AN-110

Insertion Loss/ Return Loss on Short Cables (OP930)

Overview

Units using the pulsed (OTDR) method have a specific resolution that has trouble distinguishing pulses less than 2.0m apart. For measuring RL on these cables, one needs to employ a mandrel (single mode only), matching gel, or a matching block to the far end connector to diminish the reflection. As a standard and for consistency, reference cables should be 3-3.2m in length.

Insertion Loss

Reference

Insertion loss testing does not change with the use of short cables. The procedure is the same for both Multimode and Single mode.

Connect the APC side of the 3 meter FC/ APC to PC launch cable to the OP930 front panel connector and the PC endface to the OPM. Navigate to the IL screen via channel button Ⓑ. Press the Ref button Ⓐ to establish a reference power for both wavelengths.

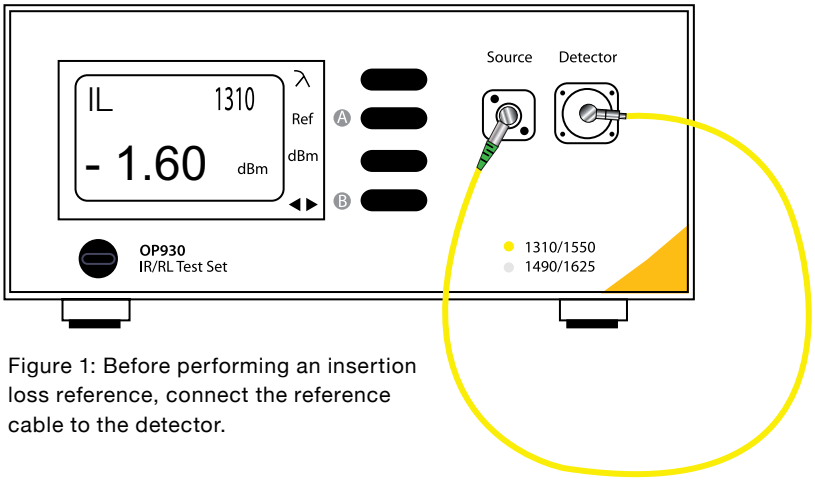

Figure 1: Before performing an insertion loss reference, connect the reference cable to the detector.

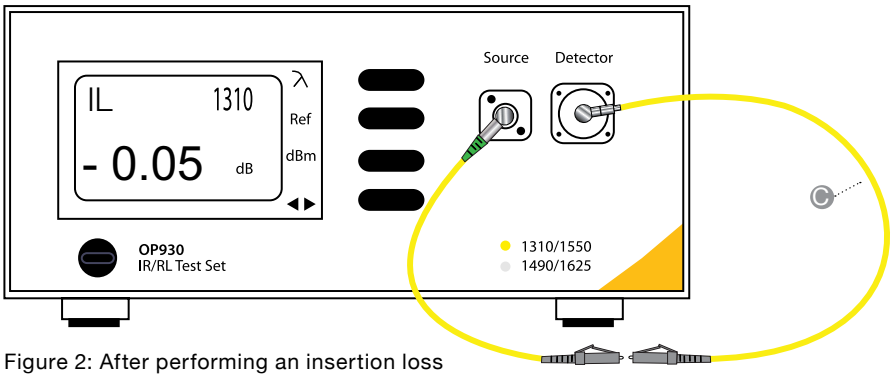

Figure 2: After performing an insertion loss reference, the front panel display will begin updating in real-time. Simply connect the test cable and the test results will be displayed.

Testing

The unit will now begin taking measurements automatically. Connect the PC-PC DUT Ⓒ between the PC endface of the launch cable and the OPM to begin testing. To test the other end of the DUT, flip the cable from the A side (already connected to launch cable) to B side (already connected to OPM) and measurements will now be made for that connector.

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Return Loss

Since launch cables should be longer than 3m, referencing is the same when testing short cables.

Reference

With an insertion loss reference established, navigate to the RL screen by pressing the channel button Ⓐ once. If return loss has not yet been referenced, the screen will be blank. Disconnect the launch cable from the OPM and leave the PC endface unmated. Referencing to an open PC connector/endface and forcing to 14dB provide for the most accurate RL measurements. Press and hold Ref Ⓑ and the unit will begin establishing the length of the launch cable by for the Fresnel reflection at the umated PC endface. When the unit has found a distance and measurement, it will be automatically displayed on the front panel screen.

Note: To force a 14dB reference, press and hold the dBm Ⓓ button after referencing.

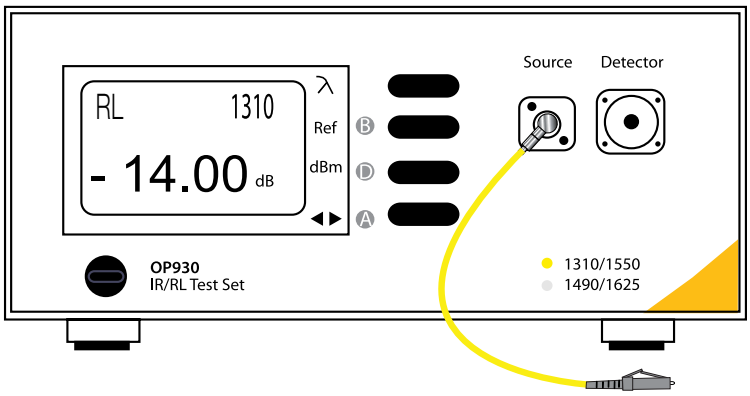

Figure 3: When referencing return loss, make sure the reference cable is terminated in an open UPC connection.

Testing

Testing return loss is different for single mode and multimode.

Singlemode

Connect the short cable PC-PC DUT to the PC endface of the launch cable. The unit will automatically start taking measurements. To reduce the open PC reflection, apply tight a mandrel wrap on the DUT.

Note: The mandrel should only be used during return loss testing.

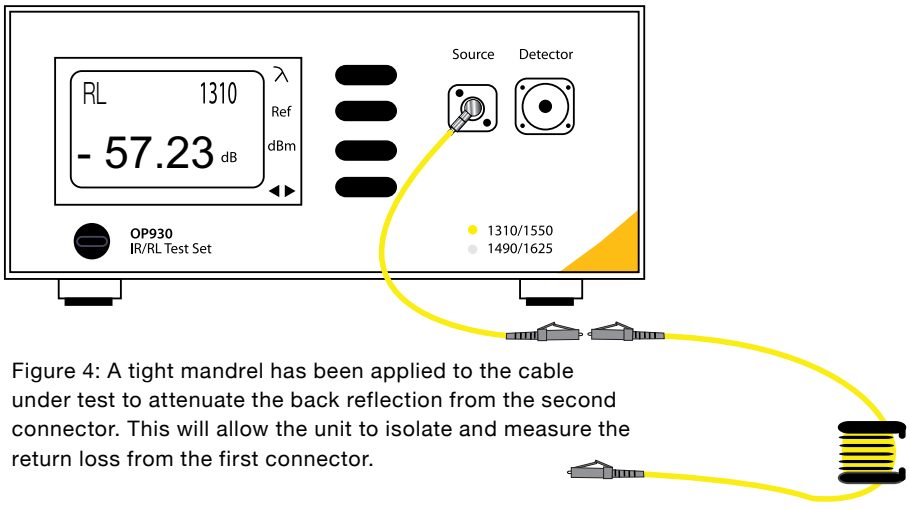

Figure 4: A tight mandrel has been applied to the cable under test to attenuate the back reflection from the second connector. This will allow the unit to isolate and measure the return loss from the first connector.

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Multimode

Connect the short cable PC-PC DUT to the PC endface of the launch cable.
The unit will automatically start taking measurements.

When testing a short cable, mandrel wrapping will only increase loss for high order modes.
To reduce the open PC reflection, an index matching block or gel should be used.
Apply this matching gel/block to the unmated endface of the DUT after connecting to the reference cable.

Note: Immediately clean the endface after using index matching gel or block to prevent any contamination or damage to either the endface or connector for both cables.

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