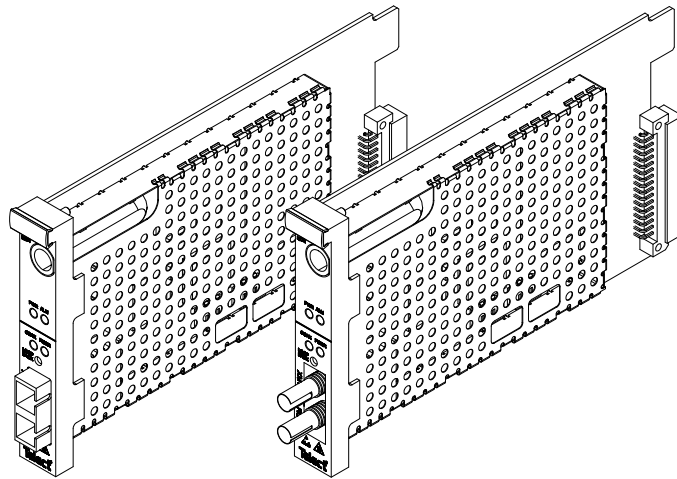


Vector Standard Optical Transport Module

Installation Guide



Vector Standard Optical Transport Module

Installation Guide 127539-1 A0

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About Telect

Telect offers complete solutions for physical layer connectivity, power, equipment housing and other network infrastructure equipment. From outside plant and central office to inside the home, Telect draws on more than 25 years of experience to deliver leading edge product and service solutions. Telect is committed to providing superior customer service and is capable of meeting the dynamic demands of customer and industry requirements. This commitment to customer and industry excellence has positioned Telect as a leading connectivity and power solution provider for the global communications industry.

Technical Support

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Vector Standard Optical Transport Module

Installation Guide

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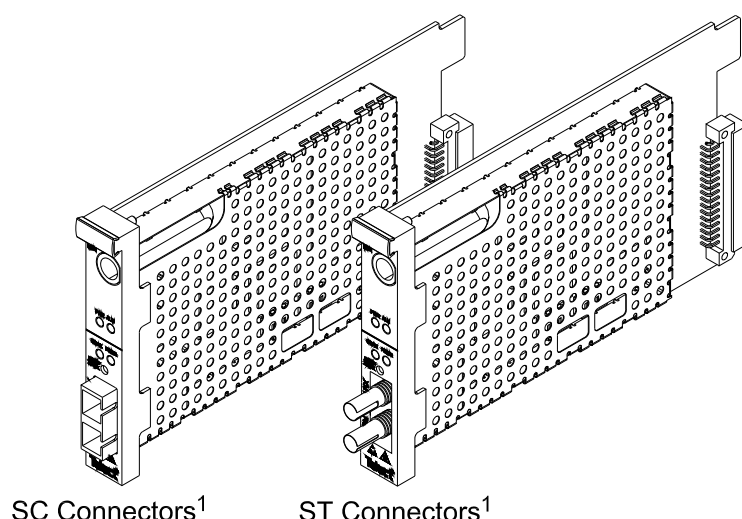
Vector Standard Optical Transport Module

Installation Guide

1.1 Overview

Telect's Vector Standard Optical Transport Module (OTM) provides bi-directional electrical / optical signal conversions in point-to-point applications up to 50 km in single-mode applications.

Telect's OTMs are designed for use in pairs at each end of an optical data link. Each module fits a single module space in one of several Telect Broadband Connectivity System II chassis (19 in. or 23 in.; horizontal or vertical, Models 010-0000-2401BCS, 010-0000-3201BCS, 010-0000-0471BCS, and 010-0000-1471BCS) or in Telect's standalone wall-mount enclosures.



1. Shown without adapter plugs. All Vector products include protective "dust cover" plugs.

Figure 1 - OTM Models

OPMs are available with ST or SC connectors in single-mode or multimode formats.

| Basic OTM Model | Description |
|--|---|
| Modules Only | |
| 710-3201-1001-U | Multi-Mode with ST Connectors |
| 710-3201-1002-U | Multi-Mode with SC Connectors |
| 710-3201-2001-U | Single Mode with ST Connectors |
| 710-3201-2002-U | Single Mode with SC Connectors |
| 710-3201-2102-U | Single Mode with SC Connectors, Hardened* |
| Module (1), Front Spacer, & Rear Spacer in a Standalone, Wall-Mount Chassis | |
| 710-1001-1001-U | Multi-Mode with ST Connectors |
| 710-1001-1002-U | Multi-Mode with SC Connectors |
| 710-1001-2001-U | Single Mode with ST Connectors |
| 710-1001-2002-U | Single Mode with SC Connectors |

| Basic OTM Model | Description |
|---|---|
| 710-1001-2102-U | Single Mode with SC Connectors, Hardened* |
| * Extended operating temperature range. | |

Standard OTMs feature

- Major and Power Alarming
- Selectable T3, E3, and STS-1 signal rates
- ST or SC optical connectors
- Single- or multimode
- Can be located up to 900 ft from remote network element (using 734 or RG-59 coaxial cable)
- Point-to-point applications up to 50 km
- Front mini-WECO monitor jack for coax input (received electrical signal)
- LED indicators for loss of optical/electrical signal and loss of power
- Built-In electrical/optical loopback (selectable at front of module), along with status LEDs
- Compatible with Telect's BCSII & standalone wall-mount chassis
- Low Power — Low Heat Dissipation
- Universal Voltage (20-to-60Vdc)
- Approved: FCC Part 15, Class A; UL/CSA 1950

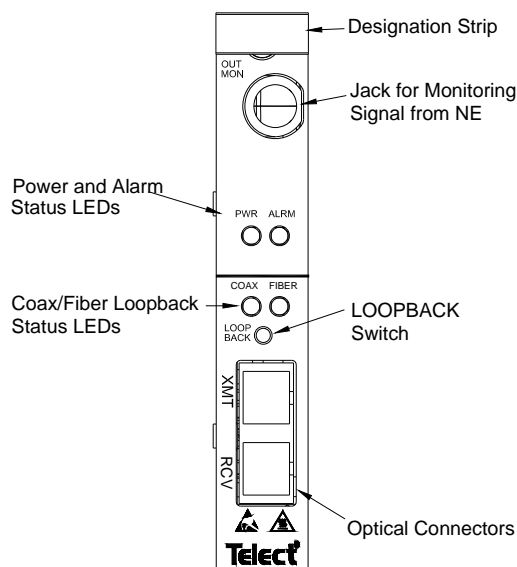


Figure 2 - Features

(!) ALERT

ALERT! Only qualified personnel may install and maintain this product. Verify all connections meet requirements specified in local electric codes or operating company guidelines before supplying power. Protect this equipment with a fuse or breaker sufficient to interrupt power to the applicable chassis. For power supply and interruption, refer to the product specifications in Section “1.2 Specifications” on page 3.

(!) ALERT

ALERT! Handle Vector OPMs along their edges. DO NOT touch components on the printed circuit portion of the module. OTMs contain static-sensitive components that can be damaged or degraded by static discharge.

Please read these instructions carefully before beginning installation. If you need assistance call Technical Support at 888-821-4856 (domestic calls), or 509-921-6161 (Option 2), or eMAIL us at getinfo@telect.com.

Inspect equipment after unpacking and compare it to the packing list.

Immediately report any shipping damage, defects, or missing parts to Telect at 1-800-551-4567. Keep all documentation that comes with your shipment.

Telect is not liable for shipping damage. If damaged, notify the carrier and call Telect's Customer Service Department at 1-800-551-4567 (domestic only) or 1-509-926-6000 for further recourse.

Before installing an OTM in an enclosure or chassis, check and if necessary change the settings of the switches located near the bottom-right side of the printed circuit board, shown in the illustration in Section "1.3 Switch Settings" on page 7.

1.2 Specifications

| Electrical Interface | Specifications |
|-----------------------|--|
| Receive Equalization: | 0 to 900 ft RG-59 (or equivalent) |
| Input Impedance: | 75Ω |
| Output Impedance: | 75Ω |
| Monitor Level: | 21 dB \pm 1.5 dB below signal level |
| Format Selection: | Manually selected prior to power up |
| Error Rate (max.): | 1×10^{-10} , with 23 dB fiber attenuation, single-mode glass fiber, 0 to 50°C |
| Return Loss: | \leq -26 dB 300kHz to 30MHz |

| Signal Formats | Specifications |
|---------------------|---|
| T3 | |
| Input Data Rate: | 44.736 Mbps \pm 100 ppm |
| Input Data Format: | Bipolar with B3ZS coding |
| Jitter Tolerance: | Meets GR-499-CORE requirements |
| Output Data Rate: | Same as input signal, transmit clock is recovered from input signal |
| Output Data Format: | Bipolar with B3ZS coding |
| Output Pulse Shape: | Complies with GR-499-CORE and ANSI T1.102_1993 |
| STS-1 | |
| Input Data Rate: | 51.84 Mbps \pm 100 ppm |

| Signal Formats | Specifications |
|---------------------|---|
| Input Data Format: | Bipolar with B3ZS coding |
| Jitter Tolerance: | Meets GR-499-CORE requirements |
| Output Data Rate: | Same as input signal, transmit clock is recovered from input signal |
| Output Data Format: | Bipolar with B3ZS coding |
| Output Pulse Shape: | Complies with GR-CORE-253 |
| E3 | |
| Input Data Rate: | 34.368 Mbps \pm 100 ppm |
| Input Data Format: | AMI with HDB3 coding |
| Jitter Tolerance: | Meets ITU-T G.832_1993 requirements |
| Output Data Rate: | Same as input signal, transmit clock is recovered from input signal |
| Output Data Format: | AMI with HDB3 coding |
| Output Level: | 1.00 Vpk, \pm 10% |
| Output Pulse Shape | Complies with ITU-T G.703 |

| Environmental | Specifications |
|---|--|
| Modules Designed for Moderate Site Conditions | |
| Operating Temp Range: | 0 to 50°C ambient |
| Storage Temp Range: | –55°C to 85°C |
| Operating Humidity: | 25% to 80%, noncondensing |
| Storage Humidity: | \leq 90% |
| Heat Dissipation: | 706W/m ² per meter @ ambient of 19°C (66°F) |
| Hardened Modules Designed for Extreme Conditions | |
| Operating Temp Range: | –40°C to 65°C ambient |
| Storage Temp Range: | –55°C to 85°C ambient |
| Operating Humidity: | 5% to 95%, noncondensing |
| Storage Humidity: | \leq 95% |
| Altitude: | 0–10,000 ft (3,048m), operating |

| Optical Interfaces | Specifications |
|---------------------------|---|
| Multimode Option | |
| Range: | 1.5 km (11 dB link budget) |
| Optical Source: | LED, 1300 nm |
| Transmit Pwr (Nom.): | −16 dBm, into 1m 62.5/125 μ m multimode glass fiber, all-ones electrical signal, 25°C |
| Transmit Pwr (Min.): | −20 dBm, into 1m 62.5/125 μ m multimode glass fiber, all-ones elec signal, 0 to 50°C ambient |
| Optical Receiver: | PIN diode and integral amplifier |
| Receiver Range: | −11 dBm to −31 dBm |
| Link Loss Budget: | 11 dB |
| Connector: | SC, both transmit and receive, ST optional |
| Single Mode Option | |
| Range: | 50 km (19 dB link budget) |
| Optical Source: | Laser, 1310 nm nominal wavelength |
| Spectral Width: | \pm 50 nm max |
| Transmit Pwr (Nom.): | −11 dBm, into 1m 9 μ m single-mode glass fiber, all-ones electrical signal, 25°C |
| Transmit Pwr (Min.): | −15 dBm, into 1m 9 μ m single-mode glass fiber, all-ones electrical signal, 0 to 50°C ambient |
| Extinction Ratio: | 8.2 dB min. |
| Laser Safety: | Unconditionally eyesafe laser, IEC 825/CDRH Class 1 compliant |
| Optical Receiver: | PIN diode and integral amplifier |
| Receiver Range: | −8 dBm to −34 dBm |
| Link Loss Budget: | 19 dB |
| Connector: | SC, transmit and receive, ST optional |

| Power | Specifications |
|------------------------|---|
| Powering Architecture: | Single DC-DC converter |
| Redundant Power: | Chassis accommodate A and B battery inputs; input are diode OR'ed on the module |

| Power | Specifications |
|-----------------------------|----------------|
| Operating Voltage, Chassis: | 20 to 60Vdc |
| Current (Max.): | 180mA @ 20Vdc |

| Remote Alarm Indicators | Specifications |
|-------------------------|--|
| PWR Alarm | Loss of 3.3V on-board power, normally open contact, common output at rear of chassis, "PWR ALARM" |
| MAJ Alarm | Condition determined at power-up, normally open contact, common output at rear of chassis, "MAJ ALARM" |

1.3 Switch Settings

| PCB Switch | ON | OFF |
|------------|----------------------------|--------------|
| E3* | E3 rate selected | Not selected |
| T3* | T3 rate selected (default) | Not selected |
| STS-1* | STS-1 rate selected | Not selected |
| SW4 | —— not used —— | |

*Only one of these can be selected. If none selected, Vector defaults to T3.

**Far-end loss of signal is detected by locally receiving an all-ones optical signal.

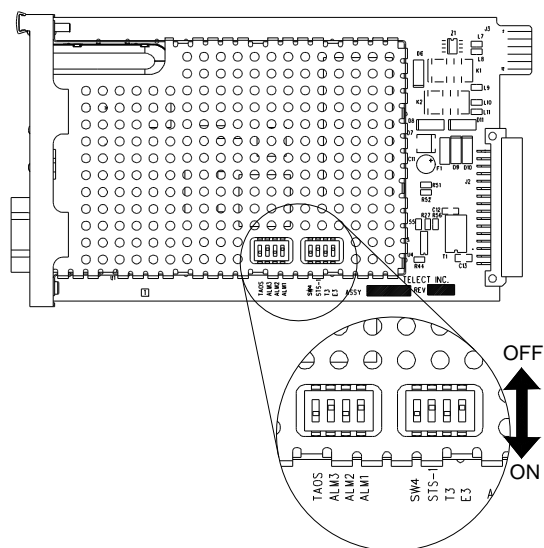


Figure 3 - Switch Setting Location

| PCB Switch | ON | OFF |
|--|---|--|
| ALM1 | Major Alarm Contacts Close on Local Loss of Optical Signal | Major Alarm Relay Unaffected by Loss of Optical Signal |
| ALM2 | Major Alarm Contacts Close on Local Loss of Electrical Signal | Major Alarm Relay Unaffected by Loss of Electrical Signal |
| ALM3 | Major Alarm Contacts Close on Far-End Loss of Signal**. Optical LOS Causes OTM to Transmit Optical All Ones Alarm Signal to Far-End.OTM | Major Alarm Relay Unaffected by Far-End Loss of Signal**. Optical All Ones Alarm Signal is Not Transmitted on an Optical LOS |
| TAOS | Transmit Electrical All-Ones Alarm Signal on Loss of Optical Signal | No Electrical All-Ones Alarm Signal on a Loss of Optical Signal |
| <p>*Only one of these can be selected. If none selected, Vector defaults to T3.</p> <p>**Far-end loss of signal is detected by locally receiving an all-ones optical signal.</p> | | |

1.4 Installing OTMs

NOTE: OTMs may be installed in any or all slots in a 19-in. or 23-in. BCSII chassis, or in either slot of a Vector OTM Standalone Wall-Mount chassis. When installing less than a full complement of OTMs in the BCSII chassis, prefer the extreme right or left end of the chassis for best heat dissipation.

NOTE: The temperature at the face plate of an OTM can rise to 49°C (120°F) at an ambient of 19°C (66°F). If you fully load a BCSII chassis with OTMs, leave 2RU (Either leave vacant or install shelves that dissipate no heat.) of space above and below the chassis for heat dissipation, or install a 1RU Telect heat baffle (Model 747-9999-0019 for 19-in. racks or Model 747-9999-0023 for 23-in. racks) above the OTM BCSII chassis to protect any heat-sensitive equipment directly above the OTMs.

Procedure steps:

1. See the preceding tables and set the switch options on the Vector Basic OTMs.

Remember: The switch settings on OTMs at opposite ends of an optical link should match. The speed settings *must* be identical.

2. Install the module in the panel or standalone wall-mounted enclosure, as directed in the manual accompanying the panel or enclosure.

For example,

- The illustration on the right shows an OTM being installed in a Telect 23-in. BCSII Chassis, Model 010-0000-3201BCS.
- The following illustration shows an OTM being installed in an existing OTM Standalone Wall-Mount Chassis, Model 710-1001-2002-U. (See Section “1.5 Installing a Vector Basic OTM Stand-alone, Wall-Mount Chassis” on page 9 for installing a complete OTM Standalone Wall-Mount Chassis.)

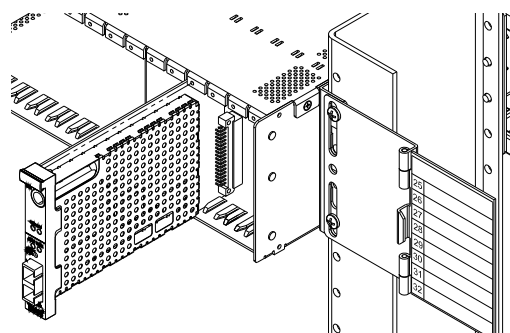


Figure 4 - Installing OTM in a BCSII Chassis

3. Secure the captive screw at the top of the OTM faceplate to the chassis.
4. If power is supplied to the panel or chassis, set the **LOOPBACK** switch on the front of the module.

The **LOOPBACK** switch is a multi-toggle pushbutton switch. Each time the switch is pushed the OTM will change operating parameters indicated by green LEDs directly above the switch. The loopback settings are as follows:

- Normal operation (with both FIBER and COAX LEDs off),
- Fiber loopback (FIBER LED on), and
- Coax loopback (COAX LED on).

Optical or electrical loopback is performed internally, without external cable revision.

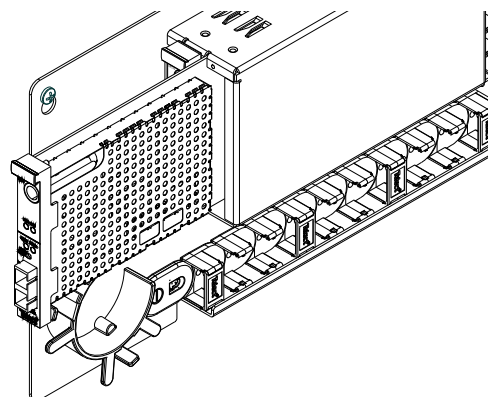


Figure 5 - Installing OTM in a Stand-alone Wall-Mount Chassis

5. Connect I/O BNC cables from the network element to the XMT/RCV ports (“O” and “I”) on the rear of the chassis, as indicated in the following network illustration.

“XI” and “XO” connectors on rear of chassis are not used. Consider inserting termination plugs over unused BNCs.

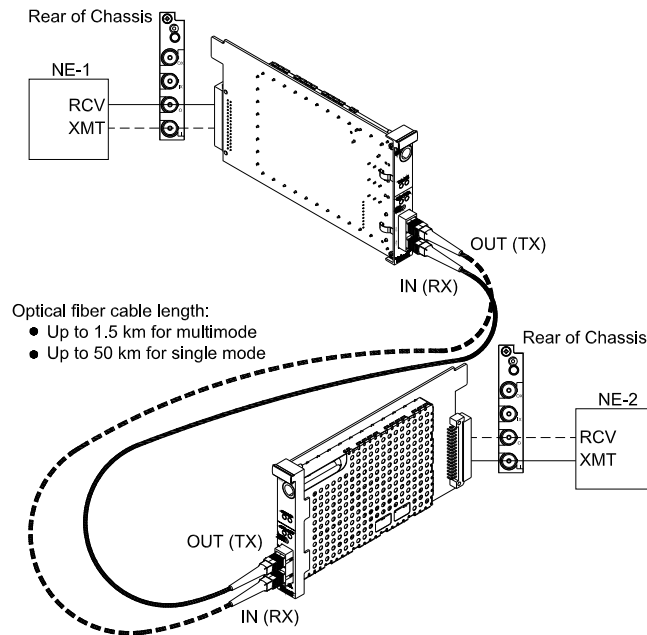


Figure 6 - Connecting an OTM

6. After having installed OTMs at both the local and remote ends of the linkup, remove the protective “dust cover” plugs at the fronts of the OTMs and connect the optical connectors (XMT and RCV) on optical data link cables.
7. Route cables as specified in the BCSII User Manual (Telect Part No.117389) and Vector User Manual (127092).

This procedure is complete.

1.5 Installing a Vector Basic OTM Standalone, Wall-Mount Chassis

The Vector Basic OTM Standalone, Wall-Mount chassis consists of a wall plate holding a dual-slot chassis with one OTM. Use three #8 screws (not supplied) to secure unit to wall-mounted rails or plywood, as shown in the illustration on the right. Refer to the **Vector Wall-Mount Chassis Installation Guide** (Publication 127257) for details on power and fiber cabling

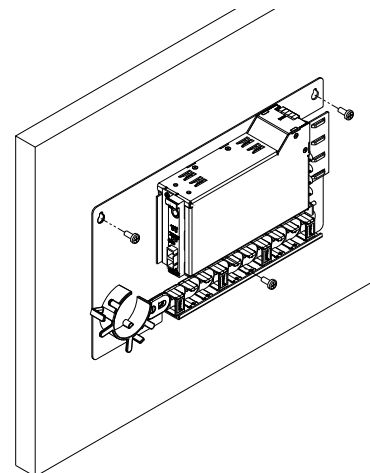


Figure 7 - OTM Standalone, Wall-Mounted Chassis

1.6 Power-Up Performance

When power is first supplied to the OTM, the PWR LED lights.

1.7 Operation

1.7.1 Control & Status LEDs

1.7.1.1 Power (PWR) LED

- GREEN — BATT A and/or BATT B power is on.
- Off — BATT A and BATT B power are off.

1.7.1.2 Alarm (ALRM) LED

- RED (Solid) — Major alarm condition, either optical or electrical LOS, or both. (Also, the major alarm relay will close the normally open major alarm contacts to set the MAJ alarm signal, depending on ALM1 and/or ALM2.)

The settings of ALM1 and ALM2 have no effect on the ALM LED.

- RED (Blinking) — Indicates that an alarm has been set at the far-end.

An electrical loss on one end will cause the ALM LED on that end to turn on solid and to send an all-ones signal to the other end. The ALM LED on that other end will blink indicating that the problem was detected at the far end.

The status of the ALM3 setting has no effect on whether the ALM LED blinks on a far-end loss of signal.

- Off — No major alarms. The ALM LED goes off if the condition causing a major alarm is remedied.

If both local and far-end alarms occur, the ALM LED will light solid red. A local alarm will take priority over a remote alarm.

1.7.1.3 COAX LED

- GREEN — Electrical loopback mode. Electrical RCV input is internally looped back to electrical XMT output.
- Off — Not in coax loopback mode

1.7.1.4 Fiber LED

- GREEN — Fiber loopback mode. Optical RCV input is internally looped back to optical XMT output.
- Off — Not in fiber loopback mode

1.7.2 Loopback Mode Switch

- Pressing the recessed **LOOPBACK** switch causes the OTM to switch from normal mode to fiber loopback. In the fiber loopback mode, the RCV optical input is internally routed to the XMT output of the same OTM.

- Pressing the **LOOPBACK** switch a second time switches from fiber to coax loopback. In the coax loopback mode, the RCV electrical input is internally routed to the XMT output of the same OTM.
- Pressing the **LOOPBACK** switch a third time returns the OTM to normal mode.

1.7.3 Alarm Relays

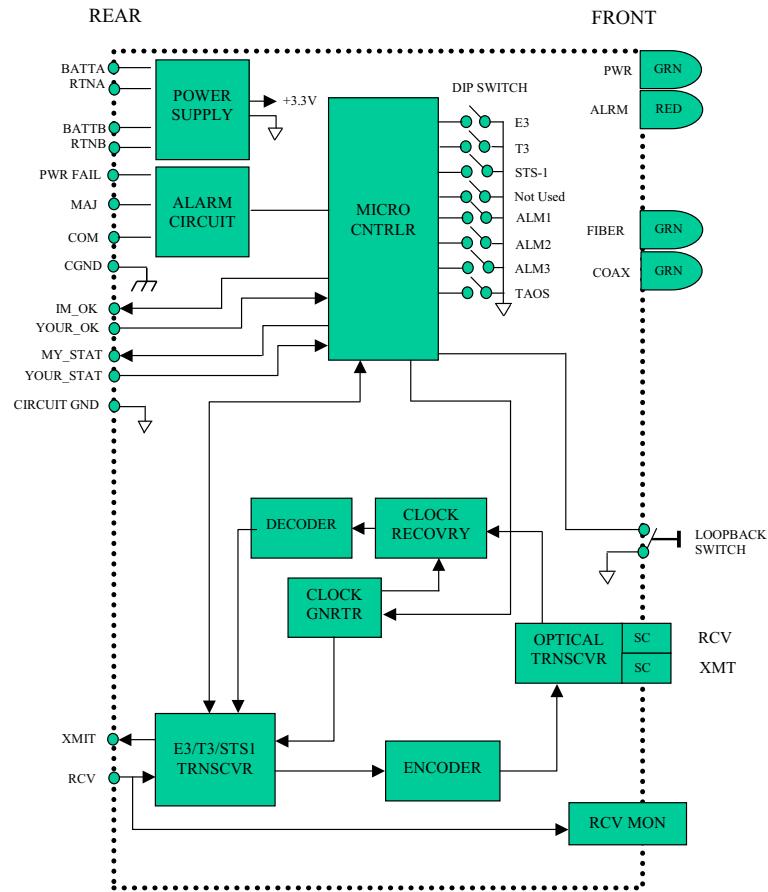
Alarm relays on the OTM cause normally open (NO) contacts to close on the local OTM. The contacts are connected to terminals on the rear of the chassis.

- A POWER FAIL alarm will occur for a power loss of 3.3 Vdc. A relay de-energizes and closes normally open (NO) contacts. ALM PWR and ALM COM (common) are located on rear of chassis.
- A MAJOR alarm is used to indicate a loss of either electrical or optical signal.
 - Local loss of electrical signal will turn on the local ALM LED. If the ALM1 switch is ON (closed), the loss of a local electrical signal will energize the major alarm relay controlling the ALM MAJ contact on the rear of the chassis.
 - If the local OTM detects a loss of optical signal, the local OTM turns on the ALM LED. If the ALM2 switch is ON (closed), the loss of the optical signal will energized the major alarm relay controlling the ALM MAJ contacts on the rear of the chassis.

1.7.4 Monitoring

The monitor jack on the module faceplate accepts a mini-WECO jack plug. You can use this jack for nonintrusive monitoring of the OUT channel from the remote network element connected to the OUT connector (**O**) on the chassis backplane.

1.8 System Block Diagram



1.9 Dimensions

