Ross Video Limited

TES9
Multi-Function HD/SD-SDI VANC Processor
Hardware User Manual

ROSS

Live Production Technology

TES9 • Multi-Function HD/SD-SDI VANC Processor Hardware User Manual

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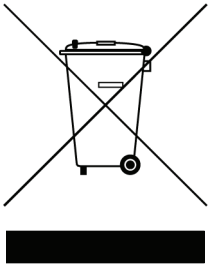

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Company Address

Ross Video Limited
8 John Street
Iroquois, Ontario
Canada, K0E 1K0

Ross Video Incorporated
P.O. Box 880
Ogdensburg, New York
USA 13669-0880

General Business Office: (+1) 613 • 652 • 4886
Fax: (+1) 613 • 652 • 4425

Technical Support: (+1) 613 • 652 • 4886
After Hours Emergency: (+1) 613 • 349 • 0006

E-mail (Technical Support): techsupport@rossvideo.com
E-mail (General Information): solutions@rossvideo.com
Website: http://www.rossvideo.com

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Introduction

In This Chapter

This chapter contains the following sections:

- Overview
- Documentation Terms and Conventions

A Word of Thanks

Congratulations on choosing an TES9 Multi-function HD/SD-SDI VANC Processor. Your TES9 is part the Ross Terminal Equipment family of products, backed by Ross Video's experience in engineering and design expertise since 1974.

You will be pleased at how easily your new TES9 fits into your overall working environment. Equally pleasing is the product quality, reliability and functionality. Thank you for joining the group of worldwide satisfied Ross Video customers!

Should you have a question pertaining to the installation or operation of your TES9, please contact us at the numbers listed on the back cover of this manual. Our technical support staff is always available for consultation, training, or service.

Overview

The TES9 is a broadcast-quality ancillary data encoder for uncompressed digital video signals. It operates with high-definition signals that comply with SMPTE standard 292M and standard-definition signals that comply with SMPTE 259M. Depending on the model, it can process either one or two video signals.

The TES9 inserts data having various formats and purposes into the vertical blanking portion of its video input signal(s). These vertical ancillary (VANC) data streams comply with SMPTE standards 291M and 334M.

The TES9 is also capable of extracting VANC data from its video input signal(s). This allows it to forward the data to other systems, combine locally generated data with that already carried in the input, and bridge data from one video signal to the other.

In addition to processing VANC data in 292M and 259M signals, the TES9 can insert and extract VBI data signals in 259M signals. These data lines contain a digital representation of the analog waveforms used for VBI data transmission in standard definition analog broadcasting. One very commonly used VBI data type is closed captioning, which complies with the CEA-608 standard; the TES9 can both insert and extract CEA-608 VBI data.

Features

This section describes capabilities that are available in the TES9 hardware platform. It is important to note that the various software products that can operate in the TES9 may make use of different subsets of these features.

The following are the principal features of the TES9:

- One or two complete video paths, depending on the model.
- The two video paths allow the TES9 to support several interesting applications, which include the following:
  - › Bridging data from one video signal to another: for example, CEA-608 captions can be extracted from a 259M signal on one input, converted to CEA-708 DTV captions and inserted into a 292M signal on the other input.
  - › Processing VANC data in two independent 292M video channels.
  - › Inserting data into one 259M and one 292M signal: for example, CEA-608 captions in 259M and CEA-708 captions in 292M.
- Compact 1 rack-unit enclosure.
- Universal AC power input: 90-250 VAC, 47-63 Hz.
- Accepts 259M and 292M signals in all the major formats.
- High-quality 75 ohm BNC connectors and video processing.
- Video bypass via a high-quality 75 ohm RF relay when the unit is powered off or when certain malfunctions are detected.
- Front-panel pushbuttons to force relay bypass.
- Monitor outputs for both video paths, to allow the output signals to be observed and analyzed even when the unit is in bypass.
- VANC insertion and extraction, per SMPTE 334M.
- Can process multiple different data streams carried in any combination of the scan lines that are available for VANC data.
- Can add a data service to others that are already present in a line, without delaying the existing services. This is a major improvement over earlier equipment that would extract

existing data services, add the locally generated data to them and re-insert the combined data one frame later. The TES9 eliminates the accumulation of delay in the data resulting from multiple processing passes. This is crucial for data services such as closed captioning and metadata which must maintain tight synchronization with the video program.

- Allows user control of the order of data packets in insertion lines. Local data can be added before existing services, if desired; this allows the user to place the most important services at the beginning of a line, where they may be most likely to be handled properly by downstream equipment. The user can direct the TES9 to insert local data both before and after existing services, or to overwrite them.
- Incoming VANC services can either be decoded regardless of the lines where they are carried, or the search can be restricted to specific lines;
- The user can select incoming VANC services - or complete lines - to be selectively deleted by the TES9 when adding its own data to the signal.
- LAN (100baseT), V.34 modem, and three RS232 ports are standard on all TES9's.
- A 15-pin terminal block on the rear panel provides remote bypass control and indication for both video paths, as well as 7 general-purpose input-output (GPIO) signals.
- An unbalanced LTC input is provided for applications that require time-code input.
- The TES9 software is stored in internal “flash” memory, which allows the software to be updated through a data port, such as the LAN.

Scope of this Manual

This manual covers the following topics:

- TES9 connections, controls and indicators.
- Installing the TES9 in a rack.
- Connecting to other equipment.
- TES9 specifications.
- Basic troubleshooting.

The TES9 accepts various software modules that can be installed at the factory or downloaded subsequently. Its versatility is such that the detailed operation of the unit needs to be described in documentation supplied with the software.

Documentation Terms and Conventions

The following terms and conventions are used throughout this manual:

- All references to the **TES9** also includes all versions unless otherwise indicated.
- "**Operator**" and "**User**" refer to the person who uses TES9.
- "**System**" and "**Video system**" refer to the mix of interconnected production and terminal equipment in your environment.
- "**Video**" by itself as a synonym for "**259M or 292M**"; that is, when either video type is appropriate. For features that apply to one video format only (such as VBI processing in 259M), the manual names the format explicitly.
- The "**Operating Tips**" and "**Note**" boxes are used throughout this manual to provide additional user information.

Hardware Overview

In This Chapter

This chapter provides an overview of the TES9.

The following topics are discussed:

- Before You Begin
- Front Panel
- Rear Panel

Before You Begin

Before proceeding with the instructions in this manual, review the following notes.

Static Discharge

Throughout this manual, 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 TES9 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.

Front Panel

The front panel of the TES9 is shown in **Figure 2.1**.The indicators and controls on the front panel of the TES9 are described in the following sections.

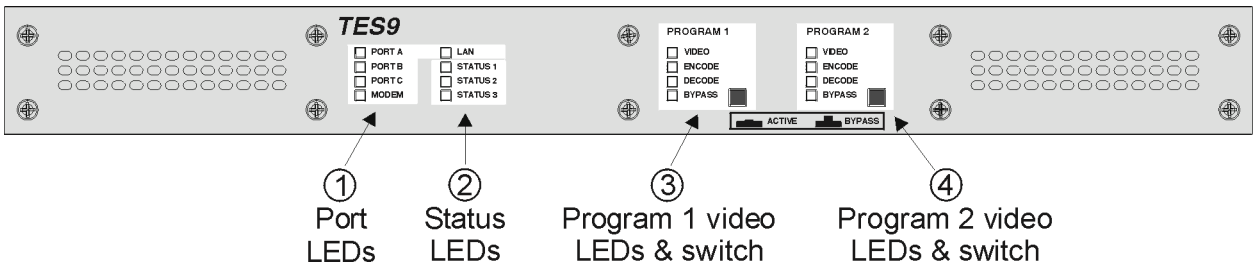

***Figure 2.1** TES9 Front Panel Controls and Indicators*

In general, the LED indicators have the meanings shown in **Table 2.1**. Exceptions to these definitions are noted where appropriate.

Table 2.1 LED Indicators

LED Color	Description
Off	Not used or not selected
Green	Normal operation
Red	Disabled, due to an error
Yellow	In use, but an error is detected
Flashing Yellow and Red	Warning to user. On STATUS 1, this means do not turn power off while data is being saved to flash memory

Port LEDs

There is one LED for each of the data ports on the rear panel.

The green **PORT A**, **PORT B** and **PORT C** LEDs follow the data on the RS232 ports. If the transmitted and/or received data is constant, the green LED will be on continuously; if the data is intermittent, it will blink accordingly.

The **MODEM** and **LAN** LEDs are green when data is being transmitted or received through the corresponding port, and off otherwise. If the software detects a problem with one of these ports, it illuminates the corresponding red LED.

STATUS LEDs

The **STATUS1**, **STATUS2** and **STATUS3** LEDs are used to indicate the status of TES9 functions that do not have their own dedicated front-panel LEDs.

When the TES9's power is first turned on, the three **STATUS** LEDs will all be illuminated red. Once the TES9 is operating normally, **STATUS 1** should be green, and **STATUS 2** and **STATUS 3** should be off.

STATUS 1 LED

The **STATUS 1** LED indicates conditions that are common to all TES9s, as shown in the following table. There may be additional combinations that depend on the operating software.

Table 2.2 STATUS 1 LED

Color	Description
Red	Powering up. If the LED stays red for more than 45 seconds, this indicates a system failure.
Green	Normal operation
Yellow	The TES9 is reconfiguring, due to a change in video type from 259M to 292M or vice versa. This state should last a few seconds.
Flashing Yellow and Green	The TES9 is in Setup mode (reached by pressing the LOAD switch for 2 seconds), ready to communicate with a Windows PC to allow you to adjust its setup.
Flashing Yellow	The TES9 is in Load mode (reached by powering on with the LOAD switch pressed), ready to communicate with a Windows PC to allow you to update its software.
Flashing Yellow and Red	Configuration changes or software updates are being saved in the TES9. **Never turn off power to the TES9 in this situation, as this could result in a loss of software that will require the unit to be returned to the factory for repairs**.

STATUS 2 LED

The **STATUS 2** LED is off when the TES9 is operating normally. Once the TES9 has started up, the presence of any red on this LED indicates an application error that can probably be corrected by changing settings or inputs. Refer to the software manual for details on this LED.

STATUS 3 LED

The STATUS 3 LED is off when the TES9 is operating normally. Once the TES9 has started up, the presence of any red on this LED indicates a major error. If this occurs, please note the flashing pattern (if any) before calling Ross Technical Support.

Program 1 and 2 LEDs and Switches

The front panel provides a bypass push-button switch and 4 LEDs for each of the video paths (PROGRAM 1 and 2) through the TES9. These are installed for all models of TES9. This includes models that do not have a PROGRAM 2 video section; in this case, the PROGRAM 2 LEDs are always off and the PROGRAM 2 bypass switch has no effect. The following discussion applies to either channel.

Note — *On some models of TES9, the two video channels may be labeled "PROGRAM" and "AUXILIARY", instead of "PROGRAM 1" and "PROGRAM 2". Their functions are nevertheless identical.*

BYPASS LED

The BYPASS LED and switch operate together, as follows:

- The BYPASS LED is illuminated red whenever the video is bypassed by the internal relay; the LED is on in all bypass situations, except when the power is off.
- The BYPASS switch is one of several devices that can force the corresponding video path into bypass.

If the switch is in the BYPASS position (out), the internal relay connects the video input directly to the output, regardless of any other operational conditions. As discussed, the LED is illuminated red in this case.

When the switch is pushed in (ACTIVE position), the bypass relay for the corresponding video channel should normally be switched to the active position and the LED should go off. However, there are other conditions that can hold the video in bypass, even though the switch is in the ACTIVE position. These include the following:

- No video input, or unrecognized video format.
- A contact closure on the bypass pins of the rear-panel GPIO connector.
- A command from a remote computer. For example, while starting up new software that has been loaded into the TES9, the software may bypass the video to avoid "glitching" it.
- An internal fault condition, such as a power-supply failure.

When any of these conditions occurs or the front-panel switch is in the BYPASS position, the video path is bypassed and the BYPASS LED is illuminated red. Otherwise, the BYPASS LED is off and the video LED should be green.

VIDEO LED

The VIDEO LED is illuminated green when there is a usable 292M or 259M video signal connected to the input jack for the corresponding channel. The following table describes the operation of the VIDEO LED in detail.

Table 2.3 VIDEO LED

Color	Description
Green	Normal: video is connected and used
Yellow	Video is connected, but the channel is not enabled: that is, no suitable data streams are defined for the video type. For example, VBI encoding is enabled, but the input is 292M; or no data streams at all have been defined.
Red	No video input on a channel that is enabled.
Off	No video input on a channel that is not enabled.
Green, with one yellow flash per second	EDH or CRC error in input. Continues for 5 seconds after the last error is detected.

ENCODE LED

The ENCODE LED is illuminated green when the TES9 is inserting data into the corresponding video signal. If the video is 292M, the inserted data is VANC; if it is 259M, it can be either VANC or VBI. The TES9 can be configured to append VANC data to a line that already contains VANC packets. In this case, there is a possibility that some of the data will not fit in the available space in the line. When this occurs, the ENCODE LED will flash yellow to indicate that the user needs to adjust some settings. This is described in the following table.

Table 2.4 VIDEO LED

Color	Description
Green	Normal: data is inserted into the video.
Off	No encoding
Green, with one Yellow flash per second	Too much data for an insertion line. The user has given priority to incoming data, so local data is lost.
Green, with five Yellow flashes per second	Too much data for an insertion line. The user has given priority to local data, so incoming data is lost

DECODE LED

The DECODE LED is illuminated green when the TES9 is extracting data from its video input. If the video is 292M, the extracted data is VANC; if it is 259M, it can be either VANC or VBI. The LED will be green when the software has set up the hardware to extract incoming data, and the data is present. If the software does not need to extract incoming data for its current operating mode, or if the data is absent from the video input, the LED is off.

Rear Panel

The rear panel of the TES9 is shown in **Figure 2.2** and **Figure 2.3**.

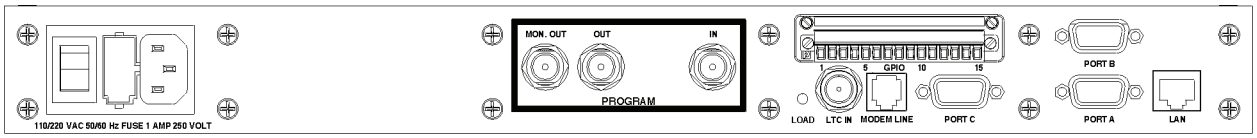

***Figure 2.2** Rear Panel: One-channel TES9*

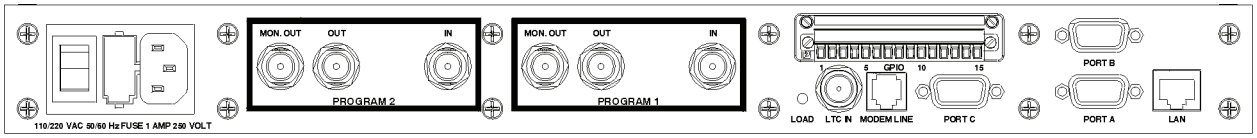

***Figure 2.3** Rear Panel: Two-channel TES9*

The following sections describe the connections and controls on the rear panel.

Power Connection

The power entry module accepts a standard power cord supplied with the unit. The power cord type is specified at the time of purchase. If your cord has the wrong plug for use with your power outlet, please contact your Ross Video sales representative.

The AC power input must be in the range 90 to 250 VAC and 47-63 Hz. The fuse is rated at 1 A and 250 V. The fuse drawer in the power entry module contains the active fuse and a spare.

PROGRAM 1 AND 2 VIDEO

The following description applies to both the Program 1 channel and the Program 2 channel if it is installed. All BNC video jacks present an impedance of 75 ohms. These high-quality jacks provide excellent impedance characteristics over the range of frequencies required for 292M and 259M signals.

IN

The **IN** jack for each channel provides the video input to the encoding and decoding circuits of the TES9. When the channel's bypass relay is in the Active position, the TES9 provides a 75-ohm termination for the input signal. When the bypass relay is in the Bypass position, the IN jack is connected directly to the **OUT** jack; the signal connected to **IN** sees its 75-ohm termination in the equipment connected to the **OUT** jack.

The video signal connected to the **IN** jack is expected to comply with one of following SMPTE standards: 259M or 292M. A list of video formats is provided in later.

When the channel's bypass relay is in the Active position, the **OUT** jack carries the video signal applied to the **IN** jack, with VANC and/or VBI data added as specified by the user. The output impedance is 75 ohms. When the bypass relay is in the Bypass position, the **OUT** jack is connected directly to **IN** via the relay contacts.

MON OUT

The **MON OUT** jack carries the video signal applied to the **IN** jack, with VANC and/or VBI data added as specified by the user. It is the same as **OUT**, except that it is not affected by the state of

the bypass relay. This allows the video output of the TES9 to be observed with test or monitoring equipment, even when the TES9 is in bypass. The output impedance is 75 ohms.

Data Ports

The following standard data ports are available on the rear panel:

PORTS A, B, C

These are RS232 9-pin, up to 115.2Kbps, wired as DTE. Port A can be used for setup, and all three ports can be used for data transfer between the TES9 and other equipment. A null modem cable is normally required to connect to other equipment such as computers. One null modem cable is supplied with the TES9. The pin-list for these ports and the wiring for the null modem cable are in section.

MODEM

This is a RJ11 jack, for 33.6 Kbps connection through a standard analog telephone line. This is typically used for captioning data input or remote maintenance.

LAN

This is a RJ45 jack, for 10baseT or 100baseT Ethernet connection to a local area network. This port is typically used for high-speed data transfer between the TES9 and other equipment. It can also be used for setup, and for loading new software into the TES9.

LTC

This BNC connector accepts an unbalanced linear time code (LTC) input that conforms to SMPTE 12M. This could, for example, allow certain TES9 operations to be triggered at specific instants in time. This should normally be left unconnected.

Control Connections

GPIO

This 15-pin terminal block provides remote bypass control and bypass indication contact closures for both TES9 video channels, as well as seven general-purpose input/output (GPIO) signals. The connector pin-out and description are in section.

LOAD

This miniature push-button switch can be used to control the operating mode of the TES9. You may be able to press it with one of your fingers; if not, use a narrow object such as a pencil.

If you press and hold the button with the TES9 power off and keep it pressed until two seconds after turning the power on, the TES9 will be ready to accept a software update through a port from a computer.

If you press and hold the button for two seconds while the TES9 is operating normally, it will suspend normal operation and prepare to accept a connection from a computer running the TES9 setup software.

Installation

In This Chapter

This chapter provides a general overview of how to install the TES9.

The following topics are discussed:

- Unpacking the TES9
- Mounting the TES9 in a Rack
- Basic Connections

Unpacking the TES9

In the shipping box for your TES9, you should find the following items:

- The TES9 unit;
- An RS232 null modem cable;
- A Hardware manual;
- A Software User's manual;
- A CD-ROM containing setup software;
- A mounting kit, containing hardware needed for rack-mounting the TES9.

The rack mounting kit for the TES9 contains the following items:

Table 3.1 Rack Mounting Kit

Description	Quantity
Rear TES9 brackets, part # 41-10437-01	2
Rear rack bracket, part # 41-10438-01	2
Screw, #8-32 flat head, 5/16”	4
Nut clip, #10-32	8
Screw, #10-32 pan head, 3/4”	8
Screw, #10-32 pan head, 3/8”	4
Tie-wrap	2

If any of these items listed in this section are missing or have been damaged in shipment, please contact Ross Technical Support.

Mounting the TES9 in a Rack

This section describes how to mount the TES9 in the rack. In using these instructions, consult **Figure 3.1**. Note that the TES9 should be attached to both the front and rear of the rack; because of the weight of the potentially large number of cables connected to the rear of the TES9, rear rack mounting is strongly advised.

Before You Begin

The first step in installing the TES9 is to select a suitable location. The TES9 requires a 1 rack-unit (1.75") space in a standard 19" rack. Its two cooling fans draw cool air in through the intake vents at the front and exhaust warmer air out the right side, as seen from the front. The TES9's power dissipation is quite modest (approximately 25 watts); nevertheless, it is important to select a location that allows this airflow, in order to ensure a long operating life.

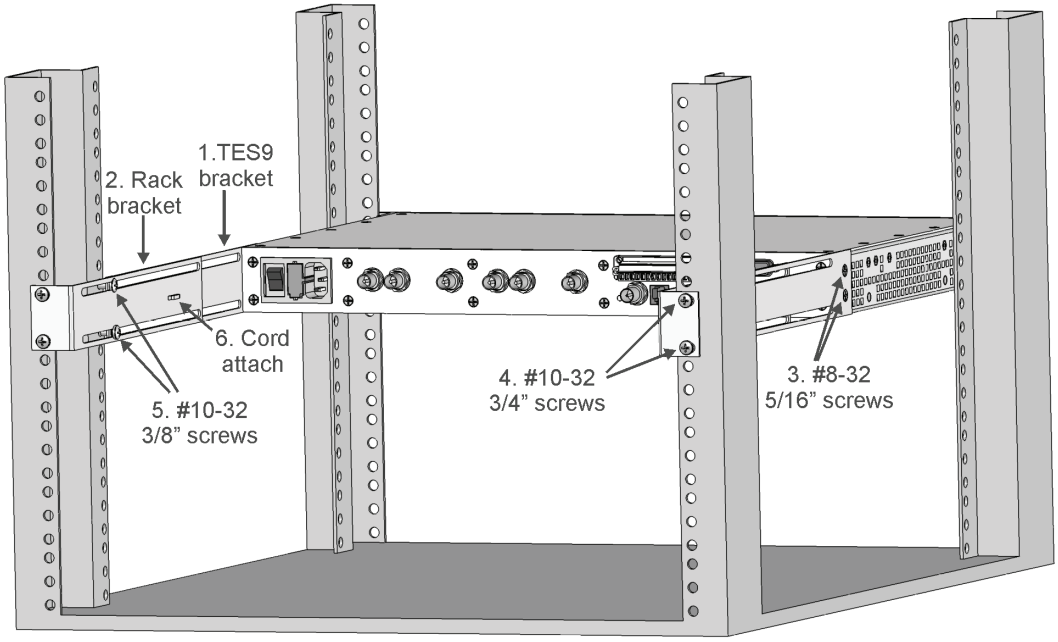

Figure 3.1 *TES9 Rear View — Rack-mounting Detail*

These instructions can be used for racks having a total depth from the front to the rear rails in the range 24-30.25” (61-77 cm).

For racks that are shallower than 24", a modified procedure is described in step 3 below.

For racks deeper than 30.25", use a mounting shelf.

Installing the TES9 in the Rack

Use the following procedure to install the TES9 in the rack:

1. Attach the rear TES9 brackets (41-10437-01) to both sides of the chassis using the mounting holes near the rear of the TES9. Use the #8-32 flat-head screws, and insert them through the countersunk holes in the bracket into the mounting holes on the TES9. See item 3 in **Figure 3.1**.
2. Install four nut clips to the front of the rack, and attach the TES9 front panel to these clips, using four 3/4” #10-32 screws.

3. If your rack is shallower than 24" (61 cm), and it has side-mounting rails, use the following procedure. Otherwise, proceed to step Install four nut clips to the rear of the rack at the same height as those used to mount the front of the TES9.
    - Skip Steps Install four nut clips to the rear of the rack at the same height as those used to mount the front of the TES9. through Install two 3/8” #10 screws through the slots in each rear bracket into the captive nuts near the rear end of the TES9 brackets. See item 5 in **Figure 3.1**.
    - Instead, mount the rear nut clips to the rear side rails and attach the TES9 brackets directly to these side rails, using 3/4” #10-32 screws through the slots in the brackets.
    - Proceed to step 7.
4. Install four nut clips to the rear of the rack at the same height as those used to mount the front of the TES9.
5. Attach the two rear rack brackets to the nut clips installed in the preceding step, using two 3/4” #10-32 screws for each bracket. See item 4 in **Figure 3.1**. Before tightening the screws, ensure that these brackets contact the inner side of the brackets mounted to the TES9; that is, they should be closer to the center of the rack than the ones on the TES9. The slots in these brackets should also be approximately aligned with the screw holes in the TES9 brackets.
6. Install two 3/8” #10 screws through the slots in each rear bracket into the captive nuts near the rear end of the TES9 brackets. See item 5 in **Figure 3.1**.
7. Plug the power cord into the receptacle on the rear of the TES9.
8. Insert a tie-wrap through the strain relief bridge on the rack bracket near the TES9 power entry module; see item 6 in **Figure 3.1**. Pass the tie-wrap around the power cord and tighten it to prevent the power cord from being inadvertently pulled out of the TES9.
9. Insert the TES9's power plug into a 110 or 220 VAC outlet. The use of conditioned power from an uninterruptible power source (UPS) is strongly recommended, in order to ensure that the processing of the video and ancillary data is not disturbed by power outages.

Basic Connections

The required connections to the TES9 depend on the application. You may wish to familiarize yourself with the video and data connections supported by your software, before proceeding with this section. This information can be found in the software manual supplied with your TES9.

In general, you will need to connect video to the **IN** and **OUT** jacks for the Program 1 channel and also for the Program 2 channel if applicable. You will also need to connect one or more data cables (RS232, LAN, modem), for transferring data to and from the TES9. During this installation phase, you will also need to connect a Windows PC to **PORT A**, using the supplied null modem cable, for use in setting your TES9 operating parameters. Afterwards, you can decide whether to disconnect the PC from **PORT A** or leave it permanently connected.

Video Connections

It is strongly recommended that you first connect a video test signal or a DA feed of your program to the PROGRAM IN jack of the TES9, and connect the TES9 OUT jack to monitoring or test equipment. This will allow you to become familiar with the operation of the TES9, discover its features and try out its setup software, with no effect on your program path.

Important — *In all cases, whether the TES9 is in your program path or in a test circuit, you must use HD-grade 75-ohm cable (such as 8281 or 1694 types) for all video connections.*

Once you have gotten to know the TES9 and are ready to insert it into your program path, use the following procedure:

1. Assuming that you want to insert the TES9 into the video path between two pieces of equipment we'll call “A” and “B”, select a time when a loss of video on this path will not cause an outage.
2. Disconnect the video cable from the input to B and connect it to IN of the TES9.
3. Connect another HD-grade coax from the TES9 **OUT** to the input of B.

Note — *If the TES9 is used as a decoder and its output is not used, connect a 75-ohm termination to **OUT**. Termination of the output in 75 ohms is essential for proper operation.*

4. Place the TES9's **BYPASS** switch in the bypass (out) position.
5. Turn on the TES9's power by moving the rear-panel power switch to the “1” (up) position.
6. After the TES9 has powered up, its **STATUS 1-3** LEDs should all be green, as well as the **VIDEO** LED for the channel you've just connected. The **BYPASS** LED will be red. Once this is the case, press the switch in. The **BYPASS** LED should go off, and the TES9 should now be fully active in your program path.

Connecting a PC for Setup

When you first use your TES9, you will need to connect it to a Windows PC in order to set up its operating parameters. It is recommended that the PC and TES9 be powered off while you make these connections.

Use the following procedure:

1. Connect one end of the null modem cable (91-09497-01) supplied with the TES9 to a 9-pin **COM** port on your PC.
2. Connect the other end of the null modem cable to **PORT A** of the TES9. If the cable is not long enough, you can add a 9-pin extension cable up to 25 feet (8 metres) long.
3. Turn the TES9 and PC power on.
4. Once the PC has booted, place the CD-ROM supplied with the TES9 into its CD drive, and follow the instructions to install the software. If you want more details about this software, please consult your TES9 software manual.
5. The TES9 should have started operation while you were installing the software. Press the LOAD button on the TES9's rear panel (using a narrow object such as a pencil if necessary), and hold it in for at least two seconds. The TES9 will enter setup mode, and the **STATUS1** LED should be alternating between green and yellow.
6. Start the setup software, using the instructions in the TES9 software manual.

Data Connections

As discussed at the beginning of section, your data connections depend on the use you are making of the TES9 and the software installed in it. The following sections describe each of these connections, but are not meant to imply that you should necessarily connect them all.

RS-232 Ports

The RS-232 ports PORT A, PORT B and PORT C can all be connected as described in section "**Connecting a PC for Setup**" on page 3-5, for use in data transmission. This is the connection discussed in the first of the following points:

- When connecting to another device such as a PC that is wired as Data Terminal Equipment (DTE), you need to use a null modem cable such as the one supplied with the TES9. Additional cables can be purchased by contacting your Ross Video sales representative. Alternatively, you can build your own cable or find an equivalent one available from a cable supplier, using the wiring table provided in section.
- When connecting to a 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. This cable is not supplied with the TES9, but is readily available from data cable suppliers.
- Although you used **PORT A** for your initial setup, you do not have to dedicate it to this purpose alone. If you enable setup to occur through the **LAN**, **PORT A** is then available for data transmission. Also, **PORT A** can be used alternately for setup and data transmission, provided your application allows the data transmission to be suspended whenever you need to change the setup.

LAN

The **LAN** port can be connected to a 10baseT or 100baseT Ethernet LAN, using a standard cable with RJ45 jacks. The **LAN** port uses a standard pin-out, which means that it is intended to be connected to a router or switch using a standard cable. If you need to connect directly to the **LAN** port on terminal equipment such as a PC, you will need to use a crossover cable.

MODEM

The modem can be connected via a standard telephone cord to an outlet of any analog telephone system. Avoid using a digital telephone line, since these tend to reduce the quality and therefore the speed of the modem connection. If the telephone line goes outside your building, you should

ensure that it is equipped with a surge suppressor, to protect the TES9's modem from external high-energy discharges.

Specifications

In This Chapter

This chapter provides the technical specification information for the TES9. Note that specifications are subject to change without notice.

The following topics are discussed:

- Technical Specifications
- Cabling Information

Technical Specifications

This section provides technical information on the TES9.

Electrical Specifications

Table 4.1 TES9 Electrical Specifications

Connector	Specification
Power	90-250V, 47-63 Hz, 0.25A typical, fuse 1A. Replacement fuse: Littelfuse #218001
Port A, Port B, Port C	RS-232, up to 115.2K bps
PROGRAM 1 and 2: VIDEO IN, OUT and MON OUT	SMPTE 259M or 292M, 800 mV p-p, 75 ohms
GPIO	Contact closures and +5V logic levels
LAN	Ethernet 10baseT or 100baseT
MODEM	V.34, analog telephone connection
LTC IN	Linear time code, SMPTE 12M, unbalanced, 0.5 - 3 V peak-to-peak, 5K ohms

Mechanical Specifications

Table 4.2 TES9 Mechanical Specifications

Category	Dimension
Width	19" (48.3 cm)
Height	1.72" (4.4 cm)
Depth	12.2" (31cm)
Weight	6.6 lbs (3.0 kg)
Mounting	Front and rear mount in standard 19" rack

Environmental Specifications

The TES9 operating temperature range is 0 to 40 ° C, or 32 to 104° F.

Video Specifications

The TES9 inputs and outputs comply with SMPTE 259M and 292M. The following table lists the video formats that are supported:

Table 4.3 TES9 Video Specifications

Category	Format Description	Defining Standards
259M	525 lines, 59.94 Hz	ITU-R BT.601, SMPTE 125M
	625 lines, 50 Hz	ITU-R BT.601
292M	1080i, 50 Hz	SMPTE 274M
	1080i, 59.94 Hz	SMPTE 274M
	1080i, 60 Hz	SMPTE 274M
	1080p, 23.98 Hz	SMPTE 274M
	1080p, 24 Hz	SMPTE 274M
	1080sf, 23.98 Hz	SMPTE 274M, RP211
	1080sf, 24 Hz	SMPTE 274M, RP211
	720p, 59.94 Hz	SMPTE 296M
	720p, 60 Hz	SMPTE 296M

The following table lists some additional video signal specifications.

Table 4.4 TES9 Additional Video Specifications

Category	Dimension
Outer Jitter	0.1 UI typical; 0.2 UI maximum
Output Return Loss (active)	15 dB minimum, to 1.485 GHz
Input Return Loss (active)	10 dB minimum, to 1.485 GHz
Automatic Input Cable Equalization (Pathological)	292M: at least 75 m. of 8281 cable 259M: at least 200 m. of 8281 cable

Cabling Information

This section provides additional cabling information for the TES9.

RS-232 Ports

The pin connections for PORT A, PORT B and PORT C are shown in **Table 4.5**. These D9 jacks are the same type commonly found on PCs.

Table 4.5 D9 Pin Connections

Pin	Signal	Direction	Status
1	DCD	(Input to TES9)	Not connected
2	RXD	Input to TES9	Active
3	TXD	Output from TES9	Active
4	DTR	Output from TES9	Asserted (+12V)
5	GND	Ground reference	Ground
6	DSR	(Input to TES9)	Not connected
7	RTS	Output from TES9	Active
8	CTS	Input to TES9	Active
9	RI	(Input to TES9)	Not connected

The following table shows the wiring of the 91-09497-01 null modem cable supplied with the TES9. This table can be used to construct a cable to connect PORT A, PORTB or PORTC to a COM port on a PC or other such equipment. This shows, for example, that the DTR signal on pin 4 of the TES9 drives pins1 (DCD) and 6 (DSR) on the PC.

Table 4.6 Connection from TES9 to a PC

TES9 D9 Connector		PC D9 Connector	
Pin	**Name**	**Pin**	**Name**
2	RXD	3	TXD
3	TXD	2	RXD
4	DTR	1	DCD
		6	DSR
5	GND	5	GND
1	DCD[a]	4	DTR[a]
6	DSR[a]		
7	RTS	8	CTS
8	CTS	7	RTS
9	No connection	9	No Connection

a. The connections to pins 1 and 6 of the TES9 ports are optional, since the TES9 does not use them. However, it is advisable to connect them, in order to keep the cable symmetrical.

GPIO

Note that the GPIO terminal block is a two-part connector. For convenience of cable construction, the plug can be removed from the socket by loosening the small screws at the two ends of the plug.

Note — *To avoid interference or damage caused by external electrical transients, it is advisable to use a shielded multi-conductor cable for the GPIO connections. Connect the shield drain wire to pin 8 or 12 of the terminal block, in addition to the ground signal wire.*

The following table shows the pin-out of the GPIO connector. The pins are numbered from left to right (as seen from the rear). Pins 1, 5, 10 and 15 are identified on the panel as shown in **Figure 2.3**.

Table 4.7 GPIO Connections

Pin	Description
1	GPI 0
2	GPI 1
3	GPI 2
4	GPI 3
5	GPI 4
6	GPI 5
7	GPI 6
8	Ground
9	Pgm 1 Bypass Indicator A
10	Pgm 1 Bypass Indicator B
11	Pgm 1 Bypass Switch
12	Ground
13	Pgm 2 Bypass Indicator A
14	Pgm 2 Bypass Indicator B
15	Pgm 2 Bypass Switch

GPI 0-6

These are general purpose +5V logic-signal inputs or outputs. Each signal is pulled up to +5V by 10K ohms. Depending on the application, these can be used to provide control or status to an external device, or accept control inputs. For safe operation, these signals must remain within the range 0-5V DC. If unused, leave them unconnected.

Program 1 Bypass Indicator A and B

When the TES9's Program 1 video channel is active, these pins are connected together by internal relay contacts. When it is in bypass, there is no connection between these pins. These pins are rated at 25V DC and 200 ma maximum.

Program 2 Bypass Indicator A and B

When the TES9's Program 2 video channel is active, these pins are connected together by internal relay contacts. When it is in bypass, there is no connection between these pins. These pins are rated at 25V DC and 200 ma maximum.

Program 1 Bypass Switch

When this pin is connected to ground (pin 8 or 12), the Program 1 video channel is placed into bypass. When this pin is left unconnected, the bypass state is controlled by the front panel bypass switch and other internal controls. This pin should not be connected to any other signals; it should either be open or connected to ground.

Program 2 Bypass Switch

When this pin is connected to ground (pin 8 or 12), the Program 2 video channel is placed into bypass. When this pin is left unconnected, the bypass state is controlled by the front panel bypass switch and other internal controls. This pin should not be connected to any other signals; it should either be open or connected to ground.

Troubleshooting

In This Chapter

This chapter contains the following sections:

- Troubleshooting

Troubleshooting

Other error conditions not outlined in this section may depend on the software modules loaded into the TES9, and on the application software that provides the data for encoding. Please refer to the manuals for these software packages for additional troubleshooting assistance.

Replacing a Fuse

The AC power to the TES9 is protected by a 1-ampere fuse; this is located behind a small cover on the rear-panel power entry module. If the power cord is attached to the TES9 and plugged into a live AC outlet, and the power switch is in the ON position, yet none of the LEDs on the TES9's front panel come on, the fuse has probably blown.

In order to change it, use the following procedure:

1. Remove the power cord from the receptacle on the rear of the TES9.
2. Insert a small screwdriver or equivalent tool into the small slot at the upper edge of the fuse holder in the centre of the power entry module. Press downwards and pull slightly outwards to disengage the upper clip.
3. Repeat the preceding step on the lower clip of the fuse holder.
4. If necessary, repeat steps 2 and 3 to fully release the fuse holder.
5. Carefully pull the fuse holder out of its housing, and be prepared to catch the fuse if it falls out.
6. Replace the live (upper) fuse by the spare one in the lower container marked “spare fuse”.
7. If you have a supply of fuses available, place a new one in the “spare” location.
8. Carefully return the fuse holder to its housing, and press lightly until it clicks into place. Note that it is keyed so that you cannot insert it incorrectly.
9. Plug the power cord back into the TES9's receptacle, and turn the power switch to the on (up) position.

The two fuses supplied with the TES9 are Littelfuse part number 218001.

Fails to Start

When power is first applied to the TES9, the three **STATUS** LEDs should illuminate red. After approximately 35 seconds, **STATUS 1** LED should turn green, and the other two should turn off. If they do not, please note the pattern of these three LEDs and contact Ross Technical Support.

Stays in Bypass

The TES9 requires the following conditions to switch from bypass to active:

- power on;
- front-panel bypass switch pressed in;
- bypass switch contacts on GPIO connector open;
- VIDEO IN present.

If the bypass LED stays on after the TES9 has fully powered up, even though all the above conditions are met, please check that the video input uses one of the formats defined in section. If so, there may be an internal fault in the TES9. Contact Ross Technical Support.

Cannot Decode TES9 Encoded Data

If the TES9 is out of bypass, and it has been set up to encode VANC or VBI services, these services should be injected into the designated lines of the Video Out signal. If you believe that they are not, please check the following:

- The **VIDEO** and **ENCODE** LEDs for the desired channel should both be illuminated green. The **ENCODE** LED may be blinking if the data is not continuous.
- If the **VIDEO** LED is yellow, there are no appropriate data services defined for the current video type. Use the setup software to check the settings.
- If **VIDEO** LED is green and **ENCODE** LED is off, there are data services defined but no data is being provided. Use the setup software to check the settings. Check that the data port that should be providing the data (e.g. Port A-C or LAN) is connected and that the data source is operating.
- If using one of the RS-232 connections **PORT A-C**, check that the baud rate is set properly and that the cable is the proper null modem type, as defined in section. If the LED for the specified port is on or flashing green, data is being received and there is probably an incorrect setting in the TES9. If the LED for the specified port is solidly off, the problem is with the data source or the cable.
- If using the **LAN** connection, check that the **LAN** LED is on. Check that the **LAN** settings of the TES9 (IP address etc.) match those used by the application that is sending the data. Make sure that the sending application is running.
- If both **VIDEO** and **ENCODE** LEDs are green, encoding is taking place. If you are unable to decode the data from the expected line downstream, check the following possibilities. The TES9 may be setup to encode with a different VANC address (DID, SDID), or in a different line or component (chroma or luma) than those expected by the decoding equipment; check the settings. There may be equipment downstream from the TES9 that is damaging the inserted data; try connecting the decoding device directly to the video output of the TES9, to check this. If you have access to a video analyzer, connect the TES9 Video Out to it, to check the presence and coding of the encoded data.

Notes:

Notes:

Contact Us

Contact our friendly and professional support representatives for the following:

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E-MAIL	**General Information**	solutions@rossvideo.com
	Technical Support	techsupport@rossvideo.com
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