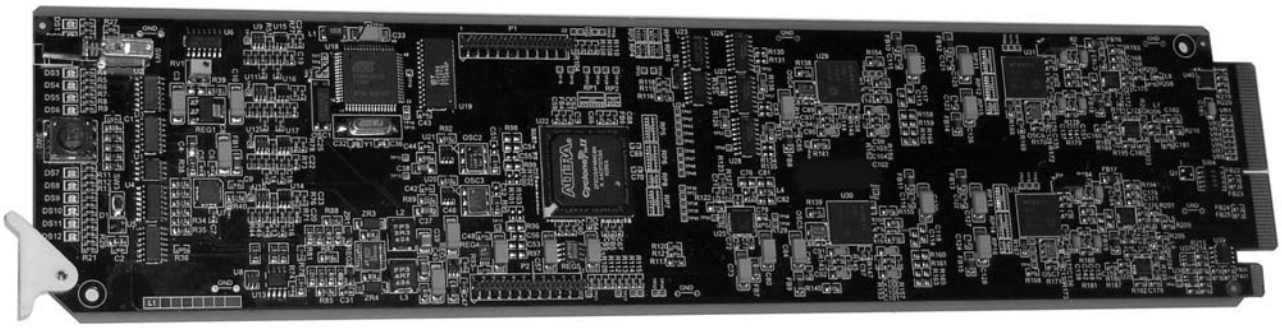
Ross Video Limited

VAC-100

VANC Authoring Card

User Manual



Live Production Technology

openGear

Product Name: VAC-100

VAC-100 • VANC Authoring Card User Manual

- Ross Part Number: **VAC100DR-004-02**
- Release Date: September 23, 2010. Printed in Canada.

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Important Regulatory and Safety Notices

Before using this product and any associated equipment, refer to the “Important Safety Instructions” listed below so as to avoid personnel injury and to prevent product damage.

Products may require specific equipment, and/or that installation procedures be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these Specific requirements.

Symbol Meanings

This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.

Warning

The symbol with the word **“Warning”** within the equipment manual indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.

Caution

The symbol with the word “**Caution**” within the equipment manual indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Notice

The symbol with the word “**Notice**” within the equipment manual indicates a situation, which if not avoided, may result in major or minor equipment damage or a situation which could place the equipment in a non-compliant operating state.

ESD Susceptibility

This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from electrostatic discharge.

Important Safety Instructions

Caution

This product is intended to be a component product of the openGear 8000 series frame. Refer to the openGear 8000 series frame User Manual for important safety instructions regarding the proper installation and safe operation of the frame as well as its component products.

Warning

Certain parts of this equipment namely the power supply area still present a safety hazard, with the power switch in the OFF position. To avoid electrical shock, disconnect all A/C power cords from the chassis' rear appliance connectors before servicing this area.

Warning

Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after any servicing.

This product contains safety critical parts, which if incorrectly replaced may present a risk of fire or electrical shock. Components contained within the product’s power supplies and power supply area, are not intended to be customer serviced and should be returned to the factory for repair.

To reduce the risk of fire, replacement fuses must be the same type and rating.

Only use attachments/accessories specified by the manufacturer.

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 users will be required to correct the interference at their own expense.

Notice

Changes or modifications to this equipment not expressly approved by Ross Video Limited could void the user's authority to operate this equipment.

CANADA

This Class "A" digital apparatus complies with Canadian ICES-003.

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

EUROPE

This equipment is in compliance with the essential requirements and other relevant provisions of **CE Directive 93/68/EEC**.

INTERNATIONAL

This equipment has been tested to **CISPR 22:1997** along with amendments **A1:2000** and **A2:2002** 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 on the last page of this manual.

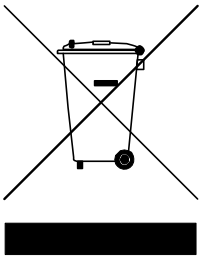
Environmental Information

The VAC-100 complies with the European Union's RoHS Directive. This stands for "the restriction of the use of certain hazardous substances in electrical and electronic equipment". This Directive bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants.

The equipment that you purchased required the extraction and use of natural resources for its production. Despite compliance with the RoHS directive, it may nevertheless 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, we encourage 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.

Contents

Introduction

In This Chapter

This chapter contains the following sections:

- Overview
- Functional Block Diagram
- Features
- Documentation Terms

A Word of Thanks

Congratulations on choosing the openGear VAC-100 VANC Authoring Card. The VAC-100 is part of a full line of Digital Products within the openGear Terminal Equipment family of products.

You will be pleased at how easily your new VAC-100 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 VAC-100, please contact us at the numbers listed on the back cover of this manual. Our technical support staff is available for consultation or service.

Overview

The **VAC-100** adds Vertical Ancillary (VANC) data services to an SDI (SMPTE 259) or HD-SDI (SMPTE 292) video signal, in accordance with SMPTE 291 and other related standards. Its function is to author and insert VANC data of known data types. Some examples are audio metadata (SMPTE 2020) and active format descriptor (AFD) metadata (SMPTE 2016).

Users who need to add a variety of dynamically changing VANC services (such as closed captioning) should consider the Ross Video TES9 encoder.

The **VAC-100** provides a number of innovative tools for defining and selecting metadata services, in order to simplify your workflow. For example:

- The **VAC-100** supports a library of the most common VANC data types. The user interface allows a simple click to select authoring and insertion.
- The VANC data output automatically adapts to the incoming video type so your data will always be correct.
- The VANC services can be triggered by contact closures on rear-panel GPIO connectors or inserted constantly. The data appearing in the VANC can be controlled by an operator using switches or by an automation system using GPIO.
- As a member of the openGear family, the VAC-100 shares a common control interface, known as DashBoard, with a broad array of other products.
- The configuration from one VAC-100 card can be uploaded to DashBoard and then downloaded to other VAC-100's, allowing you to ensure that a number of cards have exactly the same configuration and data.

The VAC-100 is housed in the openGear DFR-8300 series frames. It is compatible with both 10-slot and 20-slot network-enabled frames.

Supported Data Types

The VAC-100 is a tool for authoring VANC data through its user interface. The following data types are directly supported by the card. The supported data types are:

- Active Format Description (AFD) SMPTE-2016
- Audio Metadata SMPTE-2020
- Timecode SMPTE-12
- Broadcast Flag
- Captioning Test Sequence CEA-708
- DPI Triggers SCTE-104/SMPTE-2010
- V-ISAN
- Generic Data

The generic data type allows for the creation of data types not directly supported by the card. This includes such things as text tags to mark the source of a video stream and packets to trigger downstream devices.

Features

The following features make the VAC-100 the best solution for insertion of constant data or metadata VANC services:

- Operates automatically with major SD and HD video formats.
- Powerful metadata authoring features.
- Flexible selection of packets and assignment to scan lines.
- GPIO-triggered VANC packet selection.
- Video bypass capability with suitable Ross Video rear modules.
- Fits openGear DFR-8300 series frames.
- Intelligent VANC replacement enables automatic selection of local or network metadata, by inserting only when VANC data of the same type is not present in the input. Alternatively, the **VAC-100** can overwrite specific incoming metadata services, enabling selective metadata re-authoring**.**

Functional Block Diagram

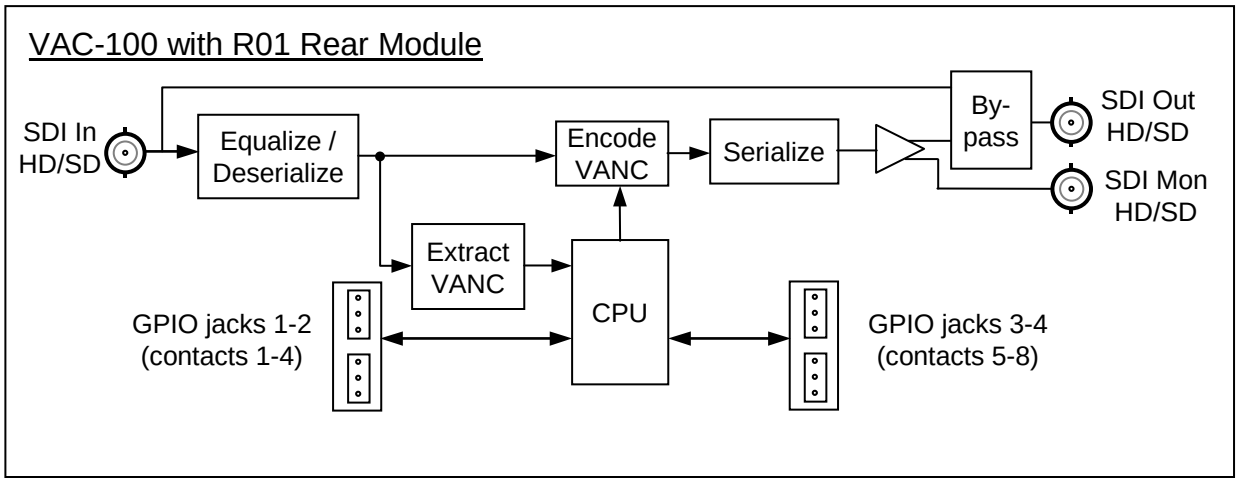


Figure 1. Simplified Block Diagram of VAC-100 Functions

Documentation Terms

The following terms are used throughout this guide:

- "**Frame**" refers to the frame that houses the VAC-100 card.
- "**Operator**" and "**User**" refer to the person who uses the VAC-100.
- "**Board**" and "**Card**" refer to the VAC-100 card itself, including all components and switches.
- "**System**" and "**Video system**" refer to the mix of interconnected production and terminal equipment in which the VAC-100 operates.
- "**Rear Module**" refers to the connector module at the rear of the frame, into which the VAC-100 is inserted.

Frame and Rear Module Compatibility

The VAC-100 can operate with the following frame and rear modules combinations. It should be noted that rear module choice dictates the functionality of the VAC-100.

Table 1.Combinations of VAC-100, Frame and Rear Module models

Rear Module	Frame	Bi-Directional GPIOs	Isolated GPIOs	Program 2 Out	Bypass Relay
ONG-MDL-R01	DFR-8310-N	Yes	No	Yes	Y
ONG-MDL-R21	DFR-8321-C or –CN or -CNS	Yes	No	Yes	Y
ONG-MDL-R23	DFR-8321-C or –CN or -CNS	Yes	No	Yes	Y

Quick Start

Assuming you have an openGear frame, an **ONG-VAC-100** card and a suitable rear module, the following steps will get you started with VANC metadata insertion:

1. Connect the frame to your LAN, using the instruction sheet "**Connecting the openGear Frame to a Network**", supplied with the frame.
2. Install DashBoard on a computer connected to the LAN. The DashBoard Control System™ software and user manual are available from the Ross Video website.
3. Install the rear module in the frame, as described in the section "**Rear Module Installation**" of this manual.
4. Install the VAC-100 into the rear module, as described in the section "**Board Installation**" of this manual.
5. Connect a 292 or 259 signal to the SDI input jack on the rear module as described in the section "**Cable Connections**" of this manual.
6. Connect the SDI output jack to an SDI analyzer or VANC monitoring test set, and turn the frame power on. For information on Ross Video's VANC monitoring tools, contact Ross Technical Support.
7. Start DashBoard on your computer. It should automatically find your frame within a minute or two. Click the "+" next to the frame name to show the cards in the frame, then double-click the VAC-100.
8. On the **Settings** tab of the VAC-100 make the settings shown. It is a good idea to name the card so that it can easily be identified within Dashboard especially when there are more than one VAC-100 present. The VAC-100 must not be in bypass if it is to insert. For this example the card will append its VANC data after any that is currently in the line.
9. On the **Edit Buffer Names** tab you can name the buffers so they can easily be identified. For this example we will create two AFD packets so we will name buffer 1 and 2. The first AFD buffer will be for a default AFD code. The second will be for the code to force a 16:9 signal to be center cut when converted to 4:3. Name these buffers as shown and then click on **Apply**.
10. Click on the **AFD** tab and in **Select Buffer** choose the **AFD Default** buffer. For **Type** choose **1000 (8) full frame image prefer** and then click on **Save**.
11. Again, on the **AFD** tab and in the **Select Buffer** choose the **AFD Center Cut** buffer. For **Type** choose **1111 (15) 16:9 with 4:3 alternate** and click on **Save**.
12. Click on the **Setup Encoding** tab. For **Encoding Service** select **Encode 1**. Set the **Encode Condition** to **Always** and the **Encoding Source** to **AFD Default**. This will cause the AFD code 1000 to be encoded into the video constantly once we click on the **Start** button.
13. To switch to other AFD packet, change the **Encoding Source** to **AFD Center Cut** and then click on the **Start** button.

    You have now encoded your first data into the VANC. Try authoring and inserting other data into the VANC to gain a better understanding of the capabilities of the VAC-100. There are four encoding buffers so you are able to insert four different sets of data into the VANC at one time.

    Once familiar with authoring and insertion, you may wish to control what is inserted by using a switch connected to a GPIO. The next steps teach you how to connect a switch to the GPIO. For this example we will assume that a switch is connected to the first GPIO.
14. Click on the **Setup Encoding** tab. For **Encoding Service** select **Encode 1**. Set the **Encode Condition** to **GPIO 1 Open** and the **Encoding Source** to **AFD Default** and then click on the **Start** button. This will cause the AFD code 1000 to be encoded into the video when the switch is open and nothing to be encoded when it is closed.

15. For **Encoding Service** select **Encode 2** and set the **Encode Condition** to **GPIO 1 Closed**. Set the **Encoding Source** to **AFD Center Cut** and click on the **Start** button. The switch now controls which AFD code is encoded. Open for **AFD Default** (1000) and closed for **AFD Center Cut** (1111). Click **Start**.

You have now followed the basic work flow for authoring and inserting VANC data. The VAC-100 supports the authoring of many types of VANC data. The details of the different types are described later in the manual and may be referenced while experimenting with the card's abilities.

Installation and Setup

In This Chapter

This chapter contains the following sections:

- Static Discharge
- Unpacking
- Rear Module Installation (Optional)
- Board Installation
- BNC Labels
- Cable Connections

Static Discharge

Whenever handling the VAC-100 and other related equipment, please observe all static discharge precautions as described in the following 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 wearing synthetic fiber clothing. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Unpacking

Unpack each VAC-100 you received from the shipping container, and check the contents against the packing list to ensure that all items are included. If any items are missing or damaged, contact your sales representative or Ross Video Limited directly.

Rear Module Installation (if applicable)

Use the following procedure to install the rear module in an openGear digital distribution frame:

1. Refer to the ***DFR-8300 Series Frames User Manual***, to ensure that the frame is properly installed according to instructions.
2. On the rear of the frame, locate the card frame slot.
3. Remove the Blocker Plate (if any) from the rear of the slot you have chosen for the VAC-100 installation. Retain the plate for possible future use.
4. Seat the bottom of the rear module in the seating slot at the base of the frame's back plane.

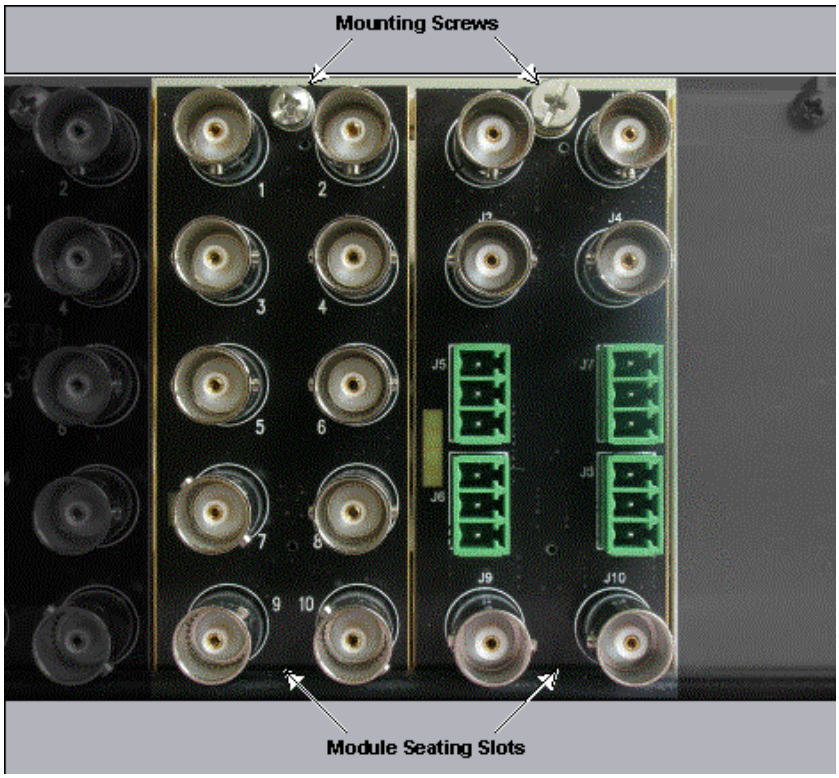


Figure 2. Rear Module Installation, showing RM-8300-B (left) and ONG-MDL-R01 (right) modules

5. Align the top hole of the rear module with the screw hole on the top edge of the back plane.
6. Using a Phillips screwdriver and the supplied screw, fasten the rear module to the frame's back plane. Do not over tighten.
7. Ensure proper frame cooling and ventilation by having all rear frame slots covered with rear I/O modules or blank metal plates. If you need blanks, contact your openGear sales representative.

This completes the procedure for installing the Rear I/O Module in an openGear digital distribution frame.

Board Installation

Use the following procedure to install the VAC-100 in an openGear distribution:

Notice — *It is recommended to use a frame with the cooling fan option in all cases, in order to allow all slots to be used without exceeding heat dissipation limits.*

1. Refer to the ***DFR-8300 Series Frames User Manual*** to ensure that the frame is properly installed according to instructions.
2. After selecting the desired frame installation slot, hold the VAC-100 card by the edges and carefully align the card edges with the slots in the frame.
3. Fully insert the card into the frame until the rear connection plugs are properly seated on the midplane and rear modules.

This completes the procedure for installing the VAC-100 in an openGear distribution frame.

BNC Labels

Affix a connector label (if supplied) to the rear of the rack frame at the position occupied by the VAC-100. Some rear modules do not require a label, as the connector names are silkscreened directly onto the rear module itself.

Cable Connections

This section provides information for connecting cables to the installed rear modules on the DFR-8310 series frame backplane. Connect the input and output cables according to the following diagram. It is not necessary to terminate unused outputs. Note that the BNCs are numbered 1-10 by convention, even though some may not be installed. The upper left BNC is #1, with the other odd-numbered jacks 3-9 below it. The even-numbered BNC jacks 2-10 are in the right column. As shown in the following illustration, the ONG-MDL-R01 rear module has 1-4 and 9-10, whereas the RM-8300-B has 1-10.

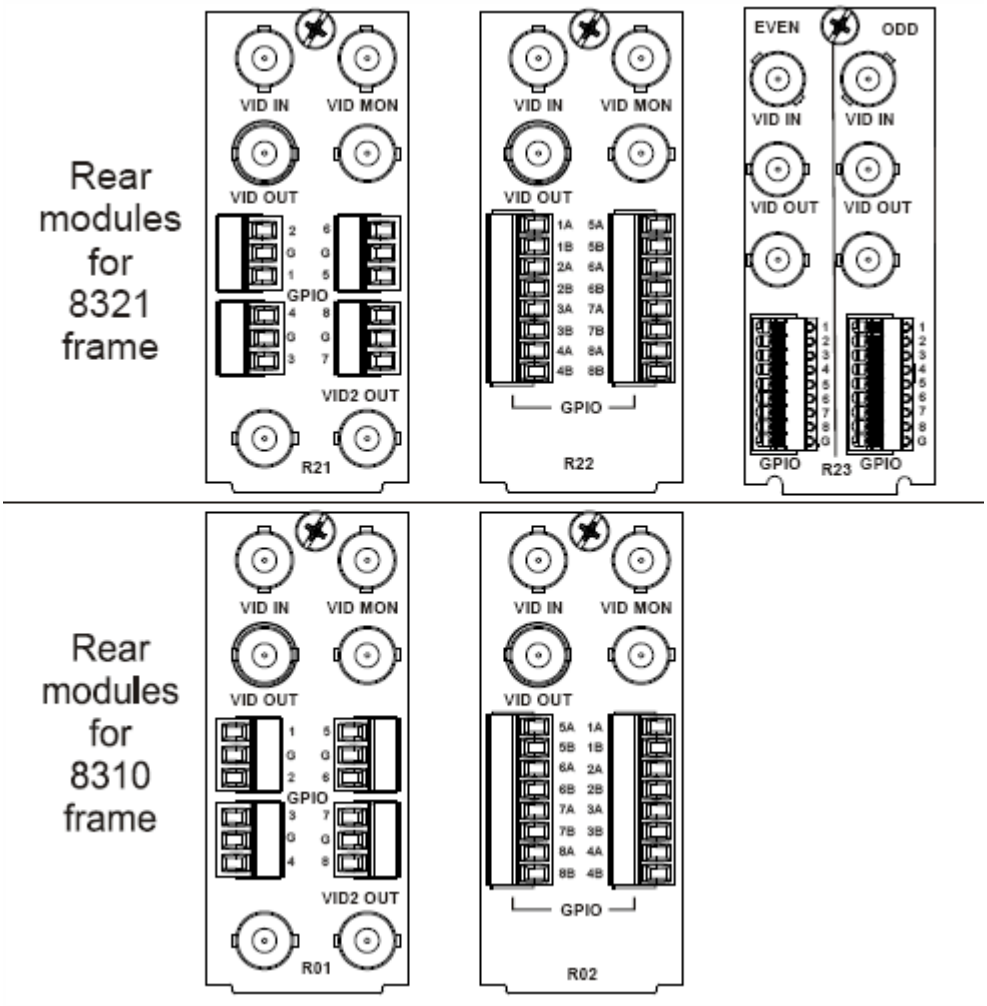


Figure 3. BNC Designations for the VAC-100 with ONG-MDL-R01 (left) and RM-8300-B Rear Modules

BNC 1 SDI Input

This jack accepts an SDI (SMPTE 259) or HD-SDI (SMPTE 292) video signal. The VAC-100 requires this input in all cases. It inserts VANC packets into this signal and routes the resulting output to BNC3. The input signal is internally terminated in 75 ohms when the VAC-100 is active; when the VAC-100 is in bypass, the termination is provided by the downstream equipment connected to BNC3.

BNC 3 SDI Output

This jack carries the main program output from the VAC-100, consisting of the signal applied to BNC1, with VANC data packets inserted. When the **ONG-MDL-R01** rear module is used, BNC1 is routed directly to BNC3 (without passing through the VAC-100), under the following circumstances: power off, VAC-100 card removed, VAC-100 Bypass pushbutton out, software selection or certain major error conditions.

BNC 2 SDI Output Monitor

When the VAC-100 is active, this jack carries a copy of the SDI output present on BNC3. This can be useful for test purposes. This jack does not have any bypass capability: with power off or the VAC-100 removed, there is no output signal on this jack.

BNC 9 LTC Time Code Input

This jack accepts an LTC time source which the VAC-100 can use as a time source when generating time codes.

BNCs 4, 9, 10 Not Used

GPIO1-4 Inputs

These jacks can be used to remotely control the operation of the VAC-100 by means of contact closures. These are available on the **ONG-MDL-R01, ONG-MDL-R21** and **ONG-MDL-R23** rear modules. VANC services can be enabled or disabled in several ways, one of which uses contact closures on one or more of these inputs.

BNCs 5-8 of the RM-8300-B rear module are unused.

User Controls

In This Chapter

This chapter contains a description of the VAC-100 user controls:

- Switches
- LEDs

User Controls

Figure 4 shows the front edge of the VAC-100. Following the illustration are descriptions of the controls and indicators identified here.

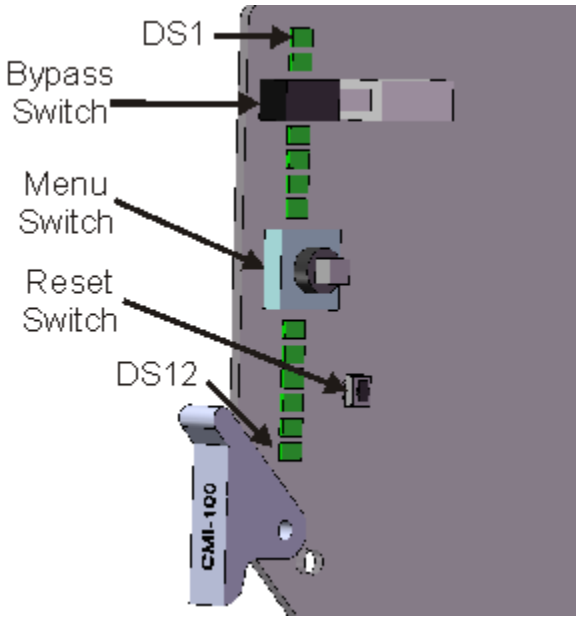


Figure 4. Card-edge User Controls

Bypass Switch

If the VAC-100 is installed in a rear module such as the ONG-MDL-R01 that has a bypass relay, this two-position pushbutton can be used to control the relay. When the pushbutton is in the "IN" position, the VAC-100 is in the video signal path. Pressing it once moves the switch to the "OUT" position and bypasses the VAC-100. Pressing it again restores the VAC-100 to its active state.

When the VAC-100 is installed in a rear module that does not provide bypass capability, this switch enables and disables VANC encoding.

Menu Switch

The menu switch is not used in the VAC-100.

Reset Switch

This button is used for rebooting the card.

LEDs

The front-edge of the card features LEDs that display the status of the input signals. Descriptions are provided in the following table.

Table 1. Selection and Status LED Descriptions

LED	Color	Location	Display and Description
Power	Red/ Green/ Orange	DS1	When off, there is no power. When lit and green the card is running with valid input. When flashing green, the boot loader is waiting for software upload. When lit orange, this is a warning about a signal or configuration error. When lit red, the card is not operational. This will occur if, for example, there is no video input.
Bypass	Red	DS2	When off, VAC-100 is in the video path and is capable of inserting data. When lit red, the VAC-100's video is bypassed.
Program Video In	Red/ Green	DS3	When lit green, the Program Video input is present and valid. When lit red, no valid input is present. This typically means that the input cable is disconnected.
Program Video Out	Red/ Green	DS4	When lit green, the Program Video output serializer is locked to a valid input. When lit red, there is a hardware fault on the card.
Not used		DS5	
Not used		DS6	
VANC Encode	Green/ Orange	DS7	When lit green, the **VAC-100** is inserting VANC data into the video. When lit orange or blinking orange-green, there is too much VANC data to fit in the specified line(s), and some data is being lost When off, there is no insertion.
Not Used		DS8	
Video Error	Green/ Orange	DS9	Normally lit green. When lit orange, this indicates that there has been an error (e.g. EDH) in the video input stream.
Unknown Rear Module	Green/ Orange	DS10	Normally lit green. When lit orange, this indicates that the rear module connected to the **VAC-100** is not one of the types recognized by the software. Operation may not be correct.
Invalid Insertion Line	Red/ Green	DS11	Normally lit green. When lit red, this indicates that the **VAC-100** has been set to insert VANC data into an invalid line, that is a line that is not in the vertical interval for the current video format.
No Video	Red/ Green	DS12	Normally lit green. When lit red, this indicates that no video is present at the input

DashBoard and VAC-100 Status

In This Chapter

This chapter provides a detailed explanation of the functions available when using DashBoard to monitor and control the VAC-100. The program is available for download from the Ross Video website.

The following topics are discussed in this chapter:

- Layout and Navigation
- Selecting a VAC-100 Module
- Screen layout
- Status and Setup menus

Layout and Navigation

This section focuses on the use of the DashBoard program to control and monitor a VAC-100. For a more complete description of DashBoard and its capabilities, please refer to the documentation supplied with the program.

Selecting a VAC-100 Module

Figure 5 shows a typical DashBoard screen. After it has established its connection to the frame containing the VAC-100, a list of modules is displayed at the left side. Clicking on a frame and then on a VAC-100 causes a window for that module to be opened, resulting in the display shown here. In this simple example, there is only one device, the VAC-100 open. DashBoard provides the ability to view multiple devices in this window. For details, see the ***DashBoard Control System User Manual***.

Screen layout

The VAC-100 window is divided into four sections as shown:

- The upper left side is the Product Status area, and displays a summary of the present module status.
- The lower left side is the Status area and provides tabs to select more detailed status.
- The right side, the Settings area, provides tabs to allow control of the various functions of the module.
- The bottom band contains buttons for functions that are used relatively infrequently.

Product Status

The left side of the main Dashboard screen has tabs to provide status information on the VAC-100 card. Product information that is useful in discussing the operation of the module with Ross Video's Technical Support staff. The **Product** tab has the name of the product and the versions of software and hardware installed. The **Saving Settings** progress bar indicates when the card is saving its settings to permanent flash memory. The card should not be powered down while it is saving its configuration.

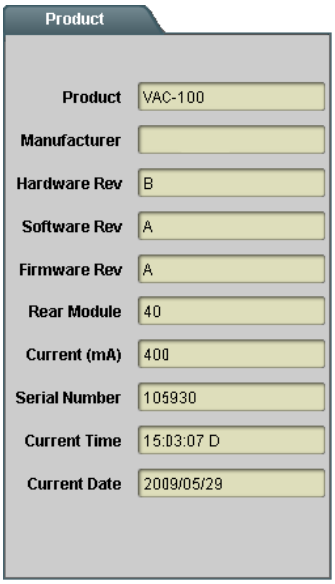


Figure 5. Product status tab

Incoming Services Status

Figure 6 shows a list of VANC services that are present in the video input signal. This includes the input video type, the last incoming LTC time code and indicates whether the rear module is in active or bypass state.

It shows up to 8 VANC services found in the VANC on the input to the card. These are labeled **Decode 1** through **Decode 8**. For each one, the following information is displayed:

- Line number (e.g. 9)
- HANC in VANC indicator (H or HANC, or nothing if VANC)
- Component (L for luma or C for chroma)
- DID:SDID (e.g. 50:01) These addresses are assigned by SMPTE to identify data services.
- Packet size in bytes. If there are two packets they are shown as 64,30 if they are in consecutive fields and as 64+30 if they are in the same field.

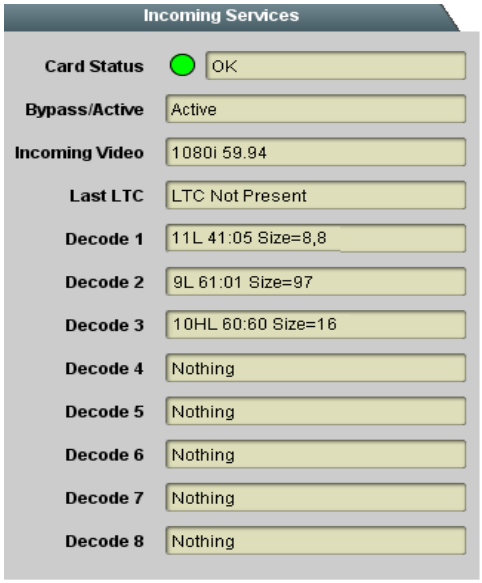


Figure 6. Incoming Services status screen

Outgoing Services Status

The left side of Figure 7 shows a list of VANC services that are currently being inserted into the program video by the VAC-100. This shows the input video type, the last incoming LTC time code and indicates whether the rear module is in the active or bypass state.

The four Encode lines show the VANC services that have been enabled using the **Setup Encoding** tab. For each one, the following information is displayed:

- Line number (e.g. 12)
- HANC in VANC indicator (H or HANC, or nothing if VANC)
- Component (L for luma or C for chroma)
- DID:SDID (e.g. 50:01) These addresses are assigned by SMPTE to identify data services.
- Service name (e.g. "AM Stereo") This is the name assigned to the buffer in the **Edit Buffer Names** tab.

The chapter, "**Setting Up the VAC-100**", describes how to cause the VAC-100 to select Services and specify where to insert them in the video signal.

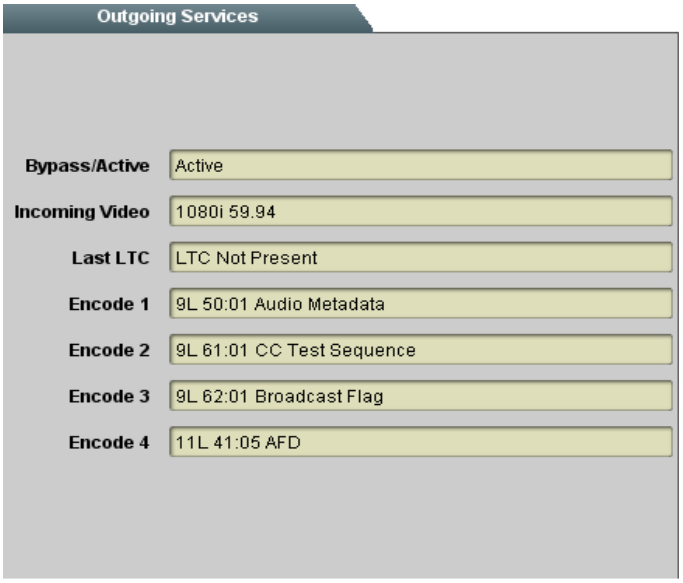


Figure 7. Outgoing Services status screen

GPIO Status

Figure 8 shows the status of the four general purpose (GPIO) inputs. Each of these ports has three pins, one of which indicates the presence of a connection. The status of each of the inputs is consequently one of the three possible values: Not Connected (no switch currently connected), Open (switch connected and open) or Closed (switch connected and closed).

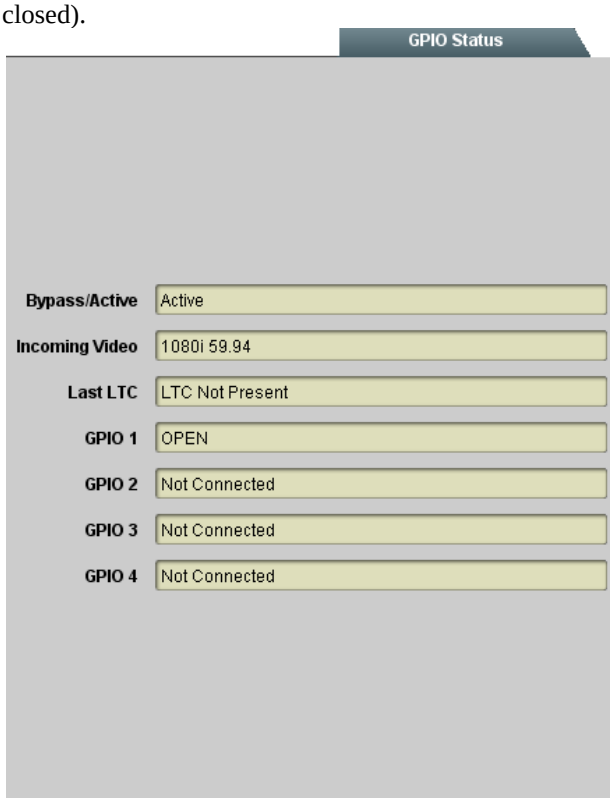


Figure 8. GPIO Input status screen

The chapter "**Setting Up the VAC-100**", describes how to cause the VAC-100 to respond to GPIO Open and Closed conditions by inserting specified VANC data into the video.

Alarm Status

Figure 9 shows the status of the various conditions that are monitored. Each of these conditions can be enabled or disabled on the **Alarms** settings tab. The **Card Status** is a summary of these indicators. It reports the most severe alarm condition that is present:

- If all the indicators are green, the **Card Status** is green and OK.
- If any of the indicators are red, the **Card Status** is also red and its description is the underlying error condition.

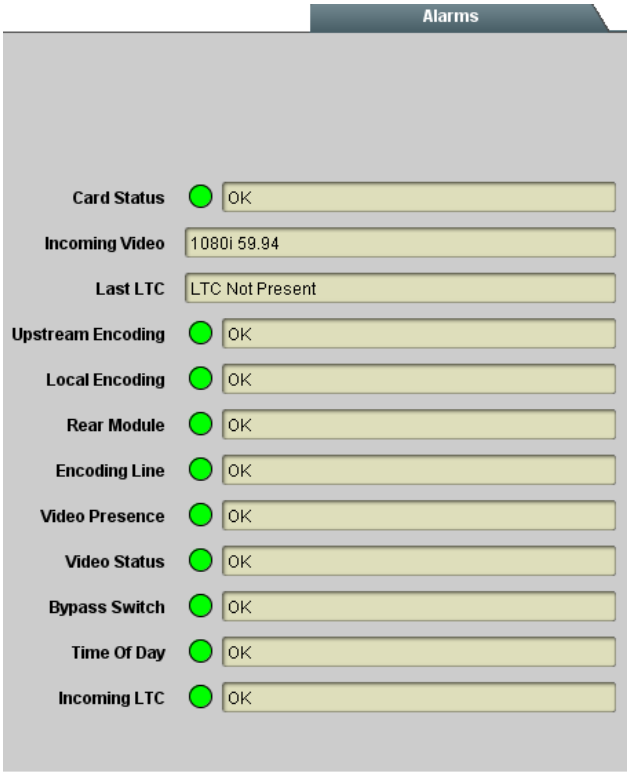


Figure 9: Alarms status screen

Setting Up the VAC-100

In This Chapter

This chapter explains how to use the user interface to set up the VAC-100. This discussion is based on the use of DashBoard through a network connection, however most of these functions are also available through the local Heads-up Display. This chapter will follow the work flow most appropriate for the VAC-100.

The following topics are discussed:

- General Settings
- Naming your data
- Authoring Data
- Inserting your data

General Settings

Figure 10 shows the screen that is displayed by clicking the **Settings** tab. Before proceeding to any of the other sections, please ensure that these settings are correct, as they will have an effect on the operation of the other functions.

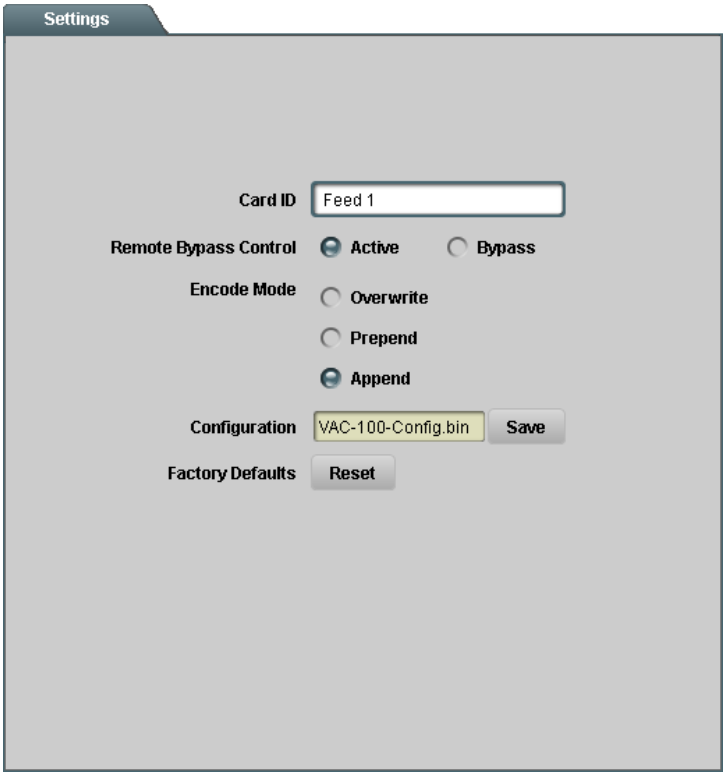


Figure 10. Settings Menu

The **Card ID** field allows you to assign a unique name to a VAC-100 card. This is especially useful if you have more than one VAC-100 in a frame. In this example, the **Card ID** has been set to " Feed 1", and the name appearing in DashBoard's device list is consequently "VAC-100 Feed 1". If this field were blank, the name would just be "VAC-100".

The **Remote Bypass Control** should normally be set to **Active**, which allows the VAC-100 to insert VANC data into the video. You might choose to set this to **Bypass** during maintenance operations such as software updates, for example – provided, of course, that the rear module has bypass capability.

The **Encode Mode** should normally be set to **Append**. This allows the VAC-100 to add your VANC data services after any that are present on the same line(s) of the input signal. This is the preferred mode of operation, since it adds your VANC data services with no effect on any others. Append will be used, regardless of the Encode Mode setting, for data inserted into the H-VANC space.

If, for some reason, you want to eliminate incoming VANC services from the output, set **Encode Mode** to **Overwrite** instead. Please note that this only affects lines encoded. Other lines will pass untouched.

If you want to place your VANC services before any incoming services in the lines, set **Encode Mode** to **Prepend**; you might choose this if you want to give priority to your locally-added services in the case where there may be insufficient space in the line(s) for both incoming and local services.

Note — *About Append and Prepend modes: when you insert a VANC service into a line that already contains packets with the same DID and SDID as the service that you are adding, the VAC-100 either deletes the incoming packets before inserting its own, or refrains from inserting to allow the incoming data to flow through; this depends on the Priority setting in the Setup Encoding menu. This eliminates any possible confusion caused by two or more versions of the same service.*

The **Configuration Save** allows all the current settings of the VAC-100 to be saved to a file on the PC. The **Upload** feature can then be used to restore the configuration. You may wish to save the configuration to allow you to return to it quickly, to use it to clone other cards with the same configuration or to allow a fast change from one configuration to another.

Time tab

Figure 11 shows **Time** tab. The VAC-100 can acquire the time over the network from an NTP server or the time and date can be set manually. The **Time** Source radio buttons control which method is used. The time is shown on the Program status tab and may be used by the Timecode tab. It is highly recommended that an NTP time server be used if timecode will be use it as a source.

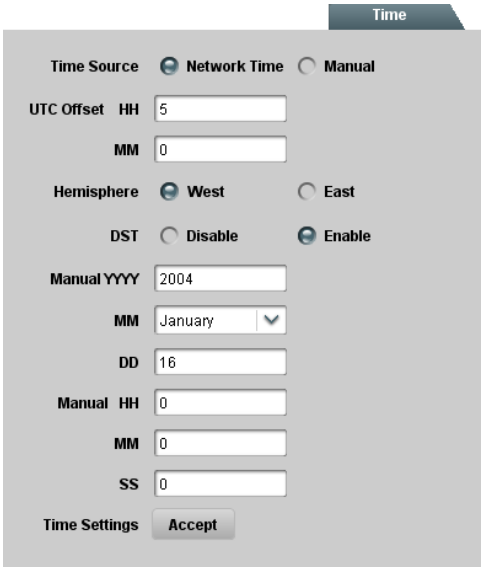


Figure 11. Time Menu

1. Select **Network Time** on this menu.
2. Specify your time offset from Universal Time (UTC), as a positive or negative number of hours and minutes. For example, the area of North America where Pacific time is observed is 8 hours west of longitude 0; the settings would be **UTC Offset** : **HH = 8, MM = 0 and Hemisphere = West**. Note that UTC is also known as GMT (Greenwich Mean Time).
3. Enable or disable **DST** (Daylight Savings Time) as appropriate, and click **Accept**.
4. In order to use network time, you also need to ensure that the network card in the openGear frame has been configured to acquire time from an NTP server. To do this, double-click the network card in slot 0 of the frame and then click the **Network** settings tab. In the menu shown below, enter the IP address of the NTP server and then click **Apply**. If you do not have access to an NTP server, you can enter the time and date directly on the **Time** settings menu, select **Manual** and click **Accept**.

Alarms tab

Figure 12 shows the **Alarm** sensitivity tab. This allows you to specify which conditions in the VAC-100 will cause an alarm indication on your DashBoard screen and the on-screen display output. Whenever any of the enabled alarm conditions becomes true, the color of the indicator for the VAC-100 on the DashBoard screen switches from green to red.

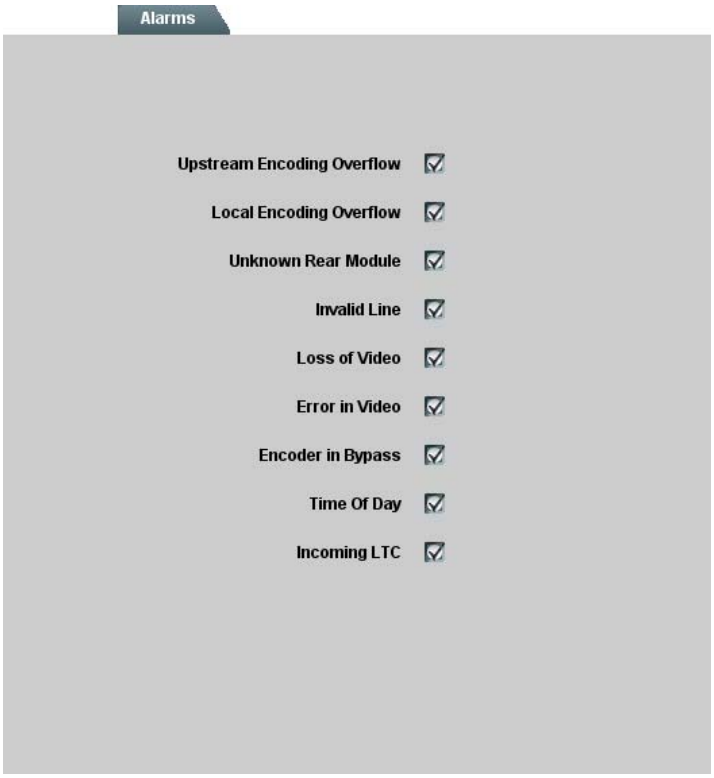


Figure 12. Alarm sensitivity tab

Upstream Encoding Overflow means that there was an attempt to add more data than could fit in the specified line(s). The total of existing plus added data does not fit in the line(s). If this alarm is enabled and this condition occurs, the **Encoding Status** on the Alarms status screen will show Overflow.

Local Encoding Overflow means that there was an attempt to insert more data than could fit in the specified line(s). The total of the added data services overflows the capacity of the line(s). If this alarm is enabled and this condition occurs, the **Encoding Status** on the Alarms status screen will show Overflow.

Unknown Rear Module means that the VAC-100 is plugged into a rear module that it does not recognize. This could have an effect on the video output, since the types and locations of jacks are unknown. If this alarm is enabled and this condition occurs, the **Rear Module** field on the Alarms status screen will show Unknown.

Invalid Line means that there has been an attempt to insert VANC data in a line that is not part of the vertical interval (for example, line > 20 for 1080i/59.94). If this alarm is enabled and this condition occurs, the **Encoding Line** field on the Alarms status screen will show Invalid.

Loss of Video is normally an emergency and should therefore always be enabled. If it is and this condition occurs, the **Video Presence** field on the Alarms status screen will show Missing.

Error in Video means that a detectable video error, such as an EDH or CRC error, has occurred in the input video. If enabled, this alarm causes the status to blink briefly from green to red when an error occurs, and stay red if errors are occurring constantly. If this alarm is enabled and this condition occurs, the **Video Status** field on the Alarms status screen will show Error.

Encoder in Bypass means that the VAC-100's video is bypassed for some reason. This could be because it has been set to **Bypass** on the **Settings** menu, or the card-edge **Bypass** pushbutton is in the **Out** position, or because of a fault condition such as missing video input. If this alarm is enabled and this condition occurs, the **Bypass Switch** field on the Alarms status screen will show Bypass.

The **Time Of Day** error occurs if the time is not set while the time of day is selected as a source of time codes..

The **Incoming LTC** error occurs when BNC 9 does not have a valid LTC input while LTC is selected as a source of time codes.

Naming VANC Data

The VAC-100 has ten buffers in which to build VANC data packets. By default these buffers are labeled Metadata 1 to Metadata 10. The **Edit Buffer Name** tab (shown in Figure 13) allows the name to be change to something more descriptive of its content. It is suggested that the buffer be named before content is authored into it. To change the type of data in a buffer, change its name and then re-author new data into it. Names are changed by typing into any of the **Buffer** fields and then clicking on the **Apply** button.

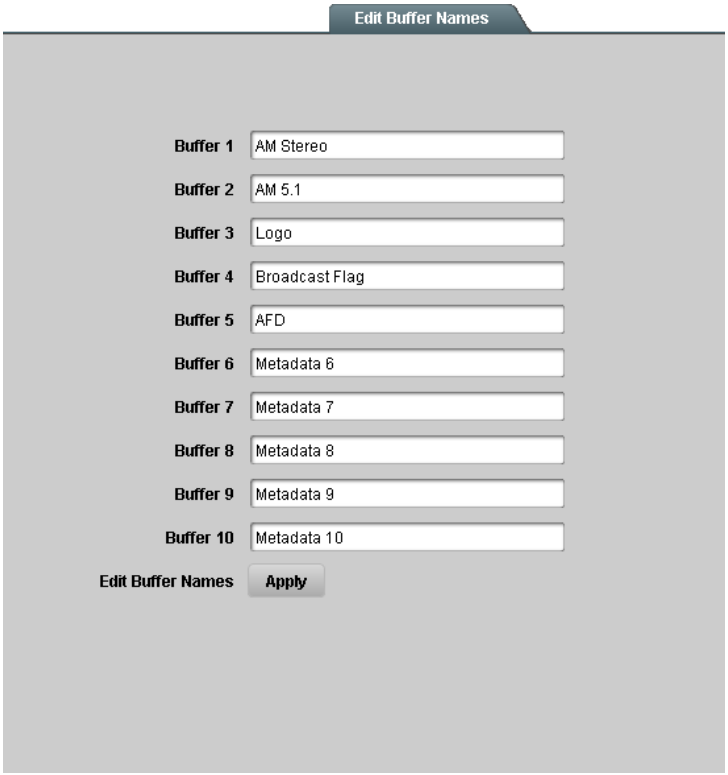


Figure 13. Edit Buffer Name tab

Authoring VANC Data

The VAC-100 provides several settings tabs to allow for the easy creation of VANC data. There are ten buffers each which can contains one VANC data type. The same data type with different attributes can be in different buffers. Buffers should be named to indicate their content and usage. The following authoring tabs are available:

- AFD
- Audio Metadata
- Timecode
- Broadcast Flag
- Captioning Test
- ISAN
- DPI Trigger
- Generic Data

Authoring AFD

Figure 14 shows the main **AFD** tab. Select a buffer from the list in **Select Buffer**. The name is created in the **Edit Buffer Name** tab as described in Naming VANC Data. Select the AFD code from the **Type** list and the **Bar Data** status will change as required. Most AFD codes do not require bar data, some do but all can have bar data set. If you do not wish to include bar data then click on the **Metadata Save** button to create a AFD packet without bar data.

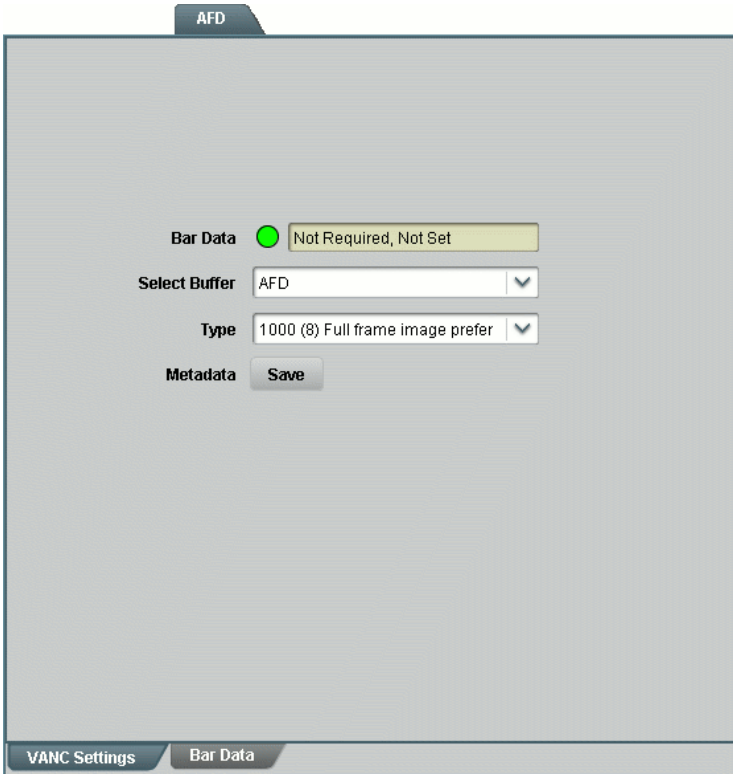


Figure 14. AFD – VANC Settings tab

If you wish to set bar data click on the **Bar Data** tab at the bottom of the **AFD** tab. This brings up the **AFD - Bar Data** tab as shown in Figure 15. Check the **Force Bar Data** check box and choose the **Video Format** for which the bar data is to apply. The bar data settings will change to produce an aspect ratio which matches the aspect ratio of the selected video so that no bars are required. Adjusting the **Aspect Ratio** slider causes bar data to be required. The VAC-100 automatically calculates bar data to center the image. The image may be moved off center by adjusting the **Bar Percentage** slider. This adjusts the percentage of bar which is on the top or left of the image. The **Image Position** and **Bar Data** status change with this adjustment.

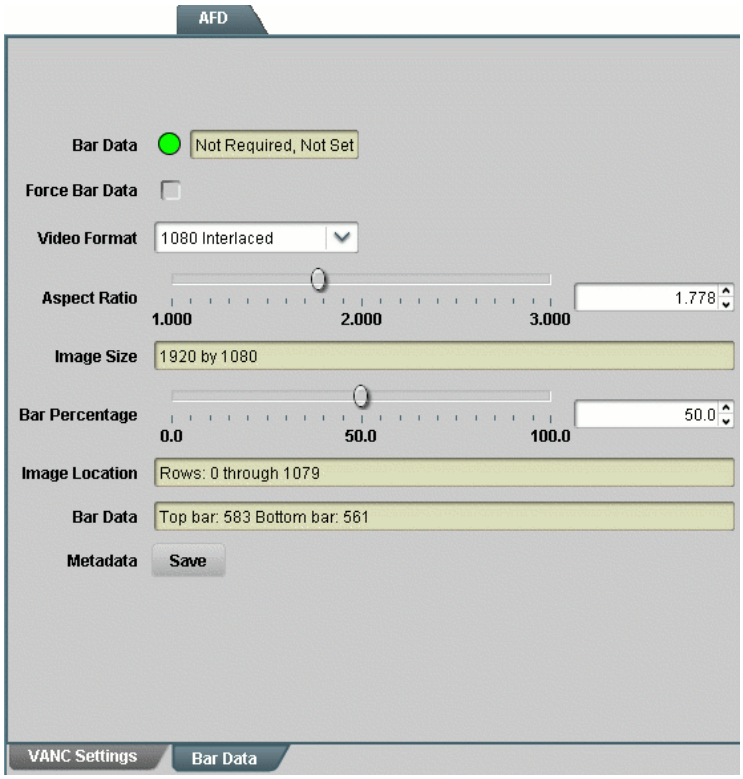


Figure 15. AFD – Bar Data tab

Authoring Audio Metadata

Audio metadata is a complex form of VANC data. The VAC-100 puts the tools in place to quickly and efficiently generate audio metadata which complies with SMPTE-2020 both method A and B.

The **Audio Metadata** tab, as shown in Figure 16, has four sub-tabs. The **VANC Settings** tab must be selected first. Use **Select Buffer** to choose which buffer to use for this audio metadata data. The buffer name can be set to any text on the **Edit Buffer Name** tab as described in section Naming VANC Data. The **Encode Method** is selected using radio buttons for **Method A** or **Method B**. Selecting the **Program Config** from the list determines the number of programs. All settings must be made for each program. Select an appropriate **Frame Rate** from the list and click the **Save** button.

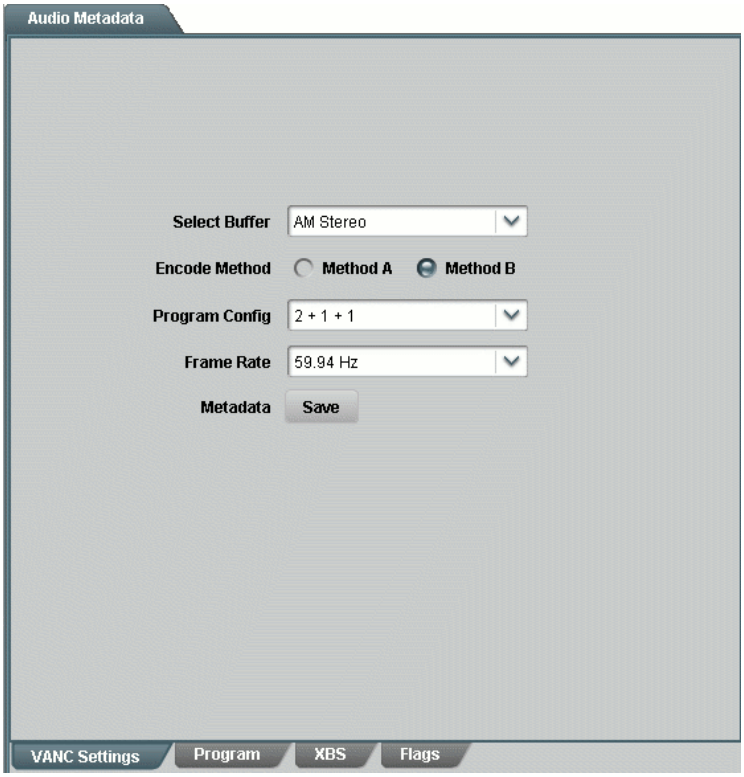


Figure 16. Audio Metadata – VANC Settings tab

Proceed to the **Program** tab as shown in Figure 17. The **Number Of Programs** status field indicates how many programs will have to be filled in. This involves filling in all the fields of the **Program**, **XBS** and **Flags** tabs for each of the programs. The easiest way to accomplish this is to use the **Program Copy** and **Program Paste** buttons. Select program 1 from the **Program Number** list and give it a name in the **Program Name** field. Fill in all the parameters for the audio metadata for that program on the **Program**, **XBS** and **Flags** tabs as shown in Figures 17, 18 and 19.

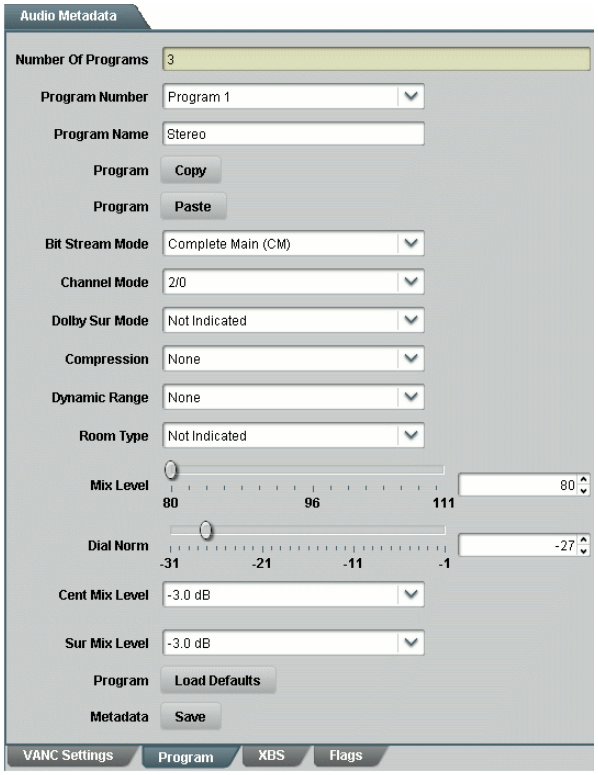


Figure 17. Audio Metadata – Program tab

Click on the **Metadata Save** button to save the work to this point. The metadata for the different programs is normally very similar so copy and paste can be effectively used to limit the number of fields that need to change in the other programs. Click on the **Program Copy** button to get a copy of the current program's settings. On the **Program** tab, select the next program from the **Program Number** list and give it a name in the **Program Name** field. Click on the **Program Paste** button to make this program's settings the same as the previous program. On the **Program**, **XBS** and **Flags** tabs, change only the settings that require setting. Repeat this process until all parameters of all programs are set.

It is advisable but not necessary to **Save** your work after setting up each program.

Authoring Timecode

The **Timecode** tab is shown in Figure 19. Use **Select Buffer** to choose which buffer to use for Timecode data. The buffer name can be set to any text on the **Edit Buffer Name** tab as described in section Naming VANC Data. There are four possible sources for the time information for the timecode, the time set on the VAC-100 with (**Local Time and Date**), the same time as (**UTC Time and Date**), the time set on this tab (**Jam**) or a copy of the incoming time codes on BNC connected to **Incoming LTC** time source. It is highly recommended that, if the time from the VAC-100 is used, it be synchronized with an NTP time server as described in the **Time** tab.

The **Timecode Type** can be either LTC or VITC. VITC normally appears on two lines but the VAC-100 allows it to appear on one line or the other or both.

When using jam mode, the timecode counts up from the time shown on this tab. The count starts when the Jam button is clicked. When controlling timecode insertion with a GPIO or timed activation (see the Inserting Data section), the timecode value is jammed to the value shown on this tab whenever timecode insertion is turned on by the GPIO or timed interval.

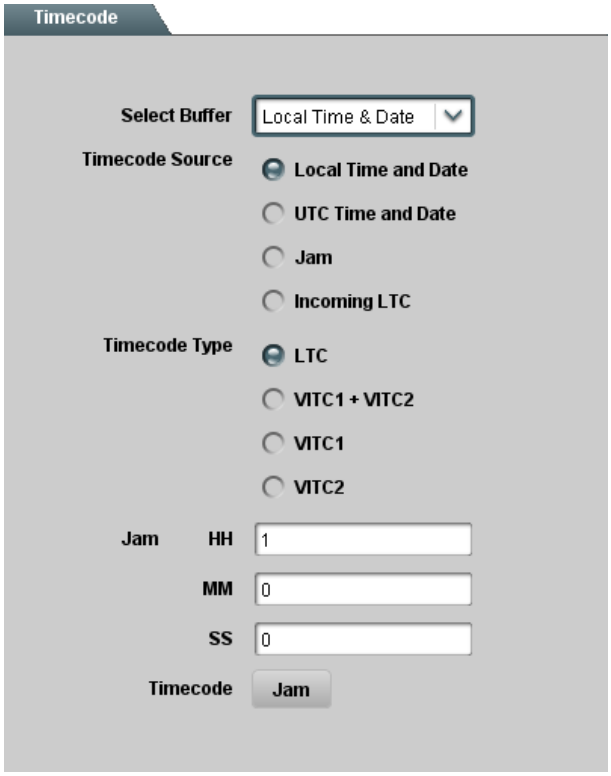


Figure 19. Timecode tab

Authoring Broadcast Flag

Figure 20 shows the **Broadcast Flag** tab. Use **Select Buffer** to choose which buffer to use for the broadcast flag. The buffer name can be set to any text on the **Edit Buffer Name** tab as described in section Naming VANC Data. Broadcast flag has no parameters to set, so click on **Save** to store it in the buffer.

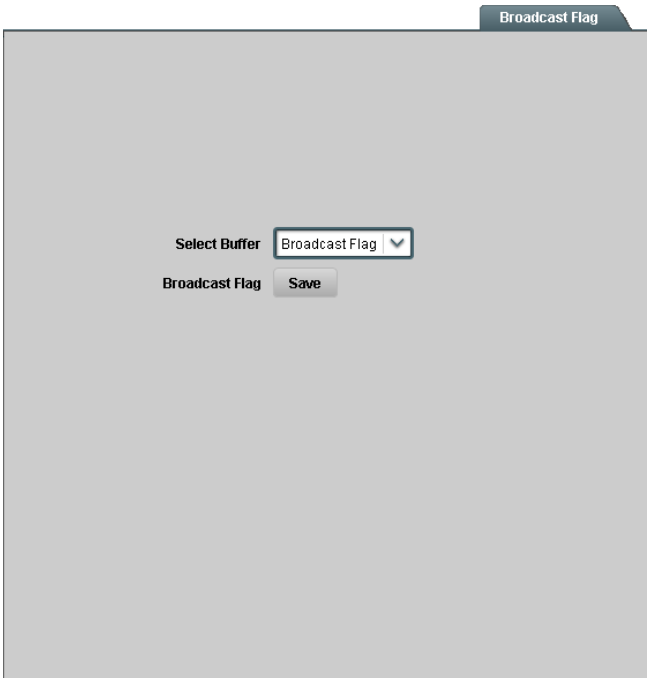


Figure 20. Broadcast Flag tab

Authoring Caption Test Data

Figure 21 shows the Closed Caption tab used to create a captioning test sequence. Use **Select Buffer** to choose which buffer to use for the captioning test. The buffer name can be set to any text on the **Edit Buffer Name** tab as described in section Naming VANC Data. The **Interval** is the number of seconds between transmissions of the lines of caption text. The **Sequence** check box causes the software to prepend a counter to the start of each line of caption text. Each of the four text fields contains the text for a single line of captioning. Each line can be zero to 32 characters long and may only contain printable characters. Clicking the **Save** button stores the caption test into the specified buffer. The caption data is inserted into both the 608 and DTVCC sections of the SMPTE-334 / CEA-708 caption packet.

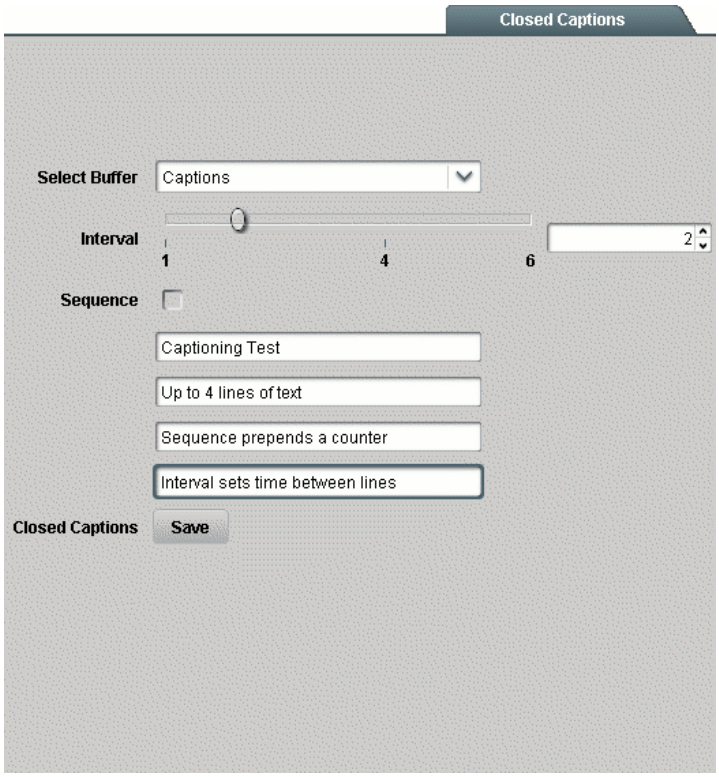


Figure 21. ***Closed Caption*** *tab*

Authoring ISAN data

Figure 22 shows the ISAN tab. The string you enter here is actually a V-ISAN, which is the International Standard Audiovisual Number with Version. The VAC-100 KLV-encodes this number in accordance with SMPTE 336 and embeds it in a VANC packet as specified in SMPTE RP214.

Use **Select Buffer** to choose which buffer to use for the ISAN data. The buffer name can be set to any text on the **Edit Buffer Name** tab as described in section Naming VANC Data. ISAN codes are in the form RRRR-RRRR-RRRR-EEEE-X-VVVV-VVVV-Y as shown on this tab. The length of the code makes it advisable to cut and paste the code rather than trying to type it in. The codes are protected by check codes and this tab checks the code when the **Save** button is pressed. If the code is correct the **ISAN Status** will be green and say **OK** (as shown). If the code is not the right length or the correct sequence, then the status will be red and say **Syntax Error**. If the length and syntax are correct but a character is incorrect then the status will be red and say **Invalid Check Code**. Clicking the **Save** button saves the data into the specified buffer.

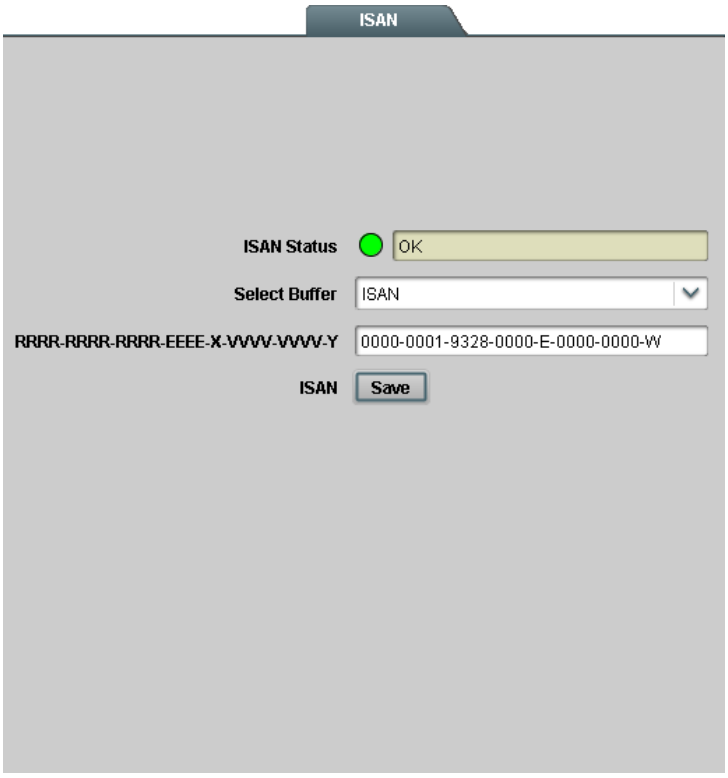


Figure 22. ISAN tab

Authoring DPI triggers

Figure 23 shows the DPI trigger tab which is use to author SMPTE 2010 VANC packets containing SCTE 104 trigger commands. Use **Select Buffer** to choose which buffer to use for the DPI trigger. The buffer name can be set to any text on the **Edit Buffer Name** tab as described in section Naming VANC Data.

The settable parameters on this screen are all included in the inserted VANC packet. For more details, please consult the SMPTE 2010, SCTE 104 and SCTE 35 standards. Set these parameters of the trigger in a way appropriate to its use and click on the Save button.

Auto Increment Avail Num check box is used in conjunction with the encoding of the trigger when controlled by a GPIO switch or timed activation. It increments the **Avail Num** for each time the trigger is sent. Clicking on Save will restore the Avail Num to the value set on the screen.

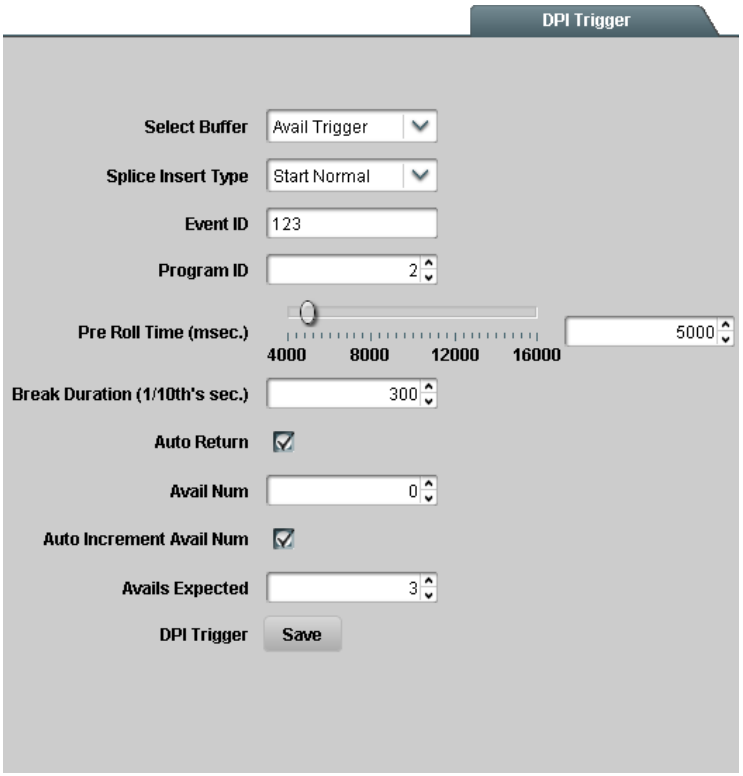


Figure 23. DPI Trigger tab

Authoring Generic Data

Generic data is a catch-all for VANC data which is not directly supported with an authoring tab. For example, generic data authoring is used to create text tags. Text tags identify the source of a video stream so that it can be tracked through the plant.

Figure 24 shows the **Generic Data** authoring tab. Use **Select Buffer** to choose which buffer to use for the generic data. The buffer name can be set to any text on the **Edit Buffer Name** tab as described in section Naming VANC Data. The **DID**, **SDID**, **Line** and **Encode Channel** determine where in the VANC the generic data will be inserted by default. Set these to values appropriate to the standard to which the data is being authored. For private data, not covered by a standard, this should match the equipment being used to capture or monitor the data.

The next step is to enter the generic data. There are ten text fields available for this purpose allowing for the creation of a packet up to the 255 byte maximum size. Blank fields are not part of the generic data nor is any non-used portion of a field. What you enter into the field is what is placed in the generic record. Use a backslash (\) to put non-printable characters into the record. The two characters after the backslash will be taken as a hex value to create a single character. Use two backslash character in a row to put a single backslash character into the record. Click on the **Save** button to save the record into the buffer.

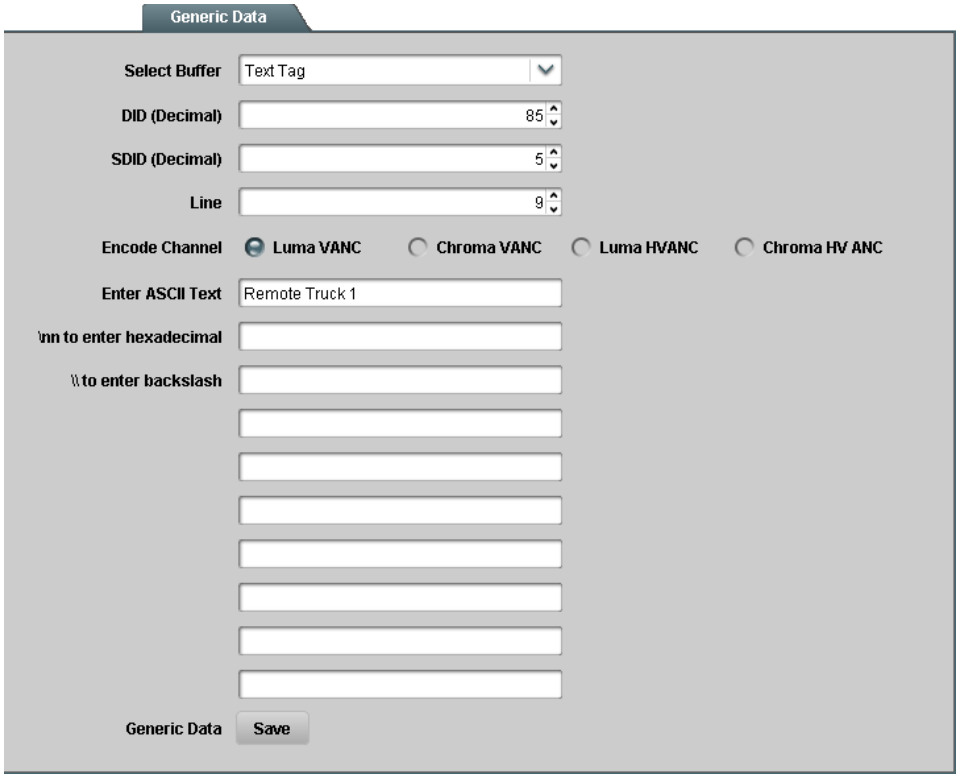


Figure 24. Generic Data tab

Inserting Data

The VAC-100 can insert zero to four encode services at a time from a selection of ten buffers containing authored data. The first step is to select which **Encoding Service** you wish to define and which **Encode Source** (authored data) to encode in that service. The **Encode Condition** determines when and how the data is encoded. There are three choices for how to encode data; **Always**, **Timed Interval** and by **GPIO** (switch) control. When set to **Always**, the VANC data is sent in every field of the video (or every frame of progressive formats).

Timed Interval and **GPIO Open/Closed** use the **Frame Count** field to specify the number of successive frames in which the VANC data is inserted. When the **Encode Condition** is set to **Timed Interval,** the VANC service is inserted in the number of frames specified by **Frame Count,** and then not inserted for the period of time specified by **Time Interval (msec.)**, and this cycle repeats endlessly. This would typically be used for services such as the Broadcast Flag which must be inserted once every 2 seconds.

Switches connected to GPIOs may also control when a VANC data record is sent. The GPIOs have two states: open and closed. Data may be inserted under either of these conditions. A single switch state may control more than one encode buffer. This can cause more than one VANC service to turn on when the switch does. By assigning different services to the open and closed states of a GPIO, you can use one switch to select between the two services. To cause a service to be inserted indefinitely when the specified GPIO condition occurs, set **Frame Count** = 0. If **Frame Count** is not 0, the service will be inserted for the specified number of frames after the GPIO condition occurs, and then stop. An example of this latter use would be DPI triggers which can be inserted a few times to ensure that they are not missed by receiving equipment.

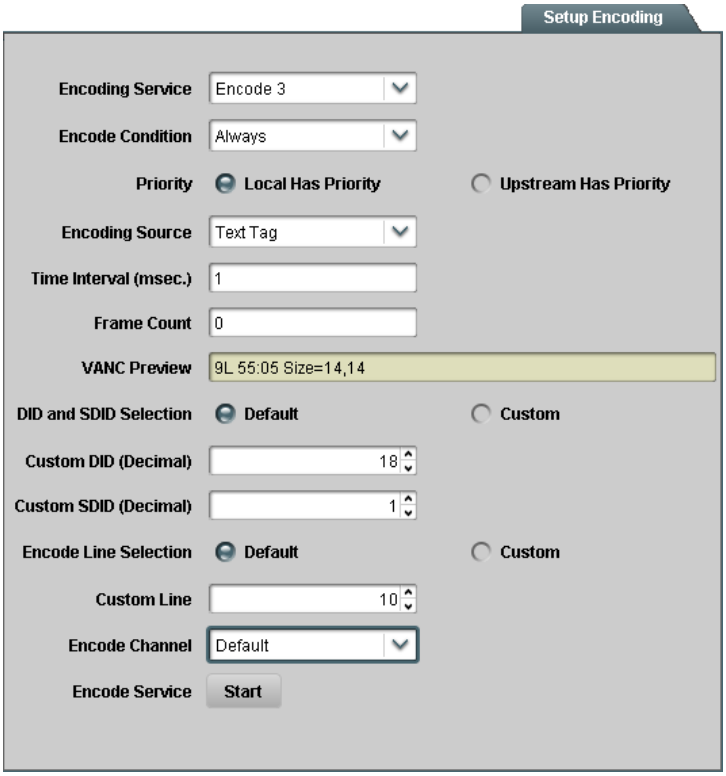


Figure 25. Setup Encoding tab

The rest of the fields of this tab control the line, channel and address used for inserting the VANC service. Authored data has default settings assigned to it. This is usually the value suggested by a standards document. The **VANC Preview Area** shows what the default values are in the format [line][channel] [DID]:[SDID] Size=[field1],[field2]. These will normally be the desired settings so the **DID and SDID Select**, **Encode Line**

Selection and **Encode Channel** can all be set to default. To use a non-standard setting, set the value and choose Custom.

Clicking the **Start** button will make the encode buffer active and the authored data will be inserted according to the rules you have set. To disable an encode buffer, change the **Encoding Source** to **Nothing** and click **Start**.

Specifications

In This Chapter

This chapter contains the Technical Specifications table. Note that specifications are subject to change without notice.

Table 2. VAC-100 - Technical Specifications

Category	Parameter	Specification
Serial Digital Video Inputs	Number Of Inputs	1 Program input (bypass-protected if available in the rear module)
	Data Rates and SMPTE Standards Accommodated	480i/59.94 (SMPTE 259M) 576i/50 (SMPTE 259M) 1080i/50, 59.94, 60 (SMPTE 292M) 720p/50, 59.94, 60 (SMPTE 292M) 1080p/23.98, 24 (SMPTE 292M) 1080sf/23.98, 24 (SMPTE 292M)
	Impedance	75Ω terminating in Active mode Loop-through to SDI Output in Bypass mode, if available in the rear module
	Equalization	Over 100m of Belden 1694A cable @ 1.485Gb/s, or 400m @ 270Mb/s
	Return Loss	>13dB to 1.485GHz
Serial Digital Video Outputs	Number of Outputs	1 Program output 1 output monitor (only available in 10-slot frame) 1 on-screen display (OSD) output (only available in 10-slot frame)
	Impedance	75Ω
	Return Loss	10dB to 1.485GHz
	Signal Level	800mV ±10%
	DC Offset	0 Volts ±50 mV
	Rise & Fall Time (20-80%)	700ps. Typical (270Mb/s) 120ps. Typical (1.485Gb/s)
	Overshoot	<8%
Analog video Output	Number of outputs	1 on-screen display (OSD) output (only available in 10-slot frame)
	Impedance	75Ω
	Signal level	1.0 v
	Formats	NTSC-M or PAL-B/G
GPIO Inputs	Number of Inputs	4 three-pin connectors (available with ONG-MDL-R01 rear module)
LTC Input	Number of Inputs	One SMPTE 12M Input
Other	Maximum Power Consumption	5W
	Warranty	1 year return to factory

Service Information

In This Chapter

This chapter contains the following sections:

- Troubleshooting Checklist
- Power LED Conditions
- Bootload Sequence
- Warranty and Repair Policy

Troubleshooting Checklist

Routine maintenance to this openGear product is not required. In the event of problems with your VAC-100, the following basic troubleshooting checklist may help identify the source of the problem. If the module still does not appear to be working properly after checking all possible causes, please contact your openGear products distributor, or the openGear Technical Support department at the numbers listed under the "**Contact Us**" section at the end of this manual.

1. **Visual Review –** Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the module, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check –** Check 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. **Reseat the Card in the Frame** – Eject the card and reinsert it in the frame.
4. **Check Control Settings –** Refer to the Installation and Operation sections of the manual and verify all user-adjustable component settings.
5. **Input Signal Status –** Verify that source equipment is operating correctly and that a valid signal is being supplied.
6. **Output Signal Path –** Verify that destination equipment is operating correctly and receiving a valid signal.
7. **Module Exchange** – Exchanging a suspect module with a module that is known to be working correctly is an efficient method for localizing problems to individual modules.

Power LED Conditions

The top front edge of the module has a Power LED which indicates card status. The Power LED displays the following conditions:

- **Off** - there is no power.
- **Green** - the card is running with valid input.
- **Flashing green** - the boot loader is waiting for, or receiving, a software upload.
- **Orang**e – there is a signal or configuration error. Check the inputs and menus.
- **Red** - the card is not operational. This will occur if, for example, there is no video input. Check the inputs, reseat the card, press the Reset button, or call Technical Support.

Bootload Sequence

In the unlikely event of a complete card failure, you may be instructed by a Ross Video Technical Support specialist to perform a complete software reload on the **VAC-100**. To perform this task, follow these steps:

1. Press and hold the Menu Switch.
2. While holding the Menu Switch, press the Reset button in.
3. Release the Reset button and then the Menu Switch.

   The Power LED will flash GREEN while the card is waiting for a new software load.

   If a new software load is not sent to the card within 60 seconds, the card will attempt to restart with the last operational software load.

Software loads can be sent to the **VAC-100** from DashBoard, using the Frame Controller with Networking.

Warranty and Repair Policy

The VAC-100 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 VAC-100 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 VAC-100 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 VAC-100. Ross Video policy dictates that all repairs to the VAC-100 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 VAC-100, 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 VAC-100. If required, a temporary replacement module 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.

Contact Us

Contact our friendly and professional support representatives for the following:

- Name and address of your local dealer
- Product information and pricing
- Technical support
- Upcoming trade show information

PHONE	**General Business Office and Technical Support**	613 • 652 • 4886
	After-hours Emergency	613 • 349 • 0006
	Fax	613 • 652 • 4425
E-MAIL	**General Information**	solutions@rossvideo.com
	Technical Support	techsupport@rossvideo.com
POSTAL SERVICE	**Ross Video Limited**	8 John Street, Iroquois, Ontario, Canada K0E 1K0
	Ross Video Incorporated	P.O. Box 880, Ogdensburg, New York, USA 13669-0880

Visit Us

Please visit us at our website for:

- Company information
- Related products and full product lines
- Trade show information
- News

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