Agilent N7785B Synchronous Scrambler

Data Sheet

Figure 1. N7785B-001 bench-top mainframe

Introduction

The Agilent **N7785B** is a high-speed synchronous scrambler. It contains a polarization controller plus microcontroller- based driving circuitry. This unit can operate in various modes:

As a **synchronous scrambler**, the device switches the SOP of the output signal in a random (pseudo) way. Switching of the SOP occurs within a few microseconds.

The SOP is stable for a predefined time until it again switches to a new SOP.

An electrical trigger input can be used to synchronize the scrambler with external events.

As an **SOP switch** the N7785B allows switching the internal waveplates to user definable angles with very high speed and repeatability.

As a traditional **scrambler**, the Agilent **N7785B** varies the output SOP smoothly in a random/pseudo random way.

The unit does not contain any moving parts, and therefore is robust and withstands even rough environmental conditions.

All above-mentioned applications of the N7785B are supported by Agilent's PC software package which comes with this instrument.

Key Benefits

- Comprehensive polarization control and management capabilities
- Covers S-, C-, and L-band plus 1.3 µm window
- Compact size
- Robust, no moving parts
- PC software package included

Applications

- Recirculating loop experiments:
  - Loop-synchronous polarization scrambling
- System test: polarization sensitivity analysis on link / transmission quality
- Characterization of optical components

Agilent N7785B Instrument Setup and Application Examples

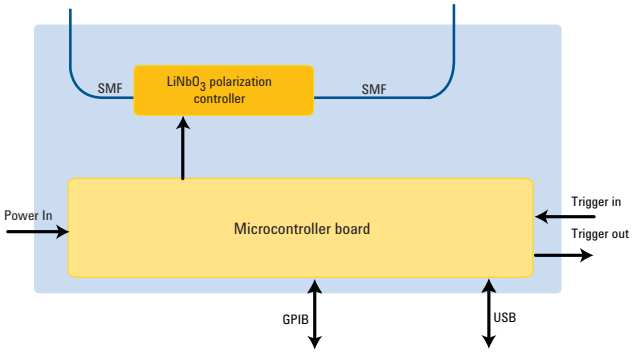

Figure 2. N7785B instrument setup

The instrument setup is shown in Figure 2. The LiNbO3 polarization controller is controlled by a signal processor which supplies user-definable sequences to the polarization controller. In this way, the SOP can be controlled in steps but also continuously. The trigger system provides synchronization capabilities to external digital signals.

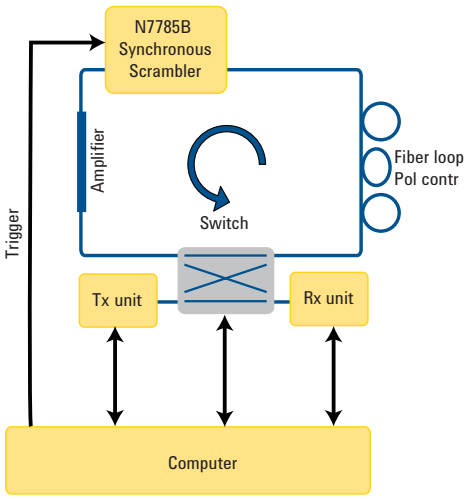

Figure 3. Recirculating loop

The results obtained in re-circulating loop experiments depend heavily on the PMD and PDL properties of the loop. Loop synchronous polarization scrambling schemes have proven to be necessary for generating results comparable to deployed systems.

The synchronized scrambling feature of the N7785B is a unique enhancement to conventional polarization scramblers. The polarization can be scanned according to a pseudo-random but reproducible path. Instead of a continuously changing SOP, the SOP is switched in discrete steps that are synchronized with an input or output trigger signal. After switching, a stable SOP is quickly reached and held until the next step.

The N7785B is ideally suited to provide the synchronous scrambling capability in such experiments.

This is a key capability for providing realistic change of polarization from cycle to cycle around the loop, while providing a stable SOP during passage of the bit train through the scrambler. This avoids the unrealistic effect rapid change of the polarization during the bit train caused by continuous scramblers.

In addition, the N7781B polarization analyzer provides the capability of monitoring the SOP evolution on each round trip.

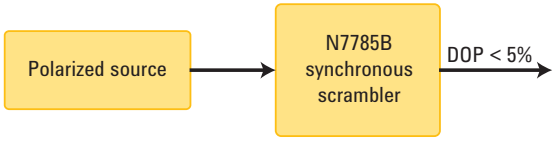

Figure 4. Scrambling/Depolarization

Light emitted by a laser is typically highly polarized. In order to avoid polarization effects it is common in some applications to depolarize light. This can be achieved highly effectively using the N7785B synchronous scrambler unit.

Table 1: Specifications[1)] N7785B Synchronous Scrambler

Wavelength	
Operating wavelength range	1260 nm ... 1640 nm
Polarization Control	
SOP switching time	< 10 µs
Optical Power	
Insertion loss	< 3 dB
Maximum safe input power	20 dBm

1) Ambient temperature change max. ± 0.5°C since normalization. Specification valid on day of calibration.

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