24926 Highway 108
Sierra Village, CA 95346
Phone: (800) 545-1022
Fax: (209) 586-1026
E-Mail: sales @olsontech.com

Olson Technology, Inc. Optical FAQ

Frequently Asked Questions

Optical Connectors Types and Connector Care

EIA/TIA and Bellcore Standards

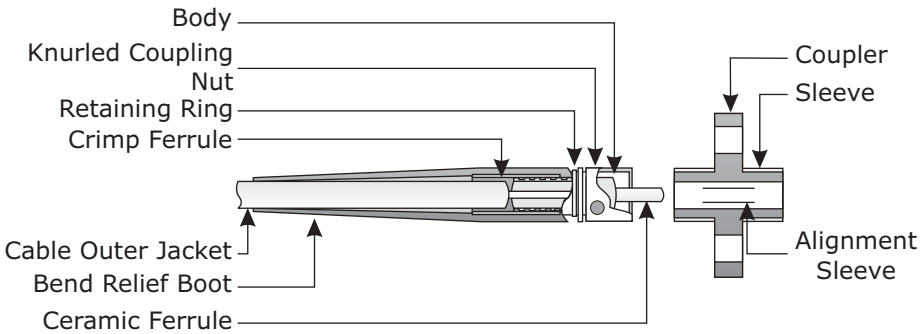
Set-up for Typical OTPN-1000 or OTPN-2000 Receiver

Optical Connectors

Connectors can vary slightly from vendor to vendor in how the fiber is terminated in the connector and how the angles are cut. These variables and other differences can have a significant impact on the optical level. Olson Technology, Inc. generally purchases all our cables from the same vendor. This vendor generally also re-terminates our detectors and lasers in order to minimize these variables.

Parts of a Typical Optical Connector

Figure 1



Optical Connector Types

Figure 2

FC Connector: One of the most widely used connectors in the Telecommunications industry. Available in PC, UPC and APC finishes. The APC type is used in the CATV industry

Figure 3

ST Connector: A widely used connector in the Telecommunications industry.

Figure 4

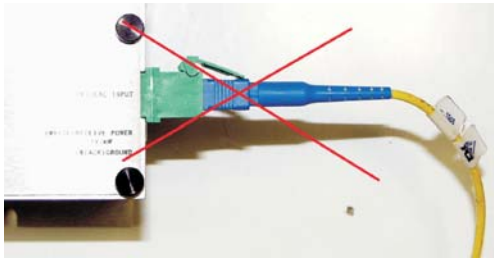
SC Connector: Most widely used connectors in Data Communications applications.

Optical Connector Types (cont.)

Figure 5

SC/APC Connector: The SC/APC connector is growing in popularity. Although the SC/APC will fit perfectly into a standard SC adapter, they are not compatible with SC/PC or SC/UPC connectors due to the angle on the fiber. This can cause problems during system set-up. SC/PC and SC/UPC connectors are usually blue, and SC/APC connectors are usually green to help avoid this error.

Figure 6



SC/APC Connector: Similar to the SC/PC connector, the SC/APC connector offers lower back reflection due to the angle cut on the end of the fiber. This connector is standard on most Olson Technology products.

Just remember, SC/PC and SC/APC don't mix!

Figure 7

Here's a close-up view of the ferrule tips on an SC/UPC connector (blue) and on an SC/APC connector (green). The angled tip o fthe SC/APC connector can be clearly seen.

Optical Connector Care

- Avoid touching the end of the fiber, oils and dirt will reduce optical power level.
- Even if the fiber is new always clean prior to connecting.
- Avoid sharp bends in the cable, this will increase attenuation.
- Never leave a connector unprotected, always keep a protective cap on or leave in an adapter.

Cleaning Optical Connectors

The single mode fiber is only 9µm to 10µm in size which means it doesn't take a very big particle of dust or debris to start affecting signal level. Even if the connector is brand new, just out of the bag, it will need to be cleaned.

The first method is to use a "Kimwipe" or other lint free wipe, dipped in isopropyl alcohol. Fold the wipe in four or so layers, dipped into alcohol, and apply to fiber end. Take another dry wipe and dab any excess alcohol off. If available, use an aerosol duster to blow dry and remove any debris still left on fiber.

The second method is to use a cassette type cleaner such the Reel Cleaner shown in Figure 8. Press the lever to reveal the cassette tape and being careful to try to match the angle cut of the fiber (8° for SC/APC or 0° for SC/PC) rub the fiber in one direction, one time to avoid putting any debris back on the fiber. If available use an aerosol duster to blow any remaining debris off.

Figure 8

Reel Cleaner for cleaning optical connectors

EIA/TIA Standards for Optical Fiber

TSB-62	Informative Test Methods for Fiber Optic Fibers, Cable, Opto-electronic Sources and Detectors,sensors, Connecting And Terminating Devices, and Other Fiber Optic Components
EIA-440-A	Fiber Optic Connector Terminology
EIA-455-A	Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices, and Other Components
EIA-455-1A	Cable Flexing for Fiber Optic Interconnecting Devices
EIA/TIA-455-6B	Cable Retention Test Procedure for Fiber Optic Cable Interconnecting Devices
EIA-455-9	Fiber Optic Test Procedure for Bundle Connector
EIA/TIA-455-13	Visual & Mechanical Inspection Of Fibers, Cables, Connectors and/or Other Fiber Optic Devices
EIA-455-17A	Maintenance Aging of Fiber Optic Connectors and Terminated Cable Assemblies
EIA-455-21A	Mating Durability for Fiber Optic Interconnecting Devices
EIA-455-26A	Crush Resistance of Fiber Optic Interconnecting Devices
EIA-455-34A	Interconnection Device Insertion Loss Test
EIA-455-36A	Twist Test for Fiber Optic Connecting Devices
TIA/EIA-455-158	Measurement of Breakaway Frictional Force In Fiber Optic Connector Alignment Sleeves
EIA-455-172	Flame Resistance of Fire Wall Connector
EIA/TIA-455-187	Engagement and Separation for Fiber Optic Connector Sets
EIA/TIA-4750000-B	Generic Specification for Fiber Optic Connectors
EIA/TIA-475C000	Sectional Specification for Type FSMA Connectors
TIA/EIA-604	Fiber Optic Connector Intermateability Standards
G.652	Single-Mode Fiber
G.662	Optical Amplifier Characteristics
G.664	Optical Safety
G.665	Raman Amplifiers
G.671	Transmission Characteristics of Optical Components
G.680	Physical Transfer Functions of Optical Network Elements
G.694.1	DWDM Frequency Grid
G.694.2	Spectral Grids for CWDM
G.695	CWDM Optical Interfaces

Bellcore Standards for Optical Fiber

GR-326	Generic Requirements for Single-mode Optical Fiber Connectors
GR-1081	Generic Requirements for Field Mountable Optical Fiber Connectors
GR-1435	Generic Requirements for Multi-fiber Optical Connectors
SR-ARH-002744	Single-mode Fiber Connectors Technology
SR-4226	Fiber Optic Connector Certification
TR-73536	Technical Requirements for Optical Connectors

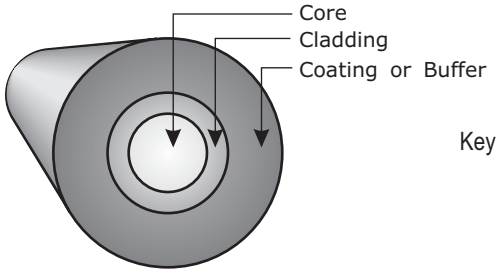


Figure 9 Key parts of an optical fiber.

Typical Olson Technology OTPN-1000 or OTPN-2000 Receiver Set-up

Equipment for Link Set-up:

- Multimeter, any digital voltmeter will due
- Plug-in pads if required. Pad size can be determined later.
- Olson Technology, Inc. Optical Attenuator, Model OTOA-1000

To set the receive optical input level:

- Connect multimeter to Receive Power Test Point and Ground Test Point.
- Connect incoming fiber to Optical Receive Input.
- Read level on multimeter (Should read between 0.25V to 2.0V, -6dBm to +3 dBm).

The factory setting is for $0.8V_{DC}$, -1dBm for +48dBmV output. If the reading is greater than this you may use the Olson Technology OTOA-1000 optical attenuator to adjust the reading down to $0.8V_{DC}$. The attenuator is adjustable by different-sized circular loops of the fiber, this is somewhat of a hit or miss adjustment. The largest of the three loops is 1dB, the middle loop is 2dB, and the smallest is 4dB. The outer "race track" is a strain relief.

If the reading is less than 0.8 V_{DC}, the Pad chart in Figure 10 below is used to select the value of the internal fixed attenuator in the OTPN-1000 or OTPN-2000 for the rated RF output level. To use the chart, look up the voltage reading and read how much you have to reduce the pad from the factory.

The Calculation for the Pad is: Pad = 10*Log(Voltage/$0.8V_{DC}$)

Figure 10

Voltage	Delta Pad Value
+0.1	-9.0
+0.2	-6.0
+0.3	-4.5
+0.4	-3.0
+0.5	-2.0
+0.6	-1.0
+0.7	-0.5
+0.8	0
+0.9	0.5
+1.0	1.0
+1.1	1.5
+1.2	2.0
+1.3	2.0
+1.4	2.5
+1.5	3.0
+1.6	3.0
+1.7	3.5
+1.8	3.5
+1.9	4.0
+2.0	4.0