

## Measuring Insertion Loss / Return Loss on Hybrid Cables

### Overview

Testing simplex cables with unmatched connector types poses difficulties because the cable cannot simply be turned around to test the reverse direction. While hybrid bulkheads (SC-FC, ST-FC, etc.) are one option that can solve the problem with only minor issues, in some circumstances hybrid bulkheads will not provide sufficiently accurate measurements. SC-LC cables are one such example. SC-LC bulkheads have high loss and poor repeatability and, as a result, they should not be used in the testing process. Using an OP940 with two detector ports coupled with an OP725 will allow the operator to accurately test hybrid cables of all configurations with the highest accuracy possible.

### Setup

The operator should have a high performance grade cable with APC connectors between the source output of the OP940 and the upper left **S** port of the OP725. A reference cable for each of the connector types should be connected to the two output ports of the OP725, **1** and **2**. In this configuration, the **O** port of the OP725 is not utilized. This method avoids adding uncertainty as a result of golden cable references, OPM offset tables, and hybrid bulkheads. This setup requires the use of our OPL-MAX software. For assistance configuring the software to do this, please [contact OptoTest](#).

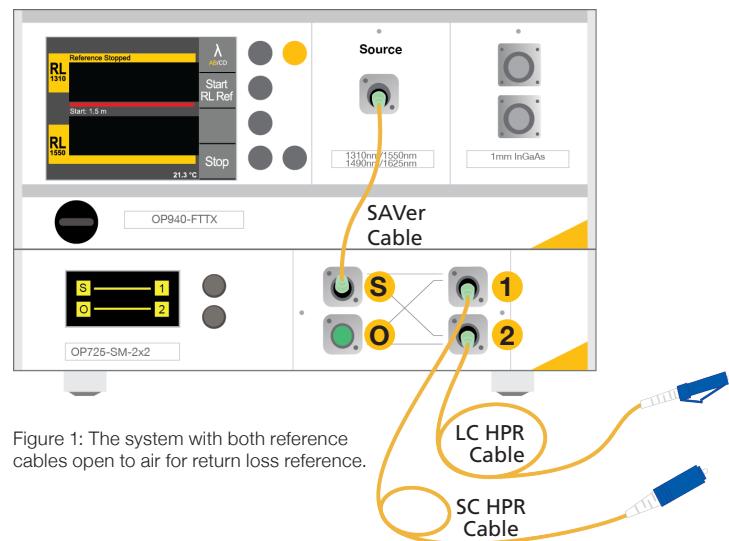


Figure 1: The system with both reference cables open to air for return loss reference.

### Referencing

Prior to any referencing or testing, attach an AD-25 or AD-SC OPM adapter to detector **1** and an AD-125 or AD-LC OPM adapter to detector **2**. Once the adapters are on as above, connect the SC reference cable (FC/APC-SC/PC) to channel **1** and connect the LC reference cable (FC/APC-LC/PC) to channel **2**. Reference Return Loss and Insertion Loss on both reference cables by switching channels on the OP725.

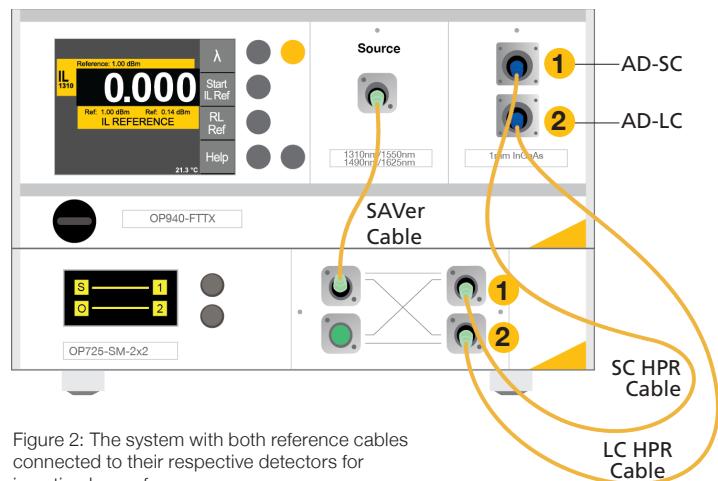


Figure 2: The system with both reference cables connected to their respective detectors for insertion loss reference.

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### Testing the DUT

Switch the adapters on detector ports **1** and **2**. Connect the SC end of the DUT to the reference cable on channel **1** and put the LC side of the DUT into detector port **1** to make measurements.

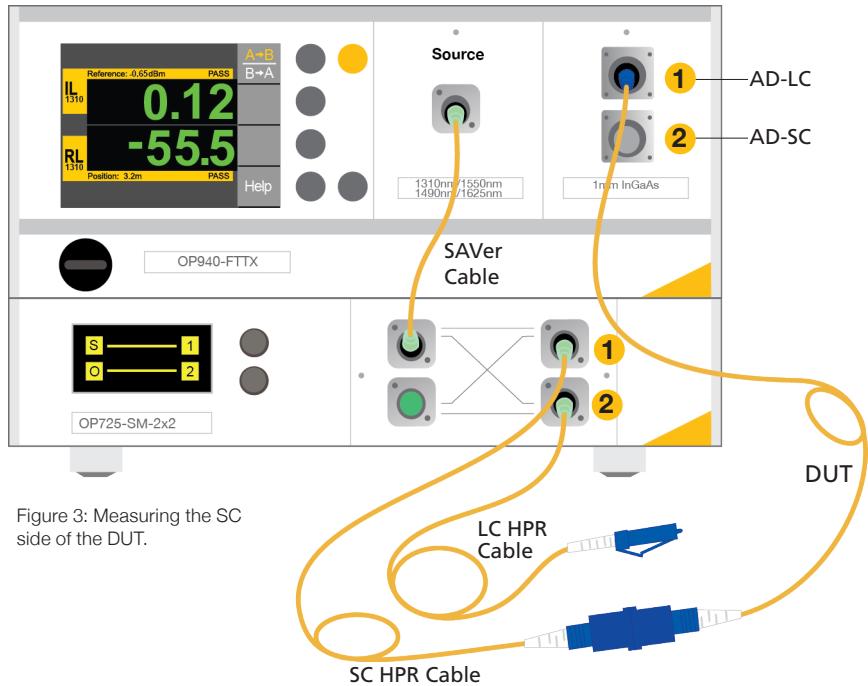


Figure 3: Measuring the SC side of the DUT.

To test the LC side of the DUT, connect the LC end to the reference cable on channel **2** and connect the SC end of the DUT into detector port **2**. Make sure to switch to the proper channel on the OP725.

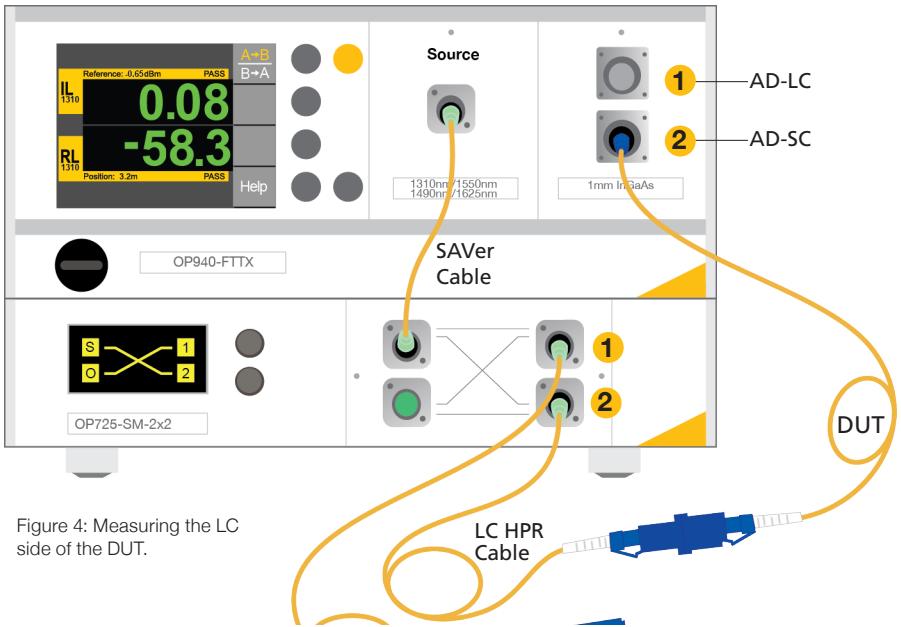


Figure 4: Measuring the LC side of the DUT.