

FIBER OPTIC SPANS

2002 Product Brief

Third Millennium Engineering offers a semi-custom product line of optical fiber transmission line test instruments, collectively called Fiber Optic Spans. These products are designed and made to order for customers involved with research, product development, manufacturing, deployment, operation, and maintenance of fiber optic telecom products. They provide a compact, programmable, optical transmission medium between a fiber optic transmitter and receiver for testing terrestrial and submarine DWDM, Ethernet, Raman Amplifier, and other fiber optic telecom products. TME can supply a variety of fiber optic span arrangements ranging from single-mode, long haul, "superhighways" between kilometers and mega-meters in length to multi-mode, short haul, "streets" between meters and kilometers in length.

Instrument models are organized into single-mode spans, multi-mode spans, and specials with programmable and manual choices. Each semi-custom instrument model is configured with one or more spools of optical fiber of various types and lengths in various arrangements with optical switches, optical amplifiers, optical filters, dispersion compensating fiber, dispersion compensators, and/or many related options. A selected configuration is packaged in a GPIB, RS-232, or USB programmable, worldwide powerable, rack-mountable, mainframe chassis to complete a test instrument. Customers can freely specify the exact model needed from hundreds of possibilities. TME can modify any customized instrument at a later date, as customer needs change or obsolescence occurs.

Variety of Fiber Types Offered

- Single-mode glass: Corning SMF-28™, SMF-28e™, LEAF®, MetroCor™; Alcatel Teralight™, 6900, 6901, 6912; Lucent TrueWave® RS, SRS, XL, AllWave™; other manufacturer's products can be accommodated
- Multi-mode glass: Corning InfiniCor™ series; Alcatel Glight™ 6930, 6931, 6932, 6933; Lucent LaserWave™ 150, 300, GigaGuide™ 50, 50XL, 62.5, 62.5XL; other manufacturer's products can be accommodated
- Multi-mode plastic: Boston Optimega™, Optigiga™; other manufacturer's products can be accommodated
- Dispersion compensating fiber modules: Corning, Furukawa-Lucent, Sumitomo, etc.

Instrument Basic Features

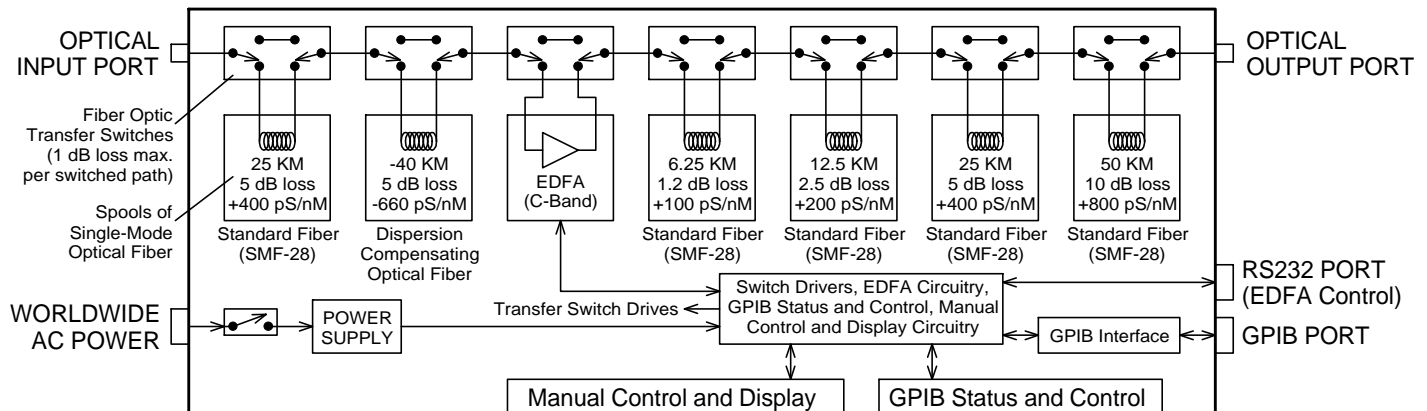
- Worldwide AC powerable, 19" rack mount or bench top mainframe chassis, rear panel mounted optical I/O connectors
- GPIB, RS-232, or USB controlled, manual control via front panel user interface

Variety of Options Offered

- Many arrangements supported using combinations of optical components such as amplifiers (single channel, DWDM, noise injection, etc.), attenuators, couplers, filters, dispersion compensators, power monitors, switches, etc.
- Front panel mounted optical I/O connectors, special customer specified optical connectors or other components
- Merged with other TME products in one mainframe

Price and Delivery

There are literally hundreds of possible fiber optic span models. Call TME or a representative to discuss and refine your Fiber Optic Span needs and request a quote. Terms are typically 50% due at order placement, 50% due after instrument acceptance. Delivery is typically 12 to 16 weeks ARO without expediting, depending on model and options. Visit Third Millennium Engineering at <http://www.tmeplano.com> for the latest information on TME products and services.



Example Block Diagram for Programmable Single-mode Fiber Optic Span
Standard Fiber (SMF-28) and 40 KM Dispersion Compensating Fiber with C-band Optical Amplifier
0 to 118.75KM in 19 steps of 6.25KM (-660 to +1900 pS/nM in 100 pS/nM steps @ 1550 nM)

Third Millennium Engineering

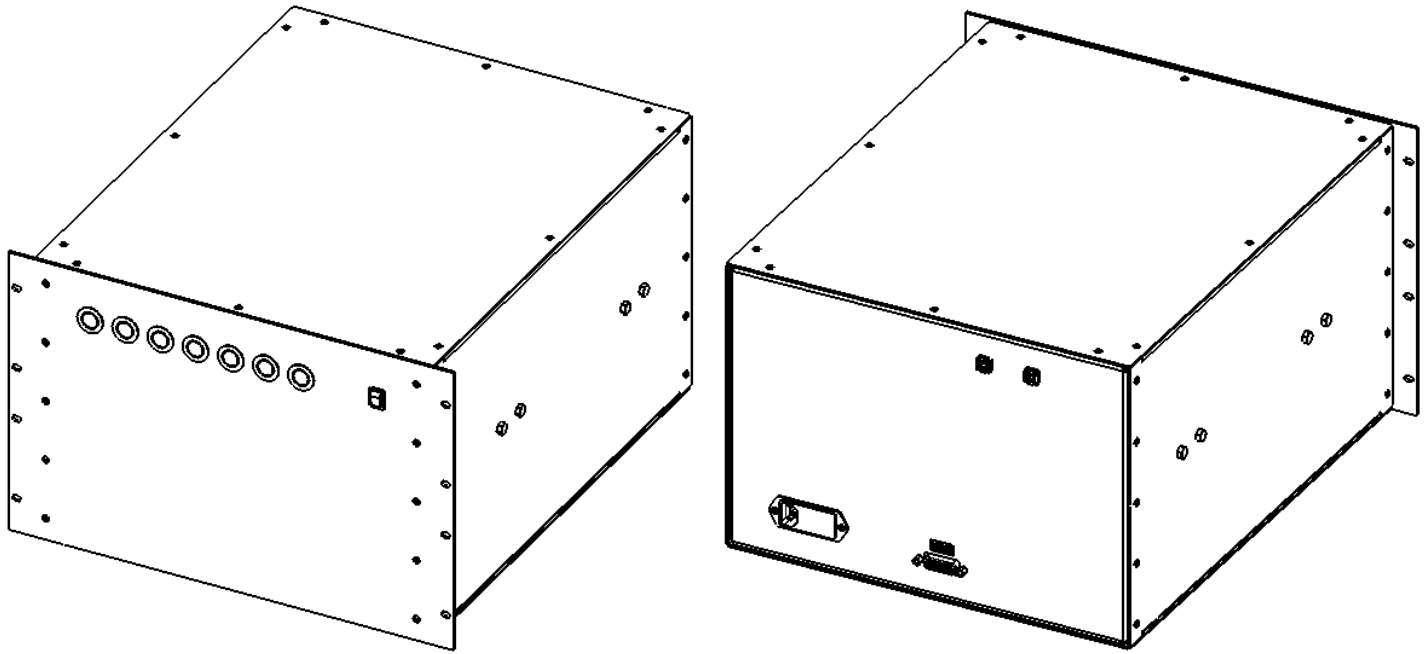
*Helping customers create and manufacture
advanced technology products for our future*



Box 867178, Plano, Texas 75086-7178 USA

Phone (972) 491-1132 Fax (972) 618-8941

sales@tmeplano.com www.tmeplano.com



Example Fiber Optic Span Test Instrument (Programmable 7 Spool, EDFA Instrument shown, 7U height)

Example Single-Mode Fiber Optic Span Models

Item	Brief Description	Price USD
1	Standard Fiber (SMF-28), 40KM Dispersion Compensating Fiber, C-band DWDM Optical Amplifier Programmable and Manual control, 0 to 118.75 KM in 19 steps of 6.25 KM, -660 to +1900 pS/nM in 100 pS/nM steps @ 1550 nM	\$133,000
2	Standard Fiber (SMF-28), C-band DWDM Optical Amplifier, 0 to 118.75 KM in 19 steps of 6.25 KM Programmable and Manual control, 0 to +1900 pS/nM in 100 pS/nM steps @ 1550 nM	\$109,750
3	Standard Fiber (SMF-28), 0 to 118.75 KM in 19 steps of 6.25 KM Programmable and Manual control, usable at 1310 nM and 1550 nM regions	\$91,250
4	Standard Fiber (SMF-28), 118.75 KM in 6 spools of various lengths Fiber only – no switches, usable from ~800 nM to ~1700 nM	\$60,750

Example Single-Mode Options (others available)

Item	Addon to Item	Model Options	Added Price
5	1	Total 20 KM Dispersion Compensating Fiber (replaces 40 KM DCF)	-\$6,000
6	1	Total 80 KM (2x40 KM) Dispersion Compensating Fiber with added switch and C-band DWDM Amplifier	\$51,000
7	1	Total 120 KM (3x40 KM) Dispersion Compensating Fiber with added switch and C-band DWDM Amplifier	\$78,000
8	1, 2, 5-7	Total 218.75 KM (4x25 KM addon) Standard Fiber (SMF-28) with added switches and C-band DWDM Amplifier	\$75,000
9	1-3, 5-7	1X2 optical input selector switch and 1x3 optical output distributor switch	\$8,000
10	1-3, 5-7	Programmable signal to noise ratio via optical amplifier noise injection, optical attenuators, optical coupler	\$33,000

Note: All listed prices and specifications may change without notice, made firm upon quote.

OTHER TME PRODUCTS

All TME semi-custom functional test instruments are GPIB, RS-232, or USB programmable, worldwide powerable, and ESD compliant.

- **FIBER OPTIC TRANSLATORS:** Digital and/or analog fiber optic transmitter, receiver, and transceiver test instruments. 1 to 16 channels, NRZ or RZ or CRZ or other modulation, 50 Mb/s to 43 Gb/s, any clock recovery rate, fixed or tunable 850 or 1310 or 1550 nM bands on ITU grid, single-ended or differential electrical I/O, AC or DC coupling, polarity reversal. Options such as SBS suppression, channel ID, optical leveling attenuators, optical power monitor.
- **FIBER OPTIC TRIGGERS:** Fiber optic sampling oscilloscope trigger test instruments using clock recovery technology. Models with 1 to 6 separate triggers, any rate between 9.5 Gb/s and 11.5 Gb/s, 1310 nM or 1550 nM, -5 dBm to +10 dBm optical power range, options for -20 dBm sensitivity and analog electrical data output. All-optical clock recovery models developed on request for 39 Gb/s to 65 Gb/s trigger rates.
- **FEC TRANSLATORS:** Electronic transmitter, receiver, and transceiver test instruments used for Forward Error Correction (FEC) of 2.5, 10, and 40 Gb/s telecom signals. 1 to 4 channels models offered for ~10 Gb/s SONET/SDH or Ethernet to G.975, G.709, or SuperFEC data rates.
- **ELECTRONIC TRANSLATORS:** Electronic transmitter and receiver test instruments for conversion, splitting, or scanning between common logic levels and telecom DS1, DS3, and other levels.
- **TELECOM SWITCH MATRICES:** Multi-channel, telecom specific RF, microwave, and optical switch matrices. Routes fiber optic, microwave, RF, DS3, DS1 signals between telecom product and test equipment. Channel loop-back, daisy chain, daisy bypass, float, terminate, short, channel test access modes.
- **“MR. HORIZON” TEST FIXTURES:** Flexible, economical, recyclable functional test fixturing system, standardizes ~75% of test fixturing. Fixture quick-connects to a base with multiple DC power supplies, digital/analog I/O, fiber optics/RF/microwave I/O, pneumatics, and temperature control.
- **FULL CUSTOM PRODUCTS:** Technical and business consulting, multi-disciplinary engineering and design, low volume manufacturing and construction, system integration. Product Design, Prototype, and Pre-Production - hybrids, MCMs, sub-assemblies, modules, equipment, systems. Expertise with fiber optic, electronic, RF, microwave, sensors, analog, digital, interface, power, transmission lines, thermal, EMI/RFI, mechanical design, packaging, pcb assemblies, advanced packaging and technologies, etc. Functional Test Systems – consoles, fixtures (single or multiple head, precision, multi-technology, etc.), custom and commodity equipment, console-fixture interfaces, software, cabling, etc. for research, product development, or manufacturing.