TE6000A

Professional MPEG2 Modular Encoder

Installation and Operation Guide

TIERNAN
A Radyne ComStream Company

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DANGER!
Electric Shock
Hazard

WARNING! Electric Shock Hazard

Do Not Open The Equipment!
Service Only by Tiernan Radyne ComStream, Inc.

Gefährliche Spannung!
Öffuen des Gerätes und Service nur dur Tiernan Radyne ComStream, Inc.

The TE6000A contains no user-serviceable parts. Do not attempt to service this product yourself. Any attempt to do so will invalidate any and all warranties.

Contents


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Preface

Using This Guide

This guide is your sourcebook for using the Tiernan TE6000A and describes the installation, operation, and configuration for this product. An overview of system and product level requirements, technical specifications, and troubleshooting procedures are also provided.

This guide is designed to help you find information quickly and easily. To take full advantage of this design, please take a moment to review the specific formats.

Important Information

Throughout this guide you will find icons designed to help you identify important information. These icons are:

The hazard icon identifies the possibility of electric shock when you perform an operation with the TE6000A or if you do not use the TE6000A according to instructions.

The caution icon identifies information that requires careful attention in order to prevent equipment damage and/or injury to the operator.

The note icon identifies information for the proper operation of your equipment, including helpful hints, shortcuts, or important reminders.

Illustrations

Some illustrations contained in this guide may differ slightly from those shown on your front panel display, rear panel, or remote terminal due to variations in your system setup, configuration, or customization.

Figures depicting equipment may differ from those at your site; therefore, refer to the labeling on your Tiernan equipment to identify the components. An effort has been made to use illustrations that reflect basic equipment and configurations of the majority of customers.

Issuing Commands

Tasks and examples are presented in a series of step-by-step instructions. Commands or information that you enter into the system appear in a different type, as shown in the following example:

> To restore the factory default configuration, select `config>presets>restore>dvb` from the front panel, or issue the remote command `cm restore dvb`.

If the command contains variable information that is to be typed into the system, the variable information is found within karats < >. In the following example, you would type `TCA DELETE` then the correct value for `<label>`:

> Type `TCA DELETE <label>`

Front Panel Navigation

This guide uses right angle brackets (>) to indicate a sequence of menus, submenus, and menu items.

For example, select `Config>Control>Clock>Date>June 03, 2003` means:

- From the config menu, select control.
- From the control menu, select clock.
- From the clock menu, select date.
- At the date option, enter the date, June 03, 2003, in the correct format.

Displays

The system may return values and messages on a front panel LCD, remote terminal, or both. In this guide these values and messages appear in a different type:

```
date = 06/23/2003
restore = dvb
```

Revision History

This guide is periodically updated and revised. For documentation updates, call Tiernan Customer Service.

Revision	Date	Type of Revision
A	04/2002	Initial release
B	06/2002	Updated Conditional Access and Screen Saver commands for both front panel and remote operations.

Customer Service

We hope this guide provides all the information and instructions you need to operate the TE6000A. However, if you need assistance, contact Tiernan Customer Service at our corporate headquarters, located in the United States, through any of the following methods:

- Phone 858.657.5454, Monday – Friday,
  7:30 a.m. – 6:00 p.m. pacific standard time
- Fax 858.657.5455
- Email support@tiernan.com
- After-hours *Emergency* Customer Service Paging: 858.657.5454, option 5
  Leave a detailed voice message and your call will be returned.

Product Shipments

Please verify that your company name and address are correct on the packing slip that is included with your equipment. Notify Tiernan Customer Service if any of the information is incorrect.

Ensure that you write down the following numbers and include them in any correspondence with Tiernan concerning your order:

- Purchase order
- Model
- Reference line
- Sales order

Errors

If any part of your shipment is missing or incorrect, call Tiernan Customer Service.

Cartons and Packing Materials

The factory shipping carton and packing materials are designed to protect the equipment from excessive shock and vibration that can occur during shipping.

Use the original shipping carton and packing materials to repack the unit for shipment to another location or to return the unit to Tiernan for repair.

For additional information on equipment repacking, refer to the Warranty booklet that accompanied the product shipment.

LCD Display

When you receive your TE6000A, the LCD display may be covered with a plastic protective covering. To remove the protective covering, gently lift one of the corners and peel off the covering.

Warranty Information

For warranty or return material authorization information, refer to the Warranty booklet that accompanied the product shipment.

Other Tiernan Products

The Tiernan Web site, found at www.tiernan.com, provides information about the entire line of Tiernan products and systems, including encoders, integrated receivers/decoders (IRD), switches, ATM products, network interfaces, and network management software.

Safety Precautions

Carefully read and follow all safety, use, and operating instructions before operating the TE6000A. Heed all warnings and cautions contained in this guide. Retain these instructions for future reference.

Follow Startup Procedure

Do not plug in the TE6000A until you have connected the system and read the chapter on installation.

Provide a Safe Location

Place the TE6000A in a rack or on a stable surface of sufficient size and strength, where it will not be jarred, hit, or pushed off its surface. Ensure that all cables and cords are out of the way and will not be tripped over, as this could cause personal injury or serious damage to the equipment.

Avoid Water and Moisture

If the equipment is exposed to any liquid, contact Tiernan, as serious damage could occur to the TE6000A or its components.

Avoid Heat, Humidity, and Dust

To avoid internal damage, the TE6000A should be placed away from all heat sources, including radiators, heater ducts, and so on, out of direct sunlight and away from high humidity, excessive dust, or mechanical vibrations that can cause damage to internal parts.

Provide Adequate Ventilation

Slots and openings on the TE6000A are provided for ventilation that is needed to ensure reliable operation. To avoid overheating and ensure that the ventilation slots are not blocked, place the TE6000A on a smooth, hard surface that has at least two inches of clearance around the unit and adequate air circulation. If the equipment is placed in a closed area, such as a rack, ensure that proper ventilation is provided and that the internal rack operating temperature does not exceed the maximum rated temperature at the position of the TE6000A.

Never place the TE6000A on a soft surface that would obstruct the required airflow into the ventilation slots.

Use Correct Power Source

For units equipped with a North American power cord, the cord has an IEC-compatible female plug on one end, and a male plug on the other end. This cord is UL and CSA approved up to 12 5VAC at 10 A and is ready to use with no user wiring required.

For units equipped with an International power cord, the cord has an IEC-compatible female plug on one end, and three stripped and tinned bare wires on the other end. This cord is approved up to 250 VAC at 6A and complies with the international color codes of green/yellow (ground), blue (neutral), and brown (line).

If these color codes do not correspond to the colored markings on the terminals in the plug, use the following standards:

- The green/yellow wire must be connected to the plug terminal marked by the letter E or by the earth symbol (⏚) or color-coded green and yellow.
- The blue wire must be connected to the plug terminal marked with the letter N or color-coded black.
- The brown wire must be connected to the plug terminal marked with the letter L or color-coded red.

An AC plug must be attached to the International power cord in accordance with government standards and codes in effect at the installation site. If an unterminated power cord is supplied with the unit, the appropriate certified termination plug must be installed. The following is a list of the required certifying agencies for various countries.

Country	Agency	Country	Agency
Australia	SAA	Italy	IMQ
Austria	OVE	Japan	MITI
Belgium	CEBEC	Netherlands	KEMA
Canada	CSA	New Zealand	SECV, SECQ, SECWA, EANSW, ETSA, HECT, SANZ
Denmark	DEMKO	Norway	NEMKO
Finland	FEI	Rep. S. Africa	SABS
France	UTE	Spain	AEE
Germany	VDE	Sweden	SEMKO
India	ISI	Switzerland	SEV
Ireland	IIRS	United Kingdom (UK)	ASTA, BSI

Route Power Cords Safely

Route power cords so they are not walked on or pinched. Pay particular attention to cords and connections at the plugs, receptacles (such as power strips), and the point where they exit from the TE6000A and attach to other equipment. Do not place any items on or against power cords.

No Stacking

Do not place or stack any objects on top of the TE6000A. Other equipment may be placed in a rack or on a shelf above or below the TE6000A, but never stacked directly on top of it.

Protect Against Lightning and Power Surges

When the TE6000A is installed, have the professional installer ground the system to protect against voltage surges and built-up static charges. For information on grounding standards for electrical and radio equipment, refer to the electrical code in the country of installation.

Protect the TE6000A from lightning and power-line surges during a storm by unplugging it from the wall outlet and disconnecting the coaxial cable.

Turn the TE6000A Off When Changing Circuit Boards

Turn the TE6000A off before installing or removing any circuit boards from chassis slots. Possible damage may occur to modem, boards, or related equipment if power is left on during this procedure.

Provide Antistatic Protection

Wear a properly grounded antistatic wrist strap to prevent electrostatic damage to components when handling circuit boards or other electronic modules.

Keep Objects Outside

Touching internal TE6000A parts is dangerous to both you and the unit. Never put any object, including your fingers, through slots or openings, as this could result in touching dangerous voltage points, short-circuiting parts, electric shock, or fire.

There are no user-serviceable parts inside the TE6000A. If an object falls into the equipment, unplug the unit and contact Tiernan Customer Service, as serious damage could occur to the TE6000A or its components.

Use Approved Attachments Only

Use only Tiernan-approved option cards and equipment with the TE6000A.

Clean the TE6000A

Before cleaning the TE6000A, unplug it from the wall outlet. Do not use any type of abrasive pads, scouring powders, aerosol cleaners, or solvents such as alcohol or benzene.

Use only a clean, soft cloth lightly moistened with a mild detergent solution. Wipe all equipment with a clean, soft cloth lightly moistened with water to remove the detergent solution.

Service the TE6000A

Do not attempt to service the TE6000A yourself, as there are no user-serviceable parts. Opening or removing covers may expose you to dangerous voltages or other hazards as well as void your warranty. Contact Tiernan Customer Service to obtain qualified service personnel.

The following conditions indicate that the equipment needs servicing:

- The power cord or plug has been damaged.
- An object has fallen into the TE6000A.
- Liquid has been spilled into the TE6000A, or it has been exposed to rain or water.
- The unit has been dropped or the cover has been damaged.
- The TE6000A does not operate normally, or it shows a marked change in performance.

Perform Safety Checks

Upon completion of any service or repairs to the TE6000A, ask the service technician to perform safety checks to verify that the system is in safe operating condition.


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TE6000A Overview

1

The TE6000A is a rugged, modular MPEG-2 encoder designed for news gathering and professional broadcast applications. Video input may be analog, PAL or NTSC, or serial digital 525/625. Two stereo audio inputs may be either analog or AES/EBU. Encoding may be 4:2:0 in accordance with MPEG-2 Main Profile @ Main Level or 4:2:2 Studio Profile @ Main Level depending on the encoding module chosen. The compressed digital output is a DVB® MPEG-2 or ATSC-compliant transport stream.

The TE6000A compresses the incoming video with the latest adaptive field-frame MPEG-2 algorithm. The video compression is performed with I, B, and P frames using bidirectional predictive coding and motion estimation. The four stereo or eight mono audio channels are compressed using the MPEG audio encoding standard. The two auxiliary data channels support both synchronous and asynchronous serial formats.

Control and system status is provided by a push-button front panel with an illuminated LCD and bright LED indicators.

The integrated DVB®, QPSK satellite modulator is controlled by one touch buttons for carrier on/off and modulate. Additionally, remote control is available using ASCII commands via the EIA-232 remote control and Ethernet ports.

The TE6000A's rugged chassis is a 2U high (8.9 cm), 19" width rack-mount unit providing full rear panel cabling. The main power switch is conveniently located on the front panel.

Features

The TE6000A consists of the following standard feature set:

- Advanced video compression chip-set which encodes the input video following either 4:2:2 Studio Profile @ Main Level or 4:2:0 Main Profile @ Main Level standards depending upon the installed feature set
- A high-quality horizontal decimation filter for intermediate horizontal resolutions
- Supports compressed audio rates of 64 to 384 kbps and four different audio channel compression methods
- Accepts two high-speed, independently programmable auxiliary data channels
- Automatic configuration of video and audio rates to match the available transmission bandwidth for optimum performance
- Dedicated modulator control buttons are provided on the front panel for one touch control
- BISS conditional access
- Extensive VBI data support of DVB teletext
- Front panel interface for local configuration, monitoring, and control
- Front panel lockout to prevent accidental configuration changes
- *At-a-glance* status monitoring via a tri-colored Status LED indicator

- Status *hot key* enables you to toggle between fault lists and other front panel menus
- Remote control via Ethernet or EIA-232 providing all configuration, monitor, and control functions
- Built-in-self-tests and extensive self-diagnostics to assist with system checkout and problem solving
- Non-volatile, field-programmable memory
- User configuration sets that can store and recall commonly used parameters sets
- Auto-ranging, auto-sensing power supply
- Rugged chassis construction

Video The TE6000A uses an advanced video compression chip-set which encodes the input video following either the 4:2:2 Studio Profile @ Main Level or the 4:2:0 Main Profile @ Main Level, according to MPEG-2 standards (ISO/IEC 13818-2).

The TE6000A supports the following compressed video rates:

- MPEG-2 4:2:2 Studio Profile @ Main Level: 2.5 to 50 Mbps which provides superior quality compressed images at high data rates
- MPEG-2 4:2:0 Main Profile @ Main Level: 1 to 15 Mbps

The video encoder features a low latency mode for interactive applications and a Tiernan proprietary, high-quality horizontal resampling filter for intermediate horizontal resolutions.

Audio Two stereo or four mono audio channels are compressed using MPEG audio encoding standards.

The TE6000A supports compressed audio output rates of 64 to 384 kbps and four different audio channel compression methods.

Auxiliary Data Two channels of synchronous data up to 4.096 Mbps each (RS-422 levels) or asynchronous data up to 38.4 kbps each (RS-232 or RS-422 levels) are supported by the TE6000A.

Conditional Access The TE6000A supports both BISS, modes 0 and 1, as well as Tiernan's proprietary condition access schemes.

VBI – Vertical Blanking Interval Extensive VBI data support is provided via the TE6000A. Supported formats include:

- Proprietary passage of NTSC line 21 closed-captions
- ATSC closed captioning
- DVB Teletext for World System Teletext (WST) on PAL
- DVB 4:2:2 expanded windows carries WSS, VPS, VITC, CC, AMOL, XDS, etc.

Modulator The TE6000A has a built-in DVB®-compatible QPSK modulator with a 70 MHz IF carrier capable of supporting up to 20 MSym/sec.

Modulator Control Buttons The TE6000A provides dedicated modulator control buttons on the front panel. These are designed to bring carriers up onto satellites in a fast and efficient manner.

Transport Stream Output Both single-program-transport-stream (SPTS) and multi-program-transport- stream (MPTS) operations are supported and may be configured in a point-to-point or point-to-multipoint system. (Note: SPTS and MPTS are also referred to as single-channel per carrier, SCPC, and multi-channels-per carrier, MCPC, respectively.)

The TE6000A accepts all commonly used video and audio input formats and outputs an MPEG-2 DVB compliant transport stream in addition to a DVB-compliant, QPSK-modulated 70 MHz IF carrier.

If an external transport stream is provided from another encoder, the TE6000A will multiplex the two transport streams to form a combined transport stream (MPTS). This daisy chaining of encoders and multiplexing of transport streams may continue until the units reach the 70 Mbps limit or the modulator symbol rate limit.

Within the data rate limitations of the channel, the TE6000A can be reconfigured for different video resolutions, video optimization, and audio compressed bit rates to get the best video performance. Higher compressed bit rates result in better decoded video quality.

For high reliability applications, the TE6000A provides exceptional MTBF performance with its extensive digital processing and proprietary FPGA circuits.

In addition, the TE6000A can automatically configure the video and audio rates in order to match the available transmission bandwidth for optimum performance.

Monitor and Control Functions The TE6000A monitor and control functions include:

- Fault Relay with passive normally-open and normally-closed contacts
- Front panel operator control utilizing an easy-to-use, intuitive menu and backlit push-buttons
- Remote control using either an Ethernet or RS-232 interface

Front Panel The TE6000A front panel interface allows you to scroll through a standard set of menus to easily set your operating parameters. All configuration and monitoring functions can be efficiently performed using the front panel.

At-a-glance system status can be quickly determined by checking the tri-colored front panel status LED:

- Green — indicates that the unit is receiving AC power and that there are no faults
- Yellow — indicates that the unit has a current fault
- Red — indicates that the unit has a hard fault

If the Status LED indicates that there is a fault, the Status *hot key* enables you to go directly to the current faults list with the press of a button.

Remote Control A remote unit, such as a computer terminal, is easily connected to either the EIA-232 remote control port or Ethernet port allowing the TE6000A to be configured, monitored, and controlled using character-based ASCII protocol.

Programmable Memory The TE6000A is a field-deployable unit with non-volatile, field-programmable memory that ensures retention of configuration parameters during power outages, power off, and transportation. The TE6000A maintains the last user configuration in flash memory.

Configuration Sets The TE6000A has a number of default configurations that can be restored as well as numerous user-defined configuration sets that can be saved and restored.

Construction The TE6000A is a small, rugged, 2RU (90 mm/3.15”) high, 19-inch wide rack-mount chassis with an international, auto-sensing, AC power supply.


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Installing the TE6000A

2

This chapter provides step-by-step procedures for installing and cabling the TE6000A.

Do not remove the TE6000A top cover! The TE6000A is powered by an exposed, switching AC power supply which presents an electric shock hazard when the top cover is removed. Personal injury or damage to the equipment can occur when the top cover is removed. None of the procedures in this manual require the removal of the TE6000A top cover.

Before beginning your installation, read the *Safety Precautions* as they contain important safety information and other instructions required to install the TE6000A.

Placement

The TE6000A can be installed on a table top or in a rack. Use the following guidelines to determine the appropriate installation for your needs:

- If the equipment must be moved frequently, install the TE6000A on a table top or other flat surface.
- If the equipment is going to be installed permanently, install the TE6000A in a rack using rack mount brackets.

Whichever installation is used, always position the equipment to allow easy access to the rear panel and provide adequate ventilation.

To properly install the TE6000A, follow the instructions provided in the appendix on table top and rack mount installation instructions.

Ventilation

The TE6000A must be positioned to receive adequate ventilation at all times. The cooling fan pulls air in through the side vents, circulates the air, and exhausts it out the side vents. The minimum air flow clearance required on both sides of the chassis is three (3) inches.

Powering On The TE6000A

The rear panel AC power supply interface includes a fuse holder, and an IEC 320 power cord receptacle. The typical TE6000A configuration requires 125 amps.

The TE6000A unit is powered by an auto-sensing, auto-ranging AC switching power supply. The supply accepts 100 to 120 VAC and 200 to 240 VAC nominal input voltage levels cycling at 50 to 60 Hz. A 3.15 amp fuse on the rear panel protects the power supply from excessive current.

The On/Off (—/0) power switch is located on the front panel.

AC Power Cords

The TE6000A shipping kit includes two AC power cords, one for North American applications, specifically the United States and Canada, and the other for international applications.

AC wiring must be done in accordance with governmental standards and codes in effect at the TE6000A installation site. Refer to the *Safety Precautions* for additional information.

North American Applications One cord has an IEC-compatible female plug on one end and a North American male plug on the other. This cord is UL and CSA approved up to 125VAC at 10A. This cord is ready to use with no user wiring required.

International Applications The international cord has an IEC-compatible female plug on one end and three stripped and tinned bare wires on the other end. This cord is approved by many international safety agencies, including VDE, up to 250VAC at 6A.

Connecting to a Power Source

To connect to an AC power source, follow these steps:

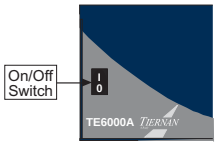
1. Select an AC power cord. If an international power cord is selected, attach a connector in accordance with local regulations and laws.
2. Ensure the TE6000A power switch is in the Off, or 0, position.
3. Connect the female plug of the AC power cord to the AC power receptacle on the TE6000A rear panel.
4. Connect the male plug of the AC power cord to an external A Cpower conditioning surge suppressor.
5. Connect the AC power conditioning surge suppressor to an A Coutlet.

CAUTION! Please Read Carefully

Corrupted AC input power can interrupt TE6000A operations and cause permanent damage to the unit. You should purchase and install a commercially available, external AC power conditioning surge suppressor to protect the TE6000A against power spikes and line transients.

Power-up Sequence

Once the cabling and interconnections for the TE6000A are completed, you may power-up the unit. The TE6000A power switch is a rocker switch located on the front panel.



The power switch is labelled with an **I** and an **0**. The **I** represents the On position, while the **0** represents the Off position.

To power up the TE6000A, press the power switch to the On, or **I**, position.

The power-on cycle takes approximately two minutes to complete, as the unit performs extensive self-diagnostics in this time period.

During the powered-up cycle, the TE6000A displays `TE6000A Encoder Initializing...`, various messages scroll across the LCD, and the tri-colored Status LED illuminates and may flash.

After the unit is initialized, the LCD displays the TE6000A SDTV MPEG-2 Encoder main menu.

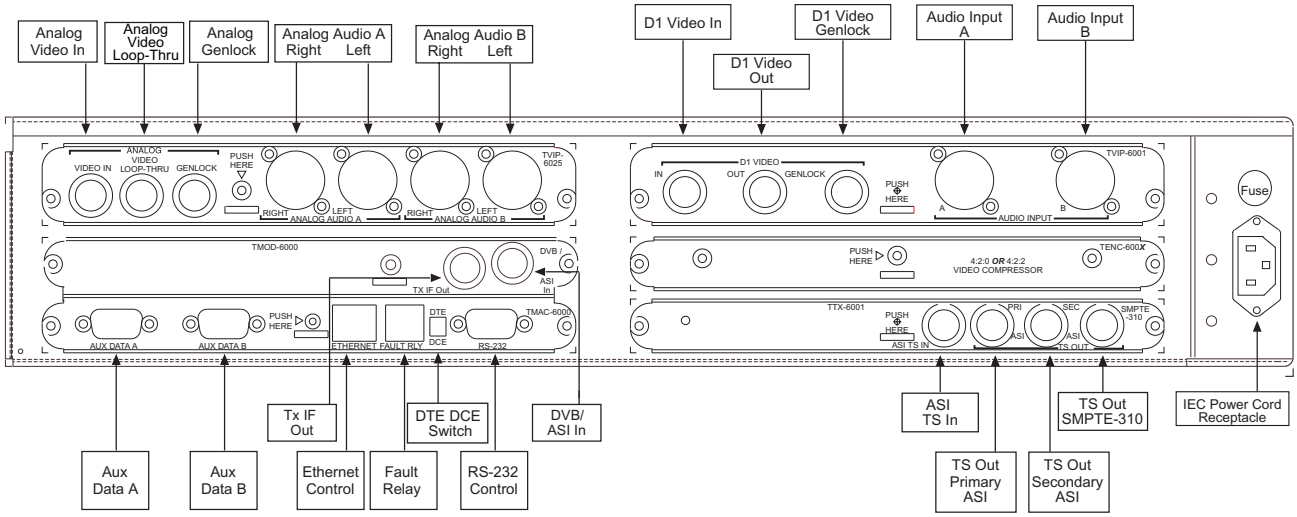
```
TE6000A SDTV MPEG-2 Encoder
[Config]   Status      Version

Software Version: 3.00
```

NOTE

When you begin the initial TE6000A installation and configuration, the modulator output (Mod State) should be turned off until you are ready to begin satellite transmissions.

Rear Panel Connections

All TE6000A external connections are located on the rear panel, as shown in the following illustration.



Video Ports

The TE6000A provides connections for both analog and digital video.

Analog Video Ports (TVIP-6025)

The TE6000A analog video ports, found on the TVIP-6025, are as follows:

- Analog Video In
- Analog Video Loop-Thru
- Analog GenLock

Analog Video In Analog Video In is a female BNC connector with 75Ω impedance, accepting a NTSC or PAL composite analog video input that is 1.0 Vpp nominal level. The analog composite video input must be compliant with SMPTE 170M NTC, ITU-R BT.470, and PAL-I/B/D. The connector shell is connected to signal ground.

Connect the video input cable to the Analog Video In connector on the rear panel.

Analog Video Loop-Thru Analog Video Loop-Thru is a loop through of the composite video in signal on a female BNC connector. This connector should be terminated with a 75Ω load to maintain proper video levels through the system.

Analog GenLock The Analog GenLock is a female BNC connector with 75Ω impedance. The 27 MHz source clock is derived from one of the following sources:

- Incoming video
- External analog genlock input, SMPTE RP154 (NTCS), EB UD23, and EBU D25 (PAL)

The external genlock input permits the user to *hot switch* the video input during the vertical blanking interval without losing synchronization. Typically GenLock is connected to a black burst *house sync* signal in a video plant.

Digital Video Ports (TVIP-6001)

The TE6000A digital video ports, found on the TVIP-6001, are as follows:

- D1 Video In
- D1 Video Out
- D1 Video GenLock

D1 Video In D1 Video In is a female BNC connector, with 75Ω impedance. The port accepts a 525 line or 625 line D1 serial digital video input that is format compliant with SMPTE-259M. The video input is expected to be 270Mbps, with 10bit ITU-R Rec. BT.601 sampled video in 4:2:2 (YCbCr) component format.

Connect the digital video input cable to the D1 Video In connector on the rear panel.

D1 Video Out D1 Video Out is a loop through of the digital video in signal on a female BNC connector. When the TE6000A is powered off, D1 Video Out is a passive loop through. When the TE6000A is powered on, the D1 Video Out is an active loop through driven by a 75Ω driver.

D1 Video GenLock The D1 Video GenLock is a female BNC connector with 75Ω impedance. The port accepts external SMPTE 259M input. When activated, the D1 Video GenLock is used as the timing reference for the 27 MHz MPEG system clock of the TE6000A.

The external genlock input permits the user to *hot switch* the video input during the vertical blanking interval without losing synchronization. Typically GenLock is connected to a black burst *house sync* signal in a video plant.

Audio Ports

The TE6000A provides the following audio input connections:

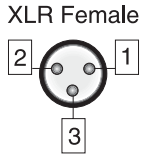
- Analog audio on the TVIP-6025
- Digital audio on the TVIP-6001

Analog Audio (TVIP6025)

The TE6000A has two sets of analog audio input ports located on the TVIP-6025:

- Analog Audio A Right and Left
- Analog Audio B Right and Left

The ports can be configured for two stereo or four independent analog mono channels.



Each port has a female XLR connector with high impedance (>10k Ω) termination.

The pin assignments for all the analog audio ports are listed in the following table.

Audio Port Pin Assignments	
Pins	**Signal**
1	Gnd
2	+
3	–

Digital Audio Ports (TVIP6001)

The TE6000A has two digital audio input ports located on the TVIP-6001:

- Audio Input A
- Audio Input B

Each port has a female XLR connector with 110Ω. nominal termination. The ports accept AES/EBU serial digital input that is compliant with ANSIAES3-1992 (ANSI S4.40-1992) recommendations. The ports are typically configured for two stereo channels.

Aux Data A and B Ports

Aux Data A and Aux Data B ports are located on the TMAC-6000. These ports are female DB-9 connectors. Each channel can be independently configured as synchronous or asynchronous.

Synchronous Configuration

In synchronous configuration, the ports accept RS-422 input at 1 kbps to 4 Mbps.

The auxiliary Data A and Data B synchronous port pin assignments are listed in the following table.

Aux Data Port Pin Assignments: Synchronous – RS-4 2 2

Pins	Signal	Direction	Definition
1	Unused	—	—
2	ST+	Out	Send Timing
3	SD+	In	Transmit Data
4	TT–	In	Term Timing
5	GND	—	Ground
6	ST–	Out	Send Timing B
7	Unused	—	—
8	SD–	In	Transmit Data
9	TT+	In	Terminal Timing
Shell	GND	—	Ground

Configuring the DTE and TE6000A Clock Interfaces

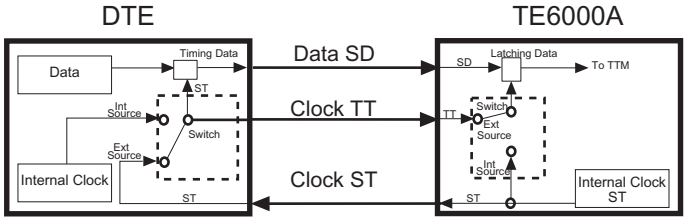
After you have cabled the data termination equipment (DTE) to the TE6000A, you must determine the most effective TE6000A and DTE clock source arrangements. There are three different ways to configure the clock interface for the TE6000A and the DTE:

- Clock Interface Configuration 1 is the most reliable clock source arrangement. This configuration requires the DTE to provide a clock (TT) synchronous with the data (SD) to the TE6000A.
- Clock Interface Configuration 2 is the second most reliable clock source arrangement. This configuration is used when the DTE cannot turn around the ST, but has an internal clock source that can be provided as TT to the TE6000A.
- Clock Interface Configuration 3 is the least reliable clock source arrangement — it should only be used if the first two clock configurations cannot be used. In this configuration the TE6000A is configured to use ST to latch the data.

Clock Interface Configuration 1 The most reliable auxiliary data channel clock source configuration requires the DTE to provide a clock (TT) synchronous with the data (SD) to the TE6000A. This scenario allows the TE6000A to latch the data using a clock that has traveled the same path as the data, which ensures that both the clock and the data are received in phase at the TE6000A.

The following block diagram shows the clock configuration for a DTE configured to turn around the ST clock source, and a TE6000A auxiliary data channel configured for an external clock source.

Notice in the illustration that the switch for the TE6000A auxiliary data channel clock source is configured for external even though the TE6000A is providing ST to the DTE.

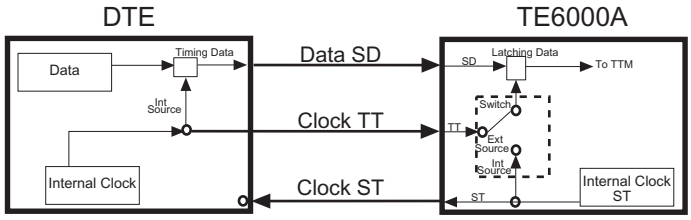


In this configuration, the TE6000A provides clock (ST) to the DTE. The switch for the DTE clock source is configured to accept the external clock (ST) provided by the TE6000A. The DTE uses the ST to time the data, sends the data to the TE6000A on SD, and returns the ST to the TE6000A on TT. The TE6000A uses TT to latch the data.

The TE6000A auxiliary data channel must be configured for an *external* clock source to accept TT from the DTE.

Clock Interface Configuration 2 If the DTE cannot turn around the ST, but has an internal clock source that can be provided as TT to the TE6000A, use this option to configure the auxiliary data channel.

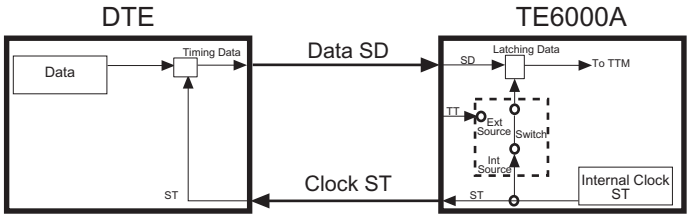
The following block diagram shows the clock configuration for a DTE providing an internal clock source as TT to the TE6000A.



In this configuration, the DTE clock is set to internal and the TE6000A auxiliary data channel clock source is set to external. The DTE uses its internal clock source to time the data, sends the data to the TE6000A on SD, and sends its internal clock to the TE6000A as TT. The TE6000A uses TT to latch the data. The TE6000A auxiliary data channel must be configured for an *external* clock source.

Clock Interface Configuration 3 If the DTE cannot turn around the ST, and does *not* have an internal clock source that can be provided as TT to the TE6000A, configure the TE6000A to use the ST to latch the data. However, this scenario is not recommended and should be considered only if neither of the other two clock source configurations can be used.

The following block diagram shows the clock configuration for a DTE configured for an external clock and a TE6000A auxiliary data channel configured for an *internal* clock.



In this scenario, both the DTE and the TE6000A use ST, but the ST is provided to the DTE on one path and to the TE6000A on a different path. Depending upon the length of cable between the DTE and the TE6000A, the clock may be received out of phase at the TE6000A. The longer the cable, the further out of phase the clock will be.

CAUTION! Please Read Carefully

If the internal clock is used to latch the data, the length of cable between the DTE and the TE6000A must be limited to one meter (3 feet). Additionally, the auxiliary data rate must be limited to not more than 64 kbps. If the cable length exceeds one meter, or if you attempt to process data at rates above 64 kbps, the auxiliary data may be corrupted.

Asynchronous Configuration

In asynchronous configurations, ports can be configured to accept RS-232 or RS-422 input at rates of 1200 bps to 38400 bps.

RS-232 The DB-9 connector allows a standard RS-232 DCE connection. The auxiliary Data A and Data B asynchronous port pin assignments for RS-232 are listed in the following table.

Aux Data Port Pin Assignments: Asynchronous – RS-232

Pins	Signal	Direction	Definition
1	Unused	—	—
2	Unused	—	—
3	TD	In	Transmit Data
4	Unused	—	—
5	GND	—	Ground
6	Unused	—	—
7	RTS	In	Ready to Send
8	CTS	Out	Clear to Send
9	Unused	—	—

RS-422 The auxiliary Data A and Data B asynchronous port pin assignments for RS-422 are listed in the following table.

Aux Data Port Pin Assignments: Asynchronous – RS-422			
Pins	**Signal**	**Direction**	**Definition**
1	Unused	In	—
2	CTS+	Out	Clear to Send
3	RD+	In	Transmit Data
4	RTS–	In	Request to Send
5	GND	—	Ground
6	CTS–	Out	Clear to Send
7	Unused	—	—
8	RD–	Receive Data	In
9	RTS+	In	Request to Send

Remote Unit Connections

A remote unit can be connected through either of two ports located on the TMAC-6000:

- RS-232
- Ethernet Control

RS-232 Control Port

The RS-232 port is a DB-9 female connector. The port can be configured as a DTE or DCE. The default configuration is as a DCE.

DCE Configuration

The pinouts for the RS-232 port configured as DCE are listed in the following table.

RS-232 Port Pin Assignments: DCE			
Pin #	**Signal**	**Direction**	**Signal Definitions**
1	DCD	In	Carrier Detect
2	RXD	In	Receive Data
3	TXD	Out	Transmit Data
4	DTR	Out	Data Terminal Ready
5	GND	—	Ground
6	DSR	In	Data Set Ready
7	RTS	Out	Request to Send
8	CTS	In	Clear to Send
9	RI	In	Ring indicator
Shell	GND	—	Ground

DTE Configuration

The pinouts for the RS-232 port configured as DTE are listed in the following table.

RS-232 Port Pin Assignments: DTE			
Pin #	**Signal**	**Direction**	**Signal Definitions**
1	Unused	—	—
2	TXD	Out	Transmit Data
3	RXD	In	Receive Data
4	DSR	In	Data Set Ready
5	GND	—	Ground
6	DTR	Out	Data Terminal Ready
7	CTS	In	Clear to Send
8	RTS	Out	Request to Send
9	RI	In	Ring indicator

Connecting to the RS-232 Control Port

To connect a remote unit to the TE6000A through the RS-232 control port, you need a cable that is the appropriate length for the application. The cable must be made to the following specifications:

- RS-232 electrical
- DB-9 female connector on one end
- An appropriate connector for the remote unit on the other end

A 6-foot long direct connect DB-9 male to DB-9 female cable is included in the TE6000A shipping kit.

Using the direct connect cable provided with the TE6000A, attach one end to a remote unit and the other end to the RS-232 control port.

Ethernet Control Port

The Ethernet control port is an RJ-45 connector. Remote control using this port requires the following:

- Tiernan Network Management Software (NMS) program
- Category 5 UTP patch cable (not supplied)

Connecting to a Network Using the Ethernet Port

You can connect the TE6000A to a LAN using the Ethernet port, which enables you to monitor and control the TE6000A through a remote unit not directly connected to the TE6000A.

NOTE

When connecting the TE6000A to a LAN using Ethernet, contact your Information System department to coordinate installation and setup.

Perform the following steps to connect to the network using the Ethernet port:

1. Connect a Category 5 cable with RJ-45 connectors (standard ethernet cable) between the TE6000A Ethernet port and a LAN hub.
2. Assign the device a unique IP address, if necessary.

   The TE6000A default IP address is 0.0.0.0. Contact your Information Systems department for a valid IP address.

   To change the IP address using the front panel:

   a. Select `Config>Comm>Network>IP Addr`

   b. Using the keypad, enter the IP address in the format xxx.xxx.xxx.xxx where xxx is a decimal number between 0 and 999.

   c. Press the Enter button

   To change the IP address using a remote unit, issue the `MC IP XXX.XXX.XXX.XXX` command where XXX is a decimal number between 0 and 999.
3. Assign additional network information, if necessary. Depending on the configuration of the LAN, you may need to enter additional parameters including:
   - Ethernet IP address mask (IP subnet mask)
   - Ethernet IP gateway
4. From a personal computer connected to the LAN, try to ping the TE6000A. At the command prompt of the personal computer, type `ping <TE6000A IP address>` where <TE6000A IP address> is the address assigned in step 2.

   If a reply is received, the TE6000A is correctly configured.

For information on establishing remote communications or on Ethernet commands, refer to the chapter on using a remote unit.

DTE/DCE Switch

The DTE/DCE switch is used to change the configuration of the RS-232 port. When the port is configured as DCE, use a standard cable for the computer Comm port. In this configuration, the port supports all of the signals required for basic modem support:

- Rdata
- Tdata
- DTR
- DCR
- CTS
- RTS
- DCD

When the port is configured as DTE, use a null modem cable to connect the PC to the TE6000A.

Fault Relay

The Fault Relay is an RJ-11 connector. The fault relay is used in a redundant configuration. In this configuration input is fed from distribution amplifiers into each of two TE6000s. A Tiernan redundancy switch monitors the output through the Fault Relay. If the primary TE6000A faults, the secondary TE6000A automatically takes over operation.

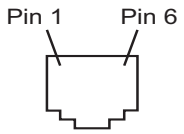
A relay fault condition is defined as:

- A unit power failure
- Unit power switch turned off
- Unit is unplugged
- A unit hardware failure

The fault condition is indicated by contact closure between pins one (1) and three (3) and open contacts between pins one (1) and si x(6).

The non-fault condition is indicated by contact closure between pins one(1) and six (6) and open contacts between pins one (1) and three (3).

The illustration indicates the physical locations of pins 1 and 6 within the fault relay port, as viewed from the rear panel.



When the fault relay detects a fault condition, the fault relay trips, and the Status LED located on the TE6000A front panel illuminates red.

Transport Connection Ports

The TE6000A multiplexer outputs an ASI transport stream with a variable rate of 1 to 70 Mbps. This transport stream is the combination of the video, audio, and auxiliary data streams in an MPEG-2 compliant transport stream. Depending on the operating mode, the transport stream is either:

- Input to the modulator or the multiplexer of another TE6000A where it is multiplexed with another transport stream before being output
- Output to an external satellite modulator

Operating Modes

The two TE6000A operator modes are:

- Single program transport stream (SPTS) (also referred to as single channel per carrier, SCPC)
- Multi-program transport stream (MPTS) (also referred to as multiple channel per carrier, MCPC)

SPTS Mode In SPTS mode, the ASI transport stream is connected from the TE6000A multiplexer to the internal modulator of the same TE6000A. In this mode, the modulator supports transport stream data rates from 1 up to 18 Mbps in SPTS mode, depending on the FEC rate selected. Output symbol rates range from 1 to 20 MSps.

MPTS Mode In MPTS mode, the ASI output of one TE6000A is fed into the multiplexer of another TE6000A so that the output of the two encoders are multiplexed in a single transport stream. The signal from a series of TE6000s can be combined in this way. The combined transport stream is then output to the modulator of the final TE6000A in the chain.

In MPTS mode, the modulator supports transport stream data rates from 1 to 32 Mbps, depending on the FEC rate selected. Output symbol rates range from 1 to 20 MSps. For applications requiring higher data rates, an external modulator can be used instead of the TE6000A integrated modulator.

Connections

The TE6000A ports used to connect the transport stream to the modulator and the MPTS chain are:

- ASI TS In
- ASI Out Pri (primary ASI out)
- ASI Out Sec (secondary ASI out)
- SMPTE -310
- DVB/ASI In

ASI TS In ASI TS In is a female BNC connector with 75Ω impedance. When the encoder is configured for MPTS operation, this port accepts the transport stream from either ASI Out port of another encoder.

ASI Out Primary ASI Out Primary is a female BNC connector with 75Ω impedance. The port outputs a DVB- compliant ASI transport stream at rates between 1 and 70 Mbps.

ASI Out Primary is used for normal operation and is typically cabled to the Mod ASI In connector with a short (14") coaxial cable.

The transport stream output on ASI Output Primary is a spare and is not bypassed in case of failure.

ASI Out Secondary ASI Out Secondary is a female BNC connector with 75Ω impedance. The port outputs a DVB-compliant ASI transport stream at rates between 1 and 70 Mbps.

ASI Out Secondary port can be used to output the transport stream of one TE6000A to the multiplexer of another TE6000A for MPTS operation. In this configuration, this port is cabled to the Mux ASI In port of the next TE6000A in the MPTS chain.

If a fault condition or power failure exists, the input transport stream, which is connected to ASI TS In, is bypassed directly to ASI Out Secondary through a passive bypass relay. This ensures that only the program associated with the failed TE6000A in an MPTS chain of encoders or in a redundant configuration is interrupted by the failure.

ASI Out Secondary can also be used to monitor the transport stream.

SMPTE -310 This port is used to output a SMPTE-310 compatible transport stream.

DVB/ASI In DVB ASI In, located on the TMOD-6000, is a female BNC connector with 75Ω impedance. The port accepts the transport stream from either ASI Out port.

The DVB/ASI In transport data is processed according to DVB standards and output from the integrated TE6000A QPSK modulator on the port labeled Tx IF Out.

Modulator Output to Upconverter Connections

The internal modulator outputs a modulated IF signal, which is connected to an upconverter.

Connections are made through the Tx If Out port. This port is a female BNC connector that outputs a 70 Mhz, DVB-compliant, QPSK modulated, FEC encoded IF signal at symbol rates from 1 to 20 MSps.

Before you cable the modulator output to the upconverter, turn the modulator off until you are ready to begin satellite transmissions.

To cable the modulator output to an upconverter, connect the output of the internal modulator from Tx IF Out to an IF-to-RF upconverter.

Using the Front Panel

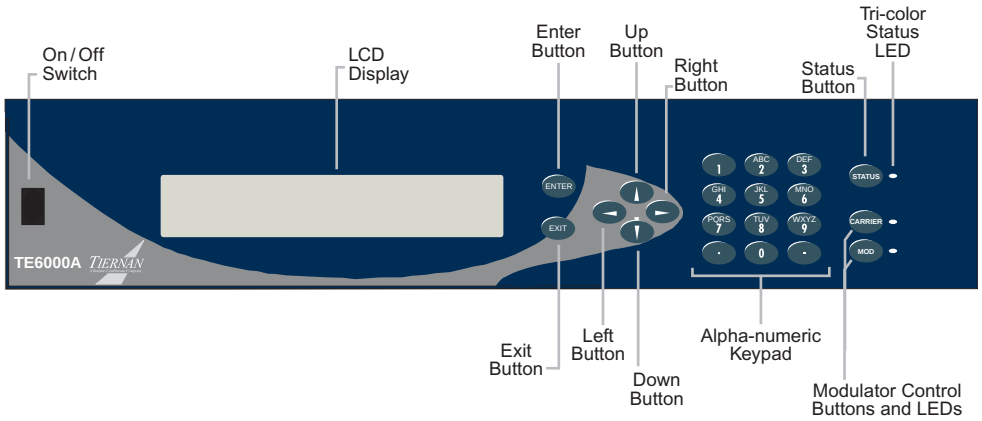
3

This chapter describes the following TE6000A front panel information:

- Components
- Navigating through menus
- Description of menus, parameters, and options

Front Panel Components

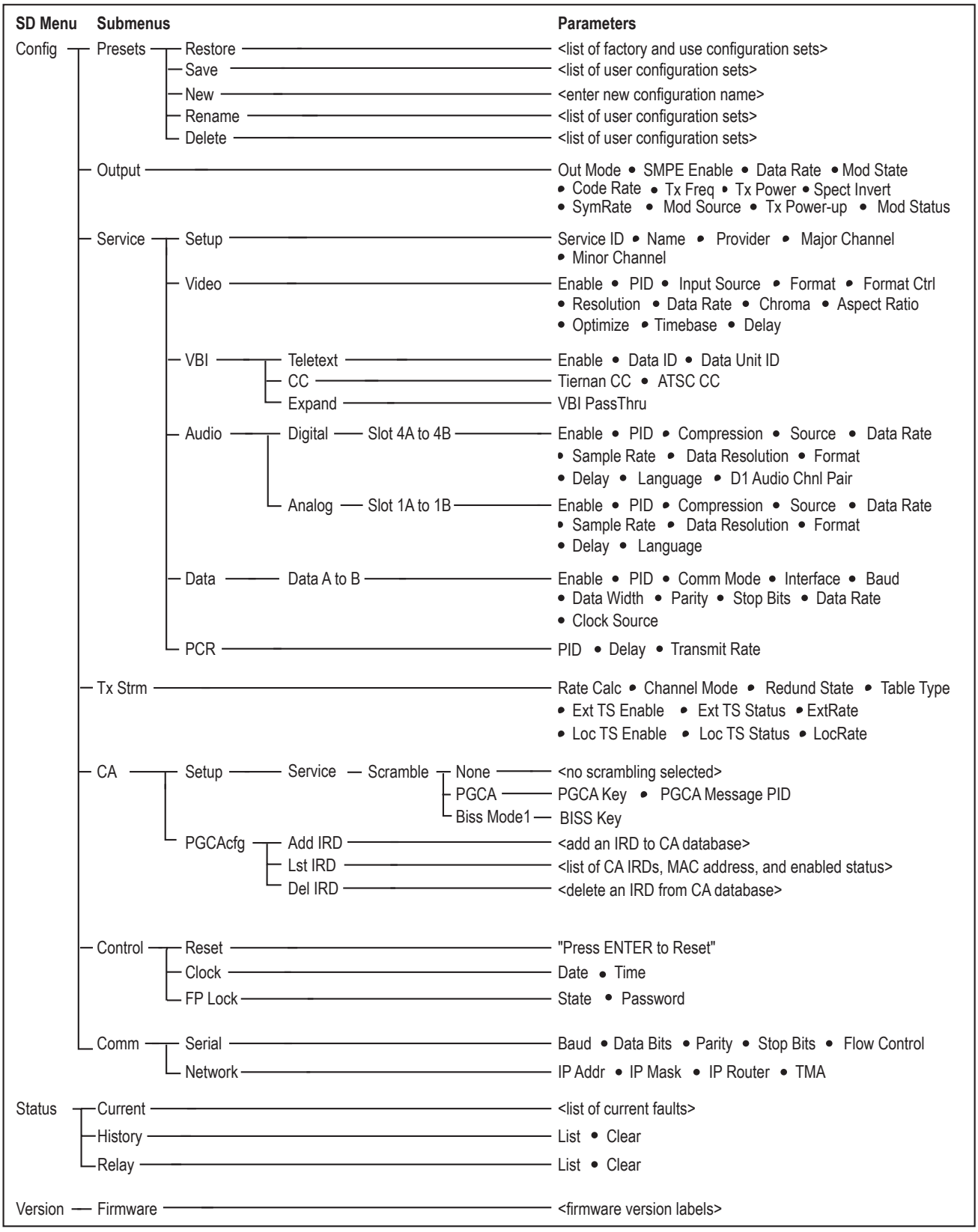
The front panel enables you to easily and efficiently configure and monitor the TE6000A.



The front panel consists of:

- LCD – displays menus, parameters, information, and messages
- Enter button – used to select a menu item, issue a command, or set a parameter
- Exit button – used to scroll up to a previous menu level or leave a parameter without changing it's option
- Left and Right buttons – used to scroll within the current ***menu level***, or to scroll through a ***list of parameters***
- Up and Down buttons – used to scroll through parameter ***options*** and increase and decrease parameter ***values***
- Alpha-numeric keypad – used to enter alphabetic and numeric parameter values
- Status button – hot key which toggles between the current front panel menu and the current faults list
- Status LED – tri-color LED alerts you to status and fault conditions
- Modulator control buttons and LEDs – these two buttons affect the power and form of the output IF transmit carrier from the encoder:
  - Carrier – enables carrier wave at nominal power
  - Mod – enables modulated carrier at nominal power

Menu Structure

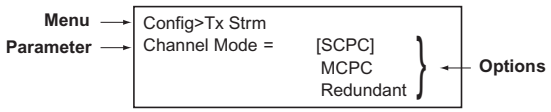


Navigating Through the Menus

The front panel LCD display and buttons were designed to help you navigate through the TE6000A menu structure quickly and efficiently.

LCD Display

The TE6000A uses the following naming conventions for data that displays on the front panel.



LCD Symbols

There are six important symbols that appear on the LCD:

- Brackets [ ]
- Asterisk (*)
- Arrows → ←
- Colon (:)
- Equal sign (=)

Brackets As you are moving through menus, parameters, and options, the brackets indicate which item is currently selected.

Arrows As you are navigating through the TE6000A ***parameters***, a right arrow will often display on the LCD. This arrow indicates that there are additional items available in that parameter list.

Asterisk While the TE6000A is executing a command or setting a parameter option, an asterisk (*) appears on the LCD, indicating that the TE6000A is processing information. When the asterisk disappears, the process is complete.

Equal Sign Most parameters, though not all, can be modified in order to configure the TE6000A. Configurable parameters are followed by an equal sign, denoting that the parameter can be modified.

Colon There are some parameters that are automatically set for your system or that are query-only parameters. These type of parameters are followed by a colon. When a parameter is followed by a colon, that parameter can be viewed but not changed.

LCD Text Formats

All menus, parameter options, and system information are displayed on the front panel LCD.

Menus All menus are displayed in the following format.

```
Config
Presets    Output     [Service]    Tx Strm
CA         Control    Comm
```

- The first line identifies the current menu level. This example shows the Configuration menu.
- The second and third lines display the available menu items.
- The brackets indicate which menu item is selected. In this example, the Service menu item is selected.

Parameter Options All parameter options are displayed in the following format.

```
Config>Service>Data>Data A
Data Width          =          [8]          →
                                7
```

- The first line identifies the current menu level, in this example, the Auxiliary Data A menu.
- The second line displays the parameter, Data Width. The current setting, [8], is surrounded by brackets.

  Up to three options (8, 7) can be displayed on the LCD at one time. If there were more than three options, you would use the Up and Down buttons to scroll through the list of options.
- The equal sign (=) denotes that this parameter can be modified. If this parameter was followed by a colon (:) the parameter would be view-only.
- The arrow indicates that there are additional Data A parameters.

  To move to another parameter, such as the Parity parameter, you would use the right and left buttons to scroll through the list of parameters.

Information Information, such as current faults, faults in the history log, and system messages are displayed as ASCII text strings as shown in the following example.

```
Status>Current
1. VI.A Loss of Input
```

- The first line identifies the current menu level, in this example, the current faults (status) menu.
- The second through fourth lines list any current faults, in this example, there is only one current fault.
- If there were more than three faults, you would use the right and left buttons to scroll through the list of faults.

Screen Saver

When the TE600A has detected no front panel activity for more than five minutes, the screen saver is activated. The screen saver displays the following information for the service currently being processed.

```
TE6000A SDTV MPEG-2 Encoder
Service:   service currently selected
OutRate:   output transport stream rate, channel mode
LocRate:   rate of locally generated transport stream
```

To exit screen saver mode and return to normal front panel operations, press the Exit button.

CAUTION! Please Read Carefully

The Enter button should ***not*** be used to exit screen saver mode, as this button may issue new commands to the TE6000A.

Front Panel Navigation Buttons

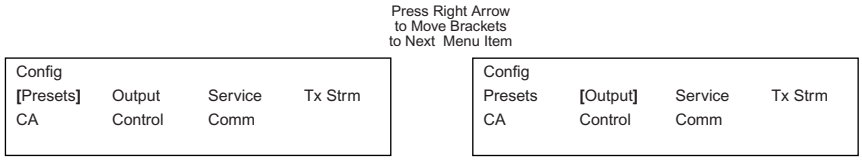
The following front panel buttons are used to move through menus in order to issue commands and view status and fault information:

- Right and Left buttons
- Enter button
- Exit button
- Up and Down buttons
- Numeric keypad
- Status button

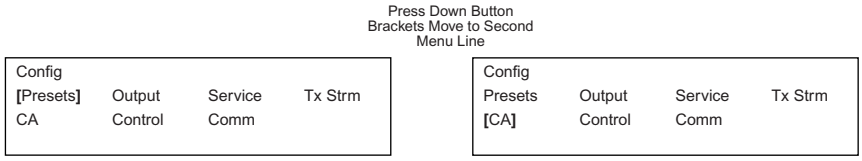
Right and Left Buttons The Right and Left buttons are used to scroll through menu items, or through a list of parameters.

These buttons move you through the menu structure in the following manner:

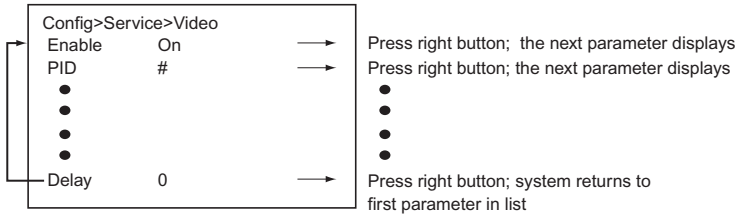
- At a *menu level* these buttons move the selection brackets [ ] and scroll right and left, (forward and backwards), respectively, through all available menu items at that current level. The following graphic illustrates how the right button functions at a menu level.



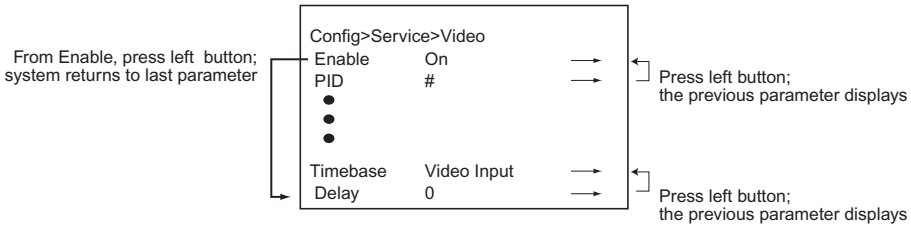
- To navigate from one menu line to another, use the up and down buttons. For example, to move from the Presets to the CA menu options, press the down button.



- In a *parameter list*, the right and left buttons scroll through the parameter ***list***. When the last parameter is reached, the TE6000A scrolls through the list again.



- Using both the right and left buttons enables you to scroll through a parameter list in either a forward or backward motion.



  If you accidentally scroll past the required parameter, you simply use the appropriate left or right button to go back to the required parameter.
- When entering alpha-numeric characters, the left button is used to delete characters.

Enter Button The Enter button is used to:

- Select the menu item displayed in brackets [ ] on the LCD
- Issue a command
- Set a new parameter option

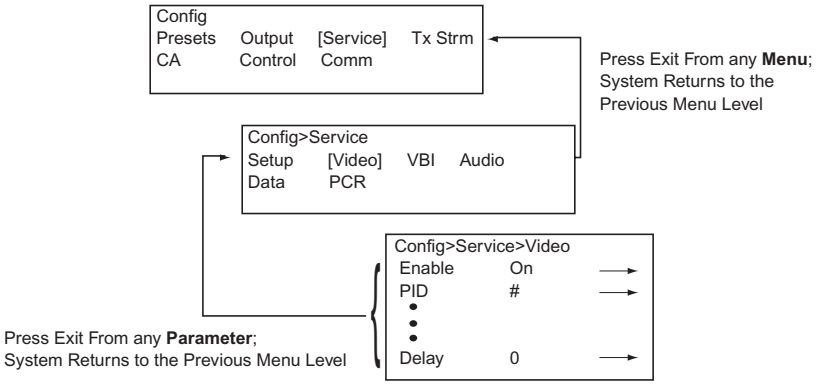
To select a menu item, use the Left/Right buttons until the brackets encompass the menu item, then press the Enter button. The Enter button moves you to the selected submenu.

To issue a command, such as the clear history log command, press the Enter button to execute the command.

To set a parameter option, such as a new video frame rate, use the Up/Down buttons until the brackets encompass the option — the option should be flashing — then press the Enter button. The TE6000A is configured with the new parameter value and the new value is stored in nonvolatile memory.

Exit Button The Exit button moves you through the menu structure in the following manner:

- At a menu level, the Exit button moves you up one menu level.
- In a parameter list, the Exit button moves you up to the previous menu level.
- When selecting a parameter option, the Exit button leaves the parameter without changing it, and moves up to the previous menu level.



The exit button is also used to exit screen saver mode.

Up and Down Buttons Once a parameter is displayed, use the Up and Down buttons to scroll through all available **options** until the brackets encompass the required option.

The Up and Down buttons will also increase and decrease the numeric value, if they are pressed ***before*** any keys on the keypad are pressed.

Alpha-numeric Keypad The alpha-numeric keypad is used to enter both alphabetic and numeric parameter values.

To correct any alpha-numeric characters, use the left arrow to delete the characters.

Alphabetic Entries — when entering values in an alpha-numeric field, the following alphabetic and numeric characters are displayed when a key is pressed:

Key	Character Displayed
1	. , ? ! - 1
2	A B C 2
3	D E F 3
4	G H I 4
5	J K L 5
6	M N O 6
7	P Q R S 7
8	T U V 8
9	W X Y Z 9
0	*space* 0 ‘ +

The first press of a number key displays the first character in the set; sequential presses of the same key advance through the character set, in a circular fashion. The cursor is advanced by either pressing another number key, or by pressing the right arrow key. For example to enter the word `ALL` which has two characters in the same characters set, the following keys would be pressed:

- `2` selects A
- `555` selects L
- → advances the cursor so the next letter can be selected
- `555` selects L

A space can be entered by either a single press of the “0” key, or by two or more presses of the right cursor key. For example, to enter the words `LA Default` the following keys would be pressed:

- 555 selects L
- 2 selects A
- 0 selects space
- 3 selects D
- → advances the cursor so the next letter can be selected
- 33 selects E
- → advances the cursor so the next letter can be selected
- 333 selects F
- 2 selects A
- 88 selects U
- 555 selects L
- 8 selects T
- Enter to issue the command

Numeric Entries — When entering values in numeric field, you simply type the required numeric value using the keypad and press Enter.

The default value that is initially displayed disappears upon the first numeric key press. Once a numeric key is pressed, the Up and Down buttons are nonfunctional; they resume their normal functions once the Enter or Exit buttons are pressed.

To delete an alpha-numeric character, use the left arrow key.

To enter a negative value, press the minus key (-) on the keypad; this toggles the value between negative and positive.

Status Button The Status button is a *hot key* which enables you to immediately view any faults currently occurring on the TE6000A and then toggle back to the front panel menu on which you were working.


NOTE

When leaving the current faults using the Status button hot key, you are returned to the ***menu level*** at which you were working, not to the parameter level.

Issuing Commands

To issue a command from the front panel, perform the following steps:

1. Navigate through the menus to the required command or parameter using the navigation buttons.
2. Change the parameter option as required:
   - Scroll through the options using the Up or Down buttons. Ensure that the required option is selected with the brackets [ ] .
   - If the option requires a numeric value to be entered, enter the value using either the Up and Down buttons to increment the value or the numeric keypad to type in the value.
3. Issue the command by pressing the Enter key. An asterisk will display and then disappear when the system is finished processing the request. The parameter, with its updated value, is then displayed in brackets and does not flash.
   - If the Enter button is not pressed, the option is not changed.
   - While the TE6000A is setting the parameter to the new value, the front panel is temporarily disabled.


NOTE

When the TE6000A configuration is changed using the front panel, the changes are automatically stored in non-volatile memory. The TE6000A automatically restores to the saved configuration whenever the unit is reset or powered up.

Correcting Mistakes

Selecting Options If you are selecting an option and have *not* pressed the Enter button, use the Up or Down buttons to scroll to the correct option.

Using the Keypad If you are entering a value with the keypad, and you have *not* pressed the Enter button, you can either press the:

- Left button to delete the numbers and then enter the correct value
- Exit button which returns you to the previous menu level

Leaving a Parameter If you have not pressed the Enter button, you can leave a parameter without modifying it by pressing either the:

- Exit button which returns you to the previous menu level
- Left or Right buttons which take you to the next parameter

In either situation, the TE6000A will ignore any values entered and return the parameter to its original setting.

After Pressing the Enter Button If you accidentally issue an incorrect parameter value to the TE6000A, you can correct the error by:

1. Selecting the correct option using the Up and Down buttons. The parameter will begin to flash.
2. Pressing the Enter button to set the correct option.

Example

The following example describes how to move through menus and select options. In this example the TE6000A video will be enabled.

1. From the main menu select Config and press Enter.

```
TE6000A SDTV MPEG-2 Encoder
[Config]   Status      Version

Software Version: 3.00
```

2. The Configuration menu displays.

```
Config
[Presets]  Output      Service     Tx Strm
CA         Control     Comm
```

3. Select Service. Press the Right button to move the brackets to Service. Press Enter.

```
Config
Presets    Output      [Service]   Tx Strm
CA         Control     Comm
```

4. The Service menu displays. Use the Right button to select Video.

```
Config>Service
Setup      [Video]     VBI         Audio
Data       PCR
```

5. The Video menu displays, showing the first video option and it's current parameter setting, which is Enable = Off.

```
Config>Service>Video
Enable      =          [Off]
                        On
```

6. Use the Up or Down button to select On. When selected, the On option is surrounded by brackets and begins to flash.

```
Config>Service>Video
Enable      =           Off
                       [On]
```

7. Press the Enter button. When the asterisk stops flashing, the TE6000A has set the new parameter.

Modulator Control Buttons

The two modulator control buttons, located at the far right of the front panel, affect the power and form of the output IF transmit carrier from the encoder. Each button has an associated LED indicator. Only one of the LEDs is illuminated at a time. These buttons cause the output carrier to be one of the following:

- Off
- Carrier on — full-power CW (constant wave)
- Modulate on — full-power modulated

A blinking LED indicates that the button is busy implementing its command. When the command is executed the LED stops blinking. Command execution takes 5 to 10 seconds to complete. Each time you press the button, even if the LED is blinking, the command is executed.

The purpose of the buttons is to allow fast and simple operation of the encoder when a DSNG operator is *coming up* on a satellite or *taking down* a link.

Pressing the modulator control buttons causes the TE6000A to toggle the modulator as follows:

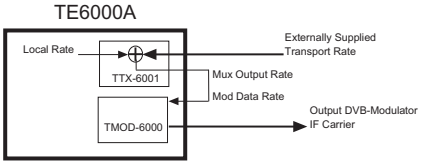
Current Modulator State	Key Press	Resulting Modulator State
Off	Mod	Modulate On; Carrier Off
Carrier On	Mod	Modulate On; Carrier Off
Modulator On	Mod	All Off
Off	Carrier	Carrier On; Modulate Off
Carrier On	Carrier	All off
Modulate On	Carrier	Carrier On; Modulate Off

Front Panel Menu Descriptions

The following table provides detailed descriptions of the TE6000A front panel menus and commands. The commands are organized in the order in which they appear on the front panel. Included are:

- Menu level
- Front panel command
- Command function
- Available options for that command or the response format if the command is query-only

TE6000A Front Panel Menu Descriptions		
Front Panel Command	**Function**	**Options/Response Format**
Configuration Menu — consists of the following submenus: ■ Presets — used to quickly and easily re-initialize the encoder using predefined factory default configuration settings your own user-defined configuration settings ■ Output — used to configure and monitor the TE6000A internal modulator ■ Service — used to setup and configure the video, VBI, audio, data, and PCR services ■ Tx Strm — Transport Stream menu enables you to set and query the TE6000A transport stream system configuration parameters. The configuration parameters set at this level impact which options and configuration parameters are available on other menus. ■ CA — Conditional Access menu is used to setup the TE6000A for conditional access and to create and modify a list of authorized decoders ■ Control — allows you to control the TE6000A hardware; submenus are Reset, Clock, Display, and FP Lock. ■ Comm — Communications menu is used to set remote control and network features; submenus are Serial and Network.		
Config>Presets Menu — Consists of five submenus, which enable you to quickly and easily save your own user-defined configuration sets, manage the user-defined list, and then re-initialize the TE6000A using either your user-defined configuration sets or predefined factory default configuration settings. These configuration sets are not altered by reset, power cycling, or factory DVB default setting of the encoder.		
Restore	initializes the TE6000A using either predefined factory configuration parameters or the selected user-stored, site-specific parameters	■ DVB (default) ■ ATSC ■ user-defined configurations, as needed, based on site-specific requirements
Save	saves the current site-specific configuration in non-volatile (flash) memory under the selected user configuration label	Up to 99 user-defined configuration sets may be saved. Configuration sets must be saved to existing user-defined labels. If there are no user labels defined, <*empty list*> is displayed. User-defined labels are set using the Config>Presets>New feature.
New	creates a new user configuration label	The configuration label may be up to 15 alpha-numeric characters in length. Up to 99 user-defined configuration sets may be created. Once the label is created, the configuration set must be saved using the Config>Presets>Save function.
Rename	changes the label (name) of an existing user configuration set	Displays the list of existing user configuration labels. If there are no user labels defined, <*empty list*> is displayed.
Delete	deletes, or erases, the selected user configuration set	Displays the list of existing configuration labels. If there are no user labels defined, <*empty list*> is displayed.
Config>Output — Used to configure and monitor the TE6000A internal modulator. When you begin the initial TE6000A installation and configuration, the modulator output (Mod State) should be turned off until you are ready to begin satellite transmissions.		
Out Mode	setting determines if the internal modulator is used to control the bit rate output of the multiplexer	■ QPSK – the internal modulator is used (default) ■ ASI – the internal modulator is *not* used
SMPTE Enable	setting determines whether or not the SMPTE output is included in the transport stream.	■ on – SMPTE output is included in the transport stream ■ off (default) – SMPTE output is *not* included in the transport stream

<table>
<tr><th colspan="3">TE6000A Front Panel Menu Descriptions (continued)</th></tr>
<tr><th>Front Panel Command</th><th>Function</th><th>Options/Response Format</th></tr>
<tr><td>Data Rate</td><td>sets the data rate for the output transport stream</td><td>■ If SMPTE is disabled: 1 to 160 Mbps default: 8.448 Mbps
■ If SMPTE is enabled: 19.392658 or 38.785316 Mbps</td></tr>
<tr><td></td><td colspan="2">Additional Information: The data rate you enter using this parameter determines the combined transport output of the TE6000A and is the multiplexed collection of the local transport stream and the externally supplied ASI transport stream, including overhead. You must set the output transport stream data rate to a value that is equal to or greater than the sum of the local transport stream and the externally supplied ASI transport stream, including overhead. That is:
Mod Input Data Rate = Mux Output Rate
AND
Mux Output Rate ≥ Local Rate + Externally Supplied Transport Stream Rate
The diagram at right represents this relationship.
 

If the output rate is set to a value that is less than the sum of the internal transport stream and the externally supplied ASI transport stream, including overhead, the data received at the decoder will be corrupted.</td></tr>
<tr><td>Mod State</td><td>setting affects the power and form of the output IF transmit carrier from the encoder</td><td>■ Off – shuts off the TE6000A modulator output (default)
■ Pure Carrier – CW enabled at nominal power
■ Modulate – carrier enabled at nominal power</td></tr>
<tr><td>Code Rate</td><td>sets the code rate for forward error correction (FEC) of the modulated signal</td><td>1/2, 2/3, 3/4, 5/6, 7/8
default: 5/6</td></tr>
<tr><td></td><td colspan="2">Additional Information: The rate selected indicates the number of error correcting bits that will be added to the data stream. For example, if you select the 5/6 rate, for every 5 bits that are input to the FEC encoder, the FEC encoder outputs 6 bits.
The relationship between the selected code rate and the data stream prior to modulation, and an indication of the degree of error correction provided by each code rate is shown below.
<table>
<tr><th>Viterbi Code Rate</th><th>Transport Stream Data Rate</th><th>Error Correction</th></tr>
<tr><td>1/2</td><td>Increases by a factor of 2 (100% increase)</td><td>Maximum</td></tr>
<tr><td>2/3</td><td>Increases by a factor of 1.5 (50% increase)</td><td>Very High</td></tr>
<tr><td>3/4</td><td>Increases by a factor of 1.33 (33% increase)</td><td>High</td></tr>
<tr><td>5/6</td><td>Increases by a factor of 1.2 (20% increase)</td><td>Moderate</td></tr>
<tr><td>7/8</td><td>Increases by a factor of 1.14 (14% increase)</td><td>Low</td></tr>
</table></td></tr>
<tr><td>Tx Freq</td><td>sets the modulator carrier frequency</td><td>52.0 to 88.0 MHz
default: 70.0 MHz</td></tr>
<tr><td></td><td colspan="2">Additional Information: The acceptable frequency range is implemented with a pass band filter that filters out all frequencies below 52000 000Hz and above 88000000 Hz.
When selecting a carrier frequency, take into account the satellite bandwidth required for transmission. If you select a carrier frequency that is too close to either end of the valid range, the modulated carrier may be clipped by the pass band filter. For information on calculating the satellite bandwidth, refer to the Config>Output>Sym Rate parameter.</td></tr>
<tr><td>Tx Power</td><td>sets the output transmit power of the TE6000A modulator</td><td>-20.0 to -5.0 dBm
default: -5.0 dBm</td></tr>
<tr><td>Spect Invert</td><td>used to instruct the modulator to invert, or not invert, the modulated IF output spectrum
Inverting the IF output spectrum eliminates spectral inversion in the RF chain caused by selecting lower side-band images of an upconverted carrier.</td><td>■ normal – modulated IF output is not inverted (default)
■ inverted – modulator inverts the IF output spectrum</td></tr>
<tr><td>SymRate</td><td>sets the current transmission symbol rate</td><td>1.0 to 20.0 MSps
default: 5.500187 MSps</td></tr>
<tr><td></td><td colspan="2">Additional Information: The symbol rate is the number of symbols required to transmit the data stream over a satellite link using quadrature phase shift keying (QPSK).
The symbol rate is automatically calculated based on the modulator input transport stream data rate, the Viterbi code rate, and other fixed parameters that add overhead to the data stream.
If the displayed symbol rate exceeds the allowable satellite bandwidth, the data will be corrupted during transmission.
To determine the satellite bandwidth required to transmit the displayed symbol rate, use the following equation:
Symbol Rate x 1.35 = Required Satellite Bandwidth (in Hz)</td></tr>
<tr><td>Mod Source</td><td>selects the modulator input</td><td>■ ASI - uses the input from the ASI IN connector
■ internal - uses the TE6000A backplane as source (default)</td></tr>
</table>

TE6000A Front Panel Menu Descriptions (continued)		
Front Panel Command	**Function**	**Options/Response Format**
Tx Power-up	sets the transmit carrier restore mode	■ off – following power-up or reset, the modulator output is disabled regardless of the modulator output carrier state prior to the power-up or reset. ■ restore – following power-up or reset, the modulator output is restored to the state that was stored in non-volatile memory just prior to the power-up or reset. (default)
Mod Status	query-only; displays if the modulator is locked to the incoming signal	■ locked – modulator is locked onto the incoming signal ■ unlocked – modulator is *not* locked onto the incoming signal
Config>Service # Menu — Used to setup and configure the TE6000A Video, Audio, and Data services		
Config>Service # >Setup — Used to setup and query TE6000A services and service providers.		
Service ID	assigns a number to a service, which, in combination with the Service and Provider names, allows the user at the decoder site to select a service **Additional Information:** If the Service ID is changed, the TE6000A automatically sets the Service ID or Program Number within the Event Information Table, Program Map Table, and Service Description Table to the same number. The Service ID may also be referred to as the Program Number.	■ if DVB: 1 to 231; default: 2 ■ if ATSC: 2 to 231; default: 2
Name	selects the name of the service	text string if default configuration is: ■ DVB, default is: *service 2* ■ ATSC, default is: *ch2*
Provider	selects the name of the provider when DVB or MPEG tables are enabled **Note:** Provider is only available when Tx Strm>Table Type is set to DVB or MPEG.	text string default: *unnamed*
Major Channel	sets the major channel when ATSC table types are enabled **Note:** Major Channel is only available when Tx Strm>Table Type is set to ATSC.	1 to 99 default: 30
Minor Channel	sets the minor channel when ATSC table types are enabled **Note:** Minor Channel is only available when Tx Strm>Table Type is set to ATSC.	1 to 99 default: 2
Config>Service #>Video — Used to configure the TE6000A video. *Note*: for embedded audio, Config>Service # >Video>Input Source must be set to digital, Config>Service # >Audio must be set to digital, and Config>Service # >Audio>Source must be set to D1.		
Enable	setting determines whether or not video is included in the output transport stream	■ on – video is included in the output transport stream (default) ■ off – video is *not* include in the output transport stream
PID	query-only; displays the video PID number included in the output transport stream	—
Input Source	set the encoder input video source	■ digital ■ analog (default) **Note**: for embedded audio, Config>Service # >Video>Input Source must be set to digital; Config>Service # >Audio must be set to digital, and Config>Service #> Audio>Source must be set to D1.
Format	query-only; displays the analog video format	■ 525 ■ 625 ■ `no video` if there is no video input
Format Ctrl	sets the video format mode when the input source is set to analog	■ auto – unit automatically senses incoming video signal format and configures the video mode to match (default) ■ PAL – 625 line PAL-N mode ■ NTSC – 525 line NTSC mode ■ NTSC 0SU – no pedestals NTS C0SU mode

<table>
<tr><th colspan="3">TE6000A Front Panel Menu Descriptions (continued)</th></tr>
<tr><th>Front Panel Command</th><th>Function</th><th>Options/Response Format</th></tr>
<tr><td>Resolution</td><td>selects the picture resizing that the TE6000A performs prior to video encoding</td><td>720, 704, 544, 480, 352
default: 720</td></tr>
<tr><td></td><td colspan="2">Additional Information: As shown in the following table, the number of lines depends upon whether the video format is set to NTSC or PAL.
<table>
<tr><th>Resolution Option</th><th>NTSC Mode</th><th>PAL-I Mode</th><th>Encoding Type</th></tr>
<tr><td>AFF352</td><td>352 pixels by 480 lines</td><td>352 pixels by 576 lines</td><td>MPEG–2</td></tr>
<tr><td>AFF480</td><td>480 pixels by 480 lines</td><td>480 pixels by 576 lines</td><td>MPEG–2</td></tr>
<tr><td>AFF544</td><td>544 pixels by 480 lines</td><td>544 pixels by 576 lines</td><td>MPEG–2</td></tr>
<tr><td>AFF704</td><td>704 pixels by 480 lines</td><td>704 pixels by 576 lines</td><td>MPEG–2</td></tr>
<tr><td>AFF720 (default)</td><td>720 pixels by 480 lines</td><td>720 pixels by 576 lines (full resolution video)</td><td>MPEG–2</td></tr>
</table></td></tr>
<tr><td>Data Rate</td><td>sets the output compressed video bit rate for optimum video performance
■ If the Tx Strm>Rate Calc is set to auto, this command is query only.
■ If the Tx Strm>Rate Calc is set to manual, you set the data rate.</td><td>if chroma set to 4:2:0 – 1.0 to 15.0 Mbps
if chroma set to 4:2:2 – 2.5 to 50.0 Mbps
default:
■ if analog: 7.443 Mbps
■ if digital: 8.0563 Mbps</td></tr>
<tr><td>Chroma</td><td>sets the chrominance compression algorithm</td><td>4:2:0, 4:2:2</td></tr>
<tr><td>Aspect Ratio</td><td>sets the picture aspect ratio which is the ratio of the frame width to the frame height</td><td>■ 4x3 (default)
■ 16x9</td></tr>
<tr><td>Optimize</td><td>sets the selected optimization mode
Note: The custom parameter is for experienced users only. Changing custom optimization features requires advanced knowledge of MPEG compression theory and encoder commands, and, if set incorrectly, the video performance maybe adversely affected. It is recommended that users consult with Tiernan customer service before using the custom configuration.</td><td>■ quality – optimizes the video performance without regard for throughput delay time. Quality mode is appropriate for action video scenes such as sports material. (default)
■ low-buffer – compensates for undersized decoder buffers
■ low-delay – reduces the throughput time required to process a signal from the encoder input, through the compression process, and to the decoder output. In low delay mode, the overall delay through a TE6000A to an IRD is 180ms +/ - 40ms. In low delay mode, the compressed audio bit rate is automatically set to 256 Kbps. Low delay mode is appropriate for real time news interviews.
■ edit – video compression uses only one frame (no prediction) which makes it easier to edit the compressed bit stream. Edit requires a higher data rate to achieve the video performance of quality mode.
■ custom – allows you to set site-specific video compression parameters, such as GOP structure and VBV size. These parameters must be initially set through a remote terminal and then saved using the remote CM SAVE command. Once saved through a remote terminal, this custom setup will persist until the video optimize setting is changed.
The custom parameter is for experienced users only. Changing custom optimization features requires advanced knowledge of MPEG compression theory and encoder commands, and, if set incorrectly, the video performance maybe adversely affected. It is recommended that users consult with Tiernan customer service before using a custom configuration.</td></tr>
<tr><td>Timebase</td><td>sets the analog video timebase source
This parameter is available only when the video input source is set to analog.</td><td>■ video input – video input is used for the encoder timebase (default)
■ gen-lock – genlock input is used for the encoder timebase. Input video must be synchronized to Genlock input in order for this option to work properly.</td></tr>
<tr><td>Delay</td><td>sets the compressed bit stream buffer delay which controls the time delay between the audio and video</td><td>-1000 to +1000 milliseconds
default: zero (0) msec
■ positive numbers cause the decoder to delay the audio output with respect to the video (i.e. lag).
■ negative numbers cause the decoder to advance the audio output with respect to the video (i.e. lead).
■ zero (0) represents nominal alignment between video and audio output from the decoder (i.e. lip sync). In addition, a zero lip sync value assumes that the video and audio has lip sync at the input of the encoder.</td></tr>
</table>

TE6000A Front Panel Menu Descriptions (continued)		
Front Panel Command	**Function**	**Options/Response Format**
Config>Service # >VBI>Teletext — used to configure the encoder to transmit teletext data ***Note*: Teletext should not be enable with other VBI encoding formats, as teletext overwrites all other VBI data.** ***Note*: For additional information on Teletext, refer to the appendix on VBI Data Transmission.**		
Enable	Configures the encoder to transmit teletext information	■ off – does not encode any teletext information (default) ■ all – encodes entire VBI teletext area; i.e., allocates bit-rate to include maximum number of Teletext lines ■ auto – automatically allocates bit-rate to include only the number of detected Teletext lines.
Data ID	Setting determines is EBU data included in the Teletext. Values from 0x10 to 0x1F reflect EBU data.	0 to 255 Default: 1
Data Unit ID	Data Unit ID defines if there are EBU Teletext sub-titles included in the data.	Data Unit ID has range from 0 to 255. Values are: ■ 2 = EBU Teletext non-subtitle data is ***not*** included (default) ■ 3 = EBU Teletext subtitle data is included ***Note***: Data Unit ID must be set to 2 or 3 for proper decoder operation.
Config>Service # >VBI>CC — used to configure the encoder to transmit closed captioning information. ***Note*: Ensure that VBI>Teletext is *disabled* when closed captions are enabled, as teletext overwrites all other VBI data.** ***Note*: For additional information on Closed Captions, refer to the appendix on VBI Data Transmission.**		
Tiernan CC	configures the encoder to transmit Tiernan closed captioning information The Tiernan CC transmission described in this document is ***Tiernan proprietary***. Only Tiernan decoders accommodate the Tiernan CC feature described in this document: ***Note***: Tiernan CC should ***not*** be implemented in PAL mode, as the closed caption information will be decoded and placed on line 22 of the video.	■ on – encodes two lines of VBI information per frame (one per field) at the expense of losing two lines of active video (one per field) The encoded picture is simply shifted up one line to include the last line of VBI and to exclude the last line of active video in each field. ■ off – does not encode any VBI information (default) ***Note***: Data transmitted in the VBI region using the Tiernan CC command will experience a degradation in quality given the inherently "lossy" compression of MPEG.
ATSC CC	configures the encoder to transmit ATSC closed captioning information	■ on – encodes ATSC VBI information ■ off – does not encode any ATSC VBI information (default)
Config>Service # >VBI>Expand — used to configure the encoder to transmit data in 16-line or 32-line expanded windows mode. ***Note*: Ensure that both VBI teletext and closed captions are disable when either 16- or 32-line expanded windows are enabled, as teletext and closed captions overwrite expanded windows data.** ***Note*: Chroma must be set to 4:2:2 for proper expanded windows operations.** ***Note*: For additional information on Expanded Windows, refer to the appendix on VBI Data Transmission.**		
VBI_Passthru	Configures the encoder to transmit either 16 or 32 lines of VBI information	■ Off – disables expanded windows mode (default) ■ 16-line – enables 16-line expanded windows mode ■ 32-line – enables 16-line expanded windows mode
Config>Service # >Audio — Used to configure the TE6000A audio. Once you have selected the audio transmission as Digital or Analog, you select which audio channel (or slot) to configure. Digital channels are Slot 4A and Slot 4B. Analog channels are Slot 1A and Slot 1B. ***Note*: for embedded audio, Config>Service # >Video>Input Source must be set to digital; Config>Service # >Audio must be set to digital, and Config>Service # >Audio>Source must be set to D1.**		
Enable	setting determines whether or not audio is included in the output transport stream	■ on – audio from that channel is included in the output transport stream (default) ■ off – audio from that channel is *not* include in the output transport stream default: ■ if digital audio: off ■ if analog audio: on
PID	query-only; displays the audio PID number included in the output transport stream	—
Compression	sets the output compression format for the audio stream	MPEG default: MPEG
Source	sets the source of the audio	■ If digital audio: AESEBU, D1 (embedded audio) ■ If analog audio: analog **Note**: for embedded audio, Config>Service # >Video>Input Source must be set to digital; Config>Service # >Audio must be set to digital, and Config>Service # >Audio>Source must be set to D1.

TE6000A Front Panel Menu Descriptions (continued)		
Front Panel Command	**Function**	**Options/Response Format**
Data Rate	sets the audio compression bit rate **Additional Information:** Selecting a high audio compressed bit rate will produce a high-quality audio signal at the output audio device; however, a high audio compressed bit rate reduces the total transport stream bit rate available for the video signal. An audio compressed bit rate should be selected that meets the audio requirements while allowing sufficient bandwidth to meet the video requirements.	■ If compression set to MPEG or ATSC: 64, 128, 192, 256, 384 Kbps ■ If compression set to none: 1 to 4096000 bps default: 256 Kbps
Sample Rate	determines how often the TE6000A samples the analog waveform during the audio analog to digital conversion process. **Additional Information:** Selecting a high audio sample rate will produce a high-quality audio signal at the output audio device; however, a high audio sample rate reduces the total transport stream bit rate available for the video signal. An audio sample rate should be selected that meets the audio requirements while allowing sufficient bandwidth to meet the video requirements.	32, 44.1, 48 KHz default: 48 KHz
Data Resolution	query-only; displays the number of bits per audio sample	16-bit, 20-bit, 24-bit
Format	sets the audio compression format which determines how the left and right channels of the audio input source are compressed	■ Stereo – left and right audio channels are compressed *separately* into two output waveforms. Stereo uses more bandwidth than mono; however, if the input audio source is stereo, the stereo effect will appear at the output audio device. ■ Dual Mono – the left and right audio channels are compressed *separately* into two output waveforms. This option uses more bandwidth than mono, however, use this option when the left and right audio channel inputs represent separate and independent audio signals. ■ Joint Stereo – the left and right audio channels are compressed *jointly* into two output waveforms. This option uses more bandwidth than mono but less than the stereo and dual mono options. Use this option when the left and right audio channel inputs are highly correlated (i.e., left and right stereo channels of one audio program source). The TE6000A uses the similarities between the two channels to save bandwidth without losing the stereo effect at the output audio device. ■ Mono – during audio compression the TE6000A ignores the right audio channel input and produces a single output waveform based on the left channel input. This option saves bandwidth; however, if the input audio source is stereo, the stereo effect at the output audio device will be lost. default: stereo
Delay	sets the compressed audio bit stream buffer delay, which controls the time delay between the audio and video	-1000 to +1000 milliseconds default: zero (0) msec ■ Positive numbers cause the decoder to delay the audio output with respect to the video (i.e. lag). ■ Negative numbers cause the decoder to advance the audio output with respect to the video (i.e. lead). ■ Zero (0) represents nominal alignment between video and audio output from the decoder (i.e. lip sync). In addition, a zero lip sync value assumes that the video and audio has lip sync at the input of the encoder.
Language	Sets the audio language descriptor for the selected service.	English, French, German, Italian, Japanese, Korean, Portuguese, Serbian, Spanish, Chinese, Danish, and Dutch.
D1 Audio Chnl Pair	selects one of the eight embedded audio channel pairs associated with the digital audio input **Note:** D1 Audio Chnl Pair is only available when digital audio channels are selected.	■ 1 through 8 default: 1
Config>Service # >Data — Used to configure the TE6000A auxiliary data. The Data menu has two data channels, A and B. Both data channels have identical parameters and options that are used to configure the auxiliary data ports.		
Enable	setting determines whether or not auxiliary data is included in the output transport stream	■ on – auxiliary data is included in the output transport stream ■ off – disables the port and does *not* include auxiliary data in the output transport stream (default)
PID	query-only; displays the data PID number included in the output transport stream	—

<table>
<tr><th colspan="3">TE6000A Front Panel Menu Descriptions (continued)</th></tr>
<tr><th>Front Panel Command</th><th>Function</th><th>Options/Response Format</th></tr>
<tr><td>Comm Mode</td><td>selects the data communication mode; the following options display when Comm Mode is set to:
■ Asynchronous:
• interface
• baud
• data bits
• parity
• stop bits
■ Synchronous:
• interface
• data rate
• clock source</td><td>■ asynchronous – sets the data communication mode to asynchronous (default)
■ synchronous – sets the data communication mode to synchronous</td></tr>
<tr><td>Interface</td><td>sets the configuration for the auxiliary data ports; dependent upon the Comm Mode setting</td><td>■ When Comm Mode is set to asynchronous, the interface options are RS-232 (default) and RS-422.
■ When Comm Mode is set to synchronous, the interface command is query-only and displays the synchronous interface RS-422</td></tr>
<tr><td>Baud</td><td>sets the baud rate for the asynchronous auxiliary data channel
Note: Baud is only available when Service>Data>Comm Mode is set to asynchronous.</td><td>1200, 2400, 4800, 9600, 19200, 38400 bps
default: 38400 bps</td></tr>
<tr><td>Data Width</td><td>sets the character length for the asynchronous auxiliary data channel
Note: Data Bits is only available when Service>Data>Comm Mode is set to asynchronous.</td><td>7, 8
default: 8</td></tr>
<tr><td>Parity</td><td>sets the parity for the asynchronous auxiliary data channel
Note: Parity is only available when Service>Data>Comm Mode is set to asynchronous.</td><td>none, even, odd
default: none</td></tr>
<tr><td>Stop Bits</td><td>sets the number of stop bits for the asynchronous auxiliary data channel
Note: Stop Bits is only available when Service>Data>Comm Mode is set to asynchronous.</td><td>1, 2
default: 1</td></tr>
<tr><td>Data Rate</td><td>sets the number of data bits for the synchronous auxiliary data channel
Note: Data Rate is only available when Service>Data>Comm Mode is set to synchronous.</td><td>1 to 4096000 bps
default:1024000 bps
Additional Information: The data rate for the auxiliary data channel reduces the total transport stream bit rate available for the video signal; therefore, an auxiliary data rate should be selected that meets but does not exceed the site-specific operational requirements.</td></tr>
<tr><td rowspan="2">Clock Source</td><td>sets the clock source for the synchronous auxiliary data channel
Note: Clock Source is only available when Service>Data>Comm Mode is set to synchronous.</td><td>■ internal – uses ST to latch the data (default)
■ external – uses TT to latch the data</td></tr>
<tr><td colspan="2">Additional Information: Clock Source allows you to select either an Internal (ST) or an External (TT) clock to latch the input auxiliary data (SD). There are three different ways to configure the clock sources for the TE6000A and a DTE. The following table lists these different configurations along with the circumstances under which each is used.
■ The first option will produce the most reliable auxiliary data.
■ You should use the last option only if you are unable to configure your DTE for either of the first two options.
<table>
<tr><th>Circumstance For Use</th><th>TE6000A Data Clock Source Configuration</th><th>TE6000A Clock Used to Latch Data</th><th>DTE Clock Source Configuration</th><th>DTE Clock Sent to TE6000A on TT</th></tr>
<tr><td>Option 1: DTE is able to turn around ST and provide ST back to the TE6000A as TT.</td><td>Internal</td><td>TT</td><td>External</td><td>ST</td></tr>
<tr><td>Option 2: DTE is not able to turn around ST, but has an internal clock that can be provided to the TE6000A as TT.</td><td>External</td><td>TT</td><td>Internal</td><td>Internal</td></tr>
<tr><td>Option 3: DTE is not able to turn around ST and does not have an internal clock to provide to the TE6000A as TT.</td><td>Internal</td><td>ST</td><td>External</td><td>None</td></tr>
</table>
For more information on configuring the auxiliary data channel clock source, refer to the chapter on installing the TE6000A.</td></tr>
</table>

TE6000A Front Panel Menu Descriptions (continued)		
Front Panel Command	**Function**	**Options/Response Format**
Config>Service # >PCR — Used to set the program clock reference parameters		
PID	query-only; displays the PCR PID number i	—
Delay	used to compensate for decoder buffering issues	-1000 to +1000 milliseconds default: zero (0) msec ■ If the decoder's buffer overflow, increase the PCR delay ■ If the decoders buffer underflow, decrease the PCR delay
Transmit Rate	sets the transmit rate of the PCR packet	0 to 100 Hz
Config>Tx Strm Menu — Enables you to set and query the TE6000A transport stream system configuration parameters. The configuration parameters set at this level impact which options and configuration parameters are available on other menus.		
Rate Calc	selects how the encoder determines the allocation of data bit rates for the various transport stream components including audio, video, and auxiliary data bit rates	■ auto-video – the TE6000A determines and sets the video bit rate automatically (default) ■ manual – you must manually calculate and then set the data bit rates for video, audio, and auxiliary data Additional Information: When Rate Calc is set to Auto, the video bit rate setting is inversely proportional to the audio and user data bit rates; that is: ■ if the audio and user data bit rates are high, a smaller portion of the transport stream bit rate can be allotted to the video bit rate ■ if the audio and user data bit rates are low, a larger portion of the transport stream bit rate can be allotted to the video bit rate
Channel Mode	sets the TE6000A to work in an SCPC, MCPC, redundant, or PSIP mode	■ SCPC – single-channel-per-carrier (default) ■ MCPC – multiple-channels-per-carrier ■ redundant – places the TE6000A in a redundant state; used when a system is operating in a redundant, or protected, setup. ■ PSIP – for use with a PSIP generator; sets the encoder to PSIP mode
Redund State	sets the operating state of the spare encoder in a redundant system **Note:** Redund State is only available when Tx Strm>Channel Mode is set to Redundant.	■ standby – spare encoder is in an inactive state and will not begin operations in the event of a primary encoder failure ■ armed – sets the spare encoder to begin operations in the event that a primary encoder fails ■ triggered – this state cannot be set; it is entered into automatically, from the Armed state, when the loss of an external service is detected.
Table Type	sets the type of PSI/SI tables to be provided	■ DVB (default) ■ ATSC – provides ATSC tables in the transport stream The fixed ATSC tables output by the THE1 are VCT, MGT, STT, RRT and EIT. RRT and EIT tables are dynamically updated by an external PSIP generator. ■ MPEG – provides MPEG tables in the transport stream ■ None – no tables are provided
Ext TS Enable	Setting determines whether or not the *externally-generated* input is included in the transport stream. **Note:** Ext TS Enable is only available when Tx Strm>Mode is set to MCPC.	■ enable – includes the externally generated input in the transport stream (default) ■ disable – does not include the externally generated input in the transport stream
Ext TS Status	query-only; displays the status of the externally-generated transport stream **Note:** Ext TS Status is only available when Tx Strm>Mode is set to MCPC.	■ absent ■ locked
ExtRate	sets the input rate of the *externally-generated* transport stream. **Note:** ExtRate is only available when Tx Strm>Mode is set to MCPC.	0.000000 to 4294.967295 Mbps
Loc TS Enable	setting determines whether or not the locally generated input is included in the transport stream. **Note:** Loc TS Enable is only available when Tx Strm>Mode is set to MCPC.	■ enable (default) ■ disable
Loc TS Status	query-only; displays the status of the locally generated transport stream **Note:** Loc TS Status is only available when Tx Strm>Mode is set to MCPC.	■ locked ■ unlocked

TE6000A Front Panel Menu Descriptions (continued)		
Front Panel Command	**Function**	**Options/Response Format**
LocRate	sets the default rate for the locally generated transport stream **Note:** LocRate is only available when Tx Strm>Mode is set to MCPC.	1 to 70 Mbps default: 8.448 Mbps
Config>CA menu — Conditional access (CA) is a method for securing and scrambling transmission streams so that only those decoders which are authorized to do so can receive the transmitted streams. The TE6000A provides two methods for conditional access: ■ **BISS – Basic Interoperable Scrambling System, an industry-standard, conditional access scheme used to secure and scramble DSNG broadcasts while allowing full operability between various vendor's DSNG equipment.** ■ **PGCA – a *Tiernan-proprietary* conditional access scheme used to secure and scramble transmission streams within the Tiernan family of products.** ***Note*: For additional information on BISS or PGCA configuration, refer to the appendix on Conditional Access.**		
Config>CA>Setup — Enables you to select a service, select the type of conditional access scrambling method to be enabled, and to define the conditional access key.		
Service	displays the individual services that can be enabled or disabled for conditional access If only one service is available, the service parameter is query-only, as this one service is automatically selected.	—
Config>CA>Setup>Service>Scramble — Used to set the type of conditional access scrambling method for a selected service and to define the conditional access key.		
None	no scrambling is enabled	—
PGCA	enables and disables PGCA at a system level; when selected, this setting ensures that only those Tiernan decoders *listed in the PGCA database and enabled at an individual level* can receive the broadcast signals. Non-Tiernan IRDs *cannot* be authorized by PGCA; therefore only *authorized* ***Tiernan*** *IRDs* can decode a service that has been protected through PGCA.	■ PGCA key – sets the PGCA scrambling key to a specified algorithmic table. Parameters are 0 to 255. ■ PGCA message PID – query-only; displays the PID for the program map table (PMT).
BISS Mode 1	enables BISS Mode 1 for the selected service. With BISS Mode 1, all components of the transmission stream are scrambled by a fixed control word (CW).	■ BISS key: sets the BISS scrambling key, which is a 12-digit scrambling key, for the selected service.
Config>CA>PGCAcfg — The three PGCA configuration menus allow you to modify the PGCA database, enable and disable individual Tiernan IRDs for PGCA, and review the PGCA database. **For additional information on adding, deleting and authorizing individual decoders, refer to the appendix on Conditional Access.**		
Add IRD	adds a Tiernan decoder to the PGCA database. ***Note***: Non-Tiernan IRDs cannot be added to the decoder database.	to determine the Tiernan decoder's MAC address, refer to the appropriate Tiernan user guide which accompanied that product.
Lst IRD	used to enable and disable individual IRDs for conditional access.	displays a list of all Tiernan decoders entered in the PGCA database. Each decoder's MAC address, and its enabled/disabled status is also displayed To enable and disable an IRD, use the minus key on the alphanumeric keypad to toggle between the On (enable) and Off (disable) parameters for the selected IRD.
Del IRD	deletes a Tiernan decoder from the conditional access database.	displays a list of Tiernan decoders and their MAC addresses
Control Menu — The Control menu allows you to control the TE6000A hardware. The Control submenus are Reset, Clock, Display, and FP Lock.		
Control>Reset — Used to reset the TE6000A to the last-saved configuration set. When a reset is performed, the TE6000A reloads all programmable logic and firmware, restarts the unit, and clears the fault history log.		
press Enter to reset	resets the TE6000A to the last configuration set; reloads all programmable logic and firmware; restarts the unit; and clears the fault history log **Additional Information:** As an aid to troubleshooting, the fault history log should be reviewed and recorded before resetting or turning the TE6000A power off.	returns to main menu after reset

TE6000A Front Panel Menu Descriptions (continued)		
Front Panel Command	**Function**	**Options/Response Format**
Control>Clock>Date — used to set the date and time		
Date	sets the date If the date is entered incorrectly, or an out-of-range value is entered, the TE6000A will display and continue to use the previously set date.	mm/dd/yyyy default: 00.00.0000
Time	sets the time The hours are in a 24-hour format and must be set from 00 to 23, where 00 is midnight and 23 is 11 PM. Both minutes and seconds can be set from 00 to 59.	hh.mm.ss default: 00:00:00
Control>FP Lock — Used to lock and unlock the front panel		
State	sets the state of the front panel	■ locked – disables the front panel; the front panel can only be used to view status and configuration parameters ■ unlocked – the front panel is unlocked and can be used to enter and change configuration parameters (default)
Password	unlocks the front panel; used in conjunction with the state command; password is only displayed when the front panel is set to locked	7384 (default) **Note**: ensure that the front panel displays 7384, not alphabetic characters when using the default password to unlock the front panel
Config>Comm — The Communications menu is used to set remote control and network features; submenus include Serial and Network.		
Comm>Serial — Used to configure the remote control port		
Baud	sets the asynchronous interface baud rate for the remote port	1200, 2400, 4800, 9600, 19200, 38400 bps default: 38400 bps
Data Bits	sets the number of data bits for the remote port	7, 8 default: 8
Parity	sets the parity for the remote port	none, even, odd default: none
Stop Bits	sets the number of stop bits for the remote control port	1, 2 default: 1
Flow Control	sets the remote control port flow control	■ soft: software XON/XOFF (default) ■ hard: hardware RTS/CTS
Comm>Network — Used to enter the network address of the TE6000A		
IP Addr	sets the IP address	user defined default: 0.0.0.0
IP Mask	query-only; displays the IP mask This parameter can be set using a remote terminal and the appropriate remote command.	text string default: 225.225.0.0
IP Router	query-only; displays the IP router address This parameter can be set using a remote terminal and the appropriate remote command.	text string default: 0.0.0.0
TMA	query-only; displays the TE6000A network address	text string
Status Menu — Used to view current faults and fault history log; clear the fault history log and fault relay		
Current	queries the current faults log	displays current faults
History	queries and clears the fault history log	■ list – displays fault history log; faults are time stamped ■ clear – clears the fault history log; after faults are cleared, the LCD displays the Status>History menu **Note**: Clearing the fault history log does not clear the fault relay.
Relay	queries and clears the fault relay	■ list – displays faults which caused the fault relay to trip; faults are time stamped ■ clear – clears the fault relay log; after faults are cleared, the LCD displays the Status>Relay menu **Note:** Clearing the fault relay does not clear the fault history log.
Version Menu — Used to display the version of firmware and hardware currently in use on the TE6000A		
Firmware	queries the version of firmware currently in use on the TE6000A	firmware version labels

TE6000A Procedures

This section provides detailed steps for performing various TE6000A tasks.

NOTE ***Note***: Before you begin the initial TE6000A installation and configuration, the modulator output (Mod State) should be turned off until you are ready to begin satellite transmissions.

Configuration Sets

Restoring a Default or User Configuration

To restore a default or user configuration set:

1. From the main menu, select Config. The Configuration menu displays.
2. Select Presets. The Preset menu displays.
3. Select Restore. The Restore menu displays.
4. Use the Up or Down buttons to select the appropriate option and press Enter. The system will perform its initialization process and reconfigure the TE6000A with the selected parameters.

   The reconfiguration process may take one to two minutes. When the system has completed its configuration process, the LCD returns to the main menu.

NOTE The operating parameters in use at the time the restore process is executed are overwritten and will be lost if not previously saved as a configuration set.

Creating a New User Configuration Label

To create a new user-defined configuration label:

1. Select Config from the main menu. The Configuration menu displays.
2. Select Presets. The Preset menu displays.
3. Select New. The New Preset menu and its option `Enter Name = 0` displays. The zero is replaced with the first alpha-numeric key press.
4. Using the alpha-numeric keypad, enter a name for the configuration set. The name can be up to 15 characters in length.
5. Press Enter. The new label is added to the configuration list and the system returns to the Presets menu.
6. To save a configuration set under this label, follow the steps under *Saving a User Configuration Under an Existing Label*.

Saving a User Configuration Under an Existing Label

To save a user-defined configuration set under an existing label:

1. Configure the TE6000A with the required parameters.
2. Once all parameters are correctly set, select Config from the main menu. The Configuration menu displays.
3. Select Presets. The Preset menu displays.
4. Select Save. The Save menu displays.
5. Use the Up or Down buttons to scroll through the list and select the correct configuration label.
6. Press Enter. The configuration process may take one to two minutes. When the system has completed its configuration process, the asterisk will disappear.

NOTE Any configuration parameters previously stored under the selected label will be overwritten once the save process is executed.

Deleting a User Configuration Label

To delete a user-defined configuration label:

1. From the main menu, select Config. The Configuration menu displays.
2. Select Presets. The Preset menu displays.
3. Select Delete. The Delete menu displays.
4. Scroll through the list and select the label that will be deleted.
5. Press Enter. The label is deleted from the configuration list and the system returns to the Presets menu.

Renaming a User Configuration Label

To rename an existing user-defined configuration label:

1. From the main menu, select Config. The Configuration menu displays.
2. Select Presets. The Preset menu displays.
3. Select Rename. The Rename menu displays.
4. Scroll through the list and select the label that will be renamed.
5. Press Enter. The name of the label to be renamed displays and a zero appears in the label entry field.

   The zero is replaced with the first alpha-numeric key press.
6. Using the alpha-numeric keypad, enter a name for the configuration set. The name can be up to 15 characters in length.
7. Press Enter. The new label is added to the configuration list and the system returns to the Rename menu.

ATSC PSIP Mode

Operating in ATSC PSIP Mode

To operate in ATSC PSIP mode, perform the following steps:

1. Connect a PSIP generator to the encoder.

   If a series of encoders are chained, connect the PSIP generator to the first encoder in the chain.
2. Set the table type to MPEG.

   Select `Config>Tx Strm>Table Type>MPEG` from the front panel or enter `TAB TYPE MPEG` from a remote unit.

   If chaining encoders, set the table type for **all** encoders to MPEG.
3. Set the control mode to Manual.

   Select `Config>Tx Strm>Rate Calc>Manual` from the front panel, or enter `MUX CM PSIP` from a remote unit.

   If chaining encoders, set the control mode to PSIP on only the **first** encoder. All other encoders should be set to MCPC.
4. On the encoder connected to the PSIP generator, set the local rate equal to the Output rate minus 10,000 bps (locrate = outrate - 10,000). A stable picture should appear.

   Select `Config>Tx Strm>LocRate>` *`<rate>`* from the front panel, or enter `MUX LOC_RATE` *`<rate>`* from a remote terminal

   If a stable picture does not display, decrease the local rate until a stable picture does appears.

NOTE When the encoder is reconfigured from manual mode to another mux configuration mode, the encoder automatically sets the out rate to the local rate. In this case, you should review the new out rate parameter and reset it as required for your configuration.

Front Panel Lock

Locking the Front Panel

To lock the front panel:

1. From the main menu, select Config. The Configuration menu displays.
2. Select Control. The Control menu displays.
3. Select FP Lock. The status `State = Unlocked` displays.
4. Press the Up button once. `State = Locked` displays.
5. Press Enter. `State = Locked` displays indicating that the front panel is now locked.

Unlocking the Front Panel

To unlock the front panel:

1. From the main menu, select Config. The Configuration menu displays.
2. Select Control. The Control menu displays.
3. Select FP Lock. The status `State = Locked` displays.
4. Press the Left or Right button once. `Password = 0` displays.
5. Using the front panel keypad, type in the password and press Enter. The default password is 7384.
6. The front panel displays `State = Unlocked` indicating that the front panel is now unlocked.


NOTE

If the wrong password is entered, the TE6000A displays `Password = 0`. If this occurs, use the front panel keypad to type in the correct password and press Enter.

Data and Time

Setting the Date

To set the date:

1. From the main menu, select Config. The Configuration menu displays.
2. Select Control. The Control menu displays.
3. Select Clock. The Date parameter displays.
4. Use the keypad to type in the correct date in the format `mm/dd/yyyy`. The TE6000A automatically enters the `/` for you.
5. Press the Enter button.

If the date is entered incorrectly, or an out-of-range value is entered, the TE6000A will display and continue to use the previously set date.

Setting the Time

The hours are in a 24-hour format and must be set from 00 to 23, where 00 is midnight and 23 is 11 PM. For example, for 8 AM you would set the hours to 08, and for 8 PM you would set the hours to 20. Both minutes and seconds can be set from 00 to 59. To set the time:

1. From the main menu, select Config. The Configuration menu displays.
2. Select Control. The Control menu displays.
3. Select Clock. The Date parameter displays.
4. Scroll to the Time parameter using the right or left buttons.
5. Use the keypad to type in the correct hour, minutes, and seconds in the format `hh:mm:ss`. The TE6000A automatically enters the `colons (:)` for you.
6. Press the Enter button.

System Reset

To reset the TE6000A:

1. From the main menu, select Config. The Configuration menu displays.
2. Select Control. The Control menu displays.
3. Select Reset.
4. Press the Enter key.

   The TE6000A is reset to the last configuration set; all programmable logic and firmware is reloaded; the unit is restarted; and the fault history log is cleared.

Embedded Audio Configuration

Configuring the Encoder for Embedded Audio

To configure the encoder for embedded audio, the following parameters must be set:

- Config>Service # >Video>Input Source must be set to digital
- Config>Service # >Audio must be set to digital
- Config>Service # >Audio>Source must be set to D1

Conditional Access: BISS and PGCA

For information on configuring the TE6000A for BISS or PGCA conditional access, refer to the appendix on conditional access.

VBI: Teletext, Closed Captions, and Expanded Windows

For information on configuring the TE6000A for teletext, closed captions, or expanded windows VBI operations, refer to the appendix on VBI data transmission.

Using a Remote Unit

4

In addition to the front panel, a remote unit can be used to configure and monitor the TE6000A. The chapter presents the following information for remote command operation:

- Configuring remote software parameters
- An overview of remote communications
- Instructions for issuing remote commands
- Front panel lockout
- Error messages
- Remote command listing

For remote control cabling information, refer to Chapter 2.


NOTE

Any parameter changes made using a remote unit are *not* automatically stored in flash memory. When the TE6000A configuration is changed using a remote unit, an operational test should be performed to verify that the system is operating correctly. Then the new configuration should be saved by issuing the CM SAVE command.

If the TE6000A is reset prior to issuing the CM SAVE command, any changes made using the remote unit will not be restored. Instead, the TE6000A restores the last changes saved to flash memory. Once the configuration is saved using the CM SAVE command, the TE6000A automatically restores the saved settings when the unit is reset or powered up.

Configuring the Remote Control Software Parameters

After you have cabled the remote unit to the TE6000A, perform the following steps to complete your installation:

1. Configure the communications software parameters of your remote unit to match the following TE6000A remote control port DVB default settings:
   - RS-232 signal
   - Baud rate = 38400 bps
   - Character length = 8
   - Parity = none
   - Number of stop bits = 1

   Unless you change the remote control settings and save the changes in non-volatile (flash) memory, the TE6000A restores these default communications settings whenever the TE6000A is reset or powered-up.
2. Press the Enter key on the remote keyboard several times to generate a prompt (>) on the remote display. Once a prompt appears on the remote display, successful communication has been established between the TE6000A and the remote unit.

   Once communications are established, the remote port parameters can be changed to a faster operating speed.

- If you are unable to generate a prompt on the remote unit, follow these troubleshooting steps:
- Ensure that the remote unit and the TE6000A are turned on and plugged into an active AC outlet.

- Verify that the baud rate and parity of the remote unit communications package match the DVB setting of the TE6000A remote control interface. DVB settings are 38400 baud, 8 data, noparity.
- Verify that the cable between the terminal, the TE6000A, and the Null Modem Adapter are properly connected.
- Ensure that the DTE/DCE switch is set to the DTE position
- If you need assistance, contact Tiernan Customer Service.

Ethernet Port

After you have cabled the TE6000A to a network through the TE6000A Ethernet port, perform the following steps to establish remote communications using Windows Telnet:


NOTE

More sophisticated applications are available that allow you to view commands and responses more easily.

1. From a remote unit, launch Telnet by typing `TELNET` at the command prompt.

   To access the command prompt, select the MS-DOS Prompt.
2. From the Connect menu, select Remote System. The Remote System dialog box appears.
3. At the Host Name or IP Address option, type the TE6000A IP address. For the procedure used to assign an IP Address, refer to the installation chapter.
4. For Port Type enter `21846` or `0x5556` (hex).


NOTE

Do not select "Telnet." If you select "Telnet," the program will attempt to log you into the device operating system.

5. For Terminal Type, accept the default.
6. Click the Connect button. You should now be connected.
7. If connection is not successful, troubleshoot the installation and setup:
   - Ensure that the TE6000A is turned on and plugged into an active AC outlet.
   - Verify that the cable between the terminal and the TE6000A is properly connected.
   - In Telnet, verify that the correct IP address and port type have been selected.
   - Check with the Information Systems to determine if problems exist with the LAN.
   - If you need assistance, contact Tiernan Customer Service.

Remote Communications Overview

The TE6000A can be configured, monitored, and control from a remote unit. Unlike front panel operations, the remote unit has no selection menus; instead, you use the remote terminal to type specific commands and parameters in order to communicate with the TE6000A.

All TE6000A commands can be issued from a remote unit that is connected to the TE6000A remote control port. The remote unit might be an ASCII terminal, a personal computer, or any other remote unit capable of asynchronous communications. The TE6000A supports ASCII protocol for remote communications.

Command Types

The remote unit accepts two different types of commands:

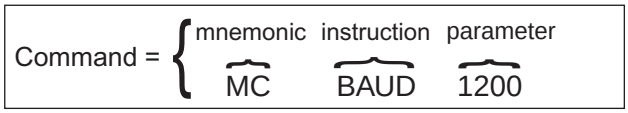
- Execute commands direct the TE6000A to perform a specified action, such as changing a configuration parameter.
- Query commands direct the TE6000A to display the current setting of a specific parameter or to display current status information.

All commands consists of a command mnemonic, which is followed by a space, and the command instruction.

The TE6000A uses the following command mnemonics to group various commands:

- AE – audio encoder
- AXD – auxiliary data
- CM – configuration management
- FM – fault monitor
- MC – monitor and control
- MOD – modulator
- MUX – multiplexer
- TAB – table
- TCA – Tiernan conditional access
- VE – video encoder
- VI – video input

Execute commands have an additional parameter which follows the command instruction.



Issuing Remote Commands

To issue a command from a remote unit, type the command at the remote prompt (>) with the appropriate parameter, and then press the ENTER key. The following syntax is used:

<command> <parameter>

where

- `<command>` consists of its mnemonic and the instruction; ensure that the command is typed correctly and includes spaces and underscore (_) characters as appropriate
- There must be one space between the command and the parameter. A space is typed by pressing the Space Bar key.
- `<parameter>` is the value pertaining to the command. Parameters can be numeric or alphanumeric. No spaces should be typed after the parameter; doing so will result in an error.

The TE6000A performs the required function and displays the prompt (>) when it is ready to accept another command.

For example, to set the remote port baud rate to 1200 bps, issue the command `MC BAUD 1200` and press Enter. In this example:

- The command mnemonic is `MC` followed by a space
- The command instruction is `BAUD` followed by a space
- The parameter is `1200`

Query commands are issued by typing the command, without a parameter, and pressing Enter. The TE6000A responds to the query by displaying information on the remote display.

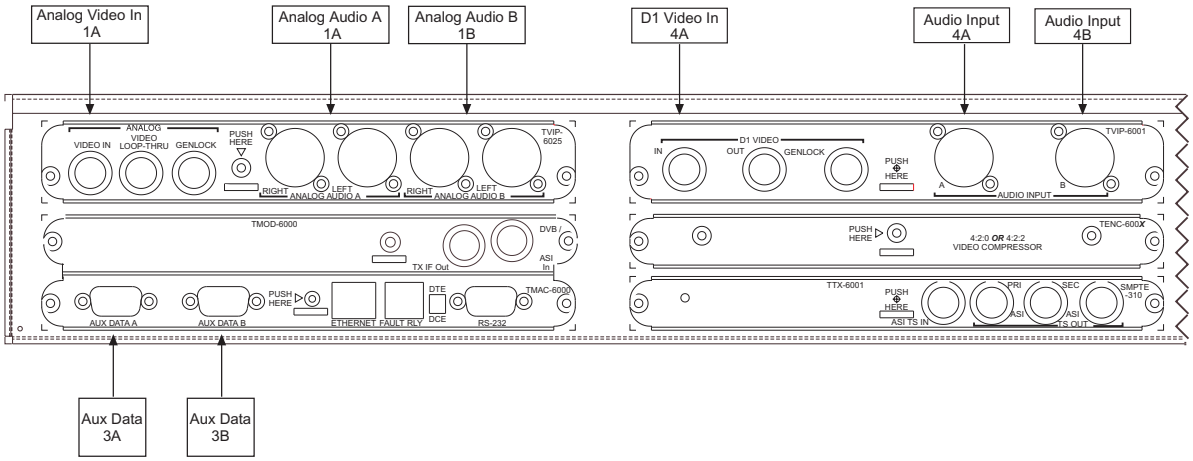
For example, to query the remote port baud rate, issue the command `MC BAUD` and press Enter. In this example:

- The command mnemonic is `MC` followed by a space
- The command instruction is `BAUD` followed by a space
- There is no parameter since this is a query command

The TE6000A responds by displaying the baud rate on the remote unit.

Command Designators – Slot and Port

The analog video and audio, digital video and audio, and auxiliary data commands contain additional command designators which enable you to configure a specific port. The command designators, shown on the TE6000A rear panel, are:



- Analog video input – .1 (slot 1, no port designator is needed, as there is only one video input in slot 1)
- Analog audio right and left – .1.A (slot 1, analog audio A)
- Analog audio right and left – .1.B (slot 1, analog audio B)
- Aux data – .3.A (slot 3, data A)
- Aux data – .3.B (slot 3, data B)
- Serial digital video input – .4 (slot 4, no port designator is needed, as there is only one video input in slot 4)
- Serial digital audio – .4.A (slot 4, digital audio A)
- Serial digital audio – .4.B (slot 4, digital audio B)

Designators are typed within the command and are separated by periods (.), for example:

<command mnemonic>.<slot>.<port> <command instruction> <parameter>

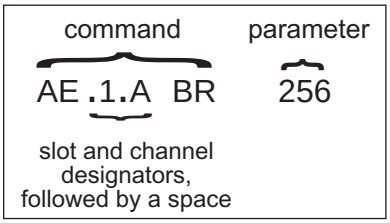
For example:

- All *audio encoder* commands begin with the command mnemonic AE, and they contain the <*slot*> and <*port*> designators which allow you to select which audio port to configure or monitor. All audio encoder commands are typed in the following format:

  <AE>.<slot>.<port> <instruction> <parameter>

- To set the compressed audio bit rate to 256Kbps for analog audio port A, issue the command `AE.1.A BR 256` typed as follows:

  AE.1.A <space> BR <space> 256



- To include audio in the transport stream for both digital ports, issue the following two commands:

  `AE.4.A Enable On` (enables serial digital audio)

  `AE.4.B Enable On` (enables serial digital audio)

The response to a query command always includes the slot and port designator in the response, even if none is needed when issuing the query command.

Typing Remote Commands

Remote commands are not case sensitive. Commands may be entered in lower case, upper case, or a combination of both.

Entering Remote Command Parameter Values

Some command parameters must be enter as a numeric value, which is represented by the pound sign <#>. If more than one pound sign is shown for a given parameter <###>, you must enter a number for each pound sign. When you issue a command containing a numeric value, do not type in the pound sign (#) nor the bracket <> signs; enter only the numerical value for the parameter.

Error Messages

If the TE6000A is not able to execute a command, an error message will be returned, indicating the command was not completed. TE6000A error messages, along with the action required to resolve the error, are listed in the following table.

Error Message	Explanation	Action Required
ERROR:AMBIGUOUS_LOCAL_INSTANCE	A designator, other than a slot designator, is required in order to set or query the command. For example, all audio commands require a port designator in order to correctly process a command.	Issue the command using the correct syntax, format, and parameter. Ensure that the appropriate designators are included in the command string.
ERROR:AMBIGUOUS_ SLOT	A slot designator is required in order to set or query the command. For example, all audio and auxiliary data commands require a slot designator.	Issue the command using the correct syntax, format, and parameter. Ensure that the appropriate designators are included in the command string.
ERROR:BAD_NUMBER_ FORMAT	The parameter number format is incorrect. For example, a hexadecimal value was entered when a decimal value is required.	Issue the command using the correct parameter format.
ERROR:BAD_RC_ INSTANCE	The command mnemonic cannot be matched to a card installed in the product.	Use the '?' command to view the current card types. Issue the command using the proper syntax and format.
ERROR:BAD_RESOURCE_ CONTROLLER_TYPE	The command mnemonic is incorrect.	Use the '?' command to view the current command mnemonics. Issue the command using the proper syntax and format.

Error Message	Explanation	Action Required
ERROR:COMMIT_ERROR	While attempting to set a command, the TE6000A may have entered an inconsistent state and may have an integrity error.	Reset the command to a known valid state. Then re-issue the new command. If the command still results in an error message, check the configuration of the unit and repeat the command. If the TE6000A still does not execute the command, reset the unit and attempt the command again. If the command cannot be executed, contact Tiernan Customer Service.
ERROR:CONFIGURABLE_ NOT_QUERYABLE	The command cannot be queried. The command may be set-only or an action.	Review the lists of commands to ensure that a valid command was issued.
ERROR:CONFIGURABLE_ NOT_SETTABLE	The command cannot be set. The command may be query-only.	Review the lists of commands to ensure that a valid command was issued.
ERROR:EXPECTED_END_ OF_LINE	The command line contains too much information. The command may have been issued with extra characters or a space after the parameter.	Issue the command using the correct syntax, format, and parameter.
ERROR:INVALID_ MNEMONIC	The issued command does not match any valid TE6000A command. The command may have been issued with extra characters, a missing underscore, a missing space, a space after the parameter, or in an improper order.	Issue the command using the proper syntax and format.
ERROR:INVALID_VALUE	The TE6000A rejected a request to change a configurable value based upon its own logic. This value is also returned to indicate that the change was attempted, detected to be in error, and then successfully reversed. (This response is only valid if the attribute "Valid Values Depend on State" or equivalent flag is set.)	Issue the command using the correct parameter.
ERROR:STRING_TOO_ LONG	The parameter's length has been exceeded.	Issue the command using the correct parameter.
ERROR:TOO_LARGE	The parameter's numeric value is too large.	Issue the command using the correct parameter.
ERROR:TOO_SMALL	The parameter's numeric value is too small.	Issue the command using the correct parameter.

In addition to the actions listed in the error messages table, you can also enter the following question mark (?) commands to receive additional information when errors are encountered or additional information is needed.

Remote Question Mark (?) Commands	Response
?	Lists all available command mnemonics associated with the current version of code installed on the TE6000A
<mnemonic>.<slot>.<port> ? For example: AE.1.A ?	Lists all commands associated with that mnemonic
<mnemonic>.<slot>.<port> <instruction> ? For example: AE.1.A BR ?	Lists information available for that particular command, including all valid parameters

Remote Command Descriptions

All standard TE6000A remote commands are listed in alphabetical order in the following table, which provides the following information:

- Remote commands and any command designators
- Parameter values or value range
- Factory default value
- Description of the command, including parameter definitions and the front panel command equivalent


NOTE

Command designators and parameter values may be shown within brackets <>; these brackets are *not* typed when issuing commands.

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
AE.<*slot*>.<*port*> BR	64, 128, 192, 256, 384 Kbps	256 Kbps	Sets the audio compressed bit rate. ***Note***: Selecting a high audio compressed bit rate will produce a high-quality audio signal at the output audio device; however, a high audio compressed bit rate reduces the total transport stream bit rate available for the video signal. Select an audio compressed bit rate that meets the audio requirements while allowing sufficient bandwidth to meet the video requirements. Front panel command equivalent: Config>Service>Audio>Data Rate
AE.<*slot*>.<*port*> CHFMT	Dual, Mono, Stereo, Jstereo	Stereo	Compressed audio format; determines how the TE6000A will compress the audio channels. ■ Dual – left and right audio channels are compressed *separately* into two output waveforms. Use dual when the left and right audio channel inputs represent separate and independent audio signals. ■ Mono – during audio compression the right audio channel input is ignored and a single output waveform is produced based on the left channel input. Mono uses half the bit rate of dual; however, if the input audio source is stereo, the stereo effect at the output audio device will be lost. ■ Stereo – left and right audio channels are compressed *separately* into two output waveforms. Stereo uses more bandwidth than mono; however, if the input audio source is stereo, the stereo effect will appear at the output audio device. ■ Jstereo – the left and right audio channels are compressed *jointly* into two output waveforms. Jstereo uses more bandwidth than mono but less than stereo and dual. Use Jstereo when the left and right audio channel inputs are highly correlated (i.e., left and right stereo channels of one audio program source). The similarities between the two channels are used, saving bandwidth without losing the stereo effect at the output device. Front panel command equivalent: Config>Service>Audio>Format
AE.<*slot*>.<*port*> COMPRESS	MPEG2, ATSC, None	MPEG2	Sets the output compression format for the audio stream. Front panel command equivalent: Config>Service>Audio>Compression
AE.<slot>.<port> D1_CH_PAIR	1 to 8	1	Selects one of the eight embedded audio channel pairs associated with the digital audio input ***Note***: D1 Audio Chnl Pair is only available when digital audio channels are selected. Front panel command equivalent: Config>Service>Audio>D1 Audio Chnl Pair
AE.<*slot*>.<*port*> DELAY	-1000 to +1000 milli-seconds	0 (zero)	Compressed audio stream time delay; enter a numeric value to adjust the audio presentation time stamp; affects the synchronization between the audio and video. Positive numbers cause the decoder to delay the audio output with respect to the video (i.e. lag). Negative numbers cause the decoder to advance the audio output with respect to the video (i.e. lead). Zero (0) represents nominal alignment between video and audio output from the decoder (i.e. lip sync). In addition, a zero value assumes that the video and audio has lip sync at the input of the encoder. Front panel command equivalent: Config>Service>Audio>Delay
AE.<*slot*>.<*port*> ENABLE	Off, On	If digital audio: Off If analog audio: On	Enables or disables the audio channel in the transport stream. Parameters are: ■ Off = audio is not included in the transport stream ■ On = audio is included in the transport stream. Front panel command equivalent: Config>Service>Audio>Enable
AE.<*slot*>.<*port*> LANGUAGE	ENG, JPN, CHI, KOR, DAN, POR, DUT, RUS, GER, SPA, ITA, FRE, UND	ENG	Sets the audio language descriptor for a selected audio channel. Parameters are: ■ ENG (English) JPN (Japanese) ■ CHI (Chinese) KOR (Korean) ■ DAN (Danish) POR (Portuguese) ■ DUT (Dutch) RUS (Russian) ■ GER (German) SPA (Spanish) ■ ITA (Italian) FRE (French) ■ UND (undetermined) Front panel command equivalent: Config>Service>Audio>Language
AE.<*slot*>.<*port*> PID	—	—	Displays the audio PID number included in the output transport stream. Front panel command equivalent: Config>Service>Audio>PID

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
AE.<*slot*>.<*port*> SRATE	32, 44.1, 48 KSps	48 KSps	Audio sample rate: determines how often the TE6000A samples the analog waveform during the audio analog to digital conversion process. This command is query-only for digital audio input ports; it is both set and query for analog audio input ports. ***Note***: Selecting a high audio sample rate will produce a high-quality audio signal at the output audio device; however, a high audio sample rate reduces the total transport stream bit rate available for the video signal. An audio sample rate should be selected that meets the audio requirements while allowing sufficient bandwidth to meet the video requirements. Front panel command equivalent: Config>Service>Audio>Sample Rate
AE.<*slot*>.<*port*> SRC	Analog, AESEBU, D1	—	Sets the source of the audio. ■ If digital audio: AESEBU, D1 (embedded audio) ■ If analog audio: analog **Note**: for embedded audio, VE SRC must be set to digital; the digital audio slot must be enabled (AE.4.# Enable on), and AE SRC must be set to D1. Front panel command equivalent: Config>Service>Audio>Source
AXD.<*slot*>.<*port*> BAUD	1200, 2400, 4800, 9600, 19200, 38400 bps	38400 bps	Sets the asynchronous serial communication baud rate. Front panel command equivalent: Config>Service>Data>Baud
AXD.<*slot*>.<*port*> DR	1200 to 4096000 bps	1024000 bps	Sets the number of data bits for the synchronous auxiliary data channel. ***Note***: The data rate for the auxiliary data channel reduces the total transport stream bit rate available for the video signal; therefore, an auxiliary data rate should be selected that meets but does not exceed the site-specific operational requirements. AXD DR is only available when AXD Mode is set to sync. Front panel command equivalent: Config>Service>Data>Data Rate
AXD.<*slot*>.<*port*> EN	Off, On	Off	Enables or disables the auxiliary data channel in the transport stream. Parameters are: ■ Off = auxiliary data is not included in the transport stream ■ On = auxiliary data is included in the transport stream. Front panel command equivalent: Config>Service>Data>Enable
AXD.<*slot*>.<*port*> IF	RS232, RS422	RS232	Sets the auxiliary data electrical interface. Parameters are: ■ When AXD Mode is set to async, AXD IF options are RS-232 (default) and RS-422. ■ When AXD Mode is set to sync, this command is query-only and displays the synchronous interface RS-422 Front panel command equivalent: Config>Service>Data>Interface
AXD.<*slot*>.<*port*> MODE	Async, Sync	Async	Sets the data communication mode; parameters are: async = sets the data communication mode to asynchronous; sync = sets the data communication mode to synchronous. The following commands can be issued when AXD Mode is set to: ■ Async: AXD IF, AXD BAUD, AXD DATA, AXD PARITY, AXD STOP ■ Sync: AXD IF, AXD DR, AXD SRC Front panel command equivalent: Config>Service>Data>Comm Mode
AXD.<*slot*>.<*port*> PARITY	N, O, E	N	Sets the parity bit for asynchronous serial communication. Parameters are: N = none, O = odd, E = even. Front panel command equivalent: Config>Service>Data>Parity
AXD.<*slot*>.<*port*> PID	—	—	displays the data PID number included in the output transport stream. Front panel command equivalent: Config>Service>Data>PID
AXD.<*slot*>.<*port*> SRC	INT, EXT	INT	Sets the clock source for the synchronous auxiliary data channel; parameters are: ■ INT = internal, uses ST to latch the data ■ EXT = external, uses TT to latch the data AXD SRC is only available when AXD Mode is set to sync. Front panel command equivalent: Config>Service>Data>Clock Source
AXD.<*slot*>.<*port*> STOP	1, 2	1	Sets the number of stop bits for the asynchronous serial protocol. Front panel command equivalent: Config>Service>Data>Stop Bits
AXD.<*slot*>.<*port*> WIDTH	7, 8	8	Sets the number of data bits for asynchronous serial communication. Front panel command equivalent: Config>Service>Data>Data Bits

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
CM CREATE <*string*>	where *string* specifies a user-defined label		Creates a user-defined label under which a configuration set may be saved. The <*string*> parameter must be an alpha-numeric label of not more than 15 characters. The string must begin with an alphabetic character. Up to 100 user configurations may be saved and recalled. Front panel command equivalent: Config>Presets>New
CM DELETE <*string*>	where *string* specifies a user-defined label	—	Deletes the specified user-defined configuration. Front panel command equivalent: Config>Presets>Delete
CM LIST	—	—	Query-only; displays a list of all current configuration labels. Front panel command equivalent: none
CM RENAME <*old label*>;<*new label*>	where <*old label*> specifies the current user-defined label and <*new label*> defines the new label name	—	Renames an existing label. Front panel command equivalent: Config>Presets>Rename
CM RESTORE <*string*>[1]	where *string* specifies a user-defined label or factory defined labels of DVB, ATSC	DVB	Recalls one of the factory- or user-defined configuration sets from memory and saves it in flash memory as the current configuration (i.e., power-up or reset restores the configuration set). For example, to restore or load the configuration set labeled *SD MCPC*, issue the command CM LOAD CD MCPC ***Note***: When the TE6000A is set to the DVB default setting, the remote port baud rate is set to 38400 bps. If the remote unit is set to communicate with the TE6000A at a baud rate other than 38400 bps, immediately after the DVB default command is issued, the remote unit will not be able to communicate with the TE6000A. To resolve this issue, the equivalent parameter in the software settings of the remote unit must be changed to 38400 bps. ***However***, the remote unit software settings must not be changed before issuing the DVB default command to the TE6000A, as the remote unit will not be able to communicate with the TE6000A. Front panel command equivalent: Config>Presets>Restore
CM SAVE [1]	—	—	Saves the current configuration to flash memory. Front panel command equivalent: none
CM SAVE_CFG <*string*>[1]	where *string* specifies a user-defined label	—	Saves the current configuration settings to the specified user-defined label. The user label must be created using the CM CREATE command prior to storing the configuration settings. For example, to store the unit's current configuration settings to the existing user configuration label *SD MCPC*, issue the command: CM SAVE_CFG SD MCPC. ***Caution***: Any configuration parameters previously saved under a specified label are overwritten and lost when a new configuration set is saved to the same location. Front panel command equivalent: Config>Presets>Save‘
FM CURR_LIST	—	—	Query-only command; displays all current faults. Front panel command equivalent: Status>Current
FM LOG_CLR	—	—	Clears the fault history log. ***Note***: Clearing the fault history log does not clear the fault relay. Front panel command equivalent: Status>History>Clear
FM LOG_LIST	—	—	Query-only command; displays the fault history log with time stamps. For a complete description of the fault history log, refer to the chapter on troubleshooting. Front panel command equivalent: Status>History>List
FM RELAY_CLR	—	—	Clears the fault relay. ***Note***: Clearing the fault relay does not clear the fault history log. Front panel command equivalent: Status>Relay>Clear
FM RELAY_LIST	—	—	Query-only command; displays a list of faults which trigger the fault relay. Front panel command equivalent: Status>Relay>List
MC BAUD	1200,2400, 4800, 9600, 19200, 38400 bps	38400 bps	Sets the asynchronous interface baud rate for the RS-232 remote control port configuration. ***Note***: The TE6000A and remote terminal baud rates must match in order for the remote terminal and TE6000A to communicate. Once the MC RS232_BAUD rate command is issued, the equivalent parameter in the remote unit software settings must be set to match the new baud rate. ***However***, the remote unit software settings must not be changed before issuing the DVB default command to the TE6000A, as the remote unit will not be able to communicate with the TE6000A. Front panel command equivalent: Config>Comm>Serial>Baud

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
MC BITRT_CTL	Auto, Manual	Auto	Video bit rate selection. Parameters are: Auto = automatically calculates the correct compressed video bit rate given other configured parameters. When in the Auto mode, you cannot change the video bit rate parameter using the VE.<*port*> BR command; Manual = allows you to manually set the compressed video bit rate. ***Note***: When MC BITRT_CTL is set to Auto, the video bit rate setting is inversely proportional to the audio and user data bit rates; that is: ■ if the audio and user data bit rates are high, a smaller portion of the transport stream bit rate can be allotted to the video bit rate ■ if the audio and user data bit rates are low, a larger portion of the transport stream bit rate can be allotted to the video bit rate Front panel command equivalent: Config>Tx Strm>Rate Calc
MC DATA	7, 8	8	Sets the number of data bits for the RS-232 remote control port configuration. Front panel command equivalent: Config>Comm>Serial>Data Bits
MC DATE *mm/dd/yyyy*	numeric value in the format: *mm/dd/yyyy*	—	Sets the TE6000A internal date.The date is set in *mm/dd/yyyy* format where: ■ *mm* = month from 01 to 12 ■ *dd* = day of the month from 01 to 31 ■ *yyyy* = current year For example, to set the date to June 21, 2003, issue the command MC DATE 06/21/2003 ***Note***: The TE6000A real-time clock does have a battery backup source. If the unit loses power, is turned off, or reset, the real-time clock is set to the current (correct) day and time. Front panel command equivalent: Config>Control>Clock>Date
MC DUPLEX	Half, Full	Full	Sets the duplex operation for the RS-232 remote control port configuration. Front panel command equivalent: none
MC FLOW	Soft, Hard	Soft	Sets the remote control port flow control. Parameters are: ■ Soft = Software XON/XOFF ■ Hard = Hardware RTS/CTS. Front panel command equivalent: Config>Comm>Serial>Flow
MC FP_STATE	Locked	Unlocked	Used to query or set the state of the front panel. If queried, responses are: unlocked = the front panel is unlocked, operators can use the front panel to configure, monitor, and control TE6000A operations; locked = front panel is locked and is only available to monitor TE6000A operations. If used to set the state of the front panel, only a LOCKED parameter may be issued. ***The front panel must be used to unlock the unit.*** For additional information on locking and unlocking the front panel, refer to the chapter on the front panel. Front panel command equivalent: Config>Control>FP Lock>State
MC FTPSERVER	On, Off	Off	Turns the FTP Server on and off. Front panel command equivalent: none
MC GATEWAY #.#.#.#	where # is a decimal number from 0 to 255	0.0.0.0	Sets the designated gateway in an IP network. Front panel command equivalent: Config>Comm>Network>IP Router
MC MAC	—	—	Displays the unit's Medium Access Control (MAC), or network, address. The format for the returned value is #:#:#:#:#:# where # represents a hexadecimal number. Front panel command equivalent: Config>Comm>Network>TMA
MC IP #.#.#.#	where # is a decimal number from 0 to 255	0.0.0.0	Sets the IP address. Front panel command equivalent: Config>Comm>Network>IP Addr
MC MASK #.#.#.#	where # is a decimal number from 0 to 255	225.225.0.0	Sets the IP mask. Front panel command equivalent: Config>Comm>Network>IP Mask
MC OUT_MODE	QPSK, ATSC	QPSK	Setting determines if the internal modulator is used to control the bit rate output of the multiplexer. ■ QPSK – the internal modulator is used ■ ASI – the internal modulator is *not* used Front panel command equivalent: Config>Output>Out Mode

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
MC PARITY	N, O, E	N	Sets the parity for the RS-232 remote control port configuration. Parameters are: ■ N = No parity ■ O = Odd parity ■ E = Even parity Front panel command equivalent: Config>Comm>Serial>Parity
MC RE	—	—	Resets the TE6000A, reloads all programmable logic and firmware, and restarts the system. All parameters return to the last settings stored in flash memory or the last changes made using the front panel. The TE6000A restores configuration settings as follows: ■ All changes made using the front panel are automatically stored in flash memory. When the TE6000A is reset, any changes made using the front panel are restored. ■ Changes made using a remote unit are *not* automatically stored in flash memory. If the TE6000A is reset before issuing the CM SAVE command, changes made using a remote unit are not restored. Instead, the last changes saved to flash memory are restored. ■ If the TE6000A configuration is changed using a remote unit, an operational test should be performed to verify system operations. Then the new configuration should be saved by issuing the CM SAVE command. Once the configuration is saved, the TE6000A automatically restores the saved settings when the unit is reset or powered up. ***Note***: The TE6000A real-time clock includes a battery backup source. If the unit loses power, is turned off, or reset, the real-time clock reverts to the current day and time. Front panel command equivalent: Config>Control>Reset
MC STOP	1, 2	1	Sets the number of stop bits for the RS-232 remote control port. Front panel command equivalent: Config>Comm>Serial>Stop Bits
MC TIME *hh:mm:ss*	numeric value in the format: *hh:mm:ss*	—	Sets the TE6000A internal real-time clock. The time is set in *hh:mm:ss* format where: ■ *hh* = hours, in a 24-hour format, from 00 to 23, where 00 is midnight and 23 is 11 PM ■ *mm* = minutes from 00 to 59 ■ *ss* = seconds from 00 to 59 For example, to set the time to 10:20:59 AM, issue the command MC TIME 10:20:59. To set the time to 10:20:59 PM, issue the command MC TIME 22:20:59. ***Note***: The TE6000A real-time clock does have a battery backup source. If the unit loses power, is turned off, or reset, the real-time clock is set to the current (correct) day and time. Front panel command equivalent: Config>Control>Clock>Time
MC VERSION	—	—	Displays the firmware version of the master controller card. Front panel command equivalent: none
MOD CK	Carrier_Off, Carrier_Low, Carrier_On, Modulate	Carrier_Off	Sets the power and form of the output IF transmit carrier from the encoder. Parameters are: carrier off = off; carrier low = low-power CW (constant wave); carrier on = full-power CW; modulate = full-power modulated. This command works in conjunction with the MOD TC command. When MOD CK is set to off, the MOD TC command setting is not implemented. Front panel equivalent: Use the modulator control buttons or issue the front panel command: Config>Output>Mod State
MOD CLDELTA	-10.0 to 0.0 dB	-10.0 dB	Carrier-low-delta; number, in tenths of dB (i.e., 0.1 dB), used to define the modulator output power level when the front panel modulator control button *carrier low* is pressed. For this command, the output power is equal to the transmit power value (MOD TP) minus the carrier-low-delta value. Front panel command equivalent: none
MOD CR	1/2, 2/3, 3/4, 5/6, 7/8	5/6	Viterbi code rate; sets the code rate for forward error correction (FEC) of the modulated signal. The rate selected indicates the number of error correction bits that will be added to the data stream. For example, if you select the 5/6 rate, for every 5 bits that are input to the FEC encoder, the FEC encoder outputs 6 bits. Viterbi forward error correction increases the transmitted symbol rate by increasing the number of bits in the data stream. Front panel command equivalent: Config>Output>Code Rate

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
MOD DR	921569 to 32254902 bps	8448000	Data rate; used to set the modulator input transport stream data rate. The data rate you enter is a function of the symbol rate and the code rate. The data rate may be entered directly by issuing a MO DDR command or may be computed based upon the symbol rate you enter. Specifically, the data rate is equal to the *Symbol Rate x 2 x 188/204 x V*, where *V*=the Viterbi code rate. Front panel command equivalent: none
MOD SI	Inverted, Normal	Normal	Spectrum Inversion; used to set the modulator so that the modulated IF spectrum is inverted. Parameters are: ■ Inverted = the modulated IF spectrum is inverted ■ Normal = the modulated IF spectrum is not inverted. Front panel command equivalent: Config>Output>Spect Invert
MOD SR	1000000 to 20000000 Sps	—	Used to enter the modulator symbol rate The symbol rate is the number of symbols required to transmit the data stream over a satellite link using quadrature phase shift keying (QPSK). The symbol rate is a function of the data rate and the code rate, including any overhead. The symbol rate may be entered directly by issuing a MOD_SR command or will be automatically computed based upon the entered data rate and code rate. The symbol rate is equal to the *Data Rate x 1/2 x 204/188 x 1/V*, where *V*=the Viterbi code rate. When you enter the code rate, the data rate remains unchanged, however, the symbol rate is recomputed. If the displayed symbol rate exceeds the allowable satellite bandwidth, the data will be corrupted during transmission. To determine the satellite bandwidth required to transmit the displayed symbol rate, use the following equation: symbol rate *x* 1.35 = required satellite bandwidth measured in *Hz* Front panel command equivalent: Config>Output>SymRate
MOD SRC	ASI, Backplane	ASI	Modulator input source; used to select either ASI or the backplane as the source for the modulator's digital input stream. The TE6000A outputs the internal transport stream in ASI format on a BNC connector, which is located on the back panel. Front panel command equivalent: Config>Output>Mod Source
MOD TC	Off, On	Off	Disables or enables the carrier modulation for testing purposes. Parameters are: ■ Off = disables pure carrier – the carrier is modulated with the data stream before being transmitted ■ On = enables pure carrier – the carrier is not modulated with the data stream before being transmitted. This command works in conjunction with the MOD CK command. When MOD CK is set to off, the MOD TC setting is not implemented. Front panel command equivalent: none
MOD TCMODE	Off, On	Off	Transmit carrier restore mode. Parameters are: ■ Off = following power-up or reset, the modulator output is disabled regardless of the modulator output carrier state prior to reset or power-up ■ On = following power-up or reset, the modulator output is restored to the state that was stored in flash memory just prior to reset or power-up. The On setting is most common for unmanned applications which may encounter power outages. For these situations, the modulator should return to a modulated carrier following power restoration. Front panel command equivalent: Config>Output>Tx Power-up
MOD TEMP	—	—	Query-only command; displays the current temperature of the modulator in Celsius. Front panel command equivalent: none
MOD TF	52000000 to 88000000 Hz, in 1 Hz increments	70000000 Hz	Used to set the modulator carrier frequency. The acceptable range of options is implemented with a pass band filter that filters out all frequencies below and above the range. When selecting a carrier frequency, you must take into account the satellite bandwidth required for transmission. If you select a carrier frequency that is too close to either end of the valid range, data may be clipped by the pass band filter. For information on calculating the satellite bandwidth, see the MOD SR command. Front panel command equivalent: Config>Output>Tx Freq

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
MOD TP	-20.0 to -5.0 dBm, in 0.1dB increments	-5.0 dBm	Transmit power; used to set the output transmit power of the TE6000A modulator. Front panel command equivalent: Config>Output>Tx Power
MOD XL	Locked, Unlocked	—	Displays if the modulator is locked to the input transport data stream. Responses are: locked = the modulator is locked onto the incoming signal; Unlocked = the modulator is not locked onto the incoming signal. Front panel command equivalent: Config>Output>Mod Status
MUX BISS_EN	On, Off	Off	Enables and disables BISS at a system level. ■ on – enables BISS ■ off – disables BISS ***Note***: BISS cannot be enabled if PGCA is enabled. Front panel command equivalent: none
MUX CM	SCPC, MCPC, Redund, PSIP	SCPC	Defines the system as SCPC, MCPC, redundant, or PSIP. Parameters are: ■ SCPC = single channel per carrier, disables multiplexing of incoming external transport stream; outputs only local program elements. ■ MCPC = multiple channels per carrier; enables the multiplexing of an incoming external transport stream with local program elements. MCPC allows the internal transport stream rate and the output transport stream rate to be independently defined; these parameters are not automatically calculated and set by the TE6000A in MCPC mode. ■ Redund = places the TE6000A in a redundant state; used when a system is operating in a redundant, or protected, setup. When Redund is selected, also set MUX RED_STATE. ■ PSIP – places the encoder in PSIP mode; used when a PSIP generator is connected to the encoder Front panel command equivalent: Config>Tx Strm>Mode
MUX EXT_ENABLE	Off, On	On	Setting determines if the external transport stream is processed or discarded. MUX EXT_Enable works in conjunction with the MUX CM command. Parameters are: ■ On = transport stream is processed; MUX CM must be set to MCPC or Redund ■ Off = transport stream is discarded; MUX CM must be set to SCPC Front panel command equivalent: Config>Tx Strm>Ext TS Enable
MUX EXT_RATE	—	—	Displays the measured external input transport rate in bps. Front panel command equivalent: Config>Tx Strm>ExtRate
MUX EXT_STATUS	—	—	Displays the status of the externally-supplied transport stream. Responses are: Absent = no signal, Unlocked = signal present, but no transport lock, Locked = transport lock detected. Front panel command equivalent: Config>Tx Strm>Ext TS Status
MUX LOC_ENABLE	On, Off	On	Setting determines whether or not the locally generated input is included in the transport stream. Front panel command equivalent: Config>Tx Strm>Loc TS Enable
MUX LOC_RATE	1000000 to 70000000 bps	8448000	Sets the local transport stream rate (generated internally by the TE6000A) in bits/second. Front panel command equivalent: Config>Tx Strm>LocRate
MUX LOC_STATUS	—	—	Displays the status of the local input transport stream. Responses are: Absent = no signal; Unlocked = signal present, but no transport lock; Locked = transport lock detected. Front panel command equivalent: Config>Tx Strm>Loc TS Status
MUX OUT_RATE	If SCPC= 1000000 to 70000000 If MCPC = 1000000 to 160000000	8448000	Sets the output transport stream rate. Range is dependent upon MUX CM setting. Front panel command equivalent: Config>Output>Data Rate
MUX PCR_RATE	1-100 Hz		Sets the transmit rate of the PCR packet. Front panel command equivalent: Config>Service>PCR>Transmit Rate
MUX PROG_INFO	—	—	Displays the current conditional access settings for all services. Information includes: program number, program name, previous scrambling mode, current scrambling mode, and the key. Front panel command equivalent: Config>CA>Setup>Service

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
MUX RED_STATE [2]	Standby, Armed, Triggered	Standby	Sets the operating state of the spare encoder in a redundant system. Parameters are: ■ Standby = spare encoder is in an inactive state and will not begin operations in the event of a primary encoder failure ■ Armed = sets the spare encoder to begin operations in the event that a primary encoder fails ■ Triggered = this state cannot be set; it is entered into automatically, from the Armed state, when the loss of an external service is detected. Front panel command equivalent: Config>Tx Strm>Redund State
MUX RSR[2]	—	—	Displays the name of the external service that has been replaced by the redundant unit. Valid only in TRIGGERED state.[3] Front panel command equivalent: none
MUX SCRAM_EN <*service#*>	Off, Mode_1	Off	Sets the BISS scrambling mode for the selected service. ■ Off – disables BISS for the selected service ■ Mode_1 – enables BISS Mode 1 for the selected service. With Mode 1, all components of the transmission stream are scrambled by a fixed control word (CW). To query the active services, and the BISS conditional access settings, use the MUX PROG_INFO command. Front panel command equivalent: Config>CA>Setup>Service>Scramble>BISS Mode 1
MUX SCRAM_KEY <*service#*> <*key*>	where <*service#*> is the service to be configured for BISS where <*key*> = 000000000000 to FFFFFFFFFFFF	—	Sets the BISS scrambling key for the selected service. The key is a 12-digit hexadecimal number. Front panel command equivalent: Config>CA>Setup>Service>Scramble> Biss Mode 1>Biss Key
MUX SMPTE_EN	On, Off	Off	Setting determines whether or not the SMPTE output is included in the transport stream. Front panel command equivalent: none
MUX SMPTE_RATE	19, 38	19	Sets the SMPTE output rate. ■ 19 – sets the rate to 19.392658 ■ 38 – sets the rate to 38.785316 Front panel command equivalent: none
TAB ATSC_NAME <*string*>	<*string*>	—	Sets the ATSC name; up to 8 characters may be used. Front panel command equivalent: none
TAB AUD_A_PID <*#*>	where # is a valid PIDs	0	Sets the Audio A PID to be included in the output transport stream. Zero is the default PID. Front panel command equivalent: none
TAB AUD_B_PID <*#*>	where # is a valid PIDs	0	Sets the Audio B PID to be included in the output transport stream. Zero is the default PID. Front panel command equivalent: none
TAB CARRIER_HZ	0-2000000000 in Hz	566310000 Hz	Sets the carrier frequency when ATSC table types are enabled. Front panel command equivalent: none
TAB MINORCH	1 to 99	2	Sets the minor channel in the ATSC tables. Front panel command equivalent: Config>Service>Setup>Minor Channel
TAB MAJORCH	1 to 99	30	Sets the major channel in the ATSC tables. Front panel command equivalent: Config>Service>Setup>Major Channel
TAB NIT_CC	1/1, 1/2, 2/3, 3/4, 5/6, 7/8	5/6	Sets the current FEC Convolution Code Rate entered in the NIT. Front panel command equivalent: none
TAB NIT_MOD	QPSK	—	Sets the NIT modulation type. Front panel command equivalent: none
TAB NIT_NAME	<*string*>	MPEG-2 Encoder	Used to enter the network name; up to 115 characters may be used. Front panel command equivalent: none
TAB NIT_NETID	0 to 65535 (decimal)	0 (zero)	Used to enter the Network ID in the NIT. Front panel command equivalent: none

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
TAB NIT_POL	Hor, Vert, Left, Right	Ver	Sets the transmitted signal polarization. Parameters are: ■ Hor =linear-horizontal polarization ■ Ver = linear-vertical polarization ■ Left = circular-left polarization ■ Right = circular-right polarization Front panel command equivalent: none
TAB NIT_SATFREQ <###.#####>	000.00000 to 999.99999	011.75725	Sets the satellite frequency in *GHz.* Front panel command equivalent: none
TAB NIT_SATPOS <###.#>	000.0 to 999.9	019.2°	Sets the satellite orbital position in degrees. Front panel command equivalent: none
TAB NIT_SR <###.#####>	###.#####	—	Sets the NIT transmitted symbol rate in sps. Front panel command equivalent: none
TAB NIT_WSTFLG	East, West	West	Sets the satellite orbital position. Parameters are: ■ East = satellite orbital position is East ■ West = satellite orbital position is West. Front panel command equivalent: none
TAB PCR_PID <#>	where # is a valid PIDs	0	Sets the PCR PID to be included in the output transport stream. Zero is the default PID. Front panel command equivalent: none
TAB PMT_PID <#>	where # is a valid PIDs	0	Sets the Program Map Table (PMT) PID to be included in the output transport stream. Zero is the default PID. Front panel command equivalent: none
TAB PROGNUM	DVB = 1-223 ATSC = 2-223	If DVB = 1 If ATSC = 2	Controls the program number for the PAT. Changing the PAT program number automatically sets the PMT to the same program number and sets the EIT and SDT service ID to match the program number. Front panel command equivalent: Config>Service>Setup>Service ID
TAB PROVIDER <*string*>	<*string*>	Unnamed	Used to enter the service provider name; name can be up to 115 characters in length. Front panel command equivalent: Config>Service>Setup>Provider
TAB SDT_NAME <*string*>	<*string*>	If DVB = *service 1* If ATSC = *ch2*	User to enter the service name; name can be up to 115 characters in length. Front panel command equivalent: Config>Service>Setup>Name
TAB TSID	0 to 65535	1	Sets the transport stream ID for the PAT. Changing the PAT Transport Stream ID automatically changes the EIT, NIT, SDT Transport Stream IDs to the same ID. Front panel command equivalent: none
TAB TYPE	None, MPEG, DVB, ATSC	DVB	Controls the type of PSI/SI tables to be provided. Works in conjunction with the CM Load Def command. Front panel command equivalent: Config>Tx Strm>Table Type
TAB USR_A_PID <#>	where # is a valid PIDs	0	Sets the Data A PID to be included in the output transport stream. Zero is the default PID. Front panel command equivalent: none
TAB USR_B_PID <#>	where # is a valid PIDs	0	Sets the Data B PID to be included in the output transport stream. Zero is the default PID. Front panel command equivalent: none
TAB VID_PID <#>	where # is a valid PIDs	0	Sets the video PID to be included in the output transport stream. Zero is the default PID. Front panel command equivalent: none
TCA ADD <*string*>	where *string* is the alpha-numeric label in the format *name@MAC address*	—	Adds a decoder to the conditional access database. The *string* can be up to 90 alphanumeric characters in length and must include a name, the @ sign, and the decoder's MAC address in the format *name@mac address.* The string **cannot** contain any spaces. The name parameter can be up to 15 characters in length. To determine the decoder's MAC address, refer to the appropriate Tiernan user guide which accompanied that product. ***Note***: Decoders are automatically authorized when they are added to the list. ***Note***: Non-Tiernan IRDs cannot be added to the decoder database. Front panel command equivalent: Config>CA>PGCAcfg>Add IRD

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
TCA AUTH *<label>*	where *label* is the alpha-numeric string specified in the TCA Add command	—	Authorizes a Tiernan decoder to receive broadcast signals. ***Note***: Non-Tiernan IRDs cannot be authorized. Front panel command equivalent: Config>CA>PGCAcfg>Lst IRD
TCA CLR	—	—	Clears the active subscriber list. Front panel command equivalent: none
TCA DEAUTH *<label>*	where *label* is the alpha-numeric string specified in the TCA Add command	—	De-authorizes a Tiernan decoder so that it cannot receive broadcast signals. Front panel command equivalent: Config>CA>PGCAcfg>Lst IRD
TCA DELETE *<label>*	where *label* is the alpha-numeric string specified in the TCA Add command	—	Deletes a Tiernan decoder from the conditional access database. Front panel command equivalent: Config>CA>PGCAcfg>Del IRD
TCA ENABLE	Off, On	Off	Enables and disables PGCA at a system level. Parameters are: ■ on – enables PGCA; this setting ensures that only those Tiernan decoders *listed in the PGCA database and authorized at an individual level* can receive the broadcast signals. ■ off – disables PGCA, all decoders, whether authorized or not, can receive the broadcast signal ***Note***: PGCA is a proprietary conditional access method used by Tiernan equipment that provides basic signal protection and the ability to authorize individual Tiernan IRDs. Non-Tiernan IRDs *cannot* be authorized by PGCA; therefore only authorized Tiernan IRDs can decode a service that has been protected through PGCA. ***Note***: For additional information on system-level PGCA, or on adding, deleting and authorizing individual decoders, refer to the appendix on Conditional Access. ***Note***: PGCA cannot be enabled if BISS is enabled. Front panel command equivalent: Config>CA>Setup>Service>Scramble> PGCA
TCA LIST	—	—	Displays a list of all Tiernan decoders registered in the PGCA database. The list includes the decoder's label, MAC address, and if the decoder is authorized. Front panel command equivalent: Config>CA>PGCAcfg>Lst IRD
TCA MASK	0 to FF	0 (zero)	Sets the PGCA scrambling key to a specified algorithmic table. Front panel command equivalent: Config>CA>Setup>Service>Scramble> PGCA>PGCA Key
TCA UPDATE	—	—	Loads the active subscriber list from the PGCA database. Front panel command equivalent: none
TCA UR	1 to 60 seconds	15	TCA update rate; specifies how often, in seconds, PGCA information is transmitted. Front panel command equivalent: none
TT DATA_ID	0 to FF	1	Setting determines is EBU data included in the Teletext. Values from 0x10 to 0x1F reflect EBU data. Front panel command: Config>Service>VBI>Teletext>Data ID
TT ENABLE	Off, All, Auto	Off	Configures the encoder to transmit teletext information. Parameters are: ■ On = enables ATSC closed captioning ■ Off = does not encode any ATSC closed captioning information Front panel command: Config>Service>VBI>Teletext>Enable
TT UNIT_ID	0 to FF	2	Unit ID defines if there are EBU Teletext sub-titles included in the data. Data Unit ID has range from 0x00 to 0xFF. Values are: ■ 0x2 = EBU Teletext non-subtitle data is ***not*** included ■ 0x3 = EBU Teletext subtitle data is included ***Note***: TT Unit_ID must be set to 2 or 3 for proper decoder operations. Front panel command: Config>Service>VBI>Teletext>Data Unit ID
VE ASP_RATIO	4x3, 16x9	4x3	Sets the picture aspect ratio. Front panel command equivalent: Config>Service>Video>Aspect Ratio
VE ATSC_CC	On, Off	Off	Configures the encoder to transmit ATSC closed captioning information. Parameters are: ■ On = enables ATSC closed captioning ■ Off = does not encode any ATSC closed captioning information Front panel command equivalent: Config>Service>VBI>CC>ATSC CC

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
VE BR	1.0 to 15.0 Mbps	—	Sets the output compressed video bit rate. This command is query-only when the MC BITRATE_CTL command is set to Auto. Front panel command equivalent: Config>Service>Video>Data Rate
VE CHROMA	4_2_0, 4_2_2	4_2_0	Queries the chroma encoding format. Front panel command equivalent: Config>Service>Video>Chroma
VE ENABLE	On, Off	On	Setting determines whether or not video is included in the output transport stream. Parameters are: On = video is included in the output transport stream; Off = video is *not* include in the output transport stream. Front panel command equivalent: Config>Service>Video>Enable
VE HRES	352, 480, 544, 704, 720	720	Sets the horizontal pixel resolution; the TE6000A uses this parameter, as well as the video format parameter, NTSC or PAL, to resize the picture prior to video encoding. For all parameters the number of lines per frame are: NTSC = 480; PAL = 576. Front panel command equivalent: Config>Service>Video>Resolution
VE OPTIMIZE	Quality, Low_Delay, Low_Buff, Edit, Custom	Quality	Sets the video compression optimization. Parameters are: ■ Quality = optimizes the video performance without regard for throughput delay time. Quality mode is appropriate for action video scenes such as sports material. ■ Low_Delay = reduces the throughput time required to process a signal from the encoder input, through the compression process, and to the decoder output. In low delay mode, the overall delay through a TE60 to an IRD is 360 ms +/-20 ms. In low delay mode, the compressed audio bit rate is automatically set to 25 6Kbps. Low delay mode is appropriate for real time news interviews. ■ Low_Buff = allows for small buffers ■ Edit = video compression uses only one frame (no prediction) which makes it easier to edit the compressed bit stream. Edit requires a higher data rate to achieve the video performance of quality mode. ■ Custom = allows you to set site-specific video compression parameters, such as GOP structure and VBV size. These parameters must be initially set through a remote terminal and then saved using the remote CM SAVE command. Once saved, this custom setup will persist until the video optimize setting is changed. The custom parameter is for experienced users only. If this option set incorrectly, the video performance maybe adversely affected. It is recommended that users consult with Tiernan Customer Service before using the custom configuration. Front panel command equivalent: Config>Service>Video>Optimize
VE PID	—	—	Displays the video PID number included in the output transport stream
VE SRC	Digital, Analog	Analog	Sets the source of the input video. Front panel command equivalent: Config>Service>Video>Input Source
VE TCC	On, Off	Off	Configures the encoder to transmit Tiernan closed captioning information. Parameters are: ■ On = encodes two lines of closed captioning information per frame (one per filed) at the expense of losing two lines of active video (one per field) ■ Off = does not encode any closed captioning information Front panel command equivalent: Config>Service>VBI>CC>Tiernan CC
VE VBI_PASS	Off, 16_LINES, 32_LINES	Off	Configures the encoder to transmit either 16 or 32 lines of VBI information ■ Off – disables expanded windows mode ■ 16_lines – enables 16-line expanded windows mode ■ 32_line – enables 16-line expanded windows mode ■ Front panel command equivalent: Config>Service>VBI>Expand>VBI Passthru
VI.<*slot*> AGC	On, Off	—	Enables or disables AGC for the analog video input. Front panel command equivalent: none

TE6000A Remote Command Descriptions			
Remote Command	**Parameter Range**	**Factory Default**	**Description**
VI.<*slot*> FMTCTL	Auto, PAL_N, NTSC, NTSC OSU	Auto	Sets the video format mode when the input source is set to analog. Parameters are: ■ Auto – unit automatically senses incoming video signal format and configures the video mode to match (default) ■ PAL N – 625 line PAL-N mode ■ NTSC – 525 line NTSC mode ■ NTSC 0SU – no pedestals NTSC0SU mode Front panel command equivalent: Config>Service>Video>Format Ctrl
VI.<*slot*> FORMAT	—	—	Query-only; displays the incoming analog video frame rate. Responses are: ■ 525 Line Video Input ■ 625 Line Video Input ■ No video present Front panel command equivalent: Config>Service>Video>Format
VI.<*slot*> GENMODE	Main, Genlock	Main	Selects the video timebase source. Parameters are: ■ Main = video input is used for the encoder timebase ■ Genlock = Genlock input is used for the encoder timebase. Input video must be synchronized to Genlock input in order for this to work properly. Front panel command equivalent: Config>Service>Video>Timebase

1 The TE6000A contains a bank of flash memory that is used to store firmware, software, and hardware configuration files as well as unit configuration parameters. Parameter changes made using the front panel are automatically stored in flash memory. When the TE6000A is reset, any changes made using the front panel are restored. Any parameter changes made using a remote unit are *not* automatically stored in flash memory. If the TE6000A is reset prior to issuing the C MSAVE command, any changes made using the remote unit will not be restored. Instead, the TE6000A restores the last changes saved to flash memory. When the TE6000A configuration is changed using a remote unit, an operational test should be performed to verify that the system is operating correctly. Then the new configuration should be saved by issuing the CM SAVE command. Once the configuration is saved, the TE6000A automatically restores saved settings when the unit is reset or powered up.

2 Command only valid when MUX CM is set to Redund.

3 Refer to the MUX RED_STATE command for additional information.

Configuring the TE6000A

5

This chapter presents the following information:

- A high-level procedure used to configure a TE6000A using either the front panel or a remote unit.
- Detailed procedures for configuring a TE6000A to the default standards using either the front panel or a remote unit
- Examples of common TE6000A configurations, including:
  - Configuring a basic DSNG setup using the front panel
  - Configuring a simple SCPC setup using a remote unit
  - Configuring a simple 2:1 MCPC setup using the front panel or a remote unit

TE6000A Configuration Procedure

Whether you use the front panel or a remote unit to configure the TE6000A, perform the following steps to configure your system:

1. Make a list of your operational requirements.
2. Compare your requirements to the corresponding TE6000A default parameter settings.
3. Determine which TE6000A default parameters must be changed for your operational requirements.
4. Write down the new TE6000A parameter values and the corresponding front panel or remote commands required to change those parameters.
5. Configure the TE6000A to the default configuration.
6. Configure the TE6000A with any new parameters.
7. Ensure that the decoder is correctly configured to operate with the TE6000A parameter settings.


NOTE

All TE6000A configuration changes issued from the front panel are automatically save to flash memory. Unlike front panel operations, TE6000A parameter changes made from a remote unit are not automatically saved to flash memory. If configuration changes are made from a remote unit, issue the command `CM SAVE` to save the configuration to flash memory.

Setting a Default Configuration

The TE6000A is configured with a set of default, DVB-compliant parameters before it is shipped from the factory. This DVB configuration consists of a standard set of operating parameters that allow you to quickly and easily begin operations. When configured to the DVB default settings, the TE6000A:

- Encodes both audio channels and the video channel at the default DVB rate
- Compresses the channels
- Includes the channels with a standard set of table information in the internal transport stream
- Does **not** include either of the Aux data channels in the transport stream

The TE6000A should be operated using either the DVB or ATSC default configuration unless your site-specific operations require a change to the default settings. If a change is required, modify only those parameters that meet your operational requirements.

When you begin operations using either the DVB or ATSC default configuration, ensure that the decoder is also initialized to the appropriate defaults. If you modify the TE6000A operating parameters, ensure that the decoder parameters are also modified to match the new TE6000A parameters.

Using the Front Panel to Set the Default Configuration

To initialize the TE6000A to a default configuration using the front panel, perform the following steps.

1. From the main menu, select Config.

```
TE6000A SDTV MPEG-2 Encoder
[Config]   Status      Version

Software Version: 3.00
```

2. The Configuration menu displays. Select Presets.

```
Config
[Presets]  Output    Service     Tx Strm
CA         Control   Comm
```

3. The Presets menu displays. Select Restore.

```
Config>Presets
[Restore]  Save      New         Rename
Delete
```

4. The Restore menu displays. The current configuration is set to DVB, indicated by the brackets [ ].

```
Config>Presets>Restore
Restore    =         [DVB]
                     ATSC
                     User01
```

NOTE

Even if the current configuration displayed on the LCD is the correct configuration for your requirements, some or all of the parameters may have been manually changed since the unit was initialized. To ensure that all of the TE6000A parameters are set to the factory default configuration, continue with steps 5 through 7.

5. Scroll through the list until the correct option is selected [ ] and is flashing. In this example, ATSC will be selected. To select ATSC, use the down arrow to move the brackets to ATSC.

```
Config>Presets>Restore
Restore     =          DVB
                       [ATSC]
                       User01
```

6. Press the Enter button.
7. When the TE6000A has completed the initialization process, the main menu displays and the TE6000A is set to the selected default configuration.

```
TE6000A SDTV MPEG-2 Encoder
[Config]    Status       Version

Software Version: 3.00
```

Using a Remote Unit to Set the Default Configuration

To initialize the TE6000A to the default configuration using a remote unit, issue the following command:

- CM RESTORE <string>

  where `<string>` is the default parameter such as `DVB` or `ATSC`

NOTE

When the TE6000A is set to the DVB default setting, the remote port baud rate is set to 38400 bps. If the remote unit is set to communicate with the TE6000A at a baud rate other than 38400 bps, immediately after the DVB default command is issued, the remote unit will not be able to communicate with the TE6000A. To resolve this issue, the equivalent parameter in the software settings of the remote unit must be changed to 38400 bps. ***However***, the remote unit software settings must not be changed before issuing the DVB default command to the TE6000A, as the remote unit will not be able to communicate with the TE6000A.

Configuration Examples

All examples presented in this section follow the TE6000A Configuration Procedure presented at the beginning of this chapter and use the DVB factory configuration as the default.

Configuring a Basic DSNG Setup Using the Front Panel

This example configures the TE6000A to a basic DSNG setup. Use this example as a guideline, substituting your site-specific parameter values as required.

Step 1: In this example, assume that the following is a list of your TE6000A operational parameters:

Input channels:

- Audio A: On
- Audio B: Off
- Video: On

Audio encoder parameters:

- Source of input audio: analog left and right input
- Compressed output audio format: stereo
- Audio compressed bit rate: 256 kbps
- Audio channel sample rate: 48 kSps

Video encoder parameters:

- Source of input video: composite analog
- Video format mode: PAL
- Pixel and line sample resolution: 720 x 576 resolution video (full resolution video)
- Output compressed video bit rate: auto-rate calculation

Aux data parameters:

- Aux data channel inputs – Aux data channel A disabled; Au xdata channel B disabled

Multiplexer Transport Stream Parameters:

- SCPC Operation – ASI output at 8.448 MHz

PSI tables: Minimal complete set

Steps 2 and 3: After comparing these operational requirements against the TE6000A DVB parameters, it is determined that all the parameters required to set the audio and video encoders to the basic DSNG setup are DVB settings, with the exception of the Audio B channel.

Step 4: The Audio B channel must be set to Off. The front panel menus used to change this parameter are:

Service>Audio>Analog>AudioB>Enable = Off

Step 5: To configure the TE6000A for this example, you must first initialize the unit to DVB default settings. The steps to perform this initialization are presented in the previous section.

Step 6: Once the TE6000A is set to the DVB default settings, the Audio B channel parameter must be changed to Off.

1. From the main menu select Config.

```
TE6000A SDTV MPEG-2 Encoder
[Config]   Status      Version

Software Version: 3.00
```

2. The Configuration menu displays. Use the right arrow to select Service and press Enter.

```
Config
Presets    Output     [Service]   Tx Strm
CA         Control    Comm
```

3. The Service menu displays. Use the right or left button to select Audio and press Enter.

```
Config>Service
[Setup]   Video   VBi   Audio
Data      PCR
```

4. The Audio menu displays. Use the right button to select Analog and press Enter.

```
Config>Service>Audio
[Digital]   Analog
```

5. The Analog Audio menu displays. Use the right button to select Audio Slot 1B and press Enter.

```
Config>Service>Audio>Analog
[Slot 1A]   Slot 1B
```

6. The Analog Audio B menu displays, showing the current Enable parameter.

```
Config>Service>Audio>Analog>Slot 1B
Enable   =   [On]   →
             Off
```

7. Press the Down button to select `Enable = Off.` This parameter should be flashing.

```
Config>Service>Audio>Analog>Slot 1B
Enable   =   On   →
             [Off]
```

8. Press the Enter button to set the parameter.

After you have set the parameter to disable the Audio B channel, all of the audio and video encoder parameters are set to the basic DSNG setup for this example.

Step 7: Ensure that the decoder is correctly configured to operate with the TE6000A parameter settings.

Configuring a Simple SCPC Setup Using the Remote Unit

This example configures the TE6000A to a simple SCPC setup. Use this example as a guideline, substituting your site-specific parameter values as required.

Step 1: In this example assume that the following is a list of your TE6000A operational parameters:

Input channels

- Audio A: On
- Audio B: On
- Video: On

Audio encoder parameters

- Source of input audio: analog left and right input
- Compressed output audio format: Stereo
- Audio compressed bit rate: 256 kbps
- Audio channel sample rate: 48 kSps

Video encoder parameters

- Source of input video: D1 serial digital
- Video format mode: PAL mode
- Pixel and line sample resolution: 480 x 576 resolution video
- Output compressed video bit rate: auto-calc

Aux data parameters: No Aux data required

Multiplexer Transport Stream Parameters:

- SCPC Operation: ASI output at 4 Mbps

PSI tables: Minimal complete set

Steps 2 and 3: After comparing these operational requirements against the TE6000A DVB parameters, it is determined that all the parameters required to set the audio and video encoders to a simple SCPC configuration are DVB settings, except for the following parameters:

- Video source
- Video resolution
- Multiplexed transport rate

Step 4: To change these parameters the following remote commands will be used:

Parameter	Remote Command
Video source = D1 serial digital	VE SRC DIGITAL
Video resolution = 480 x 576	VE HRES 480
Multiplexed transport rate =4 Mbps	MUX OUT_RATE 4000000

Step 5: To configure the TE6000A for this example, you must first initialize the unit to DVB default settings.

1. Issue the DVB default command `CM RESTORE DVB.`

   When the remote unit displays the system prompt (>) all of the TE6000A parameters have been set to the DVB default settings.
2. If the baud rate setting of the communications package in your remote unit is not set to 38400 bps, you must change the baud rate before you can continue.

NOTE

When the TE6000A is set to the DVB default setting, the remote port baud rate is set to 38400 bps. If the remote unit is set to communicate with the TE6000A at a baud rate other than 38400 bps, immediately after the DVB default command is issued, the remote unit will not be able to communicate with the TE6000A. To resolve this issue, the equivalent parameter in the software settings of the remote unit must be changed to 38400 bps. ***However***, the remote unit software settings must *not* be changed before issuing the DVB default command to the TE6000A, as the remote unit will not be able to communicate with the TE6000A.

Step 6: Once the TE6000A is set to the DVB default settings, issue the following commands to change the required parameters:

1. To set the source of the input video to D1 serial digital, issue the command `VE SRC DIGITAL`. After the TE6000A sets the parameter, the system prompt is displayed.
2. To set the pixel and line sample resolution to 480, issue the command `VE HRES 480`.
3. To set the output transport rate on the TTX-2000 ASI port to 4 Mbps issue the command `MUX OUT_RATE 4000000`.

Your TE6000A is now configured to a simple SCPC setup. To save this configuration to flash memory issue the `CM SAVE` command.

Once you have saved the settings, the TE6000A automatically restores to the simple SCPC setup whenever you reset or power-up the unit.

Step 7: Ensure that the decoder is correctly configured to operate with the TE6000A parameter settings.

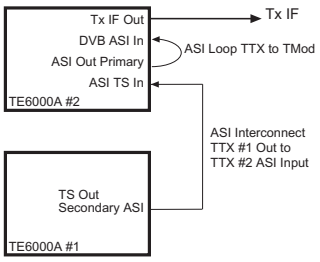
Configuring a Simple 2:1 MCPC Setup Using the Front Panel or a Remote Unit

This example configures the TE6000A to a simple 2:1 MCPC setup. To configure the TE6000s for MCPC operations, perform these steps:

1. Setup and identify the encoders.
2. Calculate the overall output rate requirements for your system.
3. Follow the TE6000A Configuration Procedure to configure the encoders and verify MCPC operation.

Setup and Identify the Encoders The interconnections of the encoders must be established and each encoder identified by label as shown in the illustration.

For detailed information on MCPC interconnections, and video and audio input connections, refer to the chapter on installation.



Calculate the Local and Total Transport Output Rates To perform the required calculations you must know the following values:

- Satellite transponder bandwidth allocation
- DVB-compliant QPSK Spectral Mask = 1.35
- Viterbi FEC rate

Perform the following calculations:

1. Calculate the symbol rate that fits into the available satellite bandwidth using the DVB-compliant QPSK spectral mask:

   Bandwidth / QPSK Spectral Mask = Symbol Rate
2. Calculate the transport output rate that fits into the available symbol rate:

   Symbol Rate x 2 [QPSK] x 188/204 [Reed-Solomon FEC] x Viterbi FEC = Total Transport output rate
3. If both encoders are running at the same rate, divide the total transport output rate by the number of programs:

   Total Transport output rate / # Programs = Local Rate

   Ensure that the local rate does ***not*** exceed the total transport output rate.
4. If both encoders are not running at the same rate, ensure that the addition of the two local rates is less than or equal to the total transport output rate.

Example: The following calculation example uses these assumptions:

- Two programs are multiplexed into one transport stream
- The stream is transmitted in 1 5MHz of satellite transponder bandwidth
- A Viterbi FEC rate of 5/6 provides adequate link margin.

1. Calculate the symbol rate that fits into the available satellite bandwidth using DVB-compliant QPSK spectral mask:

   15 MHz / 1.35 = 11.11 MSps
2. Use the Viterbi FEC rate of 5/6 to calculate the transport rate that will fit into the available symbol rate:

   11.11 MSps x 2 [QPSK] = 22.22 Mbps
   22.22 Mbps x 188/204 [Reed-Solomon FEC] = 20.477 Mbps
   20.447 Mbps x 5/6 [Viterbi FEC] = 17.064 Mbps
3. Since both encoders are running at the same rate, the transport output rate is divided by two in order to balance the available bit rate equally between the two programs:

   17.064 Mbps / 2 = 8.53 Mbps

Perform the TE6000A Configuration Procedure to Configure the Encoders and Verify MCPC Operation

Step 1: In this example assume that the following is a list of your TE6000A operational parameters:

Input channels

- Video: On
- Audio A: On
- Audio B: On

Audio encoder parameters

- Source of input audio: analog
- Compressed output audio format: stereo
- Audio compressed bit rate: 256 kbps
- Audio channel sample rate: 48 kSps

Video encoder parameters

- Source of input video: composite
- Pixel resolution per line: 720

Aux data parameters: No Aux data required

Multiplexer Transport Stream Parameters

- PSI/SI tables: minimum complete set
- TE6000A #1 transport output at 8.53 Mbps
- TE6000A#2 internally generated transport rate 8.53 Mbps
- TE6000A #2 transport output at 17.064 Mbps

Modulator Parameters

- Output frequency: 70MHz
- FEC rate: 5/6
- Input data rate: 17.064 Mbps

Steps 2 and 3: After comparing these operational requirements against the TE6000A DVB parameters, it is determined that all the parameters required to set the audio and video encoders to a simple 2:1 MCPC configuration are DVB settings, except for the following parameters:

For the TE6000A #1

- Multiplexer transport output rate

For the TE6000A #2

- Multiplexer internally generated transport rate
- System configuration
- Modulator input data rate
- Multiplexer transport output rate

Step 4: To change these parameters the following front panel or remote commands can be used:

TE6000A #1 Parameter	Front Panel Menus	Remote Commands
Multiplexer transport output rate = 8.53 Mbps	Config>Output>Data Rate>8530000	MUX OUT_RATE 8530000

TE6000A #2 Parameters	Front Panel Menus	Remote Commands
Multiplexer internally generated transport rate = 8.53 Mbps	Config>Tx Strm>LocRate>8530000	MUX LOC_RATE 8530000
System configuration = MCPC	Config>Tx Strm>Mode>MCPC	MUX CM MCPC
Multiplexer transport output rate = 17.064 Mbps	Config>Output>Data Rate> 17064000	MUX OUT_RATE 17064000

Steps 5 and 6: Set the TE6000s to the DVB default settings and issue the following commands to change the required parameters:

1. Initialize the TE6000A #1 (the first encoder in the chain) to the DVB defaults.
2. Configure the TE6000A #1:
   a. Set the encoder to SCPC mode using either the front panel `Config>Tx Strm>Mode>SCPC` option or the remote command `MUX CM SCPC`.
   b. Set the local rate using either the front panel `Config>Tx Strm>LocRate` *`value`* option or the remote command `Mux Loc_Rate` *`value`* (where *`value`* is the calculated local rate).
3. Initialize the TE6000A #2 (the second encoder in the chain) to the DVB defaults.
4. Configure the TE6000A #2:
   a. Set the encoder to MCPC mode using either the front panel `Config>Tx Strm>Mode>MCPC` option or the remote command `MUX CM MCPC`.
   b. Set the local rate using either the front panel `Config>Tx Strm>LocRate` *`value`* option or the remote command `Mux Loc_Rate` *`value`* (where *`value`* is the calculated local rate).

      The current fault `Mux.A Loc Overflow` may display. This fault will clear when the total output rate is adjusted in the next step.
   c. Set the total transport output rate using either the front panel `Config>Output>Data Rate` *`value`* option or the remote command `Mux Out_Rate` *`value`* (where *`value`* is the calculated total transport output rate).
5. If a remote unit was used to set the MCPC configuration parameters, issue the `CM SAVE` command for each TE6000A unit in order to save their configurations to flash memory.


NOTE

If you are using a remote unit to perform the TE6000A configuration, and the baud rate setting of the communications package in your remote unit is not set to 38400 bps, you must change the baud rate immediately after initializing the TE6000A to the DVB defaults in order to continue communications between the TE6000A and the remote unit.

Step 7: To verify the MCPC stream, use an IRD in a digital IF loop or satellite downlink and perform the following steps:

1. Configure the demodulator and/or IRD to the appropriate parameters.
2. When the IRD is fully locked on the MCPC transport stream, verify that multiple services are being received. Services can be viewed on the front panel of Tiernan IRDs.
3. Select a required service. The IRD should receive and process the service.

Troubleshooting

6

This chapter includes the following information:

- Fault reporting and monitoring, including the status LED and status button, viewing current faults, and viewing the fault history and fault relay logs
- Initialization self-test diagnostic functions
- Summary listing all TE6000A faults
- Operational problems and their solutions

Fault Reporting and Monitoring

The TE6000A has an internal micro-controller that continually performs real-time monitoring of system conditions. When the unit detects a fault, the front panel Status LED is triggered, the fault it is stored in the fault history log and, depending upon the type of fault, the fault may be viewed by querying the current faults.

Status LED

At-a-glance system status is quickly determined by checking the tri-colored Status LED found on the front panel. The color of the Status LED identifies the state of the TE6000A:

- Green – unit is operating correctly and has no current faults
- Yellow – current fault is detected
- Red – internal hardware faults are detected or the video or audio encoders are not processing data

If the Status LED illuminates yellow or red, the Status Button can be pressed, which will display the faults listing.

Refer to the Faults Summary List for a description of the faults and actions to take to resolve the faults.


NOTE

LED indicators may be visible through holes in the chassis side and rear panel filler plates. These indicators are used by factory technicians during the production process but are not used during normal operations. These indicators should be ignored.

Current Faults

Current faults are reported *real-time*, which means that only conditions that are present at the time of the query are displayed, regardless of what fault conditions have existed in the past. A current fault exists when the Status LED is yellow.

Viewing Current Faults on the Front Panel

To view the current faults on the front panel LCD, perform these steps.

1. From the main menu, select Status.

```
TE6000A SDTV MPEG-2 Encoder
Config     [Status]     Version

Software Version: 3.00
```

2. The Status menu displays. Select Current.

```
Status
[Current]   History     Relay
```

3. The Current Status menu displays. Up to three faults can be displayed on the LCD at one time. If there are more than three faults detected, they can be viewed by pressing the Up and Down buttons.

```
Status>Current
1. VI.A Loss of Input
```

   If no current faults exist, or if the current fault condition clears, `No Fault` is displayed.

```
Status>Current
No Fault
```

NOTE

All current faults are recorded in the fault history log; however, not all faults that are detected by the TE6000A are shown on the current faults log. To determine if other hardware or operational problems exist, the fault history log must be viewed.

Viewing Current Faults Using a Remote Unit

To view current faults using a remote unit, issue the `FM CURR_LIST` command. The TE6000A responds with either `No Faults`, if none are present, or one or more fault messages.

For example, assume that the input source to the video encoder is interrupted or disconnected. To view current faults, issue the `FM CURR_LIST` command. The remote unit displays:

```
Current Faults (LIST)16:25:43 08/21/2001
------------------------------------------------
VI.x Loss of Input
```

The query response shows:

- The type of information queried — `current faults`
- The time the query was issued — `16:25:43`
- The day the query was issued — `08/21/2001`
- A listing of all current faults

  Individual faults do not include a time tag since they were occurring at the time the query was issued, in this example at `16:25:43` on `08/21/2001`.

  To determine the time that the fault initially occurred, you must query the fault history log. For example, the loss of input could have occurred prior to 16:25:43 on this day.

Fault History Log

The fault history log is more than just a list of current faults that have occurred over a period of time. The TE6000A can detect a variety of other hardware and operational faults that are not reported as current faults. These faults are stored in the fault history log in addition to any current faults that have occurred.

The fault history log records up to 20 repeated occurrences of the same fault condition. The TE6000A stops logging faults after they occur more than 20 times. All faults are saved in the fault history log until one of the following events occur:

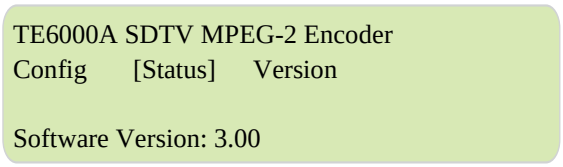
- The unit's power is turned off
- The unit is reset
- The fault history log is cleared by selecting Status>History>Clear from the front panel or issuing the remote command `FM LOG_CLEAR`.

Individual faults include a time and date tag. The time tag allows you to determine how often a particular event or fault is occurring and to track the performance of internal components. The TE6000A maintains an internal run-time clock, which is used to time-tag faults and other events to help you monitor system performance and diagnose problems.

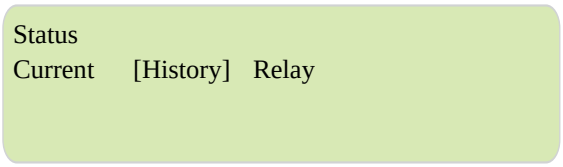
Viewing Fault History Log on the Front Panel

To view the fault history log on the front panel, perform these steps.

1. From the main menu, select the Status menu.

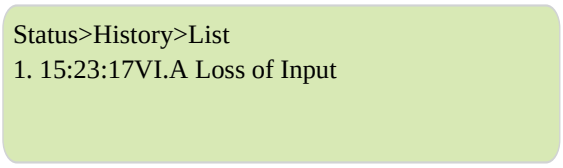


2. The Status menu displays. Select History.



3. The History menu displays. Select List.

4. The LCD displays the most recent faults. Up to three faults can be displayed on the LCD at one time. If there are more than three faults detected, they can be viewed by pressing the Up and Down buttons.



   If no faults exist, the LCD displays `No Fault`.

5. To view all faults in the history log, use the Up and Down buttons.

Faults stored in the fault history log are displayed on the front panel LCD in ASCII string format and consist of:

- A time tag
- The name of the fault

For example, at 3:23 pm the input source to the video encoder was interrupted. The fault history log, when queried, would display:

- 15:23:17 VI.x Loss of Input

where:

- `15:23:17` is the time tag
- `VI.x Loss of Input` is the name of fault

Viewing the Fault History Log Using a Remote Unit

To view fault history log using a remote unit, issue the `FM LOG_LIST` command. The unit responds with either `No Faults` if none are present, or one or more fault messages.

The remote unit displays the fault history log beginning with the time and day tag followed by the fault descriptor.

For example, assume that the current day is August 21, 2003, and it is 4:25 pm. You have just noticed that the status LED is illuminated and you query the fault history log. You issue the `FM LOG_LIST` command. The remote terminal displays the following information:

```
Fault Log at          16:25:43 08/21/2003
-----------------------------------------------
15:23:17 08/21/2003, VI.x Loss of Input
08:57:39 08/20/2003, VI.x Loss of Input
```

The query response shows:

- The type of information queried — `fault log`
- The time the query was issued — `16:25:43`
- The day of the year the query was issued — `08/21/2003`
- A listing of all faults in the fault history log

Fault Relay Monitoring

The Form-C fault relay is a real-time indicator for specific fault conditions. The relay contacts are passive.

A Form-C relay has a common contact (C) and two other contacts (A and B). Normally the common contact C is connected to A and not to B.

When the relay is indicating a fault condition, the common contact C is connected to B and not A. This relay indicates a fault condition when power has failed. A power failure, power switch turned off, or an unplugged unit is defined as a fault condition.

When the fault relay detects a fault condition, the fault relay trips and the Status LED illuminates red.

Once a fault condition sets the fault relay and illuminates the status LED on the front panel, they must be cleared manually by either:

- Selecting the front panel Status>Relay>Clear option
- Issuing a remote `FM RELAY_CLR` command

Viewing Fault Relay Log on the Front Panel

To view the fault relay log on the front panel, perform these steps.

1. From the main menu, select the Status menu.

```
TE6000A SDTV MPEG-2 Encoder
Config     [Status]     Version

Software Version: 3.00
```

2. The Status menu displays. Select Relay.

```
Status
Current     History     [Relay]
```

3. The Fault Relay menu displays. Select List.

```
Status>Relay
[List]        Clear
```

4. The most recent faults are displayed. Up to three faults can be displayed on the LCD at one time. If there are more than three faults detected, they can be viewed by pressing the Up and Down buttons.

   If no faults exist, `No Fault` is displayed.

```
Status>Relay>List
No Fault
```

5. To view all faults in the relay log, press the Up and Down buttons.

Initialization Self-Test Function

In addition to internal fault monitoring, the TE6000A micro-controller automatically performs built-in-self-tests during the initialization process. If a failure is detected, a fault is displayed to alert you to the problem.

If the TE6000A did not display an error message during initialization, but is not operating properly, perform the following diagnostic steps.

1. Verify that the unit is configured correctly for your requirements.
2. If your system is configured properly, but still not operating correctly, issue the front panel `CONFIG>PRESETS>RESTORE` command or the `CM LOAD_DEF` remote command to reset the TE6000A to the defaults.
3. Reset any custom configuration parameters specific for your site.

4. If the TE6000A is still not operating properly, query the current faults to determine if a current fault exists. Correct all current faults.
5. Query and review the fault history log. Correct all faults, if possible.
6. Clear all faults.
7. Query the current faults and fault history log.
8. If the unit continues to fail, record the fault history. Contact Tiernan Customer Service for assistance.

Fault Summary

Most TE6000A faults are non-critical, informational faults. When faults occur, perform the following steps:

- If the unit is functioning normally, clear the faults and continue operations.
- If the unit continues to fail:
  - Reset the box to the defaults
  - Configure the unit to the site specific parameters
  - If the unit is still not operating properly, query the current faults to determine if a current fault exists. Correct all current faults.
  - Query and review the fault history log. Correct all faults, if possible.
  - Clear all faults.
  - Query the current faults and fault history log.
  - If the unit continues to fail, record the fault history. Contact Tiernan Customer Service for assistance.

All TE6000A faults, whether current faults, faults listed in the fault history log, or faults that cause the fault relay to trip, are listed in alphabetical order in the following table.

TE6000A Fault Summary

Front Panel Display	Remote Unit Display	Description	Action Required
Digital Video Input			
AE.x Init	AE.x Init Error	Audio Init Error	Power cycle the unit. If normal operations do not resume, contact Tiernan Customer Service.
AE.x Inp Invd	AE.x AESEBU Input Invd	AESEBU Input Error	If unit is functioning normally, clear faults and continue operations. If faults continue check connection; ensure input source is in proper format and conforms to specified input levels. If unit continues to fail, contact Tiernan Customer Service.
AE.x Inp Loss	AE.x AESEBU Input Loss	AESEBU Audio Not Present	If unit is functioning normally, clear faults and continue operations. If faults continue, check connections; ensure input source is in proper format and conforms to specified input levels. Disable AESEBU input if it is not used. If unit continues to fail, contact Tiernan Customer Service.
AE.x L-Ch Idle	AE.x Left Channel Idle	Left Channel Idle	Status message – informational only. Continue operations.
AE.x PesOvrFlw	AE.x PES FIFO Overflow	Audio PES (packetized elementary stream) FIFO Full	MUX rate is set too low. Recalculate all bit rates and enter correct rates or select AUTO mode.
AE.x PesUndFlw	AE.x PES FIFO Undrflow	Audio PES (packetized elementary stream) FIFO Empty	If unit is functioning normally, clear faults and continue operations. Contact Tiernan Customer Service.
AE.x R-Ch Idle	AE.x Right Channel Idle	Right Channel Idle	Status message – informational only. Continue operations.

TE6000A Fault Summary (continued)			
Front Panel Display	**Remote Unit Display**	**Description**	**Action Required**
MOD.x Init	MOD.x Init Error	Modulator Initialization Error	Power cycle the unit. If normal operations do not resume, contact Tiernan Customer Service.
MOD.x Inp Loss	MOD.x Loss of Input	Modulator is not receiving the transport stream.	Verify connections. Set modulator input to backplane. Ensure Mux rate = the Modulator rate.
MOD.x LO Lock	MOD.x Local Oscill Unlocked	Modulator Loss of Local Oscillator Lock	Verify connections. Set modulator input to backplane. Ensure Mux rate = the Modulator rate.
MOD.x No Mux	MOD.x No Local Input Source	Modulator is not receiving the transport stream.	Verify connections. Set modulator input to backplane. Ensure Mux rate = the Modulator rate.
MOD.x SC Lock	MOD.x Symbol Clock Unlock	Modulator Loss of Symbol Clock Lock	Verify connections. Set modulator input to backplane. Ensure Mux rate = the Modulator rate.
MUX.x CPO Ovfl	MUX.x CPO Out Overflw	TTX CPO Overflow	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
MUX.x CPO Sync	MUX.x CPO Sync Loss	TTX CPO Sync Loss	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
MUX.x CPO Underflow	MUX.x CPO Output Underflow	TTX CPO Underflow	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
MUX.x EPO Ovfl	MUX.x EPO Out Ovrflw	TTX EPO Overflow	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
MUX.x EPO Sync	MUX.x EPO Sync Loss	TTX EPO Sync Loss	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
MUX.x EPO Underflow	MUX.x Ext Output Underflow	TTX EPO Underflow	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
MUX.x Ext Input	MUX.x Ext Input Loss	TTX External Input Loss	Verify input connections. Verify external transport stream. Ensure input source is in proper format and conforms to specified input levels.
MUX.x Ext Sync Loss	MUX.x Ext Inp Sync Err	TTX External Input Sync Loss Occurs when configuring stack and unit encounters momentary loss of signal.	If unit is functioning normally, clear faults and continue operations. If unit continues to log this as a current fault, reset unit.
MUX.x Ext Tab	MUX.x Ext Table Ovrfl	TTX ECPI Overflow	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
MUX.x Init	MUX.x Init Error	Mux Initialization Error	Power cycle the unit. If normal operations do not resume, contact Tiernan Customer Service.
MUX.x LCPI Tab	MUX.x Loc Table Overfl	TTX LCPI Overflow	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
MUX.x Loc Input	MUX.x Loc Input Loss	TTX Local Input Loss	If current fault, reset unit. If unit continues to fail, contact Tiernan Customer Service. If in fault history log, clear faults and continue operations.
MUX.x Loc PAT	MUX.x Loc PAT Timeout	TTX Local PAT (program association table) Timeout Occurs on power-up.	If unit is functioning normally, clear faults and continue operations. If unit continues to log this as a current fault, reset unit.

TE6000A Fault Summary (continued)			
Front Panel Display	**Remote Unit Display**	**Description**	**Action Required**
MUX.x Loc Sync	MUX.x Loc Input Sync	TTX Local Input Sync Loss Occurs when configuring stack and unit encounters momentary loss of signal.	If unit is functioning normally, clear faults and continue operations. If unit continues to log this as a current fault, reset unit.
MUX.x LPI Ovfl	MUX.x Loc Input Ovrflw	TTX LPI Overflow	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
MUX.x LPO Ovfl	MUX.x Loc Outpt Ovrflw	TTX LPO Overflow	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
MUX.x LPO Sync	MUX.x LPO Sync Loss	TTX LPO Sync Loss	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
MUX.x LPO Udfl	MUX.x Loc Outpt Underflow	TTX LPO Underflow	Verify internal and external MUX rates. Verify MCPC stack configuration. Ensure encoder MUX rates are in sync.
no front panel fault	S/W Error: Software trap encountered.	Internal software error.	Reset the unit. If normal operations do not resume, contact Tiernan Customer Service.
no front panel fault	S/W Error: Software exception encountered.	Internal software error.	Reset the unit. If normal operations do not resume, contact Tiernan Customer Service.
no front panel fault	S/W Error: VxWorks internal signal caught.	Internal software error.	Reset the unit. If normal operations do not resume, contact Tiernan Customer Service.
no front panel fault	S/W Error: Hardware exception caught.	Internal software error.	Reset the unit. If normal operations do not resume, contact Tiernan Customer Service.
TAB.x Init	TAB.x Init Error	Table Initialization Error	Power cycle the unit. If normal operations do not resume, contact Tiernan Customer Service.
VE.x Init	VE.x Init Error	Video Encoder Initialization Error	Power cycle the unit. If normal operations do not resume, contact Tiernan Customer Service.
VE.x EncOvrflw	VE.x ENC FIFO Overflow	Video FIFO (first in, first out) Overflow	MUX rate is set too low. Recalculate all bit rates and enter correct rates or select AUTO mode.
VE.x PesOvrflw	VE.x PES FIFO Overflow	Video PES (packetized elementary stream) FIFO Overflow	MUX rate is set too low. Recalculate all bit rates and enter correct rates or select AUTO mode.
VI.x FormatErr	VI.x Format Mismatch	Analog Video Format Mismatch – Input format does not match set configuration.	Verify source format matches configuration. If unit continues to fail, contact Tiernan Customer Service.
VI.x Gen Loss	VI.x Loss of Genlock	Analog Genlock Input is Not Present	If GenLock source was enabled, ensure input source is in proper video format and conforms to specified input levels. If unit continues to fail, disable GenLock.
VI.x Init	VI.x Init Error	Video Initialization Error	Power cycle the unit. If normal operations do not resume, contact Tiernan Customer Service.
VI.x Inp Level	VI.x Input Level Large	Analog Video Input Too Large	Ensure input source is in proper video format and conforms to specified input levels. Adjust video input signal levels. Ensure video is terminated.
VI.x Inp Level	VI.x Input Level Small	Analog Video Input Too Small	Ensure input source is in proper video format and conforms to specified input levels. Adjust video input signal levels.

TE6000A Fault Summary (continued)			
Front Panel Display	**Remote Unit Display**	**Description**	**Action Required**
VI.x Inp Loss	VI.x Loss of Input	Video Main Input Not Present	If unit is functioning normally, clear faults and continue operations. If faults continue, check connections; ensure input source is in proper video format and conforms to specified input levels. If unit continues to fail, reset unit.
VI.x Ovrflw	VI.x D1 FIFO Overflow	Digital Video D1 Video FIFO (first in, first out) Full	If unit is functioning normally, clear faults and continue operations. If faults continue, check connections; ensure input source is in proper video format and conforms to specified input levels. If unit continues to fail, reset unit.
VI.x Ovrflw	VI.x FIFO Overflow	Analog D1 FIFO (first in, first out) Overflow	If unit is functioning normally, clear faults and continue operations. If faults continue, check connections; ensure input source is in proper video format and conforms to specified input levels. If unit continues to fail, reset unit.
VI.x Udrflw	VI.x FIFO Underflow	Analog D1 FIFO (first in, first out) Underflow	If unit is functioning normally, clear faults and continue operations. If faults continue, check connections; ensure input source is in proper video format and conforms to specified input levels. If unit continues to fail, reset unit.
VI.x Undflw	VI.x D1 FIFO Underflow	Digital Video D1 Video FIFO (first in, first out) Empty	If unit is functioning normally, clear faults and continue operations. If faults continue, check connections; ensure input source is in proper video format and conforms to specified input levels. If unit continues to fail, reset unit.

Operational Problems and Possible Solutions

The following troubleshooting tips were designed to help you diagnose and correct minor operational problems in the unlikely event that you encounter difficulties with your TE6000A. If you try all of the suggested solutions and the unit still fails, contact Tiernan Customer Service.

Front Panel Symptoms	
Problem:	The front panel is not enabled, is in view-only mode, does not accept commands or button pushes.
Solutions:	The front panel may be in lock-out mode. Unlock the front panel.
Remote Unit Monitor Symptoms	
Problem:	No sign-on message on the remote terminal after power-up.
Solutions:	Ensure that the remote unit and the TE6000A are turned on and plugged into an active AC outlet. Verify that the baud rate and parity of the remote unit communications package match the DVB setting of the TE6000A remote control interface. DVB settings are 38400 baud, 8 data, no parity, and 1 stop bit. Verify that the cable between the terminal, the TE6000A, and the Null Modem Adapter are properly connected. Ensure that the DTE/DCE switch is correctly set.
Transmission or Transport Problems	
Problem:	Modulator transmit clock faults or frame sync faults.
Solutions:	Ensure that the clock rates of the TE6000A and the modulator match. Ensure that the coax cable is connecting the transport output connector (A SIOut) to the correct modulator connector (Mo dAS IIn).

Front Panel Symptoms	
Decoder Problems	
Problem:	No video output from the decoder.
Solutions	Verify that the video cabling to the encoder is correctly connected. Verify that the cabling from the decoder to the monitor is correctly connected. Ensure that the TE6000A is configured for the video input source that is being provided.
Problem:	No audio output from the decoder.
Solutions:	Verify that the audio cabling to the encoder is correctly connected. Verify that the cabling from the decoder to the audio monitor is correctly connected. Ensure that the TE6000A is configured for the audio input source that is being provided.
Problem:	No video or audio output from the decoder.
Solutions:	Data link problem between the encoder and decoder. This could be caused by excessive satellite noise or other data corruption.
Problem:	Green or black stripes across the middle of the video.
Solutions:	Noisy or “dirty” AC power. Change to a “clean” power source, or use an AC power filter or power conditioner. Ensure that the input source is in the proper format and conforms to specified input levels.

Maintenance

TE6000A encoders require no periodic or preventative maintenance other than keeping the cooling fan intake grills free of obstruction.

Field Software Upgrades

The TE6000A is controlled by a built-in micro-controller equipped with a non-volatile memory that is used to store configuration settings, operational software, operational firmware, and field programmable gate array (FPGA) configuration files.

For instructions on performing a field software upgrade, contact Tiernan Customer Service.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Specifications

A

VIDEO INPUT	PAL (625) or NTSC (525) ■ Analog: SMPTE-170M NTSC or ITU-R BT.470-6 PAL-I/B/D, BNC connector ■ Serial Digital: SMPTE 259M SDI @ 270 Mbps, BNC connector with embedded audio
VIDEO PROCESSING	MPEG-2 4:2:2 and/or 4:2:0 depending on the encoding module installed ■ Horizontal resolutions: 720, 704, 544, 480, and 352 pixels ■ Vertical resolutions: 480 (NTSC) or 576 (PAL) ■ Video data rates: • MPEG-2 4:2:0 Main Profile @ Main Level (1.0 to 15 Mbps) • MPEG-2 4:2:2 Studio Profile @ Main Level (2.5 to 50 Mbps)
ASPECT RATIO	■ 4:3 and 16:9 configurable
VERTICAL BLANKING INTERVAL	■ Proprietary passage of NTSC line 21 closed-captions ■ ATSC closed captioning ■ DVB Teletext for World System Teletext (WST) on PAL ■ DVB 4:2:2 expanded windows carries WSS, VPS, VITC, CC, AMOL, XDS, etc.
AUDIO INPUTS	■ Two stereo or four independent analog mono channels on XLR connectors ■ Two AES/EBU digital stereo pairs on XLR connectors ■ Two AES/EBU digital stereo pairs embedded in SDI video input per SMPTE-272M
AUDIO PROCESSING	■ MPEG Layer II ■ Sampling rates of 32, 44.1 and 48 ksps ■ Output rates from 64 to 384 kbps
AUXILIARY DATA	Two independently programmable auxiliary data ports on DB-9 connectors ■ Asynchronous: 1200 to 38400 bps, EIA-232 or EIA-422 levels ■ Synchronous: 1 to 4096 kbps, resolution 1 bps, EIA-422 levels
CONTROL TABLES	■ Standalone support for fixed ATSC compliant tables ■ Internally-generated DVB®-compatible PSI/SI tables
LATENCY	■ Normal: 180 to 720 ms (transport rate dependent) ■ Low Delay: 180 ms
CONDITIONAL ACCESS	■ PGCA proprietary conditional access in the transport stream ■ BISS (Basic Interoperable Scrambling System) Mode 1 and 0
TIMING	■ Program clock reference (PCR) in the transport layer ■ Presentation time stamp (PTS) in the PES layer ■ Genlock to either incoming composite video or external composite black burst signal
TRANSPORT OUTPUT	■ MPEG-2 DVB®-compliant transport stream ■ Two DVB® ASI outputs (75 Ω BNC connector) • Single program transport stream (SPTS/SCPC) 1 to 25 Mbps • Multi-program transport stream (MPTS/MCPC) 1 to 70 Mbps
TRANSPORT INPUT	DVB® ASI transport input (75 Ω BNC connector) for chaining encoders to create a multi-program transport stream (MPTS/MCPC)

MODULATOR OUTPUT	■ QPSK, DVB®-compliant ■ Symbol Rate: 1 to 20 Msps ■ IF frequency: 52 to 88 MHz ■ Power output: -20 to -5 dBm, in 0.1 dBm steps
FAULT MONITORING	Contact closure for programmable alarm conditions on an RJ-11 connector
REMOTE CONTROL	■ EIA-232-D on a DB-9 connector, DTE or DCE configurable, ASCII commands ■ IEEE 802.3 10baseT (Ethernet) on an RJ-45 connector, ASCII commands ■ SNMP v2
FRONT PANEL CONTROL	■ Pushbuttons, illuminated LCD, bright indicator LEDs, AC power switch ■ 20 user-programmable preset configurations
PHYSICAL	■ 2U: 8.9 cm high, 44.5 cm wide, 53.3 cm deep (3.5” x 17.5” x 21”) ■ Weighs less than 12.7 kg (28lbs.)
POWER SUPPLY	■ Auto-ranging 100 to120VAC and 200 to 240VAC ■ 50/60 Hz universal power supply ■ 100 Watts typical
OPERATING CONDITIONS	Ambient temperature: 0° to +50° C

Specifications subject to change without notice

VBI Data Transmission

B

Overview

The Tiernan TE6000A and the latest series of Tiernan decoders, such as the TDR60, can be configured to transmit various types of Vertical Blanking Interval (VBI) data when it is present in the input video.

The following encoders and decoders support one or more methods for transmitting VBI data:

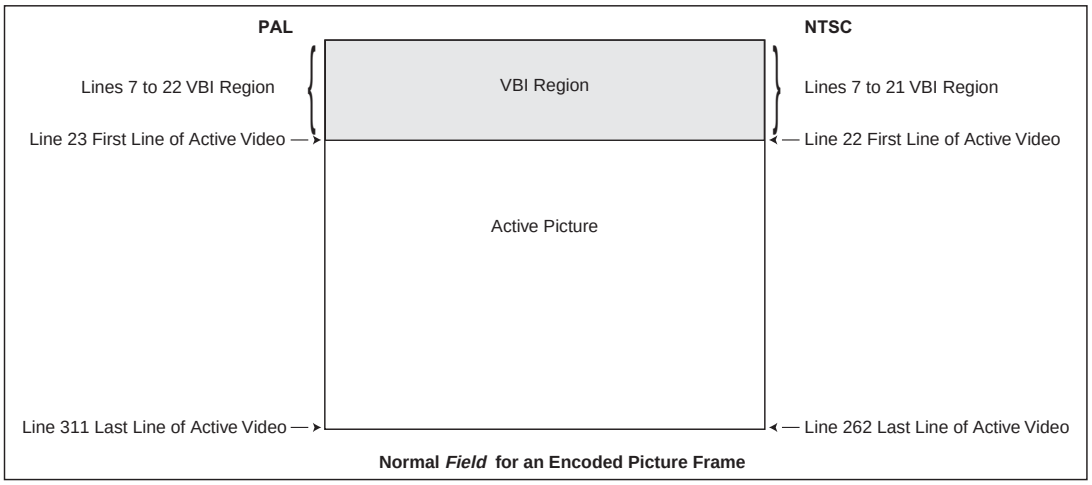
- TE6000A and TE6000 – software V2.21 or later
- TDR60 – software V4.10 or later

VBI Basics

A standard NTSC TV signal consists of 525 horizontal lines, referred to as a frame. Each frame is divided into two fields, each with 262 ½ lines. The first 21 lines of each field are the VBI region; the remaining lines contain the active video picture.

A standard PAL TV signal consists of 625 horizontal lines, referred to as a frame. Each frame is divided into two fields, each with 312 ½ lines. The first 22 lines of each field are the VBI region; the remaining lines contain the active video picture.

For standard NTSC and PAL video encoding, the first 6 lines of the VBI region contain vertical timing pulses. VBI data is not allowed on these lines, however the remaining lines in the VBI region are available to carry any type of data.



Normal *Field* for an Encoded Picture Frame

Typical forms of data included in the VBI of broadcast video transmissions are World System Teletext (WST), VPS, WSS, NABTS, Closed Captions, XDS, AMOL, Vchip, and VITC.

MPEG and VBI

Originally, the MPEG video compression scheme discarded all VBI information and included only the compressed, active video portion of the picture for transmission. This caused all VBI data to be lost when the video was digitally compressed for transmission using MPEG.

Today, however, enhancements to the original MPEG compression system have provided two methods for including VBI data in digital-compressed MPEG streams:

- The first method is to extract the data from the baseband video input and insert that data digitally into the transport stream as either a dedicated PES stream on a dedicated PID, as in DVB-Teletext, or as an extended data field in the video frame header information as in ATSC-CC.
- The second method is to shift, or expand, the active video portion of the picture to include the VBI lines in the compressed picture frame, as in DVB 4:2:2 expanded windows.

For either of these methods to work, it is required that ***both*** the encoder and decoder are:

- Functionally capable of processing the required video
- Correctly configured, either manually or via auto-sensing functionality, for the employed VBI method

All of the VBI schemes described in this document, with the exception of Tiernan Proprietary Closed Captions, adhere to industry standards and formats, defined either by ATSC or DVB. Tiernan Radyne ComStream equipment does inter-operate with all other vendor's equipment that is found to be compliant with these industry standards.

Tiernan's TE6000 and TE6000A encoders and the TDR60 decoder can process data contained in the VBI region of a video signal according to the following methods and standards:

- DVB-Teletext: – DVB standard for transmission of World System Teletext (WST) included on a composite analog PAL format video signal.
- ATSC-CC – ATSC standard for transmission of Line 21 closed captions included on a composite analog NTSC format video signal.
- Tiernan-CC – A Tiernan proprietary scheme for transmission of Line 21 closed captions included on a composite analog NTSC or component digital (525) format video signal.
- DVB 4:2:2 Expanded Windows – DVB standard for transmission of 16 or 32 lines of VBI data included on a composite analog or component digital (SDI) format video signal. This standard supports both PAL/625 and NTSC/525 format video standards.

Configuring Your System

This section describes how to configure your system for successful end-to-end processing of VBI data for each VBI scheme. For a detailed description of the front panel or remote commands used to implement the various VBI schemes, refer to the appropriate command sections found in this manual.

DVB Teletext

Tiernan encoders and decoders process VBI teletext data within a video signal according to WST standards. Teletext is supported on composite analog PAL format video signal only.

Hardware Requirements

- Encoders require a TVIP-6025 module.
- The TDR60 decoder processes VBI data in its standard configuration.

Operational Considerations

VBI teletext should ***not*** be enable with other VBI encoding formats, as teletext overwrites all other VBI data.

End-to-End Configuration

To configure the encoder and decoder for Teletext processing, follow these steps:

Encoder

1. Ensure that Teletext VBI data is included in the selected service video input signal.
2. Ensure that the video input source is set to auto or analog. Use the front panel command `Config>Service #>Video>Input Source` or the remote `VI.<port> FMTCTL` command.
3. Set the encoder to PAL mode. Issue the front panel command `Config>Service #>Video> Format Ctrl=PAL` or the remote `VI.<port> FMTCTL PAL_N` command.
4. Enable the encoder for Teletext processing. Issue the front panel command `Config>Service #>VBI>Teletext>Enable=All` or the remote `TT ENABLE ALL` command.
5. Set the data ID to 1. Issue the front panel command `Config>Service # >VBI>Teletext>Data ID=1` or the remote `TT DATA_ID 1` command.
6. Set the data unit ID to 2 or 3 as appropriate. Issue the front panel command `Config>Service # >VBI>Teletext>Data Unit ID=#` or the remote `TT UNIT_ID #` command (where # = 2 or 3).

Decoder

7. Set the decoder VBI format control to manual. Issue the front panel command `VBI>Format>VBI Format Cntrl=Manual` or the remote `VBI CONTROL MANUAL` command.
8. Set the VBI format to off. Issue the front panel command `VBI>Format>VBI Format= Off` or the remote `VBI FORMAT OFF` command.

   Note: To ensure the proper display of Teletext data, VBI Format must be set to Off.
9. Enable Teletext mode. Issue the front panel command `VBI>Teletext>Mode=On` or the remote `VBI TELETEXT MODE ON` command.

10. Set the type of Teletext standard to be decoded, either the DVB standard or a vendor's proprietary standard. Issue the front panel command `VBI>Teletext>Standard=type` or the remote `VBI TELETEXT STANDARD TYPE` command.
11. To specify a particular PID within the selected service that contains Teletext data. Issue the front panel command `VBI>Teletext>PID=PID number` or the remote `VBI TELETEXT PID NUMBER` command.

ATSC Closed Captions

Tiernan encoders and decoders support industry-standard ATSC EIA-608 closed captions. On the encoder side, ATSC closed captions, the data found on line 21 is stripped out, placed in the picture header, encoded and transmitted. At the decoder end, the data is processed and re-inserted on line 21 for proper broadcasting.

ATSC closed captions are supported on a composite analog NTSC format video signal.

Operational Considerations

Ensure that VBI teletext is ***disabled*** when closed captions are enabled, as teletext overwrites all other VBI data.

Hardware Requirements

- Encoders require a TVIP-6025 module.
- The TDR60 decoder is not currently configured to process ATSC closed captions. This feature will be implemented in the second quarter of 2002.

End-to-End Configuration

To configure the encoder and decoder for ATSC closed captioning, follow these steps:

Encoder

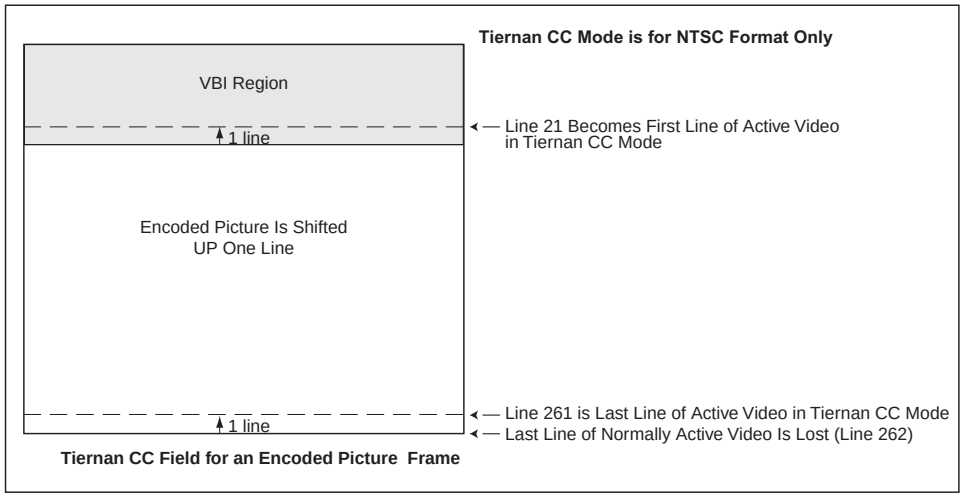
1. Ensure that Teletext is disabled. Issue the front panel command `Config>Service #>VBI>Teletext>Enable=off` or the remote `TT ENABLE OFF` command.
2. Ensure that closed caption VBI data is included in the selected service video input signal.
3. Enable the encoder for ATSC closed captions. Issue the front panel command `Config>Service #>VBI>CC=On` or the remote `VE ATSC_CC ON` command.

Decoder

4. The set-top box should automatically detect and process ATSC closed captions.

Tiernan Proprietary Closed Captions (Tiernan CC)

Using Tiernan proprietary closed captions, two lines of VBI information are encoded per frame (one per field) at the expense of losing two lines of active video (one per field). The encoded picture is simply shifted up one line to include the last line of VBI and to exclude the last line of active video in each field.



This proprietary mode is intended as a method to transmit line 21 EIA-608 closed captions in an NTSC system without incurring more bandwidth requirements.

Tiernan proprietary closed captions are supported on a composite analog NTSC or component digital (525) format video signal.

Operational Considerations

Ensure that VBI teletext is ***disabled*** when closed captions are enabled, as teletext overwrites all other VBI data.

Hardware Requirements

- Encoders will properly process Tiernan closed captions with any of the following modules: TVIP-6021, TVIP-6025, or TVIP-6001.
- The TDR60 decoder processes VBI data in its standard configuration.

End-to-End Configuration

To configure the encoder and decoder for Tiernan proprietary closed captioning, follow these steps:

Encoder

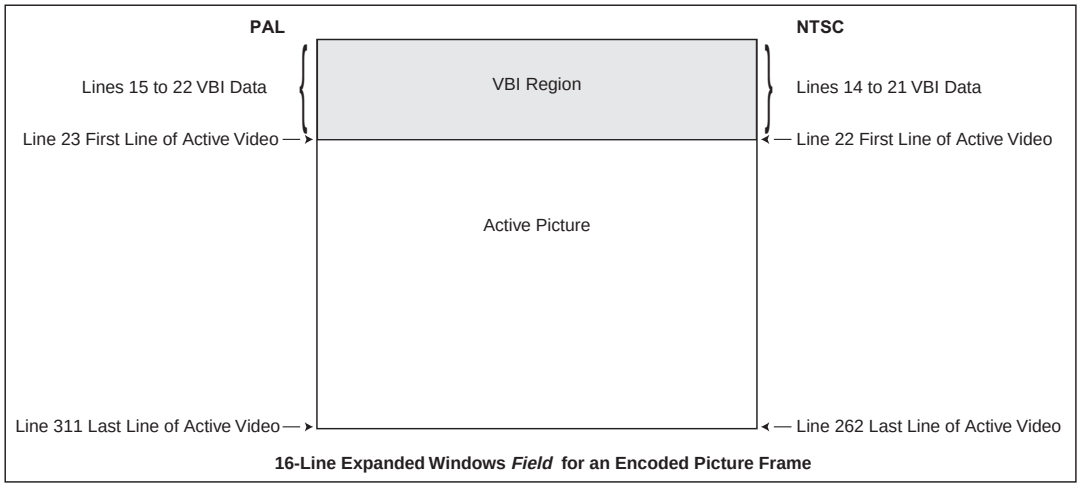
1. Ensure that Teletext is disabled. Issue the front panel command `Config>Service #>VBI>Teletext>Enable=off` or the remote `TT ENABLE Off` command.
2. Ensure that closed caption VBI data is included in the selected service video input signal.
3. Enable the encoder for Tiernan closed captions. Issue the front panel command `Config>Service #>VBI>Tiernan CC=On` or the remote `VE TCC ON` command.

Decoder

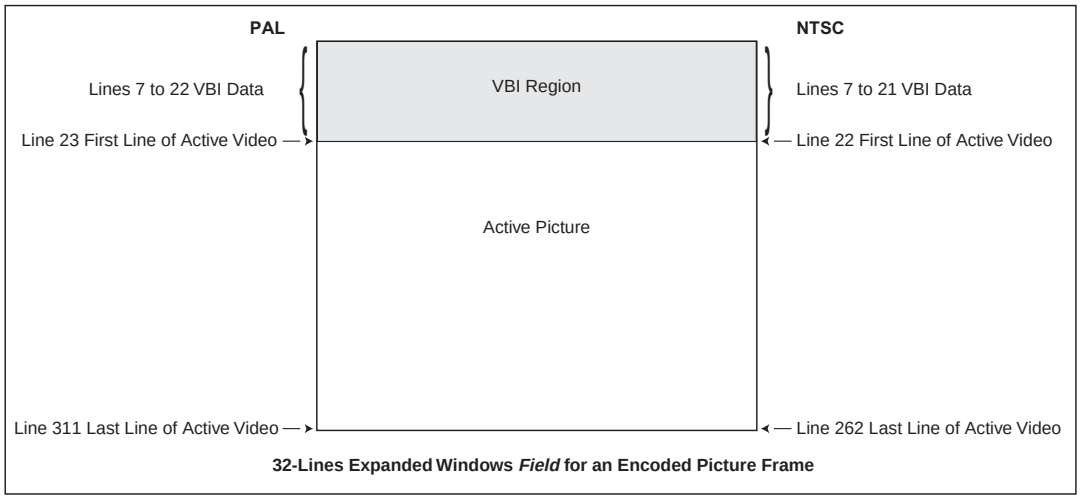
4. Ensure that Teletext mode is set to off. Issue the front panel command `VBI>Teletext>Mode=Off` or the remote `VBI TELETEXT MODE OFF` command.
5. Set the decoder VBI format control to automatically detect the type of VBI data to decode. Issue the front panel command `VBI>Format>VBI Format Cntrl=Auto` or the remote `VBI CONTROL AUTO` command.
6. If your system requires you to manually set the type of VBI data to decode, follow these steps:
   a. Set the decoder VBI format control to manual. Issue the front panel command `VBI>Format>VBI Format Cntrl=Manual` or the remote `VBI CONTROL MANUAL` command.
   b. Set the VBI format to Tiernan closed captions. Issue the front panel command `VBI>Format>VBI Format=Tiernan CC` or the remote `VBI FORMAT TIERNANCC` command.

DVB 4:2:2 Expanded Windows, 16-line and 32-line

Tiernan encoders and decoders support both 16- and 32-line expanded windows operations. As with normal video encoding, the first 6 lines of the VBI region contain timing set-up information. Expanded Windows use the remaining lines in the VBI region, either 16 or 32 per frame (8 or 16 per field), to transmit data.



16-Line Expanded Windows *Field* for an Encoded Picture Frame



32-Lines Expanded Windows *Field* for an Encoded Picture Frame

DVB 4:2:2 Expanded Windows is supported on a composite analog or component digital (SDI) format video signal. This standard supports both PAL/625 and NTSC/525 format video standards, and can transmit any of the following VBI services:

- PAL mode: Teletext, PDC, WSS, and VPS
- NTSC mode: ATSC Closed Captions, V-Chip, AMOL I and II, and VITC

Operational Considerations

- Ensure that both VBI teletext and closed captions are disable when either 16- or 32-line expanded windows are enabled, as teletext and closed captions overwrite expanded windows data.
- Chroma must be set to 4:2:2 for proper expanded windows operations.

Hardware Requirements

- Encoders will properly process Expanded Windows VBI data with any of the following modules: TVIP-6021, TVIP-6025, or TVIP-6001.
- The TDR60 decoder processes VBI data in its standard configuration.

End-to-End Configuration

To configure the encoder and decoder for DVB 4:2:2 Expanded Windows operation, follow these steps:

Encoder

1. Ensure that all other VBI schemes are disabled, including Teletext, ATSC closed captions, and Tiernan closed captions.
2. Ensure that VBI data is included in the selected service video input signal.
3. Set chroma to 4:2:2 mode. Issue the front panel command `Config>Service #>Video>Chroma=4:2:2` or the remote `VE.<port> CHROMA 4_2_2` command.
4. Configures the encoder to transmit either 16 or 32 lines of VBI information. Issue the front panel command `Config>Service #>VBI>Expand> VBI_Passthru=type` or the remote `VE VBI_PASS type` command, where type is set to 16_lines or 32_lines.

Decoder

5. Ensure that Teletext mode is set to off. Issue the front panel command `VBI>Teletext>Mode=Off` or the remote `VBI TELETEXT MODE OFF` command.
6. Set the decoder VBI format control to automatically detect the type of VBI data to decode. Issue the front panel command `VBI>Format>VBI Format Cntrl=Auto` or the remote `VBI CONTROL AUTO` command.
7. If your system requires you to manually set the type of VBI data to Expanded Windows, follow these steps:
   a. Set the decoder VBI format control to manual. Issue the front panel command `VBI>Format>VBI Format Cntrl=Manual` or the remote `VBI CONTROL MANUAL` command.
   b. Set the VBI format to either 16- or 32-lines Expanded Windows.

      From the front panel, issue the command `VBI>Format>VBI Format=#` where # is set to 16-line or 32-line.

      From a remote terminal, issue the command `VBI FORMAT #` where # is set to `lines16` or `lines32` .

Command Listing

This section provides a detailed description of the front panel and remote commands used to configure Tiernan encoders and decoders for VBI operations.

Encoder Command Listing

Front Panel Commands for Encoder Configuration

Teletext Commands

Config>Service # >VBI>Teletext — used to configure the encoder to transmit teletext data		
Enable	Configures the encoder to transmit teletext information	■ off – does not encode any teletext information (default) ■ all – encodes entire VBI teletext area; i.e., allocates bit-rate to include maximum number of Teletext lines ■ auto – automatically allocates bit-rate to include only the number of detected Teletext lines.
Data ID	Setting determines is EBU data included in the Teletext. Values from 0x10 to 0x1F reflect EBU data.	0 to 255 Default: 1
Data Unit ID	Data Unit ID defines if there are EBU Teletext sub-titles included in the data.	Data Unit ID has range from 0 to 255. Values are: ■ 2 = EBU Teletext non-subtitle data is ***not*** included (default) ■ 3 = EBU Teletext subtitle data is included ***Note***: Data Unit ID must be set to 2 or 3 for proper decoder operation.

ATSC Closed Captions Front Panel Commands

Config>Service # >VBI>CC — used to configure the encoder to transmit closed captions		
ATSC CC	Configures the encoder to transmit ATSC closed caption information	■ on – encodes ATSC VBI information ■ off – does not encode any ATSC VBI information (default)

Tiernan Closed Captions Front Panel Commands

Config>Service # >VBI>CC — used to configure the encoder to transmit closed captions		
Tiernan CC	configures the encoder to transmit Tiernan closed captioning information The Tiernan CC transmission described in this document is ***Tiernan proprietary***. Only Tiernan decoders accommodate the Tiernan CC feature described in this document: ***Note***: Tiernan CC should ***not*** be implemented in PAL mode, as the closed caption information will be decoded and placed on line 22 of the video.	■ on – encodes two lines of VBI information per frame (one per field) at the expense of losing two lines of active video (one per field) The encoded picture is simply shifted up one line to include the last line of VBI and to exclude the last line of active video in each field. ■ off – does not encode any VBI information (default) ***Note***: Data transmitted in the VBI region using the Tiernan CC command will experience a degradation in quality given the inherently "lossy" compression of MPEG.

Expanded Windows Front Panel Commands

Config>Service # >VBI>Expand — used to configure the encoder to transmit data in 16-line or 32-line expanded windows mode		
VBI_Passthru	Configures the encoder to transmit either 16 or 32 lines of VBI information	■ Off – disables expanded windows mode (default) ■ 16-line – enables 16-line expanded windows mode ■ 32-line – enables 16-line expanded windows mode

Remote Commands for Encoder Configuration

Teletext Commands

Teletext Encoder Remote Commands		
Remote Command	**Parameter Range**	**Description**
TT ENABLE	Off, All, Auto	Configures the encoder to transmit teletext information. Parameters are: ■ On = enables ATSC closed captioning ■ Off = does not encode any ATSC closed captioning information (default) Front panel command: Config>Service>VBI>CC>ATSC CC
TT DATA_ID	0 to FF	Setting determines is EBU data included in the Teletext. Values from 0x10 to 0x1F reflect EBU data. Default: 1
TT UNIT_ID	0 to FF	Unit ID defines if there are EBU Teletext sub-titles included in the data. Data Unit ID has range from 0x00 to 0xFF. Values are: ■ 0x2 = EBU Teletext non-subtitle data is ***not*** included (default) ■ 0x3 = EBU Teletext subtitle data is included ***Note***: TT Unit_ID must be set to 2 or 3 for proper decoder operations.

ATSC Closed Captions Remote Commands

Remote Command	Parameter Range	Description
VE ATSC_CC	On, Off	Configures the encoder to transmit ATSC closed captioning information. Parameters are: ■ On = enables ATSC closed captioning ■ Off = does not encode any ATSC closed captioning information (default) Front panel command: Config>Service>VBI>CC>ATSC CC

Tiernan Closed Captions Remote Commands

Remote Command	Parameter Range	Description
VE TCC	On, Off	Configures the encoder to transmit Tiernan closed captioning information. Parameters are: ■ On = encodes two lines of closed captioning information per frame (one per filed) at the expense of losing two lines of active video (one per field) ■ Off = does not encode any closed captioning information (default) Front panel command: Config>Service>VBI>CC>Tiernan CC

Expanded Windows Remote Commands

Remote Command	Parameter Range	Description
VE VBI_PASS	Off, 16_LINES, 32_LINES	Configures the encoder to transmit either 16 or 32 lines of VBI information ■ Off – disables expanded windows mode (default) ■ 16_lines – enables 16-line expanded windows mode ■ 32_line – enables 16-line expanded windows mode

Decoder Command Listing

Front Panel Commands for Decoder Configuration

The following front panel commands are used to configure the decoder for VBI teletext.

TDR60 Decoder VBI Front Panel Menu		
Menu>SubMenu	**Description**	**Parameters or Response Format**
VBI>Teletext: used to set the teletext parameters		
Active Line	Query-only; displays the number of the first active line of teletext received.	Displays either: ■ No active lines ■ the number of first active line received
Mode	Providing that teletext is available in the selected service, the Mode function allows you to determine whether the teletext data will be included in the video output stream.	■ On – Teletext data is included in the video output stream ■ Off – Teletext data is ***not*** included in the video output stream (default) ***Note***: To ensure proper display of teletext, VBI>Format>VBI Format must be set to Off.
PID	Selects the teletext PIDs available in the selected service. The TDR60 automatically selects the first PID available in the selected service.	List of teletext PIDs available in the selected service.
Standard	Sets the inversion or non-inversion of teletext data.	■ DVB – sets DVB teletext standard (default) ■ Proprietary — sets proprietary teletext standard
VBI>Format: used to set the teletext parameters		
VBI Format	Providing that the selected VBI information is available in the selected service, this command determines if the data will be included in the video output stream. ***Note***: This command is query-only when VBI>Format>VBI Format Cntrl is set to Auto.	■ Off – VBI mode is disabled (default) ■ Tiernan CC – Tiernan proprietary closed caption information will be included ■ Lines 16 – Expanded windows lines-16 information will be included; for PAL modes this includes VBI information found in lines 15 to 22; in NTSC mode this includes VBI information in lines 14 to 21. ■ Lines 32 – Expanded windows lines-32 information will be included; for PAL modes this includes VBI information found in lines 7 to 22; in NTSC mode this includes VBI information in lines 7 to 21.
VBI Format Cntrl	Setting determines if the TDR60 will automatically detect incoming VBI data or if the VBI format will be manually configured by the operator.	■ Auto – TDR60 automatically detects the format of the incoming VBI information. When Auto is selected, VBI>Format>VBI Format is query only. ■ Manual – enables the operator to manually configure the VBI format. (default)

Remote Commands For Decoder Configuration

The following front panel and remote commands are used to configure the decoder for VBI teletext.

Remote Command Mnemonic	Parameter Range	Description
VBI CONTROL	Auto, Manual	Setting determines if the TDR60 will automatically detect incoming VBI data or if the VBI format will be manually configured by the operator. ■ Auto – TDR60 automatically detects the format of the incoming VBI information. When Auto is selected, VBI CONTROL is query only. ■ Manual – enables the operator to manually configure the VBI format. (default)
VBI FORMAT	Off, TiernanCC, Lines16, Lines32	Providing that VBI information is available in the selected service, this command determines if the data will be included in the video output stream. ***Note***: This command is query-only when VBI FORMAT is set to AUTO. ■ Off – VBI mode is disabled (default) ■ TiernanCC – Tiernan proprietary closed caption information will be included ■ Lines16 – Expanded windows lines-16 information will be included; for PAL modes this includes VBI information found in lines 15 to 22; in NTSC mode this includes VBI information in lines 14 to 21. ■ Lines32 – Expanded windows lines-32 information will be included; for PAL modes this includes VBI information found in lines 7 to 22; in NTSC mode this includes VBI information in lines 7 to 21.
VBI TELETEXT LINES	—	Query-only; displays a list of the teletext lines detected in the selected service or the message `no active lines` when teletext is not present. Available only when VD MODE is set to NTSC. Front panel equivalent: VBI>Active Line
VBI TELETEXT MODE	On, Off	Providing that teletext data is available in the selected service, this function allows you to determine whether teletext data will be included in the output stream. ■ On – data will be included ■ Off – data will not be included (default) Teletext is only available only when VD MODE is set to PAL. ***Note***: To ensure proper display of teletext, VD CC must be set to Off. Front panel equivalent: VBI>Mode
VBI TELETEXT PID	<available PIDs> or Off	Selects the teletext data PID from the selected service. To query available PIDS, enter the command VBI TELETEXT PID ? Available only when VD MODE is set to PAL. Front panel equivalent: VBI>PID
VBI TELETEXT STANDARD	DVB, Proprietary	Sets the inversion or non-inversion of teletext data. ■ DVB – sets DVB teletext standard (default) ■ Proprietary — sets proprietary teletext standard Available only when VD MODE is set to PAL. Front panel equivalent: VBI>Standard

Conditional Access

C

Conditional Access Overview

Conditional access (CA) is a method for securing and scrambling transmission streams so that only those decoders which are authorized to do so can receive the transmitted streams.

The TE6000A provides two methods for conditional access:

- BISS – an industry-standard scheme which allows full conditional access operability between various vendor's DSNG equipment
- PGCA – a *Tiernan proprietary* scheme providing conditional access within the Tiernan family of products

BISS Overview

BISS, the Basic Interoperable Scrambling System, is an industry-standard, conditional access scheme used to secure and scramble DSNG broadcasts while allowing full inter-operability between various vendor's DSNG equipment.

The TE6000A currently supports BISS Mode 1 scrambling. With Mode 1, all components of the transmission stream are scrambled by a fixed control word (CW). The control word must be manually entered into the encoder and decoder for BISS operations.

High-level BISS Procedure

BISS is managed and enabled at an individual service level. To configure the TE6000A for BISS operations, follow these steps:

1. Select the service for BISS conditional access.
2. Enable BISS for that service.
3. Enter the Scramble key.

Configuring BISS from the Front Panel

To configure the TE6000A for BISS operations, follow these steps:

Select a Service

1. From the main menu, select Config>CA>Setup>Service. A list of all available services displays.

   If only one service is available, the service parameter is query-only, as this one service is automatically selected.
2. Scroll through the list to select the service to be configured for BISS scrambling and press Enter. The Scramble menu displays.
3. Ensure that the correct service name displays in the menu line. If the displayed service is incorrect, return to step 1.

Enable BISS for that Service

4. From the Scramble menu, select BISS Mode 1 and press Enter.
5. When the asterisk disappears, press the right arrow key to go to the BISS key parameter.

Enter the Scramble Key

6. Use the numeric keypad to enter the 12-digit key. Once all 12 digits are entered, the key will begin to flash. Press Enter.

   When the asterisk disappears, the BISS configuration settings are immediately implemented for that service.

Continue to Enable and Disable Individual Services, as Required

7. Continue selecting services and enabling/disabling each as required.

TE6000A is Now Processing Data Using the Current BISS Configuration

8. BISS is now enabled and will continue to use the current BISS configuration until BISS is disabled (turned off) or the BISS configuration is changed.

Disable BISS for an Individual Service

To disable BISS for a selected service, perform these steps:

1. From the main menu, select Config>CA>Setup>Service. A list of all available services displays.
2. Scroll through the list to select the service to be configured for BISS scrambling and press Enter.

   The Scramble menu displays. Ensure that the correct service name displays in the menu line.

   If the displayed service is incorrect, return to step 1.
3. From the Scramble menu, select None and press Enter.

   Conditional access is now disabled for the selected service.

Even though BISS conditional access may be disabled for a service, the TE6000A retains the BISS scramble key set for that service.

Configuring BISS from a Remote Unit

Before you begin configuring the encoder for BISS conditional access, you must have a remote unit with a communications program installed, such as ProComm.

Connect to a Remote Unit

1. Ensure that the remote unit has a communications program installed, such as ProComm.
2. Connect an RS-232 cable from the PC COM port 1 to the TE6000A RS-232 port.
3. Start the ProComm software. Configure ProComm to communicate via COM port 1 at a baud rate of 38400 bps.
4. Power on the encoder.
5. Wait for the main menu to display on the encoder's front panel.
6. ProComm should display various messages and then end with the prompt `>`.

   If the `>` prompt does not display, flip the DCE/DTE switch on the back of the TE6000A to the other position. Press the Enter key on the keyboard several times. The `>` prompt should display .

Configure BISS Parameters

1. Review the current BISS configuration parameters for all active services. Type `mux prog_info` and press Enter.

   The current conditional access settings for all services is displayed. Information includes: program number, program name, previous scrambling mode, current scrambling mode, and the key.
2. Enable BISS for a service. Type `mux scram_en <`*`service#`*`> mode_1` and press Enter.

   This command enables BISS scrambling mode 1 for the ***service*** number entered in the <*service#*> parameter.

3. Enter the Scramble key for the selected service.
   Type `mux scram_key <service#> <key>` and press Enter.

   This command sets the BISS scrambling key for the ***service*** number entered in the <*service#*> parameter. The key is a 12-digit hexadecimal number.
4. Disable BISS for any services, as required.
   Type `mux scram_en <service#> off` and press Enter.
5. Review the current BISS configuration parameters for all active services to ensure that all BISS settings are correct. Type `mux prog_info` and press Enter.
6. Enable BISS at the system level. Type `mux biss_en on` and press Enter.

   Note: BISS cannot be enabled if PGCA is enabled.

Save the Current BISS Configuration

7. Save the current BISS configuration to either:
   - Flash memory using the `CM Save` command
   - A user-defined configuration set, using the `cm create` and `cm save_cfg` commands.

   Any parameter changes, including conditional access changes, that are made using a remote unit are *not* automatically stored in flash memory. When the TE6000A configuration is changed using a remote unit, an operational test should be performed to verify that the system is operating correctly. Then the new configuration should be saved by issuing the `cm save` command.

   If the TE6000A is reset, or looses power prior to issuing the `cm save` command, any changes made using the remote unit will not be restored. Instead, the TE6000A restores the last changes saved to flash memory. Once the configuration is saved using the `cm save` command, the TE6000A automatically restores the saved settings when the unit is reset or powered up.

To Disable BISS

For a Service

Type `mux scram_en <service#> off` and press Enter.

At the System Level

Type `mux biss_en off` and press Enter.

Tiernan PGCA Overview

PGCA, Privacy Guard Conditional Access, is a Tiernan-proprietary conditional access scrambling system supported by all Tiernan DVB-compatible encoders and decoders.

PGCA is a fixed key scrambling system that is addressible. This means that the scrambling key is included in the transport stream, along with the list of individual decoder addresses authorized to descramble the transmission.

Using PGCA allows the uplink to control which decoders are authorized to receive the transmission, and what key is used to scramble the stream. The decoders automatically receive and process the authorization list. If they are authorized to receive the transmission, they extract the key and use it to descramble the service. If they are not authorized, they do not descramble or decode the service, and there is no output of video or audio from the decoder.

Although this is a fixed key system, the addressibility and in-band transmission of all information required to authorize and descramble the service is very powerful for controlling groups of IRDs and the services they are allowed to receive, without compromising the security by distributing the scrambling key in the clear to the decoders. The "fixed" key is programmable and can be changed by the uplink encoder operator if desired.

Managing the key and the decoder authorization list is simple to do using the encoder front panel menu or remote control commands. No control computer or special software is necessary. PGCA is included in all Tiernan DVB-compliant encoders and decoders as a standard feature, so there are no additional costs to use PGCA in a system.

High-level PGCA Procedure

PGCA is managed at an individual IRD level and enabled at the system level. To configure the TE6000A for PGCA operations, follow these steps:

1. Manage the IRD List.

a. Review the IRD conditional access list to ensure that all IRDs are listed and that all IRD information is correctly.

b. Add IRDs to the conditional access list, as needed.

A decoder's MAC address is required in order to create an authorized decoder database. This address must be entered in the following 16-character hexadecimal format. The TE6000A automatically enters the decimal points: `XX.XX.XX.XX.XX.XX.XX.XX`

If you do not know a decoder's MAC address, navigate through the decoder's front panel menu to locate the information:

- On the TDR600, TDR77, and TDR777 decoders, the MAC address is displayed on the `System>Status>ID:xxxxxxxxxxxxxxxx` menu.
- On the TDR7 and TD3 decoders, the MAC address is displayed on the `System>ID:xxxxxxxxxxxxxxxx` menu.
- On the TDR6 decoder, the MAC address is displayed on the `Control>Network>Addr:xxxxxxxxxxxx` menu.

  The MAC address on the TDR6 decoder is missing two bytes. To enter this number into the MAC address field when creating the authorized decoder database, simply add zeros to the most significant bits, for example: `00.00.xx.xx.xx.xx.xx.xx`

c. Delete IRDs from the conditional access list, if required

d. Enable and disable individual IRDs, as appropriate.

2. Enable PGCA at the System Level

e. Enable PGCA.

When PGCA is enabled, all current PGCA configuration settings are immediately implemented. As you enable and disable individual IRDs, those configuration settings are immediately implemented as well.

If you do not want the TE6000A to immediately implement your PGCA configurations settings, you should set Scramble to None, configure the individual IRDs, and, when ready to implement PGCA, set Scramble to PGCA .

f. Enter the PGCA Key.

g. For *front panel configurations*, PGCA is now enabled and will continue to use the current PGCA configuration until PGCA is disabled (tuned off) or the PGCA configuration is changed.

As with all other front panel configuration changes, PGCA changes are automatically saved and immediately implemented.

h. For *remote unit configuration*, the new PGCA configuration must be saved.


NOTE

During PGCA set-up and configuration, signals may be temporarily unscrambled.


NOTE

The high-level procedure for configuring PGCA from the front panel or a remote unit is the same, ***however***, at the detailed step-by-step level, there are a few important differences which must be followed. Before configuring the TE6000A from the front panel or remote unit, carefully read and follow these instructions.

Configuring PGCA from the Front Panel

Before you begin configuring the encoder for PGCA, you must have the TMA addresses for each of the decoders in your system.

To configure the TE6000A for PGCA, follow these steps:

Manage the IRD List

Review the IRD Conditional Access List

1. Review the IRD conditional access list to ensure that all IRDs are listed, all IRD information is correct, and that each IRD are correctly enabled and disabled.

   To review the IRD list, select Config>CA>PGCAcfg>LST IRD. The IRD List menu displays, showing the following information for each IRD: name of the IRD, it's MAC address, and if it is enabled (on) or disabled (off).

2. Add, deleted, and enable and disable IRDs as needed.

Add IRDs to the Conditional Access List, as Needed

3. From the PGCAcfg menu, select ADD IRD. The Name menu displays with the parameter `Name = 0`.
4. Enter the name for the IRD using the alpha-numeric keypad and press Enter.

   The Enter TMA Address menu displays.

5. Enter the 16-character MAC address for the IRD using the alphanumeric keypad. Press Enter.

   When the information is processed, the system returns to the Name menu.

6. Continue to add all IRDs to the conditional access list.
7. When you have finished adding IRDs to the conditional access list, press Exit to return to the PGCA menu.

Delete an IRD from the Conditional Access List, if Required

8. From the PGCAcfg menu, select DEL IRD. The IRD Delete menu displays.
9. Use the Up and Down buttons to scroll through the list and select the required IRD.
10. Press Enter. The LCD will display `Delete <IRD name> Yes [No]`
11. Ensure that the correct IRD name is displayed and select Yes.
12. Press Enter. When the information is processed, the system returns to the PGCA menu.

View the IRD Conditional Access List

13. View the IRD conditional access list to ensure that all IRDs are listed and that all IRD information was correctly entered.
14. From the PGCAcfg menu, select LST IRD. The IRD List menu displays.

    For each IRD, the following information is displayed: name of the IRD, it's MAC address, and if it is enabled (on) or disabled (off).

Enable and Disable Individual IRDs

15. From the PGCAcfg menu, select LST IRD. The IRD List menu displays.
16. Use the Up and Down buttons to scroll through the list and select the required IRD.
17. Enable or disable the selected IRD. Use the minus sign (-) on the alpha-numeric keypad to toggle between On and Off for the selected IRD.
18. Continue selecting IRDs and enabling/disabling each as required.
19. Press Enter. When the information is processed, the system returns to the PGCAcfg menu.

Enable PGCA at the System Level

Enable PGCA

20. From the main menu, select Config>CA>Setup>Service>Scramble>PGCA.

Enter the Scramble Key

21. Select PGCA KEY. Type in the key using the alpha-numeric keypad and press Enter.

TE6000A is Now Processing Data Using the Current PGCA Configuration

22. PGCA is now enabled and will continue to use the current PGCA configuration until PGCA is disabled or the PGCA configuration is changed.

To Disable PGCA at the System Level

To disable PGCA at the system level, select Config>CA>Setup>Service> Scramble>None.

Configuring PGCA from a Remote Unit

Before you begin configuring the encoder for PGCA, you must have the following:

- A remote unit with a communications program installed, such as ProComm.
- The TMA addresses for each of the decoders in your system.

Connect to a Remote Unit

1. Ensure that the remote unit has a communications program installed, such as ProComm.
2. Connect an RS-232 cable from the PC COM port 1 to the TE6000A RS-232 port.
3. Start the ProComm software. Configure ProComm to communicate via COM port 1 at a baud rate of 38400 bps.
4. Power on the encoder.
5. Wait for the main menu to display on the encoder's front panel.
6. ProComm should display various messages and then end with the prompt `>`.

   If the `>` prompt does not display, flip the DCE/DTE switch on the back of the TE6000A to the other position. Press the Enter key on the keyboard several times. The `>` prompt should display .

Enable PGCA at the System Level

1. Type `tca enable on` and press Enter.

   Note: PGCA cannot be enabled if BISS is enabled.

Enter the PGCA Scramble Key

2. Type `tca mask <value>` and press Enter.

Manage the IRD List

View the IRD Conditional Access List

3. Type `tca list` and press Enter.

Add IRDs to the Conditional Access List

4. Type `tca add <decoder name>@<decoder TMA Address>` and press Enter.

   Decoder names are limited to 15 characters in length or less. Decoders are automatically authorized when they are added to the list.
5. Repeat for all required decoders.

Delete IRDs from the Conditional Access List

6. Type `tca delete <decoder name>` and press Enter.
7. Repeat for all required decoders.

Enable Individual IRDs

An enabled, or authorized, decoder will be able to unscramble the incoming transmission from the encoder.

8. Type `tca auth <decoder name>` and press Enter.
9. Repeat for all required decoders.

Disable Individual IRDs

A disabled, or deauthorized, encoder will ***not*** be able to unscramble the incoming transmission from the encoder.

10. Type `tca deauth <decoder name>` and press Enter.
11. Repeat for all required decoders.

TE6000A is Now Processing Using the Current PGCA Configuration

12. PGCA is now enabled and will continue to use the current PGCA configuration until PGCA is disabled (tuned off) or the PGCA configuration is changed.

Save the Current PGCA Configuration

13. Save the current PGCA configuration to either:
    - Flash memory using the `CM Save` command
    - A user-defined configuration set, using the `cm create` and `cm save_cfg` commands.

    Any parameter changes, including conditional access changes, that are made using a remote unit are *not* automatically stored in flash memory. When the TE6000A configuration is changed using a remote unit, an operational test should be performed to verify that the system is operating correctly. Then the new configuration should be saved by issuing the CM SAVE command.

    If the TE6000A is reset, or looses power prior to issuing the CM SAVE command, any changes made using the remote unit will not be restored. Instead, the TE6000A restores the last changes saved to flash memory. Once the configuration is saved using the CM SAVE command, the TE6000A automatically restores the saved settings when the unit is reset or powered up.

To Disable PGCA at the System Level

14. Type `tca enable off` and press Enter.

PGCA Remote Unit Configuration Example

The following example shows how to add, delete, enable (authorize) and disable (de-authorize) decoders using a remote unit connected to a TE6000A. At the end of the example, the PGCA configuration is saved to flash memory.

In this example, the following assumptions apply:

- Two decoders already exist in the database; both are enabled for PGCA. The existing decoders are:
  - decoder1@11.22.33.44.55.66.77.88
  - decoder2@22.33.44.55.66.77.88.99
- Decoder1 will be disabled
- Decoder2 will be deleted from the database
- Three new decoders will be added to the database and remain authorized.

Enable PGCA

```
tca enable on
```

Enter the PGCA Scramble Key

```
tca mask <value>
```

Deauthorize decoder – decoder1 is disabled, or deauthorized

```
tca deauth decoder1
```

Remove decoder – decoder2 is deleted from the PGCA database

```
tca delete decoder2
```

Add decoders – three decoders are added to the PGCA database

```
tca add decoder3@33.44.55.66.77.88.99.00
tca add decoder4@44.55.66.77.88.99.00.11
tca add decoder5@55.66.77.88.99.00.11.22
```

When decoders are added to the database, they are automatically authorized, or enabled; therefore, these three new decoders do not have to be authorized using the `tca auth` command.

Review the IRD conditional access list to ensure it is correct

```
tca list
```

The TE6000A displays the following:

```
Decoder 0x586bd0
ID: 11.22.33.44.55.66.77.88
Auth: Deauthorized
Name: decoder1

Decoder 0x586dd0
ID: 33.44.55.66.77.88.99.00
Auth: Authorized
Name: decoder3

Decoder 0x586ad0
ID: 44.55.66.77.88.99.00.11
Auth: Authorized
Name: decoder4

Decoder 0x586cd0
ID: 55.66.77.88.99.00.11.22
Auth: Authorized
Name: decoder5
```

The list is correct, save the PGCA configuration changes to flash

```
cm save
```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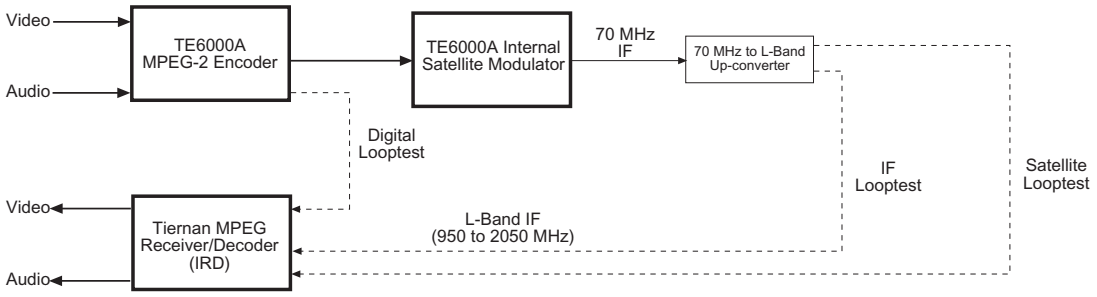
IF Looptest

D

An IF looptest is performed before installing the TE6000A and before sending the unit out for field deployment. The IF looptest helps you verify proper cabling and configuration of the equipment prior to beginning operations.

The looptest procedure is illustrated in the following diagram.



Required Equipment

The following equipment is required to perform an IF looptest using the front panel:

- IF to L-band upconverter
- A compatible integrated receiver/decoder (IRD) such as a TDR6 4:2:2 MPEG-2 receiver/decoder, or TDR777 4:2:0 MPEG-2 receiver/decoder
- Video source (test pattern generator, camera, VTR, or equivalent)
- Video input cable (BNC)
- Audio source (test tone generator, camera audio, VTR audio, or equivalent)
- Two audio input cables (analog or digital)
- ASI coaxial cable (BNC)
- Baseband video monitor (NTSC, PAL, or auto-detecting)
- Video output cable (BNC)
- Baseband audio monitor
- Audio output cables
- Modulator output cable (to cable the BNC connector output of the modulator to an upconverter)
- Looptest cable with an F-type connector to cable the upconverter to an IRD

You may also need other cables and test equipment, depending upon your site-specific installation and testing requirements.

Setting Up the TE6000A

Placement

To begin the IF looptest, set the unit on a stable bench or table-top, where you have easy access to the rear panel for cabling.

Cabling and Connections

To cable the TE6000A for an IF looptest perform the following steps.

1. Ensure that the TE6000A On/Off switch is in the Off position.
2. Connect the AC line cord to the TE6000A rear panel and then to an AC outlet.

   For U.S. and Canadian applications, use the IEC 320 power cord. For international applications, refer to Chapter 2 for power cord selection and installation.
3. Cable the video input to the TE6000A with a coaxial BNC compatible cable. The TE6000A provides both a serial digital connector and a composite analog input connector.
4. Cable the audio channel A input to the TE6000A with an XLR connector. The TE6000A provides analog audio A left and right connectors as well as a serial digital audio A connector.
5. Cable the audio channel B input to the TE6000A with an XLR connector. The TE6000A provides analog audio B left and right connectors as well as a digital audio B input connector.
6. Cable the ASI Out Primary transport output to the MOD ASI IN.
7. Cable the modulated output of the modulator from the TX IF OUT port to the L-band upconverter using the modulator output cable.
8. Cable the output of the upconverter to the appropriate input port of an IRD using the looptest cable.
9. Cable the video and audio outputs from the IRD to the appropriate output devices.


NOTE

For specific instructions on cabling and configuring the IRD, refer to the appropriate IRD operator manual.

Powering the Equipment

Once the cabling and interconnections for both the TE6000A and the selected IRD are completed, you may power-up the units. Ensure that the video and audio sources and output monitors are also powered-up and operating properly.

When the TE6000A is powered-up, the green power LED illuminates. The power-on cycle takes approximately 3-4 minutes to complete, as the TE6000A performs extensive self-diagnostics in this time period. During the power-up process, the TE6000A will display `Initializing`, and the Status LED may blink.

TE6000A Looptest Configuration

The TE6000A is now ready to be configured for an IF looptest. The steps required to configure the TE6000A are:

1. Initialize the TE6000A to the factory DVB default settings.
2. Select the video source.
3. Select the audio source.

Initializing to the DVB Defaults

To initialize the TE6000A to the DVB default settings using the front panel, perform the following steps.

1. From the main menu, select Config>Presets> Restore.
2. The Restore menu displays. Select DVB.

   The configuration option that appears on the LCD, for example DVB, is the current TE6000A configuration.

   Note: If the LCD initially displays `DVB`, as the selected configuration the TE6000A was initialized to the default DVB configurations. ***However***, some or all of the parameters may have been manually changed since the unit was initialized. To ensure that all of the TE6000A parameters are set to the default DVB configuration, scroll through the configuration options and select DVB.
3. Press Enter.
4. `Initializing` displays for a few seconds.
5. When the LCD displays the main menu, the TE6000A is set to the default DVB configuration.

Selecting the Video Source

Next, select the video source which will be used for the test. To select a video source:

1. From the main menu, select Config>Service>Video.
2. The Enable option, followed by the default setting, is displayed.
3. Scroll through the list until the Input Source parameters displays.
4. Select the required Input Source option and press Enter button. The selected parameter flashes for a few seconds. When it stops flashing, the TE6000A has set the parameter.

Selecting the Audio Source

After the video source is selected, the audio source is selected. To select an audio source, perform the following steps:

1. From the main menu, select Config>Service>Audio.
2. From the Audio menu select the type of audio input, either Digital or Analog. The LCD displays the selected audio menu.
3. Select the required audio slot option. The LCD displays the Enable option followed by its current setting.
4. Set the Enable option to On.

IRD Looptest Configuration

Once you have configured the TE6000A for the IF looptest, you must set the IRD to match the TE6000A configuration. To configure the IRD system parameters, refer to the operator's manual which accompanied that IRD, and perform the following steps:

1. Initialize the IRD to the DVB defaults.
2. Set the decoder RF frequency.
3. Set the decoder LO frequency.

   Once the RF and the LO frequencies are correctly set, you are ready to begin the IF looptest.

Performing the IF Looptest

After you have configured both the TE6000A and the IRD, check the IRD to ensure that the demod, decoder, and transport functions all display *locked*. If any of the functions display unlocked:

- Ensure that you have set the TE6000A and IRD parameters correctly
- Use the troubleshooting guide provided in this manual and in the IRD operator manual to isolate and correct any problems
- Contact Tiernan Customer Service if you need assistance

Once the IRD demod, decoder, and transport functions all display *locked*, continue to the operational fault check section.

Operational Fault Check

To perform an operational fault check, perform these steps:

1. Clear the fault history memory for both the TE6000A and IRD using the front panel menus.
2. Verify that the TE6000A Status LED is illuminated green, indicating normal operation with no faults.
3. The TE6000A is designed to present flawless video and audio. If the video is not clean, the audio is not clear, or if faults are occurring, use the troubleshooting chapter of this manual to correct any faults.

Testing the TE6000A Operational Features

While your system is configured for the IF looptest, you can also perform a few operational tests to evaluate the effectiveness of various parameters for your operations.

For example, you may want to observe video performance at resolutions other than 720 pixels per line, or you may want to disable audio channel B to allocate more transport bits to the video. Increased bits allocated to video will improve performance of fast moving complex video scenes passing through the compression system.

For a complete list of configuration commands and parameters, refer to the chapters on front panel and/or remote unit operations.

TE6000A Default Settings

E

This appendix provides the default settings for the TE6000A DVB and ATSC factory configurations. All parameter settings are the same for all factory defaults, except where noted.

The TE6000A is set to the DVB-compliant defaults at the factory.

Video Encoder Default Settings		
Parameter	**DVB and ATSC Defaults**	**Exceptions**
Data Rate Calc	Auto	—
Enable	On	—
Format Mode	Auto	—
Optimize	Quality	—
PID	33 decimal	—
Resolution	720	—
Data Rate	■ if analog: 7.443 Mbps ■ if digital: 8.0563 Mbps	—
Chroma	4:2:0	—
Timebase	Video Input	—
Source	Analog	—
PGCA	Off	—

Audio Encoder Default Settings		
Parameter	**DVB and ATSC Defaults**	**Exceptions**
Audio Channel A		
Enable	■ if digital audio: off ■ if analog audio: on	—
Compression	MPEG	—
Data Rate	256 Kbps	—
Format	Stereo	—
PID	36 decimal	—
Sample Rate	48 KSps	—
Source	Analog	—
Lip Sync	0 msec	—

Audio Encoder Default Settings (continued)		
Parameter	**DVB and ATSC Defaults**	**Exceptions**
Audio Channel B		
Enable	■ if digital audio: off ■ if analog audio: on	—
Compression	MPEG	—
Data Rate	256 Kbps	—
Format	Stereo	—
PID	37 decimal	—
Sample Rate	48 KSps	—
Source	**Analog**	—
Lip Sync	**0 msec**	—

Aux Data Channels Default Settings		
Parameter	**DVB and ATSC Defaults**	**Exceptions**
Aux Data Channel A		
Enable	Off	—
Communication Mode	Asynchronous	—
Interface	RS-232	—
Data Rate	102400 bps	—
Baud	38400 bps	—
Data Bits	8	—
Parity	none	—
Stop Bits	1	—
Clock Source	Internal	—
PID	42 decimal	—
Aux Data Channel B		
Enable	Off	—
Communication Mode	Asynchronous	—
Interface	RS-232	—
Data Rate	102400 bps	—
Baud	38400 bps	—
Data Bits	8	—
Parity	none	—
Stop Bits	1	—
Clock Source	Internal	—
PID	42 decimal	—

Multiplexer TTX Output Default Settings		
Parameter	**DVB and ATSC Defaults**	**Exceptions**
Program Clock Reference (PCR) PID	8190	—
Mode	SCPC	—
Redundant State	Standby	—
Rate Calc	Auto	—
Table Types	—	DVB: DVB ATSC: ATSC
Local Input	Enable	—
Locally Generated Transport Stream	8.448 Mbps	—
SMPTE Output	Disable	—
Output	8.448 Mbps	—

Modulator Factory Default Settings		
Parameter	**DVB and ATSC Defaults**	**Exceptions**
Internal Transport Stream Data Rate	8.448 Mbps	—
Viterbi Rate	5/6	—
Transmit Power	−5.0 dBm	—
Transmit Frequency	70.0 MHz	—
Transmit (RF) Output	On	—
Spectrum Inversion	Normal	—
Symbol Rate	5.500187 MSps	—
Transmit Enabled	Off	—
Transmit Source	Backplane	—

PSI/SI Tables Default Settings		
Parameter	**DVB and ATSC Defaults**	**Exceptions**
Event Information Table (EIT)		
Enable	On	—
PID	18	—
Transmission Interval	15 dsec	—
Network Information Table (NIT)		
Enable	On	—
FEC Convolution Code Rate	5/6	—
Network ID	0	—
Network Name	MPEG−2 Encoder	—
PID	16	—
Satellite Frequency	011.75725 GHz	—
Satellite Modulation Scheme	QPSK	—
Satellite Orbital Position	019.2° West	—
Signal Polarization	Vertical	—
Symbol Rate	005.5002 MSps	—
Transmission Interval	15 dsec	—
Program Association Table (PAT)		
Enable	On	—
PID	0	—
Program Number	—	DVB: 1 ATSC: 2
Transmission Interval	1 dsec	—
Transport Stream ID	1	—
Program Map Table (PMT)		—
Enable	On	—
PID	32 decimal	—
Transmission Interval	1 dsec	—
Service Description Table (SDT)		
Enable	On	—
PID	17 decimal	—
Service Name	—	DVB: Service 1 ATSC: Ch2
Service Provider	Unnamed	—
Transmission Interval	15 dsec	—
Enable	Off	—
PID	20 decimal	—
Transmission Interval	100 dsec	—

Remote Control Port Default Settings		
Parameter	**DVB and ATSC Defaults**	**Exceptions**
Baud rate	38400 bps	—
Data bits	8	—
Stop bits	1	—
Parity	None	—
Flow control	Software XON/XOFF	—
Communication method	Full duplex	—

Network Default Settings		
Parameter	**DVB and ATSC Defaults**	**Exceptions**
IP Address	0.0.0.0	—
IP Mask	225.225.0.0	—
IP Router	0.0.0.0	—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TE6000A PID Assignments

F

The TE6000A automatically sets PID assignments. This automatic assignment of PIDs is the same across MPEG, DVB, and ATSC table modes, and follows the ATSC PID assignment rules, which are compatible with DVB and MPEG.

Automatic PID assignment is performed according to the following rules:

- PID calculations are performed in hex (h).
- A program's base PID is assigned by multiplying the program number by 10h.
- The program mapping table (PMT) is created from the program's base PID, according to the following rules:
  - PMT equals the base PID
  - Video and program clock reference (PCR) are base +1
  - Audio A is base + 4
  - Audio B is base + 5
  - Audio C is base + 6
  - Audio D is base + 7
  - Audio E is base + 1000 hex (4096 decimal)
  - Audio F is base + 1001 hex (4097 decimal)
  - Audio G is base + 1002 hex (4098 decimal)
  - Audio H is base + 1003 hex (4099 decimal)
  - Auxiliary Data A is base + A hex (10 decimal)
  - Auxiliary Data B is base + B hex (11 decimal)

For example, for a service with a program number of 2, the following PIDs are automatically assigned:

- Program's base PID is 20 hex (2h x 10h = 20 hex)
- PMT, which equivalent to the base PID, is PID 20 hex or 32 decimal
- Video and PCR are 21 hex or 33 decimal (20h + 1 = 21 hex)
- Audio A is 24 hex or 36 decimal (20h + 4 = 24 hex)
- Auxiliary Data A is 2A hex or 42 decimal (20h +10d = 2A hex)

In addition, for full compatibility between ATSC and DVB PID assignments, program number 1 should not be used. Using this program number will cause a conflict between the elementary stream PID assignments and DVB table PID assignments.

For a listing of additional default PID assignments, refer to Appendix B.


TIERNAN
A Radyne ComStream Company

Table Top and Rack Mount Installation Instructions

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This appendix presents step-by step instructions for the installation of Tiernan 1U, 2U, and 4U products. Instructions are presented for installing products:

- On a table top
- Using front rack mount brackets
- Using rear rack mount brackets

Table Top Instructions

To install a Tiernan unit on a tabletop or other flat surface, install the rubber feet included in the shipping kit, or place the unit on a rubber mat or other material that will prevent the unit from sliding and protect the table top surface.

Ensure that the unit is placed on a stable surface of sufficient size and strength where it will not be jarred or pushed off its surface. Ensure that all cables and cords are out of the way and that they will not be tripped over, as this may cause personal injury or serious damage to the unit.

To install the rubber feet, perform these steps:

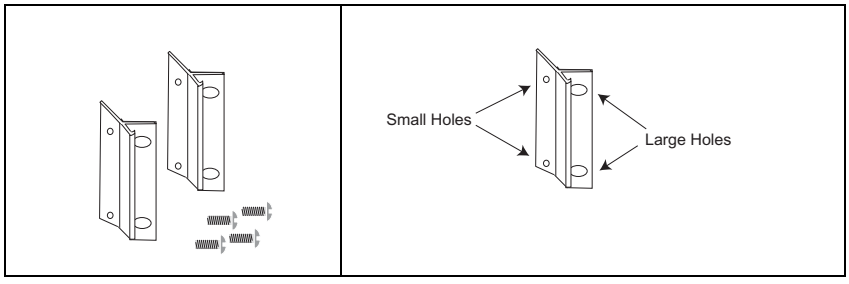
1. Ensure that there are four rubber feet included in the shipping kit.
2. Break the feet apart from one another. Working with one rubber foot at a time:
   a. Remove the protective backing
   b. Place the foot under one corner of the unit, with the sticky side against the unit.
   c. Press the foot firmly against the unit. When you are finished, there should be one rubber foot under each corner of the unit.
3. Ensure that the unit's location and position provide the minimum required air flow clearance.

Front Rack Mount Instructions

To install a Tiernan unit in a standard 19-inch equipment rack using front mounting brackets, perform these steps:

1. Ensure that there are two brackets and 4 screws in the front bracket kit.

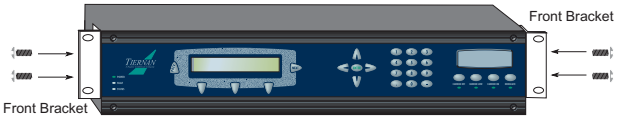
   One side of each bracket has small holes while the other side has large holes. The small holes are counter-sunk on one side. The side which is ***not*** counter-sunk is placed against the unit.



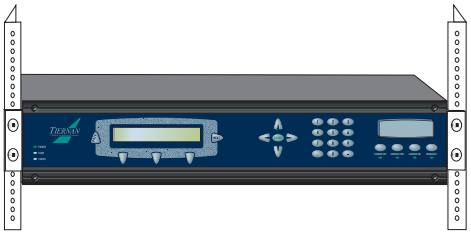
NOTE

The 4U unit contains 8 screws in the shipping kit. One side of each bracket has four small holes while the other side has two large holes.

2. Attach the brackets to both sides of the unit:
   a. Line up the small holes on the bracket with the unit's mounting holes, which are located towards the front of each side panel.
   b. Thread all of the screws through the bracket's small holes and into the Tiernan unit. The screws should be flush with the bracket when tightened.



3. Mount the unit in the rack by attaching the front brackets to the rack using your own washers and bolts.

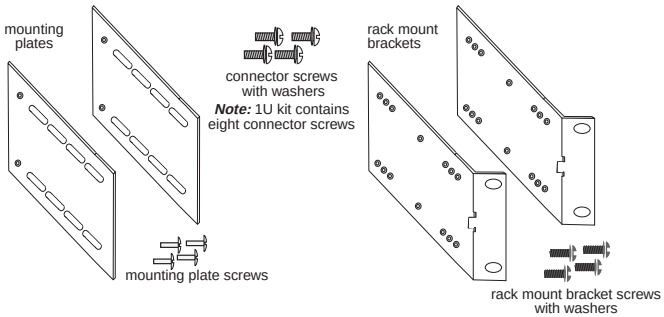


4. Ensure that the installation provides the minimum required air flow clearances at the sides and rear of the unit.

Rear Rack Mount Instructions

The rear rack mount kit contains the following items:

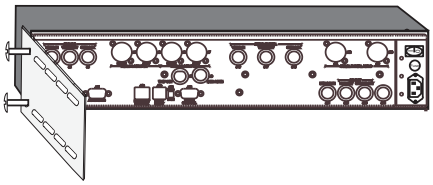
- Two mounting plates
- Two rack mount brackets
- Four mounting plate screws
- Four connector screws with attached washers. ***Note***: the 1U ship kit contains eight connector screws.
- Four rack mount bracket screws with attached washers



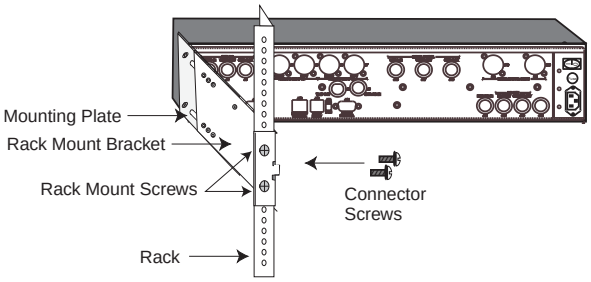
Rear Rack Bracket Mounting Instructions

To install a Tiernan unit in a standard 19-inch equipment rack using rear mounting brackets, perform the following steps:

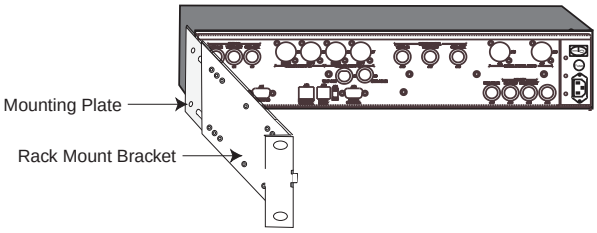
1. Attach the mounting plates to both sides of the unit:
   a. The mounting plates have a series of oblong slots and two small holes which are counter-sunk on one side. The side which in ***not*** countersunk is placed against the unit.
   b. Line up the small holes on the mounting plate with the mounting holes located on the unit towards the rear of each side panel.
   c. Thread a mounting screw through the bracket and into the Tiernan unit. The screw should be flush with the plate when tightened.



2. Align the rack mount bracket with the mounting plate. The rack mount bracket should lie flat against the outside of the mounting plate with the bracket nuts facing away from the mounting plate. The top and bottom of the bracket and plate should be even and the bracket holes should line up with the mounting plate slots.



3. Attach the rack mount brackets to the rack using the rack mount bracket screws.
4. Attach the mounting plate to the rack mount bracket using ***all*** provided connector screws. 2U and 4U units use two connector screws per bracket, 1U units use four connector screws per bracket. Screws are inserted from the inside of the bracket.



5. Ensure that the installation provides the minimum required air flow clearances at the sides and rear of the unit.

Safety Precautions

If rack-mounted units are installed in a closed or multi-unit rack, consider the following items; further evaluation by a Certifying Agency may be required.

Ambient Temperature The ambient temperature within the rack may be greater than the room's ambient temperature. When installing the unit, ensure that the required air flow for safe operation is provided.

Rack Stability During installation, consider weight distribution on the rack; hazardous stability conditions may arise if units are loaded into the rack unevenly.

Input Supply Overloading of supply circuits could impact over-current protection and supply wiring. To ensure that supply circuits are not overloaded review the nameplate ratings.

Grounding Reliable grounding of this equipment must be maintained. Pay particular attention to supply connections when connecting to power strips, rather than direct connections to the branch circuit.

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