Swap-Out connector:
protect what matters most

app note

EXFO

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EXFO's patented Swap-Out connector is a practical innovation that has proved to be a real game-changer for fiber-optic network maintenance, providing an effective solution to maintain the efficiency and accuracy of OTDRs in the field, without compromising the quality and accuracy of measurements.

The Swap-Out connector serves two main roles:

1. First, the Swap-Out connector is designed to enhance the longevity and performance of OTDRs by allowing field technicians to replace worn or damaged connectors. This innovative feature is particularly beneficial as OTDR connectors may degrade over time due to repeated connect and disconnect cycles, impacting optical performance.

2. Second, the Swap-Out connector reduces downtime by allowing replacement of a damaged connector without sending the OTDR to an EXFO-certified service center. This effectively reduces the cost of ownership of the OTDR and empowers the owner to repair and maintain their OTDR on their own timetable.

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Ensuring consistent dynamic range

The dynamic range of EXFO's OTDRs remains fully within specifications, even with the Swap-Out connector in place. EXFO meticulously evaluates the dynamic range of its OTDRs, including the Swap-Out connector. While bypassing the Swap-Out connector might show a slight gain in dynamic range, this is a normal occurrence due to the additional APC connector in the light path.

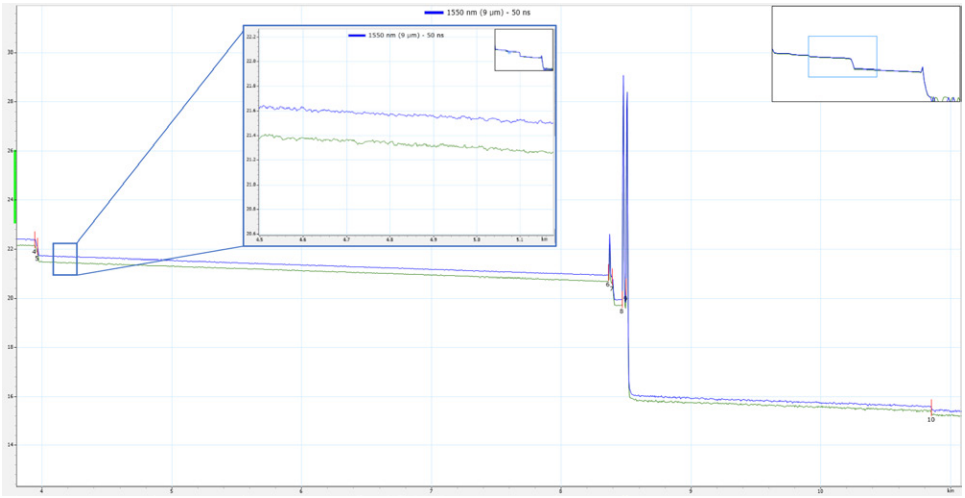

Figure 1. OTDR trace with (green) and without (blue) the Swap-Out connector.

The Swap-Out connector does not introduce any additional loss beyond that of a standard APC connector.

Figure 1 illustrates this phenomenon, showing a comparison of OTDR traces with and without the Swap-Out connector1. The offset between the two traces is minimal, measured at just 0.25 dB using the OTDR marker. Given that an APC connector typically has an insertion loss of around 0.2 dB, we can confidently conclude that the Swap-Out connector does not introduce any additional loss beyond that of a standard APC connector.

It is important to note that EXFO's dynamic range specifications include the loss from the Swap-Out connector. For instance, the 730D model boasts a dynamic range of 39 dB, with the connector loss already factored in.

Maintaining optimal ORL performance

The ORL measurement of the trace confirms that the Swap-Out connector has a negligible effect, thanks to the use of an APC connector. Typically, APC connectors exhibit an ORL of around -65 dB. For instance, the ORL variation between the two traces shown in Figure 1 is just 0.03 dB, demonstrating the minimal impact of the Swap-Out connector.

The key to maintaining this performance is ensuring the Swap-Out connection is clean. Below, you'll find the best practices for installing a new Swap-Out connector. If you have any questions regarding the installation, please don't hesitate to contact EXFO.

Reliable dead zone performance

The Swap-Out connector does not impact the dead zones of the OTDR even if the Swap-Out connector is incorrectly installed or if the connectors are dirty or damaged. Dead zones are caused by the electronic acquisition system of the OTDR. After being stimulated by a strong reflection or a strong loss, the electronic needs some time to relax and be able to see the RBS of the fiber. This phenomenon is analogous to having a strong flashlight shone in the eye or closing the light in a dark room. Human eyes need a few seconds to adapt to the new light conditions. This has nothing to do with the Swap-Out connector.

Figure 2. TThe same OTDR trace as figure 1, but the offset in dynamic range is compensated.

The dead zones of the OTDR remain unchanged, regardless of the presence of the Swap-Out connector.

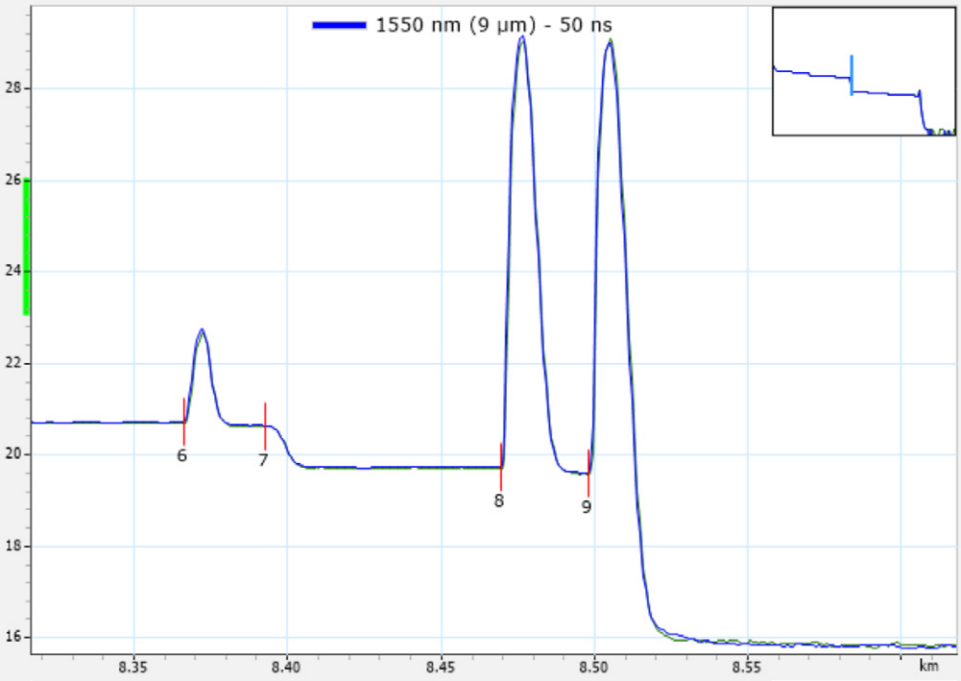

Figure 3. Close up on the event of Figure 2.

As seen in Figures 2 and 3, the traces of the OTDR with and without the Swap-Out connector overlap almost perfectly. This confirms that the dead zones of the OTDR remain unchanged, regardless of the presence of the Swap-Out connector. Similarly, Figure 4 shows a comparison of PON dead zones with and without the Swap-Out connector. Apart from the 0.25 dB insertion loss, there is no difference in the dead zone performance of the OTDR.

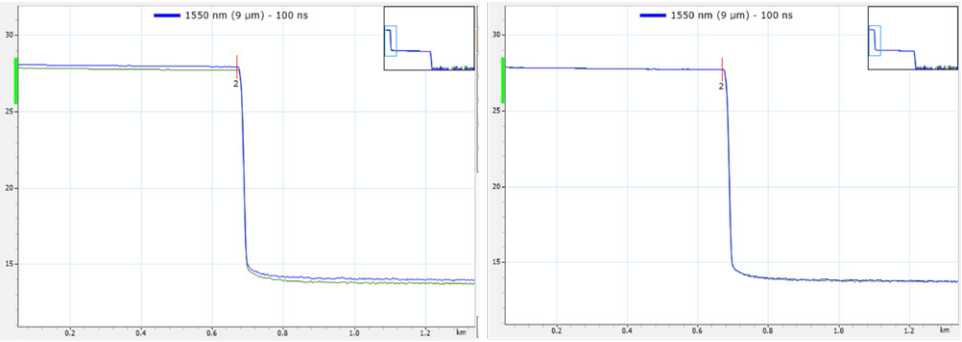

Figure 4. Demonstration of the performance of the Swap-Out connector in the case of a PON network. Blue = without Swap-Out connector. Green = with Swap-Out connector.

Figure 4 shows that, apart from the 0.25 dB insertion loss, there is no difference between with or without the Swap-Out connector in the dead zone performance of the OTDR.

Best practices when swapping a Swap-Out connector

During manufacturing, OTDRs are rigorously tested with their Swap-Out connector installed, ensuring they meet the highest standards and specifications. When a connector needs replacement, following proper precautions guarantees that the new Swap-Out connector functions perfectly.

Additional references

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1. **Inspect the OTDR port**: Before installing the new connector, always inspect the OTDR port with a fiber inspection scope (FIP-400 or FIP-500) and clean as needed. This ensures that no dust particles contaminate the fiber inside the OTDR when the old Swap-Out connector is removed. Connecting a Swap-Out connector without inspection can result in permanent damage to the connector within the OTDR, which can only be replaced by an EXFO-certified service center.
2. **Inspect the Swap-Out connector**: Before installing the new Swap-Out connector, inspect it to ensure cleanliness. Clean as needed.
3. **Secure the new connector**: When installing the new Swap-Out connector, ensure it is tightly screwed in place.
4. **Run an optical diagnostic check**: Once the new connector is installed, run an optical diagnostic check on the OTDR to ensure the new Swap-Out works as intended.

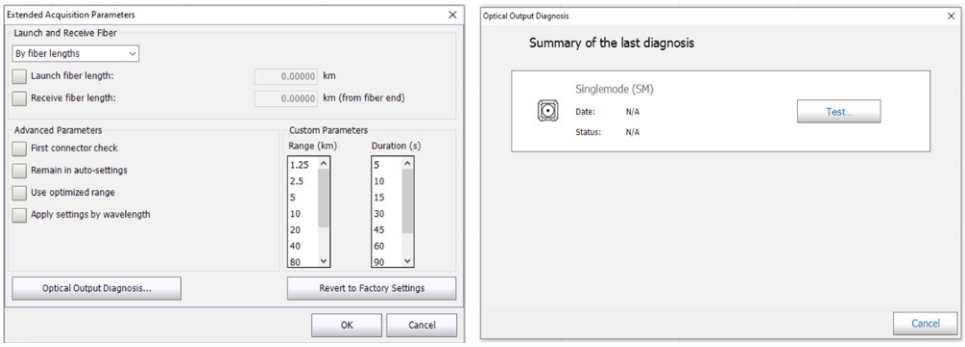

Figure 5. Optical diagnostic. This menu can be found in the extended acquisition parameters.

EXFO's Swap-Out connector protects what matters most: your OTDR's performance. With easy replacement and no compromise on dynamic range, ORL, or dead zones, it keeps your fiber testing accurate, efficient, and field-ready.