Telecast Fiber Solutions

Terrapin FTR-D6 User Guide

M4022-9900-102

24 July 2014

grass valley
A **BELDEN** BRAND

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Warranty information is available in the Support section of the Grass Valley Web site (www.miranda.com).

Title	Terrapin FTR-D6 User Guide
Part Number	M4022-9900-102
Revision	24 July 2014

Table of Contents

About Terrapin FTR-D6

1

This chapter provides an overview of the Terrapin FTR-D6 and includes the safety and warranty information about it.

About the Terrapin FTR-D6 System

The Terrapin FTR-D6 provides the features of a fiber optic digital video transmitter, a fiber optic digital video receiver, plus a six-output digital video distribution amplifier in a single unit.

The transceiver handles a wide range of digital video rates. Supported formats include:

- **3 Gb/s HD/SDI**: SMPTE 424M (reclocked)
- **1.5 Gb/s HD/SDI**: SMPTE 292M (reclocked)
- **540 Mb/s**: SMPTE 344M
- **270 Mb/s DVB/ASI** (reclocked)
- **143 Mb/s**: SMPTE 259M
- **19.4 Mb/s ATSC**: SMPTE 310M
- **AES and MADI Audio**
- **Non-standard digital signals to 3 Gb/s**

The unit is interoperable with industry standard optical HD/SDI signals to/from other equipment, such as Rattler™, Python™, TelePort™, Telethon™, and Viper™ series frames and modules, as well as other manufacturers' routers, DAs, etc.

The Terrapin FTR-D6 accepts a 75 ohm coaxial input on a BNC connector or an optical signal on an ST connector up to 3Gb/s, or both at the same time. The output of the unit can also be applied to the six BNC connectors or an ST fiber connector, or both at the same time.

The Terrapin FTR-D6 operates in one of four modes. The mode is set by using a single push-button that allows the choice of the following:

- Fiber optic transmitter with six BNC outputs of the digital video signal
- Fiber optic repeater with six BNC outputs of the received digital video signal
- Fiber optic receiver with six BNC outputs and Fiber optic transmitter of a separate digital video signal
- Fiber optic repeater and local digital video D.A.

Colored LEDs on the top of the Terrapin FTR-D6 unit show the current mode with easy-to-understand arrows indicating signal flow of the copper and optical signals.

The Terrapin FTR-D6 can be used in "throw down" mode with an external AC power supply or with the optional external battery mounted to the Terrapin FTR-D6 unit. Screw holes are provided on the unit to allow the Terrapin FTR-D6 to be attached to any suitable surface.

Figure 1-1 is a singlular example of a multitude of possible uses for the Terrapin FTR-D6. This example shows a remote truck operating at a stadium where a series of Terrapin FTR-D6 units are chained together by looping fiber feeds. Each Terrapin FTR-D6 is capable of providing a BNC signal to six destinations.
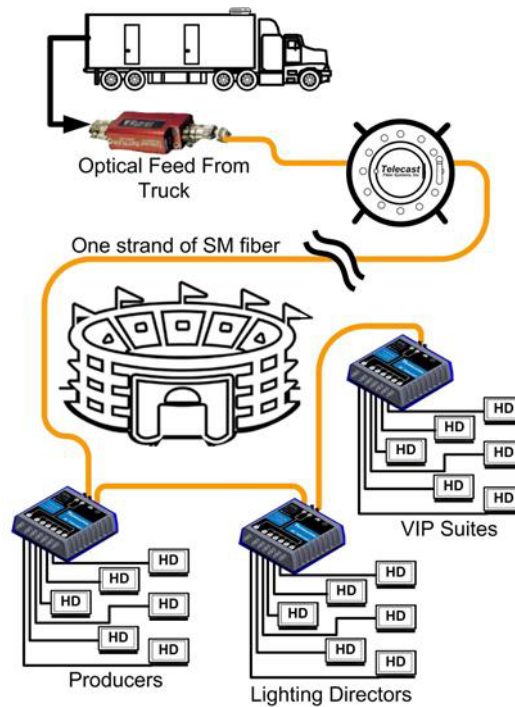
Fig. 1-1: Terrapin FTR-D6 Usage Example

Fiber Cable Overview

Fiber Optics and Fiber Optic Cable are the core technologies at the heart of the Terrapin FTR-D6 Fiber Transceiver 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 Terrapin FTR-D6. The specific theory and operation of Fiber Optics is beyond the scope of this document.
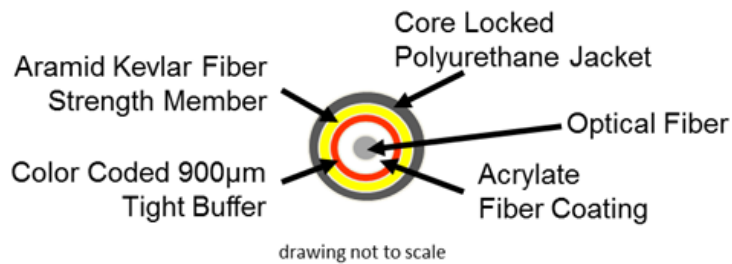
Fig. 1-2: Single Mode Fiber Optic Cable Cross-Section (Illustrative Only)

Block Diagram
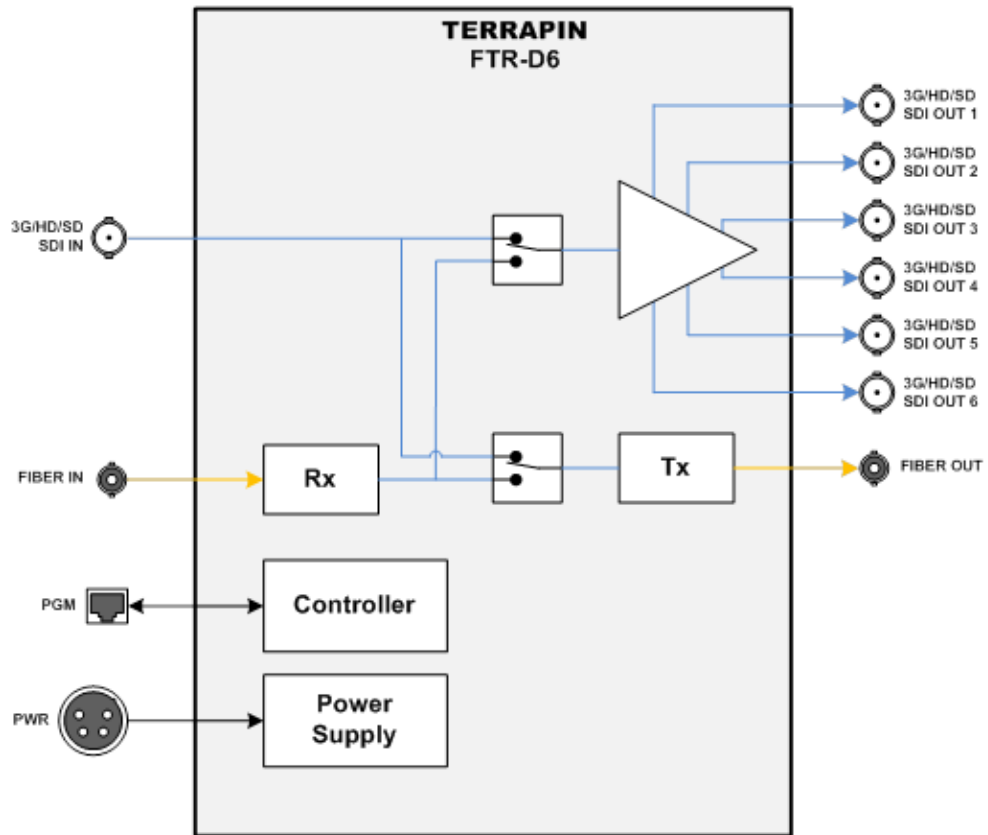
Fig. 1-3: Terrapin FTR-D6 Block Diagram

Optical Fiber Safety

Never look directly into the end of the optic fiber while either end of the system is operating.

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.

About this User Guide

This Terrapin FTR-D6 Fiber Transceiver is delivered in a single standard model. The one option is the addition of an external battery power capability. This UserGuide covers standard operation as well as the installation and use of the external battery option.

Unpacking and the Terrapin FTR-D6 Fiber Transceiver

Please consult your packing slip and purchase order to ensure that you have received all of the expected 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 Grass Valley, a Belden Brand. (see Product Returns on page 5).

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

Product Returns

In the unlikely event of damage to your Terrapin FTR-D6 Fiber Transceiver during shipping or delivery,take note the damage with the delivery or shipping service. If any component does not work correctly out of the box, contact Grass Valley Support (see Contact Us on page 27).

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

Ordering Information

Part Number	Description
FTR-D6	Terrapin FTR-D6 Fiber Optic Transceiver
ADAP-AC-04	120VAC to 12VDC Power adaptor with circular locking connector (US). Please contact Grass Valley for information regarding other regions.
TRPN-AB-PLATE	Battery mounting plate option for Anton-Bauer type Battery
TRPN-V-PLATE	Battery mounting plate option for V-Mount type Battery

Components and Operator Modes

This chapter lists the components and operator modes for the Terrapin FTR-D6.

Terrapin FTR-D6 Components

The Terrapin FTR-D6 has three areas features:

- The top panel - see Figure 2-1
- The Fiber I/O and Power panel - see The Fiber I/O and Power panel on page 12
- The "Copper" BNC I/O panel - see The "Copper" BNC I/O Panel on page 13
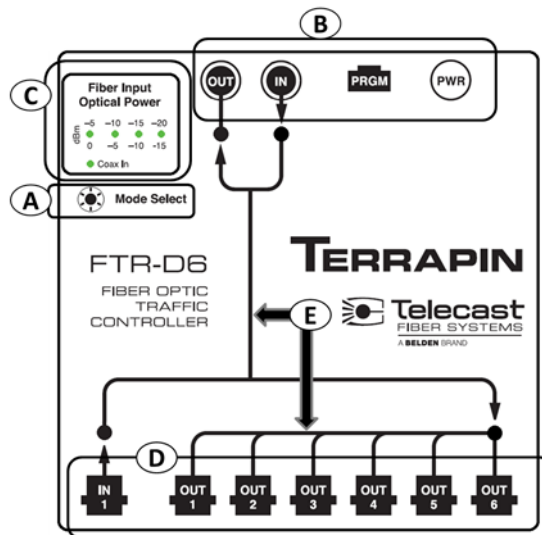
Fig. 2-1: Terrapin FTR-D6 Fiber Transceiver Top Panel

The Terrapin FTR-D6 Fiber Transceiver Top Panel has five areas of interest:

- **A - Mode Select Switch** - see Mode Select Switch Operation on page 9
- **B - The Fiber and Power labels** - the fiber and power panel is not labeled, so use these labels as your guide to the connectors - see The Fiber and Power Labels on page 9
- **C - Fiber Input Optical Power Meter** - see Fiber Input Optical Power Meter on page 10
- **D - The SDI BNC Connector labels** - the BNC connnector panel is unlabeled. Use these labels as your guide to the connectors - see The SDI BNC Connector labels on page 11
- **E - The LED mode indicators** - see The LED Mode Indicators on page 11

Mode Select Switch Operation

The mode select switch allows the selection of one of the four operating modes available with the Terrapin FTR-D6.

To select a mode

1　Hold the Mode Select switch down for four seconds.

Fig. 2-2: Mode Select switch

2　Observe the flashing LED indicators to determine the current operating mode and if you want to change the mode, push the switch once. The Terrapin FTR-D6 will advance to the next mode.

　Keep pushing the switch until you reach the desired mode. As you cycle through the modes the LEDs will change to indicate the active signal path.

3　When the desired mode is reached, release the switch and after four seconds, the Terrapin FTR-D6 is programmed with the selected mode.

> **Note:**　If you pass by the desired mode, you must cycle through the various modes until you get to the one you want. The Terrapin FTR-D6 will retain the last set mode when powered off.
>
> For more information on the four modes please see Operator Modes & LED Indicators on page 14.

The Fiber and Power Labels

The Fiber and Power Labels serve two functions. These are the labels for the connectors directly below the labels on the end panel of the Terrapin FTR-D6. The In and Out labels also serve as indicators/end points for the LED signal path indicators.

•　The LED function is described in The LED Mode Indicators on page 11.

•　The physical connectors are described in The Fiber I/O and Power panel on page 12.

Fig. 2-3: Fiber and Power Labels

Fiber Input Optical Power Meter
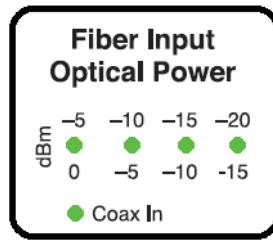
Fig. 2-4: Fiber Input Optical Power Meter

The Fiber Input Optical Power Meter serves two functions.

- The dBm scale indicates the relative strength of any Fiber Optic signal connected to the Terrapin FTR-D6 unit. The meter covers a range of 0 dBM to -20dBm in 5 dBm increments. The strongest signal is 0 dBm. The Terrapin FTR-D6 is designed to work down to a signal strength of -20 dBm.

  If these indicators fluctuate during operation, the system will continue to work. However, if the signal strengthfalls below -20dBm, the Terrapin FTR-D6 may not continue to pass the Fiber Optic signal.

- The Coax In indicator is a simple On/Off indication that an SDI signal has been connected to the BNC Input of the Terrapin FTR-D6.

The SDI BNC Connector labels

The SDI BNC Power Labels serve two functions. These are the labels for the connectors directly below the labels on the BNC end panel of the Terrapin FTR-D6. The In and Out labels also serve as indicators/end points for the LED signal path indicators.

The physical connectors are described on The Fiber I/O and Power panel on page 12.

Fig. 2-5: SDI BNC Power Labels

The LED Mode Indicators

The Terrapin FTR-D6 uses a two-color LED system to indicate the various operating modes of the system. The Fiber input and output and the SDI input each have an endpoint LED indicator. The six SDI outputs have a single indicator for all six connections.

The operation of the LED indicators is described beginning on The LED Mode Indicators on page 11.
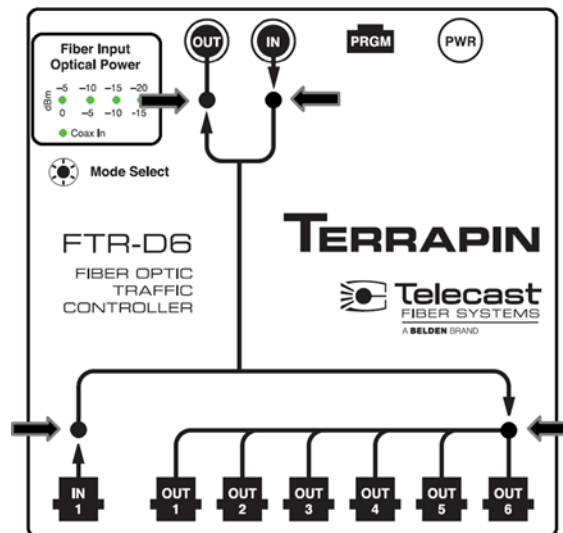
Fig. 2-6: LED Mode Indicators

The Fiber I/O and Power panel

The Terrapin FTR-D6 Fiber I/O and Power panel has four connectors. Each function corresponds to the label indicated on the top panel of the unit.
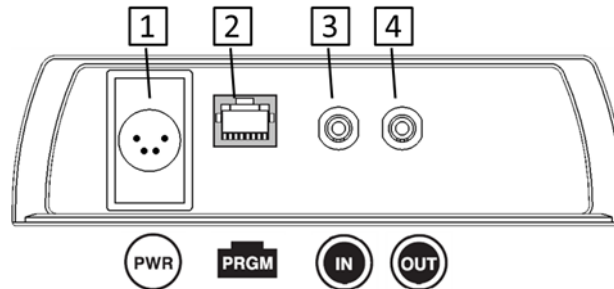
Fig. 2-7: Fiber I/O and Power Panel

1 The Power Connector is a 4-pin XLR type connector that takes a nominal 12V power supply. The supplied power supply is the ADAP-AC-04-X, with X being the specific geographic region covered (see Ordering Information on page 5).

The unit can also be powered by the optional External Battery option, which allows the use of an Anton-Bauer or "V-Mount" type battery (see Installing and Using the External Battery Operation on page 22).

2 The Terrapin FTR-D6 is equipped with an RJ45 data connector, which allows for future firmware changes or upgrades. Currently, this connector has only a maintenance function.

3 Fiber Optic ST Connector for Single Mode Fiber signal input.

4 Fiber Optic ST Connector for Single Mode Fiber signal output for transmitting the connected BNC input, or for re-transmitting the Fiber Optic signal received on the Fiber signal input (connector #3).

For a list of all supported signal types, see Supported Signal Types on page 17.

The "Copper" BNC I/O Panel

The Terrapin FTR-D6 BNC I/O end panel has seven connectors. Each function corresponds to the label indicated on the top panel of the unit.
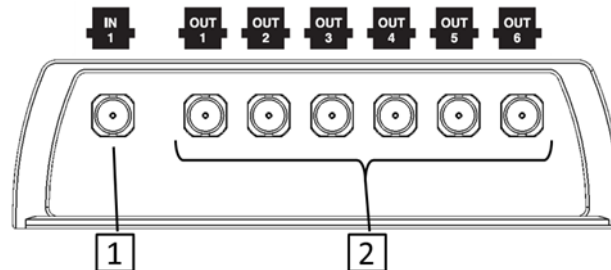
Fig. 2-8: BNC I/O Panel

1 **Input BNC connector**: the Terrapin FTR-D6 accepts any digital signal from 19.2 Mb/s to 3 Gb/s, including many non-standard signals. Please see Supported Signal Types on page 17 for a list of supported signal types.

2 **Output BNC connectors**: each output delivers an identical copy of the input signal whether from the BNC Input (connector #1) or from the Fiber Optic input connection - depending on the operating mode. Standard 270Mb/s, 1.5Gb/s & 3Gb/s signals are reclocked.

ADAP Power Supplies

The Terrapin FTR-D6 Fiber Transceiver requires a power supply providing 5-16 volts at 1.5 Amps. The power supply shipped with the unit is the ADAP-AC-04-X (X being the specific geography required). Any power supply meeting the required specification and providing power through an XLR-4 Female connector can be used.

Fig. 2-9: Power Supply

Part Number ADAP-AC-04: supplied with 4PIN XLR/A4F connector for the power plug on the Terrapin FTR-D6 unit

Operator Modes & LED Indicators

The Terrapin FTR-D6 has four operating modes as follows:

- **Fiber optic transmitter with six BNC outputs of the digital video signal**

  The digital signal input to the BNC is distributed from the six digital signal (BNC) outputs and is transmitted from the Fiber Optic output.

- **Fiber optic repeater with six BNC outputs of the received digital video signal**

  The Fiber Optic input is re-transmitted out of the Fiber Optic output and is also distributed from the six digital signal (BNC) outputs.

- **Fiber optic receiver with six BNC outputs and Fiber optic transmitter of a separate digital video signal**

  The Fiber Optic input is distributed from the six digital signal (BNC) outputs, while a separate BNC input is sent to the Fiber optic output.

- **Fiber optic repeater and local digital video distribution**

  The Fiber Optic signal is re-transmitted and boosted out of the Fiber Optic Output, while an input to the Digital signal BNC is distributed to the 6 digital signal outputs.

When the Terrapin FTR-D6 is set in a particular mode, LED indicators on the top panel display the signal type and direction.

- **Blue**: Digital signals input to the BNC connector
- **Orange**: Fiber Optic sourced signals
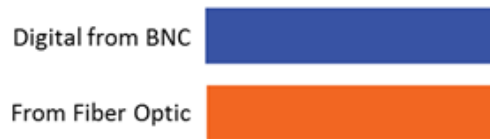
Fig. 2-10: Signal legend

Terrapin FTR-D6 Input/Out Status Depends on Mode

Please see the diagrams following for a visual explanation of each Terrapin FTR-D6 operating mode.

Operating Mode	Fiber Optic Input	Fiber Optic Output	BNC Input	BNC Output
Mode 1	Inactive	Signal 1	Signal 1	Signal 1
Mode 2	Signal 1	Signal 1	Inactive	Signal 1
Mode 3	Signal 1	Signal 2	Signal 2	Signal 1
Mode 4	Signal 1	Signal 1	Signal 2	Signal 2

Mode 1

The Fiber Optic Transmitter has six BNC outputs of the Digital Video Signal.
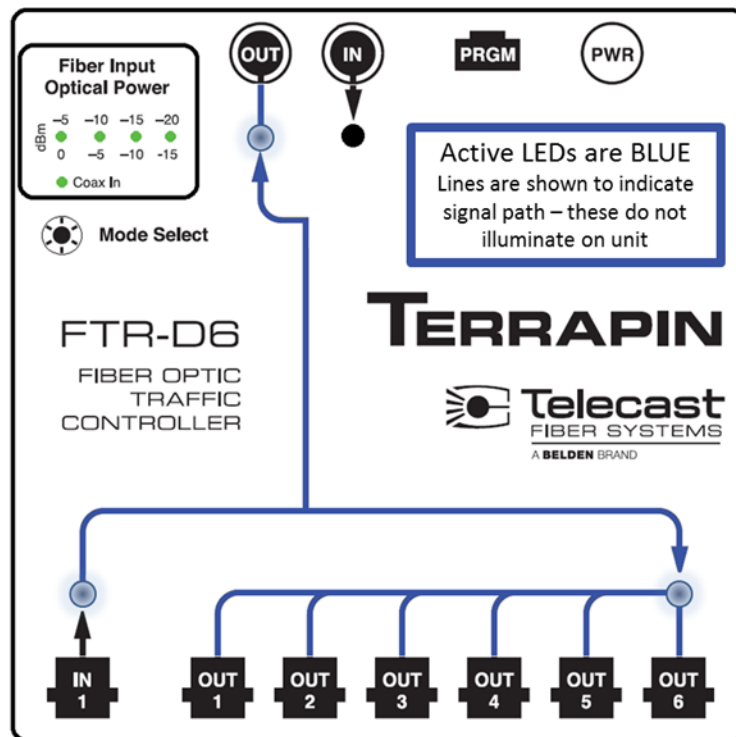
Fig. 2-11: Terrapin FTR-D6 Mode 1 diagram

Mode 2

The Fiber Optic Repeater uses six BNC Outputs of the Received Digital Video Signal.
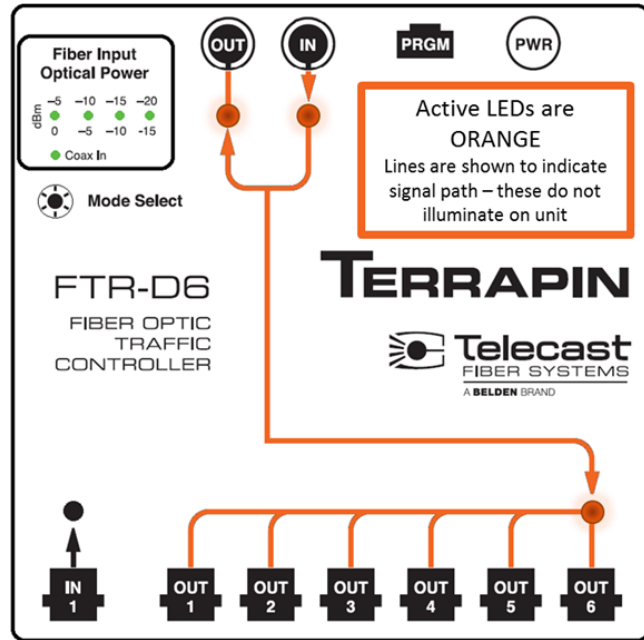
Fig. 2-12: Terrapin FTR-D6 Mode 2 diagram

Mode 3

Fiber Optic Receiver uses six BNC Outputs and a Fiber Optic Transmitter of a separate Digital Video Signal.
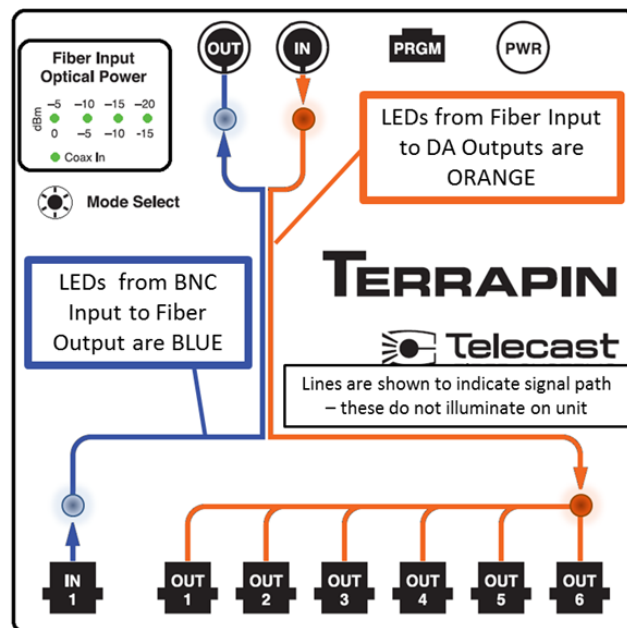
Fig. 2-13: Terrapin FTR-D6 Mode 3 diagram

Mode 4

Fiber Optic Repeater & Local Digital Video DA.
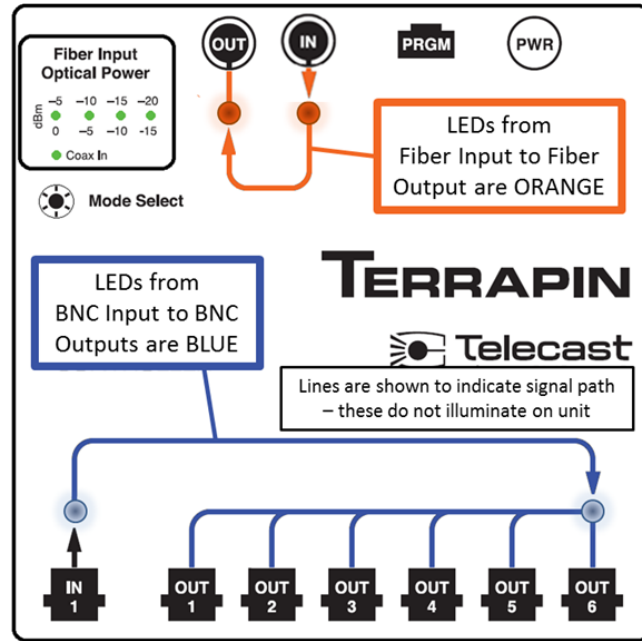
Fig. 2-14: Terrapin FTR-D6 Mode 4 diagram

Supported Signal Types

The Terrapin FTR-D6 supports the following signal types as of May 15, 2012.

Description	Used For	Standard
3 Gb/s SMPTE 424M HD/SDI	HD/SDI Video	SMPTE 424M HD/SDI
1.5 Gbps SMPTE 292M HD/SDI	HD/SDI Video	SMPTE 292M HD/SDI
19.4 Mbps SMPTE 310M	Digital Video	SMPTE 310M
143 to 540 Mbps SMPTE 259M/344M	Digital Video	SMPTE 259M/344M
DVB/ASI 270Mb/s	Digital Video	DVB/ASI 270Mbps
AES and MADI Audio	Digital Audio	AES and MADI
Non-standard digital signals to 3 Gb/s	Other	User must determine if signal quality is sufficient.

3

Terrapin FTR-D6 Transceiver Operation

This chapter describes the operation of the Terrapin FTR-D6. Please keep in mind that once the system is properly set up and configured, there is very little to do during normal operation.

Best Practices

- Take care when using the laser equipment to prevent eye damage
- Protect the Fiber Optic Cable and the Fiber Optic Connectors. **Always** keep these capped unless there are being connected.
- Make sure that the Terrapin FTR-D6 unit is secure and cannot be inadvertently moved. Mounting the unit to a wall, the floor, or a piece of plywood using the mounting holes on the unit can ensure safe and continuous operation.
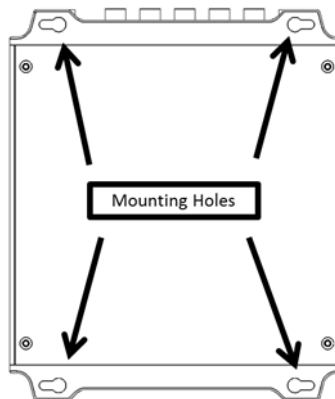
Fig. 3-1: Terrapin FTR-D6 Bottom Place with Mounting Holes

- Once the system is set up and running, carefullymonitor the Fiber Input Optical Power displays on the Terrapin FTR-D6. The system is digital, so the Signal Strength must meet or exceed the requirements. When thesignal is no longer strong enough, the signal stops.
- Be as careful during System tear down as during System setup.
- Read the **Using Fiber Optics Guide** for information on how to manage and deploy your fiber optics cabling, safety precautions, tips & tricks, and recommendations for creating complex fiber optic networks. You can find a copy of this document on the Support portal (see Contact Us on page 27).

Troubleshooting

Troubleshooting any technical issues with the Terrapin FTR-D6 Fiber Transceiver System is similar to any piece of television production gear with the obvious exception of the core Fiber Optic technology.

Keep the following in mind:

- Check all your cables for any broken connections or bad connectors.
- Ensure that the Power Supply is working or fully charged (for external battery)? If there is a power problem, check the fuses.
- Ensurethat the Terrapin FTR-D6 unit is in the correct operating mode for the operation you need.
- The Terrapin FTR-D6 will indicate a fault by blinking LEDs in the Fiber Input Optical Power section of the top panel. The blinking will occur at one second intervals.

  Faults indicated may be due to excessively high operating temperature or possibly frp, the reclocking function not working correctly. The unit may continue to operate at an excessively high temperature, but you should take action to lower the temperature. If the reclocking is not working properly, it will adversely affect the output.
- If you cannot resolve the problem in the field, contact Grass Valley support (see Contact Us on page 27).

Installing and Using the External Battery Operation

The Terrapin FTR-D6 can be operated using the optional external battery adaptor plate and battery mount (see Product Returns on page 5 for ordering information). Contact Grass Valley Support (see Contact Us on page 27) or your Solutions dealer directly for more information.

The external power option consists of a replacement bottom plate for the Terrapin FTR-D6 and one of two external battery mounting units. When ordering the external battery option, select one of the following:

- Anton-Bauer battery mounting plate (Part - TRPN-AB-PLATE)
- V-Mount battery mounting plate (Part – TRPN-V-PLATE)

Use of the battery mounting plate requires a user-supplied battery.

Anton-Bauer battery
mounting plate

V-Mount battery
mounting plate
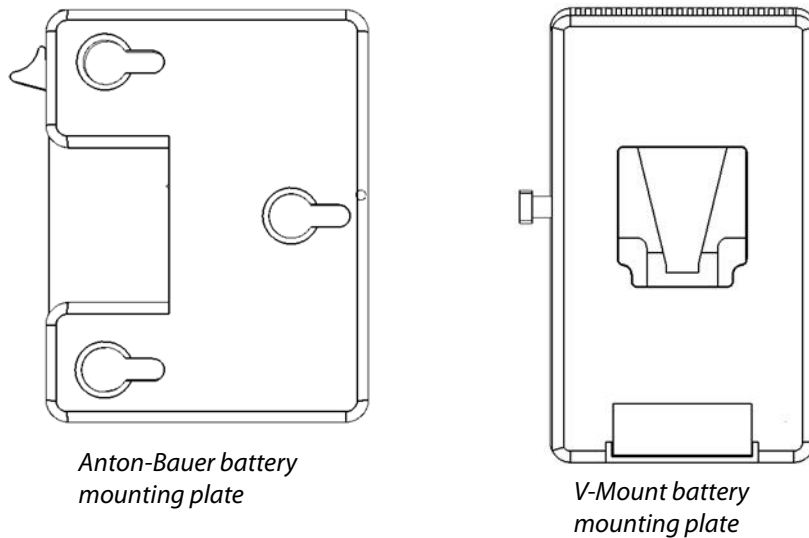
Fig. 3-2: Anton-Bauer and V-Mount Battery Mounting Plate
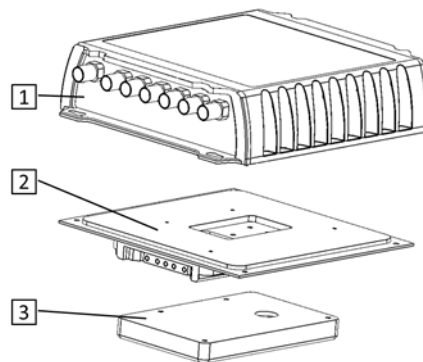
Fig. 3-3: External Battery Plate Components

The external battery plate is a field installable option.

To install an external battery

1 Unscrew the existing blank bottom plate from the Terrapin FTR-D6 unit (**1**). Retain the mounting screws for re-use in the next step.

2 Mount the Battery Mount (**3**) to the External Power bottom plate (**2**) making sure to pass the connector through the intended aperture and to not pinch the connector cable between the two pieces.

   In most cases, this step will not be necessary as the battery mount will be shipped already attached to the External Power bottom plate.

Remove 4 Screws
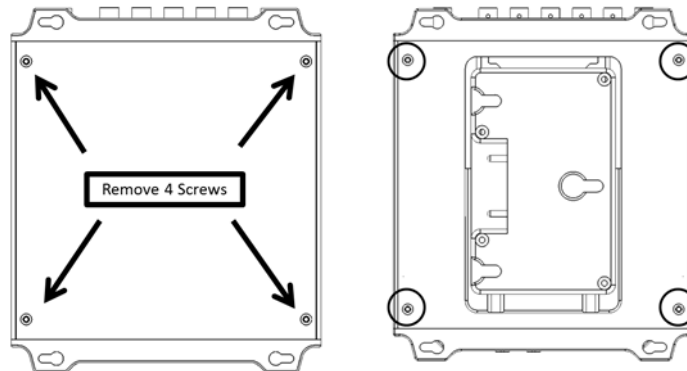
Fig. 3-4: Connecting the External Battery Mounting Plate

3 Connect the Battery Mount connector to the **BATTERY IN** connector (Figure 3-5):

End of Unit with Power Connection

Fig. 3-5: Connecting the External Battery Mounting Plate

4 Carefully position the now-connected bottom plate on to the Terrapin FTR-D6, being careful not to pinch the cable between the Terrapin FTR-D6 and the bottom plate.

5 Attach the bottom plate to the Terrapin FTR-D6 unit using the retaining screws set aside in **Step 1**.

The External Battery option is now ready for use. Attach a charged battery to the unit and confirm that the Terrapin FTR-D6 operates correctly.

The Terrapin FTR-D6 can be operated in the following power modes:

- AC power connected to the XLR.
- External Battery attached to the unit.
- Both AC Power connected and an External Battery attached to the unit. In this mode, the unit will take power from both sources. Consider this method a way of providing a backup power source to the unit in critical situations.
- The Optical Power LEDs will blink Red if battery power is too low to adequately operate the Terrapin FTR-D6.

Specifications 4

Transmission

    Operating Wavelength .... 1310, or 1270-1610 (CWDM)

    Coaxial video connectors in/out ....BNC

    Optical Connectors (2). ....ST

    Optical Source Laser Diod. .... (FP or CWDM DFB)

    Optical detector. ....PIN-TIA Diode

    Transmitter output. .... -7 to +3 dBm

    Receiver sensitivity. ....-20 dBm @ 3Gb/s

    Link Margin/Distance .... 15-25 dB/20-50 km

    Fiber type. ....single-mode or multimode (distance limited.)

Video

    Transmission method .... Digital

    Input level. ....800 mV (peak to peak)

    Input Impedance.. .... 75 ohms

    Coax Equalization ....@ 2.97 Gb/s 100 meters

    Output Impedance. ....75 ohms (x6)

    Bit-Error Rate. .... 10^{-4}(-20 dBm @ 3Gb/s)

    Jitter (color bars) ....≤ 0.3 UI @ 3G, ≤.2 UI @ 1.5G

    Rise/Fall Times. .... < 120 ps @ 1.5Gb/s & 3Gb/s, ≈600ps @ 270Mb/s

HDX:

    Power Req. .... 110-120/220-240 VAC, 50 to 60Hz

    Power Consumption. .... 250 watts max @120VAC

    Safety Interlock ....32VAC Pilot, 5VDC

    Sense return Main Output (to PowerPlus): 320VDC

Mechanical/Environmental

    Dimensions: (LxWxH) .... 5.9" x 6.2" x 1.7"

    Weight, ... 14.4 oz.

    Input Voltage ....5-16 VDC

    Power connector plug .... XLR-4 pin

    Power Consumption (typ.) .... 4.4 watts

    Indicators. .... Power, Signal, Link, Optical Power

    Temperature Range ....Operating -25° C to +60°C

    Humidity Range ....0 to 95%RH, non-condensing

    Certifications .... FCC Part 15, RoHS, LEED, CE

Specifications

Contact Us

Grass Valley Technical Support

For technical assistance, please contact the Grass Valley Technical Support center nearest you:

Americas

Office hours:	9:00 a.m. – 9:00 p.m. (EST)
Telephone:	1-800-224-7882
Fax:	+1 514 335 1614
E-mail:	support@miranda.com

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