

# Bidirectional IL/RL Test on a Duplex-LC Cable

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The OP940 and OP721 form the ideal test system for multichannel bidirectional insertion loss and return loss testing. The increased demand for more efficient IL and RL testing on multifiber cables, such as duplex LCs, MTP cables, and MTP fanout cables has led to an increased interest in this type of measurement. Additionally, this type of test is ideal for cables that require a two or three cable reference method, such as harsh environment connectors like 38999 and other Neutrik's OpticalCON. In this video, we demonstrate how to perform this test on a duplex LC cable in OPL-Max.

Before we begin testing, we must prepare the equipment. This test setup calls for the [OP940 Insertion Loss and Return Loss Meter](#) and the [OP721 Bidirectional Optical Switch](#). Both units must be connected to power and to the computer through USB. Next the units must be connected to each other.

The source and detector of the OP940 connect to the source and output ports of the OP721. The cables used for this should be long enough that there is no unnecessary strain to reach any port. Otherwise, there is no minimum required length.

With the units connected to each other, the reference cables are now connected to the switch. This OP721 is 24-channel, meaning that there are 24 channels available in each direction for a total of 48 connections at the front panel.

Here we connect to channels 1 and 2 on each side. By default, light emits from the left-hand side and is received by the right-hand side when the switch is set to the forward direction. Reversing the direction sets the light to emit from the right.

The test will begin with the insertion loss reference, so the reference cables are connected together.

Before we continue, let's address an issue that can arise when the reference cables are connected together. Within the duplex-LC housing, the LC connector on the right is always the A connector and B is on the left. (See *Figure 1*)

A and B correspond to 1 and 2 labels on the FC side of the reference cable respectively. Connecting to the OP721 in accordance with these labels creates a problem. Light will emit from the channel 1 port of the OP721 and enter fiber 1 of the first reference cable, but then it passes into fiber 2 of the second cable. As a result, channel 2 on the other side of the OP721 receives the light instead of channel 1, and the insertion loss reference for channel 1 comes up dark. (See *Figure 2*)

The simplest way to fix this is to swap the connectors on the right-hand side of the OP721. This ensures that the light emits from channel 1 on the left and is received by channel 1 on the right. (See *Figure 3*)

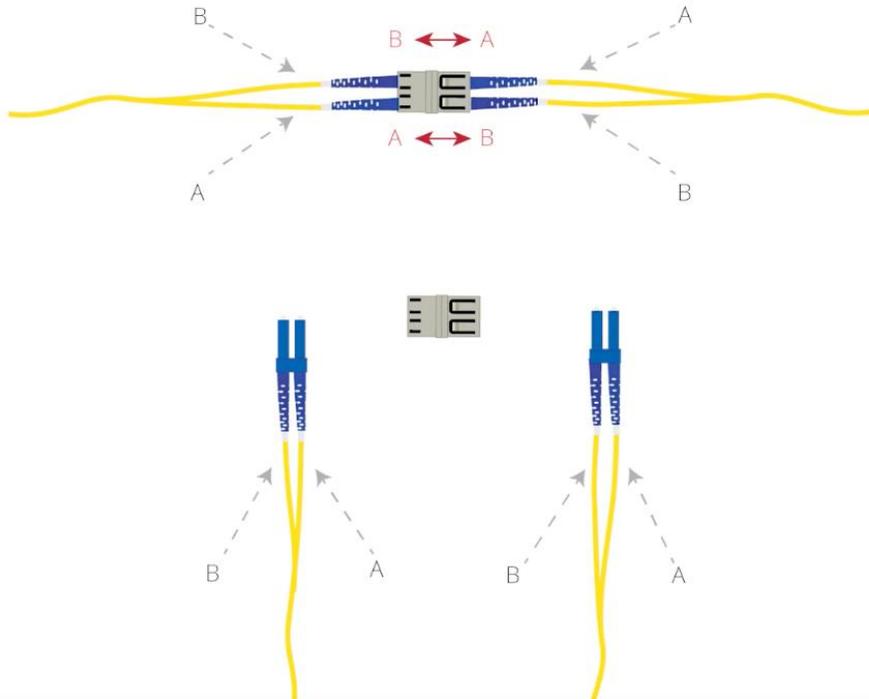


Figure 1

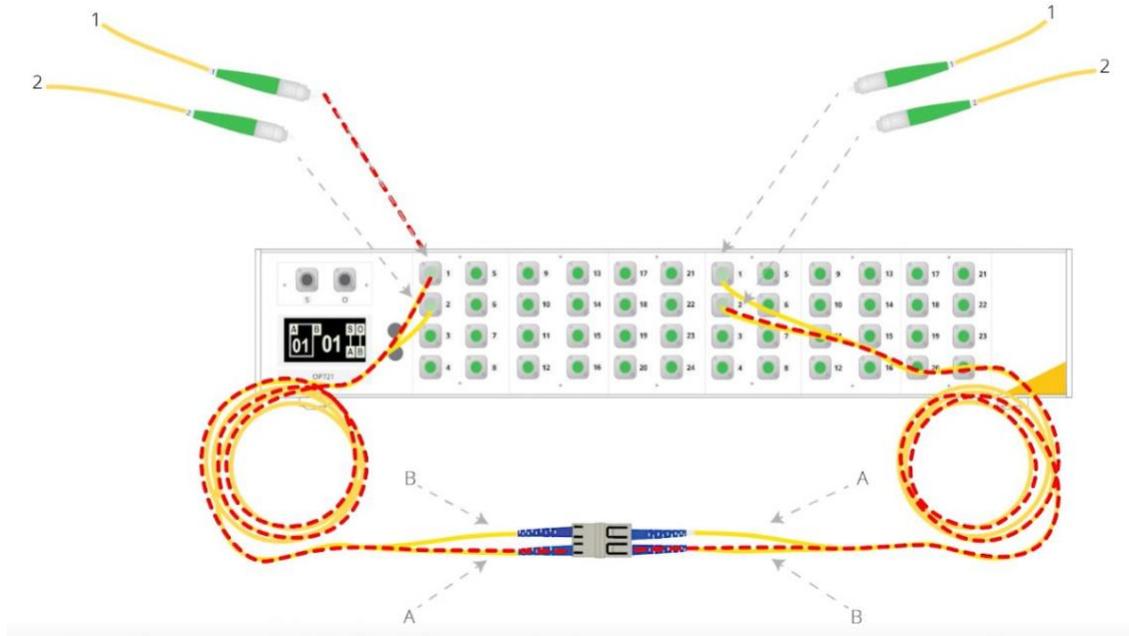


Figure 2

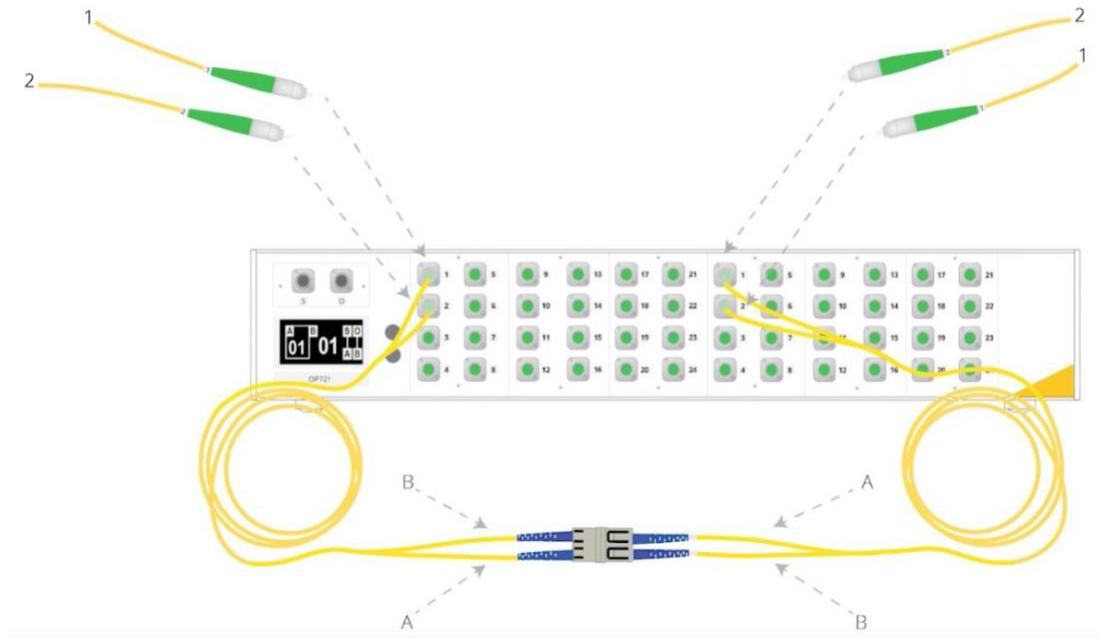


Figure 3

Another option is to use simplex reference cables rather than duplex, as is done on the right-hand side of the test setup on this video.

Once the units are powered on, we can begin testing in OPL-Max. We obtain Insertion Loss reference values for channels 1 and 2, first in the forward direction, then in the back direction.

Now we disconnect the reference cables from each other before moving on the return loss reference. This ensures that we reference to flat polish connectors that are open to air.

The return loss reference is performed in the same order as the previous step. Here we reference each channel individually, but it is possible to copy the reference from the first channel to the second in each direction. Since these are duplex cables, the reference lengths will be approximately the same.

With the referencing done, we now connect the device under test between the reference cables.

This test will produce insertion loss and return loss results in each direction. The return loss results may vary noticeably from one direction to the other since that measurement is connector level rather than throughput.

With the test complete, OPL-Max produces a test report as designed by the user.