2400ODU

Integrated Outdoor RF Fiber Transport System

Instruction Manual

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IMPORTANT SAFETY INSTRUCTIONS

	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of un-insulated “Dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.

- Read these instructions
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has enetered the electronics or objects have fallen into the apparatus, the apparatus does not operate normally, or has been dropped.

WARNING
NORMAL OPERATION REQUIRES THE ENCLOSURE DOOR TO BE CLOSED. ENSURE THAT THE INSIDE OF THE ENCLOSURE IS NOT EXPOSED TO RAIN OR SPLASHING LIQUID

WARNING
THIS UNIT MAY BE POWERED BY MULTIPLE SOURCES. DISCONNECT AND LOCK OUT ALL SOURCES PRIOR TO SERVCING

WARNING
TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, TURN OFF UPSTREAM BREAKERS/SWITCHED DISCONNECTS OR REMOVE UPSTREAM FUSES/DISCONNECTS

INFORMATION TO USERS IN EUROPE

NOTE

This equipment with the CE marking complies with both the EMC Directive (2004/108/EC) and the Low Voltage Directive (2006/95/EC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European standards:

- EN60065 Product Safety
- EN55103-1 Electromagnetic Interference Class A (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE	EN600065 EN55103-1: 1996 EN55103-2: 1996	Safety Emission Immunity

	EN504192 2005 Waste electrical products should not be disposed of with household waste. Contact your Local Authority for recycling advice

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Changes or modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment. Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

Evertz Microsystems Ltd FC For Commercial Use	Tested to comply with FCC Standards	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: This device may cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Release	May 2009
1.1	Added “External Finish” section	July 2013

CAUTION

If the LNB POWER LED is on or flashing on any of the 2408LT's, there will be DC voltage for LNB power at the associated RF 1-4 connector on the bottom of the unit. This can damage some test equipment.

The user can turn off the LNB power by switching LNB MODE switch to the OFF position on the 2408LT.

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1. OVERVIEW

The 2400ODU provides a convenient, pre-integrated package for fiber transport of Satellite, OTA DTV and other signals within the extended L-Band range and below. Contained in a compact, weatherproof enclosure are up to four 2408LT fiber optic transmitters and a 2400PSU-8 power supply. This provides the needed equipment to transport up to four RF signals over individual fibers and power the connected LNBs. The 2400ODU may be conveniently mounted directly on or near the antenna structure, minimizing the required length and associated signal loss of coaxial cable.

Features:

- Minimizes length of coax run from LNB
- Convenient, time-saving pre-integrated package including fiber transmitters and power supply
- Each fiber transmitter provides a coaxial monitoring output for easy signal monitoring
- Lightning protection included on RF inputs
- Weather sealed enclosure with durable powder coat finish
- Wide operating temperature range
- Additional fiber transmitters are field-installable
- Knockouts provided for termination of AC power and fiber conduits
- SmartMON™ equipped 2408LT's provide remote monitoring capabilities without a separate data connection
- Fiber link provides electrical isolation between antenna and facility, mitigating ground loop and lightning issues

For additional or specific information about the 2408LT and/or 2400PSU-8 modules, please refer to the manuals and data sheets for these products.

In order to accommodate various signal transport requirements, the 2400ODU may be ordered from the factory with one to four 2408LT fiber optic transmitters included. If required, additional 2408LT units may be field-installed later as more signals are required. Interwiring for the DC power connections between the 2408LTs and 2400PSU-8, and for the RF connections between the 2408LT's and lightning supressors, is done at the factory.

Inside the unit there are two flat panels with equipment mounted. The outermost panel supports the 2408LT's. This panel is hinged, allowing it to swing out to expose the 2400PSU-8 which is mounted on the inner fixed panel. The exterior door of the unit sits against a gasket, providing a weather tight seal. Both the exterior door and the inner swing panel are secured in the closed position via quarter-turn latches which are operated using a straight (flat) screwdriver. In addition, the exterior door latch has provision for a padlock.

Figure 1-1: 2400ODU, Front Door Closed

Figure 1-2: 2400ODU, Front Door Open, Swing Panel with 2408LT's Mounted

Figure 1-3: 2400ODU, Swing Panel Open, Inner Panel with 2400PSU-8 Mounted

2. INSTALLATION

From the factory, the 2400ODU comes ready to install. No additional assembly is required. The installer needs only to mount the unit and make fiber, RF, and AC power connections.

2.1. MOUNTING

The 2400ODU comes with mounting brackets pre-installed. Be sure to choose appropriate fasteners suitable for the surface/material on which the 2400ODU is to be mounted. Also ensure that the fasteners are strong enough to support the 2400ODU's weight. The mounting hole locations and dimensional information of the 2400ODU are illustrated in Figure 1-1:

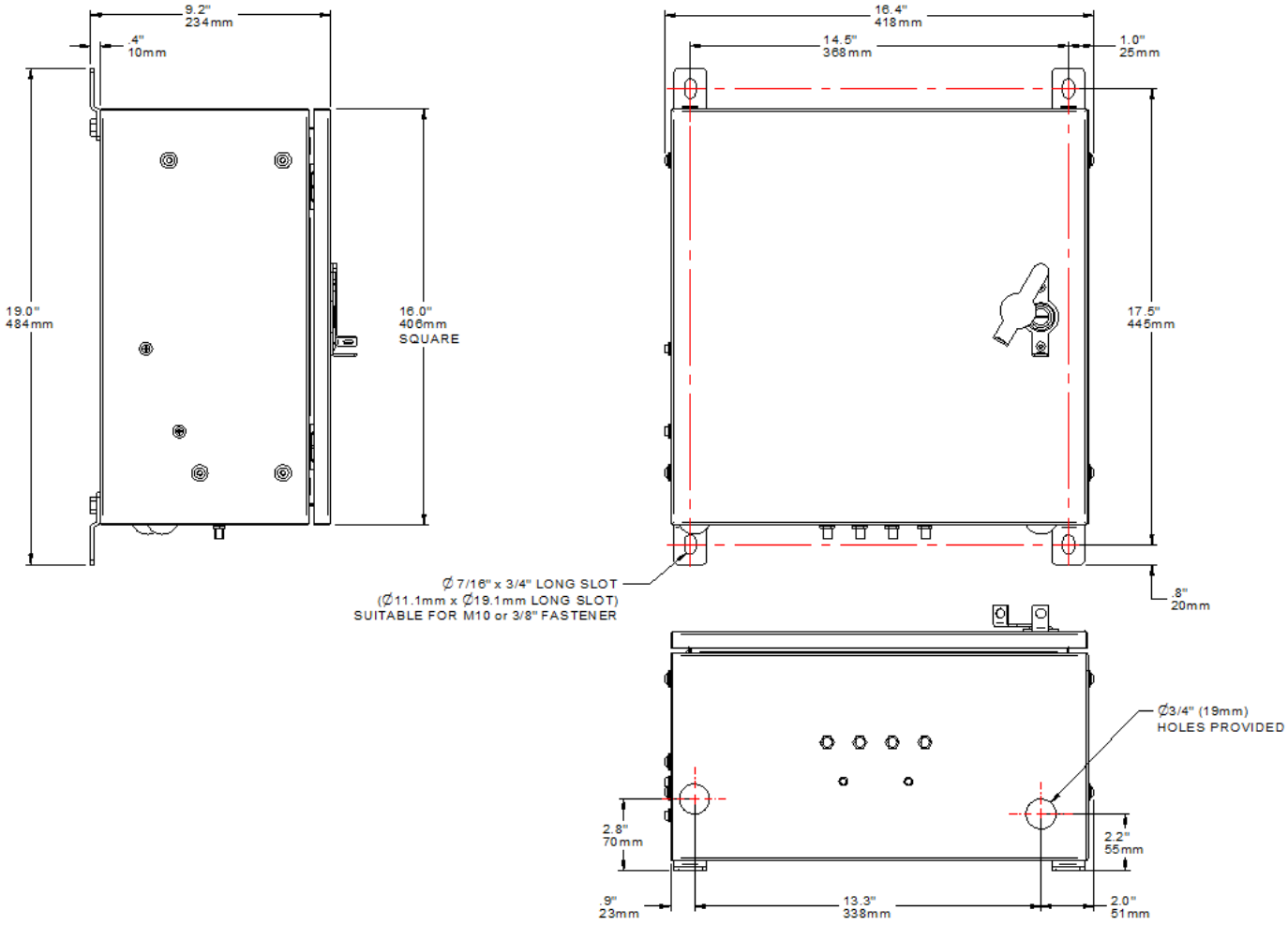

Figure 2-1: 2400ODU Mounting and Dimensional Information

When choosing a mounting location, it is recommended that the 2400ODU be positioned such that it is out of direct sunlight for the duration of the day. Solar heat gain caused by direct sunlight can significantly raise the interior temperatures of the 2400ODU over the temperature rise incurred by ambient air temperatures alone.

2.2. RF CONNECTIONS

RF input connections are made on the bottom of the unit on the provided connectors. While not required to prevent water ingress into the unit, good outdoor installation practice suggests the use of waterproof connectors, boots and/or protecting connectors with a wrap of Scotch 130C rubber tape followed by Scotch Super 88 vinyl tape, or equivalent.

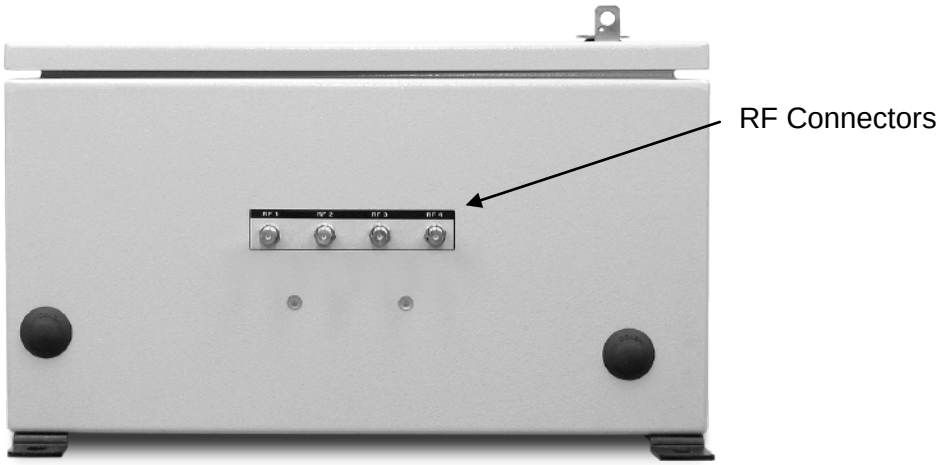

Figure 2-2: 2400ODU RF Connectors

Interwiring between the RF connectors (lightning supressors) and 2408LTs is done at the factory. The relationship between the connectors (1-4) and the associated 2408LTs is illustrated in Figure 2-3.

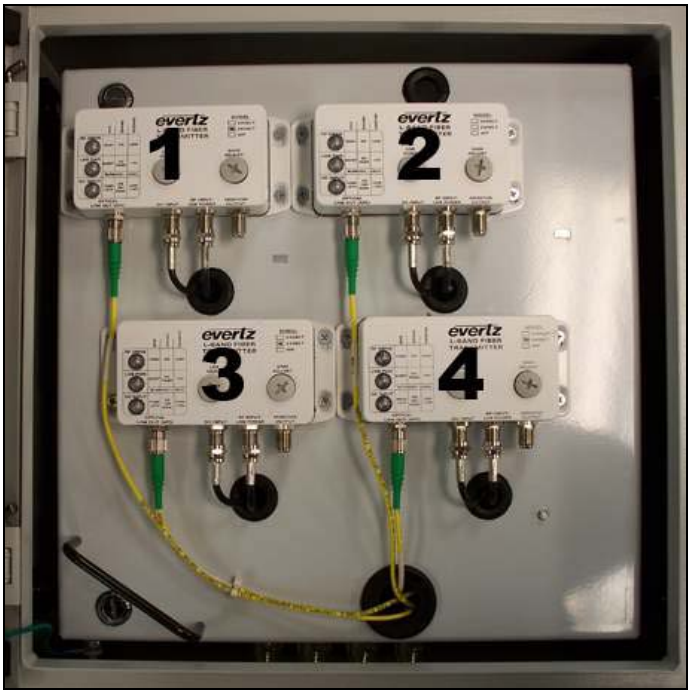

Figure 2-3: 2400ODU Association between RF Connectors and 2408LT's

2.3. AC INPUT CONNECTIONS AND GROUNDING

As standard, the 2400ODU is equipped, from the factory, with a NEMA5-15R duplex receptacle and junction box. When the 2400ODU is equipped with the +IEC option, the unit is intended for applications outside of North America. When equipped with this option, the 2400PSU-8 is included with a pair of male IEC320 power inlets and the NEMA5-15R receptacle is not installed. On the bottom of the 2400ODU, a ¾" (19mm) hole is provided for landing conduit for AC input. From the factory, a watertight plug is installed in the hole, which may be removed for wiring installation.

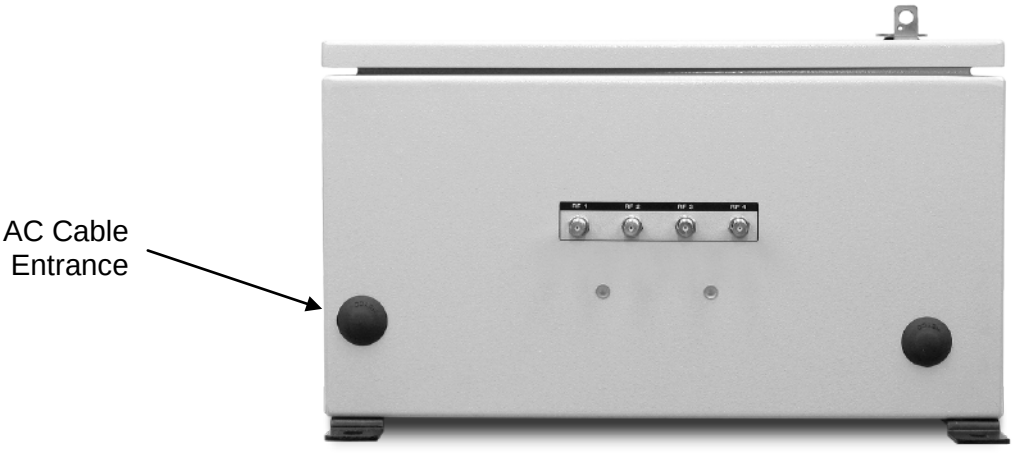

Figure 2-4: AC Cable Entrance

2.3.1. AC INPUT (without +IEC option)

The standard version of the 2400ODU comes equipped with a junction box with a duplex NEMA5-15R receptacle installed. A single AC feed may be wired directly to this duplex receptacle. The 2400PSU-8 power supply is equipped with dual, internal redundant power supplies which may be fed from separate sources. If separate sources are to be used, the links on the duplex outlet may be removed in order to separate the top and bottom outlets, providing the ability to wire each to a separate source. Wiring of the AC feed(s) is typically 14AWG per NEC and protected by 15 Amp (maximum) upstream circuit breaker(s).

WIRING INSTRUCTIONS ARE RECOMMENDATIONS ONLY. PLEASE CONSULT LOCAL ELECTRICAL CODE FOR SPECIFIC AND ADDITIONAL REQUIREMENTS IN YOUR AREA.

2.3.2. AC INPUT (with +IEC option)

The +IEC option is intended for applications outside North America. When equipped with this option, the 2400PSU-8 is included with a pair of male IEC320 power inlets and the NEMA5-15R receptacle is not installed. In this case, the incoming power feeds(s) to the 2400ODU should be terminated with IEC320 female connector(s). If a single power feed is to be provided to the 2400ODU, a two-position power strip should be used to provide a dual power connection to a single source. Wiring should be protected by appropriately sized upstream circuit breaker(s).

WIRING INSTRUCTIONS ARE RECOMMENDATIONS ONLY. PLEASE CONSULT LOCAL ELECTRICAL CODE FOR SPECIFIC AND ADDITIONAL REQUIREMENTS IN YOUR AREA.

2.3.3. GROUNDING

To ensure that all metallic parts are well grounded, a grounding stud is provided at the base of the enclosure, which is also used to provide a ground connection to the door. This stud must be connected to ground **in addition** to the ground connections made at the AC input. The provided stud accepts ring lugs designed for ¼" or M6 bolts/screws.

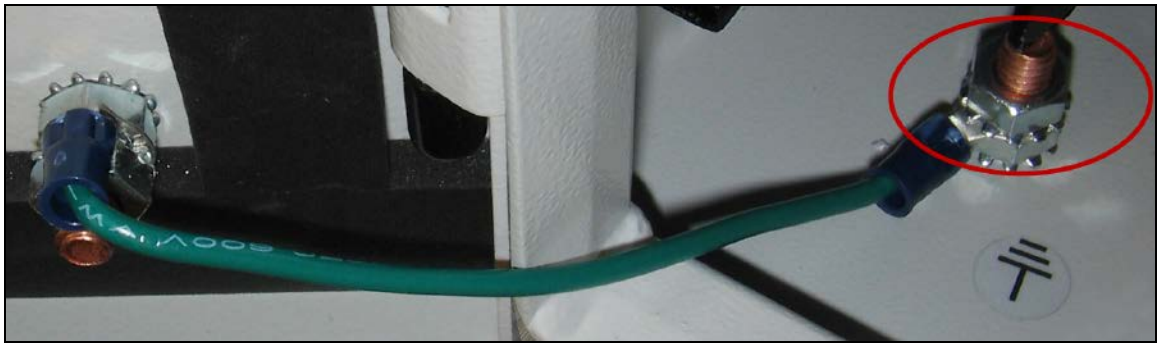

Figure 2-5: 2400ODU Enclosure Ground Stud

2.4. FIBER CONNECTIONS

On the bottom of the 2400ODU, a ¾" (19mm) hole is provided for landing conduit for fiber optic cable. From the factory, a watertight plug is installed in the hole, which may be removed for cable installation.

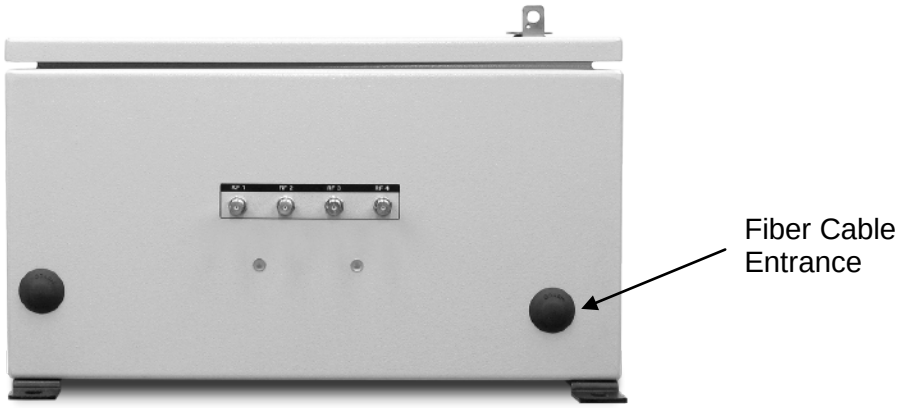

Figure 2-6: 2400ODU Fiber Cable Entrance

Inside the 2400ODU, three large saddles are provided for fiber cable management. The incoming fiber should first be fed through the saddles on the rear panel of the unit. From there, the fiber should be fed towards and through the saddle located on the rear of the swing panel. Finally, the fiber may then be fed through the large rubber grommet located at the bottom of the swing panel. See Figure 2-7 for an example.

Figure 2-7: 2400ODU Fiber Cable Routing

Keep fiber cables loose so as not to break the core or introduce bending loss. Ensure there is enough slack in the fiber to allow the swing panel to operate without pulling the fibers tight. The fiber saddles provided are large in diameter so as to allow movement of and not to place tension on the installed fiber.

Once through the grommet, the fibers should be fed to the individual 2408LT units located on the swing panel. The fiber ends must be terminated with FC/APC connectors. An additional fiber saddle is provided on the front of the swing panel to allow neat routing of the fiber cables for 2408LT units 1 and 3. Figure 2-8 illustrates fiber cable routing and connection to the 2408LT's.

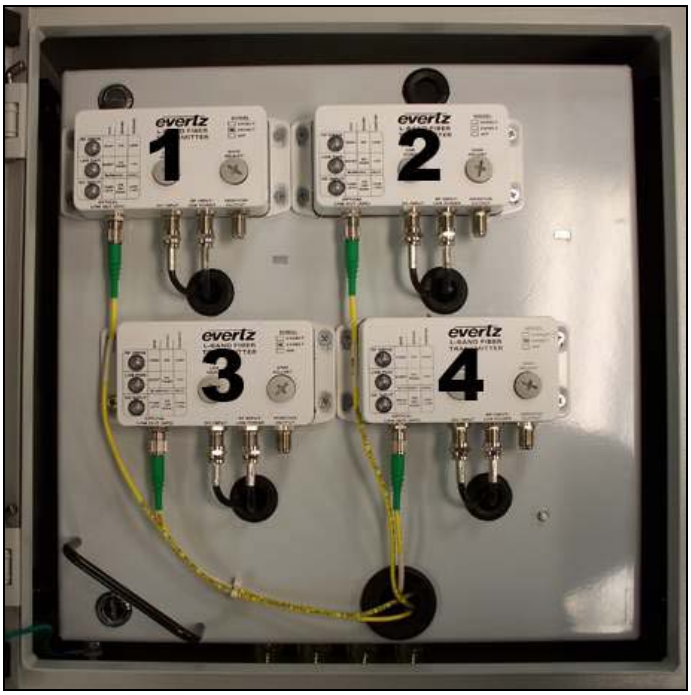

Figure 2-8: 2400ODU Swing Panel Fiber Cable Routing

2.5. CARE AND HANDLING OF OPTICAL FIBER

2.5.1. Safety

CLASS 1 LASER PRODUCT

Background colour: yellow
Triangular band: black
Symbol: black

CAUTION: USE OF ANY CONTROLS, ADJUSTMENTS, OR PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE

Background colour: yellow
Triangular band: black
Symbol: black

2.5.2. Assembly

Assembly or repair of the laser sub-module is done only at Evertz facility and performed only by Evertz technical personnel.

2.5.3. Labeling

Certification and Identification labels are combined into one label.

- Date of manufacture on this label can be traced by serial number.
- Class 1 Laser Products: The Model number is one of the following 2408LTA13 or 2408LTxx (xx = 27, 29, 31, 33, 35, 37, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61)

Figure 2-9: Reproduction of 2408LT Certification and Identification

2.5.4. Handling and Connecting Fibers

Never touch the end face of an optical fiber. Always keep dust caps on optical fiber connectors when not connected and always remember to properly clean the optical end facet of a connector before making a connection.

The transmission characteristics of the fiber are dependent on the shape of the optical core and therefore care must be taken to prevent fiber damage due to heavy objects or abrupt fiber bending. Evertz recommends that the user maintain a minimum bending radius of 5 cm to avoid fiber-bending loss that will decrease the maximum attainable distance of the fiber cable.

3. OPERATION AND MAINTENANACE

Once installed, the 2400ODU is essentially maintenance-free. For remote monitoring, important parameters are relayed to the fiber receivers via the 2408LT's SmartMON™ technology. The 2408LT and 2400PSU-8 are serviceable as replaceable modules (for detailed operation instructions on these modules, please refer to their respective operation manuals). In addition, the lightning supressors contain replaceable gas-tubes.

Normal operation of this unit requires the door to be closed and latched. Do not expose the electronics inside the enclosure to rain or splashing liquids.

3.1. LIGHTNING SUPRESSORS

The lightning supressors are located inside the 2400ODU, directly opposite and integral to the external RF connections. These supressors contain gas tubes that may be replaced after a lightning strike or other surge. The gas tube itself is located behind the threaded access cover.

Figure 3-1: 2400ODU Lightning Supressor

To replace the gas tube, start by removing the access cover using a flat (straight) screwdriver. Upon removing the access cover, take care not to lose the spring washer located between the cover and gas tube. Remove the spring washer, followed by the gas tube. Re-assembly is the reverse process of above. Replacement gas tubes are available from Evertz in packages of four pieces, part number **ODU-4GT**.

Figure 3-2: 2400ODU Lightning Supressor - Access Cover Removed, Spring Washer and Gas Tube Still in Place

Figure 3-3: 2400ODU Lightning Supressor – Disassembled, Gas Tube and Spring Washer Removed

3.2. REPLACEMENT AND ADDITION OF MODULES

Both the 2408LT and 2400PSU-8 are replaceable at the module level. The process involves simply removing all connections from the affected module and removing it from the 2400ODU. Note the GAIN and LNB MODE settings on the 2408LT being removed and apply these settings to the replacement unit prior to installing it. Installation of the replacement module is the reverse process of above.

If a 2400ODU model was purchased without being fully populated with 2408LT fiber transmitters (max four pieces per 2400ODU), additional transmitters may be easily added at any time. Expansion kits are available from Evertz which contain the fiber transmitter and the required cabling and hardware for installation. Please contact Evertz sales for additional information.

3.3. EXTERNAL FINISH

The 2400ODU is coated with a textured powder coat finish designed to provide years of protection to the enclosure. If the enclosure becomes scratched or otherwise damaged and bare metal exposed, this should be addressed to prevent corrosion/rusting. Color-matched touchup paint is available from many electronics distributors:

Manufacturer: MG Chemicals
Part #: 1413LGS

The factory-finish follows the RAL color matching system. A suitable outdoor-grade enamel rated for coating and preventing metal corrosion may be used, formulated to the RAL 7035 shade.

4. 2400ODU SPECIFICATIONS

4.1. RF INPUT

Number of Inputs:	1-4 depending on number of installed fiber transmitters
Connector:	F-Type (N-type optional)
Impedance75Ω (50Ω optional):	Frequency Range120 to 2250MHz
Input Power Range:	-10dBm to -60dBm
LNB Voltage:	18V DC, 13.5V DC, off (selectable)
Current:	500mA
Protection:	Short Circuit, current limited
LO Control:	22kHz on/off (selectable)

4.2. OPTICAL OUTPUT

Number of Outputs:	1-4 depending on number of installed fiber transmitters
Connector:	Female FC/APC
Operating Wavelength:	1310nm
Output Power:	+2dBm

4.3. POWER INPUT

Number of Inputs:	1 or 2 inputs possible (supports dual, independent sources)
Connector	
Standard:	Direct wiring to duplex NEMA5-15R receptacle
+IEC Option:	IEC320 male inlets, one per supply in 2400PSU-8
Voltage:	Auto ranging 100-240V
AC Frequency:	47-63Hz
Power:	120 Watts maximum per input

4.4. ELECTRICAL

Voltage:	+11VDC to 22VDC
Power:	3 Watts with no LNB load
EMI/RFI:	Complies with FCC regulations for class A devices Complies with EU EMC directive
Connector:	F type
Conductor Range:	21-19 AWG (0.81-1.29 mm^2)

4.5. PHYSICAL

Dimensions

Without Flanges:	9" D x 16" W x 16" H (229mm D x 407mm W x 407mm H)
Knockouts:	2x¾" (19mm)
Finish:	Textured light grey (RAL 7035) powder coat
Environmental	
Temperature:	-20 to +55°C ambient air temperature

For additional specifications on 2408LT and 2400PSU-8 modules, please refer to their individual manuals and data sheets.