Model 410

**SDI-OVER-FIBER
TRANSPORT SYSTEM**

STUDIO TECHNOLOGIES INC.

The Model 410 SDI-Over-Fiber Transport System is a high-performance, cost-effective "throw-down" or rack-mounted solution for distributing digital video signals over short and medium distances. The system is compatible with all common broadcast serial digital video formats and is suitable for use in remote trucks, live-event video distribution, and fixed links associated with broadcast and production facilities. Three Model 410 versions are available, providing a range of input and output configurations. The SDI transport capabilities, user support features, and compact form factor make the Model 410 a highly unique product.

Model 410 General Features:

- Multi-channel electrical-to-optical (E2O) and optical-to-electrical (O2E) SDI transport

- Three format-independent SDI data paths over one single-mode optical fiber

- Supports 3G (SMPTE 424M), HD (SMPTE 292), and SD (SMPTE 259M) SDI, as well as DVB-ASI

- Fiber transport based on the SMPTE 297 standard

- Powered by 10-18 Vdc external source; optional Anton-Bauer® battery mount available

- Ethernet port provides system configuration and performance monitoring using web pages or SNMP

- Front-panel features include status display, navigation buttons, power switch, and LED indicators

- "Half-rack" enclosure weighs less than 2 pounds (0.9 kg)

Model 410-3T Features:

- Three SDI inputs, each with re-clocked loop-through output

- One single-mode optical output, transporting three SDI signals using WDM/CWDM multiplexing

- Configurable laser on/off output control

Model 410-3R Features:

- One single-mode optical input, WDM/CWDM de-multiplexed to three re-clocked SDI signals

- Three SDI output channels, each with two independently buffered outputs

- Monitoring of optical receive levels and SDI signal status

Model 410-3T/3R Features:

- "Transceiver" with three SDI inputs and three SDI outputs

- One single-mode optical output and one single-mode optical input

- Monitoring of optical output and input levels

Overview

The Model 410 SDI-Over-Fiber Transport System consists of half-rack "thrown-down" units that are factory configured from among three available choices. These configurations allow the needs of specific applications to be directly supported. The Model 410-3T is a 3-channel electrical-to-optical (E2O) unit. The Model 410-3R is a 3-channel optical-to-electrical (O2E) unit. For "transceiver" applications the Model 410-3T/3R provides three channels of electrical-to-optical (E2O) and three channels of optical-to-electrical (O2E) transport. Each unit's front panel features a day-/night-readable color backlit display, menu navigation buttons, status LEDs, and power on/off switch. The back panels include connections for DC power, ST or SC (optional) optical connectors, BNC connectors, and an RJ45 jack for the Ethernet interface.

Technology

The Model 410 uses a novel hardware implementation to transport three SDI signals over one single-mode optical fiber. The three SDI signals, at rates of up to 2.97 Gb/s, are transported over one fiber at wavelengths of 1310, 1490, and 1550 nm. In typical applications the launch power is such that signals can be transported over a minimum distance of 10 kilometers.

SDI input signals can be SD (270 Mb/s), HD (1.485 Gb/s), or 3G (2.97 Gb/s). 3G signals can be in either Level A or Level B format. The inputs also support video signals in the DVB-ASI (270 Mb/s) format. Each of the Model 410's SDI input channels is independent, allowing any combination of rates/formats to be transported.

Associated with each of the Model 410-3T's SDI inputs is a re-clocked and buffered loop-through output. These can be extremely useful, allowing a signal source to be routed to an input on a related piece of equipment. The SDI inputs on the Model 410-3T/3R are re-clocked but panel-space limitations prevent loop-through outputs from being provided.

The optical input on the Model 410-3R and Model 410-3T/3R units receive their signal via one single-mode fiber. The optical input is de-multiplexed into three optical channels, which are converted into electrical signals. Each of these SDI signals is then re-clocked and sent to SDI output drivers. With the Model 410-3R each SDI signal has two independent outputs. Space limitations dictated that the Model 410-3T/3R provides one SDI output per channel.

Operating Power

The Model 410 is powered using an external source of 10-18 volts DC that is connected via a broadcast-standard 4-pin XLR

connector. Included with each unit is a compact 100-240 volt input/12 volt DC output power supply. An optional Model 410 cover assembly provides an Anton-Bauer QR-Gold mount, allowing direct attachment of a broadcast-standard rechargeable battery. With the Model 410's modest energy requirement one battery can support operation for many, many hours.

Model 410-3T Back Panel

Model 410-3R Back Panel

Model 410-3T/3R Back Panel

Remote Monitoring and Configuration

The Model 410 has an embedded web server that allows the user to monitor system status through any web-enabled device such as a personal computer or smartphone. System status can also be communicated using SNMP, making it possible to integrate the unit's monitoring information into a networked alarm and control software application.

The Model 410's status screen lets a user or supervisor check the status of SDI input and output channels, signal rate, and whether the optical transmitters are enabled. The optical output power of each electrical-to-optical (E2O) channel is reported directly in dBm. The optical receive power (in dBm) of an optical-to-electrical (O2E) channel is also displayed. This is a particularly useful feature for remote system troubleshooting.

The embedded web server also provides a configuration menu, allowing a variety of monitoring parameters to be set. These include enabling alarms for loss of SDI inputs and outputs, low optical transmit and receive levels, and excessive temperature. Additional menu screens provide access to SNMP, network IP address, and front-panel display configurations. Advanced features include the ability to remotely update the Model 410's system firmware via the Ethernet connection.

Simple Installation

While the Ethernet-accessed monitoring and configuration functions enhance the utility of the Model 410 they are not necessary for basic SDI-over-fiber transport operation. Model 410 units will deliver reliable, high-quality performance with no other user actions outside of making SDI-over-coaxial cable, fiber, and power connections. All back-panel connectors are clearly labeled for simple, fast, and intuitive use. And the front-panel display provides direct access to the unit's most important status information.

The Model 410 is housed in a small, rugged, and lightweight aluminum enclosure that is designed to be "road tough." It can be used in this manner as a standalone portable unit for "throw-down" applications. Two rack-mount options are also available allowing one or two units to be mounted in one space (1U) of a standard 19-inch rack enclosure.

Model 410 Specifications

Ethernet Interface:
Type: 10/100, auto MDI/MDI-X
Connector: RJ45 (8-pin modular)
Status LEDs: 2, link and activity
Supported Protocols: HTTP, SNMP, DHCP, DNS

Display: vacuum fluorescent (emissive) with color LED backlighting

Power Requirement:
10 to 18 volts DC, 1.7 A maximum @ 10 volts.
Universal mains input/12 volt DC output power supply shipped with each unit.
Connector: 4-pin male XLR-type
Battery Operation: optional cover with Anton-Bauer® QR-Gold mount available (M410BMA-1)

Dimensions – Standard Portable "Throw-Down" Version (Overall):
8.7 inches wide (22.1 cm)
1.72 inches high (4.4 cm)
8.00 inches deep (20.3 cm)

Mounting Options: single-unit (M410RM-1) or dual-unit (M410RM-2) rack-mount front panels; each uses one space (1U) in a standard 19-inch rack

Weight: 1.8 pounds (0.82 kg)

SDI Inputs:
Quantity: 3, Model 410-3T and Model 410-3T/3R
Data Rate: 270 Mb/s to 2.97 Gb/s
Supported Standards: 3G-SDI (SMPTE 424M), HD-SDI (SMPTE 292), SD-SDI (SMPTE 259M), DVB-ASI (AES3 digital audio transport not supported)
Connector: BNC, 3G-SDI optimized, gold plating on center pin, per IEC 61169-8 Annex A
Type: unbalanced
Impedance: 75 ohms

SDI Loop-through Outputs:
Quantity: 3, Model 410-3T only
Source: re-clocked copy of input
Data Rate: 270 Mb/s to 2.97 Gb/s
Supported Standards: 3G-SDI, HD-SDI, SD-SDI, DVB-ASI
Connector: BNC, 3G-SDI optimized, gold plating on center pin, per IEC 61169-8 Annex A
Type: unbalanced
Impedance: 75 ohms
Level: 800 mV p-p, nominal

Optical Output:
Compliance: SMPTE 297 (as applicable)
Fiber Type: single-mode
Connector: ST PC (SC optional)
Multiplexed Wavelengths: 1310 nm (FP), 1490 nm (DFB), 1550 nm (DFB)
Launch Power: −3 dBm nominal @ 1310 and 1550 nm; −1 dBm nominal @ 1490 nm
Typical Fiber Length: 10 km minimum

Optical Input:
Compliance: SMPTE 297 (as applicable)
Fiber Type: single-mode
Connector: ST PC (SC optional)
Wavelengths Supported: 1310 nm, 1490 nm, and 1550 nm
Receive Sensitivity: −17 dBm, nominal @ 2.97 Gb/s
Maximum Input Power: −3 dBm, nominal

Digital Video Outputs:
Quantity Model 410-3R: 6 (3 pair)
Quantity Model 410-3T/3R: 3
Data Rate: 270 Mb/s to 2.97 Gb/s
Supported Standards: 3G-SDI, HD-SDI, SD-SDI, DVB-ASI
Connector: BNC, 3G-SDI optimized, gold plating on center pin, per IEC 61169-8 Annex A
Type: unbalanced
Impedance: 75 ohms
Level: 800 mV p-p, nominal

Specifications subject to change without notice.

Model 410 Available Configurations

Model 410-3T Back Panel (Order code: M410-3T)

The Model 410-3T provides electrical-to-optical (E2O) conversion of 3 SD/HD/3G-SDI inputs to 1 single-mode optical output. BNC input and loop through connectors (6 total); ST optical output connector (1 total).

Model 410-3R Back Panel (Order code: M410-3R)

The Model 410-3R provides optical-to-electrical (O2E) conversion of 1 single-mode optical input to 3 pairs of SD/HD/3G-SDI outputs. ST optical input connector (1 total); BNC SDI output connectors (6 total).

Model 410-3T/3R Back Panel (Order code: M410-3T/3R)

The Model 410-3T/3R provides both electrical-to-optical (E2O) conversion (3 SD/HD/3G-SDI inputs to 1 single-mode optical output) and optical-to-electrical (O2E) conversion (1 single-mode optical input to 3 SD/HD/3G-SDI outputs). BNC SDI input and output connectors (6 total); ST optical output and input connectors (2 total).

Model 410 Mounting Options

Model 410 Unit mounted in a Single-Unit Rack-Mount Front Panel (Order code: M410RM-1)

Two Model 410 Units mounted in a Dual-Unit Rack-Mount Front Panel (Order code: M410RM-2)