintenance

*Jean-François Lavoie, Product Manager, Industrial and Scientific Division*

Connectors are designed to require minimum maintenance in order to provide reliable operation for many years. To ensure accurate readings and minimum insertion loss, it is important that fiber ends and optical ports be clean at all times. Proper cleaning also prevents the buildup of dirt, dust and other foreign substances—especially in connector pins.

This paper is designed to address the proper maintenance of

- FC, SC, ST and E-2000 connectors
- Singlemode and multimode fibers
- Bulkhead connectors, FOAs, detector ports and EUI connectors

Before you start the cleaning procedure you will need the following standard cleaning equipment:

- Isopropyl alcohol[1]
- Soft tissues (Kimwipes®)
- Cotton swabs (cleaning tips)
- Compressed air[2]
- FOMS-400X-UNIV (to check for cleanliness and scratches)

The following cleaning instructions contain some general safety precautions, which must be observed during all cleaning phases.

[1] Use isopropyl alcohol that is 98 % pure or more. When using isopropyl alcohol to clean an optical device, do not proceed immediately to dry the surface with compressed air (except when you are cleaning very sensitive optical devices). This is because the dust and dirt are in solution and will leave behind a filmy deposit once the alcohol has evaporated. Therefore, you should first remove alcohol and dust with a soft tissue, and then use compressed air to blow away any remaining particles.

[2] It is essential that compressed air be free of dust, water and oil. Use only clean, dry air. Otherwise, this could lead to filmy deposits or scratches on the surface of the connector. This will result in reduced performance of your transmission system.

To properly carry out connector maintenance, you must be familiar with the visual inspection procedure. It is imperative that there be no dirt on the connector core. Any connector that has a scratch across the core, or a scratch that appears to end in the core, must be rejected. Any connector with more than one scratch or an obvious scratch must also be eliminated. In addition, any patchcord showing obvious signs of wear on the ferrule, cladding or core must be rejected (see Figures 1 and 2).

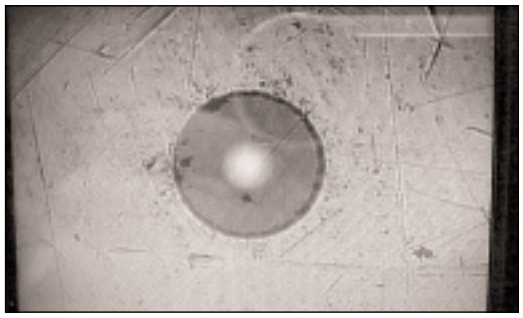


*Figure 1. Scratched connectors must be rejected*

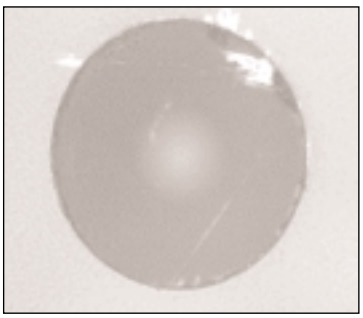


*Figure 2. Worn connectors must be rejected*



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## Cleaning the Connectors

Below are a few hints on how to keep your connectors in the best possible condition.

When inserting a connector ferrule into a connector or adapter, ensure that the ferrule tip does not touch the outside of the mating connector or adapter. Otherwise, the fiber end will rub against an unsuitable surface, producing scratches and dirt deposits on the fiber. Please note that the ceramic or metal sleeves inside the adapter are tightly fitted. Carefully rotate the ferrule in the adapter in order to align it with the connector key. Do not force the ferrule into the adapter.

Every time there is a disconnection or an undesirable contact, you must carry out the cleaning procedure. This ensures reliable patchcords, and consequently, accurate readings. Still, this procedure does not replace careful handling of patchcords. The use of protective caps is also necessary, but does not guarantee the cleanliness or the quality of a patchcord. This procedure conforms to the GR-326 standard, entitled *Singlemode Optical Connectors and Jumper Assemblies*.

Cleaning connectors is difficult because the core diameter of a singlemode fiber measures only about 9 µm. This generally means you will not be able to see scratches on the surface. In order to be certain of the connection's surface condition and to be able to check it after cleaning, you need a fiber-optic microscope such as the FOMS-400X-UNIV.

**Warning: Never look into the end of an optical cable that is connected to an active source!**

## Cleaning the Fiber Ends

1. Make sure the fiber is not active.
2. Remove the protective caps.
3. Gently wipe the fiber end with a lint-free Kimwipe® moistened with isopropyl alcohol (see Figure 3).
4. To dry, use a lint-free, dry Kimwipe® first, and then use compressed air.
5. Verify the cleanliness of the connector with your FOMS-400X-UNIV (see Figure 4).

The patchcord is clean when there is no debris touching the cladding or the core.

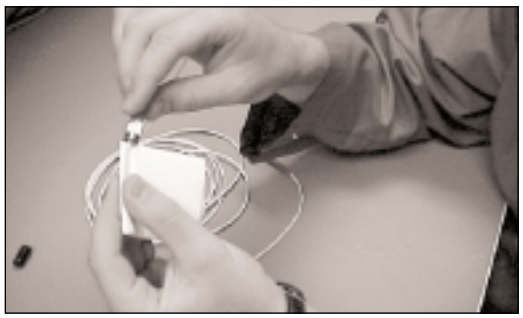


*Figure 3. Cleaning fiber ends*




*Figure 4. Verify connectors with your FOMS-400X-UNIV*



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## Cleaning the Bulkhead Connector

1. Remove the protective caps.
2. Slowly insert a cleaning tip that has been dipped in isopropyl alcohol into the bulkhead connector (see Figures 5 and 6). A gentle rotating movement may help.
3. To dry, insert a dry cleaning tip.
4. Blow away any remaining lint with clean compressed air.



*Figure 5. Cleaning setup*



*Figure 6. Cleaning bulkhead connectors*

## Cleaning the Fiber-Optic Adapter (FOA)

1. Remove the FOA from the instrument.
2. Slowly insert a cleaning tip that has been dipped in isopropyl alcohol into the FOA (see Figure 7). A gentle rotating movement may help.
3. To dry, insert a dry cleaning tip.
4. Blow away any remaining lint with clean compressed air (see Figure 8).



*Figure 7. Cleaning the FOA*



*Figure 8. Use compressed air to end the procedure*

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## Cleaning the Detector Ports

To ensure the maximum accuracy of power measurements, power meter detectors must be kept clean at all times. When not in use, the detector(s) should be covered with a protective cap. In addition, the optical source port and fiber end should be cleaned occasionally to minimize insertion loss.

The cleaning tips supplied with EXFO test equipment are specially designed to clean the detector port(s) without having to disassemble the unit.

To clean the detector port(s),

1. Remove the protective cap from the detector.
2. If the detector is dusty, blow dry using compressed air.
3. Carefully remove a cleaning tip from the package, without touching the cotton swab.
4. Moisten the cleaning tip with isopropyl alcohol.
5. Slowly insert the cleaning tip into the port until it reaches the detector's protective window (gently rotating the cleaning tip clockwise may help).
6. While applying moderate pressure, turn the cleaning tip one full turn. Be careful not to damage the detector window (see Figure 9a).
7. Gently withdraw the cleaning tip.
8. Using compressed air, blow the detector dry (see figure 9b) or repeat steps 5 to 7 with a dry cleaning tip.

To help keep the source port clean, EXFO recommends placing a protective cap on it whenever it is not in use. Also, always clean fiber ends before connecting them to the power meter port.

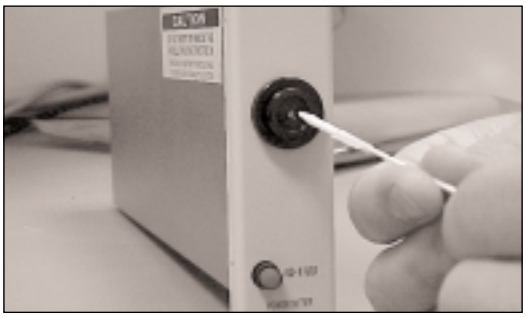


*Figure 9a. Cleaning the detector port(s)*

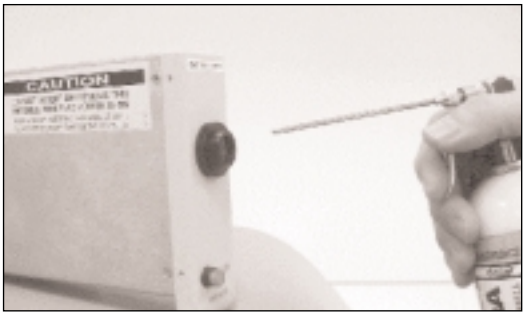



*Figure 9b. Cleaning the detector port(s)*



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## Cleaning the EUI Connector

1. Remove the EUI from the instrument (see Figure 10).
2. Slowly insert a cleaning tip that has been dipped in isopropyl alcohol into the EUI connector (see Figure 11). A gentle rotating movement may help.
3. To dry, insert a dry cleaning tip first, then use clean compressed air (see Figure 12).
4. Clean the ferrule in the connector port using a lint-free Kimwipe® moistened with isopropyl alcohol (see Figure 13).
5. Dry thoroughly with a dry lint-free Kimwipe®.
6. Put the EUI connector back onto the instrument (see Figure 14).



*Figure 10. Removing the EUI*



*Figure 11. Cleaning the EUI*



*Figure 12. Drying the EUI with compressed air*



*Figure 13. Cleaning the ferrule in the connector port*



*Figure 14. Putting the EUI connector back onto the instrument*

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