Launch Cables
How To Use Them Properly

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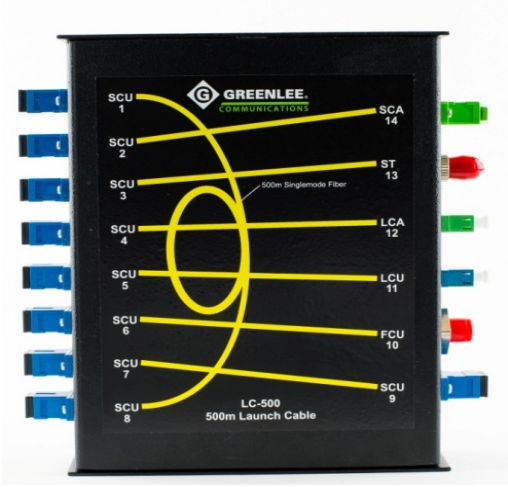
Agenda

- Why use Launch Cables?
- Protect the Connectors
- Cleaning and Inspection
- OTDR Configuration & Trade-offs
- Deadzone Considerations
- Measurement Examples
- Typical Launch Cable Length

Why Use a Launch Cable?

- Sometimes called a Pulse Suppressor or Launch Box
- Be able to view and measure all events especially those masked after the OTDR bulkhead
- Characterize the input and output connectors
- OTDR has highly reflective components
- Compensate for OTDR Deadzone
- Deadzone increases with wider pulse widths

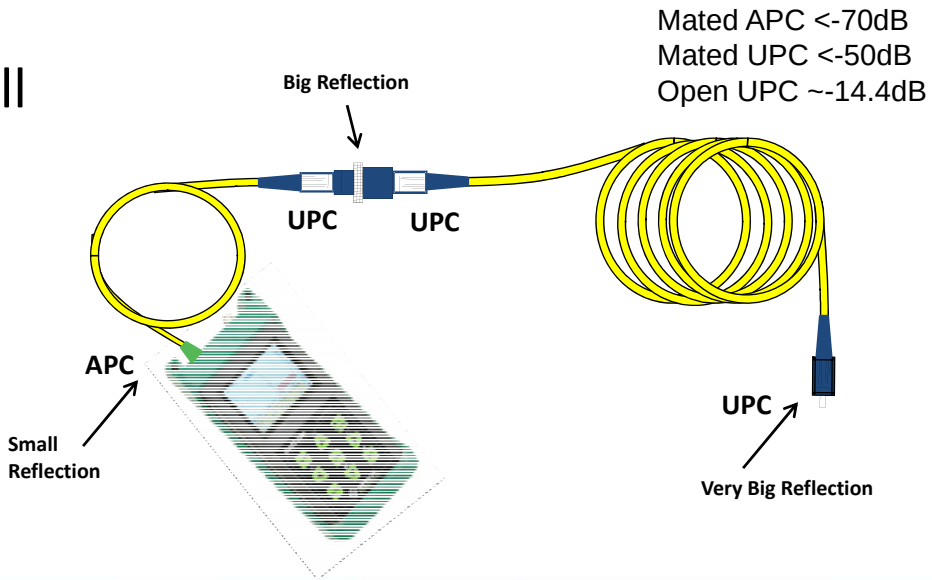


LC-500

LC-2000

Protect the Connectors & OTDR Bulkhead

- Use a 1m jumper at the OTDR bulkhead
- Clean and Clean again! & Inspect
- Contaminated or damaged connectors will cause high reflections which will saturate the OTDR detector
- Use an OTDR with APC connectors

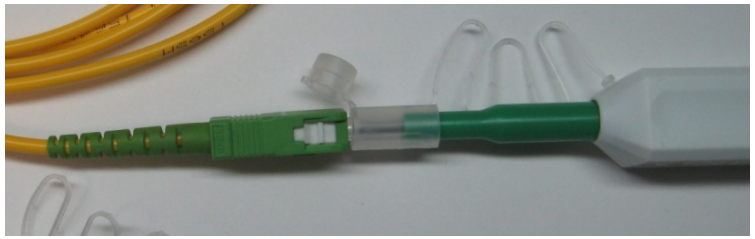


Fiber Cleaning

Connectors must be CLEAN!

- Reel type of cleaners work well
- Pens can clean both ferrule and bulkhead
- 80% of all failures due to not cleaning or improper cleaning

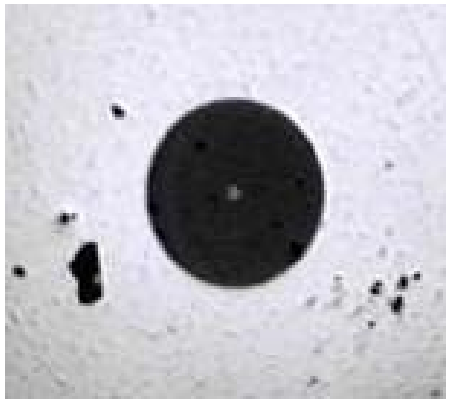
Photo: Courtesy Cletop



The technician will use the pens!

Fiber Scopes

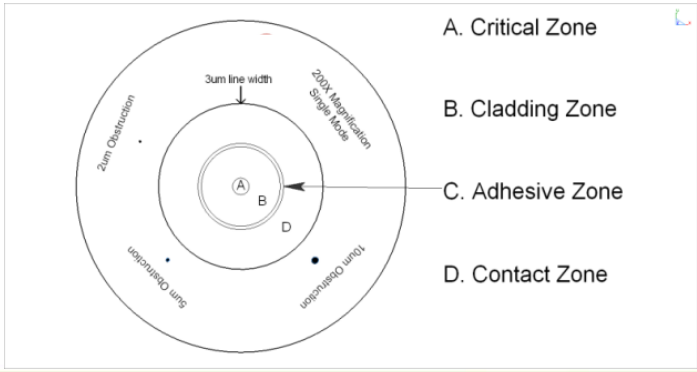
- Validate that connector is clean
- Inspect – Clean if Necessary – Inspect – Then Connect –Replace if Necessary
- Field of View most important specification – must be able to view outside of the four zones
- Contamination can migrate with vibration



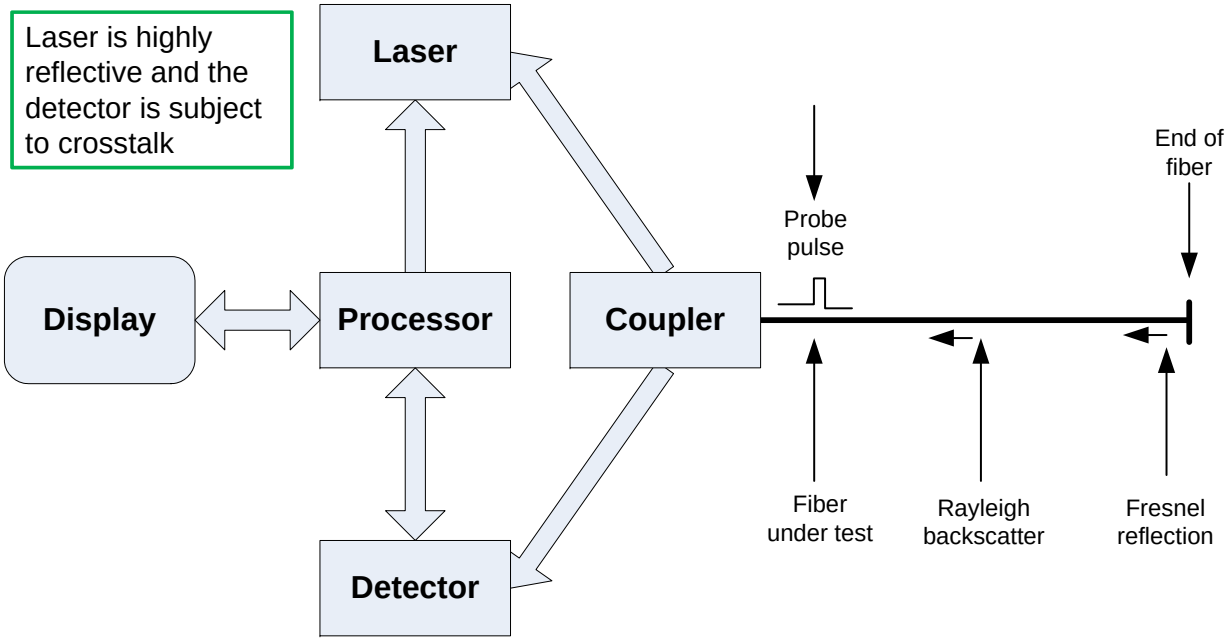
IEC61300-3-35 Specification

Single-Mode Criteria Table

Zone	Description	Diameter	Allowable Defects (Dia)	Allowable Scratches (Width)
A	Critical Zone	25um	None visible at 200X	None visible at 200x
B	Cladding Zone	25 to 120um	Any < 2um	None >3um
			Total of five 2um - 5um	None > 10um
C	Adhesive Zone	120 to 130um	None > 10um	Any scratch OK
D	Contact Zone	130 to 250um	None > 10um	Any Scratch OK

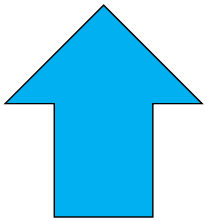


OTDR Configuration



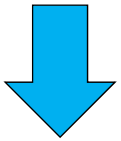
The Optical Time Domain Reflectometer (OTDR) is an instrument that uses the inherent backscattering properties of an optical fiber to detect faults and categorize its condition. The OTDR sends high-power pulses of laser light down the fiber and captures the light that is reflected back (much like a radar system). By measuring the timing and power levels of the return pulses, the instrument correlates the reflected information with physical locations along the fiber and displays a “trace” that shows optical power versus distance. Attenuation of the fiber is displayed as the slope of the trace. Interruptions such as splices, connectors, bends, breaks or flaws in the fiber appear as transitions (“events”) that represent their nature and location.

OTDR Trade-Offs Pulse Width

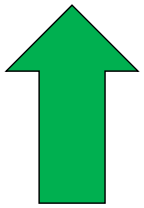


Larger pulse width

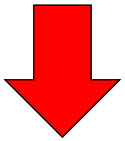
(more energy into the fiber)



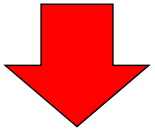
Smaller pulse width
(less energy into the fiber)



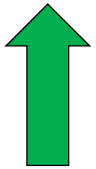
Longer distance measured



Shorter distance measured



Results in lower resolution

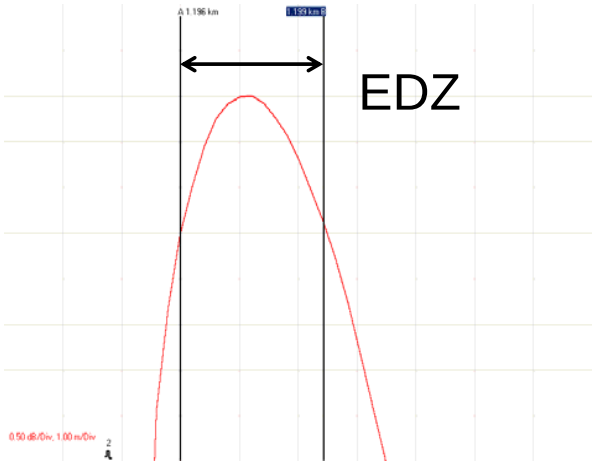


Results in higher resolution

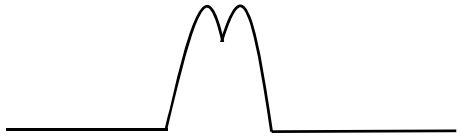
OTDR Event Deadzone

Event Deadzone; typically specified at 1m at smallest pulse width

- The ability of the OTDR to resolve between two reflective events such as poor connectors and over-layed fiber events
- Resolution is quoted at the narrowest pulse width, this results in the poorest dynamic range.
- Measured at 1.5dB from the peak of the -45dB pulse

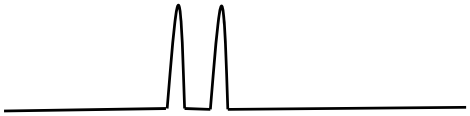


Event Deadzone Considerations



Two pulses closer together than the event deadzone

Results in one pulse being displayed



Using a shorter pulse width will result in the ability to measure two closely spaced events

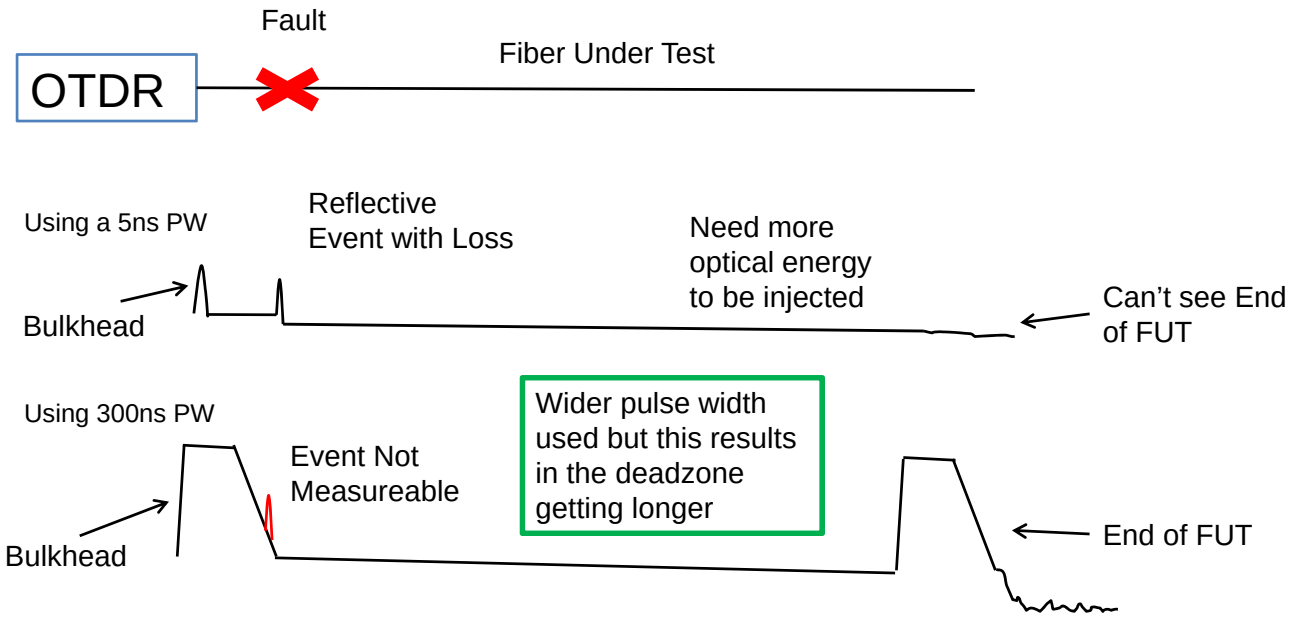
Wider pulse widths are needed to measure longer fibers

OTDR Attenuation Deadzone

Attenuation Deadzone; typically specified at 4m

- The ability of the OTDR to measure a backscatter event (fusion splice) after a reflective event.
- Measured at 0.5dB from the noise floor of the -45dB pulse

If you Don’t Use a Launch Cable



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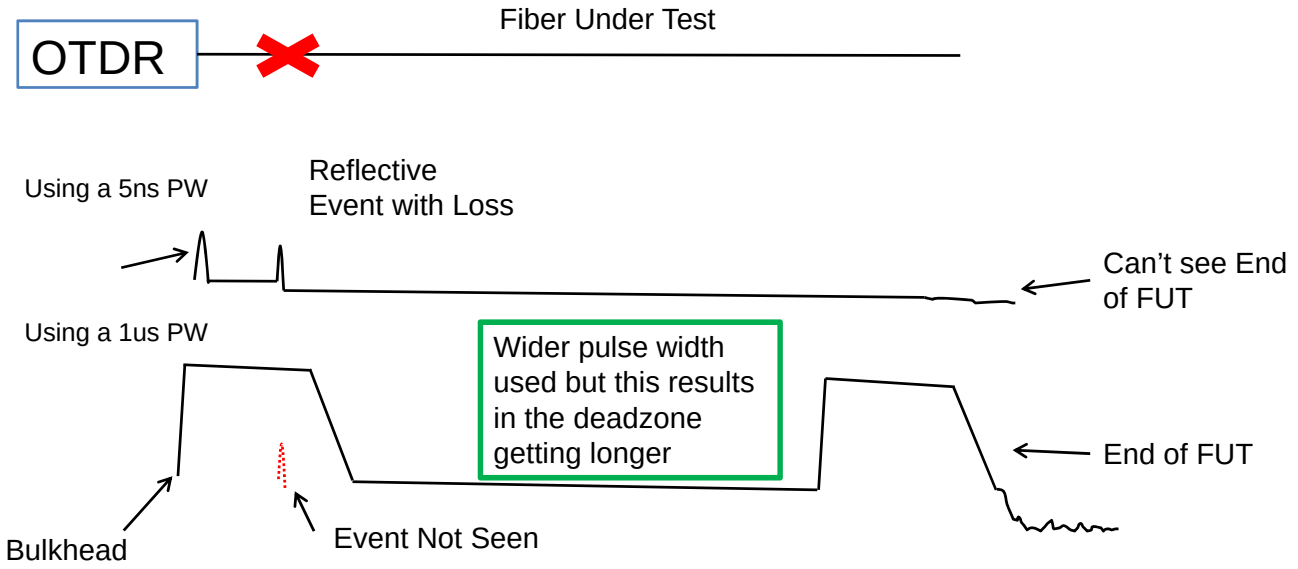
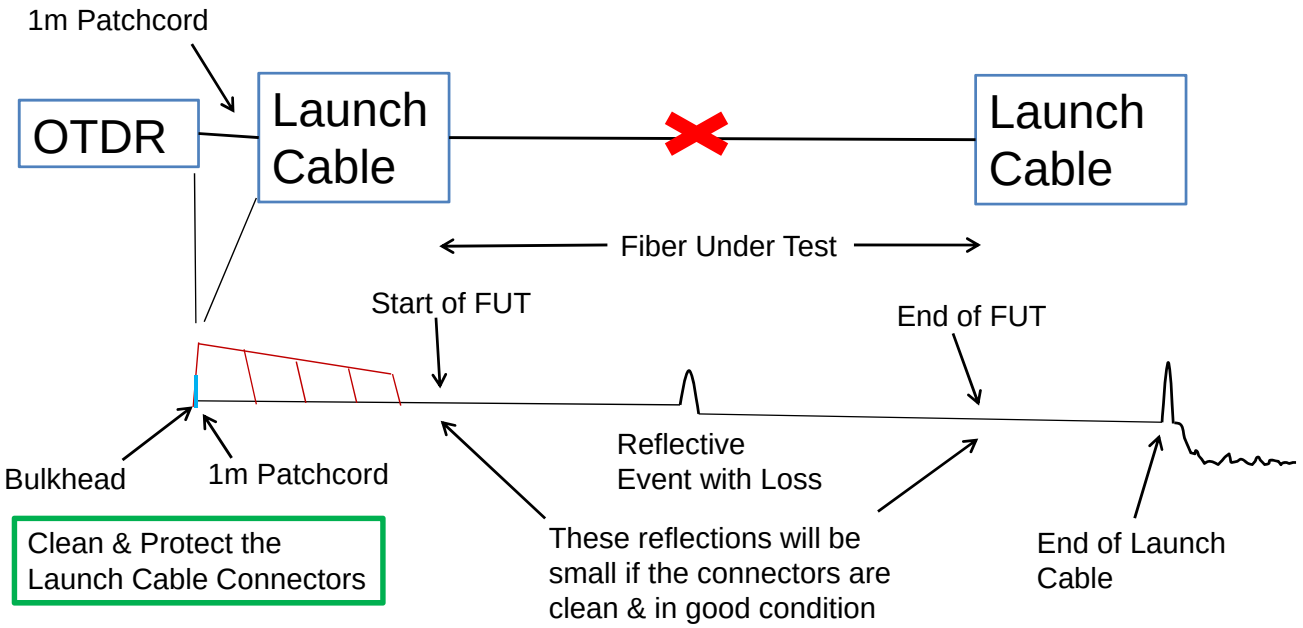


Measurement Using a Launch Cable



How Long of a Launch Cable Is Needed?

Set the Range & Pulse Width to be able to see entire fiber & sufficient backscatter

- c = d/t
- Propagation of light in fiber = 0.2m/ns
- ~10X pulse width (sufficient backscatter required to measure insertion loss)
- Using too long of a launch cable will reduce resolution of the measurements

Pulse Width (ns)	Launch Cable Length (m)
5	100
10	100
30	100
100	200
300	500
1,000	2,000
2,000	2,000
10,000 & 20,000	2,000*

Summary

- Use a launch cable to reduce the effects of the OTDR deadzone
- Be able to measure events that might be hidden by the OTDR probe pulse; troubleshooting & qualification
- Be able to characterize the input and output connectors
- Clean and protect the connectors
- Select the correct length for optimum results