TES-8643 User Guide

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Our mission is to:

1. Provide a Superior Customer Experience
    - offer the best product quality and support
2. Make Cool Practical Technology
    - develop great products that customers love

Ross has become well known for the Ross Video Code of Ethics. It guides our interactions and empowers our employees. I hope you enjoy reading it below.

If anything at all with your Ross experience does not live up to your expectations be sure to reach out to us at *solutions@rossvideo.com*.

David Ross
CEO, Ross Video
dross@rossvideo.com

Ross Video Code of Ethics

Any company is the sum total of the people that make things happen. At Ross, our employees are a special group. Our employees truly care about doing a great job and delivering a high quality customer experience every day. This code of ethics hangs on the wall of all Ross Video locations to guide our behavior:

1. We will always act in our customers' best interest.
2. We will do our best to understand our customers' requirements.
3. We will not ship crap.
4. We will be great to work with.
5. We will do something extra for our customers, as an apology, when something big goes wrong and it's our fault.
6. We will keep our promises.
7. We will treat the competition with respect.
8. We will cooperate with and help other friendly companies.
9. We will go above and beyond in times of crisis. *If there's no one to authorize the required action in times of company or customer crisis - do what you know in your heart is right. (You may rent helicopters if necessary.)*

TES-8643 · User Guide

- Ross Part Number: 8643DR-004-09
- Release Date: May 6, 2020.

The information contained in this Guide is subject to change without notice or obligation.

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Patents

Patent numbers US 7,034,886; US 7,508,455; US 7,602,446; US 7,802,802 B2; US 7,834,886; US 7,914,332; US 8,307,284; US 8,407,374 B2; US 8,499,019 B2; US 8,519,949 B2; US 8,743,292 B2; GB 2,419,119 B; GB 2,447,380 B; and other patents pending.

Notice

The material in this manual is furnished for informational use only. It is subject to change without notice and should not be construed as commitment by Ross Video Limited. Ross Video Limited assumes no responsibility or liability for errors or inaccuracies that may appear in this manual.

Safety Notices

Refer to the "**Important Regulatory and Safety Notices**" document that accompanied your product.

Statement of Compliance

This product has been determined to be compliant with the applicable standards, regulations, and directives for the countries where the product is marketed.

Compliance documentation, such as certification or Declaration of Compliance for the product is available upon request by contacting techsupport@rossvideo.com. Please include the product; model number identifiers and serial number and country that compliance information is needed in request.

EMC Notices

US FCC Part 15

This equipment has been tested and found to comply with the limits for a class A Digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a Commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio

communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

> **Notice** — *Changes or modifications to this equipment not expressly approved by Ross Video Ltd. could void the user's authority to operate this equipment.*

Canada

This Class "A" digital apparatus complies with Canadian ICES-003 and part 15 of the FCC Rules.

Cet appareil numerique de la classe "A" est conforme a la norme NMB-003 du Canada.

European Union

This equipment is in compliance with the essential requirements and other relevant provisions established under regulation (EC) No 765/2008 and Decision No 768/2008/EC referred to as the "New Legislative Framework".

> **Warning** — *This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.*

Australia/New Zealand

This equipment is in compliance with the provisions established under the Radiocommunications Act 1992 and Radiocommunications Labeling (Electromagnetic Compatibility) Notice 2008.

Korea

This equipment is in compliance with the provisions established under the Radio Waves Act.

Class A equipment (Broadcasting and communications service for business use)

This device is a business-use (Class A) EMC-compliant device. The seller and user are advised to be aware of this fact. This device is intended for use in areas outside home.

Type of Equipment	User's Guide
A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
Class A Equipment (Industrial Broadcasting & Communication Equipment)	This equipment is **Industrial (Class A) electromagnetic wave suitability equipment** and seller or user should take notice of it, and this equipment is to be used in the places except for home.

International

This equipment has been tested under the requirements of CISPR 22:2008 or CISPR 32:2015 and found to comply with the limits for a Class A Digital device.

> **Notice** — *This is a Class A product. In domestic environments, this product may cause radio interference, in which case the user may have to take adequate measures.*

Maintenance/User Serviceable Parts

Routine maintenance to this openGear product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the numbers listed under the "**Contact Us**" section of this manual. All openGear products are covered by a generous 5-year warranty

and will be repaired without charge for materials or labor within this period. See the "**Warranty and Repair Policy**" section in this manual for details.

Environmental Information

The equipment may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.

If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration. You can also contact Ross Video for more information on the environmental performances of our products.

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Contents

Introduction

This guide covers the installation and use of the TES-8643 3G/HD/SD VANC Processor. The following chapters are included:

- "**Introduction**" summarizes the guide and provides important terms, and conventions.
- "**Before You Begin**" provides general information to keep in mind before installing and configuring your TES-8643.
- "**Hardware Overview**" provides a basic introduction to the TES-8643 hardware features.
- "**Physical Installation**" provides instructions for the physical installation of the TES-8643.
- "**Cabling**" provides basic cabling information for set ting up the TES-8643 as an encoder or decoder.
- "**Using DashBoard**" provides an overview of launching DashBoard and accessing the TES-8643 interfaces in the DashBoard window.
- "**Basic Configuration**" provides instructions for setting up a network connection on the card, specifying a timing source, configuring the video outputs, and setting up communications between the card and external devices.
- "**ANC Encoding and Decoding**" outlines how to configure the encoding and decoding features of the TES-8643 in a transparent stream.
- "**SCTE 104 Messages**" outlines how to configure the TES-8643 to manage SCTE 104 messages.
- "**Data Ports Configuration**" outlines how to configure serial and ethernet communication.
- "**Using a Port Expander**" describes how to set up the TES-8643 and the Comtrol® DeviceMaster® to work together.
- "**DashBoard Menus**" provides a brief summary of the menus available for the TES-8643 in DashBoard.
- "**Configuration Example**" provides an example of how to include the TES-8643 in a simple data distribution system.
- "**Software Upgrades**" outlines how to upgrade the software on the TES-8643 using the options in DashBoard.
- "**Technical Specifications**" provides the specifications for the TES-8643.
- "**Software Licenses**" provides third-party software license information for your TES-8643.
- "**Service Information**" provides information on the warranty and repair policy for your TES-8643.
- "**Glossary**"provides a list of terms used throughout this guide.

Related Publications

It is recommended to consult the following Ross documentation before installing and configuring your TES-8643:

- ***DashBoard User Manual***, Ross Part Number: 8351DR-004
- ***MFC-OG3-N User Manual***, Ross Part Number: 8322DR-004
- ***OGX-FR User Manual***, Ross Part Number:

Documentation Conventions

Special text formats are used in this guide to identify parts of the user interface, text that a user must enter, or a sequence of menus and sub-menus that must be followed to reach a particular command.

Interface Elements

Bold text is used to identify a user interface element such as a dialog box, menu item, or button. For example:

In the **Network** tab, click **Apply**.

User Entered Text

Courier text is used to identify text that a user must enter. For example:

In the **Language** box, enter **`English`**.

Referenced Guides

Text set in bold and italic represent the titles of referenced guides, manuals, or documents. For example:

For more information, refer to the ***DashBoard User Manual***.

Menu Sequences

Menu arrows are used in procedures to identify a sequence of menu items that you must follow. For example, if a step reads "**File** > **Save As**," you would click the **File** menu and then click **Save As**.

Important Instructions

Star icons are used to identify important instructions or features. For example:

✶ Contact your IT department before connecting to your facility network to ensure that there are no conflicts. They will provide you with an appropriate value for the IP Address, Subnet Mask, and Gateway for your device.

Contacting Technical Support

At Ross Video, we take pride in the quality of our products, but if problems occur, help is as close as the nearest telephone.

Our 24-hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support is provided directly by Ross Video personnel. During business hours (Eastern Time), technical support personnel are available by telephone. After hours and on weekends, a direct emergency technical support phone line is available. If the technical support person who is on call does not answer this line immediately, a voice message can be left and the call will be returned shortly. This team of highly trained staff is available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

- **Technical Support**: (+1) 613-652-4886
- **After Hours Emergency**: (+1) 613-349-0006
- **E-mail**: techsupport@rossvideo.com
- **Website**: http://www.rossvideo.com

Before You Begin

Should you have a question pertaining to the installation or operation of your TES-8643, please contact us at the numbers listed in "**Contacting Technical Support**" on page 12. Our technical support staff is always available for consultation, training, or service.

Product Overview

The TES-8643 is a broadcast-quality ancillary data encoder/decoder for uncompressed digital video signals. It operates with signals that comply with SMPTE 424M, SMPTE 292M, and SMPTE 259M. The TES-8643 can be used to add the data to the digital video stream, or extract it, or both.

The TES-8643 can be part of a system that allows data to be inserted into the VANC (Vertical Ancillary) area of an SDI video signal for distribution over a video network. This method of data embedding ensures that the data follows the video signal wherever it is routed. Eventually, the video signal reaches a location where the data is extracted and processed.

The TES-8643 inserts data having various formats and purposes into the vertical ancillary (VANC) space of its video input signal. These VANC data streams comply with SMPTE 291M and SMPTE 334M.

The TES-8643 is also capable of extracting VANC data from its video input signal. This allows it to forward the data to other systems, and combine locally generated data with that already carried in the input.

You can also use the TES-8643 to encode SMPTE 104 messages into VANC in accordance with SMPTE 2010-2008. The SMPTE messages can be source from either the serial port or a TCP/IP connection. In addition to sourcing from a port, the GPIs can be configured to trigger up to 8 pre-determined triggers.

These facilities allow the TES-8643 to perform a number of functions:

- Inserting data received from one or more of the data ports into the video. This is normally called "encoding", "inserting" or "embedding".
- Extracting data from the video and forwarding it to one or more data ports. This is normally called "decoding", "extracting" or "disembedding".
- Deleting selected data from the video.

Features

The following features are standard on the TES-8643:

- Accepts 1080p, 1080i, 720p, 480i, and 576i
- Simultaneous use of data input and output over LAN, and Serial
- Bypass relay protection
- Bypass relay is controllable in DashBoard
- Ample status for easy signal troubleshooting
- Reports status and configuration remotely via DashBoard
- Compatible with DataSafe
- Fully compliant with openGear specifications
- 5-year transferable warranty

ANC Encoding and Decoding Features

- VANC insertion and extraction as per SMPTE 334M
- Supports four encode data services, plus four transparent decode data services, and one SCTE 104 encode/decode service

- Ability to append a data service to others that are already present in a line, without delaying the existing services
- Multiple packet per line VANC encoding/insertion at megabit rates
- Ability to locate incoming VANC packets by DID-SDID, regardless of their line number
- Ability to mark existing packets for deletion
- Deletion of all VANC on selected lines
- Supports SMPTE 12M Linear Timecode (LTC) on the Serial port or via a GPI port

SCTE 104 Messages Encoding and Decoding

- Identifies the occurrence of an SCTE 104 trigger, either by recognizing the splice-insert commands or simply by detecting the present of the trigger Program ID (PID)
- Monitor up to 8 selected PIDs and associate them with eight GPIO outputs, allowing you to monitor multiple services with one TES-8643 card
- Can be set to match on specific values of the `splice_insert_ID` code in addition to the PID, for additional flexibility
- Each GPIO can indicate either the presence or absence of the a specified PID
- Each GPIO output can be specified to either close for the full duration of a trigger, or pulse briefly to indicate the start or end of a trigger
- An on-board log of the last 24 trigger events can be browsed from DashBoard
- Ability to repeat the last SCTE 104 splice message
- Support for SCTE 104 GPIO controls via SNMP
- Supports SMPTE 104 DTMF messages via a GPIO port

Functional Block Diagram

Figure 1.1 shows the flow of video and data through the TES-8643.

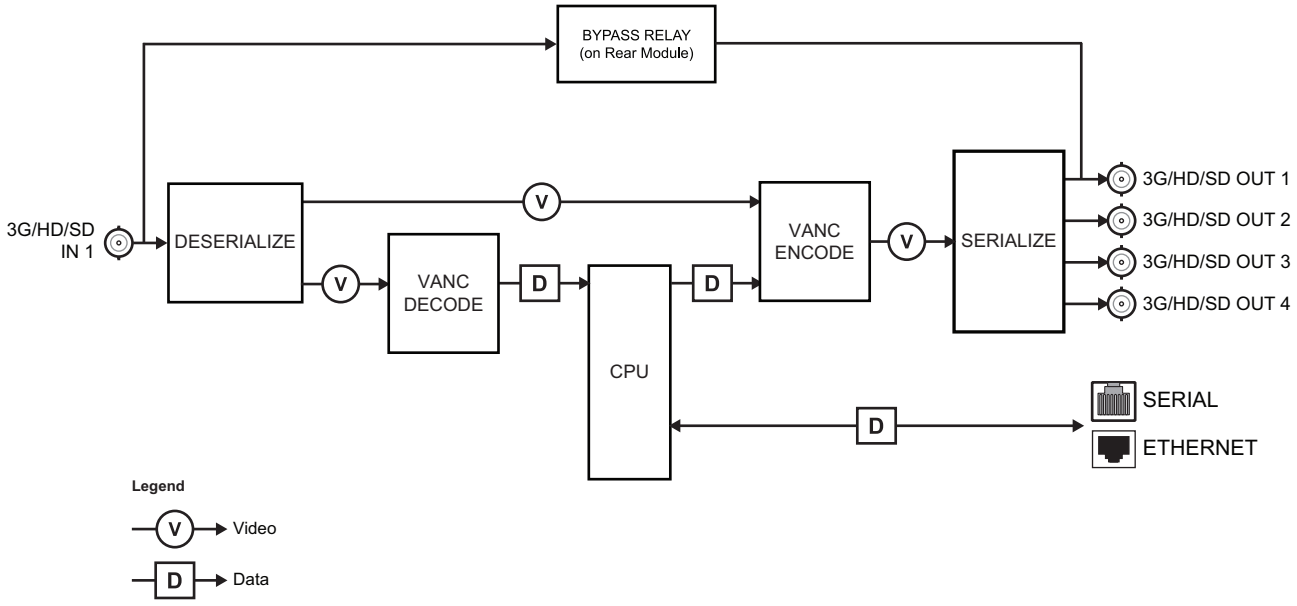


Figure 1.1 TES-8643 — Simplified Block Diagram

Figure 1.1 shows that a channel is equipped with a VANC decoder that provides extracted data to the CPU, and a VANC encoder that accepts data from the CPU for insertion into the video. The CPU also has access to a serial and Ethernet data port.

Workflow Overview

The VANC Processor is able to simultaneously insert and extract four data streams. Decode and encode operation and bandwidth usage are independent. Bandwidth for each is limited to just under 4kB/field including overhead (approximately 2Mbps of user data with maximum size packets at 60Hz). These eight data streams may be delivered via the network connection (**Ethernet** port) or one may be through the **Serial** port.

Transparent Encoding

The VANC Processor of the TES-8643 allows insertion in any line[1] component of the VANC space that is defined for the video format (but not outside the VANC area). You can assign each data service to any valid line and component, including having any or all services share a single line and component. The VANC Processor allows you to specify whether to insert locally sourced data services after existing VANC data (append), or completely blank the line before inserting (overwrite).

Delay

Locally sourced data appears in the output stream with up to a one field delay. The upstream VANC data in the SDI input that are not processed, or that are simply marked for deletion, have a minimal delay equal to the SDI path length of the TES-8643.

Encode Overflow

If a line is not marked for deletion, then locally appended data may overflow the line. In this case the locally appended data will be appended in the next available VANC space. Additionally, a high capacity stream may exceed the space available in a single line, so again it is inserted in the next available VANC space. High capacity data should always be inserted on lines after other data services. We recommend >5lines after the switch-line.

VANC Deletion

The VANC Processor is able to 'mark for deletion' all incoming VANC packets having the same DID/SDID as services that are being inserted, regardless of their location in the VANC lines. This feature is automatically enabled for each DID/SDID used for insertion, to ensure that the output does not contain an unintended combination of upstream and locally inserted data bearing the same DID/SDID. The software has the ability to disable deletion for selected services, for example to allow an upstream data service to pass through when local insertion is paused.

★ If an incoming service is carried in a line that is set for deletion, it will be deleted rather than just marked for deletion

Transparent Decoding

You can specify services to be decoded and forwarded to a data port (Serial or Ethernet), by specifying the DID and SDID values. The TES-8643 finds and decodes these services, regardless of the line and luma/chroma component where they are carried in the SDI input.

User Interfaces

The TES-8643 includes the following user interfaces.

DashBoard

DashBoard enables you to monitor and control openGear frames and cards from a computer. DashBoard communicates with cards in the openGear frame through the Network Controller Card. This controller card is required in order to use DashBoard to monitor the TES-8643. The DashBoard software and manual are available for download from our website

1. Encodes into luma channel when using an HD or 3G signal. SD combines the luma and chroma components to form a single channel.

✶ Ross Video recommends using the MFC-8320-N, the MFC-8322-N, or MFC-OG3-N Network Controller Card for optimal performance especially when multiple TES-8643 are installed in one frame. An MFC-8320-S Controller Card can be used, but you may encounter delays in updating settings in DashBoard and upgrading the card software.

For More Information on...

- setting up and using the Network Controller Card, refer to the ***MFC-OG3 Series User Manual***.
- the TES-8643 menus in DashBoard, refer to refer to the section "DashBoard Menus" on page 69.

Card-edge Controls

The front-edge of the card features LED indicators for input status and communication activity. The card also includes a 3-position jumper block used to configure the termination on the local reference input.

For More Information on...

- the card-edge controls, refer to the section refer to the section "Card Overview" on page 17.
- the LEDs, refer to the section refer to the section "Card-edge LEDs" on page 18.

SNMP Monitoring and Control

The Network Controller card in the openGear frame provides optional support for remote monitoring of your frame and the TES-8643 using Simple Network Management Protocol (SNMP), which is compatible with many third-party monitoring and control tools.

For More Information on...

- enabling SNMP Monitoring and Control for your frame, refer to the ***MFC-OG3 Series User Manual***.
- SNMP controls for your card, refer to its Management Information Base (MIB) file.

Hardware Overview

This chapter provides an overview of the controls available on the TES-8643. (**Figure 2.1**)

Card Overview

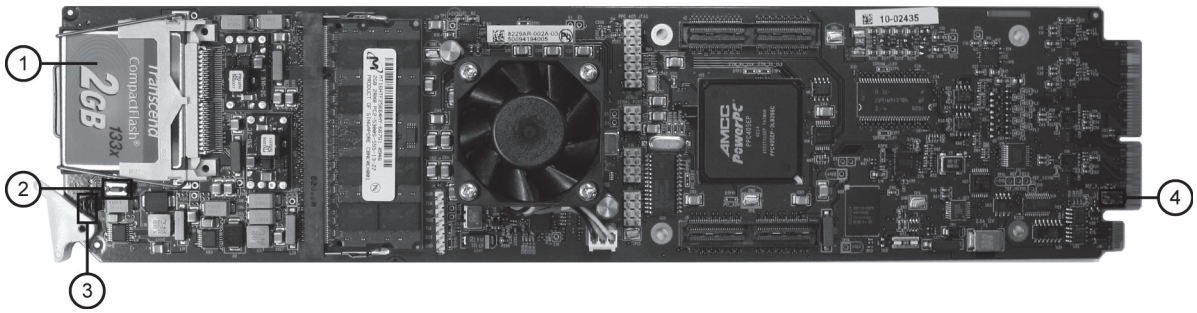


Figure 2.1 Components

1) CompactFlash™ Card	2) JP5, JP6
3) Board Reset Button (SW1)	4) Reference Termination (JP7)

1. CompactFlash™ Card

The CompactFlash™ card is not implemented on the TES-8643.

2. Board Reset Button (SW1)

Pressing this button resets the microprocessor and re-initializes the card. This is a hard reset of the card and unsaved settings are not retained. This may cause loss of data and should only be performed as advised by Ross Video Technical Support.

3. JP5, JP6

These jumpers are not yet implemented and must be left in the default position of **Pin 2** (center) and **Pin 3** (bottom).

4. Reference Termination (JP7)

JP7 is a 3-position jumper block used to configure the 75ohm termination on the local reference input on **BNC 9**.

› **Pin 1** (left) + **Pin 2** (center) position — In this position, the reference is terminated with a 75ohm resistor. This configuration is to be used for point-to-point cabling, or on the last card of a daisy chain topology. This is the default position. Refer to **Figure 2.2** for pin positions.

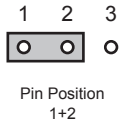


Figure 2.2 J7 — Default Position

› **Pin 2** (center) + **Pin 3** (right) position — In this position, the 75ohm termination is removed and the reference is not terminated. This configuration is used in a daisy chain cabling topology where only the last card is to be terminated.

Card-edge LEDs

This section describes the card-edge LEDs. Refer to **Figure 2.3** for LED locations.

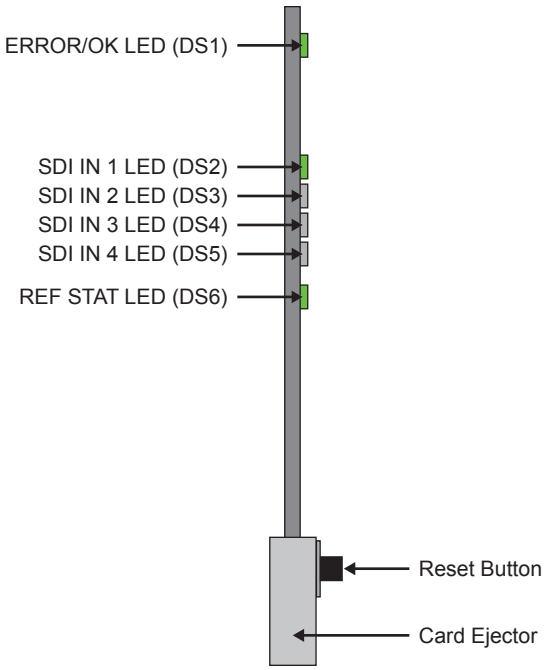


Figure 2.3 Card-edge LEDs

Table 2.1 LEDs on the Card-edge

LED	Color	Display and Description
ERROR/OK	Green	When this LED is green, the card is in normal operation with no errors.
	Red	When this LED is red, the card is experiencing internal errors.
	Off	When this LED is off, there is no power to the card.
SDI IN 1	Green	When this LED is green, the IN 1 video input is valid.
	Red	When this LED is red, the IN 1 input is not present or is invalid.
SDI IN 2	This LED is not implemented.	
SDI IN 3	This LED is not implemented.	
SDI IN 4	This LED is not implemented.	
REF STAT	Green	When this LED is green, the reference signal is valid.
	Red	When this LED is red, the reference signal is not present or is invalid.

Supported Rear Modules

Note that each rear module accommodates one card and occupies four slots in the frame. The following rear module is supported:

- **8320AR-055** Full Rear Module — This rear module provides one SDI input, four SDI outputs, a reference input, a serial port, and an ethernet port. The 8320AR-055 also includes a bypass relay between **IN 1** and **OUT 1**.

Figure 2.4, and the rear module label, summarize the cabling designations for the 8320AR-055.

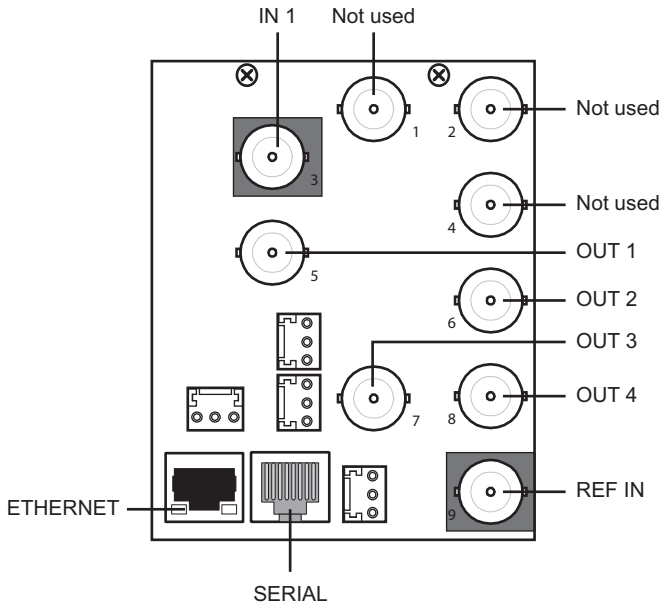


Figure 2.4 Cable Connections for the 8320AR-055

For More Information on...

- the bypass relay, refer to the section "**Bypass Relay**" on page 24.

Physical Installation

This chapter provides instructions for the basic physical installation of your TES-8643.

Before You Begin

Before you begin, ensure that you are using DashBoard version 6.2.0 or higher. The DashBoard software and user manual are available to download from the Ross Video website.

Static Discharge

Throughout this chapter, please heed the following cautionary note:

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Unpacking

Unpack each card you received from the shipping container and ensure that all items are included. If any items are missing or damaged, contact your sales representative or Ross Video directly.

Installing the TES-8643

This section provides a brief overview of the physical installation of the TES-8643 which includes installing the rear module and the card into an openGear frame. If the rear module and card are already installed, proceed to the chapter "**Cabling**" on page 23.

Installing the Card

If the rear module is already installed, proceed to the section "**To install the card in an openGear frame**".

To install the rear module in an openGear frame

1. Ensure that the openGear frame is properly installed. Refer to the manual for your frame for details.
2. When installing the rear module, use one of the following slot combinations:
   - Slots 1, 2, 3, 4
   - Slots 5, 6, 7, 8
   - Slots 9, 10, 11, 12
   - Slots 13, 14, 15, 16
   - Slots 17, 18, 19, 20
3. Remove the Blank Plates from the rear of the selected card frame slots. You will need to remove two blank plates for each rear module.
4. Seat the bottom of the rear module in the seating slot at the base of the frame's backplane.
5. Align the top hole of the rear module with the screw hole on the top-edge of the frame backplane.
6. Verify that the card aligns with the rear module before fully tightening any of the slot screws.
7. Using a Phillips screwdriver and the supplied screw, fasten the rear module to the backplane. Do not over tighten.
8. Ensure proper frame cooling and ventilation by having all rear frame slots covered with rear modules or Blank Plates.

To install the card in an openGear frame

1. Install the card in slot 2, 6, 10, 14, or 18. The slot number is dependent on the slot combinations you installed the rear module in. This allows adequate spacing to avoid damaging the card, the cards installed in the neighboring slots, or both.
2. Hold the card by the edges and carefully align the card edges with the rails in the frame.
3. Fully insert the card into the frame until the card is properly seated in the rear module.
4. Verify whether your rear module label is self-adhesive by checking the back of the label for a thin wax sheet. Remove the wax sheet before applying the label.
5. Affix the supplied rear module label to the rear module face.

Cabling

This chapter outlines the cabling designations for the TES-8643.

Getting Started

This section briefly outlines the steps to cable the TES-8643 as an encoder or as a receiver.

To install the TES-8643 as an encoder

If you plan to use the TES-8643 as an encoder, proceed as follows:

1. Connect the equipment providing the video signal source to the **IN 1** connector on the TES-8643 rear module.
2. Connect the **OUT 1** connector on the TES-8643 rear module to the equipment that is to receive the video signal with the inserted VANC data.
3. If you are using a serial data connection, connect the transmit computer to the **Serial** port on the rear module.
4. If you are you are using a LAN connection, connect the transmit computer to the **Ethernet** port on the TES-8643 rear module via an Ethernet LAN, using a standard RJ45 cable.

To install the TES-8643 as a receiver

1. Connect the equipment providing the video signal containing the VANC data to be received to the TES-8643 **IN 1** connector on the encoder.
2. Connect the TES-8643 **OUT 1** connector to other equipment that needs this video signal. It is recommended that the output be terminated in 75ohm.
3. If you are using a serial data connection, connect the receive computer to the **Serial** port on the TES-8643 rear module.
4. If you are using a LAN connection, connect the receive computer to the **Ethernet** port on the TES-8643 rear module via an Ethernet LAN, using a standard RJ45 cable.

Cabling a Reference Source

A video reference can be supplied to the TES-8643, either through the local reference input on the rear module, or one of the reference inputs on the openGear frame. However, Ross Video recommends using the SDI input as the reference source.

To cable the reference source for your TES-8643

1. If you wish to use the frame reference input, connect the reference input to the **REF 1** or **REF 2** connector on the openGear frame.
2. If you wish to use an local reference input, connect the analog reference input source to the **REF IN** connector on your TES-8643 rear module.
3. If you wish to use the SDI input as the reference source, connect the reference input to **IN 1** on the rear module. Refer to **Figure 2.4** for connector location.
4. If you are using the local reference input on the rear module, you must also configure **J7** on the card-edge. Choose from the following:
   - **Pin 1** (left) + **Pin 2** (center) position — In this position, the reference is terminated with an 75ohm resistor. This configuration is to be used for point-to-point cabling, or on the last card of a daisy chain topology. This is the default position. (**Figure 2.2**)
   - **Pin 2** (center) + **Pin 3** (right) position — In this position, the 75ohm terminator is removed and the reference is not terminated. This configuration is used in a daisy chain cabling topology where only the last card is to be terminated.

For More Information on...

- configuring your reference source in DashBoard, refer to the section "**Selecting the Timing Source**" on page 31.

Bypass Relay

There is a bypass relay from the **IN 1** to **OUT 1** on the 8320AR-055 rear module. The purpose of this relay is as follows:

- When the card is removed from the frame, the relay passes video from the IN 1 to OUT 1 of the card. This allows the card to be serviced with minimum interruption to the video signal.
- If the card loses power, or the frame loses power, the video still passes through.
- When the card boots, the relay will be left in Bypass mode until the card can generate a valid output. Once the card is functional, the relay is disabled if the bypass is also disabled in the **Config** tab of DashBoard.
- You can also put the card into Bypass mode by toggling the **Video State** button in the **Video** sub-tab of the **Config** tab.

Ethernet Port Cabling

The **Ethernet** port on the rear module is an RJ-45 jack for Ethernet connection to a local area network. This port is used to stream VANC decode/encode data, connect to an Ethernet network for communications, and software upgrades using DashBoard.

This section presents a general overview of the Ethernet connection process. The exact steps for connecting your card to your facility via an Ethernet network depend on the network requirements of your facility. Note that in addition to the **Ethernet** port on the rear module, you must also provide an Ethernet connection to the openGear frame as outlined in the manual that accompanied your frame. The Ethernet connection on the frame is used for communications, software upgrades using DashBoard, and as the time source for the SCTE 104 event log.

For More Information on...

- set up of Ethernet connections between the Comtrol® DeviceMaster® and the TES-8643, refer to the chapter "**Using a Port Expander**" on page 67.

Ethernet Cabling for the TES-8643

Contact your IT Department before connecting to your facility network to ensure that there are no conflicts. They will provide you with an appropriate value for the IP Address, Subnet Mask, and Gateway for the TES-8643.

You will require a standard network CAT-5 cable to connect the TES-8643 to your facility network. (**Figure 4.1**) There is no need for a crossover cable as the TES-8643 includes an Auto-MDIX Ethernet PHY that will switch from straight to crossover automatically as needed. Ross Video does not supply these cables.

The **Ethernet** port uses a standard pinout, which means that it is intended to be connected to a router or switch using a standard cable.

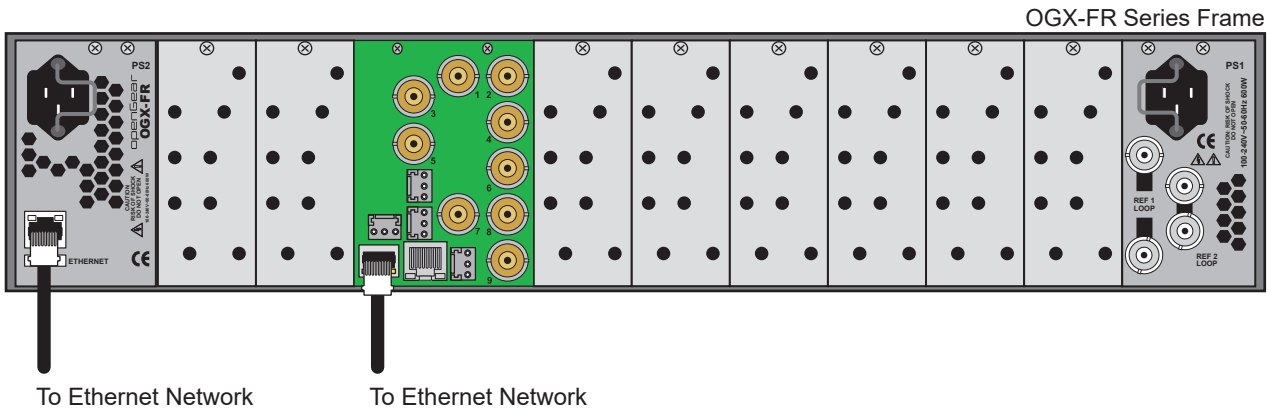


Figure 4.1 TES-8643 — Ethernet Connection

For More Information on...

- configuring the Ethernet communications for the TES-8643, refer to the section "**Ethernet Communication Setup**" on page 31.

Serial Cabling

The **Serial** port on the rear module is used for data transfer between the TES-8643 and other equipment. When connecting to an external device, such as a PC that is wired as Data Terminal Equipment (DTE), you need to use a null modem cable. When connecting to an external device that is wired as Data Communications Equipment (DCE), such as a modem, you need to use a "straight-through" 9-pin cable instead of the null-modem.

Cabling for the Serial Port

You will need a cable with an RJ-45 connector on one end (connects to the **Serial** port on the TES-8643 rear module). Refer to the manual for your device for specific pinout information and the required port to use. Refer to **Table 4.1** for cabling details.

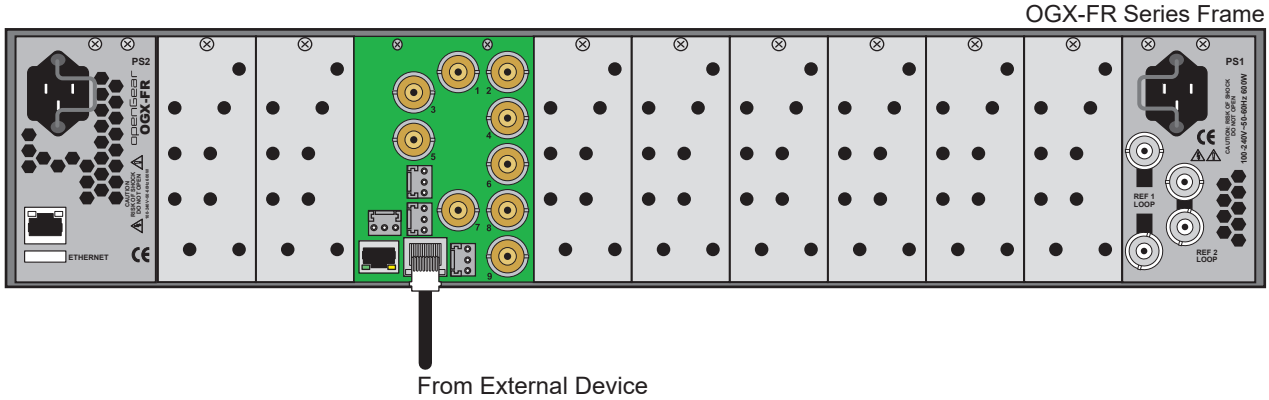


Figure 4.2 TES-8643 — Serial Connection

Serial Port Pin Assignment

When building cables to interface to the TES-8643 **Serial** port, it is recommended to use CAT-5 or CAT-5e cable with the standard wiring color coding. Ross Video does not supply this cable. **Figure 4.3** illustrates the male connector to insert into the **Serial** port of the rear module.

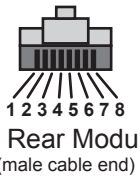


Figure 4.3 8320AR-055 Rear Module to Serial Device Connector

Table 4.1 provides the pin assignment of the **Serial** port on the rear module.

Table 4.1 RJ-45 Pin Assignment

RJ45 Pin	RS-232	RS-422	RS-422 Null
1	n/c	Tx+	Rx+
2	Rx	Tx-	Rx-
3	Tx	Rx+	Tx+
4	n/c	n/c	n/c
5	n/c	n/c	n/c
6	n/c	Rx-	Tx-
7	GND	GND	GND
8	GND	GND	GND

GPI Cabling

The TES-8643 provides up to eight General Purpose Input (GPI) and Tally pins to interface with external equipment. The number of GPI/Tallies available depends on the rear module type and the card model you are using.

The GPI ports are available on 3-pin connectors located on the rear module. The 3-pin mating connectors are provided with the rear module.

The default state for the GPI/O contacts is active low signaling. This way, if the card is removed from the openGear frame, no external events will be inadvertently asserted by the card. This also means that if a GPI cable is absent from the rear module, no GPI or Tally will be triggered and executed inadvertently by the card.

Ports are user programmable to be either an input (GPI) or an output (Tally). Electrically, the ports are set up for contact closure to ground, with 4.75Kohm pull-up resistor to +5V, so they default to a logical high state.

For More Information on...

- configuring GPIs for triggering SCTE 104 messages, refer to the section "**Setting up GPI/Tally Communications**" on page 51.

GPI/Tally Cabling

GPI/Tallies can be used to remotely control the operation of the TES-8643 by means of contact closures. VANC services (SCTE 104 triggers) can be enabled or disabled on one or more of these inputs. The 8320AR-055 rear module provides up to eight GPI and Tally pins to interface with external equipment. (**Figure 4.4**)

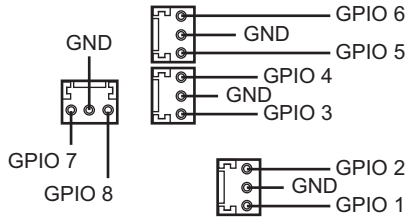


Figure 4.4 8320AR-055 GPI Connections

Linear Timecode Cabling

The TES-8643 provides the option to receive Linear Timecode (LTC) on the **Serial** port, or via the **GPI** pins. The outgoing video signal is rendered with a known and constant delay. This section describes the two methods of cabling an LTC input to the TES-8643: via the **Serial** port, or via one of the **GPIO** ports, on the rear module. Note that how you connect to the LTC device determines how you must configure the communications between the LTC device and your card.

Overview

There are two methods of cabling an LTC input to the TES-8643: via the **Serial** port, or via one of the eight **GPI** ports, on the rear module. Note that how you connect to the LTC device determines how you must configure the communications between the LTC device and your card.

- **Serial** port — Use this port when the LTC device drives a balanced pair, following the recommended voltage amplitude defined in the SMPTE 12M specification. The LTC signal pair must be connected to the **Serial** port on the Rx+ and Rx- input pins.
- **GPI** port — Use one of these ports when the LTC device drives a single-ended TTL compatible signal.

For More Information on...

- on configuring your card to communicate with an LTC device, refer to the section "**Linear Timecode Communication Setup**" on page 33.

Serial Cabling

Use the **Serial** port when the LTC device drives a balanced pair, following the recommended voltage amplitude defined in the SMPTE 12M specification. The LTC signal pair must be connected to the **Serial** port on the Rx+ and Rx- input pins. Ross Video does not supply this cable.

To cable the Serial port for an LTC input

1. Refer to **Table 4.2**, and your LTC device documentation, for pinout information for your required **Serial Interface Cable**.

Table 4.2 Interface Cable for LTC Input

RJ45 Pin	RS-422 Serial COM Rx Port	LTC Signal
1	Tx+	
2	Tx-	
3	Rx+	LTC+
4	n/c	
5	n/c	
6	Rx-	LTC-
7	GND	GND
8	GND	GND

2. Connect and secure the RJ-45 connector of the Serial Interface Cable to the **Serial** port on the rear module.
3. Connect and secure the other end of the Serial Interface Cable to the appropriate port on your LTC device. Refer to the user manual for your LTC device for specific pinout information and the required port to use.
4. Proceed to "**Linear Timecode Communication Setup**" on page 33 to configure the card to communicate with the LTC device.

GPI Cabling

Use one of the **GPIO** ports when the LTC device drives a single-ended TTL compatible signal. The left and right pins are the two GPI/O signals while the center pin is the common Ground (GND).

✶ When using a GPI port for LTC, the LTC interface must be TTL compatible where V (IH) is 2.0V-5.0V, and V(IL) is 0.0V-0.8V.

To cable a GPI port for an LTC input

1. Locate the GPI/Tally ports on the rear module. Refer to the rear module labeling, and **Figure 2.4** for locations.
2. Wire the GPI/Tally port for an LTC input as follows:
   - The left and right pins are the two GPI/O signals while the center pin is the common Ground (GND).
   - Refer to **Figure 4.4** for GPI configuration on the rear module.
   - Refer to your LTC device documentation for specific pinout information.
3. Proceed to "**Linear Timecode Communication Setup**" on page 33 to configure the card to communicate with the LTC device.

Using DashBoard

The DashBoard Control System enables you to monitor and control openGear frames and cards from a computer. DashBoard communicates with cards in the openGear frame through the Network Controller Card. This controller card is required in order to use DashBoard to monitor the TES-8643.

Before You Begin

Before proceeding, ensure that DashBoard software version 6.2.0 or higher is installed on a PC connected to your facility network. The DashBoard software and user manual are available from the Ross Video website.

For More Information on...

- using DashBoard, refer to the ***DashBoard User Manual***.

Accessing the TES-8643 in DashBoard

Ensure that the openGear frame with the TES-8643 card(s) is displayed in the Tree View located on the left-side of the DashBoard window. It may take 30 seconds or more to update the Tree View. Consult the ***MFC-OG3 Series User Manual*** and ***DashBoard User Manual*** should the Tree View not display the TES-8643 node.

To launch DashBoard

1. Ensure that you are running DashBoard software version 6.2.0 or higher.
2. Launch DashBoard by double-clicking its icon on your desktop.

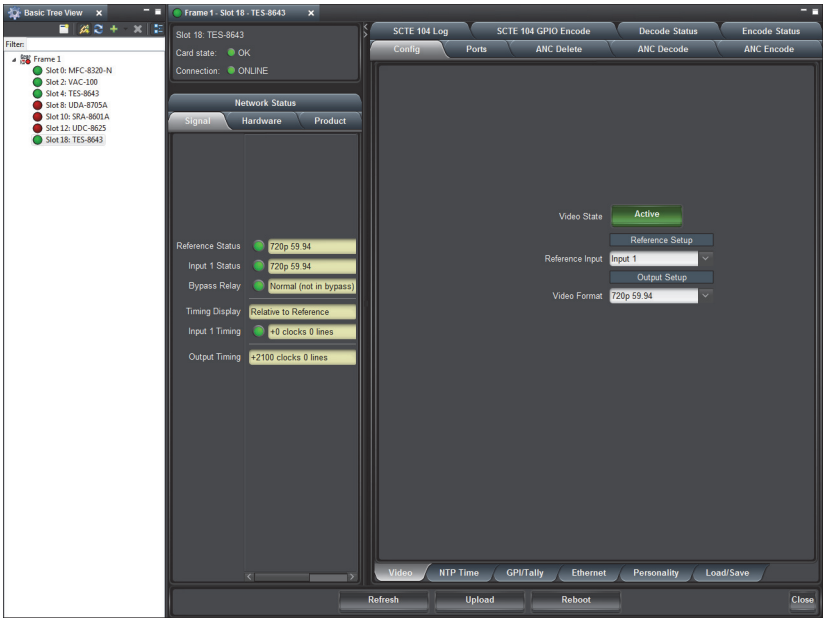
To access the TES-8643 in DashBoard

1. From the **Tree View**, expand the node for the openGear frame your cards are installed in.

   A list of cards installed in the frame displays.

2. Double-click the node for a card to display its menus in the right-side of the DashBoard window.

   In the example below, the node for Frame 1 is expanded to show a list of six cards including two TES-8643 cards.



Basic Configuration

This chapter provides instructions for configuring the TES-8643 using the options available in DashBoard.

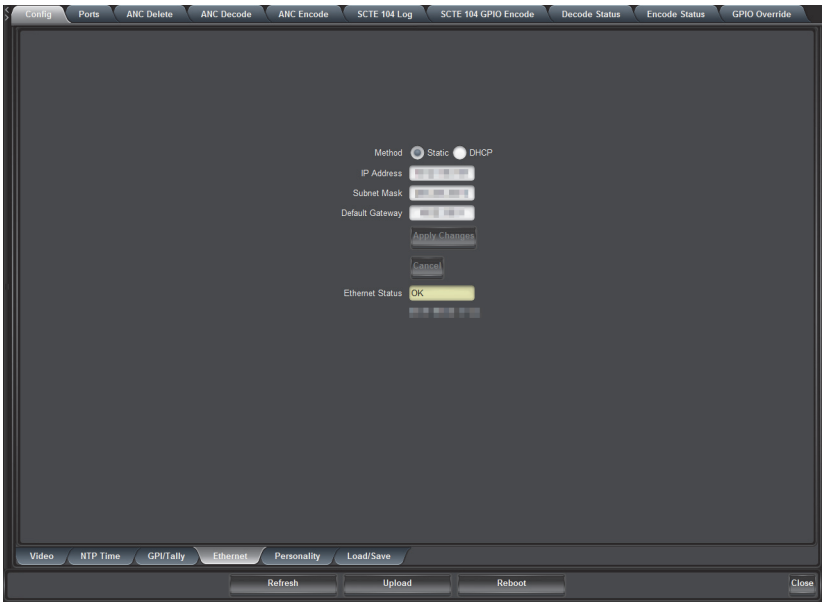
✶ This chapter assumes that DashBoard is launched on your computer and the TES-8643 interface displays in the right-side of the DashBoard window.

Ethernet Communication Setup

The **Ethernet** port on the rear module is used to stream VANC decode/encode data, connect to an ethernet network for communications, and software upgrades using DashBoard. To use the rear module ethernet port, the card must be configured with valid ethernet settings. The settings can be specified manually (**Static**) or may be obtained automatically from a server on your network (**DHCP**).

To set up ethernet communications for the card

1. Select the **Config** tab.
2. Select the **Ethernet** tab located at the bottom of the **Config** tab.



3. To obtain network settings automatically, select **DHCP** from the **Method** area.
4. To manually configure the ethernet settings:
   - Select **Static** from the **Method** area.
   - Enter the **IP Address**, **Subnet Mask**, and **Default Gateway** settings for the card.
5. Click **Apply Changes** to save the new settings. Click **Cancel** to revert to the previous settings.

✶ The Ethernet Status field in the Network tab displays the current status of your connection. Refer to Table 11.8 on page 74 for a list of the messages.

Selecting the Timing Source

The openGear frames support a distributed frame reference, allowing incoming reference signals to feed timing information to all cards in that frame. Thus, a single composite or tri-level sync signal can be used for multiple TES-8643 cards. Alternatively, each card accepts a reference signal on the rear module to provide additional system timing flexibility.

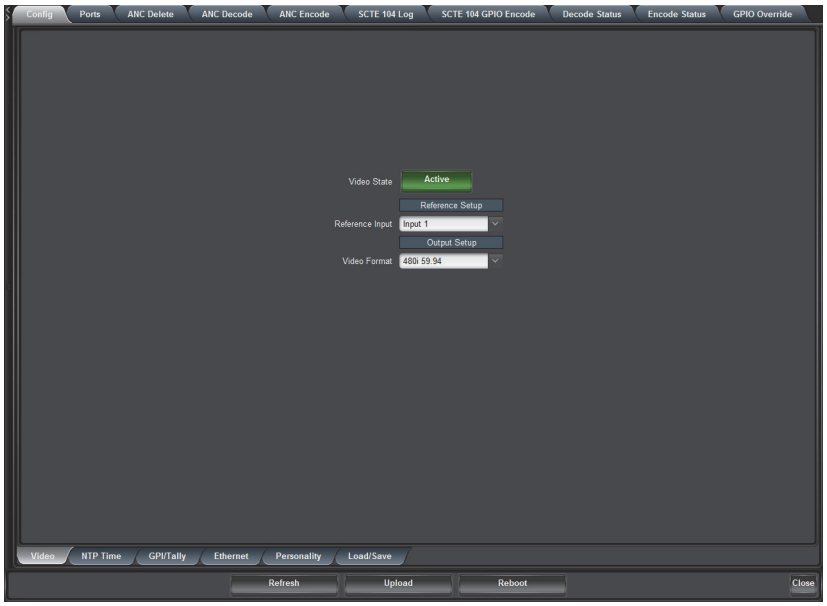
The TES-8643 requires a reference input at the same frame rate as the SDI input. You must supply and select a reference signal. This section provides information for specifying the reference source for your card.

For More Information on...

- cabling the reference source for your card, refer to the section "**Cabling a Reference Source**" on page 23.
- configuring how the input signal timing is reported by DashBoard, refer to the section "**To configure the input signal timing for your card**" on page 35.
- monitoring the reference status, refer to the section "**Signal Tab**" on page 69.

To select the reference source for the card

1. Select the **Config** tab.
2. Select the **Video** tab located at the bottom of the **Config** tab.



3. Select a reference input from the **Reference Input** menu. Refer to **Table 11.5** for a list of options.

Configuring the Video Outputs

The video format must be compatible with the selected reference. Refer to **Table 11.5** for a list of available formats.

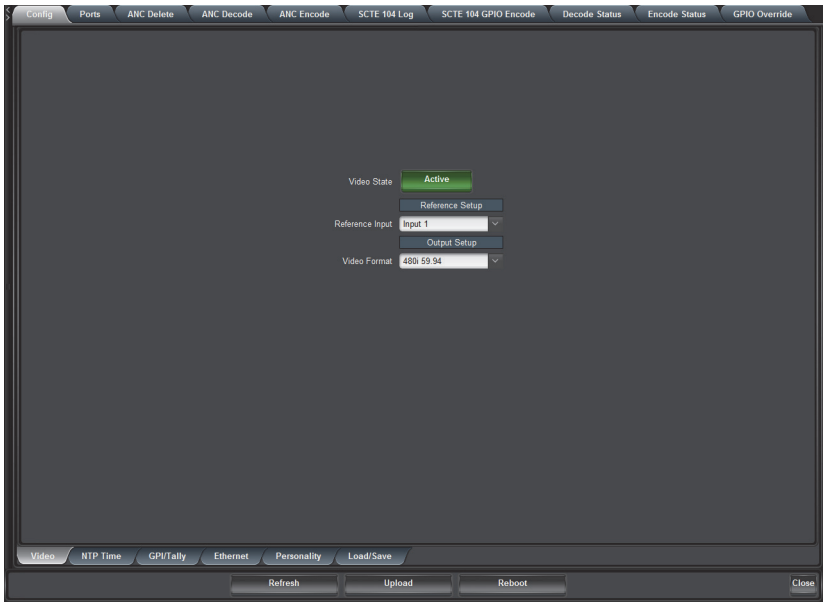
✶ The output timing delay is fixed at half a line from the reference source.

For More Information on...

- input status fields in the **Signal** tab, refer to the section "**Signal Tab**" on page 69.

To configure your video outputs on the card

1. Select the **Config** tab.
2. Select the **Video** tab located at the bottom of the **Config** tab.



3. From the **Video Format** menu, specify the video format for the card input and outputs.

Linear Timecode Communication Setup

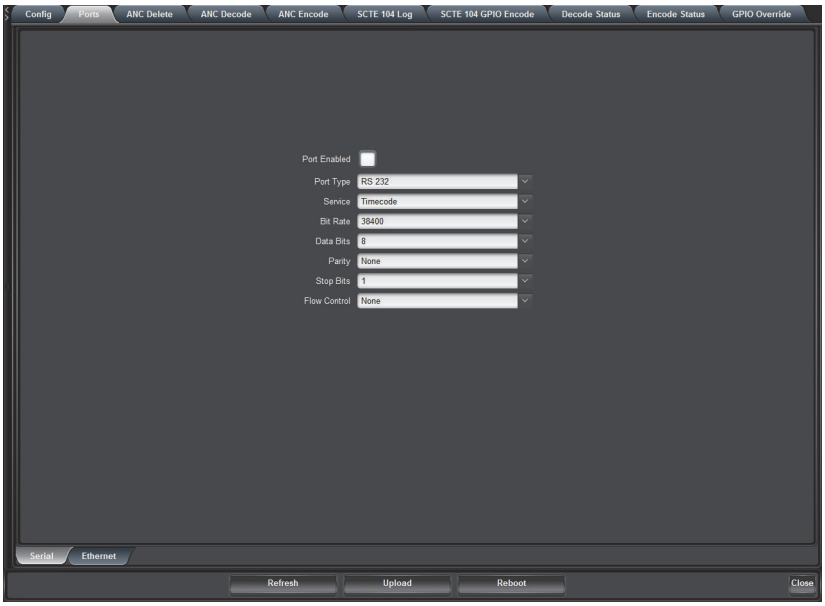
This section explains how to configure an LTC input to the card using the menus and options available in DashBoard.

Serial Communication Setup

The following procedure is used when the LTC input device communicates via a serial connection to provide balanced linear timecode.

To configure serial communications for an LTC input

1. Select the **Ports** tab.



2. Select **RS 422 unterm** from the **Port Type** menu.
3. Select **Timecode** from the **Service** menu.

4. Select the **Port Enabled** check box.

GPI Communication Setup

Ensure that only one GPI port is configured as an LTC input at one time. If you attempt to configure a second GPI port for timecode communications, the first GPI will be automatically assigned to **None**.

To configure GPI communications for an LTC input

1. Select the **Config** tab.
2. Select the **GPI/Tally** tab located at the bottom of the **Config** tab.
3. From the **Function** menu for the GPI you are configuring, select **Timecode Input**.

   The **Trigger** and **Polarity** fields are ignored.

Verifying the GPIO Functions

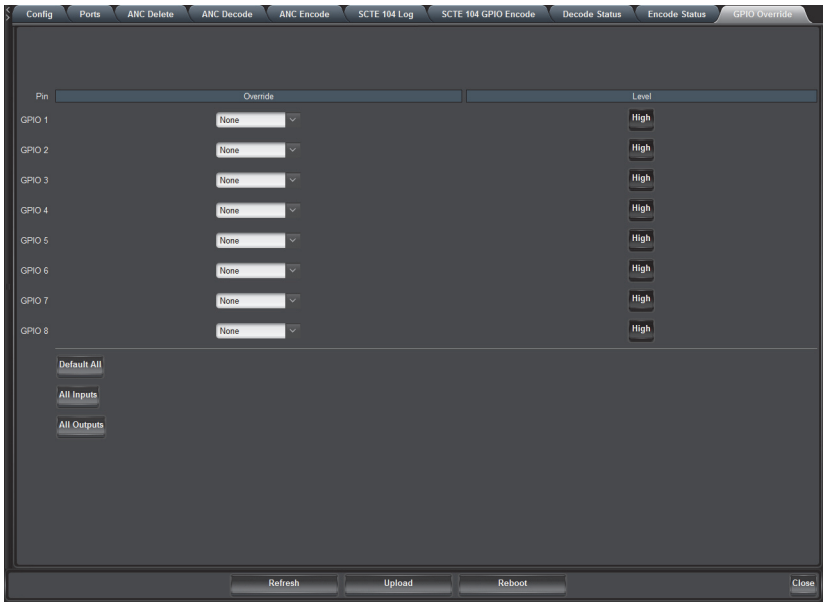
The TES-8643 uses General Purpose Interface (GPI) input and output signals to trigger events on external equipment, or have external equipment trigger events on the card.

Once you have installed and configured the GPIs for your TES-8643, you may wish to test the card's GPI functions. The options on the GPIO Override tab enable you to override the configured GPI function or view the current GPIO state, allowing you to verify the communication between the TES-8643 and your external equipment.

To override the function of a GPIO

✶ Before using the options in the GPIO Override tab, you must configure your GPI inputs and outputs using the options in the GPI/Tally tab. Otherwise the selections on the GPIO Override tab will have no effect.

1. Select the **GPIO Override** tab.



2. From the override **Function** menu for the GPI you want to verify, select the function you want to test. Choose from the following:

   - **None** — The current settings are not overridden. The **Level** button in the **GPIO Override** tab indicates the current physical state of the GPIO. This is the default setting.
   - **Input** — The TES-8643 disregards the GPI input levels from the rear module and enables the user to control the GPI operations from the **GPIO Override** tab as if the GPI inputs were connected.
   - **Output** — The TES-8643 enables the user to control of the GPO output levels on the rear module.

3. If you set the override **Function** to **Input** or **Output**, toggle the **Level** button for the GPIO to set the polarity of the level trigger to verify the trigger on your external equipment.

Configuring the Input Signal Timing Display

The **Timing Display** feature enables you to configure how the input signal timing is reported by DashBoard. This information is displayed in the individual **Input Timing** fields of the **Signal** tab. The timing display reports the delay of the input signals in output format clocks and lines.

To configure the input signal timing for your card

1. Select the **Config** tab.
2. Select the **Personality** tab located at the bottom of the **Config** tab.
3. Configure how the signal timing by selecting one of the following options from the **Timing Display** menu.
   - **Relative to Reference** — Select this option to display the timing offset values of the SDI inputs relative to the selected reference as follows:
     - › A negative offset value indicates that the SDI signal is earlier than the reference.
     - › A positive value indicates that the SDI signal is later than the reference.
   - **Input to Output** — Select this option to display the timing offset values of the SDI inputs relative to the SDI output of the card as follows:
     - › A negative offset value indicates that the IN signal is earlier than the OUT signal.
     - › A positive value indicates that the IN signal is later than the OUT signal.

Configuring the Edit Permissions

The **Personality** tab in DashBoard enables you to lock the card permissions so that parameters are read-only and cannot be changed.

To configure the card edit permissions

1. Select the **Config** tab.
2. Select the **Personality** tab located at the bottom of the **Config** tab.
3. Configure the edit permission by choosing an option from the **Edit Permission** menu. Refer to **Table 11.9** for a list of options.

Loading the Factory Defaults

If required, the card menu parameters can be reset to the factory default values using the option available in the **Load/Save** tab.

✶ Ethernet settings, reference selection, and the output formats are not reset using this method.

To reset the card to the factory default configuration in DashBoard

1. Select the **Config** tab.
2. Select the **Load/Save** tab located at the bottom of the **Config** tab.
3. From the **Global Settings** area, click **Load Factory Defaults**.

   The **Confirm** dialog opens.
4. Click **Yes** to load the factory default values for all menu parameters, or **No** to cancel the load and close the dialog.

Using DataSafe

DataSafe enables you to load and store card parameters automatically, or you can load from and store to a single file in DashBoard. Ensure that you are loading parameters to the same model of card. The DataSafe feature is available for openGear frames using the MFC-8320-N or MFC-OG3-N cards only. For details on using the DataSafe feature, refer to the ***MFC-8300 Series*** or ***MFC-OG3 Series User Manual*** and the ***DashBoard User Manual***.

However, the following card parameters are not restored/saved using DataSafe:

- Ethernet setup settings

ANC Encoding and Decoding

The TES-8643 can act as both an ANC encoder and a decoder simultaneously. This chapter outlines how to configure the encoding and decoding features of the TES-8643 in a transparent stream.

- This chapter assumes that DashBoard is launched on your computer and the TES-8643 interface displays in the right-side of the DashBoard window.
- Before proceeding, ensure that you are running DashBoard software version 6.2.0 or higher. You can download the DashBoard software and manual from the Ross Video website.

Encoder Settings Overview

The TES-8643 provides the ability to 'mark for deletion' all incoming VANC packets having the same DID and SDID as services that are being inserted, regardless of their location in the VANC lines. This feature is enabled by default for each DID/SDID used for insertion, to ensure that the output does not contain an unintended combination of upstream and locally inserted data bearing the same DID and SDID. However, you can disable deletion for selected services, for example to allow an upstream data service to pass through when local insertion is passed.

This section outlines the basic settings available on each **ANC Encode** tab.

Encode Mode

When you select a Encode Mode, the TES-8643 automatically configures and locks the applicable settings on the tab. Refer to the section refer to the section "Encode Mode Overview" on page 38 for information on the available Encode Modes to choose from.

DID and SDID

The Data ID and Secondary Data ID specify (in hexadecimal) the values to be used for the corresponding fields in the encoded Ancillary Data Packet, as defined by SMPTE 291M. No matter what Encode Mode is selected the DID and SDID can be changed.

Encode Line

Line Selection allows for the choice of lines to encode into. The line number selection will change with the Encode Mode selection. All packet Encode Modes will insert a single packet on the line indicated. Selecting Byte mode with a data count greater than 255 will result in multiple packets on the selected line.

- Lines earlier than the second line after the switching line are not recommended for insertion. Lines outside the VANC interval are not usable.

Send Field Indicator

When this check box is checked, the Transparent module sends field indicator characters out the **Serial** or **Ethernet** port that it is using to receive data, to allow the transmit computer to synchronize to the video signal. The field indicator is sent just after each vertical interval. For an interlaced signal, the indicator is a '1' (ASCII code 0x31) to indicate field 1, and a '2' (ASCII code 0x32) to indicate field 2. For a non-interlaced (progressive) signal, each field indicator corresponds to the passing of one video frame, and the indicators still alternate between '1' and '2', even though a progressive signal consists of frames, rather than fields.

Upstream VANC Priority

The Upstream VANC Priority options enable you to control the arbitration between incoming VANC (network) data and locally-sourced (local) data for the TES-8643.

- ANC delete takes precedence. If a packet is deleted from a line, then it is not available to the encoder.

There are three mutually-exclusive options: overwrite upstream, local priority, and upstream priority. You can also define a time out period.

Overwrite

The TES-8643 always marks for deletion packets in the upstream video with matching DID and SDID. This is the default setting.This enables local data to be inserted without interference from unwanted network data. This will also occur even if the local source is disconnected or idle, and can be used for arbitrarily marking packets for deletion.

Local Priority

This option enables local data to be inserted whenever it is available, overwriting any network data. Network data passes through whenever local data has stopped arriving at the assigned port for longer than a defined time out period.

This mode enables the local user to insert transparent data simply by sending it to the TES-8643, and to revert to passing network data by simply stopping the sending of local data to the TES-8643.

Upstream Priority

This option enables network data to pass through whenever it is available, and any local data is discarded. Local data is inserted whenever network is absent for longer than the defined time out period.

When selected, this mode enables the network to control the sharing between network and local data. The network can create an insertion opportunity for local data by pausing transmission of network data.

Timeout (Frames)

Specifies the number of frames the TES-8643 will wait before switching away from the priority item. The range is 1-60 video frames. The default value is 10.

- If the priority source is active, the TES-8643 switches to it.
- If the priority source is not active, the TES-8643 waits the specified time before switching to the secondary source.

Encode Mode Overview

The TES-8643 supports specific Encode Modes, such as Caption CDP, which have define data formats. The TES-8643 can also handle general data which has no specified format. When you select a Encode Mode, the required settings are auto-configured for you on the selected ANC Encoder tab while other settings may be set to read-only.

Disabled

Disables the encoding feature for the specified service.

Caption CDP Mode

The Caption CDP selection is for a source providing data formatted as Caption Distribution Packets (CDP). This is the type of data used in CEA-708 captioning for HDTV. The setup software will make most of the other settings for you. The source must provide CDP packets correctly timed to the video. That means a CDP must be provided for each frame of the video. The encoder will find the CDP boundaries and buffer the packet until the beginning of the next frame.

✶ The Caption CDP and Subtitle SDP modes only insert into the first field.

Subtitle SDP Mode

The Subtitle SDP is for a source providing data as Subtitle Distribution Packets (SDP). This is the type of data used to carry WST subtitling information in an HD signal. The data must be formatted according to OP47. The setup software will make most of the other settings for you. The source must provide SDP correctly timed to the video. That means a SDP must be provided for each frame of the video. The encoder will find the SDP boundaries and buffer the packet until the beginning of the next frame.

Custom Packet Mode

In Custom Packet mode you must make all of your own settings. Normally, one of the other modes will provide the functionality that you require. If not, then Custom Packet mode and a thorough understanding of the settings will allow you to send many different types of data. Custom Packet mode is provided as a way for you to make any settings you desire. This mode is further discussed in the section "**Custom Packet Mode**" on page 39.

✶ This mode will insert packets in both fields unless the source carefully times data transmission for one field using the Field Indicator.

In Custom Packet mode, the TES-8643 allows packets of data to be formatted by the transmit computer such that each packet will correspond to one VANC packet inserted into the HDTV signal. The packet of data sent to the TES-8643 by the transmit computer must be formatted as follows:

```
{Identifier} {Length} {data} {Footer ID} {Footer data}
```

The components of the packet are as follows:

Table 7.1 Packet Components

Parameter	Description
`{Identifier}`	A 2byte sequence indicating the start of the packet. This identifier must match the value specified as the Packet Identifier in the Packet Identifier field on the ANC Encoder tab.
`{Length}`	A 1byte unsigned number indicating the number of bytes in the entire packet, from the first byte of the Identifier to the last byte of the Footer data, inclusive
`{data}`	A sequence of any 8bit data, maximum number of data bytes is 248 (255-7).
`{Footer ID}`	One byte with a hexadecimal value of 0x74, indicating the start of the Footer data.
`{Footer data}`	A 3byte sequence of any 8bit data.

Two applications for this mode are:

- Inserting Caption Distribution Packets (CDPs), carrying DTV Closed Captioning data, as defined by CEA-708.
- Inserting Subtitle Distribution Packets (SDPs), carrying WST teletext data and EST Enhanced Systems Teletext, as defined by SMPTE 334M.

When Custom Packet mode is being used for one of these applications, the values for the various fields must conform to the applicable standard. For any custom applications, however, the transmit computer need only ensure that the fields conform to the format given above.

Byte Mode

Byte mode allows data of undefined format to be inserted into the VANC. The data will normally be inserted into a single packet on a single line and will be inserted as soon as possible. At each insertion opportunity the TES-8643 will take the data accumulated from the source and build it into one or more packets (as defined by the Data Count

setting) and insert it. If you try to provide data faster than the rate specified by the Data Count setting, then the TES-8643 will flow control the data source.

In Byte mode, data is encoded as it arrives at the port according to rules which are defined by the settings enabled when Encode mode is set to Byte.

Data Count

Data Count sets the maximum number of bytes that will be sent in a single VANC line for the given field. If the port provides more data than can be inserted, then the data will be buffered until the port is flow controlled. Flow control will be used to maintain the specified data rate.

If the port provides less data than allowed on the line, then any completed packets will be sent. If no complete packets have been gathered then no packets will be inserted (unless one of the following flush behaviors is triggered). A VANC packet is full if it contains 255bytes or matches the data count (counts less than 255). If you set the Data Count to a value greater than 255, and the data source provides more than 255bytes per field interval, the TES-8643 will insert a second and subsequent packets as needed. These additional packets are inserted immediately after the first one, in the same line if possible. If they do not all fit in the specified line, the remaining packets are inserted in the next line.

Flush Buffer at VANC

These check boxes modify the operation of the Data Count if the port does not provide enough data to form a packet of the size specified by the Data Count for the field. If one or both of the check boxes are selected, then any data which has been received, at the point when the specified VANC area of the video occurs, will be used to form a packet (with a smaller Data Count if necessary) and will be inserted in the following VANC area.

As an example, assume that only the Field 2 check box is checked, the Data Count is set to 180 bytes, and the baud rate is set to 9600. At this baud rate, a maximum of 32 characters will be received during any 2 field period of a 59.94Hz or 60Hz video signal. If the data is being sent by the transmit computer at the maximum rate, then at each field 2 VANC the data received during the previous 2 fields (usually 32 characters) will be used to form a packet and will be inserted in the following field 1 VANC area.

If a progressive video signal (i.e. 720p or 1080p) is being used, then the Field 2 check box is ignored. If the Field 1 check box is selected in this case, then the buffer is flushed at every VANC area.

Flush Buffer Timeout

This setting specifies an idle timeout. After the specified time, if no new data has been received, then any previously received data will be inserted. This is useful to terminate a transmission as cleanly as possible. Otherwise data may linger in a buffer until data reception resumes.

VANC Header

Normally this field should be cleared. The header is applied to each inserted packet. It may be useful to the application to aid parsing.

Configuring the TES-8643 for Encoding

Control of overwriting upstream data is on a line by line basis. It is possible to have different settings for different lines.

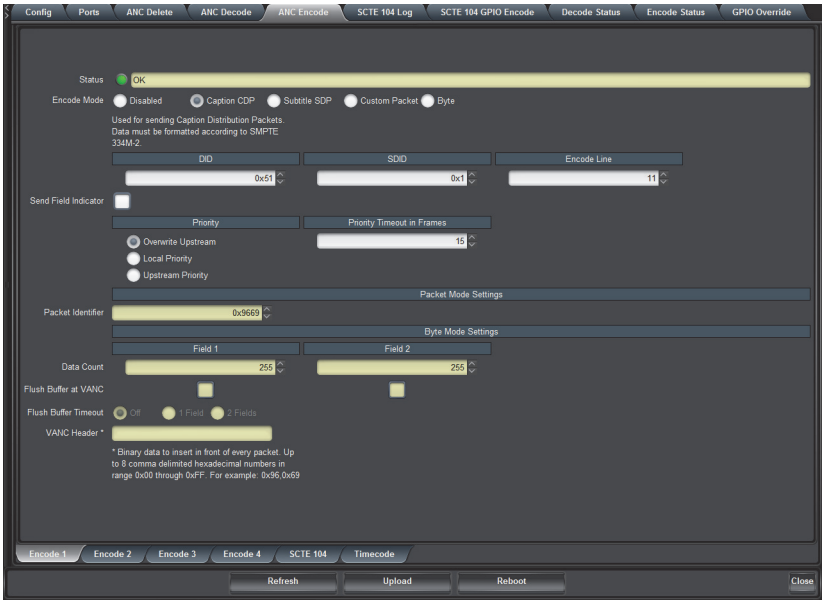
✶ The encoding feature can only “mark for deletion” packets in VANC. If a packet with matching DID/SDID arrives in HANC, it will pass through unaltered.

For More Information on...

- the parameters available in the **ANC Encode** tabs, refer to the section “**ANC Encode Tabs**” on page 79.

To configure the TES-8643 for encoding

1. Select the required **ANC Encode** tab for the service you wish to configure.
2. Use the **Encode Mode** options to specify the type of encoding for the stream. Refer to the section "**Encoder Settings Overview**" on page 37 for details. Depending on the selected mode, some menu items may be read-only.



3. Use the **DID** and **SDID** fields to specify the fields in the encoded Ancillary Data Packet.
4. Use the **Encode Line** field to specify which line to encode into.

✶ The VANC packet is encoded into the luma channel of the HD or 3G video stream. For SD streams, the VANC packet is encoded into the luma and chroma.

5. Configure the **Send Field Indicator** as required. Refer to the section "**Send Field Indicator**" on page 37 for details on this parameter.
6. If you selected **Byte** as the **Encode Mode**:
   a. In the **Data Count field**, specify the maximum number of bytes that will be sent on a single VANC line for the given field.
   b. Set the **Flush Buffer at VANC** for each field. Refer to the section "**Flush Buffer at VANC**" on page 40 for details on setting this parameter.
   c. Set the **Flush Buffer Timeout** as follows as outlined in the section "**Flush Buffer Timeout**" on page 40.
   d. In the **VANC Header** field, type a string of hexadecimal bytes to insert at the start of each Byte Mode packet. For example, to insert the two bytes `FA AF` in front of each packet, the string would contain `0xFA 0xAF`. For most applications, this field should be left empty.
7. If you selected **Custom Packet** as the **Encode Mode**, proceed to the section "**Upstream VANC Priority**" on page 37.

Configuring the Upstream VANC Priority Settings

Configure the Upstream VANC Priority settings when you wish to easily switch between incoming "network" CEA-708 closed captioning and locally-sourced "local" closed captioning in the VANC space.

To configure the upstream VANC priority

1. Select the applicable **ANC Encode** tab.
2. In the **VANC Priority** area, select the required priority option. Refer to the section "**Upstream VANC Priority**" on page 37 for details.
3. Use the **Timeout in frames** field to specify the number of frames the TES-8643 will wait before switching away form the priority item.

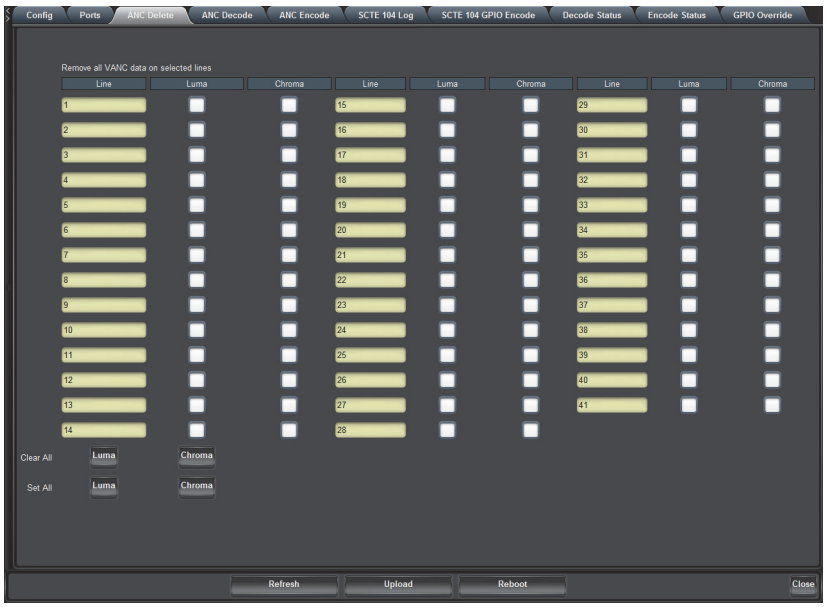
ANC Delete Setup

The TES-8643 is capable of deleting all VANC packets in user-selectable lines in the VANC space. All data on the line in the selected channel is completely deleted.

★ This setting supersedes the upstream VANC priority setting. If there is upstream data on the deleted line, it can not be detected by an encoder

To specify which lines to remove all VANC data from

1. Select the **ANC Delete** tab.



2. Locate the field in the **Line** column that represents the line that you wish to remove VANC data from. Refer to **Table 14.8** for a list of switch lines and the last VANC lines.
3. Select the required **Luma** check box to remove all VANC packets from the luma channel of the incoming VANC service.
4. Select the required **Chroma** check box to remove all VANC packets from the Chroma channel of the incoming VANC service.

Decoder Settings Overview

The TES-8643 performs transparent decoding. You select the services to be decoded and forwarded to a data port (**Serial** or **Ethernet**) by specifying only their DID and SDID values. The TES-8643 finds and decodes these services, regardless of the line and luma/chroma channel where they are carried in the SDI input.

This section outlines the basic settings available on the **ANC Decode** tab.

DID and SDID

The Data ID and Secondary Data ID specify (in hexadecimal) the values to be used for the corresponding fields in the encoded Ancillary Data Packet, as defined by SMPTE 291M.

Send Field Indicator

When this check box is checked, the TES-8643 sends field indicator characters out the **Serial** or **Ethernet** port that it is using for decoded data, in order to allow the receive computer to synchronize to the video signal. The field indicator is sent just after each vertical interval. For an interlaced signal, the indicator is a '1' (ASCII code 0x31) to indicate field 1, and a '2' (ASCII code 0x32) to indicate field 2. For a non-interlaced (progressive) signal, each field indicator corresponds to the passing of one video frame, and the indicators still alternate between '1' and '2', even though a progressive signal consists of frames, rather than fields.

For most applications, the output data is expected to be the same as that which arrived at an upstream encoder; for this reason, the Send Field Indicator check box should be left clear (unselected) unless you know that the receiving device needs the field indicator for proper operation.

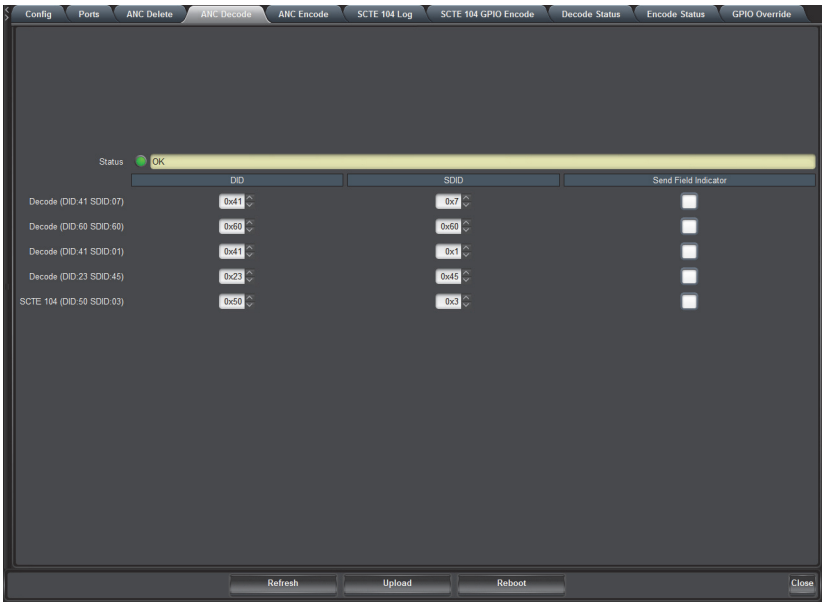
Configuring the TES-8643 to Decode

If the DID and SDID match a packet, then the contents are captured and made available at the data port selected. All data is sent to the data port. If the service is a packet type, then the header and footer data are sent along with the body. It is up to the receive computer to parse the stream to find the packet boundaries. The packet may be found in luma and/or chroma, HANC and/or VANC.

To configure the TES-8643 to decode

1. Select the **ANC Decode** tab.

   Each Decode service (Decode 1-4) is listed on the tab, enabling you to configure each service separately.



2. Use the **DID** and **SDID** fields to specify (in hexadecimal) the values to be used for the corresponding fields in the encoded Ancillary Data Packet, as defined by SMPTE 291M.
3. Select the **Send Field Indicator** check box to enable the TES-8643 to send the field indicator characters out the data port that it is sending decoded data to, to allow the receive computer to synchronize to the video signal. The field indicator is sent just after the VANC of each field (for an interlaced signal) or frame (for a progressive

signal) in the video. Note that this box should be cleared (unselected) unless you are certain that the receive computer requires it.

- For an interlaced signal, the indicator is a '1' (ASCII code 0x31) to indicate field 1, and '2' (ASCII code 0x32) to indicate field 2.
- For a progressive signal, each field indicator corresponds to the passing of one video frame, and the indicators still alternate between '1' and '2', even though a progressive signal consists of frames, rather than fields.

Assigning Data Ports

After you have defined one or more services, you need to assign data port(s) to them as described in the chapter "**Data Ports Configuration**" on page 65. The TES-8643 can simultaneously insert up to four data streams or extract up to four data streams. The eight streams may all be delivered via the network connection (**Ethernet** port) or one may be through the **Serial** port on the rear module. For each stream, you can specify the source port, and the insertion/extraction parameters.

Calculating the Data Throughput

This section briefly summarizes how to calculate the data throughput based on the data port type.

Serial Port

When encoding a transparent stream using data supplied through a serial port, the throughput depends on the Data Count and also on the serial port baud rate. The maximum throughput is the lesser of the baud rate and the data rate value resulting from the following equation:

```
DR = FV x 10 x DC bits/second
```

Where:

- `FV` is the field rate for interlaced formats, or the frame rate for progressive formats.
- `DC` is the Data Count set for the TES-8643.
- The factor 10 in the equation reflects the fact that each 8bit value is carried on the serial link with one start and one stop bit.

This is expressed in bits/second to allow comparison with the serial port baud rate.

For example, if FV = 59.94 and DC = 100, DR = 59,940 bits/second.

If the serial port speed is set to 57,600 bits/sec, the TES-8643 cannot fully use the capacity that has been reserved for this stream, and the throughput will be 57,600 bits/sec. If the port speed is 115,200 bits/sec, the TES-8643 will use flow control to maintain an average rate of 59,940 bits/sec However, if the transmit computer does not respect flow control, data will be lost.

This points out the importance of flow control. If you are not certain that the program you are using to send data to the TES-8643 responds properly to XON/XOFF flow control, it is advisable to select a Data Count value for the transparent stream which is large enough to ensure that flow control is never needed. For example, with FV= 59.94, a DC value of 193 or greater can transport a 115,200 bits/sec stream without flow control.

Similarly, when decoding a transparent stream, care must be taken to set the serial port baud rate high enough for the throughput of the stream. In the above example with DC=100, the serial port for the decode stream would need to be set to 115,200 bits/sec, since 57,600 bits/sec is insufficient to sustain the throughput of 59,940 bits/sec.

Ethernet Port

When encoding a transparent stream using data supplied through the TCP/LAN port, the throughput is completely defined by the Data Count specified for the stream, assuming that the transmit computer and LAN can supply data as needed. This is defined by the following equation:

```
T = FV x DC bytes/second
```

Where:

- FV is the field rate for interlaced formats, or the frame rate for progressive formats.
- DC is the Data Count set for the TES-8643.

Monitoring the Status via DashBoard

Use the Decode Status and Encode Status tabs to monitor the ANC services you have configured on the TES-8643. This list updates whenever you configure a new stream using one of the **ANC Encode** sub-tabs or the **ANC Decode** tab.

Monitoring the Encode and Decode Status

The **Encode** and **Decode Status** tabs provide read-only information on each stream currently configured on the TES-8643. You can also enable the alarm for each stream using the provided **Alarm Enable** check box. When the check box is selected for a stream, the corresponding **Status** field reports when error conditions are occurring for that stream. If the check box is cleared, the **Status** field will not report any error conditions even if they are occurring on the TES-8643.

Encoding Status

For each encode stream, the following read-only information is reported on the Encode Status tab:

- Encode Mode assigned to the stream or disabled. (e.g. `Encode Custom Packet` or `Encode Disabled`).
- Specified DID:SDID for the stream. (e.g. `DID:61 SDID:01`, `DID:10 SDID:01`)
- Indicator and current status. For example, a green indicator that displays `OK` in the **Status** field indicates the encoding stream is not experiencing errors. Most warning and error messages will be hidden if the **Alarm Enable** check box is not selected.
- Data rate reported in Bytes/second.

Decoding Status

For each decode stream, the following read-only information is reported on the **Decode Status** tab:

- Specified DID:SDID for the stream. (e.g. `DID:12 SDID:34`, `DID:10 SDID:06`)
- Indicator and current status. For example, a red indicator that displays `Decode stream not assigned to output port` in the **Status** field could indicate that the stream has not been assigned to a data port. Most warning and error messages will be hidden if the **Alarm Enable** check box is not selected.
- Data rate reported in Bytes/second.
- Line number(s), channel (`LUMA` or `CHROMA`), and/or field (`F1`, or `F2`).

Monitoring the Ethernet Data Ports

The **Ethernet** sub-tab in the **Ports** tab provides read-only information on each stream currently configured on the TES-8643 to be carried on an Ethernet port.

For More Information on...

- the status messages reported in the Ethernet sub-tab, refer to the section "**Ethernet Tab**" on page 77.

SCTE 104 Messages

This chapter outlines how to configure the TES-8643 to manage SCTE 104 messages.

Overview

For detailed information on using SCTE 104 splice insert (DPI) commands, refer to the ***SCTE 104 2017*** standard available from the Society of Cable Telecommunications Engineers.

GPI Based Encoding

When the SCTE 104 direction is set to encode, the eight GPIOs function as inputs. If a GPI message arrives at the same time as a data port message, it is inserted on the following field.

In the case where two or more GPIs are asserted simultaneously, the TES-8643 parses the message and holds the GPI in Trigger state until the event has expired.

GPI Based Decoding

When the SCTE 104 direction is set to decoding, the eight GPIOs function as outputs, with each GPO assigned to a specified decoded SCTE 104 message. Each GPO is triggered by the arrival of a transport stream packet with the specified PID, and is then negated after a user-specified time-out. This lets you control the duration of the output pulse to meet your system requirements.

Encoding and Decoding via a Data Port

Since the packet format and DID/SDID values are fixed for SCTE 104 triggers, you only need to specify a serial port or network input, the direction (encode or decode), and the network port to be used for logging.

Event Logging

When installed in openGear frames with an MFC-8322-N or MFC-OG3-N cards, the TES-8643 uses NTP to properly timestamp messages and SCTE 104 event log entries. Note that this timestamp is expressed as UTC time only. Logging is limited to messages containing splice requests only. Refer to the section "**SCTE 104 Log Tab**" on page 84 for details on what read-only information is displayed in this tab.

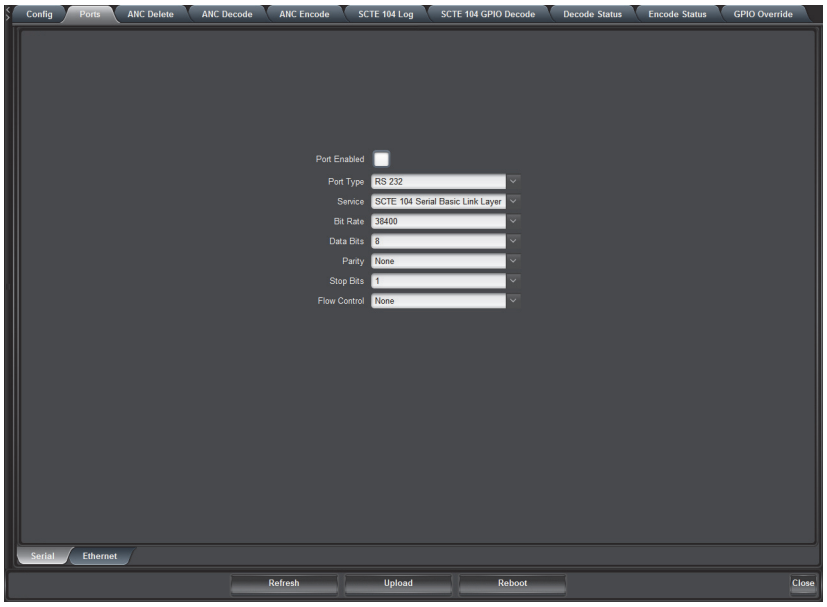
Selecting a Source

The SCTE 104 messages can be received via the **Ethernet** port, the **Serial** port, or the **IN 1** port on the rear module. This section outlines how to specify either the **Ethernet** port or the **Serial** port to monitor for SCTE 104 messages.

To specify the Serial port as the SCTE 104 source for the TES-8643

1. Select the **Ports** tab.

   The **Ports** tab displays with the **Serial** sub-tab automatically selected.



2. Use the **Port Type** menu to specify the communications protocol for the Serial port. Refer to **Table 11.11** for more information on the available options.
3. Use the **Service** menu to select **SCTE 104 Serial Basic Link Layer**.
4. Specify the **Bit Rate**, **Data Bits**, **Parity**, and **Stop Bits** settings for the Serial port.

To specify the Ethernet port as the SCTE 104 source

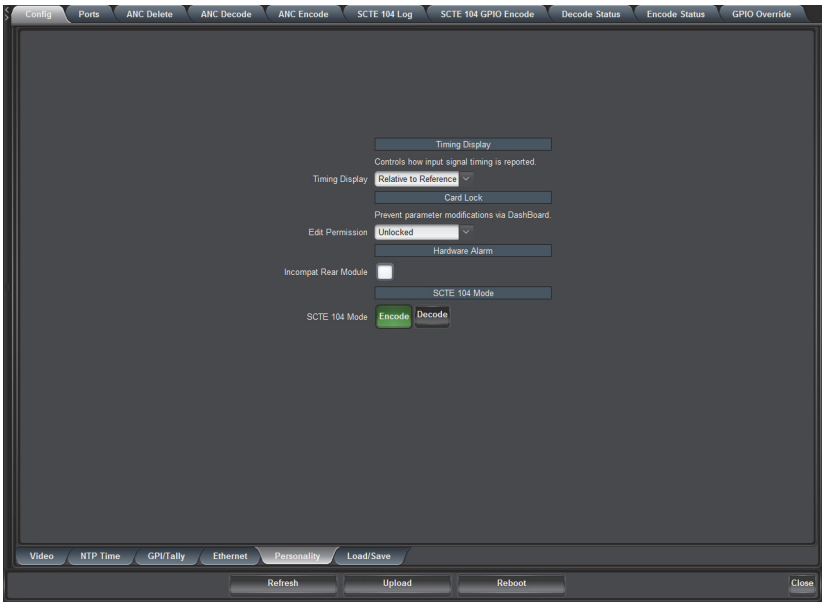
1. Select the **Ports** tab.
2. Select the **Ethernet** tab located at the bottom of the **Ports** tab.
3. Locate the **SCTE 104 TCP/IP** row in the **Ethernet** tab.
4. Set the **Role** menu to **Server**.
5. Use the **Protocol** menu to specify the transmission protocol the source devices uses for communications.
6. Use the **Port** field to specify the port number of the source device.

Selecting a Mode

The TES-8643 can either encode or decode SCTE 104 triggers at any given time, and not a mix. You must select a mode from the **Personality** tab before configuring the TES-8643.

To select a mode

1. Select the **Config** tab.
2. Select the **Personality** tab located at the bottom of the **Config** tab.



3. To enable the TES-8643 to encode SCTE 104 messages, click **Encode** in the **SCTE 104 Mode** area.
   - The **Encode** button is now lit green.
   - The **SCTE 104 GPIO Encode** tab is displayed in the **Device View** (as seen in the example above).
4. To enable the TES-8643 to decode SCTE 104 messages, click **Decode** in the **SCTE 104 Mode** area.
   - The **Decode** button is now lit green.
   - The **SCTE 104 GPIO Decode** tab is displayed in the **Device View**.

Encoding in a Transparent Stream

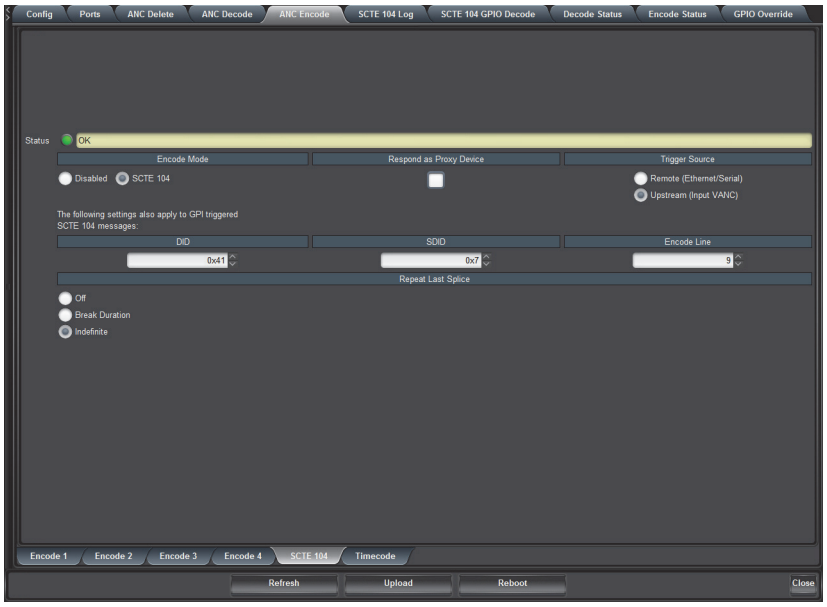
This section outlines how to enable the TES-8643 to identify the occurrence of an SCTE 104 trigger (whether by a specific line or specific DID, SDID, line and channel).

Specifying a Line for SCTE 104 Messages

You can enable the TES-8643 to specify the specific line to encode on.

To specify a line for SCTE 104 messages

1. Select the **ANC Encode** tab.
2. Select the **SCTE 104** tab located at the bottom of the **ANC Encode** tab.



3. Select **SCTE 104** from the **Encode Mode**.

   The **DID**, and **SDID** fields are set to the values defined by ***SMPTE 2010 - Section 5***.

4. Specify a line in the **Encode Line** field.

5. Use the **Trigger Source** options to specify the source of the incoming SCTE 104 commands to encode into the outgoing VANC. Choose from the following:

   - **Remote (Ethernet/Serial)** — The SCTE 104 messages are received via the **Ethernet** and/or the **Serial** ports on the TES-8643 rear module.
     - › If the source is via the **Ethernet** port, ensure that the **Enabled** box in the **Ports** > **Ethernet** tab is selected in the **SCTE 104 TCP/IP** row.
     - › If the source is via the **Serial** port, ensure that the **Service** menu in the **Ports** > **Serial** tab is set to **SCTE 104 Serial Basic Link Layer**.
   - **Upstream (Input VANC)** — The SCTE 104 messages are received via the **IN 1** connector on the TES-8643 rear module.

Customizing the SCTE 104 Encoding

You can override the DID, SDID, and Encode Line, for the SCTE 104 message by providing specific values other than the defaults. Note that if you change the Encode Mode, the values return to the default settings.

To specify a line for SCTE 104 messages

1. Select the **ANC Encode** tab.
2. Select the **SCTE 104** tab located at the bottom of the **ANC Encode** tab.
3. Select **SCTE 104** from the **Encode Mode** menu.
4. Use the **DID** field to specify the Data ID packet (in hexadecimal) to be used for the corresponding fields in the encoded Ancillary Data packet.
5. Use the **SDID** field to specify the Secondary ID packet (in hexadecimal) to be used for the corresponding fields in the encoded Ancillary Data packet.
6. Use the **Encode Line** field to specify the line to encode into.

✶ The VANC packet is encoded into the luma channel of the HD or 3G video stream. For SD streams, the VANC packet is encoded into the luma and chroma.

Setting up GPI/Tally Communications

This section explains how to configure communications for GPIs on the card using the menus and options available in DashBoard. Each of the GPI/O ports can be configured for SCTE 104 messages.

GPI Overview

When configured as a GPI for SCTE 104 messages, a port behaves as an input, and can be used to transmit SCTE 104 messages. A push-button switch, or an ON-OFF switch, may be directly connected between the port and the adjacent ground pin. Alternatively, an external device may drive a low level. Minimum pulse duration is 1ms, anything shorter will be filtered out.

Typically, you will configure the GPI for Edge trigger. This means that the action is carried out either on the falling edge (button is pushed), or rising edge (button is released), depending on which Polarity is selected. Alternatively, users may configure the GPI for Level trigger. In this mode, the action is carried out on both the rising and falling edges, so there are effectively two states. The Polarity control can be used to invert the behavior. Regardless of the trigger type, GPI commands may be overridden by other command inputs such as serial protocols.

Edge

This option enables the GPI to act as a latching trigger. Edge triggers are used when you want to toggle between settings. This option enables the GPI to execute a specific function.

- If configured for Falling Edge, the selected function is executed when the GPI input signal transitions from High to Low.
- If configured for Rising Edge, the selected function is executed when the GPI input signal transitions from Low to High.
- Edge triggered GPI signals are sampled once a frame and the associated function is executed only once per frame. The minimum pulse width is 1 millisecond.
- Typically, the edge triggered GPI is driven by external equipment that generates one pulse per event.

Level

Level triggers are used when you want to assert a particular state for a setting. You define the on-air state of the function as being either Level High or Level Low.

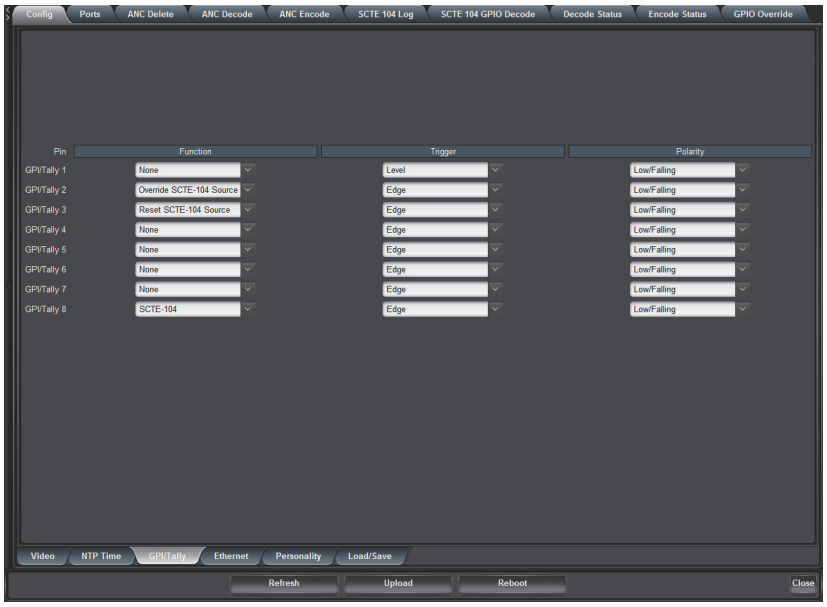
- If configured for Active Low, the selected function is executed when the GPI input signal is driven Low.
- If configured for Active High, the selected function is executed when the GPI input signal is driven High.

Configuring a GPIO for SCTE 104 Messages

The TES-8643 allows you to match against a Splice Insert or a Program ID message for each of its eight GPIO ports. But first you must configure each port you wish to use for SCTE 104 encoding.

To configure a GPIO port for SCTE 104 messages

1. Select the **Config** tab.
2. Select the **GPI/Tally** tab located at the bottom of the **Config** tab.



3. Enable the port by selecting **SCTE-104** from the **Function** field next to the GPI in the **GPI/Tally** area.
4. Select a trigger for the GPIO from the **Trigger** column.

★ Setting the GPIO Trigger to Edge results in a one second pulse on the output.

5. Select a polarity for the GPIO from the **Polarity** column.

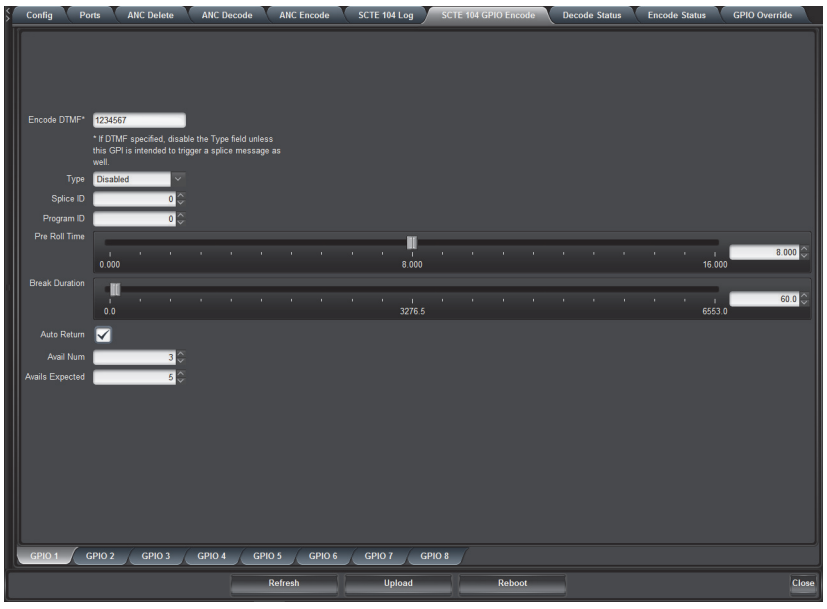
Configuring the TES-8643 to Encode

Configure the TES-8643 to encode via GPIs when you want to use contact closures to cause insertion of one of a group of predefined SCTE 104 messages. You can use the options in DashBoard to define the set of messages and this information is stored in the non-volatile memory in the VANC Processor. In this case, the TES-8643 becomes a GPI-driven SCTE 104 *inserter*.

To configure the TES-8643 to encode

1. Select the **SCTE 104 GPIO Encode** tab.

   Each Decode service (GPIO 1-8) is allocated a sub-tab, enabling you to configure each service separately.



✶ If the **SCTE 104 GPIO Encode** tab is not displayed, ensure the SCTE 104 Mode **Encode** button is selected (lit green) in the **Personality** tab.

2. Select the sub-tab for the **GPIO** you wish to configure.
3. If required, use the **Encode DTMF** field to send a specific DMTF message on GPIO activation.
4. Use the **Type** menu to specify the class of splice insertion. Refer to **Table 11.23** for a list of options.[1]
5. Use the **Program ID Value** field to specify the PID in the encoded message.
6. Use the **Splice ID Value** field to specifies the splice insert command in the encoded message.
7. Use the **Pre Roll Time** slider to specify, in the encoded message, the number of seconds to wait before initiating the trigger.
8. Use the **Break Duration** slider to specify the number of seconds for the insertion length in the encoded message.
9. Select the **Auto Return** box to have the encoded message specify that an acknowledgment to the device connected to the specified GPIO must be sent.
10. Use the **Avail Num** field to specify the amount of Avails within the associated PID of the encoded message.
11. Use the **Avails Expected** field to specify the total number of the expected Avails of the encoded message.

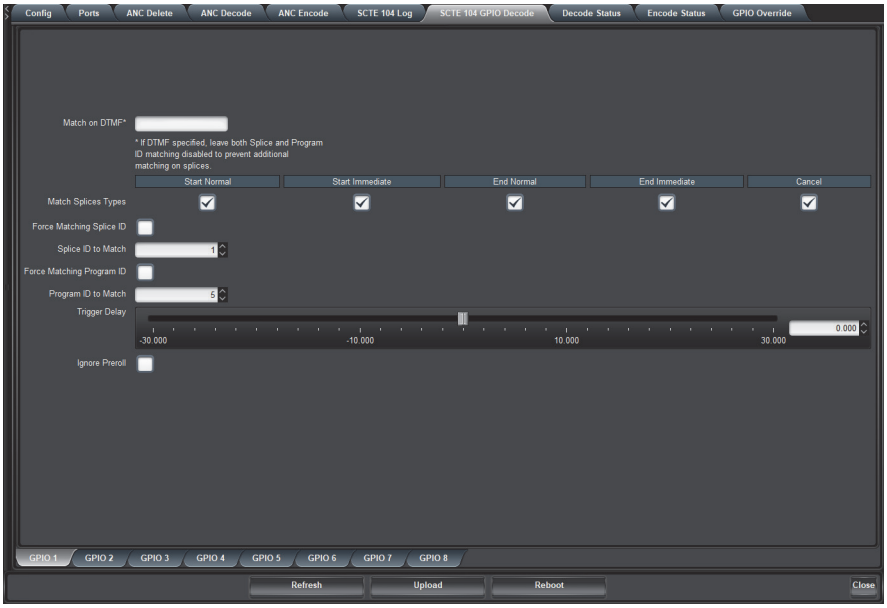
Configuring the TES-8643 to Decode

Configure the TES-8643 for GPI-based decoding if you want to create contact closure outputs in response to predefined SCTE 104 messages. You can use the options in DashBoard to define the set of messages and this information is stored in non-volatile memory in the VANC Processor. In this case, the TES-8643 becomes a SCTE 104 *receiver* with contact closure outputs.

To configure the TES-8643 to decode

1. Select the **SCTE 104 GPIO Decode** tab.

✶ If the **SCTE 104 GPIO Decode** tab is not displayed, ensure the SCTE 104 Mode **Decode** button is selected (lit green) in the **Personality** tab.



2. Select the sub-tab for the **GPIO** you wish to configure.

1. You may wish to set the Type to Disabled if you want a GPIO to only trigger a DTMF message without an accompanying splice message

3. If required, use the **Match on DTMF** field to allow any incoming DTMF message with an exact match to trigger the 1sec GPIO pulse.
4. Use the **Match Splice Types** to specify the splice type(s) the TES-8643 searches for in the trigger.
5. To match the Program ID to the trigger:
    a. Select the **Force Matching Program ID** box.
    b. Use the **Program ID to Match** field to specify the Program ID value that the TES-8643 searches for in the trigger. The TES-8643 activates the GPO when the specified value matches what is set in the trigger. If the values do not match, the trigger is ignored.
6. To match the Splice ID in the trigger:
    a. Select the **Force Matching Splice ID** box.
    b. Use the **Splice ID to Match** field to specify the Splice ID value that the TES-8643 searches for in the trigger. The TES-8643 activates the GPO when the specified value matches what is set in the trigger. If the values do not match, the trigger is ignored.
7. Use the **Trigger Delay** slider to augment when the pre-roll begins (in milliseconds). This field allows the GPIO pulse signal to be delayed if required for compatibility with connected equipment. This should normally be set to 0 unless you know that a delay is needed.
8. Select the **Ignore Preroll** box to enable the TES-8643 to ignore any pre-roll values and initiate the trigger immediately.

Overriding the SCTE 104 Messages

The TES-8643 provides a means of overriding the source of messages to be encoded into the outgoing VANC. When using SCTE-104, local messages are received from an Ethernet or Serial port and upstream messages are present in the input video VANC. From the **SCTE 104** tab in DashBoard, you can select the trigger source of incoming SCTE 104 commands to encode into the outgoing VANC and have the ability to change this setting at any time without the need of a GPI. Once this setting is enabled, GPI events can be used to temporarily override the setting.

When a GPI is configured and used as an override of the main setting described above, the GPI will behave differently depending on the trigger function assigned to the GPI.

- **Level** trigger — If the GPI is set to **Override SCTE-104 Source**, and the GPI is configured as a Level trigger, then the feature is enabled while the GPI is active. In this mode the feature will not automatically disable when the commands are received from the other source. The feature would only be disabled when the GPI level changes back to an inactive state.
- **Edge** trigger — If the GPI is set to **Override SCTE-104 Source**, and the GPI is configured as a Edge trigger, then the feature is enabled when the edge event occurs. In this scenario the override would automatically disable at the next receipt of an event command from the other data source. Alternatively, you can remove the override by asserting a 'Reset' GPI event if they wish.

Keep the following in mind when using this feature:

- Receiving any Multiple Operation Message from the other source will disable the feature.
- Receiving a Single Operation Message will not disable the override feature.
- GPI triggered SCTE 104 splice events will not reset the override feature.

To configure an override of the SCTE 104 messages on a GPIO

1. Select the **Config** tab.
2. Select the **GPI/Tally** tab located at the bottom of the **Config** tab.
3. To use the GPI to override the Trigger Source setting in the ANC Encode > SCTE 104 tab, set the **GPI Function** to **Override SCTE-104 Source**.

4. To use the GPI to reset the Trigger Source setting in the ANC Encode > SCTE 104 tab, set the **GPI Function** to **Reset SCTE-104 Source**.
5. Select a trigger for the GPIO from the **Trigger** column.
6. Select a polarity for the GPIO from the **Polarity** column.

To override the SCTE 104 messages on a GPIO via DashBoard

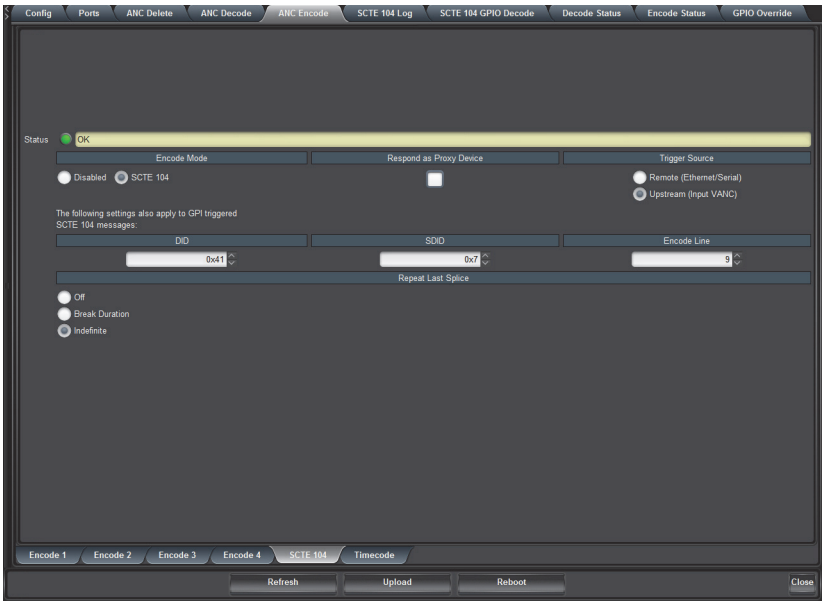
1. Select the **GPIO Override** tab.
2. Locate the GPIO you want to use as an override.
3. Use the **Override** menu to assign a function to the GPIO for the override.
4. Toggle the **Level** button to set the level for the override.

Repeating the Last Splice

The TES-8643 can continuously encode the last splice message (not other messages such as “Init” or “Keep Alive”) that was received on a data port, or initiated via a GPI, on each frame. The message continues to be re-transmitted until the next message arrives from the data port, or is activated via a GPI. This “duplicated message” flag is 0 (zero) on the first packet and 1 (one) on all repeated packets as per ***ST2010-2008***. A new incoming SCTE 104 message from the data port, or activated via GPI, stops the re-transmissions of the old message and starts transmission of the new message.

To repeat the last splice

1. Select the **ANC Encode** tab.
2. Select the **SCTE 104** tab located at the bottom of the **ANC Encode** tab.



3. In the **Repeat Last Splice** area choose one of the following:
   - **Off** — Disables this feature. There is no repetition of splice messages, including any on-going message.
   - **Break Duration** — Repeats the current message for its remaining duration and repeats future splices to the longest splice duration in the message. When the break duration is unknown, the message is repeated indefinitely.
   - **Indefinite** — Repeats the current and future messages indefinitely, regardless of the break duration encoded in the message.

Encoding Timecode

The TES-8643 provides the ability to transmit ***SMPTE ST 12-2*** timecode into the outgoing ancillary data space. Before proceeding, ensure that the port is connected to the timecode source. Refer to the section "**Supported Rear Modules**" on page 18 for details on the available ports.

Timecode Encode Lines and Locations

The timecode and binary fields are copied directly to the ANC output timecode with no interpretation except the field mark flag as follows:

Table 8.1 Field Mark Flags

Video Format	Flags
Interlaced	0 on Field 1, 1 on Field 2
Progressive	≤ 30Hz: always 0
	>30Hz:0 on the first frame of a pair, 1 on duplicated second frame of a pair

The location of the field mark bit depends on the video as follows:

Table 8.2 Location of Field Mark Bit

Frames/Second	VITC Bit Number[a]	ATC UDW, Bit Number[b]
24, 30	35	UDW 7, Bit 7
25	75	UDW 15, Bit 7

a. ST 12-1-2014, section 10.2.2
b. ST 12-2-2014, section 6.3

For SD video formats, the default is to encode in the VANC area on the second line following the switch line.

Table 8.3 Default Lines

Video Format	Lines
480i	Line 12F1/275F2
576i	Line 8F1/321F2
HD interlaced	LTC on Line 10, VITC2 on Line 571
HD progressive	LTC on Line 10, VITC2 on Line 9

Selecting the Timecode Source

The timecode can be sourced from the **Serial** port (balanced) or a **GPI** port (unbalanced) on the rear module. However, only one source may be selected for timecode. Refer to the section refer to the section "Linear Timecode Communication Setup" on page 33 for information on selecting the timecode source.

Selecting the Timecode Encode Mode

The TES-8643 gives you the choice of encoding Linear Timecode (LTC), or a Vertical Interval Timecode (VITC) pair.

For More Information on...

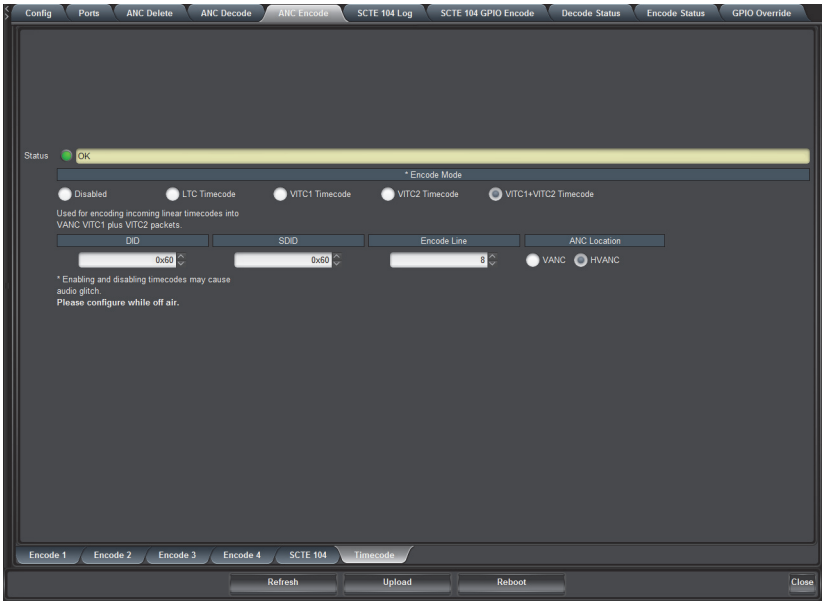
- the options in the **Timecode** tab, refer to **Table 11.19**.

To select a timecode encode mode

1. Select the **ANC Encode** tab.
2. Select the **Timecode** tab located at the bottom of the **ANC Encode** tab.

3. From the **Encode Mode** area, specify the type of timecode to encode.

   The **DID**, **SDID**, and **ANC Location** fields are now editable.



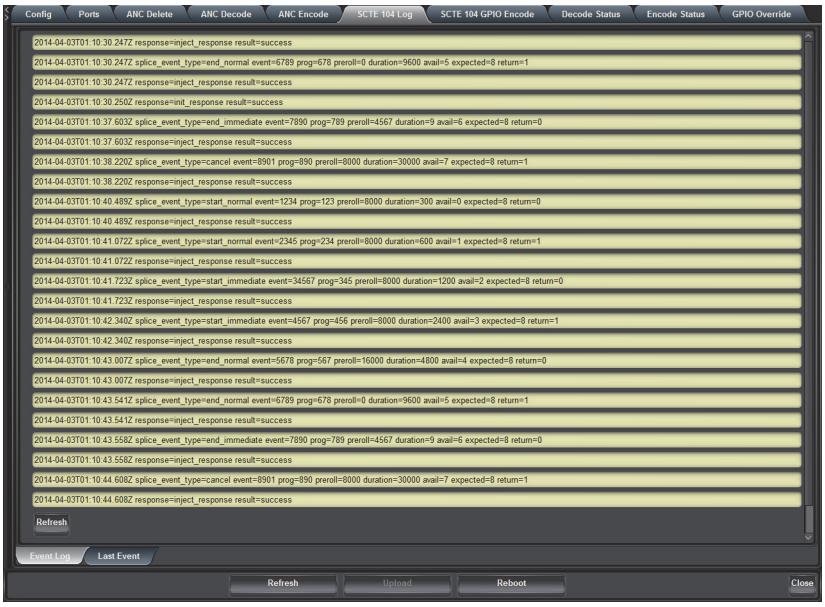
4. Use the **DID** field to specify the Data ID packet (in hexadecimal) to be used for the corresponding fields in the encoded Ancillary Data packet to include the timecode in.
5. Use the **SDID** field to specify the Secondary ID packet (in hexadecimal) to be used for the corresponding fields in the encoded Ancillary Data packet to include the timecode in.
6. Use the **Encode Line** field to specify the line to encode the timecode into.

★ The VANC packet is encoded into the luma channel of the HD or 3G video stream. For SD streams, the VANC packet is encoded into the luma and chroma.

7. Use the **ANC Location** options to specify where in the vertical blanking region to encode the timecode data.

Setting up Logging

The TES-8643 maintains a list of trigger events and presents them in reverse chronological order in the **Event Log** sub-tab of the **SCTE 104 Log** tab. An example is shown in the following screen capture.



SCTE 104 Log Tab — Event Log Sub-tab

Each entry includes the GPIO number, date and time, Splice Event ID, and type of event.

- When encoding, this includes logging of all upstream VANC messages including those originating from the remote port or GPI-triggered event.
- When decoding, all upstream VANC splice messages, including when an error occurs, is recorded.

The tab displays the last 24 of a possible 4000 log entries. At a typical rate of 2 trigger events per hour, it will hold over 20 days of triggers for one GPIO or 2.6 days for eight GPIOs. When it fills, the oldest entries are removed to make room for new ones.

Alternately, the **Last Event** sub-tab of the **SCTE 104 Log** tab displays the last log entry for each GPIO and the data port configured for SCTE 104 triggers. Refer to **Table 11.22** for details on the information displayed in this tab.

For More Information on...

- the log entries, refer to the section "**SCTE 104 Log Tab**" on page 84.

Logging via the Ethernet Port

You can configure the **Ethernet** port on the TES-8643 rear module to output the log entries. Note that the TES-8643 discards all existing log entries on initial connection, then continues reporting events as they occur.

For More Information on...

- configuring this port, refer to the section "**Configuring the Ethernet Data Ports**" on page 66.

Data Port Based Encoding and Decoding

The TES-8643 can operate as an SCTE 104 proxy device when you have an automation systems (AS) that sends SCTE 104 messages over a network or serial connection. The TES-8643 recognizes and accepts messages addressed to an "Injector", rejects others, responds appropriately to the AS, divides the message into VANC packets if needed, prepends the Payload Descriptor byte to each VANC packet per SMPTE 2010, inserts the packets into VANC, and maintains a log of transmissions.

SCTE 104 Encode Mode

In SCTE-104 Encode mode, the TES-8643 takes the part of a **Proxy Device** as described in ***section 6.5 of ANSI_SCTE 104 2017*** (the current revision at the time of writing). The TES-8643 takes the place of the **Injector Device** accepting commands from the **Automation System** (AS). Since some automation systems do not recognize

the proxy result code (128) for success, there is a DashBoard control directing the TES-8643 to respond with the standard injector response code (100) for success.

The AS sends single operation or multiple operation messages, exactly as outlined in the SCTE 104 document. The AS does not add the SMPTE 2010 encoding. The TES-8643 adds the SMPTE 2010 encoding, splitting long SCTE 104 messages into multiple VANC packets as required and marking duplicate packets where applicable. The TES-8643 also repeats the last splice message as directed by a DashBoard control, marking the repeated messages as duplicates. If you require the TES-8643 for an AS application, you can assign a data port (Serial or Ethernet) as described in the chapter "**Data Ports Configuration**" on page 65.

SCTE 104 Decode Mode

In SCTE-104 Decode mode, the TES-8643 passes **Automation System** messages received from the VANC to the actual **Injector Device** through the Ethernet or Serial port. The TES-8643 strips off the SMPTE 2010 encoding to rebuild the SCTE 104 messages before sending the message to the port. The duplicate SCTE 104 messages are discarded.

The TES-8643 monitors responses from the injector. The responses are not required, but they are logged upon arrival.

Serial Basic Link Layer (BLL)

There is also a **Basic Link Layer** (BLL) syntax that is mandatory when using the physical serial port on the rear module but is also made available on the Ethernet port for use with a serial hub. Refer to ***SCTE-104 - Appendix B*** for details.

Encode Mode

In Encode mode, it is the responsibility of the AS to add the BLL start delimiter, CRC and end delimiter. It is also required to insert `<ESCAPE>` characters where required. The TES-8643 verifies the BLL before building the SMPTE 2010 encoded VANC packets for insertion.

Decode Mode

In Decode mode, the TES-8643 removes the SMPTE 2010 encoding, reconstructing the raw SCTE 104 messages. The TES-8643 applies the BLL encoding to the raw SCTE 104 messages before sending to the target port.

SCTE 104 Examples

The automation system is responsible for encoding message as either single operation messages.

Example of the Keep Alive Message

An example of a single operation message is: `keep alive`. The automation system sends the following stream:

Byte Offset	Field	Value (Hexadecimal)	Notes
0	opID	0003	alive_request_data See table 7-3 on pg 25
2	messageSize	000d	Total 13 bytes in message
4	result	0000	See section 13.0
6	result_extension	0000	
8	protocol_version	00	This field must be zero
9	AS_index	00	See section 7.2.1
10	messsage_number	17	Message number: 23

Byte Offset	Field	Value (Hexadecimal)	Notes
11	DPI_PID_index	0000	See section 7.2.1
13	data()		None for this message

On receipt of a `keep alive` message, the TES-8643 returns the following response to the AS:

Byte Offset	Field	Value (Hexadecimal)	Notes
0	opID	0004	alive_request_data See table 7-3 on pg 25
2	messageSize	000d	Total 13 bytes in message
4	result	0064	Success: See section 13.0
6	result_extension	0000	
8	protocol_version	00	This field must be zero
9	AS_index	00	See section 7.2.1
10	messsage_number	17	Message number: 23
11	DPI_PID_index	0000	See section 7.2.1
13	data()		None for this message

Example of the Splice Event

The AS does not send the SMPTE 2010 payload descriptor byte. The TES-8643 does this automatically. It also breaks long SCTE 104 messages of more that 254 bytes into the required number of VANC packets.

Byte Offset	Field	Value (Hexadecimal)	Notes
0	opID	ffff	Header for all multiple operation messages
2	messageSize	001e	Total 30 bytes in message. This includes all multiple operation messages.
4	protocol_version	00	This field must be zero.
5	AS_index	00	See section 7.2.1.
6	message_number	05	Message number: 5
7	DPI_PID_index	0000	See section 7.2.1.
9	SCTE35_protocol_version	00	Must be 0.
10	timestamp()	00	Type = 0, no time: See 11.5
11	num_ops	01	On multiple operation message
Multiple Operation Message: 1			
12	opID	0101	splice_request_data. See table 7.4 on page 28
14	data_length	000e	Splice requests totals 14 bytes

Byte Offset	Field	Value (Hexadecimal)	Notes
16	splice_insert_type	03 (spliceEnd_normal)	splice_request_data... See section 8.3, pages 35-41 for more details
17	splice_event_id	001a85 (6789)	
21	unique_program_id	02a6 (678)	
23	pre_roll_time	0000	
25	break_duration	0005	
27	avail_num	06	
28	avails_expected	08	
29	auto_return_flag	01	
Multiple Operation Message: 2 (not applicable in this example)			

Example of Inject_Response

On receipt of a multiple operation message, the TES-8643 returns the following response to the AS:

Byte Offset	Field	Value (Hexadecimal)	Notes
0	opID	0007	inject_response_data See table 7-3 on page 25
2	messageSize	000e	Total 14 bytes in message. Includes 1 byte of data ().
4	result	0064*	Success. See section 13.0
6	result_extension	0000	
8	protocol_version	00	This field must be zero
9	AS_index	00	See section 7.2.1
10	message_number	05	Message number: 5
11	DPI_PID_index	0000	See section 7.2.1.
13	data()	05	Message number from original splice request: 05

*Note that the result code here would be 0080 (or 128) when responding as a Proxy Device.

Example of Inject_Complete_Response

The TES-8643 sends an `inject_complete` message approximately 0.5 second after the `inject_complete` response to the AS:

Byte Offset	Field	Value (Hexadecimal)	Notes
0	opID	0008	inject_response_data See table 7-3 on page 25
2	messageSize	000f	Total 15 bytes in message. Includes 2 bytes of data ().
4	result	0064	Success See section 13.0
6	result_extension	0000	
8	protocol_version	00	This field must be zero
9	AS_index	00	See section 7.2.1.
10	message_number	06	Message number: 6 (this message, note the original splice request message)

Byte Offset	Field	Value (Hexadecimal)	Notes
11	DPI_PID_index	0000	See section 7.2.1
13	data() - see section 8.6.3, page 49	05	Message number from the corresponding splice request: 05
14		01	The number of splice requests in the corresponding splice request: 01

*Note that the result code here would be 0080 (or 128) when responding as a Proxy Device.

Example of Serial Basic Link Layer

Here is an example of the same splice request and response described above, but with the Basic Link Layer protocol (BLL). Note the ESC (1b) characters inserted within the body of the message. The blue characters are present due to the BLL, the remainder of the message is exactly the same as for the Ethernet message.

Byte Offset	Field	Value (Hexadecimal)	Notes
0	start_delimiter	**02**	Denotes start of BLL message
1	opID	ffff	Header for all multiple operation messages
3	messageSize	001e	Total 30 bytes in message. This includes all multiple operation messages.
6	protocol_version	00	This field must be zero.
7	AS_index	00	See section 7.2.1
8	message_number	05	Message number: 5
9	DPI_PID_index	0000	See section 7.2.1
10	SCTE35_protocol_version	00	Must be 0
11	timestamp()	00	Type = 0, no time: See section 11.5
12	num_ops	01	On multiple operation message
Multiple operation message: 1			
13	opID	0101	splice_request_data See table 7-4, page 28
15	data_length	000e	Splice request totals 14 bytes
17	splice_insert_type	**1b**03 (spliceEnd_normal)	splice_request_data... See section 8.3, pages 35-41 for details. Note the escape characters place before 02 and 03 values used by the BLL protocol.
19	splice_event_id	001a85 (6789)	
23	unique_program_id	**1b**02a6 (678)	
26	pre_roll_time	0000	
28	break_duration	0005	
30	avail_num	06	
31	avails_expected	08	
32	auto_return_flag	01	
33	message_CRC	**4e9cc962**	MPEG2 32bit CRC
37	end_delimiter	**03**	Denotes end of BLL message

Example of Inject_Response with Serial BLL

On receipt of a multiple operation message, the TES-8643 returns the following response to the AS. Once again, the blue characters are due to the BLL.

Byte Offset	Field	Value (Hexadecimal)	Notes
0	start_delimiter	**02**	Denotes start of BLL message
0	opID	0007	inject_response_data See table 7-3 on page 25
2	messageSize	000e	Total 14 bytes in message. Includes 1 byte of data ().
4	result	09064	Success See section 13.0
6	result_extension	0000	
8	protocol_version	00	This field must be zero
9	AS_index	00	See section 7.2.1
10	message_number	05	Message number: 5
11	DPI_PID_index	0000	See section 7.2.1
13	data()	05	Message number from original splice request: 05
	message_CRC	**62569528**	MPEG2 32bit CRC
	end_delimiter	**03**	Denotes end of BLL message

Data Ports Configuration

This chapter outlines how to configure the **Serial** and **Ethernet** ports on the rear module. Before proceeding, ensure that you have configured the ANC encode and/or decode services, and the Ethernet communication settings, for your TES-8643 as outlined in the previous chapters.

For details on using a Comtrol® DeviceMaster® with the TES-8643, refer to the chapter "**Using a Port Expander**" on page 67.

✶ This chapter assumes that DashBoard is launched on your computer and the TES-8643 interface displays in the right-side of the DashBoard window.

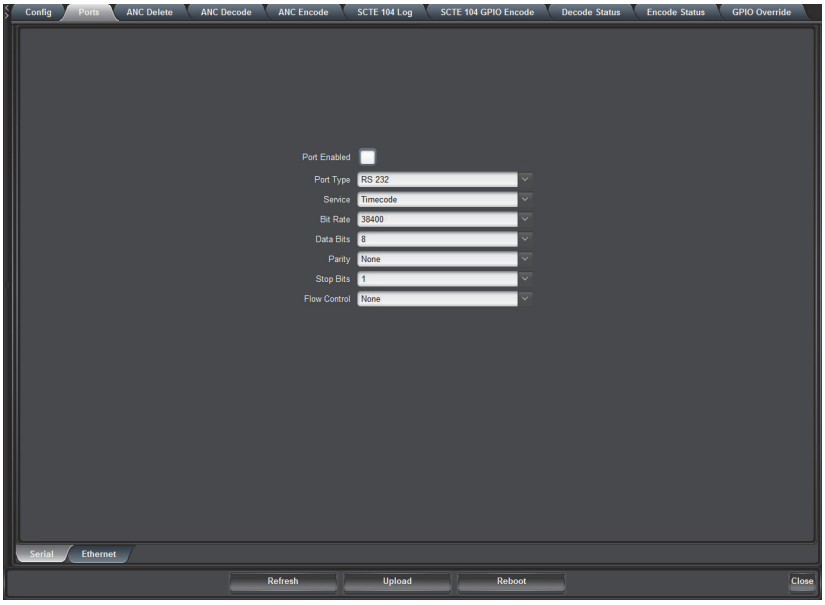
Configuring the Serial Data Port

This section outlines how to configure the TES-8643 to communicate over the **Serial** port on the rear module.

✶ When the Serial port is disabled, any incoming data on the port is discarded by the TES-8643. The Bit Rate, Data Bits, Parity and Stop Bits fields are ignored.

To configure serial communications

1. Select the **Ports** tab.
2. Select the **Serial** tab located at the bottom of the **Ports** tab.



3. Use the **Port Type** menu to specify the transmission standard used by the external device connected to the **Serial** port.
4. Use the **Service** menu to specify the information to be transmitted on the **Serial** port. Refer to the Table 11.11 on page 75 for a list of options.

✶ The SCTE 104 Serial Basic Link Layer protocol can only be active on the serial port, or on the Ethernet port, but not both. Should you attempt to enable the same protocol on both ports, the TES-8643 automatically disables the first port (the **Enabled** box is cleared).

5. Use the **Bit Rate**, **Data Bits**, **Parity**, and **Stop Bits** menus to configure the communication standards for the **Serial** port.
6. Use the **Flow Control** menu to regulate the data transmission on the serial communication link using specific ASCII characters to start or stop the flow of data.

7. Select the **Port Enabled** box to apply your changes and enable communication on the **Serial** port.

Configuring the Ethernet Data Ports

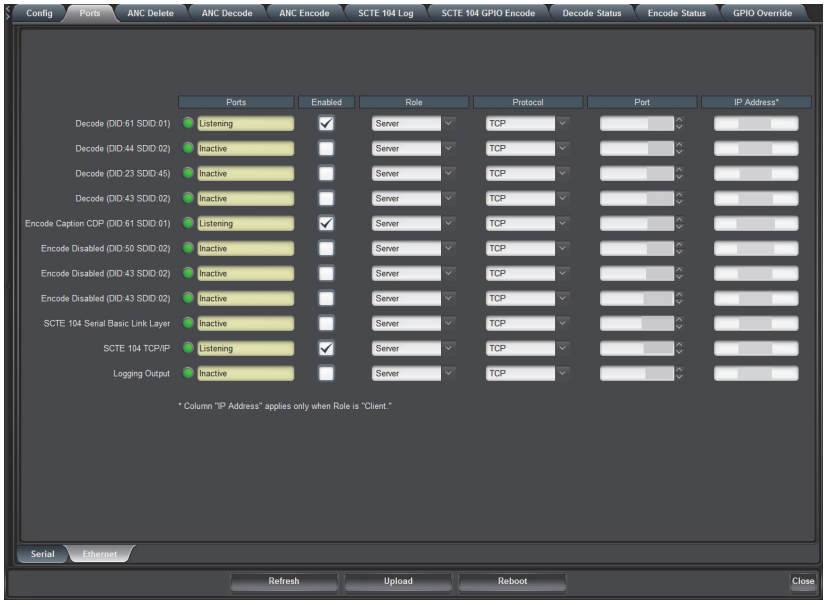
This section outlines how to configure the **Ethernet** port on the rear module to communicate with equipment via your facility network.

For More Information on...

- the settings available in the **Ports** tabs, refer to the section "**Ports Tab**" on page 75.
- configuring the Ethernet port as a logging output for SCTE 104 messages, refer to the section "**Setting up Logging**" on page 57.

To configure an ethernet data port

1. Select the **Ports** tab.
2. Select the **Ethernet** tab located at the bottom of the **Ports** tab.



3. Locate the service you want to transmit via the network connection. Note that the list of ANC services depends on the settings of the **ANC Encode** and **ANC Decode** tabs.

★ The SCTE 104 Serial Basic Link Layer protocol can only be active on the serial port, or on the Ethernet port, but not both. Should you attempt to enable the same protocol on both ports, the TES-8643 automatically disables the first port (the **Enabled** box is cleared).

4. From the **Role** menu, configure how the TES-8643 functions on the network. Choose from the following:
   - **Server** — TES-8643 functions as a host, or socket listener.
   - **Client** — TES-8643 functions as a service requester that initiates communications with a server.
5. Use the **Protocol** menu to specify the transmission protocol the service uses for ethernet communications.
6. Use the **Port** field to specify the port number to be used for this VANC decode or encode service. This port number applies to the server, which can be either the TES-8643 or the remote device, depending on the **Role** setting.
7. From the **IP Address** menu, specify the IP address of the external device if you selected **Client** in 4
8. Select the **Enabled** box for the required service.

Using a Port Expander

This chapter describes how to set up the TES-8643 and the Comtrol® DeviceMaster® to work together.

Before You Begin

The Comtrol® DeviceMaster® connects to the TES-8643 over Ethernet and provides a number of RS-232/422/485 serial ports.

Before you begin, ensure that you have the following items:

- Comtrol® DeviceMaster® Port Expander
- Ethernet interface cables

Comtrol® DeviceMaster® Pinouts

Table 10.1 Serial Pinouts

Pin	RS-232	RS-422
1	CD	n/c
2	Rx	RxA (Rx-)
3	Tx	TxA (Tx-)
4	DTR	n/c
5	Ground	n/c
6	DSR	n/c
7	RTS	TxB (Tx+)
8	CTS	RxB (Rx+)
9	RI	n/c

Compatibility

Table 10.2 Compatibility

	Version
Comtrol DeviceMaster Socket Server	7.31
Comtrol PortVision Plus	4.08
TES-8643	1.0

DeviceMaster Setup

This procedure assumes that a DeviceMaster is already installed in your facility. If not, or if you are encountering difficulties configuring your DeviceMaster via a web browser, it is recommended to use the Comtrol® PortVision® software to set up your DeviceMaster. Refer to your DeviceMaster documentation for details on using this software or for troubleshooting your installation.

To set up a DeviceMaster

1. On your computer, open your web browser and, in the address bar, enter the IP address of your DeviceMaster and press **Enter**. The default address is **192.168.250.250**.
2. Click **Configure Network**.
3. Click **Use static configuration below:** and enter the IP Address, Net mask, and Gateway you want to use. A static IP Address is recommended for the DeviceMaster to communicate with the TES-8643.
4. Click **Save**. Changes do not take effect until the DeviceMaster is rebooted.
5. Click **Port x**, where **x** is the port on the DeviceMaster you are connecting a device to.
6. Enter the Serial Configuration information for your device.
   a. Enter the TCP Connection Configuration information for your device:
      › **Enable** — selected
      › **Listen** — selected
      › **Port** — Ross Video suggests that you start numbering the ports at **8701**.
   b. Leave all other settings at their default values.
7. Click **Save**. Changes do not take effect until the DeviceMaster is rebooted.
8. Reboot the DeviceMaster.

TES-8643 Setup

This section outlines how to configure the TES-8643 to communicate with the Comtrol® DeviceMaster® via an ethernet protocol.

To set up communications

1. From the **Tree View** in DashBoard, expand the node for the TES-8643 you want to access.
2. Select the **Ports** tab.
3. Select the **Ethernet** tab located at the bottom of the **Ports** tab.
4. Locate the Encode and/or Decode stream in the provided list that you want to access via the Comtrol® DeviceMaster® port.
5. From the **Role** menu, select **Client**.
6. Use the **Protocol** menu to specify the transmission protocol the external device uses for communications.
7. From the **Port** menu, specify the port number for the DeviceMaster.
8. From the **IP Address** menu, specify the IP Address of the DeviceMaster.
9. Select the **Enabled** box for the Encode and/or Decode stream.
10. Repeat steps 4 to 9 for each stream as required.

DashBoard Menus

This chapter provides a brief summary of the menus available for the TES-8643. Default values are indicated with an asterisk (*).

✶ Before proceeding, ensure that you are running DashBoard software version 6.2.0 or higher. The DashBoard software and user manual are available to download from the Ross Video website.

Status Tabs

This section summarizes the read-only information displayed in the **Status** tabs. The fields in the **Status** tabs vary in severity from green (valid), yellow (caution), to red (alarm). DashBoard reports the most severe alarm for a single field. Alarm colors are noted within the tables as text set in brackets next to the menu parameter name.

Signal Tab

Table 11.1 summarizes the read-only information displayed in the **Signal** tab.

Table 11.1 Signal Tab Items

Item	Parameters	Description
Signal		
Reference Status	No Reference	No signal detected on the selected reference input
	Incompatible: ###	A reference signal is detected but the format is incompatible with the current output mode
	Unlocked: ###	A reference signal is detected but the card is not locked to it
	###	Indicates the reference format detected
Input 1 Status	Format # (Green)	Indicates the detected input format
	Format # - No Signal (Red)	The input signal is not detected and the Input 1 Loss alarm is enabled
	Error - Unsupported (Red)	The input format is incompatible with the output format
	Error - Incompatible (Yellow)	The input format is incompatible with its selected function such as the input format does not match output format. If an input is not selected for one of these functions, no error is indicated.
Bypass Relay	Normal (not in bypass) (Green)	IN 1 is available for processing, and OUT 1 is driven by the card
	Active (in bypass) (Red)	IN 1 bypasses the card and is looped passively on OUT 1 through the relay. Note IN 1 cannot be detected by the card in this state.
Timing Display[a]	Relative to Reference	The **Input Timing** fields display the input signal timing values relative to the selected reference
	Input to Output	The **Input Timing** fields display the input signal timing values relative to the SDI output of the card

Table 11.1 Signal Tab Items

Item	Parameters	Description
Input 1 Timing	## Clocks ## lines	Indicates the timing of the specified SDI input to what is selected in the **Personality** tab. The display is in output format clocks and lines.
Output Timing	## Clocks ## lines	Indicates the relative timing of the output to the selected reference signal

a. This can be changed via the Timing Display menu located on the Personality tab.

Hardware Tab

Table 11.2 summarizes the read-only information displayed in the **Hardware** tab.

Table 11.2 Hardware Tab Items

Item	Parameters	Description
HW Status	OK (Green)	Normal operation; no hardware errors and the correct rear module is installed
	Incomp I/O module (Red)	Card is connected to the wrong rear module
	Alarm suppressed (Green)	Rear module is incompatible and the **Incompat Rear Module** alarm is disabled
Voltage (V)	#	Measured input voltage
Current (mA)	#	Current consumption in milliamperes
Power (W)	#	Calculated power of the card
FPGA Temp	##C / ##F	FPGA Core temperature. A warning is displayed when the card FPGA Core Temperature reaches 85°C. If the temperature reaches 100°C, the card automatically shuts down to avoid permanent damage and will have to be re-booted, or power cycled, to resume normal operation.
CPU Usage	x.xx / y.yy / z.zz	Displays the CPU Load average where: • **x.xx** represents in the last minute • **y.yy** represents the last five minutes • **z.zz** represents the last fifteen minutes
RAM Available	# / ##	CPU Memory Used / Total CPU Memory
CF Card Status[a]	Not used	CompactFlash™ card is not implemented
	#.## of # GB used	Displays the amount of space used on the CompactFlash card
	Missing	CompactFlash card is not present
	Unreadable	An error occurred such as incompatible CompactFlash card, or the card cannot be read

a. The CompactFlash™ card is not currently used by the TES-8643.

Product Tab

Table 11.3 summarizes the read-only information displayed in the **Product** tab.

Table 11.3 Product Tab Items

Item	Parameters	Description
Product	TES-8643	Indicates the product name
Supplier	Ross Video Ltd.	Indicates the manufacturer of your card
Board Rev	##	Indicates the board version of your card
Serial Number	######	Indicates the serial number of your card
Rear Module	#	Indicates the type of rear module in the slot
Software Rev	##.##	Indicates the software and build versions
Firmware Rev	#.###	Indicates the FPGA version number

Network Status Tab

Table 11.4 summarizes the read-only information displayed in the **Network Status** tab.

Table 11.4 Network Status Tab Items

Item	Parameters	Description
IP Address	##.##.###.###	IP Address of the card
Subnet Mask	###.###.###.#	Subnet Mask for the card
Default Gateway	##.##.#.#	Card gateway
Ethernet Status	OK	Ethernet communications for the TES-8643 are valid
	Link Down	Ethernet communications for the TES-8643 are invalid. The ethernet cable may be disconnected on the rear module or the ethernet network may be down or experiencing problems.
	No IP Address	The following conditions are occurring: • The **Method** is set to **DHCP**. • The ethernet cable connection to the TES-8643 rear module is correct. • A valid IP Address could not be obtained. The DHCP server may be down or is still powering up after a power outage.
##:##:##:##:##:##	Indicates the MAC Address for the TES-8643	

Configuration Tabs

This section briefly summarizes the sub-tabs available in the **Config** tab.

Video Tab

Table 11.5 summarizes the **Video** set up options available in DashBoard.

Table 11.5 Video Menu Items

Item	Parameters	Description
Video State		
Video State[a]	Active (Green)	IN 1 is available for processing, and OUT 1 is driven by the TES-8643
	Relay in Bypass (Red)	IN 1 bypasses the TES-8643 and is looped passively on OUT 1 through the relay. Note IN 1 cannot be detected by the TES-8643 in this state.
Reference Setup		
Reference Input	Frame 1*	TES-8643 uses the reference source connected to the **REF 1** port on the frame
	Frame 2	TES-8643 uses the reference source connected to the **REF 2** port on the frame
	Local	TES-8643 uses the external reference source connected to the **ANLG REF IN** BNC on the rear module. You must also configure **JP7** on the card to enable or disable a 75ohm terminator on the external reference input.
	Input #	TES-8643 locks to the specified SDI input on the rear module
Output Setup		
Video Format	480i 59.94	Selects the video format for the output signal. Note that a change in video format will not take effect until the reference is compatible.
	720p 59.94	
	1080i 59.94*	
	1080p 59.94 LEVEL A	
	576i 50	
	720p 50	
	1080i 50	
	1080p 50 LEVEL A	

a. This option is not available when using an incompatible rear module.

NTP Time Tab

Table 11.6 summarizes fields in the **NTP Time** tab.

Table 11.6 NTP Time Menu Items

Item	Parameter	Description
Alarm Enable	Selected*	Enables the NTP Status field to report when a time source is missing
	Cleared	Disables this alarm

Table 11.6 NTP Time Menu Items

Item	Parameter	Description
NTP Status	Present (Green)	Indicates a valid time source is reporting to the TES-8643
	Time Source missing (Red)	Indicates that the time source reporting to the TES-8643 is invalid or absent
NTP Time	yyyy-Mm-Dd hh:mm:ss UTC	Indicates the current date based on NTP, where: • **yyyy** represents the year • **Mm** represents the month • **Dd** represents the day • **hh**:**mm**:**ss** represents the current local time (hours:minutes:seconds)

GPI Configuration Tab

The menu items available in the **GPI** tab enable you to configure each GPI.

Table 11.7 GPI Configuration Menu Items

Item	Parameter	Description
GPI/Tally #		
Function	None*	The GPI/O port is not configured and the GPI has no effect
	SCTE-104	Specifies that the port will be used for SCTE 104 trigger encoding/decoding[a]
	Override SCTE-104 Source	Specifies that the GPI will override the Trigger Source setting in the ANC Encode > SCTE 104 tab.
	Reset SCTE-104 Source	Specifies that the GPI will switch the Trigger Source setting to the original selection in the ANC Encode > SCTE 104 tab (if the Trigger is set to Edge).
	Timecode Input	Specifies that the GPI port (unbalanced) will be used for SMPTE 12M Linear Timecode.
Trigger	Edge*	Performs the function when a transition edge is detected on the GPI input. The Low-to-High or High-to-Low active edge is set by the Polarity control.
	Level	Performs the function when a voltage level is driven on the GPI input. The voltage level High or Low is set by the Polarity control.
Polarity	High/Rising	Sets the polarity of the edge or level trigger. In the case of edge trigger, a Low-to-High transition starts the function. In the case of level trigger, a high level starts the function.
	Low/Falling*	Sets the polarity of the edge or level trigger. In the case of the edge trigger, a High-to-Low transition starts the function. In the case of level trigger, a low level starts the function.

a. The SCTE 104 Trigger Mode option in the Personality tab determines whether the port will be used for encoding or decoding. Refer to Table 11.9 on page 74 for more information.

Ethernet Tab

Table 11.8 summarizes the **Ethernet** options available in DashBoard.

Table 11.8 Ethernet Menu Items

Item	Parameter	Description
Method	Static	User manually supplies the network settings
	DHCP*	Automates the assignment of the network settings
IP Address	##.#.#.###	The IP Address for the card
Subnet Mask	###.#.#.#	The subnet mask for the card
Default Gateway	##.#.#.#	The gateway for communication outside of the local area network (LAN)
Apply Changes	Applies and saves any changes made to the **Ethernet Settings**	
Cancel	Cancels any setting changes and resets the **Ethernet Settings** to the previous values	
Ethernet Status (read-only)	OK	Ethernet communications for the card are valid
	Link Down	Ethernet communications for the card are invalid. The Ethernet cable may be disconnected on the rear module or the Ethernet network may be down.
	No IP Address	The following conditions may be occurring: • The **Method** is set to **DHCP** and the DHCP server is not available • The Ethernet cable is disconnected from the card rear module • A valid IP Address is no longer available. The DHCP server may be down or is still powering up after a loss of power.
##:##:##:##:##:## (read-only)		The MAC Address for the card

Personality Tab

Table 11.9 summarizes the options available in the **Personality** tab.

Table 11.9 Personality Menu Items

Item	Parameters	Description
Timing Display		
Timing Display	Relative to Reference*	The **Input Timing** fields in the **Signal** tab display the timing values relative to the reference
	Input to Output	The **Input Timing** fields in the **Signal** tab display the timing values relative to the output
Card Lock		
Edit Permission	Unlocked*	Menu options are unlocked and editable from DashBoard
	Locked	All menu items, except this one, are locked and read-only
Hardware Alarm		

Table 11.9 Personality Menu Items

Item	Parameters	Description
Incompat Rear Module	Selected*	**Rear Module** field in the Product tab reports when a rear module is not compatible with the TES-8643
	Cleared	Disables the alarm
SCTE 104 Mode		
Encode	Selected (Green)	Configures the TES-8643 as an encoder of SCTE 104 triggers. All GPIO ports are automatically configured as inputs.
	Not selected (Grey)	TES-8643 does not encode SCTE 104 triggers
Decode	Selected (Green)	Configures the TES-8643 as a decoder of SCTE 104 triggers. All GPIO ports are automatically configured as outputs.
	Not selected (Grey)	TES-8643 does not decode SCTE 104 triggers

Load/Save Tab

Table 11.10 summarizes the options in the **Load/Save** tab.

Table 11.10 Load/Save Menu Items

Item	Parameter	Description
Global Settings		
Load Factory Defaults	Resets all DashBoard parameters and values (excluding Ethernet, reference, and output format settings) to the factory default values	

Ports Tab

This section summarizes the options in the **Ports** tab. The Serial and Ethernet ports have separate tabs so that different settings can be maintained.

Serial Tab

Table 11.11 summarizes the options in the **Serial** sub-tab.

Table 11.11 Serial Menu Items

Item	Parameters	Description
Port Enabled	Selected	Enables the serial port on the Rear Module to communicate with a serial device
	Cleared*	Disables the serial port on the Rear Module
Port Type	None*	No transmission standard is specified.
	RS 232	Select this option if the card is connected to an external device that uses the RS-232 (TIA/EIA-232) transmission standard.
	RS 422	Select this option if the card is connected to an external device that uses the RS-422 (TIA/EIA-422) transmission standard. In this mode, the Rx receive end is terminated with a 120ohm resistor on the card.

Table 11.11 Serial Menu Items

Item	Parameters	Description
Port Type	RS 422 unterm	Select this option if the card is connected to an external device that uses an unterminated RS-422 transmission standard. In this mode, the Rx receive end is not terminated on the card. This mode is used to daisy-chain several card Rx ports, where only the last one would be terminated.
	RS 422 NULL	Select this option if the card is connected to an external device that uses the standard RS-422 transmission standard with a null pinout. In this mode, the Rx and Tx are swapped on the card port and the Rx receive end is terminated with a 120ohm resistor on the card.
	RS 422 NULL unterm	Select this option if the card is connected to an external device that uses the standard RS-422 unterminated transmission standard with a null pinout. In this mode, the Rx and Tx are swapped on the card port and the Rx receive end is not terminated on the card. This mode is used to daisy-chain several card Rx ports, where only the last one would be terminated.
Service	Timecode	Specifies that the Serial port will be used for SMPTE 12M Linear Timecode
	Decode (DID: # SDID: #)	Specifies which VANC service is assigned to the **Serial** port. Note that this list corresponds to the labels on the Ethernet sub-tab.
	Encode x[a] (DID: # SDID: #)	
	SCTE 104 Serial Basic Link Layer[b]	
	Logging Output	
Bit Rate	9600	Selects the bit rate for the external device connected to the Serial port
	19200	
	38400	
	57600	
	115200	
Data Bits	7	Sets the number of data bits transmission (character length)
	8	
Parity	None	Sets the Parity type
	Even	
	Odd	
Stop Bits	1	Sets the number of stop bits transmission
	2	

Table 11.11 Serial Menu Items

Item	Parameters	Description
Flow Control	None*	Disables this feature
	SW	Flow control is used to maintain the byte count data rate. If the port provides more data than can be inserted, then the data will be buffered until the port is flow controlled. Since the maximum baud rate is 115200, the TES-8643 transmits up to 192bytes per field @ 60Hz.

a. Where x represents the Encode Mode assigned to the service.
b. This option is mutually exclusive with the SCTE104 Serial Basic Link Layer option on the Ethernet tab.

Ethernet Tab

Table 11.12 summarizes the options in the **Ethernet** sub-tab.

Table 11.12 Ethernet Menu Items

Item	Parameters	Description
x[a] (DID:# SDID:#) or SCTE 104 Serial Basic Link Layer[b] or SCTE 104 TCP/IP or Logging Output		
Ports (read-only)	Inactive (Green)	**Enabled** box is not selected for this protocol
	Connected (Green)	• **Enabled** box is selected for this protocol • **Role** is set to **Client** • Specified IP address and Port number are valid • TES-8643 has successfully established connection to the given IP address and port
	Listening (Green)	• **Enabled** box is selected for this protocol • **Role** is set to **Server** • Specified Port number is valid • TES-8643 is ready to accept connections on the specified port
	Reconnecting (Yellow)	• **Enabled** box is selected for this protocol • **Role** is set to **Client** • TES-8643 attempts to connect periodically to the specified IP address and Port number. The interval between connection attempts start at 10 seconds, increases by 10 seconds, to a maximum of 60 seconds.
	Connecting (Yellow)	• **Enabled** box is selected for this protocol • **Role** is set to **Client** • TES-8643 is attempting to connect to the specified IP address and Port Number
	Port in use (Red)	• **Enabled** box is selected for this protocol • **Role** is set to **Server** • Port Number specified in the Port field is invalid or in use by another service
	Cannot connect (Red)	• **Enabled** box is selected for this protocol • **Role** is set to **Client** • Specified IP address and Port Number are invalid or in use by another device

Table 11.12 Ethernet Menu Items

Item	Parameters	Description
Enabled	Selected	Enables the specified communication protocol on the ethernet port
	Cleared*	Disables the specified communication protocol on the ethernet port. When the check box is cleared, any incoming data from the service is ignored.
Role	Server*	TES-8643 function as a host, or socket listener, on the network
	Client	TES-8643 functions as a service requester that initiates communications with a server
Protocol	TCP*	Select this option if your external device is connected to the TES-8643 through a network and uses the Transmission Control Protocol (TCP)
	UDP	Select this option if your device is connected to the TES-8643 through a network and uses the User Datagram Protocol (UDP/IP)
Port	#	When **Role** is set to **Server**: • specifies the TCP port number where the TES-8643 will listen. • TCP ports 0, 21, 80, 5253, and 6667 are unavailable for ethernet communications When **Role** is set to **Client**: • specifies the remote port number to which the TES-8643 will try to connect • specifies the port number of the external device
IP Address	#.#.#.#	• Only applicable when **Role** is set to **Client** • Specifies the IP address of the external device. The default is 0.0.0.0 and this must be changed to the actual IP address of the external device

a. Where x represents the service.
b. This option is mutually exclusive with the SCTE104 Serial Basic Link Layer option on the Serial tab.

ANC Delete Tab

Table 11.13 summarizes the settings in the **ANC Delete** tab.

Table 11.13 ANC Delete Menu Items

Item	Parameters	Description
Line (read-only)	#	Specifies the line where the TES-8643 will delete the VANC data
Luma	Selected	Deletes all VANC data in the luma channel for the specified line
	Cleared*	VANC data remains in the luma channel
Chroma	Selected	Deletes all VANC data in the chroma channel for the specified line
	Cleared*	VANC data remains in the chroma channel

Table 11.13 ANC Delete Menu Items

Item	Parameters	Description
Clear All	Luma	Clears all the check boxes for all luma channels
	Chroma	Clears all the check boxes for all chroma channels
Set All	Luma	Selects all check boxes for all luma channels
	Chroma	Selects all check boxes for all chroma channels

ANC Decode Tab

Table 11.14 summarizes the settings in the **ANC Decode** tab.

Table 11.14 ANC Decode Menu Items

Item	Parameters	Description
Status	OK (Green)	No DID and SDID conflicts are occurring
	Duplicate DID and SDID (Red)	There is more than one stream that uses the same DID and SDID
DID	#	Specifies the Data Identification packet to decode
SDID	#	Specifies the Secondary Data Identification packet to decode
Send Field Indicator	Selected	The TES-8643 sends a single byte field indicator (either an ASCII ‘1’ or ‘2’) at the start of a field before sending any received data packets. This allows the downstream equipment to synchronize to the video signal.
	Cleared*	Disables this feature

ANC Encode Tabs

This section summarizes the **ANC Encode** options for transparent streams.

Encode 1-4 Tabs

Table 11.15 summarizes the options available in each of the four encode tabs. Note that some menu items may be read-only or configurable depending on the selected Encode Mode.

Table 11.15 ANC Encode Menu Items

Item	Parameters	Description
Status	OK (Green)	No DID and SDID conflicts are occurring
	Duplicate DID and SDID (Red)	There is more than one stream that uses the same DID and SDID
Encode Mode	Disabled	Upstream data passes through without modification
	Caption CDP	The source provides data that is formatted as Caption Distribution Packets (CDPs). This is the type of data used in CEA-708 captioning for HDTV. The source must provide CDP packets correctly timed to the video. That means a CDP must be provided for each Field 1 of the video.

Table 11.15 ANC Encode Menu Items

Item	Parameters	Description
Encode Mode	Subtitle SDP	The source provides data as Subtitle Distribution Packets (SDPs). This is the type of data used to carry WST subtitling information in an HD signal. The data must be formatted according to OP47.
	Custom Packet	Insert data using the packet header to parse and align incoming data.
	Byte	Insert data as it is received. Refer to **Table 11.16** for other Byte Mode settings which can modify data flow.
DID	#	Specifies the Data ID and Secondary Data ID values to be used for the corresponding fields in the encoded Ancillary Data Packet as defined by SMPTE 291M. The default values for the remaining options in this tab depend on the Encode Mode selected.
SDID	#	
Encode Line	#	Specifies the line that you wish to insert VANC data into
Send Field Indicator	Selected	Sends a single byte field indicator (either an ASCII '1' or '2'), at the start of the next field to encode, out the data port to allow the downstream equipment to synchronize to the video signal.
	Cleared*	Disables this feature
Priority	Overwrite Upstream*	The TES-8643 inserts data on the line specified. Any existing data with matching DID and SDID in VANC are marked for deletion.
	Local Priority	Enables the local user to insert transparent data simply by sending it to the TES-8643, and to revert to passing network data by simply stopping the sending of local data to the TES-8643.
	Upstream Priority	Enables the network to control the sharing between network and local data. The network can create an insertion opportunity for local data by pausing transmission of network data.
Priority Timeout in Frames	0-60[a]	Specifies the number of frames the TES-8643 will wait before switching away from the priority item
Packet Mode Settings		
Packet Identifier[b]	#	Identifies the service type when operating in Packet mode.
Byte Mode Settings - Field #		
Data Count[a, c]	#	Sets the maximum number of bytes that will be sent for the specified field.
Flush Buffer at VANC[c]	Selected	Any data which has been received, at the point when the specified VANC area of the video occurs, will be used to form a packet (with a smaller Data Count if necessary) and will be inserted in the following VANC area.
	Cleared	A data packet will behave as determined by the Data Count parameter.

Table 11.15 ANC Encode Menu Items

Item	Parameters	Description
Flush Buffer Timeout[c]	Off	A data packet will behave as determined by the Data Count parameter
	1 Field	Any received data will be inserted, using a smaller data Count if necessary, when no data has been received for one complete video field.
	2 Fields	Any received data will be inserted, using a smaller data Count if necessary, when no data has been received for two complete video fields.
VANC Header	#	Adds a string of hexadecimal bytes to insert in the header of each Byte mode packet.

a. The default value is 10.
b. Field is read-only when Encode Mode is set to Caption CDP, or Subtitle SDP.
c. Field is read-only unless Encode Mode is set to Byte.

Configurable Settings

Table 11.16 outlines the parameters that are configurable based on the Encode Mode selected. A check-mark indicates that the parameter is configurable.

Table 11.16 Configurable Settings by Encode Mode

Setting	Encode Mode				
	Disabled	Caption CDP	Subtitle SDP	Custom Packet	Byte
DID		✓	✓	✓	✓
SDID		✓	✓	✓	✓
Encode Line		✓	✓	✓	✓
Encode Channel		✓	✓	✓	✓
VANC Priority		✓	✓	✓	✓
Timeout in frames		✓	✓	✓	✓
Send Field Indicator		✓	✓	✓	✓
Packet Mode Settings					
Packet Identifier				✓	
Byte Mode Settings					
Data Count					✓
Flush Buffer at VANC					✓
Flush Buffer Timeout					✓
VANC Header					✓

Default Settings

Table 11.17 summarizes the default settings of the encode parameters based on the Encode Mode.

Table 11.17 Default Settings by Encode Mode

Setting	Encode Mode			
	Caption CDP	Subtitle SDP	Custom Packet	Byte
DID	0x61	0x43	Last value	Last value
SDID	0x1	0x2		
Encode Line	9	9		
Packet Mode Settings				
Packet Identifier	0x9669	0x5115	Last value	Last value
Byte Mode Settings				
Data Count	Field 1: 255 Field 2: 255	Field 1: 255 Field 2: 255	Field 1: 255 Field 2: 255	Last value
Flush Buffer at VANC	Cleared	Cleared	Cleared	
Flush Buffer Timeout	Off	Off	Off	
VANC Header	0	0	0	

SCTE 104 Tab

Table 11.18 summarizes the options for configuring a transparent stream for SCTE 104 encoding.

Table 11.18 SCTE 104 Menu Items

Item	Parameters	Description
Status (read-only)	OK (Green)	No DID and SDID conflicts are occurring
	Duplicate DID and SDID (Red)	There is more than one transparent stream that uses the same DID and SDID
Encode Mode	Disabled*	TES-8643 does not monitor incoming data for SCTE 104 messages and the Encode Mode settings set on this tab apply to GPIOs only.
	SCTE 104	TES-8643 monitors incoming data for SCTE 104 messages. You can also configured the card to override the SCTE 104 packets DID, and SDID.
Respond as Proxy Device	Selected	TES-8643 communicates as a proxy device using response code value 128
	Cleared*	Disables this feature. Select this option if you are using an automation system that does not recognize the proxy response code.
Trigger Source	Remote (Ethernet/Serial)	Specifies that the source of the incoming SCTE 104 commands to encode into the outgoing VANC will be via the Ethernet or Serial port on the TES-8643 rear module
	Upstream (Input VANC)*	Specifies that the source of the incoming SCTE 104 commands to encode into the outgoing VANC will be via the **IN 1** connector on the TES-8643 rear module

Table 11.18 SCTE 104 Menu Items

Item	Parameters	Description
DID[a]	#[b]	Specifies the Data ID and Secondary Data ID values to be used for the corresponding fields in the encoded Ancillary Data Packet as defined by ***SCTE 104 2011***.
SDID[c]	#[d]	
Encode Line	#[e]	Specifies the line that contains the SCTE 104 message
Repeat Last Splice	Off*	Disables this feature
	Break Duration	TES-8643 encodes the last SCTE 104 trigger (or other message); if there are "start" events with a non-zero duration, then re-transmission stop after the duration in the message.
	Indefinite	• TES-8643 continuously encodes the last SCTE 104 trigger (or other message) that was received on each frame. The TES-8643 continues to re-transmit the message until the next message arrives. • Note there is only one SCTE 104 message transmitted per frame.

a. This field is read-only if Encode Mode is set to Disabled.
b. The default is 0x41.
c. This field is read-only if Encode Mode is set to Disabled.
d. The default is 0x07.
e. The default is 9.

Timecode Tab

Table 11.19 summarizes the options for configuring a transparent stream for Timecode encoding.

Table 11.19 Timecode Menu Items

Item	Parameters	Description
Status (read-only)	OK (Green)	Timecode source is valid and the data is encoding without errors
	Duplicate DID and SDID (Red)	There is more than one transparent stream that uses the same DID and SDID
Encode Mode	Disabled*	Disables this feature. The DID, SDID, Encode Channel and ANC Location fields are read-only.
	LTC Timecode	Encodes Linear Timecode from the configured port on the rear module. Only one port may be configured.
	VITC# Timecode	Encodes the specific Vertical Interval Timecode pair
	VITC1 + VITC2 Timecode	Encodes the Vertical Interval Timecode on Field 1 and Field 2
DID[a]	#[b]	Specifies the Data ID and Secondary Data ID values to be used for the corresponding fields in the encoded Ancillary Data Packet as defined by ***SCTE 104 2011***.
SDID[c]	#[d]	
Encode Line	#	Specifies the line that includes the timecode data. The default is 9.
ANC Location[e]	VANC	Inserts the timecode packet into the vertical ancillary data
	HVANC*	Inserts the timecode packet before the first line of the VANC

a. This field is read-only if Encode Mode is set to Disabled.
b. The default is 0x60.
c. This field is read-only if Encode Mode is set to Disabled.
d. The default is 0x60.
e. This field is read-only if Encode Mode is set to Disabled.

SCTE 104 Log Tab

This section summarizes the read-only information displayed in the **SCTE 104 Log** sub-tabs.

Event Log Tab

Table 11.20 summarizes the read-only information displayed in the **Event Log** sub-tab.

Table 11.20 Event Log Menu Items

Item	Parameters	Description
yyyy-mm-dd Tt Ty SI PID PT BD AR AN AE		Each field displays an event where: • **yyy-mm-dd** represents the date • **Tt** represents the timestamp (UTC) • **Ty** represents the trigger type • **SI** represents the Splice ID • **PID** represents the Program ID • **PT** represents the Pre-roll Time • **BD** represents the Break Duration • **AR** represents the Auto Return • **AN** represents the Avail Numbers • **AE** represents the Avail Numbers Expected
Refresh		Updates the fields on the Event Log tab
Clear Log		Removes the entries from the fields on the Event Log tab

Logging Prefixes

Table 11.21 briefly summarizes the prefixes that log entries can include.

Table 11.21 Extended Logging Prefixes

Prefix	Notes
BLOCKED	The upstream VANC message was not re-encoded into the VANC output stream due to the GPI non-override state.
COMM FAILURE	Received message from the incoming VANC stream could not be sent to the remote port. Verify your Ethernet connection.
EXTRA PACKET	Only one SCTE 104 VANC packet is expected per frame. This message is contained in an extra VANC packet.
SUPPRESSED	Remote or GPI-triggered message was not encoded into the VANC output stream while in the GPI Override state.
UPSTREAM	This upstream VANC message was re-encoded into the VANC output stream due to the GPI Override state.

Last Event Tab

Table 11.22 summarizes the read-only information displayed in the **Last Event** sub-tab.

Table 11.22 Last Event Menu Items

Item	Parameters	Description
Port, GPIO #		
Timestamp	#	Specific time that the event was processed (UTC value) for the specified port/GPIO
Type	#	Specifies when the splice occurred
Splice ID	#	Specifies the Splice ID value in the SCTE 104 message
Program ID	#	Specifies the Program ID value in the SCTE 104 message
Pre Roll Time	#	Indicates the Pre Roll Time that was applied
Break Duration	#	Indicates the insertion length
Auto Return	#	Indicates whether an auto ACK was sent
Avail Num	#	Specifies the found Avail value
Avails Expected	#	Indicates the total number of Avails

SCTE 104 GPIO Encode Tab

Table 11.23 summarizes the options available in DashBoard for the **SCTE 104 GPIO Encode** tab.

Table 11.23 SCTE 104 GPIO Encode Menu Items

Item	Parameters	Description
Encode DTMF	#[a]	Sends the appropriate DMTF message on GPIO activation. The Pre Roll Time is applied.
Type	Start Normal	Trigger occurs before the splice point. This is enabled by default.
	Start Immediate	Trigger occurs at the exact moment of the splice point. This is enabled by default.
	End Normal	Trigger occurs once the splice point ends. This is disabled by default.
	End Immediate	Trigger occurs before the splice point ends. This is disabled by default.
	Disabled	Disables the splice event. Select this option to enable a GPIO to trigger a DTMF message only, without an accompanying splice message
	Cancel	Cancels the last sent trigger
Splice ID	#	Specifies the Splice ID value that the TES-8643 searches for in the packet. The TES-8643 activates the GPIO when the specified value matches what is set in the trigger. If the value does not match, the trigger is ignored.

Table 11.23 SCTE 104 GPIO Encode Menu Items

Item	Parameters	Description
Program ID	#	Specifies the Program ID value that the TES-8643 searches for in the trigger. The TES-8643 activates the GPIO when the specified value matches what is set in the trigger. If the value does not match, the trigger is ignored.
Pre Roll Time	0.000 - 16.000[b]	TES-8643 adjusts and applies the pre-roll value (number of seconds) before initiating the trigger. This value is ignored when Type is set to Start Immediate or End Immediate.
Break Duration	0.0* - 65530.0	Specifies the length (tenths of seconds) for the insertion. This value is ignored when Type is set to End Normal or End Immediate.
Auto Return	Selected	TES-8643 automatically returns an ACK message to the automation system connected to the specified GPIO port. This is ignored when Type is set to End Normal or End Immediate.
	Cleared*	Disables this feature
Avail Num	0*-255	Specifies the Avail within the specified Program ID
Avails Expected	0*-255	Specifies the total number of the expected Avails during the trigger. When set to 0, the **Avail Num** value is ignored.

a. The maximum is 7 characters. Characters are limited to 0 through 9, #, or *.
b. The default is 8 seconds.

SCTE 104 GPIO Decode Tab

Table 11.24 summarizes the options available in DashBoard for the **SCTE 104 GPIO Decode** tab.

Table 11.24 SCTE 104 GPIO Decode Menu Items

Item	Parameters	Description
Match on DTMF	#[a]	Any incoming DTMF message with an exact match will trigger the 1sec GPIO pulse. The message must match the Splice ID and DTMF messages.
Match Splice Types	Start Normal	Specifies that a splice event must match the selected Splice type(s) in order to trigger a GPIO event. The Start Normal and Start Immediate types are enabled by default. The other types are disabled by default.
	Start Immediate	
	End Normal	
	End Immediate	
	Cancel	
Force Matching Splice ID	Selected	Matches the Splice (split) ID in the SCTE 104 message
	Cleared	The Splice ID is ignored

Table 11.24 SCTE 104 GPIO Decode Menu Items

Item	Parameters	Description
Splice ID to Match	#	Specifies the Splice ID value that the TES-8643 searches for in the message. The TES-8643 activates the GPIO when the specified value matches what is set in the message. If the value does not match, the message is ignored.
Force Matching Program ID	Selected	Matches the Program ID in the SCTE 104 message
	Cleared	The Program ID is ignored
Program ID to Match	#	Specifies the Program ID value that the TES-8643 searches for in the message. The TES-8643 activates the GPIO when the specified value matches what is set in the message. If the value does not match, the message is ignored.
Trigger Delay	#[b]	Augments when the pre-roll begins (in milliseconds). A negative value decreases the pre-roll start time while a positive value adds to the pre-roll start time.
Ignore Preroll	Selected	Enables the TES-8643 to ignore any pre-roll values and initiate the message immediately
	Cleared	The TES-8643 applies the pre-roll value before initiating the trigger

a. The maximum is 7 characters. Characters are limited to 0 through 9, #, or *.
b. The default is 0.

Decode Status Tab

Table 11.25 summarizes the read-only information displayed in the **Decode Status** tab. The **Status** field in the **Decode Status** tab varies in severity from green (valid), yellow (caution), to red (alarm). DashBoard reports the most severe alarm for a single field. Alarm colors are noted within the tables as text set in brackets next to the menu parameter name.

Table 11.25 Decode Status Menu Items

Item	Parameter	Description
Decode x[a] (DID:# SDID:#)		
Status	OK (Green)	TES-8643 is decoding correctly without errors.
	Duplicate DID and SDID on Decode # (Green)	There are two enabled services using the same DID and SDID.
	No Incoming ANC (Yellow)	Matching DID and SDID is not present in the input stream.
Status	Decode output port not connected (Yellow)	There is incoming data matching the DID and SDID, but the output port is not connected.
	Data present in both luma and chroma (Yellow)	There is data matching the DID and SDID present on both the incoming luma and chroma channels.
	Decoded data overflowed output port (Yellow)	Losing data because the output port can't keep up.
	Decode stream not assigned to output port (Red)	There is data matching the DID and SDID present on both the incoming luma and chroma channels.

Table 11.25 Decode Status Menu Items

Item	Parameter	Description
Data Rate (Bytes/Sec)	#	Reports the running average of the number of decoded bytes/second. Note that a value of 0 (zero) triggers an inactivity error if the alarm is enabled on the corresponding port.
Line	# c f	Indicates the line(s) and channels with decoded data where: • **#** represents the line number. If there are multiple lines, the field reports it as # - # • **c** represents the channel (LUMA or CHROMA) • **f** represents the field (F1, or F2)
Alarm Enable	Selected	The corresponding **Status** field reports decoding errors
	Cleared	Disables the alarm for the selected decode stream. If an error occurs for this decode stream, the **Status** field will not report it.
Field #		
Bandwidth Used (Percent)	#	Indicates the percentage of the data capacity used

a. Where x represents the transparent service or SCTE 104 (DID: 41 SDID:07).

Encode Status Tab

Table 11.26 summarizes the read-only information displayed in the **Encode Status** tab.The **Status** field in the **Encode Status** tab varies in severity from green (valid), yellow (caution), to red (alarm). DashBoard reports the most severe alarm for a single field. Alarm colors are noted within the tables as text set in brackets next to the menu parameter name.

Table 11.26 Encode Status Menu Items

Item	Parameter	Description
Encode x[a] (DID:# SDID:#)		
Status	OK (Green)	Encoding is operating correctly without errors
	Passing upstream (Green)	The encode stream is enabled but not in overwrite mode. There is upstream data with the same DID and SDID, which the TES-8643 is letting pass through the encoder because there is either no local data to encode or upstream data has priority.
	Erasing upstream (Green)	The encode stream is enabled in overwrite mode. There is upstream data with the same DID and SDID, which the TES-8643 is erasing because there is no local data to encode.
	Overwriting stream (Green)	The encode stream is enabled in overwrite mode or local priority mode. There is upstream data with the same DID and SDID, which we are overwriting with local data.
	Not sending ANC (Yellow)	There is no data to encode from the incoming port.

Table 11.26 Encode Status Menu Items

Item	Parameter	Description
Status	Packet sequence error (Yellow)	Found the packet identifier, the length is valid and there is a footer in the proper location, the checksum is valid, but is out of sequence from the previous packet. The TES-8643 still lets this packet pass.
	Encode input port not connected (Yellow)	One of the following errors is occurring: • The cable(s) to the serial port or ethernet port on the rear module is not secured. • If the input port is an ethernet port, check its status and settings in the **Ethernet** sub-tab of the **Ports** tab.
	Incoming data overflowed output (Yellow)	Data being sent to the encoder is faster than it can be processed. • If the data is sent via the Serial port, the encoder will assert flow control to the transmit computer when needed to avoid losing data. • If the program sending the data does not respect flow control, the TES-8643 will receive more data than it can process and data will be lost.
	Encode stream not assigned to input port (Red)	• If the encode stream is assigned to the serial port, verify that the serial communication settings are valid. Refer to "**Configuring the Serial Data Port**" on page 65. • If the encode stream is assigned to an Ethernet port, verify that the Ethernet settings are valid. Refer to "**Configuring the Ethernet Data Ports**" on page 66.
	Can't find packet header (Red)	Cannot match on the packet identifier in the incoming stream.
	Can't find packet footer (Red)	Missing the packet footer byte, 0x74, which must follow the payload.
	Invalid packet length (Red)	Found the packet identifier but the packet length is too short. There must be at least 7bytes in the packet.
	Packet checksum error (Red)	Found the packet identifier, the length is valid and there is a footer in the proper location, but the checksum is invalid. The TES-8643 still lets this packet pass.
	Duplicate DID and SDID on Encode # (Red)	There are two enabled services using the same DID and SDID
	Invalid code line for video mode (Red)	User has selected a line outside of the Vertical Interval. The service is not currently encoding. It is recommended to verify the Encode Line value in the ANC Encode tab.
Data Rate (Bytes/Sec)	#	Reports the running average of the number of encoded bytes/second. Note that a value of 0 (zero) triggers an inactivity error if the alarm is enabled on the corresponding port.
Alarm Enable	Selected	The corresponding **Status** field reports encoding errors
	Cleared	Disables the alarm for the selected encode stream. If an error occurs for this encode stream, the **Status** field will not report it.

Table 11.26 Encode Status Menu Items

Item	Parameter	Description
Field #		
Bandwidth Used (Percent)	#	Indicates the percentage of the data capacity used

a. Where x represents the transparent service or SCTE 104 (DID: 41 SDID:07).

GPIO Override Tab

Table 11.27 summarizes the options available in DashBoard for the **GPIO Override** tab.

✶ The settings on this tab are not retained after a re-boot.

Table 11.27 GPIO Override Menu Items

Item	Parameters	Description
Override	None*	The settings for the specified GPIO are not overridden
	Input	The specified GPIO functions as an input
	Output	The specified GPIO functions as an output
Level[a]	High*	If Override is set to Input or Output, sets the polarity of the level trigger where a high level starts the function
	Low	If Override is set to Input or Output, sets the polarity of the level trigger where a low level starts the function
Default All		Sets all GPIO settings on this tab to the factory default settings
All Inputs		Configures all GPIOs as inputs
All Outputs		Configures all GPIOs as outputs

a. When Override is set to None, this button reports the current status of the specified GPIO and toggling this button will have no effect.

Configuration Example

This chapter describes the steps required to set up a working TES-8643 configuration. Many such configurations are possible, this is only one example.

✶ This chapter assumes that DashBoard is launched on your computer and the TES-8643 interface displays in the right-side of the DashBoard window.

Overview

Figure 12.1 shows the pieces of equipment involved in a simple data distribution system. In this configuration, there are two TES-8643 with one acting as an encoder, and the second as a decoder.

✶ In this chapter, the term *encoder* is used to refer to a TES-8643 which is being used to insert data into the video signal, and *decoder* is used to refer to a TES-8643 which is extracting data from the video signal.

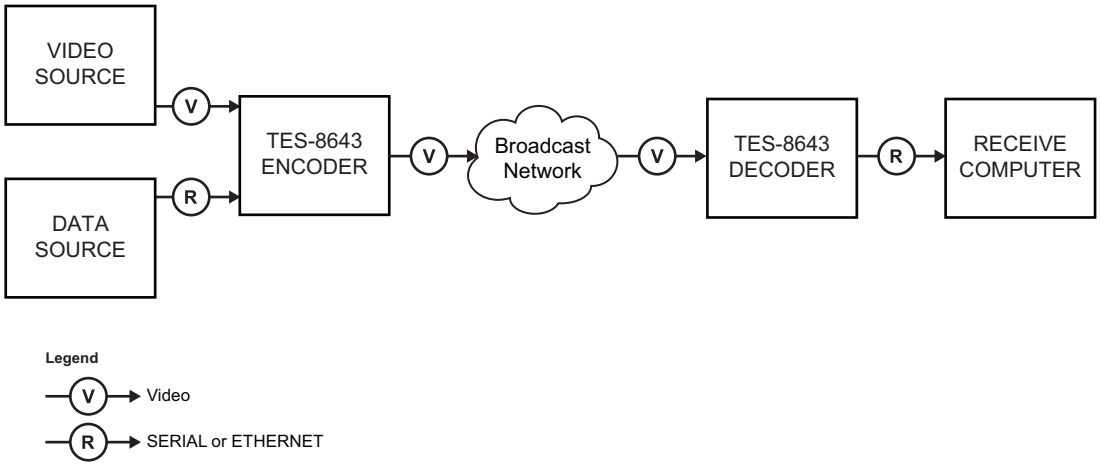


Figure 12.1 Work Flow Diagram — Simple Data Distribution System

Example: Raw Data Carriage in VANC

You want to use VANC through SDI as an end-to-end one-way data channel. The data output at the receive end must be identical to the input data at the transmit end, except for propagation delay. In this simple example, we will use Telnet to send text through VANC.

System Components

This section briefly describes the components seen in the use case presented in **Figure 12.1**.

DATA SOURCE

The Data Source executes application programs that supply data to the encoder.

In practical applications, data is sent to the TES-8643 encoder by application programs which may be written specifically for the data distribution system. Note that proper software timing may be critical to proper transmission of data.

In this example, a standard Telnet client, such as Tera Term, is used to send text that you type to the TES-8643.

TES-8643 ENCODER

The TES-8643 can encode up to four different input data streams into VANC lines of the SDI input. In this example, we will encode just one stream using transparent Byte mode.

DATA SOURCE to TES-8643 LINK

The link between the Data Source and the TES-8643 encoder, and between the TES-8643 decoder and receive computer, are a combination of Ethernet (LAN) and serial connections. In this example, we will use an Ethernet connection.

TES-8643 DECODER

The TES-8643 can decode up to four different data streams from VANC lines of the SDI input. In this example we will decode one stream.

TES-8643 DECODER to RECEIVER COMPUTER LINK

The link between the TES-8643 decoder and the receive computer can be any combination of LAN and serial connections, as discussed above for the Data Source to TES-8643 Encoder link.

In this example, the Receive computer runs a Telnet client, just as the Data Source does.

RECEIVE COMPUTER

The receive computer processes the extracted VANC data. The program that processes the data can be either a Ross Video application program or a user-provided program. The term “computer” is used here to represent any type of device that can accept data from the TES-8643; for example, in the case of captioning data, this might be an MPEG video encoder.

Installing the TES-8643

This section provides a general overview of how to cable the two TES-8643 and external equipment.

Installing the TES-8643 cards in an openGear frame

The openGear frame is a 2RU high density modular frame, designed to accommodate up to 20 openGear cards.

1. Install each rear module in the backplane of the openGear frame as outlined in “**To install the rear module in an openGear frame**” on page 21.
2. Install the first card in the appropriate slots as outlined in “**To install the card in an openGear frame**” on page 22.
3. Connect the **OUT 1** BNC on the first TES-8643 to the **IN 1** BNC on the second TES-8643. (**Figure 12.2**)

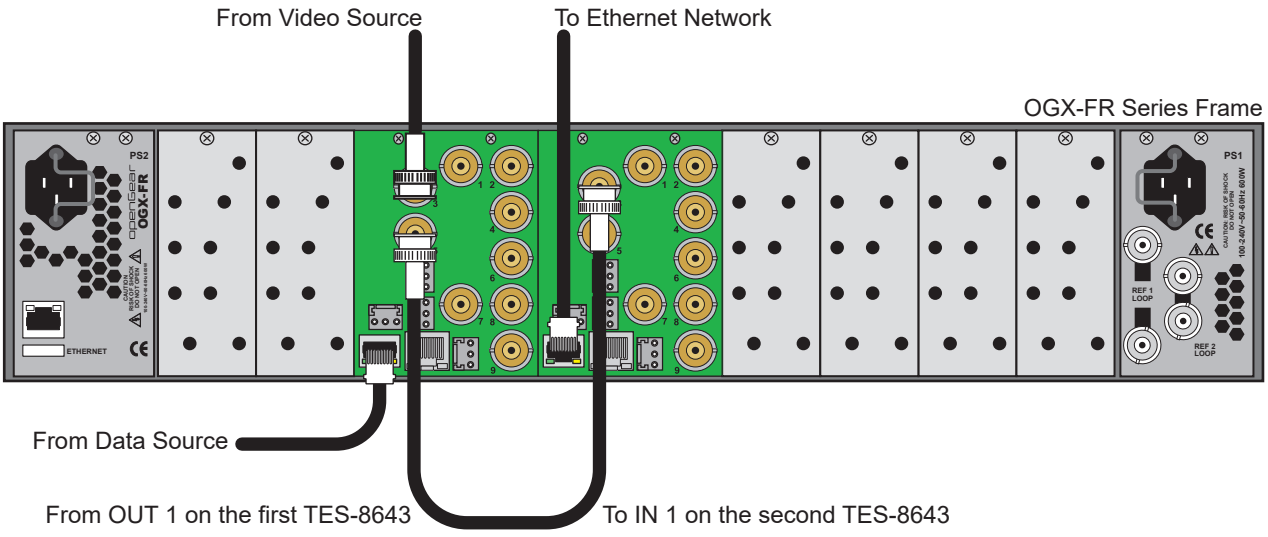


Figure 12.2 Connections between the TES-8643

4. Connect the **IN 1** BNC on the first TES-8643 to the video source. (**Figure 12.2**)
5. Connect the Data Source and the first TES-8643 to the Ethernet. (**Figure 12.2**)
6. Connect the receive computer and the second TES-8643 to the Ethernet.

Configuration

This section outlines how to configure each TES-8643 seen in the example in **Figure 12.1**.

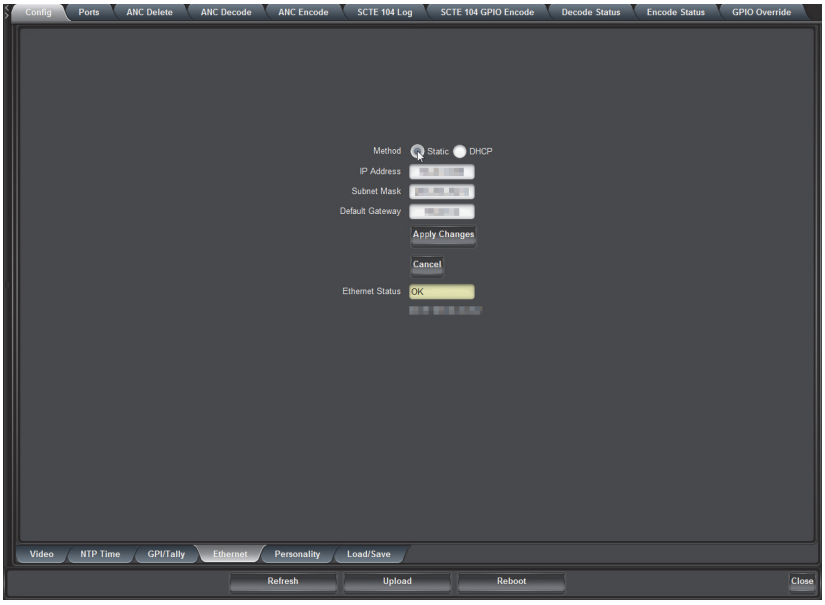
Set up Communications for each TES-8643

Perform the following procedure for each TES-8643 to set up basic communications for the card, select a reference source, and configure the video outputs.

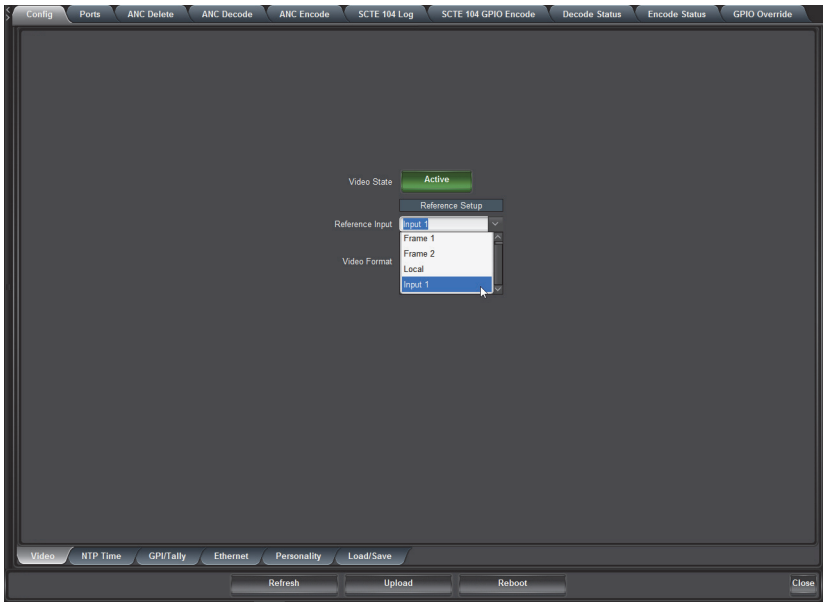
To set up communications for a TES-8643

1. Configure the Ethernet communications on the TES-8643 as outlined in "**Ethernet Communication Setup**" on page 31.

   This allows the card to communicate with the Network Controller card in the openGear frame and DashBoard.



2. Configure the reference source for the TES-8643 as outlined in "**Selecting the Timing Source**" on page 31.



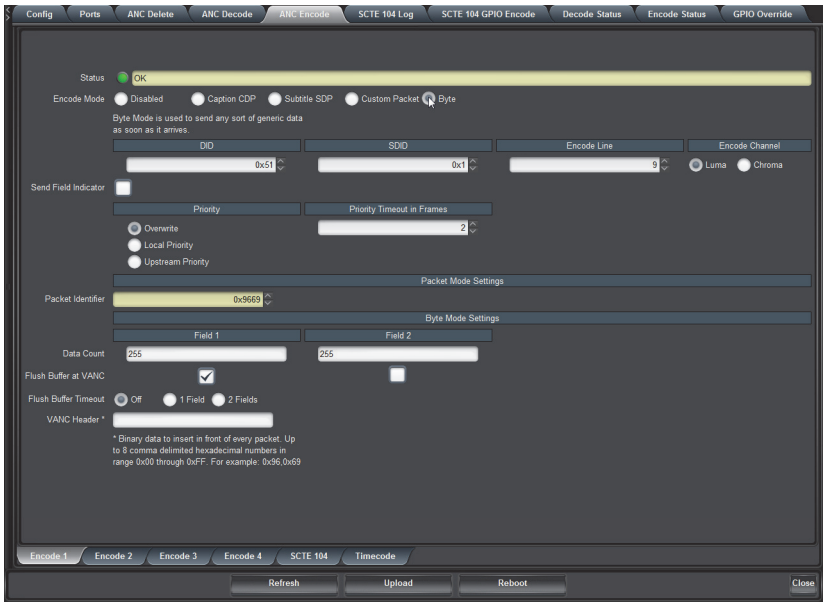
3. Select the video format for the input as outlined in "**Configuring the Video Outputs**" on page 32. It is recommended to select **Input 1**.

Configure the First TES-8643 for Encoding

The first TES-8643 communicates with the Data Source over Telnet, and then sends the encoded service over VANC to the second TES-8643.

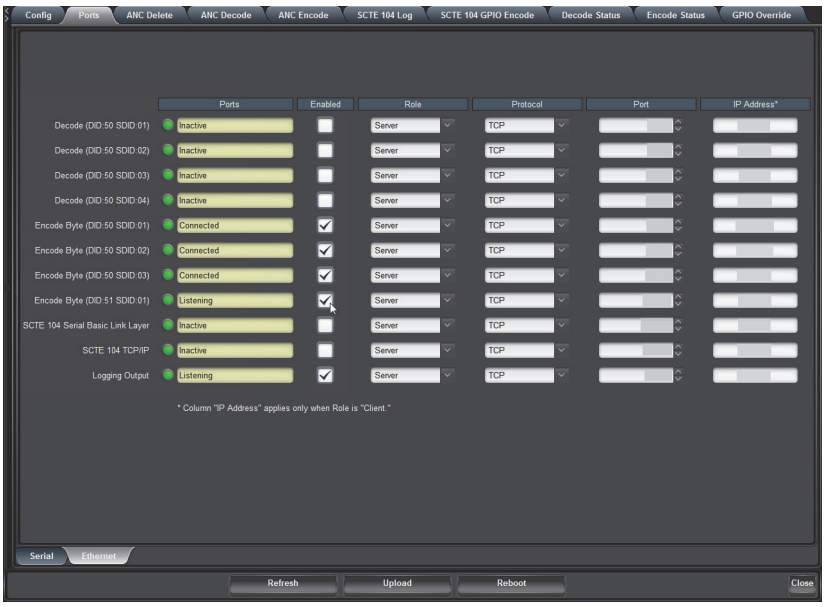
To configure the first TES-8643 for encoding

1. Select the **ANC Encode 1** tab.
2. Configure the first TES-8643 as outlined in "**To configure the TES-8643 for encoding**" on page 41 and setting the **Encode Mode** to **Byte**.
3. Enable the **Flush Buffer at VANC** for **Field 1**.



To configure the data ports on the first TES-8643

1. Verify that the encoding streams configured in the section "**To configure the first TES-8643 for encoding**" on page 94 is now listed in the **Ports** sub-tabs.
2. To configure the **Ethernet** port, follow the instructions in "**Configuring the Ethernet Data Ports**" on page 66.
3. Note the port number selected here, and the IP Address displayed in the **Network Status** tab. You will need these settings to configure your transmit Telnet session.

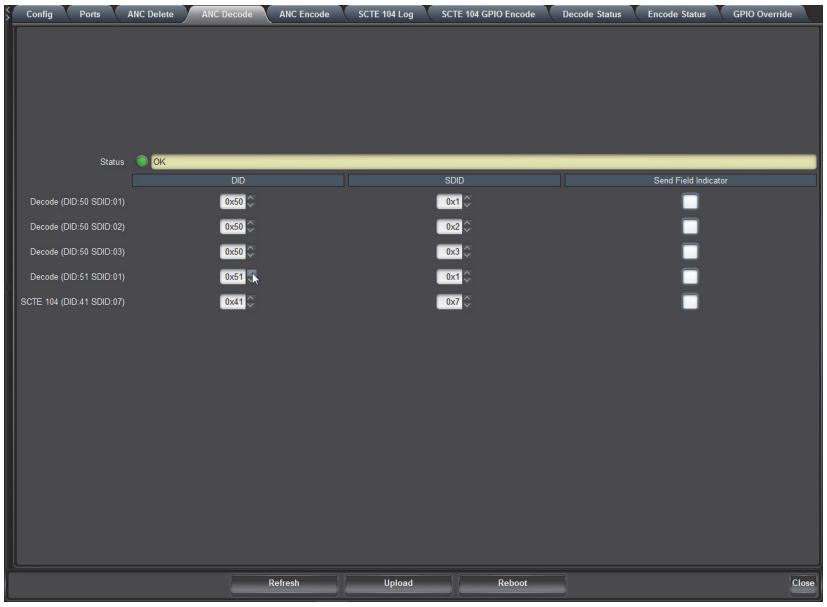


Configure the Second TES-8643 for Decoding

The second TES-8643 receives the encoded service over VANC from the first TES-8643 and communicates with the receive computer over ethernet.

To configure the second TES-8643 for decoding

1. Select the **ANC Decode** tab.
2. Configure the second TES-8643 as outlined in "**To configure the TES-8643 to decode**" on page 43.
3. Set the DID and SDID to the same values you selected for encoding on the first TES-8643. Note that in the following example, Decode 1 was configured with DID:51 SDID:01 just like Encode 1 in the example provided above.



To configure the data ports on the second TES-8643

1. Verify that the decoding streams that you configured in the section "**To configure the second TES-8643 for decoding**" are now listed in the **Ports** sub-tabs.
2. To configure the **Ethernet** port, follow the instructions in "**Configuring the Ethernet Data Ports**" on page 66.
3. Note the port number selected here, and the IP Address displayed in the **Network Status** tab. You will need these settings to configure your receive Telnet session

Using Telnet

This section briefly summarizes how to use Telnet to connect the two TES-8643 to the transmit and receive computers.

To use Telnet

1. Run the Telnet client programs on the Data Source and Receive computer.
2. In the Data Source's Telnet, connect to the TES-8643 Encoder at the IP address and port that you set.
3. In the Receive computer's Telnet, connect to the TES-8643 Decoder at the IP address and port that you set.
4. Any characters you type in the Data Source's Telnet session should appear in the Receive computer's telnet window. If you disconnect the SDI cable between the two TES-8643 cards, the text will no longer pass through to the Receive computer.

To illustrate some subtle buffer behavior

1. De-select both **Flush Buffer at VANC** boxes.
2. Set the data count to 8.
3. Type again on your transmit Telnet session and see how nothing is received until multiples of 8 characters are typed.

Software Upgrades

The TES-8643 can be upgraded in the field via the **Ethernet** port on the rear module, or via the Network Controller card in your openGear frame. The instructions in this section are applicable to both methods. Note that DashBoard version 6.2.0 or higher is required for this procedure.

✶ Ross Video recommends that you connect and configure the Ethernet on the rear module before upgrading. Without this connection, the upgrade process can take several minutes especially when upgrading multiple cards. Refer to the section "**Ethernet Port Cabling**" on page 24 for setup details.

To upgrade the software on a card

1. Contact Ross Technical Support for the latest software version file.
2. If you are upgrading via the **Ethernet** port on the rear module:
   - Ensure the Ethernet cable is properly connected to the **Ethernet** port. Refer to the section "**Ethernet Port Cabling**" on page 24 for details.
   - Verify that the **Ethernet Status** field in the **Network** tab displays **OK**. Note that if an error is reported in this field, the upgrade is automatically performed via the Network Controller card and upgrade times may be effected.
3. Display the **Device View** of the card by double-clicking its status indicator in the **Basic Tree View**.
4. From the **Device View**, click **Upload**.

   The **Select file for upload** dialog opens.
5. Navigate to the ***.bin** upload file you wish to upload.
6. Click **Open**.
7. If you are upgrading a single card, click **Finish** to display the **Uploading to Selected Devices** dialog. Proceed to step 9.
8. If you are upgrading multiple cards:
   - Click **Next >** to display the **Select Destination** menu. This menu provides a list of the compatible cards based on the card selected in step 3.
   - Specify the card(s) to upload the file to by selecting the check box(es) for the cards you wish to upload the file to.
   - Verify that the card(s) you wish to upload the file to. The **Error/Warning** fields indicate any errors, such as incompatible software or card type mismatch.
   - Click **Finish** to display the **Uploading to Selected Devices** dialog.
9. Monitor the upgrade.
   - The **Uploading to Selected Devices** dialog enables you to monitor the upgrade process.
   - Notice that each card is listed in the dialog with a  button. This button is replaced with a **Reboot** button once the software file is loaded to that card.

✶ Avoid clicking the individual **Reboot** buttons until all cards have successfully completed the file upload process and the **OK** button, located in the bottom right corner of the dialog, is enabled.

- Click **OK** to re-boot all the cards listed in the **Uploading to Selected Devices** dialog.
- The **Reboot Confirm** dialog displays, indicating the number of cards that will re-boot. Click **Yes** to continue the upgrade process. Note that clicking **Cancel** or **No** returns you to the **Uploading to Selected Devices** dialog without rebooting the card(s).
- The card(s) are temporarily taken off-line during the re-boot process. The process is complete once the status indicators for the **Card State** and **Connection** fields return to their previous status.

Troubleshooting

If you encounter problems when upgrading your card software, verify the following:

- Your network settings on the card are valid. Refer to the section refer to the section “Ethernet Tab” on page 74 for a list of available settings.
- The ethernet cable is properly connected if you are uploading the file via a network connection.
- The file you are attempting to load is a ***.bin** file that is for the card you are upgrading.

Technical Specifications

This chapter provides technical information for TES-8643.

✶ Specifications are subject to change without notice.

Output Format Reference Compatibility

The TES-8643 locks the output video to an external reference. Reference compatibility is shown in **Table 14.1**. A check-mark indicates a supported output reference compatibility.

Table 14.1 Output/Reference Compatibility

Reference	Output							
	480i 59.94Hz	720p 59.94Hz	1080i 59.94Hz	1080p 59.94Hz	576i 50Hz	720p 50Hz	1080i 50Hz	1080p 50Hz
480i 59.94Hz	✓	✓	✓	✓				
720p 59.94Hz		✓		✓				
1080i 59.94Hz	✓	✓	✓	✓				
576i 50Hz					✓	✓	✓	✓
720p 50Hz						✓		✓
1080i 50Hz					✓	✓	✓	✓

SDI Input Specifications

Table 14.2 Technical Specifications — SDI Inputs

Item	Specifications
Number of Inputs	1
Standards Accommodated	480i 59.94Hz (SMPTE 259M)
	576i 50Hz (SMPTE 259M)
	1080i 59.94Hz (SMPTE 292M)
	1080i 50Hz (SMPTE 292M)
	720p 59.94Hz (SMPTE 292M)
	720p 50Hz (SMPTE 292M)
	1080p Level A 59.94Hz (SMPTE 424M)
	1080p Level A 50Hz (SMPTE 424M)
Impedance	75ohm terminating
Return Loss	SD: > 15dB
	HD: > 15dB
	3G: >10dB
Equalization (using Belden 1694A cable)	SD: 300m
	HD: 140m
	3G: 60m

SDI Outputs Specifications

Table 14.3 Technical Specifications — SDI Outputs

Item	Specifications
Number of Outputs	4
Impedance	75ohm
Return Loss	SD: >13dB
	HD: >13dB
	3G: >10dB
Signal Level	800mV ±10%
DC Offset	0V ±50mV
Rise and Fall Time (20-80%)	SD: 900ps typical
	HD: 150ps typical
	3G: 130ps typical
Overshoot	<10% typical

Serial Cable Lengths

Table 14.4 Technical Specifications — Serial Cable Lengths

Item	Specifications
RS-232 Serial Interface Max. Cable Length	10m (33ft)
RS-422 Serial Interface Max. Cable Length	300m (984ft)

Environment

Table 14.5 Technical Specifications — Environment

Item	Specifications
Maximum Ambient Temperature	40°C (104°F)

Power

Table 14.6 Technical Specifications — Power

Item	Specifications
Maximum Power Consumption	19W

Communication Specifications

This section provides additional information on the different connector types of the TES-8643 rear module.

Serial Port

When building cables to interface to the card **Serial** port, it is recommended to use CAT-5 or CAT-5e cable with the standard Ethernet wiring color coding. **Table 14.7** shows the pin assignment of the **Serial** port located on the rear module.

Table 14.7 RJ-45 Pin Assignment

RJ45 Pin	RS-232	RS-422	RS-422 Null
1	n/c	Tx+	Rx+
2	Rx	Tx-	Rx-
3	Tx	Rx+	Tx+
4	n/c	n/c	n/c
5	n/c	n/c	n/c
6	n/c	Rx-	Tx-
7	GND	GND	GND
8	GND	GND	GND

Ethernet Port

The **Ethernet** port on the rear module is used to connect to an ethernet network for communications, and software upgrades using DashBoard

✶ Contact your IT Department before connecting the card to your facility network to ensure that there are no conflicts. They will provide you with an appropriate value for the IP Address, Subnet Mask, and Gateway for the card.

Switch Lines Overview

The video source provides the serial digital video signal into which the TES-8643 encoder inserts the VANC data. The video signal may be any of those listed in **Table 14.8**.

Table 14.8 Switch Lines and Last VANC Line

Type	Format	Defining Standards	Switch Line(s)		Vertical Blanking Last Line	
			Field 1	Field 2	Field 1	Field 2
259M	480i 59.94Hz	ITU-R BT.601, SMPTE 125M	10	273	19	282
	576i 50Hz	ITU-R BT.601	6	319	22	335
292M	720p 50Hz	SMPTE 296M	7		25	
	720p 59.94Hz	SMPTE 296M	7		25	
	1080i 50Hz	SMPTE 274M	7	569	20	583
	1080i 59.94Hz	SMPTE 274M	7	569	20	583
424M	1080p 50Hz Level A	SMPTE 425M	7		41	
	1080p 60Hz Level A	SMPTE 425M	7		41	

Commonly Used Services

Table 14.9 lists the commonly used VANC services and is provided for guidance only. Refer to the specific SMPTE standard for details.

Table 14.9 DID/SDID VANC Services

Type	DID	SDID	SMPTE	Description	Location
2	060	060	12M-2	Ancillary Time Code	See **Table 14.10**.
2	061	001	334-1	EIA 708B data mapping into VANC space	VANC, second line after the switch line to last VANC line before AP, Y-stream
2	061	002	272M	EIA 608 data mapping into VANC space	
2	045	001	S2020-1	Compressed Audio Metadata, HD-SDI, no association	VANC, second line after the switch line to last VANC line before AP, Y-stream
2	045	002	S2020-2	Compressed Audio Metadata, HD-SDI, channel pair 1/2	
2	045	003	S2020-3	Compressed Audio Metadata, HD-SDI, channel pair 3/4	
2	045	004	S2020-4	Compressed Audio Metadata, HD-SDI, channel pair 5/6	
2	045	005	S2020-5	Compressed Audio Metadata, HD-SDI, channel pair 7/8	
2	045	006	S2020-6	Compressed Audio Metadata, HD-SDI, channel pair 9/10	
2	045	007	S2020-7	Compressed Audio Metadata, HD-SDI, channel pair 11/12	
2	045	008	S2020-8	Compressed Audio Metadata, HD-SDI, channel pair 13/14	
2	045	009	S2020-9	Compressed Audio Metadata, HD-SDI, channel pair 15/16	
2	041	001	S352M	Video Payload Identification for Digital Interfaces	HANC, immediately following EAV word. Refer to ***SMPTE 342M*** for format specific line number(s).
2	041	005	S2016-3	AFD	VANC, second line after the switch line to last VANC line before AP, Y-stream
2	041	007	S2010	ANSI/SCTE-104 triggers	VANC, second line after the switch line to last VANC line before AP, Y-stream

HANC Services

Table 14.10 lists the HANC services that could be decoded by the TES-8643. Refer to ***SMPTE RP291*** and other SMPTE standards for details.

Table 14.10 HANC Services

Payload Type	Video Format (Interface Line Numbers)		
	1125 Interlaced	1125 Progressive	750 Progressive
ATC_LTC	HANC, line 10	HANC, line 10	HANC, line 10
ATC_VITC1	HANC, line 9	HANC, line 9	HANC, line 9
ATC_VITC2	HANC, line 571	HANC, line 9	HANC, line 9

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Version 3, 29 June 2007

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zlib

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The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files ftp://ds.internic.net/rfc/rfc1950.txt (zlib format), rfc1951.txt (deflate format) and rfc1952.txt (gzip format).

Service Information

Troubleshooting Checklist

Routine maintenance to this openGear product is not required. In the event of problems with your TES-8643, the following basic troubleshooting checklist may help identify the source of the problem. If the frame still does not appear to be working properly after checking all possible causes, please contact your openGear products distributor, or the Technical Support department at the numbers listed under the "**Contact Us**" section.

1. **Visual Review** — Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the card, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check** — Verify the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Reference Signal Status** — Verify that the reference (blackburst or tri-level) is supplied on one of the available reference inputs. Check the **Reference Status** field in the **Signal** tab in DashBoard.
4. **Input Signal Status** — Verify that source equipment is operating correctly and that a valid signal is being supplied.
5. **Output Signal Path** — Verify that destination equipment is operating correctly and receiving a valid signal.
6. **Unit Exchange** — Exchanging a suspect unit with a unit that is known to be working correctly is an efficient method for localizing problems to individual units.
7. **Re-load the Factory Defaults** — If the card appears to be working and reports no errors, but is not generating an active picture or outputs black, restoring the default factory configuration may fix the problem. Refer to the section Refer to the section "**Loading the Factory Defaults**" on page 35 for information.

Warranty and Repair Policy

The TES-8643 is warranted to be free of any defect with respect to performance, quality, reliability, and workmanship for a period of FIVE (5) years from the date of shipment from our factory. In the event that your TES-8643 proves to be defective in any way during this warranty period, Ross Video Limited reserves the right to repair or replace this piece of equipment with a unit of equal or superior performance characteristics.

Should you find that this TES-8643 has failed after your warranty period has expired, we will repair your defective product should suitable replacement components be available. You, the owner, will bear any labor and/or part costs incurred in the repair or refurbishment of said equipment beyond the FIVE (5) year warranty period.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profits) incurred by the use of this product. Implied warranties are expressly limited to the duration of this warranty.

This user manual provides all pertinent information for the safe installation and operation of your openGear Product. Ross Video policy dictates that all repairs to the TES-8643 are to be conducted only by an authorized Ross Video Limited factory representative. Therefore, any unauthorized attempt to repair this product, by anyone other than an authorized Ross Video Limited factory representative, will automatically void the warranty. Please contact Ross Video Technical Support for more information.

In Case of Problems

Should any problem arise with your TES-8643, please contact the Ross Video Technical Support Department. (Contact information is supplied at the end of this publication.)

A Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions, should you wish our factory to repair your TES-8643. If required, a temporary replacement frame will be made available at a nominal charge. Any shipping costs incurred will be the responsibility of you, the customer. All products shipped to you from Ross Video Limited will be shipped collect.

The Ross Video Technical Support Department will continue to provide advice on any product manufactured by Ross Video Limited, beyond the warranty period without charge, for the life of the equipment.

Glossary

The following terms are used throughout this guide:

Active image — the portion of the video picture area (production aperture) that is being utilized for output content. Active image excludes letterbox bars and pillarbox bars.

Card — openGear terminal devices within openGear frames, including all components and switches.

CBR — constant bit rate.

CDN — content distribution network.

DashBoard — the DashBoard Control System.

DF — Differentiated Services.

DTVCC captions — CEA-708 captions.

Frame — the OGX-FR frame that houses the OGX-FR.

HLS — HTTP Live streaming.

HTTP — Direct Hypertext Transfer Protocol.

MIB — management information base.

Network Controller Card — the MFC-OG3-N and any available options unless otherwise noted.

NTSC captions — the CEA-608-D: Line 21 Data Services captions.

openGear frame — refers to the OGX-FR frames unless otherwise noted.

PAL — PAL-B and PAL-G unless otherwise stated.

PCR — program clock reference.

PID — packet identifier.

Production aperture — the image lattice that represents the maximum possible image extent in a given standard (e.g. the full size of all active pixels and active lines). For example, the 1080i production aperture would be 1920x1080.

RTMP — Real Time Messaging Protocol.

Stream — a transport stream present at the port.

System— the mix of interconnected production and terminal equipment in your environment.

TCP — Transmission Control Protocol.

TOS — Type of Service.

TPG — Test Packet Generator.

TTL — Time To Live.

UDP — User Datagram Protocol.

User — the person who uses the OGX-FR.