Red Helix

Always evolving. Always there.

LUCIOL INSTRUMENTS

High Resolution Photon Counting OTDR

Luciol LOR-200

An OTDR for applications that require sub-centimetre event accuracy

Aerospace ✓ Rail ✓ Military ✓ Maritime ✓ Oil/Gas ✓ Smart Structures ✓

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An OTDR for applications in demanding environments, where precise accuracy and high reliability are of paramount importance

Luciol's photon counting technique provides order-of-magnitude better resolution than conventional telecoms OTDRs.

Whilst tradional telecoms OTDRs use real-time analogue optical power detection, Luciol's short range fully portable high resolution OTDRs utilise a photon counting technique which brings much better sensitivity, spacial resolution and minimal dead zones

Applications

Optical fibres are being used more and more in aerospace, avionics - commercial and military - on ships and submarines, and a wide variety of land-based examples from trains to military surveillance and next generation combat vehicles.

In many of these cases distances between connectors or splices may be quite short, excess fibre around the joints may be limited, and the access to the link may be restricted. So at the commissioning stage, when final tests are being performed, the higher the resolution the better, and in cases where troubleshooting and repairs are required, precise location information of faults is essential.

Some vehicular systems are now being designed to incorporate an optical tap to eliminate the need to expose any system connectors to any risk of contamination - testing can be performed with an OTDR via a monitoring port before the system is put into service and a comparison done at maintenance or fault-finding stages later in the system's life. This can even be designed to work without taking the system out of service to look for degradation and schedule the next maintenance outage.

Other demanding environments, such as those encountered in the oil and gas industry, are using optical fibres for sensor and communication applications. Since Luciol OTDRs can still achieve high resolution at the end of some kilometres of fibre, they can provide invaluable information on whether a fault is underwater or not - or in other situations, whether in a radioactive zone or not - both of which are potentially significant time savers if the fault is to be shown on the other side of the boundary with easier access.

If manufacture of any products which incorporate optical fibre, for example some fibre lasers, a high resolution OTDR test at each stage enables splices or internal connector losses to be monitored and potentially thrown out for rework, before the whole product reaches the end of the line, only to fail - worst case, catastrophically.

Technology

Over 100 years ago, Albert Einstein introduced the world to the concept of the smallest possible quantum of light – now known as the photon. Over 10 years ago, Luciol's co-founders introduced photon counting techniques to the world of OTDRs to break the sensitivity/bandwidth barrier which was always the limiting factor for traditional measurement systems.

Traditional systems require a sensitive enough detector to make a measurement, but when they want higher resolution they need higher bandwidth, which means lower sensitivity and more noise on the signal. With photon counting, Luciol OTDRs can utilise the highest sensitivity permitted by the laws of physics.

The transition from analogue to digital is performed right at the optical level ensuring simple and robust instrumentation. Luciol's expertise in photon counting technology makes this technology available for portable optical test instruments, which can out-perform their classical analogue counterparts.

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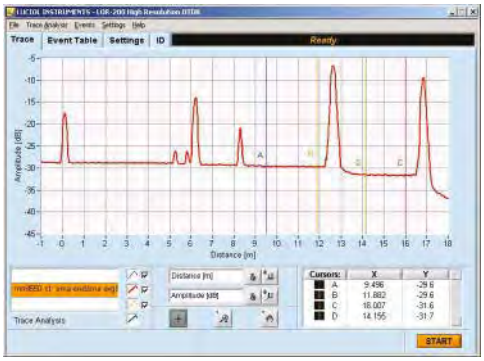
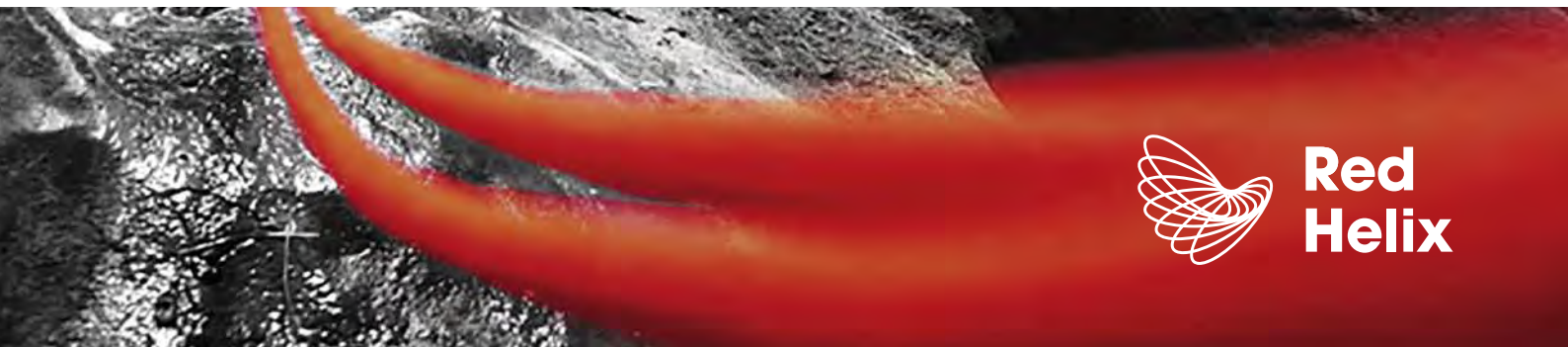
Order-of-magnitude better resolution than conventional telecoms OTDRs

The LOR-200 series all-in-one instruments can go down to cm event resolution using a scanning photon counting technique, whilst the original Luciol v-OTDRs with their sub-ns pulses can resolve events closer together still. Only available in the UK from Red Helix, the LOR-200 is optimised for telecom wavelengths, typically from 1000nm to 1650nm. It has superb resolution and 20cm event dead zone. The optical pulse width is variable from 2ns to 1µs. A wide variety of wavelength options is available – up to 4 different emitters can be integrated in a single module. The fibre options include single mode and multimode versions.



The LOR-220 is the highest resolution instrument of the LOR-200 family, well suited for short range fibre testing in aviation, in military and other vehicles. With its 1ns optical pulse width, industry-leading resolution and 10cm dead-zone, it is optimised for short range fibre assembly testing.

The LOR family now has options for built-in optical power meter (OPM), visible (red) fault locator (VFL) and a USB connector inspection microscope add-on with a wide range of different connector adapter tips, so connector end face images can be viewed on the OTDR screen and saved in internal memory or external drives.



Specifications

Optical

LOR-200

Wavelength options[1] (±10nm):
- 1310nm; 1490nm; 1550nm; 1625nm or
- 1650nm (both with matched filter for active
- PON monitoring)

Fibre Type: Single Mode; Multimode 62.5µm or 50µm
Optical Connector: Universal, APC or PC type, with FC, SC or ST adapter
Optical Pulse Widths: 2ns, 5ns, 10ns, 30ns,100ns, 300ns, 1µs
Measurement Range: 1.25, 2.5, 5, 10, 20, 40, 80, 160km
Distance Units: kilometre, metre, feet, miles, time(ns)
Sampling Resolution: Any multiple of 2.5cm (250ps)
Dynamic Range[2]:
- Return loss: 98dB (-10dB to -108dB)
- Rayleigh Backscattering[2]:
- 30dB for pulsewidth = 1µs (S/N=1)
- 15dB for pulsewidth = 2ns (S/N =1)

Deadzones[2]:
- Event deadzone: 20cm
- Attenuation deadzone[3]: 50cm

Distance accuracy:
- ± (10mm + 5x10-5x[fibre length])
- Reflectance accuracy: ± 1dB

LOR-220

Wavelength options (standard)[1]:
- 670nm, 810nm

Fibre Type: MMF 200µm; Multimode 62.5µm or 50µm
Optical Connector: Universal, PC type, with FC, SC or ST adapter
Optical Pulse Width: 1ns
Measurement Range: 1.25, 2.5, 5, 10, 20, 40, 80, 160km
Distance Units: kilometre, metre, feet, miles, time(ns)
Sampling Resolution: Any multiple of 2.5cm (250ps)
Dynamic Range[2]:
- Return loss: 98dB
- Rayleigh Backscattering: >20dB (S/N=1)

Deadzones[2]:
- Event deadzone: 10cm
- Attenuation deadzone[4]: 40cm

Distance accuracy:
- ± (10mm + 5x10-5x[fibre length])

Reflectance accuracy: ± 1dB

Hardware

Operating system: Windows XP embedded
Processor: AMD Geode 500MHz
RAM: 512MB
Storage: Compact flash 8GB (more optional)
Display: Touchscreen TFT 10.4”; 800X600

Interfaces:
- Ethernet RG45
- 2x USB Type 2
- VGA
- Serial port.

Power rating: 15V; 3.2A
Power input: AC operation with 100 to 240VAC, 50/60Hz universal adapter; DC operation on batteries (Li Ion, 6.6Ah)
Battery operating time: 5h
Battery charging time: 3.5h
Size: 320 x 240 x 90mm
Weight: 3.1kg

Environmental

Operating temperature: 0˚ to +40˚C (32° to 104°F)
Storage temperature: -20˚ to +60˚C (-4° to 140°F)
Humidity: 0% to 90% noncondensing

Options available

OPM[5]
Optical power meter for 670 and 850nm; 1310, 1550 and 1610nm.
VFL
Visual Fault Locator on the OTDR output available with 670nm source option; can also be used as a Fibre Identifier
FM
Fibre microscope; End-face verification of connectors; USB connection; Video displayed on LOR screen.

Ordering information

LOR-200
LOR-20X-FFF-W1(/W2/W3/W4)-CC;
X= # of wavelengths;
FFF= fibre type: SMF, MMF62, MMF50; W1, W2…: wavelengths with source type (FP or DFB lasers, LED), add -F for filtered wavelength;
CC= connector type: ASC, AFC, SC, FC, ST.

Ordering example

LOR-203-SMF-1310DFB/1480FP/1625DFB-F-FC
LOR-200 SMF, with 3 wavelengths, one FP laser at 1310nm, one FP laser at 1550nm, and one DFB laser with optical filter at 1625nm, FC connector.

Other wavelengths and configurations are available on a custom basis. Please contact us with your special requirements.

Notes:

1: Other wavelengths available on request;
2: Typical;
3: At a wavelength of 1310nm;
4: For ORL = 45dB.
5: Preliminary specifications:
- -50dBm to +5dBm for 670 & 850nm
- -60dBm to +5dBm for 1310, 1550 & 1610nm

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