CommLink™ TR6442i

Fiber Optic Intercom Link

User Manual

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June 2012

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About this User Guide

This CommLink Model TR6442i Fiber Optic Intercom Link can be delivered in a number of configurations depending on the physical package selected. This user guide is designed to cover each of the various packages and so not every page in this guide will apply to your specific system.

Throughout this guide a number of informational pointers are used to mark important or useful information.

	Caution – the information provided is important safety information and should be understood and followed in order to operate the CommLink TR6442i Fiber Optic Intercom Link safely and properly.
	Useful information regarding the User Guide and the CommLink TR6442i Fiber Optic Intercom Link. Reading and understanding this information will make using the manual and the product easier.

Chapter 1. Important Information

1.1. Warranty

LIMITED WARRANTY STATEMENT

Belden Inc. expressly warrants to Buyer that the Products supplied shall be free from defects in materials and workmanship for a period of 12 months following the date the Products are delivered to Buyer (the “Warranty Period”). Belden’s liability under this limited warranty shall be limited, at its option, to providing refund of purchase price for Products, or replacing or repairing Products shown to be defective either in materials or workmanship. Buyer's sole and exclusive remedy for breach of warranty shall be such refund, replacement or repair.

A claim of defect in materials or workmanship in any Product shall be allowed only when it is submitted in writing to the Telecast Fiber Systems division of Belden Inc. within seven days after discovery of the defect, and in any event within the Warranty Period. No claim shall be allowed in respect of any Product which has been altered, neglected, damaged or stored in any manner which adversely affects it. In order to obtain service under the terms of this warranty, Distributor’s customer or Distributor must notify the Telecast Fiber Systems division of Belden Inc. of the defect prior to the expiration of the applicable warranty period and obtain a Return Authorization Number from Belden. In no event may products be returned to Belden or to Distributor for warranty service without having obtained from Belden a Return Authorization Number.

This limited warranty applies only to new and unused Products delivered to Buyers located within the United States of America, or to international Buyers if sold through an authorized Distributor organization, and shall not extend to any equipment not manufactured by Belden Inc., even though such equipment may be sold or operated with the Products. In addition, this limited warranty shall be void and of no further force or effect whatsoever if the Product is repaired or modified by any person other than an authorized representative of Belden Inc. without the consent of Belden Inc. This warranty shall not apply to any defect, failure or damage caused by improper use or inadequate maintenance and care. Nor shall this warranty apply to any damage caused in whole or in part by attempts by personnel other than personnel, as approved in advance in accordance with the foregoing provisions, to open, install, repair, or service the Product; nor to damage resulting from improper connection with incompatible equipment; nor to damage to a unit which has been modified by personnel other than Belden personnel.

Products returned to the Telecast Fiber Systems division of Belden Inc. for warranty service shall be shipped, freight prepaid to the Telecast Fiber Systems division of Belden Inc. Belden will return the repaired product or ship a replacement, freight prepaid, to either Distributor or Distributor’s customer, as requested by Distributor’s customer, at a location within the United States or, at Belden’s option, to Distributor’s location in the case of international sales. This limited warranty shall also apply to Products that replace defective Products and Products that have been repaired by

authorized representatives of Belden only for the original Warranty Period. The Warranty Period shall not be extended by reason of defect, or any period of time during which the Product is not available to Buyer because of defects or repairs, without the express written consent of Belden Inc.

EXCEPT FOR THE EXPRESS LIMITED WARRANTY AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP CONTAINED HEREIN, BELDEN INC. MAKES NO WARRANTY OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, AND ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND OTHER WARRANTIES OF WHATEVER KIND ARE HEREBY DISCLAIMED BY BELDEN, INC. THIS LIMITED WARRANTY SETS FORTH EXCLUSIVELY ALL OF BELDEN'S LIABILITY IN CONTRACT OR OTHERWISE IN THE EVENT OF A DEFECTIVE PRODUCT. WITHOUT LIMITATION ON THE FOREGOING, BELDEN, INC. EXPRESSLY DISCLAIMS ANY LIABILITY WHATSOEVER FOR ANY DAMAGES INCURRED DIRECTLY OR INDIRECTLY IN CONNECTION WITH THE SALE OR USE OF, OR OTHERWISE IN CONNECTION WITH, THE PRODUCT, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS AND SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER CAUSED BY NEGLIGENCE OR OTHERWISE, REGARDLESS WHETHER BELDEN INC. HAS BEEN GIVEN ADVANCE NOTICE OF THE POSSIBILITY THEREOF.

THIS WARRANTY IS GIVEN BY IN LIEU OF ANY OTHER WARRANTY EXPRESSED OR IMPLIED.

1.2. Safety and Fiber Optic Systems

Optical Fiber Safety

Never look directly into the end of the optic fiber while either end of the system is operating. Eye damage can result.

Always use cable connector caps when the cables are not connected. This protects the connector from damage and the unlikely event of exposure to an operating optical link. Keeping the caps in place when the connectors are not in use will prevent dirt and dust from entering the connector and degrading the performance of the optical link

1.3. Unpacking the CommLink TR6442i Fiber Optic Intercom Link

Please consult your packing slip and purchase order to insure that you have received all of the expected Telecast Fiber Systems components.

Inspect all components for scratches and other mechanical damage, and inspect the electrical connectors for bent or damaged pins and latches. Report any missing or damaged components to Telecast Fiber Systems, Inc. See the following section regarding product returns.

You must use your own cables to make connections for two-wire RTS or Clear-Com intercom channels and for Clear-Com or RTS matrix frames.

Leave the protective caps on the optical connectors whenever the fiber is disconnected.

1.4. Product Returns

In the unlikely event of damage to your CommLink TR6442i Fiber Optic Intercom Link during shipping or delivery please note the damage with the delivery or shipping service and document the packaging and product where you see damage. If any component does not work correctly out of the box please contact Telecast Fiber Systems service at (508) 754-4858.

If the problem cannot be remedied through a service telephone call an RMA (Return of Merchandise Authorization) will be issued and you will receive an RMA number. Please note this RMA number inside and outside of all shipping boxes and on all documentation provided with the items to be returned.

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Chapter 2. – System Overview

This chapter covers the following:

1) Fiber Optic Cable Overview

2) CommLink TR6442i Fiber Optic Intercom Link concepts

2.1. Fiber Overview

Fiber Optics and Fiber Optic Cable are the core technologies at the heart of the Telecast Fiber Systems CommLink TR6442i Fiber Optic Intercom Link System. The ability to multiplex and de-multiplex a variety of video, audio and data signals so that they can be carried over a thin strand of Fiber Optic cable for long distances enables the CommLink system. The specific theory and operation of Fiber Optics is beyond the scope of this document. What *is* important for the end user to be aware of the different types of Fiber Optic Cable and Fiber Optic Cable Connectors. Most CommLink TR6442i applications will use Single Mode Fiber with ST Connectors.

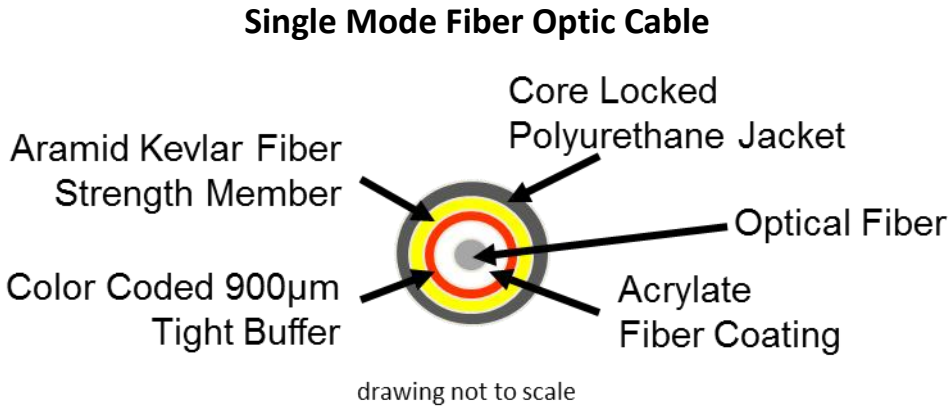

Figure 1 - Single Mode Fiber Optic Cable Cross-Section (Illustrative Only)

2.2. CommLink TR6442i Fiber Optic Intercom Link Concepts

Telecast's CommLink™ TR6442i Intercom Link is a fiber-optic transceiver system that uses one strand of fiber to carry two channels of production intercom, allowing robust voice and data connectivity over distances up to 40KM (about 25 miles). The CommLink utilizes Wavelength Division Multiplexing (WDM) for bidirectional signal transmission on a single fiber strand. Hence, all fiber links must consist of a 1310nm unit at one end and a 1550nm unit at the other. Please see the section of Wavelength-Division Multiplexing (WDM) and the use of CommLink units below. The CommLink is compatible with the industry's most popular intercom systems:

- Party line
    - Clear-Com®
    - RTS® TW
- Digital Matrix
    - Clear-Com® MatrixPlus/Eclipse
    - RTS® Adam/Cronus/Zeus
- Generic 4-Wire and Data
    - Two Channels of bidirectional audio
    - Two paths of bidirectional dataRS422 or RS485

In a special usage case multi-strand fiber optic cable can be used to more than one signal – one to the CommLink TR6442 and one carrying HD Video. Please see Section 4.1 below.

CommLink Physical Configurations

The CommLink™ TR6442i Intercom Link comes in three physical configurations each supplied in a 1310mm unit and a 1550 nm unit. Please see Appendix 2 for ordering information.

TR6442i
Viper II Rack Mount

MTR6442i-MML
MiniMussel Shell Enclosure for Harsh Environments

MTR6442i
"Throw Down"

Figure 2 - CommLink TR6442i Physical Configurations

All variations of the CommLink™ TR6442i Intercom Link work in the same way. The only difference is in the method in which they are powered and whether they are a 1310mm or a 1550mm unit.

The system provides flexibility in the types of intercom systems that can be used in that the system can link one type of party line system to another type of party line system, a matrix frame to two key panels, or act as a two-wire to four wire hybrid adaptor via fiber or as a standalone local unit. Each of these operating modes is explained in detail later in this document.

TWO-WIRE PARTYLINE MODE

Plug two channels of Clear-Com® PL (two XLRs) or RTS® TW (one XLR) into each CommLink module and connect them with a fiber cable. The system will "translate" between two systems so that you can have Clear-Com® at one end and RTS® at the other. It also translates the call lights.

ADVANCED DSP AUTO-NULLING

Once the two-party system is connected, a toggle of the AUTO NULL switch provides a digital system null of the two-wire system, no matter what the load, without the need for manual adjustments.

BELT PACK POWER

Each CommLink™ module can be powered from the Party line intercom circuit without an external power supply, like a belt pack. Alternately, with a 12VDC power source, the CommLink unit can act as a Party line power supply, providing enough 30VDC current to support approximately ten belt packs.

FOUR-WIRE MATRIX MODE

The system links a MatrixPlus/Eclipse (Clear-Com®) or Adam (RTS®) family matrix frame and two of the system's key panels over a fiber strand. All of the key panel functionality is supported, including displays, controls, and communications to the matrix frame.

HYBRID MODE

The CommLink system can be used to connect a matrix frame in a control room or truck with two party line channels in the venue, without the need for a separate hybrid adaptor.

A single CommLink unit can also act as a standalone digital system interface/system-to-system adapter, utilizing the digital auto-nulling system. Connect two-wire intercom systems to legacy fiber systems, two-way radios, satellite links, TV cameras, and other communications devices with 4-wire circuits.

Wavelength-Division Multiplexing (WDM) and the Use of the CommLink TR6442i Fiber Optic Link System

Fiber optic transmission depends on Wavelength-Division Multiplexing (WDM). With WDM a number of optical carrier signals can be carried on a single optical fiber by using different wavelengths of laser light. The full theory of WDM is beyond the scope of this manual but it is important to understand that by using equipment with different WDM factors on either end of a fiber optic cable, signals can be sent in both directions over that single cable. The Telecast Fiber CommLink units utilize a WDM factor of 1310 nm and a WDM of 1550 nm to provide a complementary pair.

In practice any CommLink setup requires one unit with a 1310 nm WDM factor and one unit with a 1550 nm WDM factor. Any 1310 nm unit can be used with any 1550 nm unit regardless of physical form. Two units with the same WDM factor will not work regardless of the physical form.

The following illustration displays how any 1310 nm WDM CommLink unit can be paired with any 1550 nm WDM unit.

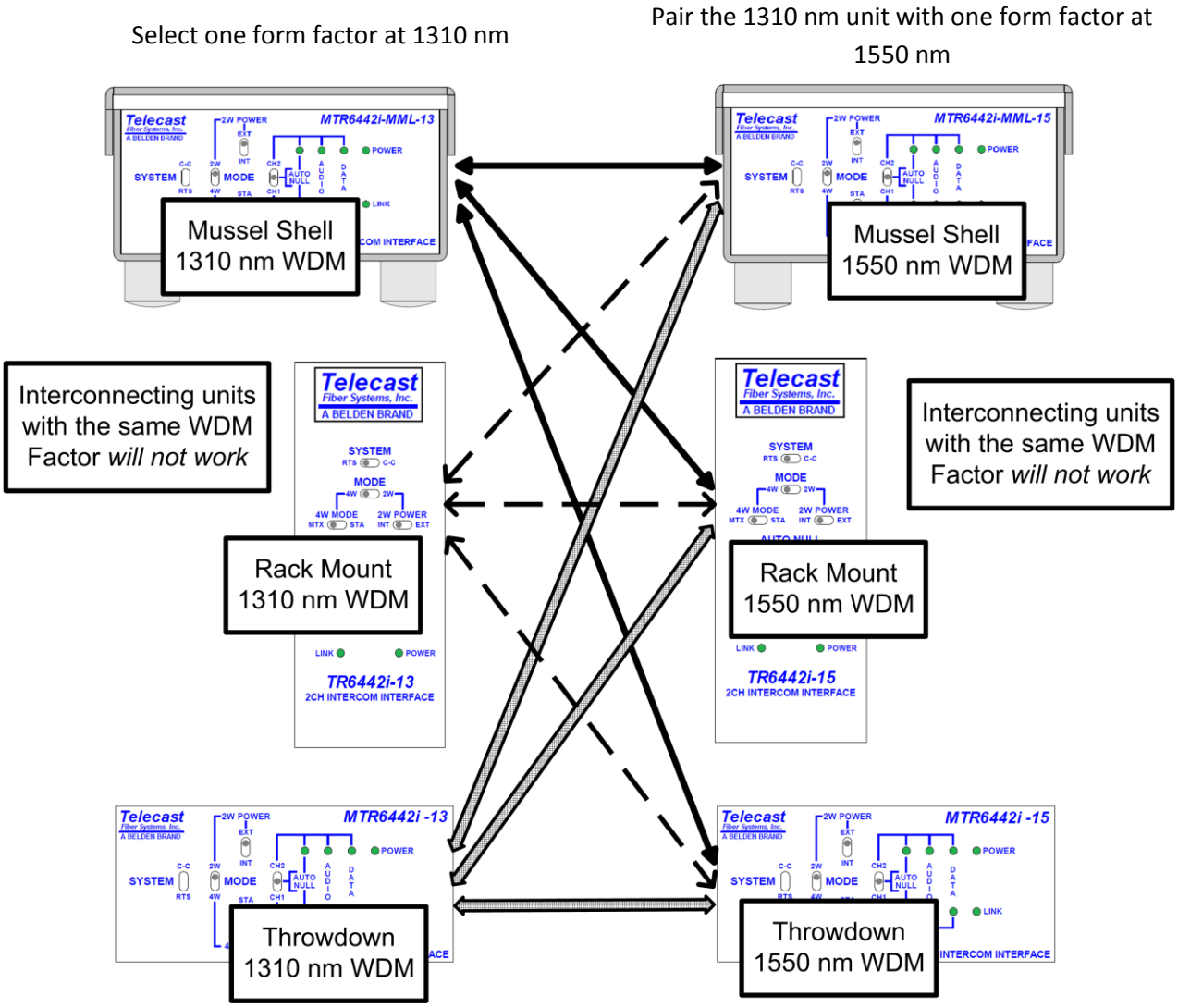

Figure 3 - Pairing Different WDM Factor CommLink Units

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Chapter 3. CommLink TR6442i Fiber Optic Intercom Link Components

The three physical types of the CommLink TR6442i Fiber Optic Intercom Link work identically. The variations between them are in their physical appearance and in how they are powered.

In this section the "throwdown" version of the CommLink TR6442i Fiber Optic Intercom Link is used to illustrate functionality. The variations for the other two types of CommLink TR6442i Fiber Optic Intercom Link (Rack Mount and Mini-Mussel Shell) are explained in later sections. Please see Appendix 1 for information about the installation of the CommLink TR6442i rack mount version in the Viper II rack.

3.1. CommLink TR6442i Fiber Optic Intercom Link Front Panel

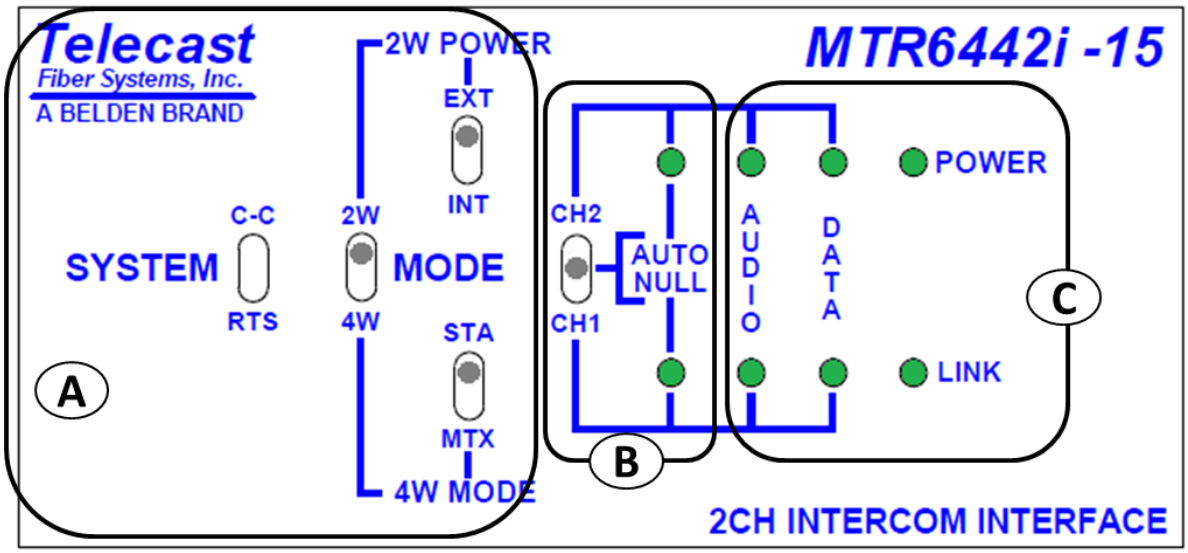


Figure 4 – CommLink TR6442i Throw Down Front Panel

The CommLink TR6442i has three area of interest

A) System Configuration Switches

See Page 16

B) Auto Null Control and Indicators

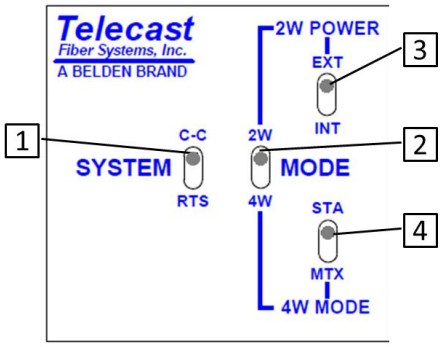
See Page 17

C) System Status Indicators

See Page 17

Area A – System Configuration Switches

The four switches in this section allow the configuration of the CommLink TR6442i for the particular intercom environment in use. Please see Section 4.1 below on operation of the CommLink TR6442i for examples of how these switches interact.



1) System Switch – sets the CommLink TR6442i in either RTS mode or Clear-Com (C-C) mode

2) Mode Switch – sets the CommLink TR6442i in either Two Wire (2W) or Four Wire (4W) mode

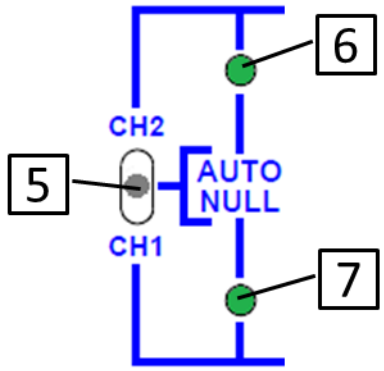
3) 2W Power Switch – sets the CommLink TR6442i power mode to either externally powered (EXT) or internally powered (INT). This switch is only operational when the Mode Switch is set to 2W.

4) 4W Mode Switch – sets the CommLink TR6442i to run in Station (STA) mode or Matrix (MTX) mode. This switch is only operational when the Mode Switch is in 4W mode.

When connecting two CommLink TR6442i units via fiber cable each CommLink TR6442i unit must be independently set for the configuration requirements at that CommLink TR6442i unit.

Area B – Auto Null Operation.

Please see Section 5.1 below on the Auto Null function.



5) Auto Null switch. This is a three position spring-loaded momentary switch that activates the Auto Null process for either Channel 1 (CH1) or Channel 2 (CH2).

6) Channel 1 Auto Null Activity Indicator

This indicator will blink green while the Nulling process occurs.

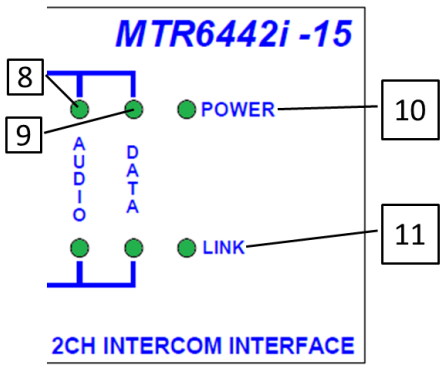
This indicator will be constant green to indicate the process is complete and good.

This indicator will be red if there was a problem with the null. (see – Section 5.1 below on operating the Auto Null feature)

7) Channel 2 Auto Null Activity Indicator

This indicator behaves the same as the Ch1 Auto Null activity indicator

Area C – System Status Indicators



8) Audio Activity Indicator

Green when audio activity is below 0 db

Red when audio activity is above 0 db

9) Data Activity Indicator

Green when there is data activity on the particular channel

10) Power Indicator

Green indicates power

11) Link Status Indicator

Green indicates link is good

Red indicates link is bad or non-existent.

3.2. CommLink TR6442i Fiber Optic Intercom Link Back Panel

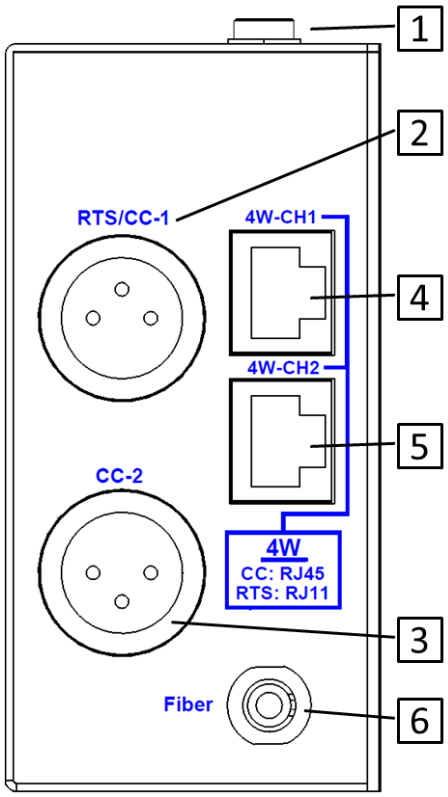


Figure 5 - CommLink Throw Down Back Panel

1) Power Connector (MTR6442i Throw Down and TR6442i Rack Mount Versions only)

This connector takes a 2.5 mm locking power plug. The recommended power unit is the Telecast Fiber System ADAP-AC-04LC (Please see Section 3.4 for more information regarding CommLink TR6442i power options)

2) RTS/CC-1 Chassis Mounted XLR Connector – for RTS TW operation or Channel 1 of Clear-Com two wire operation

3) CC-2 Chassis Mounted XLR Connector – for Channel 2 of Clear-Com two wire operation. Not active when the system is in RTS-TW mode.

Connectors 4 and 5 operate in one of 4 modes, depending on system configuration. These connectors can be used with RJ45 cables or RJ11 cables. Please see the following section for more information and for wiring information.

4) 4W-CH1 Connector - 8 Conductor RJ45/RJ11 connector for Channel 1

5) 4W-CH2 Connector - 8 Conductor RJ45/RJ11 connector for Channel 2

6) Fiber Connector – ST Connector for Fiber Optic Cable

See the section below on using fiber optic cable.

7) 11-18 VDC Power Connector – for use with the Telecast Fiber ADAP-AC-04 Power Supply.

This power supply has a 4 pin XLR connector and is used only with the MTR6442i-MML Mussell Shell configuration of the CommLink TR6442i. See Page 22 for wiring information.

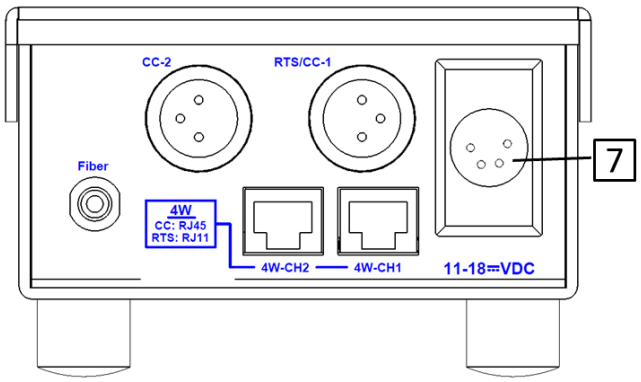


Figure 6 - CommLink Mussell Shell Back Panel

3.3. CommLink TR6442i Matrix and Station Connectors

Both the RTS and Clear-Com system matrix systems use data wiring to carry intercom audio and data. Clear-Com systems use 8 wire “network” cable with RJ45 connectors. RTS systems use 6 wire cable with RJ11 connectors similar to standard telephone wiring. However, telephone wiring will not work as it is only four wire.

The CommLink TR6442i Configuration is shown for each intercom mode. The switch position is indicated. In all cases the 4W/2W switch is in the 4W position.

Clear-Com Mode Wiring

Clear-Com Switch Settings

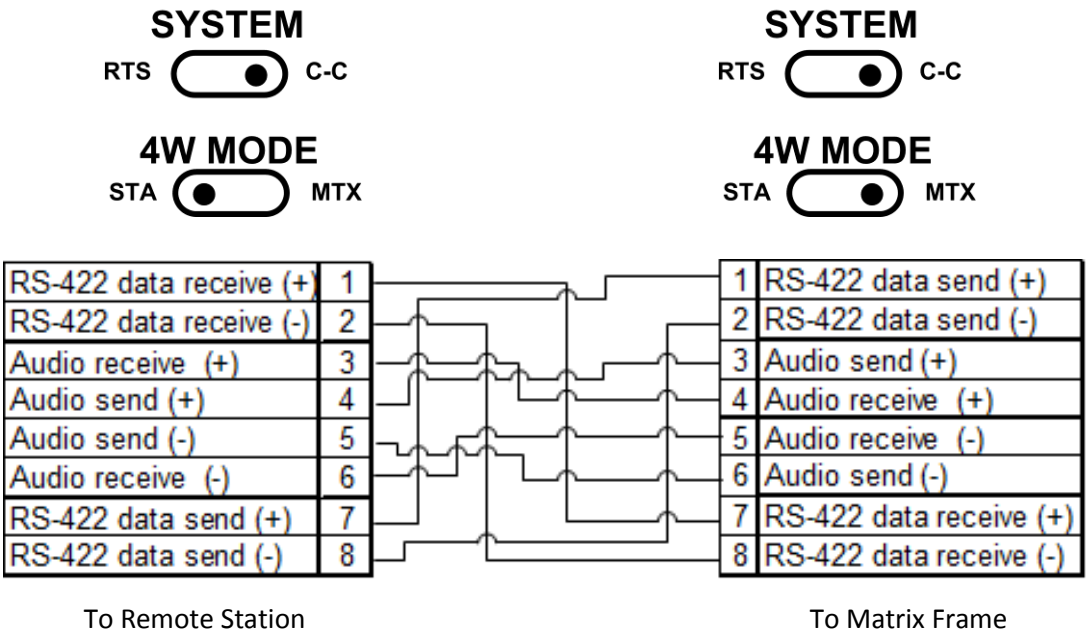


Figure 7 - Clear-Com Mode Data Cable Wiring

Clear-Com Wiring Pin Outs (RJ45)

1	to 7
2	to 8
3	to 4
4	to 3
5	to 6
6	to 5
7	to 1
8	to 2

Table 1 - Clear-Com Wiring Pin Outs

The Clear-Com system utilizes RS422 data.

RTS Mode Wiring

RTS Switch Settings

In all cases the 4W/2W switch is in the 4W position.

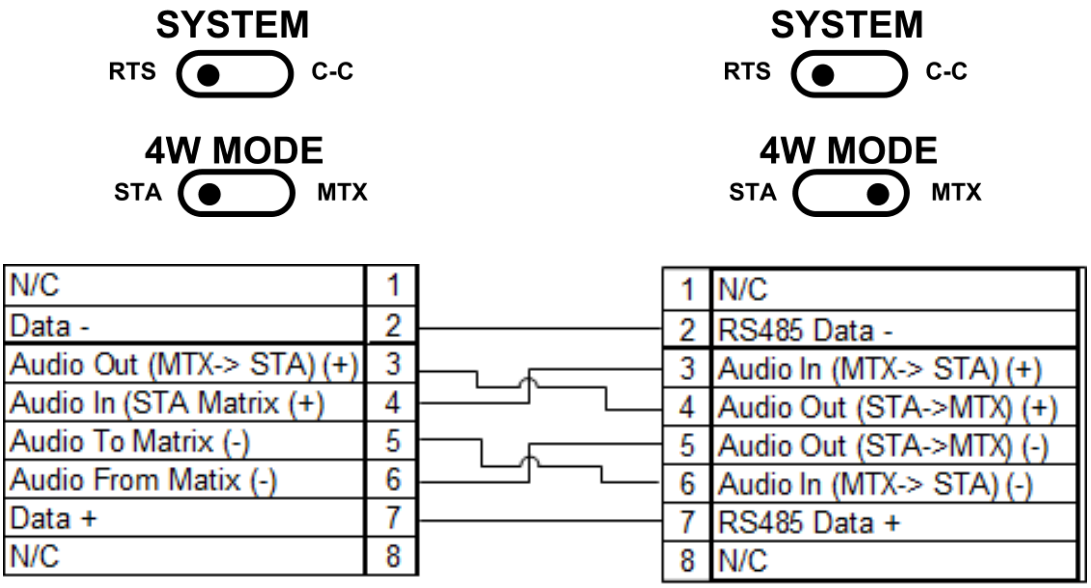


Figure 8 - RTS Mode Data Cable Wiring

RTS Wiring Pin Outs RJ11

1	NA
2	to 2
3	to 4
4	to 3
5	to 6
6	to 5
7	to 7
8	NA

Table 2- RTS Wiring Pin Outs

3.4. CommLink TR6442i Power Options

The CommLink TR6442i Fiber Optic Intercom Link is powered through an attached external power supply or from power received from the Two-Wire intercom connection.

The following table shows how each CommLink TR6442i unit can be powered.

Model	Type	12 Volt Power Supply	30 Volt Power Supply	30 Volt Power Output to Belt Packs*
MTR6442i-13 or 15	Throw Down	Telecast ADAP-AC-04LC with 2.5mm plug	Can be powered from Intercom system when in Two-Wire mode	30 Volts is provided on RTS/CC-1 and CC-2 XLR connectors.
MTR6442i-MML-13 or 15	Mussell Shell	Telecast ADAP-AC-04 with 4-pin XLR	Can be powered from Intercom system when in Two-Wire mode	30 Volts is provided on RTS/CC-1 and CC-2 XLR connectors.
TR6442i-13 or 15	Rack Mount in Viper II Rack Unit	Powered through Viper II frame – PS5000 power supply	Can be powered from Intercom system when in Two-Wire mode	30 Volts is provided on RTS/CC-1 and CC-2 XLR connectors.

Table 3- CommLink Power Options

* 30 Volts is output from the CommLink TR6442i unit when it has 12V power applied. When no 12V power is applied (2W Power switch is on EXT) the CommLink TR6442i unit derives power from the intercom connection and all Belt-Packs derive power from the Intercom system or from internal power sources.

When powered by the 12 Volt power supply the CommLink TR6442i will power 5 intercom belt packs (10 total on the system) or two remote matrix stations per channel. If the system has self-powered belt packs attached (30V) and the external 12 Volt power supply is also attached the 12 Volt supply takes priority in powering the CommLink TR6442i.

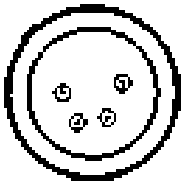
CommLink TR6442i Port State and Power Options

The CommLink TR6442i also manages the enabling of ports depending on the type of power supply and the system mode. The following table shows the different CommLink TR6442i states:

System Mode	Power Supply	Internal 30 Volt Supply	Belt Pack Power	4W Ports
2W	30V from Intercom System	Disabled	Self-powered or from Intercom System	Disabled
2W	12 Volt External & Belt-Packs are powered internally or from the intercom system	Disabled	Self-powered or from Intercom System	Disabled
2W	12 Volt External	Enabled	From CommLink	Disabled
4W	12 Volt External	Disabled	Disabled	Enabled
2W to 4W or 4W to 2W Conversion	12 Volt External	Can be used	Self-powered or from Intercom System or from CommLink TR6442i 30V supply	Enabled but with RS422/485 data transfer disabled

Table 4 - CommLink Power States

Mussel Shell MTR6442i Power Connector – 4 Pin XLR Connector Wiring



Pin	Function
1	Ground
2	Unused
3	Unused
4	+ Power 12 VDC

Table 5 – MTR6442i Power Connector Wiring

This matching connector is from either an ADAP-AC-04 or a customer 12VDC power supply

Telecast Fiber ADAP Power Supplies

Telecast Fiber Part Number ADAP-AC-04

Supplied with 4PIN XLR/A4F connector for power plug on Mussell Shell unit

Telecast Fiber Part Number ADAP-AC-04LC

Supplied with 2.5 MM plug for power jack on Throw Down unit

Figure 9 - Telecast Power Supplies

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Chapter 4. Setting Up the CommLink TR6442i Fiber Optic Intercom Link

Use of the CommLink TR6442i system first requires the setup and connection of the Intercom System and the CommLink TR6442i Link units. The second step is the proper configuration or setting of switches on the CommLink TR6442i front panel. If two-wire systems are in use, the Auto Null function should be employed.

Each system setup is based on the appropriate mix of the three physical types of the CommLink TR6442i. Depending on your particular operation the combination of units may be all the same physical type or a mix and match. Whatever the physical configuration of the units, they must operate in pairs of 1310mm WDM and 1550mm WDM units. It makes no difference where the WDM units are placed in the system. If the CommLink TR6442i is being used locally to convert between intercom system types, either WDM type can be used

4.1. Example CommLink TR6442i Usage Scenarios

Five usage configurations are illustrated:

1. Connecting a Two Channel Base System with Remote Belt Packs
2. Connecting a Matrix Frame System with Two Remote Matrix Stations
3. Connecting a Matrix Frame with Remote Belt Packs
4. Connecting Two Matrix Stations System with a Matrix Frame with Video Multiplexed on to a Multi-Strand Fiber Cable (This is an example of “hybrid” use with the CommLink TR6442i)
5. Converting a Two Channel System to work with a Matrix Frame

Connecting a Two Channel Base System with Remote Belt Packs

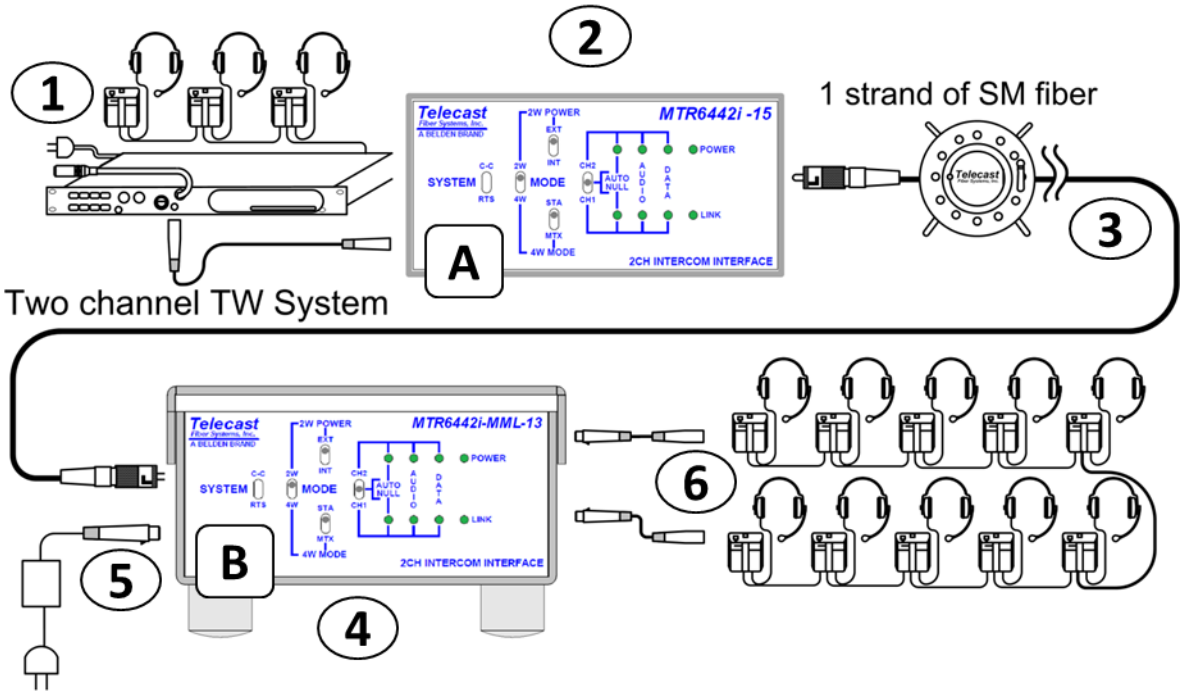

Figure 10 - Connecting a Two Channel Base System with Remote Belt Packs

Connect the Two-Channel Two-Wire Intercom System **(1)** and CommLink TR6442i Unit "A" (**2).** In this example it is assumed that the CommLink TR6442i is powered from the intercom. Run a Single Strand Fiber Cable **(3)** between CommLink TR6442i Unit "B" **(4)** and power the CommLink TR6442i using the appropriate power supply **(5).**

Connect your intercom Belt Packs in normal daisy chain fashion to the CommLink TR6442i. The number of Belt Packs will depend on whether they are self-powered or are powered by the CommLink TR6442i. When powered by the CommLink TR6442i you can expect 5 units to work per channel.

Remember that CommLink TR6442i "A" must have a WDM factor different from CommLink TR6442i "B." You must use a WDM @1550nm unit at one end of the fiber cable and a WDM@1310 at the other end of the fiber cable.

In this example two Mussel Shell versions of the CommLink TR6442i are used. It makes no difference which of the three physical versions is used so long as the WDM factors are different as described above.

CommLink Unit	System Switch	Mode Switch	4W Switch	2W Power Switch
#A in drawing	Match Intercom	2W	NA	EXT
#B in drawing	Match Intercom	2W	NA	INT

Table 6 - Configuration for Two Channel to Belt Pack Setup

Connecting a Matrix Frame System with Two Remote Matrix Stations

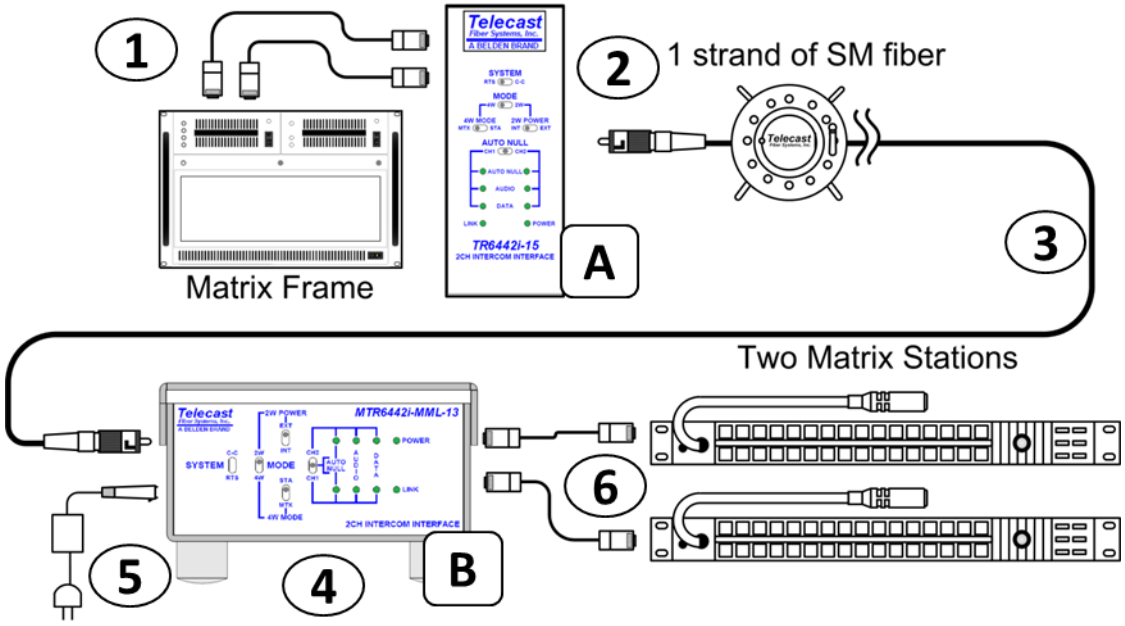

Figure 11 - Connecting a Matrix Frame System with Two Remote Matrix Stations

Connect the Intercom Matrix (**1)** and CommLink TR6442i Unit "A" **(2)** In this case it is assumed the CommLink TR6442i is a rack mount unit and is powered from the Viper II frame.* Run a Single Strand Fiber Cable **(3)** between CommLink TR6442i Unit "B" **(4)** and power the CommLink TR6442i using the appropriate power supply **(5).**

Connect your two intercom Matrix Stations **(6)** and provide power locally. Remember that CommLink TR6442i "A" must have a WDM factor different from CommLink TR6442i "B." You must use a WDM @1550nm unit at one end of the fiber cable and a WDM@1310 at the other end of the fiber cable.

* If using a Throw Down CommLink TR6442i it would need to be powered from the Telecast Fiber ADAP—AC-04LC power supply unit

CommLink Unit	System Switch	Mode Switch	4W Switch	2W Power Switch
#A in drawing	Match Intercom	4W	MTX	NA
#B in drawing	Match Intercom	4W	STA	NA

Table 7 - Configuration for Matrix Frame to Two Matrix Stations

Connecting a Matrix Frame with Remote Belt Packs

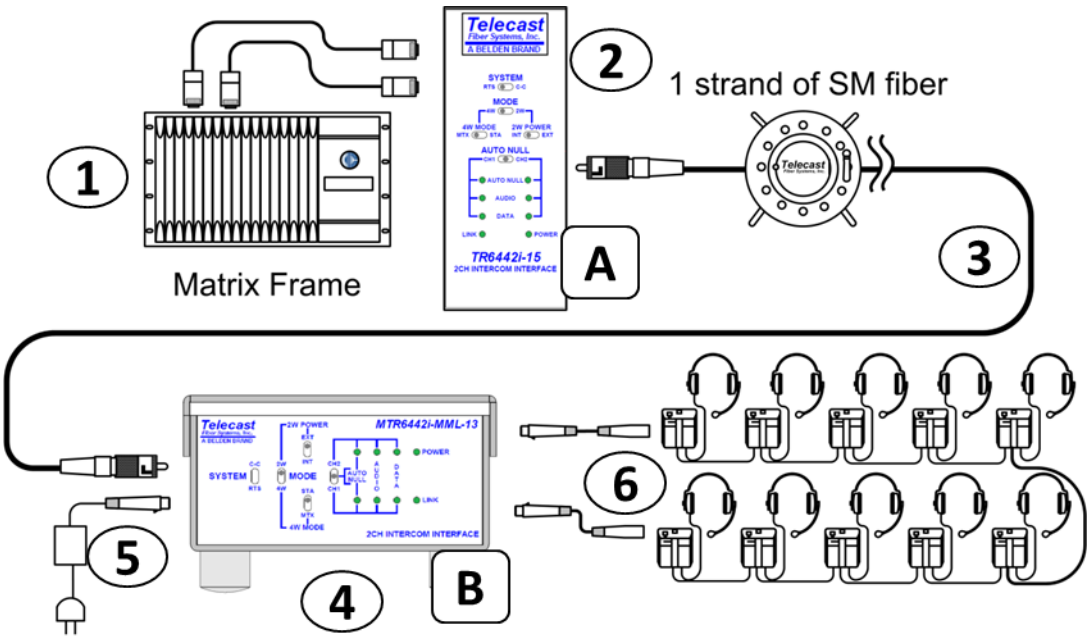

Figure 12 - Connecting a Matrix Frame with Remote Belt Packs

Connect the Intercom Matrix (**1)** and CommLink TR6442i Unit "A" **(2)** In this case it is assumed the CommLink TR6442i is a rack mount unit and is powered from the Viper II frame.* Run a Single Strand Fiber Cable **(3)** between CommLink TR6442i Unit "B" **(4)** and power the CommLink TR6442i using the appropriate power supply **(5).**

Connect your intercom Belt Packs in normal daisy chain fashion to the CommLink TR6442i. The number of Belt Packs will depend on whether they are self-powered or are powered by the CommLink TR6442i. When powered by the CommLink TR6442i you can expect 5 units to work per channel depending on cable runs

Remember that CommLink TR6442i "A" must have a WDM factor different from CommLink TR6442i "B." You must use a WDM @1550nm unit at one end of the fiber cable and a WDM@1310 at the other end of the fiber cable.

* If using a Throw Down CommLink TR6442i it would need to be powered from the Telecast Fiber ADAP—AC-04LC power supply unit

CommLink Unit	System Switch	Mode Switch	4W Switch	2W Power Switch
#A in drawing	Match Intercom	4W	MTX	NA
#B in drawing	Match Intercom	2W	NA	INT

Table 8 - Configuration for Matrix Frame to Remote Belt Packs

Connecting Two Matrix Stations System with a Matrix Frame plus Video Multiplexed on a Multi-Strand Fiber Cable

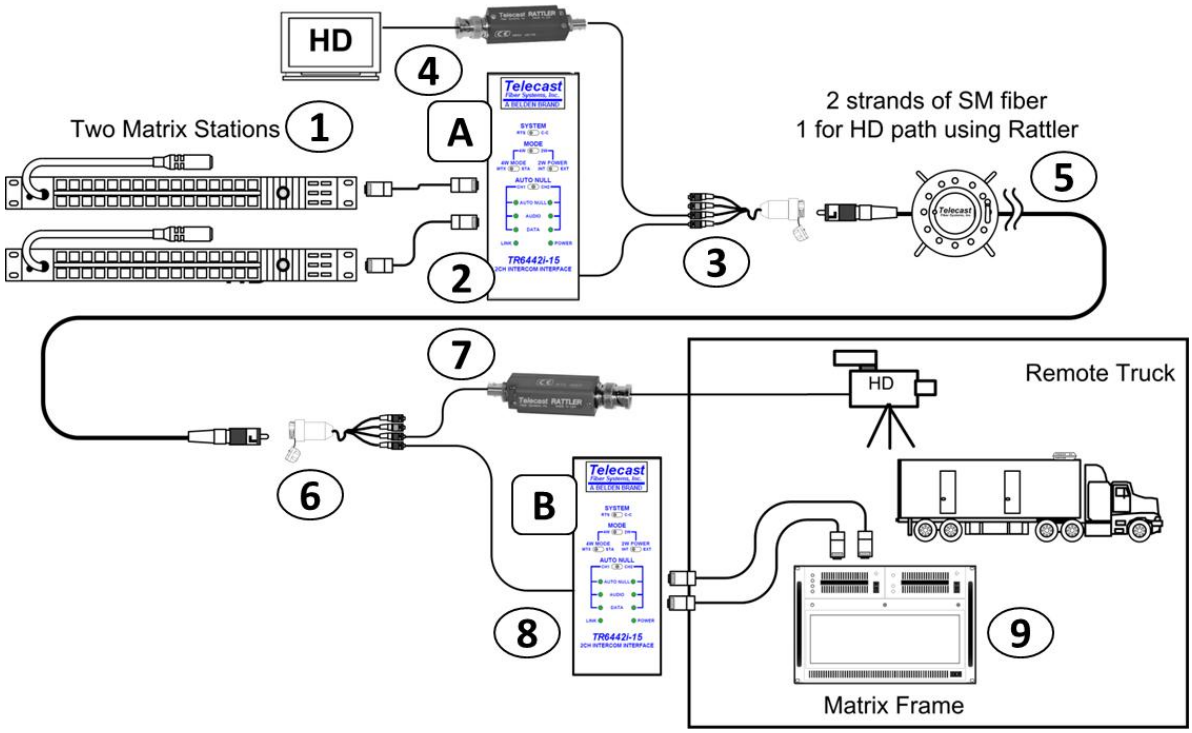

Figure 13 - Connecting Two Matrix Stations System with a Matrix Frame plus Video Multiplexed on the Multi-Strand Fiber Cable

This usage scenario demonstrates the flexibility provided by the Telecast Fiber products. In this case Multi-Strand Fiber Cable with MX Connectors is used in place of Single Strand Fiber Cable. With the addition of the Break Out cable MXRR-4-08 Fiber optic signals can be sent to multiple locations. Here a Telecast Fiber Rattler Mini HD/SDI Transmitter and Receiver are used to transmit HD video along the same Fiber Cable as the Intercom Link. A wide variety of set-ups is possible using different Telecast Systems components. Please consult you Telecast Systems dealer for more information.

The example calls for you to connect the Matrix Stations (**1)** and CommLink TR6442i Unit "A" **(2).** In this case it is assumed the CommLink TR6442i is a rack mount unit and is powered from the Viper II frame.* Connect the CommLink TR6442i Unit to the Break-Out Cable **(3)** and then connect the Break-Out cable to the Multi-Strand Fiber Cable **(5).** Connect the Rattler Receive Unit RRX 1679 **(4)** to your HD Video Display and to the Break Out Cable **(3)**.

Connect the Fiber Cable **(5)** to a Break Out Cable **(6)** at the other end. The Break Out Cable then connects to CommLink TR6442i Unit "B" **(8)** and to the Rattler Transmit Unit RTX 1660 **(7)**. The Rattler is connected to your HD Video Source and CommLink TR6442i is connected to the Intercom Matrix Frame **(9).**

Converting a Two Channel System to work with a Matrix Frame

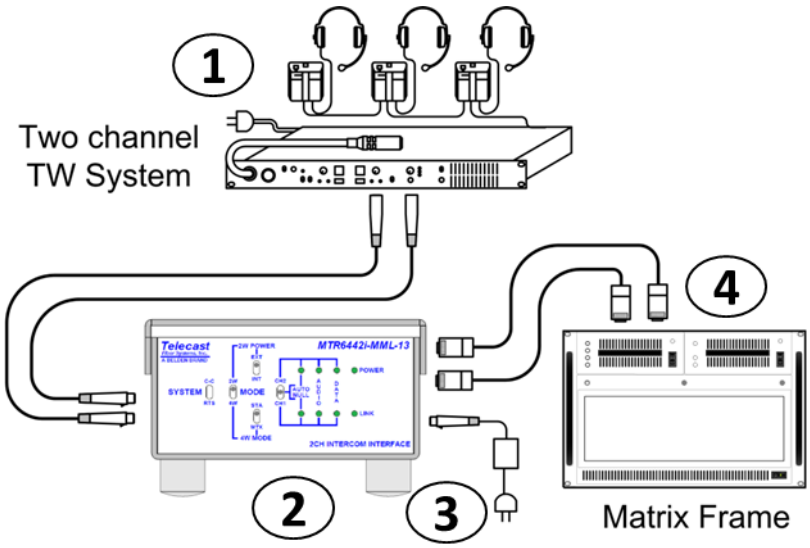

Figure 14 - Converting a Two Channel System to work with a Matrix Frame

Connect the Two-Channel Two-Wire Intercom System **(1)** and CommLink TR6442i Unit (**2).** In this example a Mussell Shell version is used. Power the CommLink TR6442i using the appropriate power supply **(3).**

Connect the Intercom Matrix (**4).** The WDM factor of the CommLink TR6442i is not relevant in this scenario.

In this example a Mussel Shell version of the CommLink TR6442i is used. It makes no difference which of the three physical versions of the CommLink TR6442i is used.

The System Switches should be set as follows:

SYSTEM – Set for your Two Channel System – ClearCom (CC) or RTS

MODE – Set to 2W

2W POWER – Set for your CommLink Unit

4.2. CommLink TR6442i Switch Configuration

The following decision tree traces the setting of the CommLink TR6442i configuration switches.

1. Set the System mode – Clear-Com (CC) or RTS
2. Decide if you are operating in 2W or 4W
3. If in 2W set your power to External (EXT) or Internal (INT) – this decides between using the power from the intercom system or Belt Packs (EXT) or providing internal power from the CommLink TR6442i with the 12 Volt power supply (INT)
4. If in 4W set the switch depending on whether you have an Intercom Matrix Station (STA) or Matrix (MTX) attached to the CommLink TR6442i

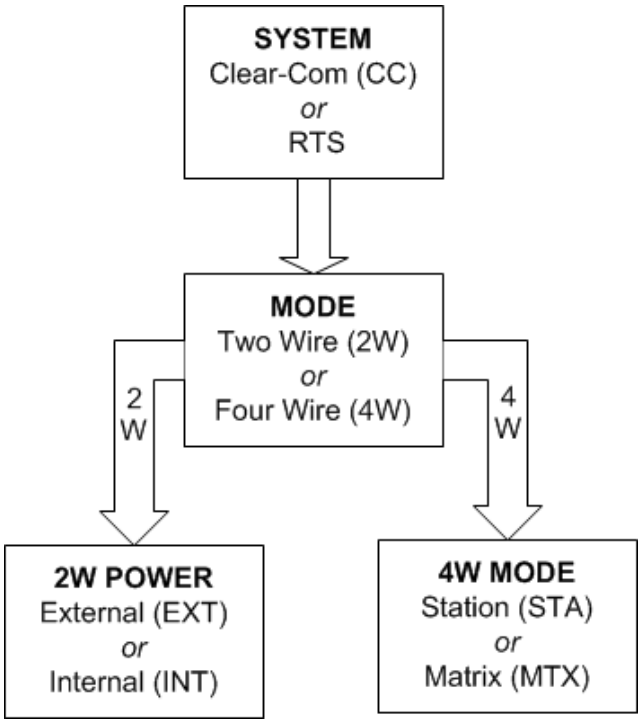

Figure 15 - Configuration Switch Decision Tree

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Chapter 5. CommLink TR6442i Fiber Optic Intercom Link Operation

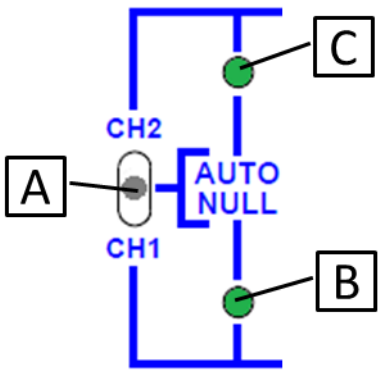
This chapter describes in the operation of CommLink TR6442i. Please keep in mind that once the system is properly set up and configured there is very little to do during normal operation.

The following topics are covered:

1) Using the Auto Null function
2) Managing and Connecting the Fiber Cable
3) Hints on Standard Operation
4) Troubleshooting

5.1. Using the Auto-Null Function

The Auto-Null function is used only with CommLink TR6442i units that are connected to Two-Wire system. Auto Null has no purpose with a Four Wire system.



1) Before starting the Auto-Null process please insure the following:
   A) All headsets are connected
   B) Headsets are not being worn by any operators
   C) Headset microphones are off
2) To Auto Null Channel 1 (CH1) hold the Auto Null switch **(A)** in the direction of CH1.
3) The system will generate a tone and the indicator **(B)** will blink green while the Nulling process occurs. This should take about 7.5 seconds.
4) Once the Auto Null process is complete the tone will stop and the indicator will glow green.
5) This indicator will be red if there was a problem with the null. This can occur if any of the items in Step 1 are not followed.
6) Once you troubleshoot the Null problem perform steps 1-3 again.
7) For Channel 2 (CH2) hold the Auto Null switch **(A)** in the direction of CH2. Steps 2 and 3 will then follow with the CH2 indicator being active **(C)**.
8) After completing the Auto-Null process check that side-tone operation and overall intercom performance on each intercom channel is correct.

5.2. Managing and Connecting the Fiber Cable

This section provides an overview of managing and connecting the Fiber Optic Cable between the two CommLink TR6442i units.

	**Never look directly into the end of the optic fiber while either end of the system is operating. Eye damage can result!**
	Always use cable connector caps when the cables are not connected. This protects the connector from damage and the unlikely event of exposure to an operating optical link. Keeping the caps in place when the connectors are not in use will prevent dirt and dust from entering the connector and degrading the performance of the optical link

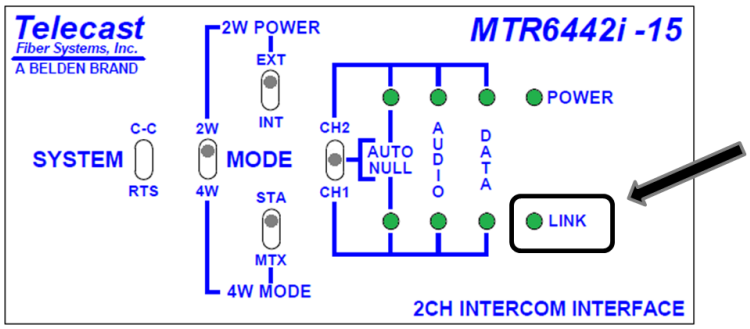
It is important that you do an initial setup and test of your CommLink TR6442i Fiber Optic Intercom Link System as soon as you receive it in order to confirm proper operation and to provide training to you and your team prior to an actual production.

It is highly recommended that you do not attempt to power up the system until all connections are made and in particular the Fiber Optic Cable has been connected at both ends. If you need to power up either CommLink TR6442i units make sure that the Fiber Connectors are securely capped. This will protect them from damage or dirt and protect you from eye damage.

5.3. Connecting and Managing the Fiber Cable

Connecting and managing the Fiber Cable between the two CommLink TR6442i units requires you to perform four tasks:

1. Plan the route the Fiber Cable will take between the two CommLink TR6442i units
2. Run the Fiber Cable along the planned route
3. Connect the Fiber Cable Connectors at each end
4. Power up the CommLink TR6442i units and check the Fiber Optic Cable Link by means of the Link indicator.



Planning the Fiber Cable Route

Obviously the longer the planned cable run the more planning required. It also makes a difference whether you are running Single Strand Fiber Cable or Multi-Strand Fiber Cable as these affect both the length and the type of exposure the cable can endure. With the CommLink TR6442i you will most likely be using single strand fiber cable.

When planning your cable route take into the consideration the following:

1. Possible obstacles that might cause you to run short of cable – you may need to take a more indirect, but achievable route

2. Possible hazards to the cable – while tactical fiber is extremely durable it is not immune to damage. An obvious hazard is running the cable across a lawn scheduled to be cut during your live production. Make sure the empty roadway at 6AM will not be filled with heavy equipment when it comes time to retrieve your cable

3. Possible interference (physical) with the cable that might cause it to bend or kink to an extent that unacceptable signal loss occurs.

4. Safety hazards – make sure that the cable will not cause a tripping or tangling hazard with people, animals or vehicles.

5. Decide whether the Fiber Cable is to be unspooled from the Base Station location or the Belt-Pack location. Typically the reel is kept close to the base station. However if there is a chance the Belt-Pack location may need to move further away from the Base Station after initial placement it makes sense to place the reel at the Belt-Pack end. Make sure there is enough free cable coming out of the stationary end of the cable reel to accommodate a well-managed connection to the first Belt-Pack.

Planning the cable route requires common sense and the ability to foresee the unforeseen.

Running the Fiber Cable

Do the following when running your Fiber Cable:

1. Make sure that both ends of the Fiber Cable are securely capped. In this case the concern is dirt and damage. ANY dirt in the connector can adversely affect Fiber Optical performance and potentially cause you to lose the use of your camera while the problem is diagnosed and remedied.
2. If the cable run is long or if you will lose sight of the spooling out cable reel make sure you have appropriate assistance in running out the cable. When retrieving the cable, assistance to prevent the cable end from being caught or tangled up could be critical. Don't start reeling in the cable on your own and assume the Connector end will make it back to home base safely.
3. When unspooling the cable ALWAYS make sure the stationary end (the end that goes to the Base CommLink TR6442i) is securely contained within the reel. A loose Connector can bang around and be damaged and NEVER connect the stationary end of the Fiber Cable to the Base CommLink TR6442i and the start unspooling the Fiber Cable. Severe damage to the cable could occur due to extreme spiraling of the connected portion of the cable.

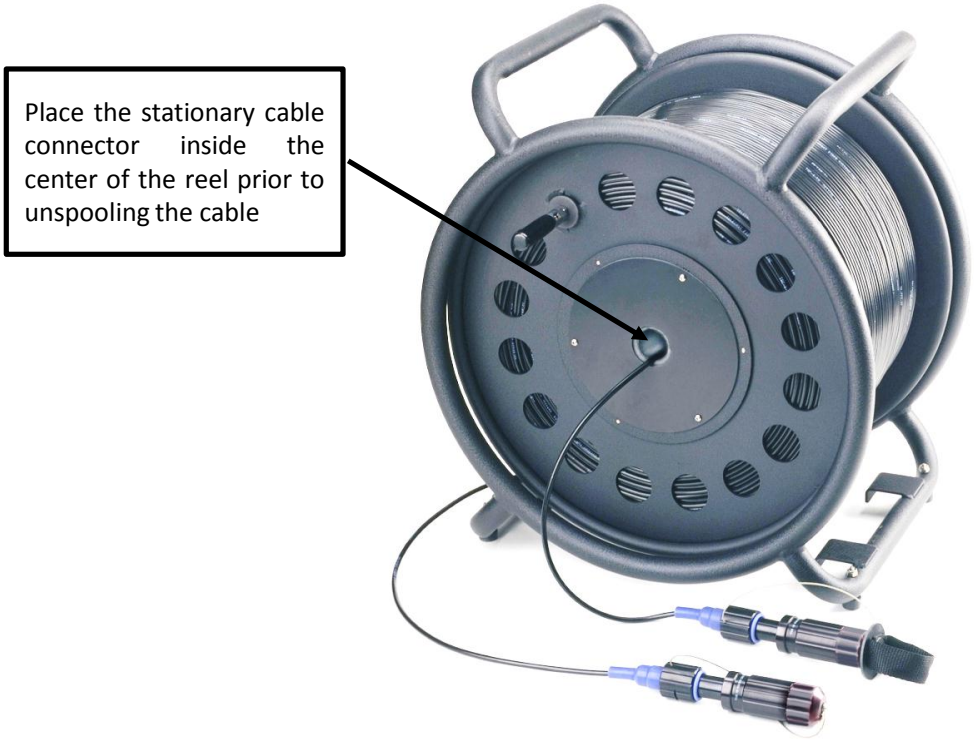


Figure 16 - Fiber Cable Reel

4. Prior to connecting the Fiber Connectors to the CommLink TR6442i Units, inspect both Connectors. If required, clean with dry compressed air or with technical wipes that have been moistened with isopropyl alcohol. Fingerprints or other dirt on the optical connector end surfaces will reduce the optical signal level on the fiber. If the connectors have been properly capped during storage and movement you will not likely have a problem. However if a connector has been dropped or dragged through dirt or exposed to dust cleaning is recommended.

5. Once the Fiber Cable has been connected it is time to secure the Fiber Cable run. Make sure there are no cable hazards in the run. Secure the cable with Cable Guards and/or Gaffers tape to insure safety.

6. Now the system can be powered on. Plugging in Fiber Cable connectors with the power on will not damage the system but is not recommended because of the chance of possible eye damage.

7. When re-spooling the Fiber Cable on to the spool guide it across the entire width of the spool so that it winds evenly and the possibility of cinching or kinks is greatly reduced.

5.4. Standard Operation

The section is devoted to a number of “Best Practices” for use of the CommLink TR6442i Fiber Optic Intercom Link System. Specific information on how to operate the system has been presented in the sections above.

1. Take the possibility of Laser Eye damage seriously. It is not likely but you don’t want to be the one-in-a-million case.

2. Protect the Fiber Optic Cable and the Fiber Optic Connectors. **Always** keep these capped unless there are being connected.

3. Read the section on planning the Fiber Run – it may come in handy – Page 35.

4. Once the system is set up and running, do not ignore the Link strength indicators at either of the CommLink TR6442i units. The system is, of course, digital and so the Signal Strength is either just good enough or usually much better than that. When it is no longer strong enough the signal stops.

5. If introducing new equipment (intercom units, additional Belt-Packs, etc.) or new operators be sure to do a test run with everything as it will be during the actual production. Reading this User Guide is a good start but hands-on is the best way to understand how it will and more importantly what to do to insure proper operation.

6. Be as careful during System tear down as during setup.

5.5. Troubleshooting

Troubleshooting any technical issues with the CommLink TR6442i Fiber Optic Intercom Link System is similar to any piece of television production gear with the obvious exception of the core Fiber Optic technology. Here is a list of things to look out for and check – some of them obvious but sometimes forgotten.

1. During power-up of the CommLink TR6442i the Auto Null indicators will turn GREEN and then RED and then OFF. This indicates that these indicators are working properly. These are the only indicators tested on power up.

2. The Auto Null indicators will blink on and off RED if any of the CommLink TR6442i operating power levels are out of specification. This error condition will not likely affect operation but should be addressed as soon as convenient. This error may require contacting Telecast Fiber Support at 508-754-4858.

3. Check all your cables – and broken connections or bad connectors?

4. Check your power – are the Power Supplies working?

5. If there is a power problem, check the fuses.

6. If you cannot resolve the problem in the field please contact Telecast Fiber support at 508-754-4858

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Appendix 1. CommLink TR6442i Fiber Optic Intercom Link Installation Items

Two items are covered in this appendix:

1. Installing the CommLink TR6442i in the Viper II Rack

2. Converting the CommLink TR6442i Throw Down to a Rack Mount unit

Installing the CommLink TR6442i in the Viper II Rack

Note: Much of this section is adapted from the Telecast Fiber System *Viper II – V2Frame User Manual* which is available at http://www.telecast-fiber.com/product-manuals. Please consult this manual for complete information regarding the use and operation of the Viper II V2 Frame.

The CommLink TR6442i-13 or 15 rack mount unit is a standard Viper II module. The installation and removal of modules is a very straight-forward process but care should be taken to ensure that no damage occurs as a result of an improperly inserted module. Be careful when inserting and removing modules as the pins are of a very fine pitch and can easily be bent. If pins do become bent, contact Telecast Fiber Systems for an RMA number as it is not recommended that the user attempt a repair as failure to properly align the backplane will result in additional bent pins

Carefully align the module in the top and bottom guides and slowly insert it. As the rear end of the module nears the rear of the frame, it will hit a riser-plate that serves to lift the module so that the power connectors will properly come together and seat. You will "feel" this plate as you insert the module and as you continue to insert it you will "feel" the female power connector on the module make smooth contact with the male power plug in the frame. Any attempts to 'slam' the module into the frame are likely to result in bent pins.

Figure 17- Viper II - V2 Frame

The CommLink TR6442i Rack Mount unit can go into any Viper II frame slot.

Converting the TR6442i Viper II Rack Mount Unit to a MTR6442i Throw Down

The CommLink TR6442i Rack Mount version can be converted to a MTR 6442i Throw Down version of the CommLink. The Throw Down unit can also be converted to a Rack Mount kit. The conversion of a Rack Mount unit requires a TDK-TR6442i kit and the conversion of a Throw Down unit requires an RMK-TR6442i kit. The kit consists of a replacement front plate and rear plate. Make sure you order the -13 or -15 version of the kit to match your existing CommLink unit.

The CommLink TR6442i Rack Mount Unit can be converted to a CommLink MTR6442i Throw Down Unit

Side view of the CommLink Units

The conversion can be performed by a qualified end-user who is comfortable working with delicate multi-pin connectors and can work in a static-free environment. An experienced Telecast Fiber technician can accomplish this conversion in about 15 minutes so give yourself an hour and make sure you have time to fully test the unit prior to using in a production environment.

You will need a medium Phillips head screwdriver, a wrench to loosen and re-install an ST Fiber Barrel, something to temporarily hold a number of screws and a clean static-free work space.

The instructions for converting a Rack Mount unit using the TDK-TR6442i kit follow on the next nine pages. The conversion of a Throw Down unit is essentially the same using the RMK-TR6442i kit.

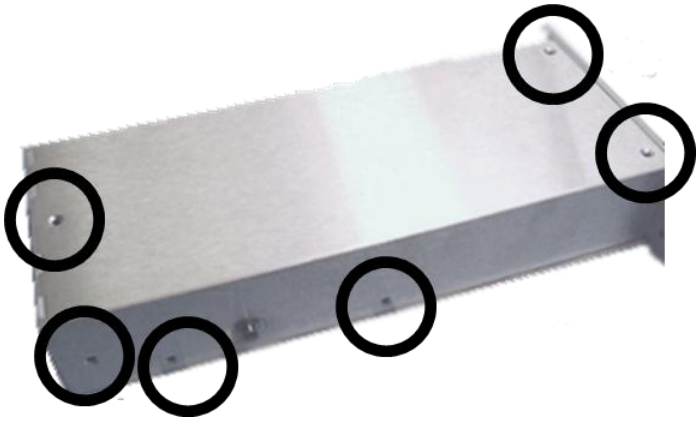
Step-By-Step Instructions for Converting a CommLink Rack Mount Unit to a Throw Down Unit

Please walk through all of the steps prior to beginning the disassembly of the Rack Mount unit. Be sure you understand each step. Nothing is difficult – you just have to be particularly carefully when disconnecting and reconnecting the multi-pin connectors.

Step 1

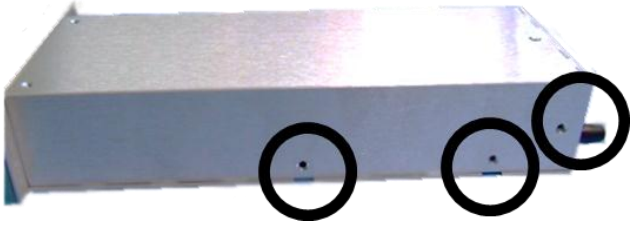
Disconnect all cables and power from the unit and place it on your work surface.

Remove three screws from the top of the unit and three screws from the side of the unit with the power connector. Make sure to retain the screws for re-use later.



Step 2

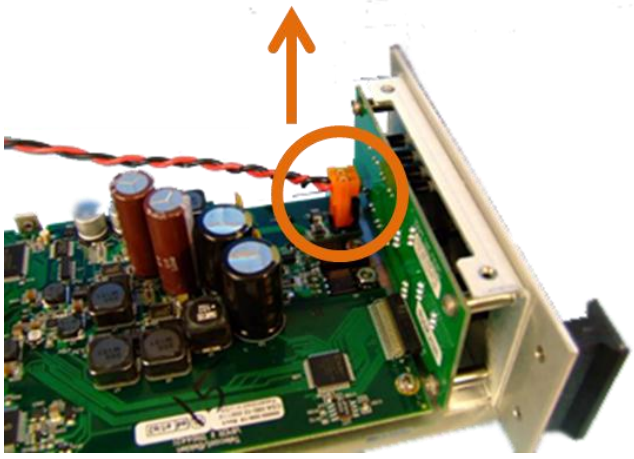
On the side opposite the power connector remove the three remaining cover screws- Retain the screws for re-use later. After removing all of the cover screws lift off the cover being careful not to pull the power connection.



Step 3

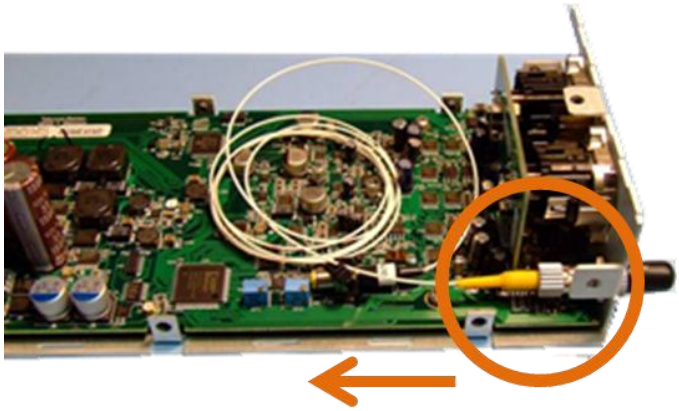
Carefully remove the orange power connector from the main circuit board.

Yiu can now set the unit cover aside for re-installation later.



Step 4

Remove the Fiber Cable from the ST Barrel on the rear plate. Remove the connector by pushing in and turning to the left. Protect the Fiber Cable connector from debris and dust.

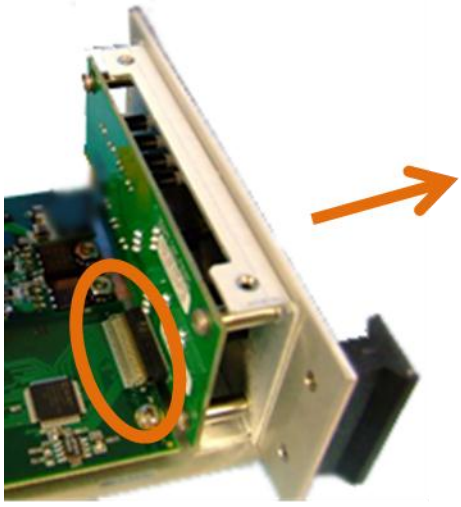


Step 5

Begin the process of removing the front panel by removing the two screws indicated. Retain the screws for later re-use. Do not slide off the front panel just yet.

Step 6

Carefully slide the front panel straight out from the unit so as to not bend the connector pins. This is a multi-pin connector as noted and can be damaged if not handled carefully.

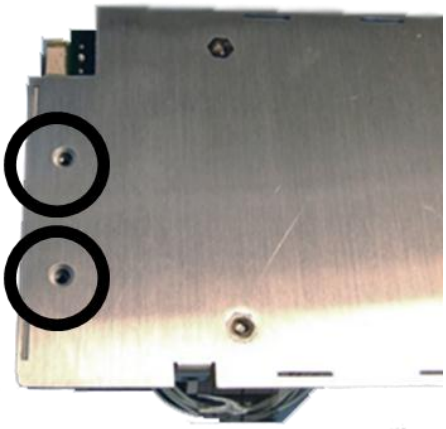


Step 6 continued

When the front panel is removed the unit will look like this.

Step 7

At the bottom rear of the unit remove two screws that hold the back panel in place.

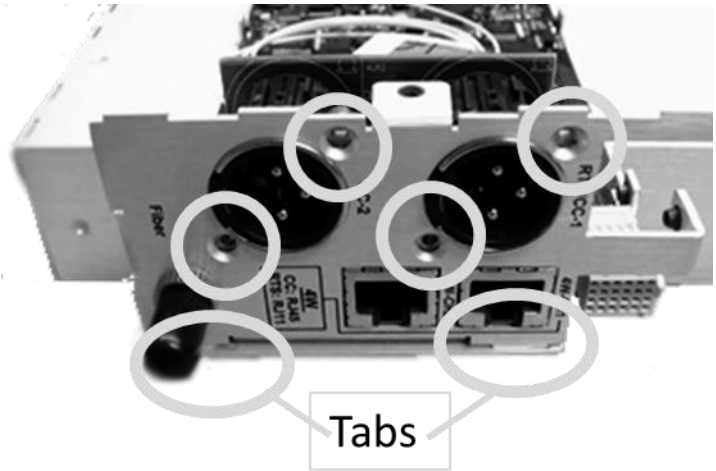


Step 8

Remove the four screws from the back panel. These screws hold the connector board to the panel. Do not attempt to remove the panel just yet

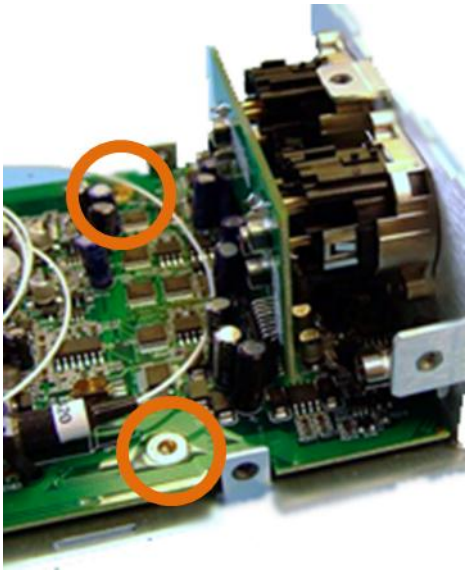
Note the two tabs that go into the bottom plate of the unit.

Once the screws are removed pull the connector board up and away from the unit. Make sure to not bend the ribbon connector. Set aside for re-installation.



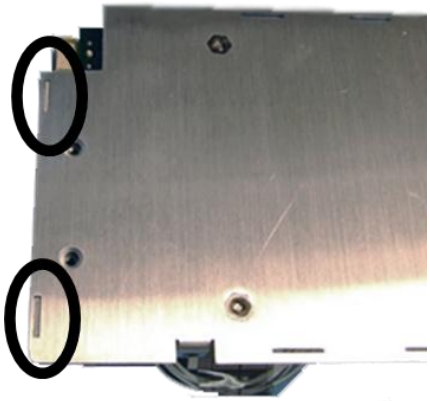
Step 9

On the main circuit board loosen but DO NOT REMOVE the two screws indicated. This will allow you to raise slightly the board and allows the rear panel to come clear of the main unit.



Step 10

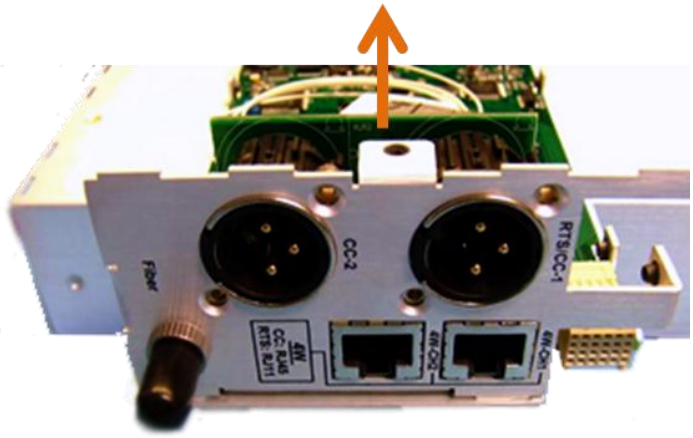
Note the tabs/slots on the bottom of the unit. These are what you will be clearing in order to remove the rear panel.



Step 11

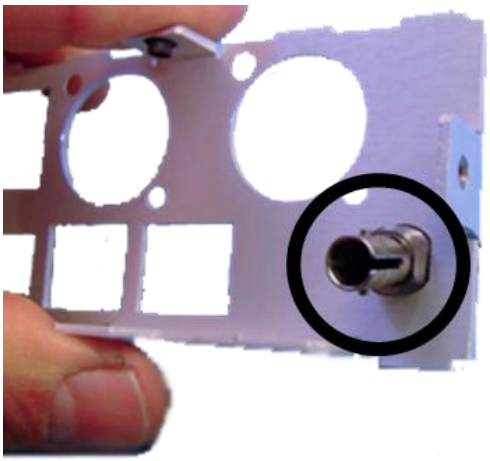
Lift the front panel slightly and pull out away from the unit. Make sure to clear the tabs. The previous step of loosening the circuit board screws should give you the clearance to remove the rear panel. If it does not feel free to completely remove the screws and retain them for re-installation.

At this point the connector panel should have been removed from the unit (not shown).



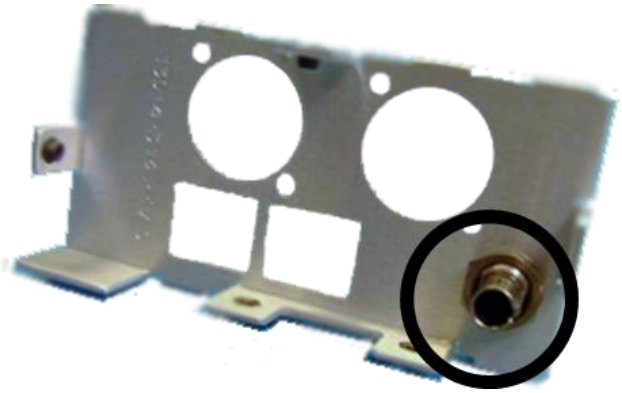
Step 12

Remove the ST Fiber Barrel from the just removed Rack Mount version rear panel. The Barrel will be used in the next step.



Step 13

Install the ST Fiber Barrel as shown in the Throw Down version rear panel. The slotted side of the Barrel should be installed so that it will face the exterior of the unit.

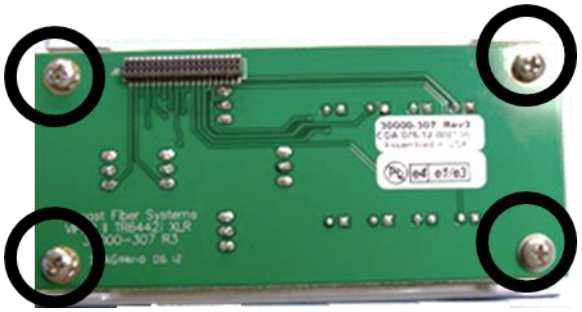


Step 14

Remove the display circuit board from the Rack Mount version front panel. The board and the four screws will be used in the next step.

Step 15

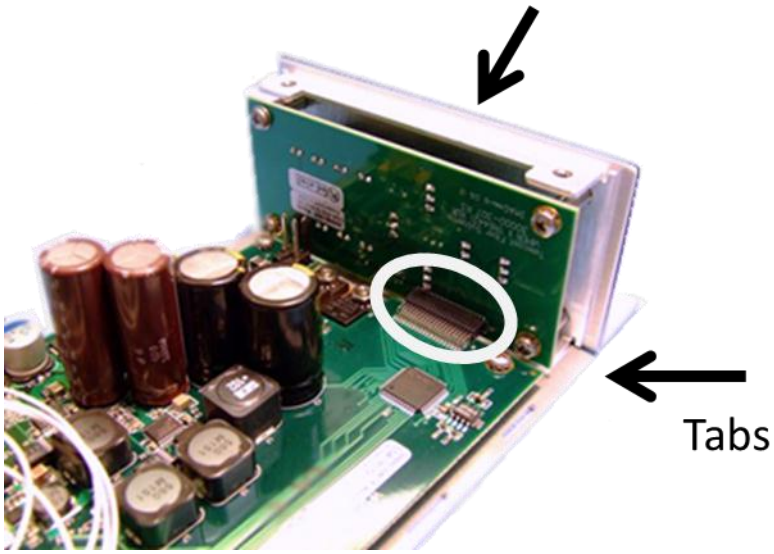
Install the display circuit board from the previous step to the Throw Down front panel using the same four screws



Step 16

Install the front plate assembly onto the base of the unit as shown. Carefully align the connector of the ribbon connector. The pins should go straight in and align.

Once the front plate is properly seated and the tabs inserted into the bottom plate of the unit you are ready to secure the plate with the screw previously removed.

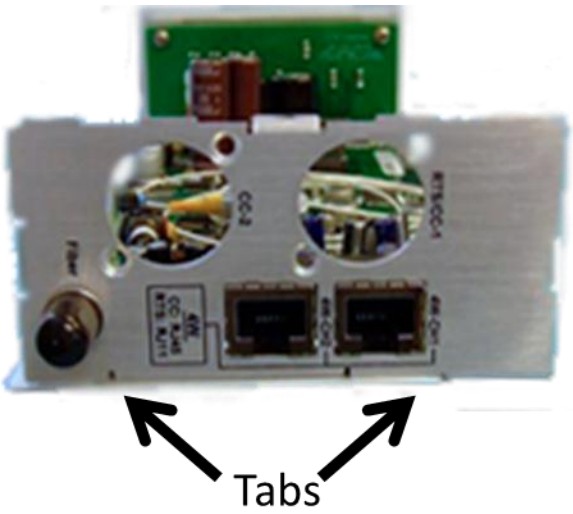


Step 17

Secure the front plate with the two screws as shown.

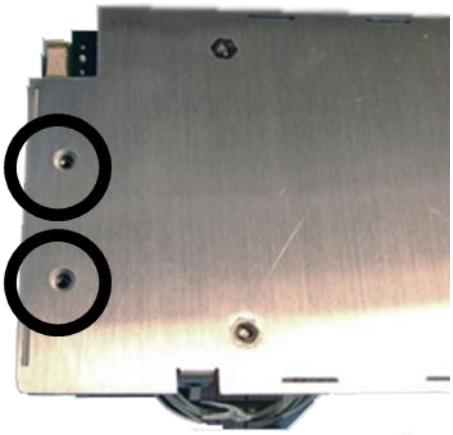
Step 18

Install the rear plate on to the unit.
In order to get the tabs into place on the bottom plate of the unit you will have to lift the main circuit board as you did when removing the Rack Mount rear panel.
You may need to give the panel a small amount of pressure in order to the the 4 Wire (RJ45 type) connectors in place over the EMI tabs.



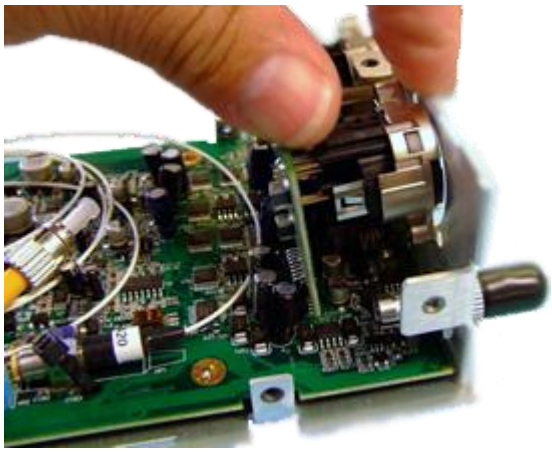
Step 19

Secure the back plate to the unit base by re-installing the two screw removed when taking off the Rack Mount rear panel



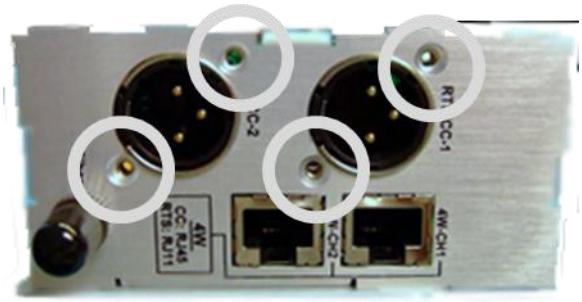
Step 20

Install the connector board onto the base. Be careful not to bend the connector pins.
Initially the board won't fit correctly – once the connectors are seated pull the back plate forward slightly and the board will fall into place.



Step 21

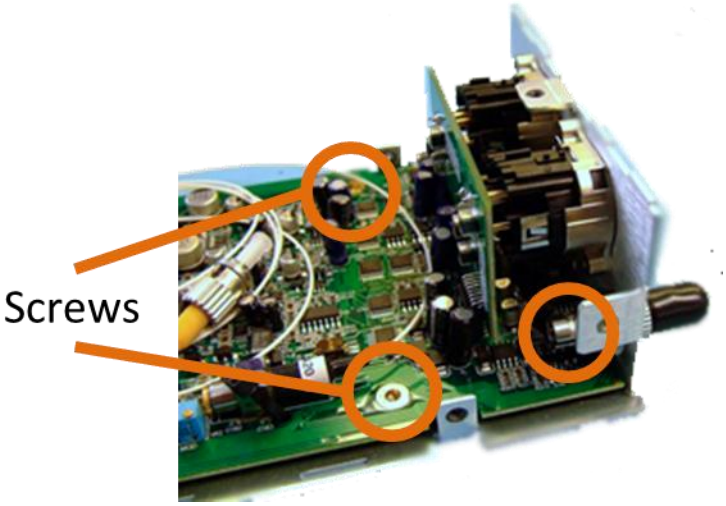
Re-install the four self-tapping screws removed when the Rack Mount rear panel was taken off of the main unit.



Step 22

Tighten (replace if you removed completely) the two screws holding the main circuit board in place.

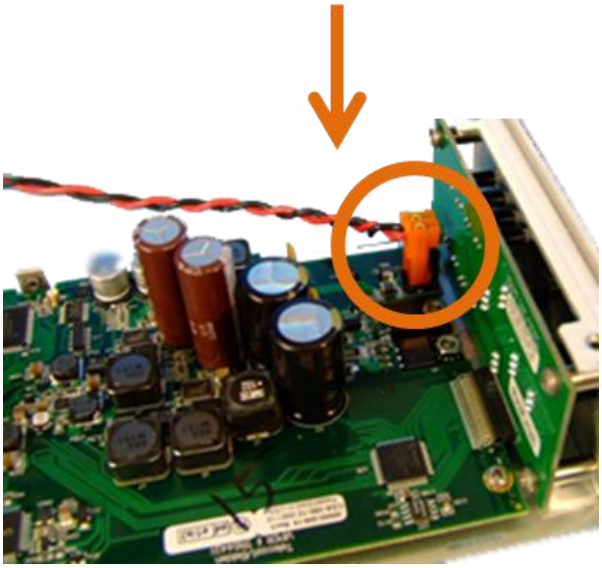
Re-install the Fiber Cable on to the ST Barrel. Make sure it locks into place.



Step 23

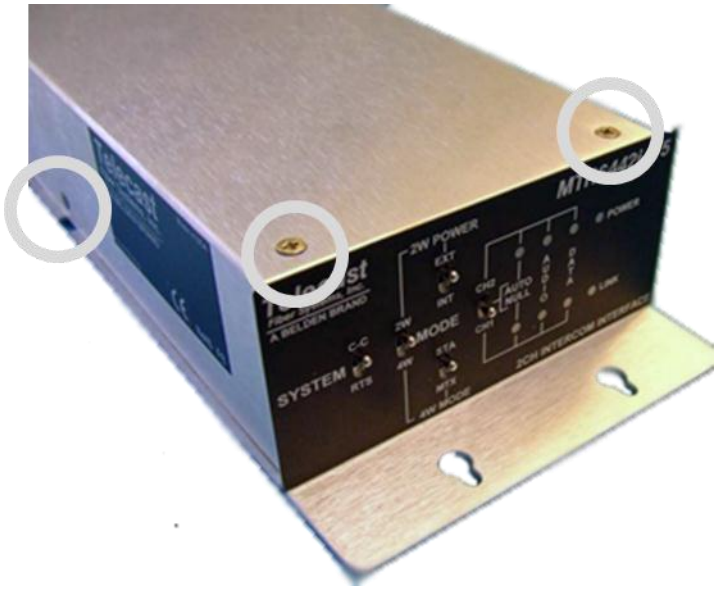
Re-install the power connector. It is keyed to fit only one way.

Replace the cover on the unit making sure not to pinch the Fiber Cable and the Power Cable between the cover and the main chassis.



Step 24

Replace all nine screw removed in Steps 1 and 2. Three of the screws are shown here.



Step 25

Reconnect the CommLink unit to your system components and to power. Check that all of the indicator LEDs and switches on the front panel function properly and that the system performs as expected.

Appendix 2. Ordering Information

Part Number	Description
MTR6442i-MML-13	Intercom transceiver & 4W/2W hybrid (w/autonull), RTS & C-C, MiniMussel, 1 SM fiber: int WDM @ 1310nm, ST connector. Requires (M)TR64421-15.
MTR6442i-MML-15	Intercom transceiver & 4W/2W hybrid (w/autonull), RTS & C-C, MiniMussel, 1 SM fiber: int WDM @ 1550nm, ST connector. Requires (M)TR64421-13.
TR6442i-13	Intercom transceiver & 4W/2W hybrid (w/autonull), RTS & C-C, V2 rackmount, 1 SM fiber: int WDM @ 1310nm, ST connector. Requires (M)TR64421-15.
TR6442i-15	Intercom transceiver & 4W/2W hybrid (w/autonull), RTS & C-C, V2 rackmount, 1 SM fiber: int WDM @ 1550nm, ST connector. Requires (M)TR64421-13.
MTR6442i-13	Intercom transceiver & 4W/2W hybrid (w/autonull), RTS & C-C, V2 throw down, 1 SM fiber: int WDM @ 1310nm, ST connector. Requires (M)TR64421-15.
MTR6442i-15	Intercom transceiver & 4W/2W hybrid (w/autonull), RTS & C-C, V2 throwdown, 1 SM fiber: int WDM @ 1550nm, ST connector. Requires (M)TR64421-13.
ADAP-AC-04	AC Power Adapter for MML units; 120/240 VAC in; 4-pin XLR; 4A; 15 VDC
ADAP-AC-04LC	AC Power Adapter for Viper2 units; 120/240 VAC in; 2.5mm circ; 4A; 15 VDC
TDK-TR6442i-13 and TDK-TR6442i-15	Rack-mount to Throw Down conversion kit
RMK-TR6442i-13 and RMK-TR6442i-15	Throw Down to Rack-mount conversion kit

Appendix 3. Specification

Intercom

Number or intercom channels.....2

2-Wire (TW/PL)

Interface:.....Clear-Com PL: XLR3M x 2
.....RTS TW: XLR3M x 1
Max Level…...2VP-P, @ 1KHz (equiv. to +18dBu in 4W)‡
Dyn. Range.....>85dB, ref. 2VP-P @ 1KHz ‡
Freq. Response…… +.1/-3dB, 70Hz to 22kHz, ref. 2VP-P ‡
THD+N.....<.1% @ 2VP-P ‡

I/O Impedance (100Hz to 20KHz).....
Termination engaged (internal power)……..220Ω ±10%
Termination dis-engaged (external power)…..... ≥10KΩ

Nulling: .....Automatic DSP

‡properly terminated (internal or external)

4-Wire (4W) Ports

Interface.....Clear-Com MatrixPlus/Eclipse: RJ45 x 2
..... RTS Adam/Cronus/Zeus: RJ11 x 2
Maximum Level (I/O, Unity Gain) ……..... +18dBu
Dynamic Range.....>85dB, ref. +18dBu
Frequency Response…….+.1/-3dB, 35Hz-22kHz, ref. 0dBu
THD+N.....<.05% @ +17dBu @ 1KHz
Input Impedance.....10kΩ balanced
Output Impedance.....30Ω balanced
Data: .....Clear-Com: RS422, RTS: RS485
Crosstalk: .....>85dB

Electro-Optical

Operating Wavelength, standard.....
.....1310/1550 nm (Wave Division Multiplexed)

Nominal Optical Loss Budget Values
TX Laser output power.....-7 dBm
RX Sensitivity, HD/SDI.....-22 dBm
Link/Distance Limit* .....15dB optical loss (≥ 30Km*)
Fiber Compatibility.....Single Mode
Optical Connector .....ST
**Maximum cable length varies due to optical cable quality, dirt/dust/contamination on connectors, and the number of in-line connectors.*

Mechanical/Environmental

Dimensions (HxWxL)
Rack Mount .....5" x 2" x 10"
Throw Down.....4" x 2" x 10"
Mini-Mussel (without feet).....2" x 4" x 10"
Weight
Rack Mount/Throwdown.....1.375 lb
MiniMussel.....2.8 lb
Power Consumption
2W with Local Power .....3 watts@10-18VDC
Powered from 2W System.....6 watts@10-18VDC
4W System.....3 watts@10-18VDC
Temperature Range.....-25° to +55°C
Humidity Range.....0 to 95% RH, Non-condensing

Compliance

Laser Safety.....Class 1 Laser 21 CFR 1040.10
EMI/RFI.....IEC/EN 60825-1
RoHS

CE