Test Evolution Ltd

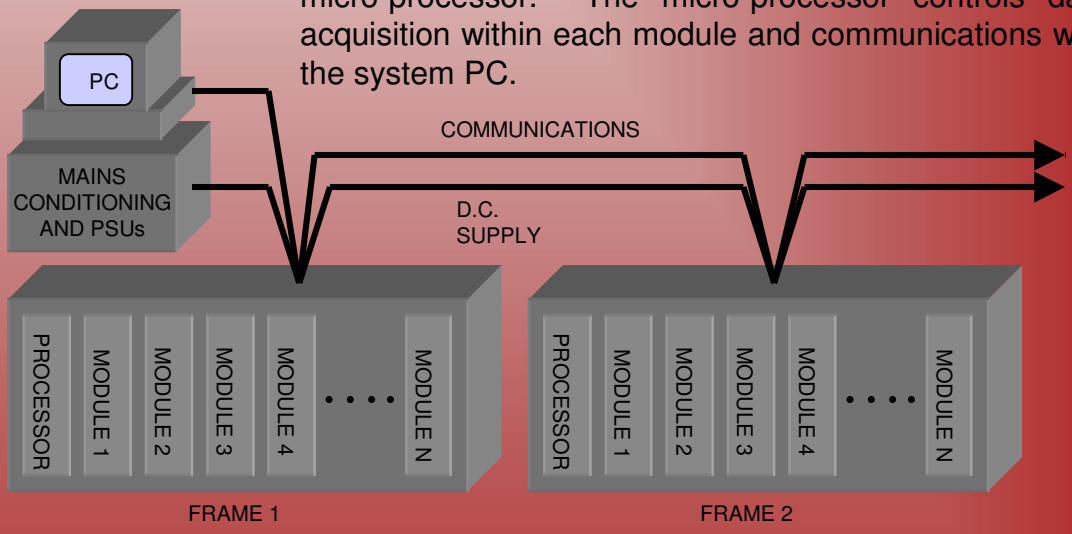
Multi-channel Optical Loss Measurement System

Test Evolution Ltd's multi-channel fibre optic loss test system was developed to provide a distributed versatile solution for the automated testing of fibre optic systems and interconnections. The system is highly modular, with an architecture which can easily be expanded and with low maintenance. Central to the system are the receiver/transmitter (RX/TX) modules of which one per point of connection to the product or system under test would be required. Each module can either launch or detect the optical signal allowing many multiple loss measurements to be carried out simultaneously, reducing test times to a minimum.

The system is controlled by comprehensive PC based software allowing the user to quickly define the interconnection between the test equipment and product, run tests and then analyze results.

System Architecture

Each module card frame enclosure shown in the diagram below consists of a (customer specified) number of RX/TX modules up to a maximum of 32, and a local micro-processor. The micro-processor controls data acquisition within each module and communications with the system PC.



Each frame can either be powered from 110/240 a.c. mains or from a 48V d.c. supply to provide a safe operating environment in a highly distributed system. The d.c. supply can be provided by a PSU conditioning chassis situated close to the PC with the supply fed down the cabling used for communications.

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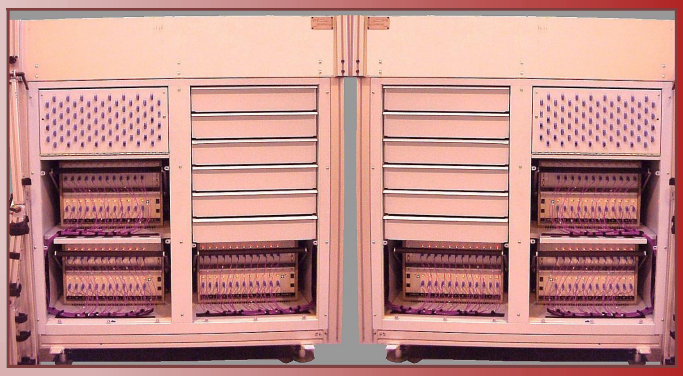
Due to the modularity of the test system architecture the packaging of the system can be specified by the customer to suit their own production test requirements. For example all modules and card frames can be packaged into one larger rack or a smaller number of modules can be packaged into several smaller frame enclosures distributed around the system under test. Frames can easily added in the future if the test requirement changes.

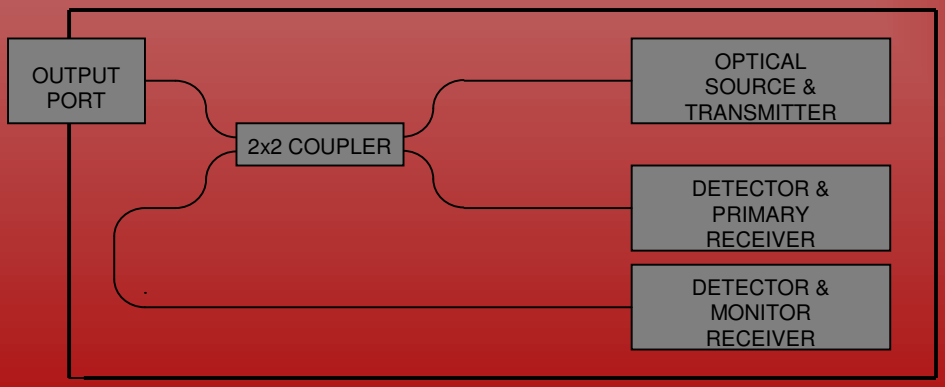
The picture on the left shows a 48 channel system constructed of two 24 channel frames packaged into a mobile trolley. The picture below shows a 144 channel system constructed as six 24 channel free standing frames.



The Optical ports on each module are normally linked to a 'patch panel' with a short length of optical fiber to provide a working interface to the product or system under test which can easily be cleaned and maintained.

Module Design

Each module contains a two optical detectors and one optical source linked with a 2x2 optical coupler as shown in the diagram below. The types of detectors, sources and fibre used in the coupler are project / customer dependant. When in transmit mode the source is enabled and the monitor receiver used to provide a measurement of the light launched from the optical output port. When in receive mode the source is disabled and the primary receiver used.



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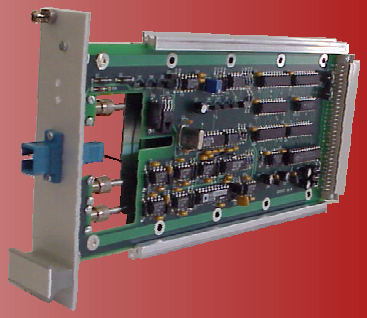
The calibration parameters for both receivers and the transmitter in each module are stored locally on each module and are uploaded to the PC at the start of a test. This means that modules can be interchanged seamlessly (I.e. for maintenance). All the PC then needs to make loss measurements is to take a measurement from the monitor receiver on one module and measurements from the primary receiver on any number of other modules, coupled with the relevant calibration values for the receivers used.

The module uses a modulated transmitter and receiver design to eliminate the effects of stray light entering the optical system at visible and near visible optical wavelengths.



Software

The following options are available to the user through a simple menu driven interface suitable for a production environment :

•Optical Testing

On selection of this option the user is first taken through a series of connection instructions, as defined in a test file, detailing how to connect the system to the system under test. A visual indication of loss is given at this stage using a low accuracy fast measurement mode to give an immediate indication of a bad or dirty connection. On successful completion of the connection instructions the user enters the measurement menu where a full automated measurement of the whole system or individual measurements of specific paths made. Measured data can be presented in tabulated, graphical or summary format. Any failed optical losses are highlighted.

•Test File Editor

Allows the user to create new or edit existing test files which define such things as the inter-connections between the test equipment and system under test and pass / fail limits associated with individual optical paths.

•File Management

Allows results stored in previous measurements to be viewed, re-printed and compared with current results.

•System Calibration

An option to automate calibration of the modules.

•System Configuration

Contains a submenu allowing all system variables to be altered, I.e. number of units and modules attached to the system, communication link parameters, user passwords, directory structure, etc.

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Typical System Specification

Wavelength	Project / Application Specific
Fiber Type	Project / Application Specific
Loss Measurement Range Range 1 Range 2	 0 to –15dB -10dB to –25dB
Display Resolution	0.01dB
Measurement Stability	<0.01dB
Measurement Accuracy (of electronics)	<0.01dB
System Measurement Accuracy	Application Specific – dependant on optical connector type
Measurement Repeatability	Application Specific – dependant on optical connector type

Contact Information

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