

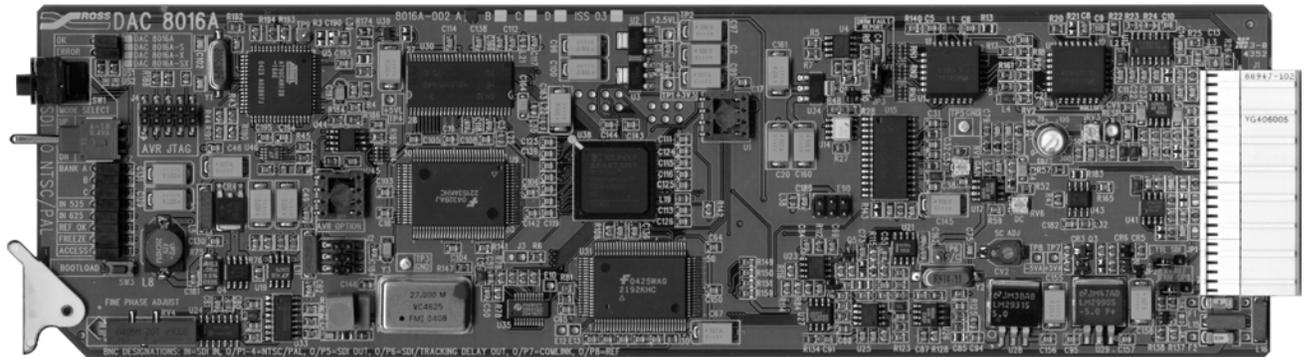
# DAC-8016A

## SDI to Analog Composite Converter

### User Manual

Covers the following models:

- DAC-8016A SDI to Analog Composite Converter
- DAC-8016A-S SDI to Analog Composite Converter with Frame Sync
- DAC-8016A-X SDI to Analog Composite Converter with Cross Color Filter
- DAC-8016A-SX SDI to Analog Composite Converter with Frame Sync and Cross Color Filter



Ross Part Number: 8016ADR-004  
Issue: 03A

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## DAC-8016A • SDI to Analog Composite Converter User Manual

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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 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 an ESD event.

### Important Safety Instructions



**Caution**

This product is intended to be a component product of the RossGear 8000 series frame. Refer to the RossGear 8000 series frame User Manual for important safety instructions regarding the proper installation and safe operation of the frame as well as it’s 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 Ltd. could void the user's authority to operate this equipment.

### ***CANADA***

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

Cet appareil numérique 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**

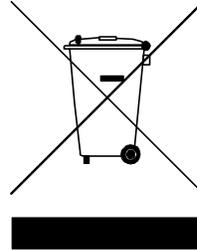
Routine maintenance to this RossGear product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the numbers listed under the "Contact Us" section on the last page of this manual. All RossGear products are covered by a generous 5-year warranty and will be repaired without charge for materials or labor within this period. See the "Warranty and Repair Policy" section in this manual for details.

## Environmental Information

**The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.**

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

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



If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You can also contact Ross Video for more information on the environmental performances of our products.





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# Introduction

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## In This Chapter

This chapter contains the following information sections:

- A Word of Thanks
- Overview
- Functional Block Diagram
- Features
- Documentation Terms
- Abbreviations

### A Word of Thanks

Congratulations on choosing the Ross Video **DAC-8016A** SDI to Analog Composite Converter. You have purchased a powerful, versatile, and advanced encoder. The DAC-8016A is part of a full line of Digital Conversion Products within the RossGear 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 DAC-8016A 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 DAC-8016A, please contact us at the numbers listed in this publication. Our technical support staff is always available for consultation, training, or service.

## Overview

The DAC-8016A is a broadcast quality encoder specifically designed for broadcast or production situations in which a serial digital component (SDI) signal must be converted to program quality composite analog PAL or NTSC.

Using a single-card, low power consumption design, the DAC-8016A accepts a serial digital signal (SMPTE-259M-C) and converts it to NTSC or PAL, providing four NTSC or PAL analog outputs. In addition, a rich set of features are instantly accessible using simple board-edge switches and controls — in conjunction with a concise Heads-Up Display.

The DAC-8016A is available in four different models:

- **DAC-8016A** — The base model encoder includes a **Proc Amp**, **Line Delay**, and **Line Synchronizer** timing modes.
- **DAC-8016A-X** — In addition to the Proc Amp, Line Delay, and Line Synchronizer modes, the “X” model includes the **NTSC Cross Color Reduction Filter**.
- **DAC-8016A-S** — In addition to the Proc Amp, Line Delay, and Line Synchronizer modes, the “S” model includes a **Frame Synchronizer**.
- **DAC-8016A-SX** — The all-inclusive “SX” model includes the **Proc Amp**, **Line Delay**, **Line Synchronizer**, **NTSC Cross Color Reduction Filter**, and **Frame Synchronizer**.

The DAC-8016A-X uses advanced Cross Color Reduction Filter circuitry to achieve a major improvement in the transmitted quality of NTSC pictures by reducing cross-color “flickering rainbow” effects. These effects typically occur whenever scenes contain fine details, such as diagonally repetitive patterns. A superb improvement is evident on items such as tweed suits, striped ties, etc.

The DAC-8016A-S version comes with a fully functional frame synchronizer, capable of synchronizing incoming video to house reference. Various timing modes are available to accommodate most situations. New techniques in frame synchronization contribute to the board’s low power requirements and compact design. The complete circuit for the DAC-8016A, including a 12-bit D-A converter, encoder, frame (or line) synchronizer, tracking delay pulse, and microprocessor is contained on a single DA-sized card. Additional daughter cards are not required.

The DAC-8016A’s 10-bit encoding process provides excellent performance with all types of picture sources. In order to achieve the highest level of precision, all signal processing and encoding is performed entirely in the digital domain.

To make configuration simple and easy, the DAC-8016A offers a Heads-Up Display mode for most board-level adjustments. This display is especially convenient during setup, and for programming several DAC-8016A cards with identical configurations. With the display enabled, the parameter currently being adjusted has its value super-imposed over *all* outputs.

As an alternative to the Heads-up Display, the board’s Comlink Terminal Display allows you to view *all settings* simultaneously on any PC running VT-100 terminal emulation. The only requirement is a connection between the PC’s serial port and the DAC-8016A’s Comlink connector. This feature is especially convenient for making adjustments while the card’s output is on air.

The DAC-8016A encoders are part of a full line of RossGear digital distribution products engineered to satisfy the highest quality broadcast standards and the most demanding requirements of your facility.

## Functional Block Diagram

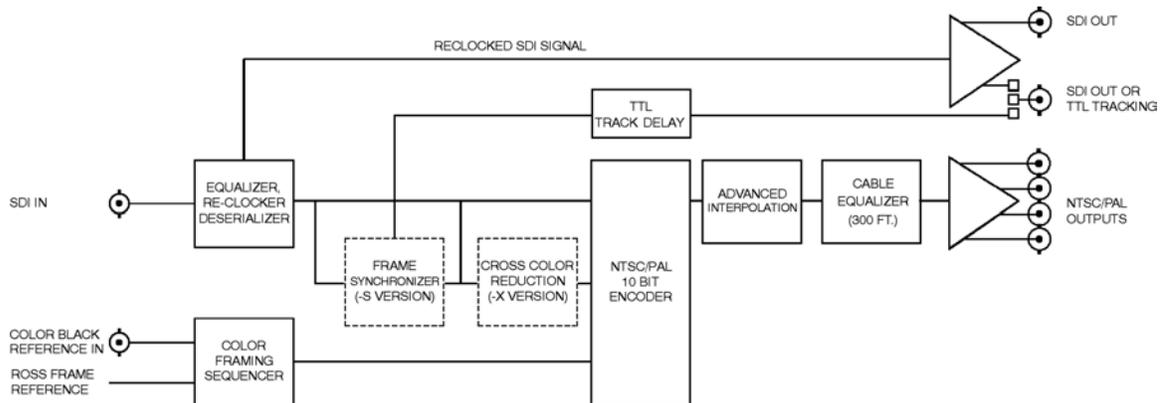


Figure 1. Simplified Block Diagram of DAC-8016A Functions

## Features

The following features make the DAC-8016A SDI to Analog Composite Converter the most flexible, high-quality encoding card for your digital to analog composite conversion requirements:

- 10-bit encoding
- 12-bit digital to analog conversion
- Compact design on a single DA-sized card
- Heads-Up display
- Comlink terminal display
- Field-upgradeable Frame Synchronization option available
- Optional cross color reduction filtering
- Extensive proc amp controls
- Freeze modes
- Hot-switching
- Horizontal and vertical timing adjustments with Frame Synchronization
- Programmable Vertical Interval blanking
- Setup adjustment
- Black Level offset adjust
- Super Black control
- Internal test patterns
- Cable equalization
- Input and conversion status indicator LEDs on card edge
- Auto-detects 525/625
- Choice of reference inputs
- Four analog composite outputs
- One or two re-clocked SDI outputs
- Tracking Delay output for companion audio synchronizer
- SMPTE 269M Fault Reporting
- Fits Ross Video 8000-C series digital products frames and Leitch FR-6800 series frames
- 5-year transferable warranty

## Documentation Terms

The following terms are used throughout this guide:

- “**Frame**” refers to the **DFR-8104A** and **DFR-8110A** frames that house the **DAC-8016A** card.
- All references to the **DFR-8104A** and **DFR-8110A** also include the **DFR-8104A-C** and **DFR-8110A-C** versions with the cooling fan option. See the respective User Manuals for details.
- “**Operator**” and “**User**” both refer to the person who uses the **DAC-8016A**.
- “**Board**”, “**Card**”, and “**Module**” all refer to the **DAC-8016A** encoder module itself.
- “**System**” and “**Video system**” refers to the mix of interconnected digital and analog production and terminal equipment in which the **DAC-8016A** operates.
- “**525-line mode**” refers to broadcast situations using **NTSC** composite (analog) signal reference inputs.
- “**625-line mode**” refers to broadcast situations using **PAL** composite (analog) signal reference inputs. All references to **PAL** in this manual imply that **PAL-B** is being used.

## Abbreviations

The following abbreviations may be used throughout the text:

Abbreviation	Definition
ADC	Analog to Digital Converter
A-D	Analog-to-Digital
D-A	Digital-to-Analog
DA	Distribution Amplifier
DAC	Digital to Analog Converter
DDR	Digital Disk Recorder
DIS	Disable
DVR	Digital Video Recorder
EN	Enable
LOW SIG	Low Signal
RU	Rack Unit
SDI	Serial Digital Interface
VCR	Video Cassette Recorder
VTR	Video Tape Recorder

# Installation and Setup

---

## In This Chapter

This chapter contains the following information sections:

- Static Discharge
- Unpacking
- Jumper Setup
- Equalization Setup
- Board Installation
- BNC Labels
- Cable Connections

### Static Discharge

Whenever handling the DAC-8016A and other related equipment, please observe all static discharge precautions as described in the following note:



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 DAC-8016A 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 directly.

## Jumper Setup

Use Figure 2, the card labeling, and the following discussions to set up DAC-8016A jumpers. These settings are performed *before* installing the unit in the frame, but may be repeated as required. Refer to Figure 2 for card jumper locations.

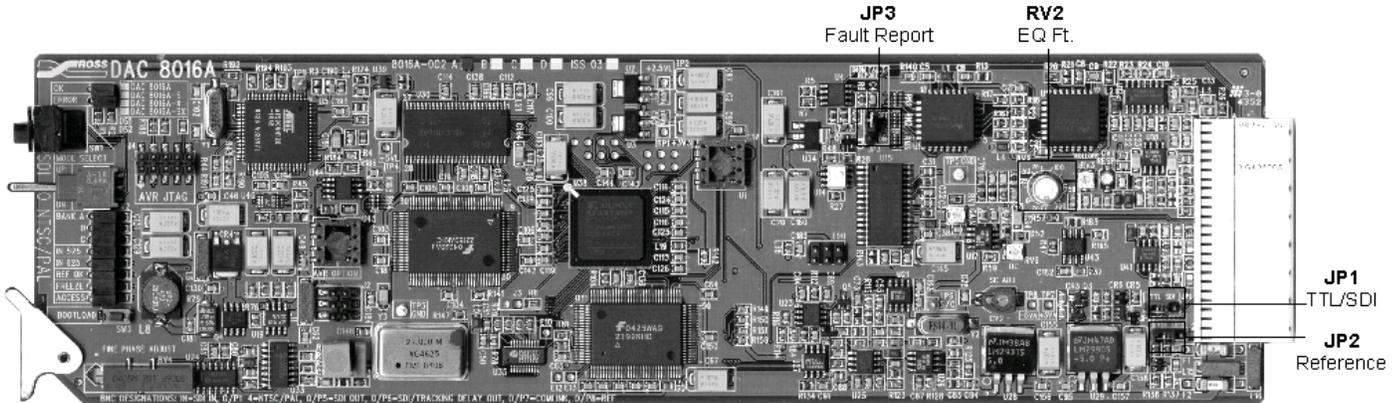


Figure 2. DAC-8016A Jumper Locations

### SDI / Tracking Delay

BNC connector 6 can be set to provide a second reclocked SDI output, or to provide an output signal which tracks the synchronizer's video delay. Depending on your output requirements, set **JP1 (TTL/SDI)** to either:

- **SDI** to enable digital video output for connector 6 (Default setting)
- **TTL** to enable tracking delay output for connector 6

### Reference

An analog composite reference is required for **Line Sync** and **Frame Sync** modes as well as color framing. Using the figure above and the card silk-screening, set Jumper **JP2 (Ext Ref)** to determine the location from which you want to obtain external reference.

- Set jumper to **FRM** to obtain the reference from the frame's master reference (analog reference) connector (default setting)
- Set jumper to **O/P8** to obtain the reference from connector **8** on the back-plane

### SMPTE Fault Reporting

(Optional) Using the figure above and the card silk-screening, set Jumper **JP3 (269M Fault Reporting)** to enable or disable the card's SMPTE alarm:

- Set jumper to **ON** to enable SMPTE fault reporting (default setting)
- Set jumper to **OFF** to disable SMPTE fault reporting

(See Chapter 5, "SMPTE 269M Fault Reporting" for details on fault reporting.)

## Equalization Setup

Use the following steps to set up cable equalization. This step is normally performed *prior* to installing the unit in the frame, simply because of access restrictions once the card is inserted.

1. Locate pot **RV2 (EQ FT)**. See Figure 2, on the previous page. The control is calibrated from **0** to **300** ft.

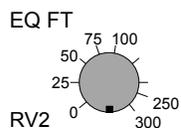


Figure 3. RV2 EQ Potentiometer and card markings

2. Set the control for the cable length currently in use between the DAC-8016A and the target destination. If desired, a more accurate setting may be obtained by using the internal test patterns (set to **Color Bars**), and by setting the EQ control to obtain the proper color levels as measured at the destination video device.

### Important!

Re-adjustment of the EQ control will be required if the length of the cable run to your destination device changes..

## Board Installation

### Important!

It is recommended that the DAC-8016A be installed into a Ross 8000A-C series digital distribution frame with a cooling module option installed. See the “**Optional Equipment**” section in Chapter 8 for details.

Use the following steps to install the DAC-8016A in a RossGear 8000 series digital distribution frame:

- Refer to the User Manual of the RossGear 8000 series frame, to ensure that the frame is properly installed according to instructions. If this module is to be installed in any compatible frame other than a Ross Video product, refer to the frame manufacturer’s manual for specific instructions.
- Please note that heat and power distribution requirements within a frame may dictate specific slot placement of cards. Cards with many heat-producing components should be arranged to avoid areas of excess heat build-up, particularly in frames using convectational cooling.
- After selecting the desired frame installation slot, hold the DAC-8016A card by the edges and carefully align the card edges with the slots in the frame. Then fully insert the card into the frame until the rear connection plug is properly seated.

## BNC Labels

Affix the supplied BNC label, as per the included instructions, to the BNC area on the rear of the rack frame.

## Cable Connections

This section provides instructions for connecting cables to the DAC-8016A when mounted in RossGear 8000 series Digital Products Frames. See the following frame rear panel diagram for BNC input and output designations:

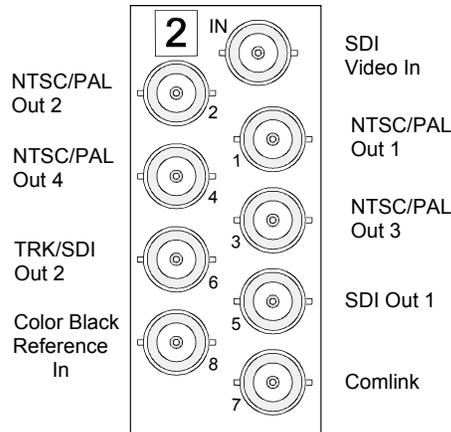


Figure 4. DAC-8016A BNC Designations for RossGear Frames

Connect the BNC cables as follows:

1. Connect the **SDI Video IN** BNC to the output of your digital video device.
2. Connect BNCs **1** through **4** to four analog video device inputs as required.
3. Connect BNC **5** to the input of a digital video device as required.
4. Connect BNC **6** in one of two ways:
  - Connect to any device that needs to track the video delay through the 8016A or 8016A-S. (IE: RossGear ADL-8520 AES/EBU Auto Tracking Audio Delay). Jumper **JP1** must be set to **TTL**, see the “**Jumper Setup**” section. The Tracking Delay Pulse is a positive 5V pulse. Its width tracks the video delay as it passes through the card. The DAC-8016A tracking delay pulse tracks up to 2 video lines, the DAC-8016A-S up to 2 fields.
  - Connect the re-clocked output SDI signal to the input of another digital video device. Jumper **JP1** must be set to **SDI**, see the “**Jumper Setup**” section.

### Note

SDI outputs are relocked copies of the input. They will not be synchronized or have any video processing applied to them.

5. If you wish to use the Comlink functionality, connect the BNC end of the Comlink adapter cable (not supplied) to BNC **7**. See Chapter 6, “**Comlink**” for details on this optional feature.
6. Connect a video reference one of two ways:
  - If you wish to obtain the reference directly from the card’s back plane, connect a composite analog color black reference to BNC **8**. Jumper **JP2** must be set to **OP8**, see the “**Jumper Setup**” section.

### Note

BNC **8** is terminated at 75-ohms on the card.

- If you wish to reference the card from the frame’s Master Reference connector, ensure that a composite analog (typically color black) reference signal is connected to the REF BNC on the frame (see Figure 4). Jumper **JP2** must be set to **FRM**, see the “**Jumper Setup**” section

# User Controls

---

## In This Chapter

This section contains a discussion of the DAC-8016A user controls and LEDs.

**Note**

The DAC-8016A uses card edge controls for changing operational parameters. The card defaults with switch access set to the locked position. Refer to the “**Bank A - F: Lock/Unlock Switch Access**” section in Chapter 4, “**Using Banks**”, before attempting to make any adjustments.

## User Controls

The following are general descriptions of the user controls identified in the figure below.

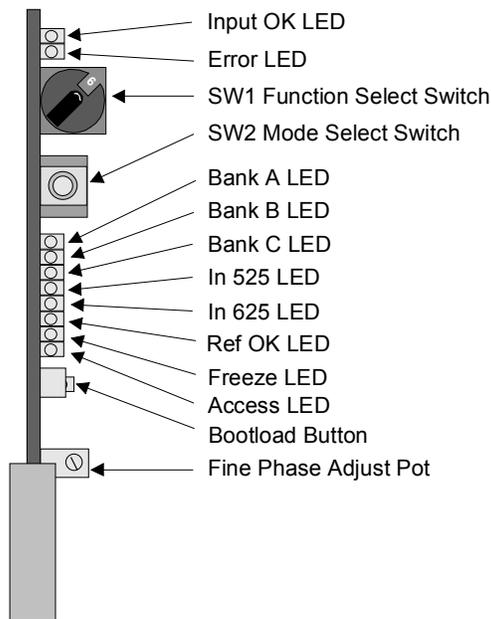


Figure 5. DAC-8016A Card-edge User Controls

### SW1 – Function Select Switch

The **SW1 Function Select** switch is a 16-position rotary switch used to select functions such as timing and video setup menu items. The SW1 switch works in conjunction with the SW2 toggle switch; first, the function category is selected with SW1, and then the SW2 toggle switch is used to select modes or configuration settings within that function selection. See Chapter 4, “**Using Banks**” for complete details.

### SW2 – Mode Select Switch

The **SW2 Mode Select** switch is used to enable, disable, and select specific DAC-8016A *functional modes, or configurations*, within the operational function menu (selected first with the SW1 Function Select switch). The **Mode Select** switch is a 3-position momentary toggle switch with an automatic spring-return to the center position.

Two methods of toggling SW2 are used to select basic and advanced level menu items.

- Single momentary toggle to select single options
- Hold toggle to:
  - Enable or disable functions that carry a higher level of importance
  - Scroll through a range of values or options

Toggling the switch for menu selection is made according to two basic menu design categories:

- menu selections utilizing a scrolling *wrap-around* style of selection (from last menu item directly back to first menu item)
- menu selections utilizing a *bi-directional* upper and lower range limit

### ***Fine Phase Adjust Potentiometer***

The Fine Phase Adjust potentiometer (**RV4**) adjusts the board's output delay in sub-pixel increments, with a range of 0 (zero) to >37ns, which is slightly longer than the step size of the H Delay function.

Using Figure 5 and the card silk-screening for reference, set **RV4 (Fine Phase Adjust)** to adjust sub-pixel delay timing. Turning the pot clockwise increases delay, whereas turning it counter-clockwise decreases the delay.

### ***Bootload Button***

Use this button to set the card into upgrade mode upon install. See Figure 6 for location information and see Chapter 7, *Upgrades*, for detailed procedures.

## Status and Selection LEDs

The front edge of the card features ten LEDs that display the status of the input signals, and indicate menu function and configuration selections.

As selections are made from the menu tables, (see Chapter 4, “Using Banks” for complete bank menu table descriptions), the LEDs display the status of the input signals, banks, and menu function and configuration selections. Basic LED displays and descriptions are provided in the following table:

Table 1. Selection and Status LED Descriptions

LED	Color	Display and Description When Lit
INPUT OK	Green	Indicates that the card is functioning normally and that no anomalies have been detected. Both of the following conditions must be satisfied: <ul style="list-style-type: none"> <li>• A valid input signal is present</li> <li>• A valid reference signal is present when a reference is required, and that the reference standard matches the input standard. Selecting Line Sync or Frame Sync modes or turning on color framing require that a reference signal is present</li> </ul>
ERROR	Red	Indicates that conditions for INPUT OK are not met. Mutually exclusive with INPUT OK LED <ul style="list-style-type: none"> <li>• <i>Flashing</i> = upgrade in progress</li> </ul>
BANK A	Green	Confirms that Bank A is selected
BANK B	Green	Confirms that Bank B is selected
BANK C	Green	Confirms that Bank C is selected
IN 525	Green	The SDI input signal is 525-lines (for NTSC)
IN 625	Green	The SDI input signal is 625-lines (for PAL)
REF OK	Green	Indicates a reference signal is present and that the reference signal is locked <ul style="list-style-type: none"> <li>• <i>On</i> = External reference standard matches the input standard</li> <li>• <i>Flashing</i> = External reference standard does not match the input standard</li> <li>• <i>Off</i> = No external reference is present</li> </ul>
FREEZE	Yellow	When lit, this LED indicates that Freeze Mode is enabled (S and SX models).
ACCESS	Yellow	When lit, this LED indicates that Switch Access is unlocked. See Bank A Functions, Mode Select position F.

# Using Banks

---

## In This Chapter

This section provides a detailed explanation on using Bank functions. The following topics are discussed:

- General Operating Rules
- Selecting Banks
- Bank Function Tables
- Using Bank A Functions
- Using Bank B Functions
- Using Bank C Functions
- Timing Mode Summaries

## General Operating Rules

Please note the following important operating rules for the DAC-8016A:

- Whenever the card is powered up, it defaults to Bank A, and the Bank A LED is lit.

### Note

The card defaults with switch access set to the locked position. To unlock the access refer to the “**Bank A-F: Lock/Unlock Switch Access**” section in this chapter before attempting to make any adjustments.

- New menu settings are saved to memory after one (1) second of operator inactivity.
- The SDI input video format determines which analog format the card will output. Relevant format menu selections will be affected accordingly.
- Always check to see that the **Input OK** LED is lit. If not, check that the inputs are valid. If a reference is used, check that the reference is valid and that the reference standard matches the input standard.
- Before making adjustments, choose the method that you wish to use. Three methods are available:
  1. **No display** - Adjustments are made using the **Function Select** and **Mode Select** switches, without the assistance of the Heads-Up Display or the Comlink Display. Results should be confirmed with test equipment suitable for measuring the parameter being adjusted (such as a waveform monitor or vector scope).
  2. **Heads-Up Display** - Adjustments are made using **Function Select** and **Mode Select** switches in conjunction with the Heads-Up Display. Ensure that the Heads-Up Display is enabled (Bank A, Position 1). Note that the display is superimposed over *all* DAC-8016A video outputs.
  3. **Terminal Display** - Adjustments are made using **Function Select** and **Mode Select** switches in conjunction with the Comlink Display. Ensure that the Comlink port is properly connected to a PC. Refer to Chapter 6, “**Comlink**” for instructions.

### Note

Both the **Heads-Up Display** and the **Comlink Display** can be used simultaneously.

## Operating Conventions For Function Tables

The following rules apply to the function tables that are used throughout this section:

- The label “+” instructs you to toggle the **Mode Select** switch (SW2) *up* momentarily.
- The label “-” instructs you to toggle the **Mode Select** switch (SW2) *down* momentarily.
- The label “+ (h)” instructs you to *hold* the **Mode Select** switch (SW2) *up* for one second or more.
- The label “- (h)” instructs you to *hold* the **Mode Select** switch (SW2) *down* for one second or more.

## Selecting Banks

**Function Select** switch functionality is divided into three banks of functions. Use the following steps to select Bank **A**, **B** or **C** as required.

1. Rotate **Function Select (SW1)** to position 0. Note that position 0 is always used to select the bank, regardless of the bank that you are currently using.
2. Toggle **Mode Select (SW2)** up or down to choose the desired bank. Three positions are available: Bank A, B or C.
3. The table below illustrates each switch function, along with the Heads-Up Display label, the Status LED indication, and the default value. If you are not using a display, be sure to verify your selection on the Status LED's.

*Table 2. Switch and Bank Selection*

Mode Select SW2		Heads-up Display Label	Status LED	Default Bank
+	A	BANK A	BANK A	A
	B	BANK B	BANK B	A
-	C	BANK C	BANK C	A

## Bank Function Tables

The following sections presents a detailed charting of all board-level DAC-8016A functions in the following three tables. The operational usage is explained in the next section.

### Bank A Function Table

Table 3. Function Select: Bank A Function Table

SW1 Function Select	Function	SW2 Mode Select Options	Heads Up Display On-Screen Label and Value		Default Value
0	Bank Select	+ A B - C	BANK	A B C	A
1	Heads-Up Display	+ (h) On - Off	HEADS UP	ON OFF	OFF
2	N/A				
3	N/A				
4	Cross Color Filter	+ Enabled - Disabled	CROSS CLR	ON OFF	ON ***
5	Test Pattern	+ Ramp Bars - Disabled	TEST PTN	RAMP BARS OFF	OFF
6	N/A				
7	N/A				
8	Video Gain <sup>m</sup>	+ Increase - Decrease	VID GAIN	(###.#)%	100% *
9	Black Level Offset <sup>m</sup>	+ Increase - Decrease	BLK OFF	(##.#) IRE	0 IRE *
A	Chroma Gain <sup>m</sup>	+ Increase - Decrease	CHROMA	(###.#)%	100% *
B	Hue <sup>m</sup>	+ Increase - Decrease	HUE	(###.#) DEG.	0 DEG. *
C	U Gain <sup>m</sup>	+ Increase - Decrease	U GAIN	(###.#)%	100% *
D	N/A				
E	Factory Defaults	+ (h) Reset All - (h) Reset Proc Amp	DEFAULT	ALL RST PROC RST	N/A
F	Switch Access **	+ Locked - (h) Unlocked	ACCESS	LOCKED UNLOCKED	LOCKED

**Note:** Functions stored in memory always power up in the last known state. All other items power up in their default state.

\* Indicates Proc Amp controls that are affected by position E, Factory Defaults function.

\*\* Locking Switch Access shuts off the Heads-up Display. Unlocking will not restore the display if it was previously enabled. This must be performed manually.

\*\*\* On is default for X or SX models. All other models have this item defaulted to OFF.

<sup>m</sup> Stored in memory

## Bank B Function Table

Table 4. Function Select: Bank B Function Table

SW1 Function Select	Function	SW2 Mode Select Options	Heads Up Display On-Screen Label and Value	Default Value
0	Bank Select	+ A - B - C	BANK A B C	A
1	NTSC Setup <sup>m</sup>	+ On - Off	SETUP ON OFF	ON* OFF**
2	Setup Level	+ Increase - Decrease	STP LVL (##.#) IRE	7.5 IRE* 0**
3	VI Blanking <sup>m</sup>	+ Blank - Pass Through	VI BLNK BLANK PASS	PASS
4	VI End <sup>m***</sup>	+ Increase - Decrease	VI END (###.# ###.#)	21.0 20.5* 23.5 24.0**
5	SuperBlack <sup>m</sup>	+ Pass Through - Clip	SUPBLK PASS CLIP	PASS
6	N/A			
7	SC/H	+ (h) Increase - (h) Decrease	SCH (###) DEG.	0 DEG. *
8	Color Framing Enable	+ Enabled - Disabled	CLR FRAMING ON OFF	ON
9	N/A			
A	N/A			
B	N/A			
C	N/A			
D	N/A			
E	N/A			
F	N/A			

**Note:** Functions stored in memory always power up in the last known state. All other items power up in their default state.

\* Indicates default NTSC setting.

\*\* Indicates default PAL setting.

<sup>m</sup> Stored in memory

\*\*\* See Table in VI End section, below

## Bank C Function Table

Table 5. Function Select: Bank C Function Table

SW1 Function Select	Function	SW2 Mode Select Options	Heads Up Display On-Screen Label and Value	Default Value
0	Bank Select	+ A - B - C	BANK A B C	A
1	Timing Mode <sup>m</sup>	+ Frame Sync & Fld Chk*** Frame Sync*** Frame Delay*** Line Sync - Line Delay	TIME MODE FS FC FS FD LS LD	LS (FS FC on S model)
2	H Delay <sup>m</sup>	+ Increase - Decrease	H DELAY (#####)	0
3	H Reset	+ Zero - No action	H RESET ZERO	N/A
4	V Delay <sup>m</sup>	+ Increase - Decrease	V DELAY # (###)	0 0
5	V Reset	+ Zero - No action	V RESET ZERO	N/A
6	Set Min. Delay	+ Zero - No action	MIN DEL ZERO	N/A
7	Subcarrier Lock Mode	+ ON - OFF	SC LOCK ON OFF	ON * OFF **
8	Freeze Mode <sup>m, **</sup>	+ Frame Field 2 - Field 1	FRZ MODE FRAME FLD 2 FLD 1	FLD 1
9	Forced Freeze	+ Freeze**** - Pass Through	FREEZE FORCE PASS	PASS
A	Input Loss Mode <sup>m</sup>	+ No Output - Black	IN LOSS NO OUTPT BLACK	BLACK
B	Hotswitch Mode <sup>m</sup>	+ Freeze**** - Black Off	HOTSW MD FREEZE BLACK OFF	OFF
C	N/A			
D	N/A			
E	N/A			
F	N/A			

**Note:** Functions stored in memory always power up in the last known state. All other items power up in their default state.

\* Indicates default NTSC setting.

\*\* Indicates default PAL setting.

\*\*\* Only available on DAC-8016A-S and DAC-8016A-SX.

\*\*\*\* When Freeze mode is activated the freeze will affect either field 1, field 2, or the entire frame.

<sup>m</sup> Stored in memory

## Using Bank A Functions

The following topics are discussed in this section:

- Heads-up Display
- Cross Color Filter
- Test Pattern
- Video Gain
- Black Level Offset
- Chroma Gain
- Hue
- U Gain
- Factory Defaults
- Lock/Unlock Switch Access

### Important

The card defaults with switch access set to the locked position. To unlock the access refer to the “**Bank A-F: Lock/Unlock Switch Access**” section in this chapter before attempting to make any adjustments.

### Bank A-1: Heads-up Display

Use the following steps to enable or disable the Heads-up display:

1. Select Bank A, and rotate **SW1 Function Select** to position 1.
2. Choose the desired display mode:
  - Hold **Mode Select** *up* for one second to enable the display.
  - Hold **Mode Select** *down* to disable the display.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
A	1	+ (h) On - Off	HEADS UP ON OFF	OFF

### Note

The display is superimposed over all DAC-8016A video outputs. Do not use this feature with “on-air” signals.

### Bank A-4: Cross Color Filter

Use the following steps to enable or disable the Cross-color filter (Model **X** and **SX** only).

1. Select Bank A, and rotate **Function Select** to position 4.
2. Adjust video gain up or down as required:
  - Toggle **Mode Select up** to enable the filter.
  - Toggle **Mode Select down** to disable the filter.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
A	4	+ Enabled - Disabled	CROSS CLR    ON OFF	ON

### Bank A-6: Test Pattern

Use the following steps to select a test pattern for the card to display:

1. Select Bank A, and rotate **Function Select** to position 6.
2. Select the desired pattern according to the table below:
  - Toggle **Mode Select up** to advance up the list.
  - Toggle **Mode Select down** to descend down the list.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
A	6	+ Ramp Bars (FF 75%) - Disabled	TEST PTN    RAMP BARS OFF	OFF

**Note**

With **Test Pattern** enabled, the Heads Up Display will not appear.

### Bank A-8: Video Gain

Video Gain affects only the active portion of the video line. Sync and Burst are not affected.

Use the following steps to adjust the DAC-8016A's output video gain:

1. Select Bank A, and rotate **Function Select** to position 8.
2. Adjust video gain up or down as required:
  - Toggle **Mode Select up** to increase video gain.
  - Hold **Mode Select up** to increase video gain continuously.
  - Toggle **Mode Select down** to decrease video gain.
  - Hold **Mode Select down** to decrease video gain continuously.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
A	8	+ Increase - Decrease	VID GAIN    (###.#)%	100%

**Note**

**Video Gain** is one of the “Proc Amp” controls that can be reset using **Factory Defaults** (Bank A, Position E).

**Bank A-9: Black Level Offset**

Use the following steps to change the card’s output black level. This setting is a black level offset that is *not* affected by the **NTSC Setup** function (Bank B, Position 1). For example, with **Black Level Offset** at 1 IRE and **NTSC Setup** off, the black level will be 1 IRE. With **NTSC Setup** on and a setup level of 7.5 IRE, the black level will be 8.5 IRE.

1. Select Bank A, and rotate **Function Select** to position 9.
2. Choose the desired Black Level Offset setting:
  - Toggle **Mode Select up** to increase the black level offset.
  - Hold **Mode Select up** to increase the black level offset continuously.
  - Toggle **Mode Select down** to decrease the black level offset.
  - Hold **Mode Select down** to decrease the black level offset continuously.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
A	9	+ Increase - Decrease	BLK OFF (##.#) IRE	0 IRE

**Note**

**Black Level Offset** is one of the “Proc Amp” controls that can be reset using **Factory Defaults** (Bank A, Position E).

**Bank A-A: Chroma Gain**

Use the following steps to adjust the DAC-8016A’s output Chroma gain:

1. Select Bank A, and rotate **Function Select** to position A.
2. Adjust Chroma gain up or down as required:
  - Toggle **Mode Select up** to increase Chroma gain.
  - Hold **Mode Select up** to increase Chroma gain continuously.
  - Toggle **Mode Select down** to decrease Chroma gain.
  - Hold **Mode Select down** to decrease Chroma gain continuously.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
A	A	+ Increase - Decrease	CHROMA (###.#)%	100%

**Note**

**Chroma Gain** is one of the “Proc Amp” controls that can be reset using **Factory Defaults** (Bank A, Position E).

### Bank A-B: Hue

Use the following steps to adjust the DAC-8016A's output hue:

1. Select Bank A, and rotate **Function Select** to position B.
2. Adjust hue (in degrees) as required:
  - Toggle **Mode Select up** to change the hue in a clockwise direction.
  - Hold **Mode Select up** to change the hue clockwise, continuously.
  - Toggle **Mode Select down** to change the hue in a counter-clockwise direction.
  - Hold **Mode Select down** to change the hue counter-clockwise, continuously.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
A	B	+ Increase - Decrease	HUE (###.#) DEG.	0 DEG.

#### Note

**Hue** is one of the “Proc Amp” controls that can be reset using **Factory Defaults** (Bank A, Position E).

### Bank A-C: U Gain

Use the following steps to adjust the DAC-8016A's output U gain:

1. Select Bank A, and rotate **Function Select** to position C.
2. Adjust U Gain up or down as required:
  - Toggle **Mode Select up** to increase U gain.
  - Hold **Mode Select up** to increase U gain continuously.
  - Toggle **Mode Select down** to decrease U gain.
  - Hold **Mode Select down** to decrease U gain continuously.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
A	C	+ Increase - Decrease	U GAIN (###.#)%	100%

#### Note

**U Gain** is one of the “Proc Amp” controls that can be reset using **Factory Defaults** (Bank A, Position E).

### Bank A-E: Factory Defaults

This function allows you to return all controls to their default values, or simply the “Proc Amp” controls by themselves. Use the following steps to select factory default values:

1. Select Bank A, and rotate **Function Select** to position E.
2. Select the desired default settings:
  - Hold **Mode Select** up to reset all adjustments to their default values.
  - Hold **Mode Select** down to reset the “Proc Amp” adjustments to their default values (**Video Gain**, **Black Level Offset**, **Chroma Gain**, **Hue**, and **U Gain**).

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
A	E	+ (h) Reset All - (h) Reset Proc Amp	DEFAULT ALL RST PROC RST	N/A

### Bank A-F: Lock/Unlock Switch Access

The **Switch Access** function allows you to lock or unlock user access to all adjustment parameters. The “lock” function should be performed after installation to secure all settings, and to prevent anyone from accidentally changing the settings. Note the following rules:

- When access is locked, no adjustments can be made and the Heads-Up Display is automatically turned off.
- When you unlock switch access and you wish to use the Heads-Up display again, you must manually enable it (Bank A, Position 1).

Use the following steps to lock or unlock switch access:

1. Select Bank A, and rotate **Function Select** to position F.
2. Choose the desired access mode:
  - Toggle **Mode Select** up to lock switch access. Adjustments cannot be made, and the display is disabled. The **ACCESS** LED is off.
  - Hold **Mode Select** down for one second to unlock switch access. Adjustments can now be made. The **ACCESS** LED is on.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
A	F	+ Locked - (h) Unlocked	ACCESS LOCKED UNLOCKED	LOCKED

## Using Bank B Functions

The following topics are discussed in this section:

- NTSC Setup
- Setup Level
- VI Blanking
- VI End
- SuperBlack
- SC/H
- Color Framing Enable

### **Bank B-1: NTSC Setup**

Use the following steps to enable or disable setup:

1. Select Bank B, and rotate **Function Select** to position 1.
2. Choose the desired setup value:
  - Toggle **Mode Select** *up* to enable NTSC setup.
  - Toggle **Mode Select** *down* to disable NTSC setup.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
B	1	+ On - Off	SETUP ON OFF	ON* OFF**

\* Indicates default NTSC setting

\*\* Indicates default PAL setting, always disabled in PAL

### **Bank B-2: Setup Level**

Use the following steps to increase or decrease NTSC Setup level:

1. Select Bank B, and rotate **Function Select** to position 1.
2. Choose the desired setup value:
  - Toggle **Mode Select** *up* to increase NTSC Setup.
  - Toggle **Mode Select** *down* to decrease NTSC Setup.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
B	2	+ Increase - Decrease	STP LVL (##.#) IRE	7.5 IRE* 0**

\* Indicates default NTSC setting

\*\* Indicates default PAL setting

### Bank B-3: VI Blanking

Use the following steps to blank the vertical interval, or allow the signals in the vertical interval to pass through the **DAC-8016A**:

1. Select Bank B, and rotate **Function Select** to position 3.
2. Choose the desired blanking mode:
  - Toggle **Mode Select** *up* to blank the vertical interval.
  - Toggle **Mode Select** *down* to pass the vertical interval.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label		Default
B	3	+	Blank	VI BLNK	BLANK
		-	Pass Through		PASS

### Bank B-4: VI End

The **DAC-8016A** has a programmable Vertical Interval function that allows you to set where the VI ends and the first line of active video begins. Everything up to (but not including) the first line of active video is considered part of the Vertical Interval and will be affected by this function. In 525-line mode, signals in the vertical interval are passed without setup even if setup is enabled. The range in 525-line mode is line 20 to 22. Use the following steps to select the end point for vertical blanking:

1. Select Bank B, and rotate **Function Select** to position 4.
2. Choose field 1 and field 2 settings, according to the table below:
  - Toggle **Mode Select** *up* to increase the line at which the VI ends.
  - Toggle **Mode Select** *down* to decrease the line at which the VI ends.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label		Default
B	4	+	Increase	VI END	21.0 20.5*
		-	Decrease	(##,# ##,#)	23.5 24.0**

\* 525-line mode (NTSC) default value

\*\* 626-line mode (PAL) default value

Table6. Vertical Interval Details

SW2	First Line of Active Video			
	NTSC		PAL	
	Field 1	Field 2	Field 3	Field 4
+	23	23	23.5	336
	23	22.5	23.5	336
	23	22	23.5	336
	22.5	22	23.5	336
	22	22	23.5	336
	22	21.5	25	336
	22	21	24.5	337
	21.5	21	24	337
	21	21	24	337
	21 *	20.5 *	23.5 *	336 *
-	21	20	23	336
	20.5	20	23	335
	20	20	22.5	335

\* Indicates default values

### Bank B-5: SuperBlack

Use the following steps to enable or disable the SuperBlack clipping function:

1. Select Bank B, and rotate **Function Select** to position 5.
2. Choose the desired SuperBlack setting:
  - Toggle **Mode Select up** to allow the input's active video signal to pass through.
  - Toggle **Mode Select down** to clip any value below black.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
B	5	+ Pass - Clip	SUP BLK      PASS CLIP	PASS

### Bank B-7: SC/H

The SC/H control allows you to adjust the sub-carrier-to-horizontal edge relationship (in degrees) for purposes of phasing the DAC-8016A's output into another system.

1. Select Bank B, and rotate **Function Select** to position 7.
2. Adjust the SC/H as required:
  - Toggle **Mode Select up** to increase the SC/H phase, clockwise.
  - Toggle **Mode Select down** to decrease the SC/H phase, counter-clockwise.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
B	7	+ (h) Incr - (h) Decr	SCH      (###) DEG	0 DEG

### Bank B-8: Color Framing Enable

In situations in which color framing is irrelevant, one can disable color framing. In line or frame delay modes, disabling the **Color Framing Enable** feature prevents an error condition when there is no external reference present.

Use the following steps to enable or disable color framing:

1. Select Bank A, and rotate **Function Select** to position 4.
2. Adjust video gain up or down as required:
  - Toggle **Mode Select up** to enable the filter.
  - Toggle **Mode Select down** to disable the filter.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
B	8	+ Enabled - Disabled	CLR FRAMING    ON OFF	ON

## Using Bank C Functions

The following topics are discussed in this section:

- Timing Mode
- H Delay
- H Reset
- V Delay
- V Reset
- Set Minimum Delay
- Subcarrier Lock Mode
- Freeze Mode
- Forced Freeze
- Input Loss Mode
- Hotswitch Mode

### ***Bank C-1: Timing Mode***

The following topics are discussed in this section:

- About the Timing Mode
- Timing Mode Summary
- Bank C-1: Timing Mode Procedure

### ***About the Timing Mode***

There are two versions of the DAC-8016A available. The standard DAC-8016A can be timed within one line in 37ns increments. The DAC-8016A-S with the frame synchronizer can be timed within one video frame in 37ns increments. The fine phase potentiometer (**RV1**) is provided for sub-pixel adjustment.

The presence of a frame synchronizer means that the **Frame Delay** and **Frame Sync** modes are available. Without the frame synchronizer, the **Line Delay** and **Line Sync** modes are available. The non-S version provides enough timing flexibility to meet a wide variety of applications. These cards can be upgraded in the field for full frame synchronizing capabilities. The following information provides detailed explanations of when to use each mode, as well as an analysis of the advantages each mode has to offer.

The DAC-8016A offers a tracking delay output that pulses high at frame rate. The pulse width is a measurement of the video delay through the card to a minimum of 10 $\mu$ S. This is useful when connecting with devices which accept this type of measurement signal (such as the RossGear ADL-8520 AES Audio Delay Unit). This feature is jumper-selectable and available on all models of the DAC-8016A.

### ***Line Delay (All Models)***

**Line Delay** mode uses the input signal to generate the output timing. In other words, it provides a constant delay between the input and the output. The external reference is not used in any way other than for color framing. This is useful in applications where a constant delay through the card is required. The disadvantage is that the output is sensitive to sudden changes in input timing, i.e., switching input sources. Switching between two sources that aren't perfectly timed results in a visible disruption on the screen.

The delay through the card has a minimum value, as described in Chapter 8, "**Specifications**". Output timing can be adjusted from this minimum delay up to an additional two lines in sub-pixel increments.

## Line Sync (All Models)

**Line Sync** mode uses the external reference to generate the output timing on a line-by-line basis, but uses the digital input signal timing to decide when a frame begins.

Whenever an SDI signal is received, the output timing generator waits for the next falling edge of H Sync on the external reference, before displaying the incoming line. The advantage of this mode is that as long as all input sources are timed to be within one line of each other, the output timing stays constant, regardless of which input is selected — with no visible disruption on the screen. This is very useful in that all sources to the DAC-8016A (for example, from a routing switcher) only need to be lined up to the same line, rather than having to be lined up to within subpixel timing.

Any source can then be switched to the DAC-8016A without any change to the output timing, and consequently, *without any visible disturbance to the output video as long as vertical interval switching is used.*

The **Line Sync** mode has internal latency, so that using minimum delay still means that the output video will not be lined up with the external reference (the H Sync edges will not occur at the same point in time). To do so would have meant adding even more latency, which may not be desirable. However, output timing can be delayed by up to two lines from that point on, in subpixel increments, so that the output video can be lined up as needed.

### Note

If two input sources are not on the same line, then switching from one source to the other causes a jump in the output timing by an exact number of lines. For example, if the two sources are 2.5 lines apart, the output will jump by either 2 or 3 lines depending on the position of the sources with respect to the external reference.

## Threshold Point (All Models)

As the input signal is delayed in time, there comes a point where the output timing will have to jump by exactly one line (the output must always come after the input). This point is called the **threshold point**.

When comparing the input signal with the external reference, the threshold point in microseconds is 0.13 for NTSC and 0.01 for PAL before the falling edge of the external reference.

In addition, there is built in hysteresis so that if an input source is on the threshold point, the output timing will be constant and will not jump back and forth by a line if the input signal varies slightly. However, if the input signal is exactly on the threshold point, the output timing may vary from one power up sequence to the other. In other words, the card may power up with *different timing* than the previous time it was powered-up.

To avoid this condition, set the card to **Line Delay** mode and use minimum delay through the card (**H Delay = 0** and **V Delay = 0**). Then, check to see where the output video is relative to the external reference. The threshold point is approximately 19.6 microseconds in NTSC (15.7 in PAL) to the right of the falling edge of H Sync on the external reference. If the falling edge of the output video's H Sync is within 1  $\mu$ s of this point, we recommend that you move the input SDI timing at the source to keep it away from the threshold point.

### Note

In **Line Sync** mode, you must keep the falling H sync edge of the incoming video away from the threshold point.

### **Frame Delay (DAC-8016A-S, SX Models)**

The **Frame Delay** mode is identical to the **Line Delay** mode, except that the output timing can be delayed by up to a full frame of video. By using almost a full frame of delay, it is possible to set apparent negative timing, making it look like the output occurs before the input.

### **Frame Sync (DAC-8016A-S, SX Models)**

The **Frame Sync** mode makes it possible to use asynchronous sources. The output timing is generated entirely based on the external reference. Whether a synchronous or an asynchronous source is used, output timing is constant. Setting **H Delay = 0** and **V Delay = 0** will zero time the output relative to the external reference (the start of line 1, field 1 on the output will be aligned in time with the start of line 1, field 1 of the external reference). The delay through the card will be the minimum latency (in the order of microseconds) to a full frame of delay. Frame Sync mode can normally handle hard switching of untimed synchronous sources as long as the sources are just a few lines apart. However if switching occurs at the input, we recommend using **Frame Sync and Field Check**.

### **Frame Sync and Field Check (DAC-8016A-S, SX Models)**

The **Frame Sync and Field Check** mode is made possible because the DAC-8016A has enough video memory to store three full video fields. Field checking ensures that all EAV signals line up correctly in an incoming field, before it is displayed. If it finds that an EAV is missing or in the wrong location, it tags the field as bad and discards it. In the meantime, the frame currently in memory is repeated. This is useful for detecting changes in input timing, such as when the input source has been switched at a routing switcher. The timing implication is that the delay through the card will be a minimum of 1 field to a maximum of 3 fields.

Frame Sync mode can handle hard switching of untimed synchronous or asynchronous sources, regardless of input timing. If switching at the input will occur, this mode is recommended. The only potential drawback is that a minimum of one field of delay through the card will occur. For asynchronous sources this will always be the case, but for synchronous sources it depends on the timing relationship between the input video and the external reference (if the input and external reference are already a field apart, enabling field checking will not affect the timing).

#### **Note**

We recommend that you <i>not</i> enable hotswitching in this mode.
--

## Timing Mode Summaries

This section provides a summary of all Timing Modes.

### **Line Delay**

Use when you do not have an S version and need constant delay through the card.

- Output timing based on input timing
- Ignores external reference
- Has the lowest minimum delay through the card
- Two-line output timing adjustment window

### **Line Sync**

Use when you do not have an S version and need constant output timing even though input timing may change. **This is the recommended mode for the non-S version.**

- Output timing based on external reference (line by line only)
- If input sources are timed to be on the same line, the output timing will be constant.
- Keep input timing away from the threshold point.

### **Frame Delay**

Use when you have an S version and need constant delay through the card.

- Output timing based on input timing.
- Ignores external reference.
- Has the lowest minimum delay through the card.
- Output timing adjustment window has infinite phasing over a full frame.

### **Frame Sync**

Use when you have an S version and need constant output timing, or when the input is asynchronous to house reference.

- Input can be asynchronous.
- Output timing is constant, regardless of input timing.
- Output phasing is infinite over a full frame, and the delay through the card varies from the minimum processing delay up to the minimum processing delay plus a full frame.

### **Frame Sync and Field Check**

Use when you have an **S** version and need constant output timing, or when the input is asynchronous to house reference, or when input timing may change. *Recommended mode for S versions.*

- Input can be asynchronous.
- Output timing is constant, regardless of input timing.
- Can be zero timed to the external reference.
- Output phasing is infinite over a full frame, and the delay through the card varies from the minimum processing delay plus a field up to the minimum processing delay plus three fields.
- Handles vertical interval switching at the input, regardless of input timing. Output timing and video will be unaffected. Disable hotswitching as it is not necessary .

### Bank C-1: Timing Mode Procedure

Use the following steps to set the timing mode:

1. Select Bank C, and rotate **Function Select** to position 1.
2. Select the desired timing mode according to the following table.
  - Toggle **Mode Select** *up* to advance up the list.
  - Toggle **Mode Select** *down* to descend down the list.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
C	1	+ Frame Sync & Fld Chk* Frame Sync * Frame Delay * Line Sync - Line Delay	TIME MODE FS FC FS FD LS LD	LS (FS FC on S models)

\* Indicates DAC-8016A-S or -SX models only

### Bank C-2: H Delay

Use the following steps to adjust the output's H Delay:

1. Select Bank C, and rotate **Function Select** to position 2.
2. Increase or decrease the H Delay as required:
  - Toggle **Mode Select** *up* to increase H Delay by half a pixel (one 27MHz-clock period) with each toggle.
  - Hold **Mode Select** *up* to increase H Delay continuously.
  - Toggle **Mode Select** *down* to decrease H Delay by half a pixel (one 27MHz-clock period) with each toggle.
  - Hold **Mode Select** *down* to decrease H Delay continuously.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
C	2	+ Increase - Decrease	H DELAY (#####)	0

Please note the following important points regarding H Delay:

- If you cross over the maximum H Delay, the value returns to 0 (zero) and the V Delay value increments by 1.
- Crossing the minimum delay returns the H Delay value to 1715 (NTSC) or 1727 (PAL) and decrements the V Delay value by 1.
- Sub-pixel timing adjustments can be made using the **RV4 Fine Phase Adjust** potentiometer on the front edge of the card. Turning the pot clockwise increases delay, whereas turning it counter-clockwise decreases the delay. The range is >37ns, which is slightly longer than the step size of the H Delay function.

### Bank C-3: H Reset

Use the following steps to reset just the H Delay value to 0 (zero). This function is particularly useful if your adjustment range is far off the mark, or if you simply want to quickly return to zero.

1. Select Bank C, and rotate **Function Select** to position 3.
2. Reset H Delay as required:
  - Toggle **Mode Select** *up* to reset H Delay to 0.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
C	3	+ Zero - No action	H RESET ZERO	N/A

### Bank C-4: V Delay

Use the following steps to adjust the output's V Delay:

1. Select Bank C, and rotate **Function Select** to position 4.
2. Increase or decrease the V Delay as required:
  - Toggle **Mode Select** *up* to increase V Delay by one line.
  - Hold **Mode Select** *up* to increase V Delay continuously.
  - Toggle **Mode Select** *down* to decrease V Delay by one line.
  - Hold **Mode Select** *down* to decrease V Delay continuously.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
C	4	+ Increase - Decrease	V DELAY # (###)	0

#### Note

If you cross over the maximum V Delay, the delay value returns to **0** (zero) and the **Color Frame Index** value increments by **1**. When the **Color Frame Index** is **0**, field 1 of the output video is aligned with color field 1 of the reference input. When the **Color Frame Index** is **1**, output field 1 is aligned with color field 3 of the reference input. For PAL signals, an index of **2** aligns output color field 1 with reference color field 5, and an index of **3** aligns output color field 1 with reference color field 7. A reference signal that meets SMPTE or EBU specifications is required in order to correctly color-frame the DAC-8016A output.

### Bank C-5: V Reset

Use the following steps to reset just the V Delay value to 0 (zero).

1. Select Bank C, and rotate **Function Select** to position 5.
2. Reset V Delay as required:
  - Toggle **Mode Select up** to reset V Delay to 0.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label		Default
C	5	+ Zero - No action	V RESET	ZERO	N/A

### Bank C-6: Set Minimum Delay

Use the following steps to reset both the H Delay and V Delay values to 0 (zero).

1. Select Bank C, and rotate **Function Select** to position 6.
2. Reset all delays as required:
  - Toggle **Mode Select up** to reset H Delay and V Delay to 0.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label		Default
C	6	+ Zero - No action	MIN DEL	ZERO	N/A

### Bank C-7: Subcarrier Lock Mode

This function is enabled in NTSC only. When the NTSC reference has minimal subcarrier/H-sync phase errors, color subcarrier provides a more stable lock than H-sync.

When ON, the card will lock to the color subcarrier from the reference signal. When OFF, the card will lock to the H-sync of the reference signal.

Use the following steps to set the both the H Delay and V Delay values to 0 (zero).

1. Select Bank C, and rotate **Function Select** to position 7.
2. Toggle **Mode Select up** to enable Subcarrier Lock Mode.
3. Toggle **Mode Select down** to disable Subcarrier Lock Mode.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label		Default
C	7	+ ON - OFF	SC LOCK	ON OFF	ON (NTSC) OFF (PAL)

### Bank C-8: Freeze Mode

The input image can be frozen (**DAC-8016A-S** and **SX** only) if any of the following conditions occur:

- The user selects Manual Freeze (**Forced Freeze**, Bank C, Position 9)
- There is a loss of input signal (**Input Loss Mode**, Bank C, Position A)
- A hotswitch occurs (**Hotswitch Mode**, Bank C, Position B)

The **Freeze Mode** function allows you to set the *type* of freeze that occurs: Field 1, Field 2, or Full Frame. Use the following steps to set the freeze mode:

1. Select Bank C, and rotate **Function Select** to position 8.
2. Select the desired mode according to the table below:
  - Toggle **Mode Select** *up* to advance up the list.
  - Toggle **Mode Select** *down* to descend down the list.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label		Default
C	8	+ Frame Field 2	FRZ MODE	FRAME	FLD 1
		- Field 1		FLD 2 FLD 1	

### Bank C-9: Forced Freeze

The output can be *manually* frozen (**DAC-8016A-S** and **SX** only) using the **Forced Freeze** mode. When enabled, the freeze will affect either field 1, field 2 or the entire frame (as determined by the **Freeze Mode** function).

Use the following steps to enable or disable the Forced Freeze mode:

1. Select Bank C, and rotate **Function Select** to position 9.
2. Select the desired mode:
  - Toggle **Mode Select** *up* to freeze the image. The **FREEZE** LED is on.
  - Toggle **Mode Select** *down* to un-freeze the image, and allow input video to pass through. The **FREEZE** LED is off.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label		Default
C	9	+ Freeze	FREEZE	FORCE	PASS
		- Pass Through		PASS	

**Note**

With **Force Field** enabled, the Heads Up Display is still available.

### Bank C-A: Input Loss Mode

The **Input Loss Mode** function selects what type of video appears at the system's four outputs when the input signal is lost or invalid. These choices are available:

1. **Black.**
2. **No Output** - flat line, no signal present.

Use the following steps to set the Input Loss Mode:

1. Select Bank C, and rotate **Function Select** to position A.
2. Select the desired mode according to the table below:
  - Toggle **Mode Select up** to advance up the list.
  - Toggle **Mode Select down** to descend down the list.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
C	A	+ Freeze - No Output - Black	IN LOSS NO OUTPUT BLACK	BLACK

#### Important

It is recommended that **Hotswitch Mode** and **Input Loss Mode** be set to black. There is circuitry in the sync stripper that removes unwanted impulses to make the circuit more noise tolerant. During a hotswitch, this could cause the **DAC-8016A** to interpret the signal has been lost. Since the Input Loss mode overrides the Hotswitch mode setting, not having both set the same could lead to a momentary glitch on the screen.

### Bank C-B: Hotswitch Mode

Depending on which timing mode is being used, switching untimed input sources can cause the output to break up while the DAC-8016A is synchronizing to the new timing. In this case, hotswitching can be used to make this break up less apparent.

To mask this disruption, a hotswitch mode was created. This is accomplished by momentarily freezing the last good frame, or momentarily going to black while the untimed switch occurs. Going to black is recommended since the output can be forced to black as soon as the hotswitch condition is detected. Freezing must wait until the next field, in which case a single corrupted field could get through to the output.

In Frame Sync timing mode, the output timing will be undisturbed as it is based on the external reference. In Line Sync mode, as long as the input sources are on the same line relative to the external reference, and they do not cross the threshold point (see Bank C-1 Timing Mode for details on the threshold point), then the output timing will also be undisturbed. In all other cases, the output timing will be disturbed any time an untimed switch is made at the input of the **DAC-8016A**. Three choices are available:

- **Off** - disables the Hotswitch Mode.
- **Black** - the output momentarily cuts to black when an untimed switch is made at the input.
- **Freeze** - (**DAC-8016A-S** or **-SX** only) the last valid image is momentarily frozen. The freeze will display field 1, field 2, or the entire frame in FS or FSFC timing modes (as determined by the **Freeze Mode** function).

In either case, the output returns once the card has relocked to the input. Use the following steps to set the Hotswitch Mode:

1. Select Bank C, and rotate **Function Select** to position B.
2. Select the desired mode according to the table below:
  - Toggle **Mode Select** *up* to advance up the list.
  - Toggle **Mode Select** *down* to descend down the list.

Bank	SW1 Function Select	SW2 Mode Select	Heads-Up Display Label	Default
C	B	+ Freeze - Black - Off	HOTSW MD FREEZE BLACK OFF	OFF

**Note**

Freeze hotswitching is not supported in **Line Delay**, **Line Sync** and **Frame Delay** timing modes. If one of these timing modes is selected and freeze hotswitching is enabled, the hotswitch will go to black instead.

**Important**

Because output timing is disrupted in **Line Delay** and **Frame Delay** modes, hotswitching is not guaranteed to go completely black. These two timing modes should never be used if the input source is switched while on air, since the output timing will be affected, and this could affect equipment downstream of the **DAC-8016A**.

**Important**

It is recommended that the **Hotswitch Mode** and **Input Loss Mode** be set to black. There is circuitry in the sync stripper that removes unwanted impulses to make the circuit more noise tolerant. During a hotswitch, this could cause the **DAC-8016A** to interpret the signal has been lost. Since the Input Loss mode overrides the Hotswitch mode setting, not having both set the same could lead to a momentary glitch on the screen.

# SMPTE 269M Fault Reporting

## In This Chapter

This chapter contains the following sections:

- Overview
- Jumper Setup
- Frame Connections
- Details

## Overview

The SMPTE 269M Fault Reporting system, also known as an SMPTE “alarm”, provides indication if one or more frame modules encounter a fault or an abnormal condition. The DAC-8016A module provides a jumper to enable SMPTE-269M fault reporting. The card connects by means of an internal interface circuit to an auxiliary telco connector on RossGear 8000 series frames. When the frame connection is interfaced with a customer-designed system of LEDs or audible alarms, faults can be traced to a specific frame when a card fault occurs within that frame.

The following diagram illustrates a general arrangement for SMPTE 269M alarm reporting:

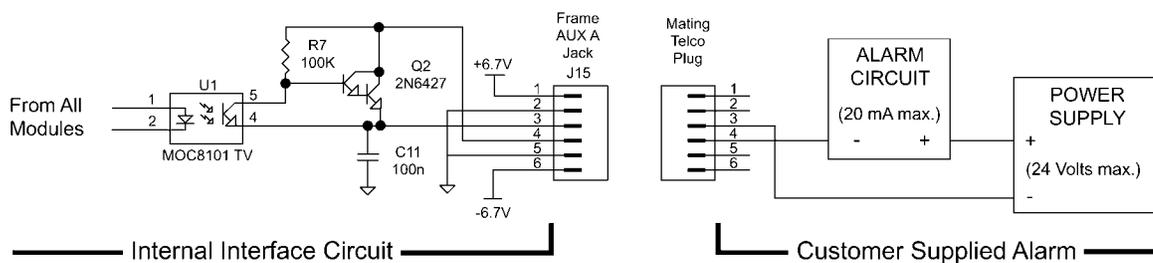


Figure 7. SMPTE 269M Alarm Reporting: Internal interface and typical connections

## Jumper Setup

If fault reporting for the DAC-8016A is desired, use jumper **JP3 - 269M Fault Report** to set up the card.

1. To access the jumper, remove the card from the frame by pressing down the white card ejector tab and pulling the card from the frame slot.
2. Observing all static discharge and handling precautions, place the card with the component side facing up on a clean flat surface.
3. To enable SMPTE fault reporting, set jumper **JP3** to **ON** position. See the Jumper Setup section in Chapter 2 “**Installation and Setup**”.
4. To disable SMPTE fault reporting, set jumper **JP3** to **OFF** position. See the Jumper Setup section in Chapter 2 “**Installation and Setup**”.
5. To return the card to the designated frame installation slot, hold the DAC-8016A card by the edges and carefully align the card edges with the slots in the frame. Then fully insert the card into the frame until the rear connection plug is properly seated.

## Frame Connections

The SMPTE 269M Fault Reporting connection on RossGear 8000 series frames is provided by the auxiliary telco connector, **AUX A**, for interfacing with a customer-designed alarm system.

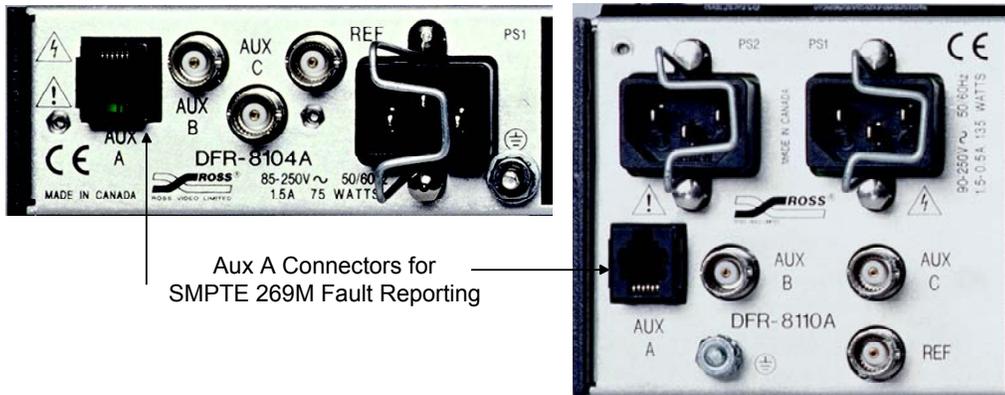


Figure 8. SMPTE 269M Alarm Reporting Frame Connections

Connect the frame’s **AUX A** connector to your facility’s SMPTE alarm circuit.

## Details

The fault report contacts are closed when the card detects an internal failure or a power loss condition. Some internal failures are:

- Problems with the card analog power supplies.
- Failure of the card to initialize.
- Failure in the fault reporting circuitry.

The fault report contacts are pulsating when there is a loss of an input signal. This occurs when:

- There is no valid D1 SDI input to the card.
- There is no external reference present in the **Line Sync** or **Frame Sync** modes.
- There is no external reference when color framing is enabled.

For additional information on alarm system design, refer to the SMPTE document *ANSI/SMPTE 269M - 1999*.

# Comlink

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## In This Chapter

This chapter contains the following sections:

- Overview
- Cable Construction
- Connection and Configuration

### Overview

The board's Terminal Display feature uses the Comlink BNC (7) to establish a connection between a PC and the DAC-8016A. When properly connected, you can view your setup parameters on a PC running VT-100 terminal emulation. All tables are output in ASCII format using an RS-485 interface. Because of the nature of the frame, it is not possible to have a true differential signal. In this situation, using a BNC on the frame side, the connection is single-ended. Only the center conductor carries information, while the shield is grounded.

#### Important!

Ensure that the PC and the card frame are at the same ground potential in order to avoid ground loops.

Although the interface is RS-485, the Comlink can function with most modern RS-232 equipment, thereby making it easy and convenient to use with standard PC COM ports. To connect the Comlink between the DAC-8016A and your PC, you require a coax adapter cable with a BNC connector at one end, and either a 9-pin or 25-pin RS-422 or RS-232 connector at the other end.

## Cable Construction

Construct a custom coax cable adapter as follows:

- On the **Frame** end of the coax cable, no change to the BNC cable is required. Ensure that the pin and shield are properly connected.
- On the **PC** end of the cable, make the following connections according to whether your PC port uses a 9-pin “D” or a 25-pin “D” connector:

### Important!

Regardless of whether your PC port uses a 9-pin “D” or a 25-pin “D” connector, the pin-out configuration may vary. Always check your PC’s **Technical Guide** to determine the correct pin-outs for your computer. The **RX** and **GND** pin-outs may vary from machine to machine.

### 9-Pin Connections

The following diagram illustrates a *sample* connection using a *typical* pin-out configuration for a PC’s 9-pin D-type connector.

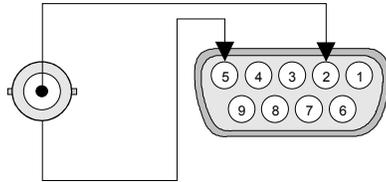


Figure 9. D-9 to BNC Connections

1. Connect the center conductor of the coax to the pin 2 (**RX**) on your serial port connector.
2. Connect the shield of the coax to the ground pin 5 (**GND**) on your serial port connector.

### 25-Pin Connections

The following diagram illustrates a *sample* connection using a *typical* pin-out configuration for a PC’s 25-pin D-type connector.

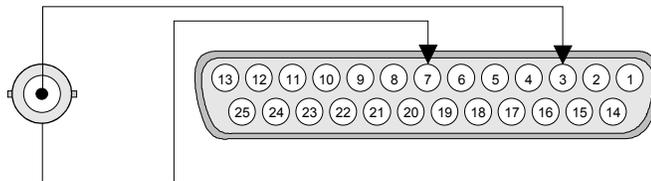


Figure 10. D-25 to BNC Connections

1. Connect the center conductor of the coax to the pin 3 (**RX**) on your serial port connector.
2. Connect the shield of the coax to the ground pin 7 (**GND**) on your serial port connector.

## Connection and Configuration

Once you have constructed the Comlink adapter cable, connect it and configure the PC as follows:

1. Connect the cable between your PC's serial port and BNC 7 on the rear panel of the DAC-8016A.
2. With the custom cable properly connected, set up your PC's serial port parameters as follows:
  - 19.2 K baud rate
  - 8 data bits
  - No parity
  - 1 stop bit
  - No flow control
3. On your PC, run a program that uses VT-100 terminal emulation, such as **Terminal.exe** or **HyperTerminal**. With the DAC-8016A powered up, you should now have all setup parameters visible on the PC, as illustrated in the sample screen below.

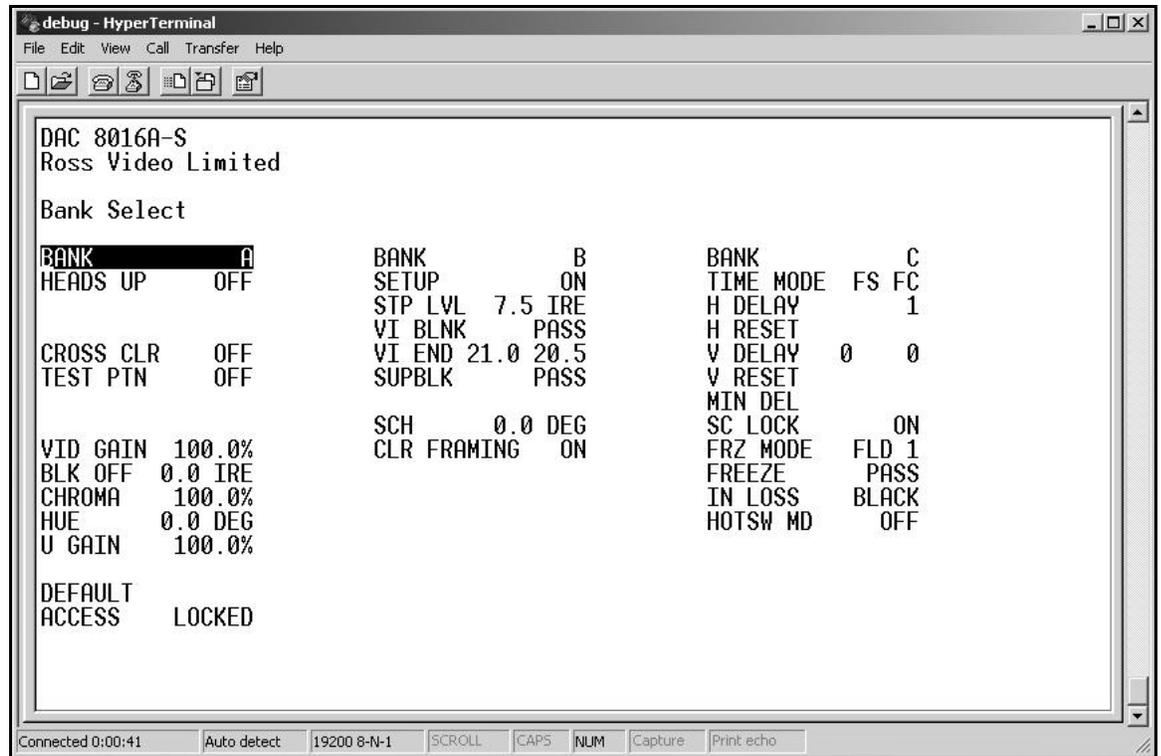


Figure 11. Sample Terminal Display



# Upgrades

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## In This Chapter

This chapter provides instructions required to properly upgrade your DAC-8016A encoder for the following functionality:

- Full frame synchronization operation (DAC-8016A -S functionality)
- Software
- Firmware

To order any DAC-8016A Upgrade kit, contact Ross Video Customer Service.

This chapter contains the following sections:

- Equipment Supplied
- Upgrade Procedures
- Confirm Upgrade

### Equipment Supplied

Your DAC-8016A Upgrade kit contains:

- 1 DAC-8016A User Manual
- Required upgrade chip(s)

## Upgrade Procedures

This section contains procedures for the following upgrade options:

- Chip Removal
- Frame Synchronizer Upgrade
- Software or Firmware Upgrade
- Confirm Frame Synchronizer Upgrade
- Confirm Software or Firmware Upgrade

Figure 12 below indicates the user interface components required during these procedures.

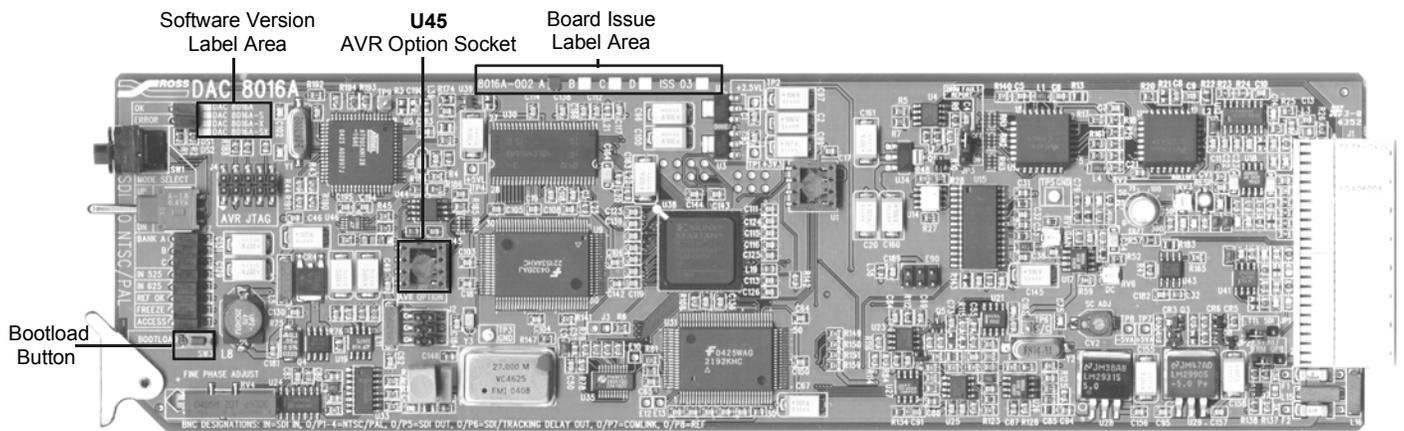


Figure 12. DAC-8016A Upgrade Socket and Label Locations

## Chip Removal

If there is a chip already in the AVR Option socket you need to remove it to upgrade the card software or firmware. Record your settings if you are removing a Frame Synchronizer Upgrade chip.

1. Do one of the following:
  - If the chip currently in the AVR Option socket is a Frame Synchronizer Upgrade chip, record the Bank C settings listed in the following table. You will need to reconfigure these settings when you reinstall the Frame Synchronizer Upgrade chip after performing the software or firmware upgrade.

Table 7. Frame Synchronizer Affected Settings: Bank C Function Table

SW1 Function Select	Function	Bank C Settings
1	Timing Mode	
2	H Delay	
4	V Delay	
8	Freeze Mode	

- If the chip currently in the AVR Option socket is an earlier software or firmware chip, continue with the Chip removal procedure.
2. With the card out of the frame, refer to Figure 12 and the card labeling to locate the AVR Option socket (**U45**).
3. Use a tong-type IC chip removal tool (not supplied) to grab the chip by the unlegged ends and gently pry the chip out of the socket.
4. Store the chip in a labeled static free container. You may need to return it to the socket later if it is a Frame Synchronizer upgrade chip. The card cannot operate as a Frame Synchronizer without the chip in the socket.

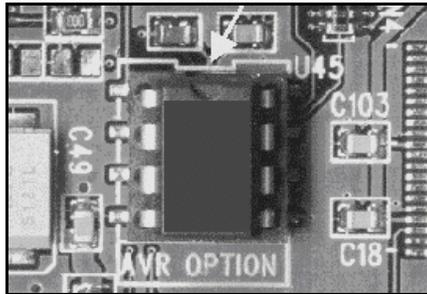


Figure 13. Chip and Socket Alignment

## ***Frame Synchronizer Upgrade***

1. Remove the card from the frame.
2. Verify the card issue level matches the issue level of the upgrade kit.
3. Refer to Figure 12 and the card labeling to locate the AVR Option socket (**U45**).
4. If the socket is occupied, complete the Chip Removal procedure.
5. Align the new chip over the socket with the keyed sides together and the legs over the socket holes. The arrow in Figure 13 indicates a chip and socket with keys aligned.
6. Gently and firmly press the chip into the socket.
7. Perform the Confirm Frame Synchronizer Upgrade section in this chapter.
8. Refer to the relevant chapters in this user manual for information on the operation of the full frame synchronizer.

## ***Software or Firmware Upgrade***

This procedure applies to any software or firmware upgrade or even downgrade you perform on the DAC-8016A. If you are upgrading multiple cards, repeat this procedure for each card to be upgraded.

1. With the card out of the frame, refer to Figure 12 and the card labeling to locate the AVR Option socket (**U45**).
2. If the socket is occupied, complete the Chip Removal procedure.
3. Carefully remove the new chip from the packaging.
4. Align the new chip over the socket with the keyed sides together and the legs over the socket holes. The arrow in Figure 13 indicates a chip and socket with keys aligned.
5. Gently and firmly press the chip into the socket.
6. Reinsert the card in the frame.
7. Press the Bootload button and wait for the upgrade to complete. The Error LED will flash while the upgrade is loading. Firmware upgrades take approximately 90 seconds to complete.
8. Complete the Confirm Software or Firmware Upgrade procedure.
9. Remove the card from the frame and complete the Chip Removal procedure.
10. If your card had the Frame Synchronizer upgrade installed, you will have to reinstall that chip using the Frame Synchronizer Upgrade procedure above.

## Confirm Upgrade

Depending whether you upgraded to the Frame Synchronizer option or upgraded the card software or firmware, use the relevant upgrade confirm procedure below.

### ***Confirm Frame Synchronizer Upgrade***

With the card installed in the frame and powered up:

1. Rotate **Function Select** to the **0** position, toggle **Mode Select** to Bank A, and rotate **Function Select** to position **F**.
2. Hold **Mode Select** *down* for one second to unlock switch access.  
The **ACCESS LED** is on.
3. Rotate **Function Select** to position **1**.
4. Hold **Mode Select** *up* for one second to enable the **Heads Up** display.
5. Rotate **Function Select** to position **0**.
6. Toggle **Mode Select** *down* to position **C**.
7. Hold **Mode Select** *down* for several seconds to display the card model installed.  
On the **Heads Up** display, “**DAC-8016A-S** or **-SX**” is displayed, indicating that the upgrade was successful.
8. If you are upgrading multiple cards, repeat the relevant upgrade procedures as necessary.

### ***Confirm Software or Firmware Upgrade***

With the card installed in the frame and powered up:

1. Rotate **Function Select** to the **0** position, toggle **Mode Select** to Bank A, and rotate **Function Select** to position **F**.
2. Hold **Mode Select** *down* for one second to unlock switch access.  
The **ACCESS LED** is on.
3. Rotate **Function Select** to position **1**.
4. Hold **Mode Select** *up* for one second to enable the **Heads Up** display.
5. Rotate **Function Select** to position **0**.
6. Hold **Mode Select** *up* for several seconds to display the card software and hardware versions installed.  
On the **Heads Up** display, “**SW V #.## HW V #.##**” is displayed, indicating that the upgrade was successful. Confirm that the displayed numbers match the upgrade versions you have performed.
7. If you are upgrading multiple cards, repeat the relevant upgrade procedures as necessary.

If you have any questions or encounter any problems, please contact Ross Video Customer Service at (613) 652-4886.



# Specifications

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## In This Chapter

This chapter contains the Technical Specifications table.

# Technical Specifications

Table 8. DAC-8016A - Technical Specifications

Category	Parameter	Specification
<b>Component SDI Input</b>	Standard	SMPTE 259M-C; 270Mb/s, 525/625 lines
	Number of Inputs	1
	Input Impedance	75Ω
	Return loss	>20dB to 270MHz
	Common Mode	4.5V p-p @ 50/60Hz
	Equalization	Automatic, up to 26dB (250m)
<b>Component SDI Output</b>	Signal Standards	SMPTE 259M-C, 270Mb/s 525/625 lines
	Number of Outputs	1 or 2
	Output Return Loss	>15dB to 270MHz
	Signal Level	800mV ± 5%
	DC Offset	<30mV
	Rise and Fall Time	>800pS (20 - 80%, ±15%)
	Overshoot	<10% typical
<b>Composite Video Output</b>	Standard	NTSC or PAL composite video, 1V pp, 75Ω
	Number of outputs	4
	Output return loss	>45dB to 5MHz
	Output Isolation	>48dB to 5MHz
	Nominal Signal Level	1V p-p ± 5%
	DC Offset	± 50mV
	Output Equalization	0 to 300ft.
<b>Analog Reference</b>	Signal Standards Accepted	NTSC, PAL
	Number of Inputs	1
	Input Impedance	75Ω
	Return Loss	>40dB to 5MHz
<b>Performance</b>	Frequency Response	± 0.1dB to 5.0MHz, -0.2dB at 5.5MHz
	Field & Line Tilt	<0.5%
	Differential Phase	<0.5 degrees
	Differential Gain	<0.5%
	Subcarrier Jitter	<1.0 degrees
	Group delay	± 10ns to 5MHz
	RMS noise (unweighted)	<-61dB to 5MHz
	Output Quantizing	12 bits
	H and V phasing	infinite with frame sync, 2 lines without frame sync

Category	Parameter	Specification
<b>Minimum Delay in Line/Frame Delay Mode</b>	8016A NTSC	20 $\mu$ s
	8016A PAL	19.6 $\mu$ s
	8016A-X NTSC	1 line + 22.9 $\mu$ s
	8016A-X PAL	19.6 $\mu$ s
	8016A-S NTSC	20 $\mu$ s
	8016A-S PAL	19.6 $\mu$ s
	8016A-SX NTSC	1 line + 22.9 $\mu$ s
	8016A-SX PAL	19.6 $\mu$ s
<b>Power Consumption</b>	Total	6.8W
<b>Tracking Delay Pulse</b>	DAC-8016A	up to 2 video lines
	DAC-8016A-S	up to 2 video fields
	Minimum Pulse Width	10 $\mu$ s
	Maximum Pulse Width	1 frame -10 $\mu$ s
	Level	5V

Specifications are subject to change without notification



# Service Information

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## In This Chapter

This chapter contains the following sections:

- Troubleshooting Checklist
- Warranty and Repair Policy

### Troubleshooting Checklist

Routine maintenance to this RossGear product is not required. In the event of problems with your DAC-8016A, 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 Ross Video products distributor, or the Ross Video 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 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.

## **Warranty and Repair Policy**

The RossGear DAC-8016A 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 RossGear DAC-8016A 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 RossGear DAC-8016A has failed after your warranty period has expired, we will repair your defective product for as long as suitable replacement components are 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 RossGear DAC-8016A SDI to Analog Composite Converter User Manual of our Digital Products line provides all pertinent information for the safe installation and operation of your RossGear Product. Ross Video policy dictates that all repairs to the RossGear DAC-8016A 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 RossGear DAC-8016A, 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 RossGear DAC-8016A. A temporary replacement module, if required, 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 this equipment.

# Ordering Information

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## In This Chapter

This chapter contains ordering information for the DAC-8016A and related products.

### DAC-8016A and Related Products

#### *Standard Equipment*

- **DAC-8016A** SDI to Analog Composite Converter
- **DAC-8016A-X** SDI to Analog Composite Converter with Cross Color Filter
- **DAC-8016A-S** SDI to Analog Composite Converter with Frame Synchronizer
- **DAC-8016A-SX** SDI to Analog Composite Converter with Cross Color Filter and Frame Synchronizer

#### *Optional Equipment*

- **8016ADR-004** SDI to Analog Composite Converter User Manual (additional User Manual)
- **FSU-8016A** Frame Synchronizer Upgrade kit for adding Frame Sync function to standard DAC-8016A
- **EXT-8100** Extender Board (module servicing extension)
- **DFR-8104A** Digital Products Frame and Power Supply (PS-8102)\* (1RU, holds 4 modules, includes 1 power supply)
- **DFR-8104A-C** Digital Products Frame with Cooling Fan Module and Power Supply (PS-8102)\* (1RU, holds 4 modules, includes 1 power supply)
- **DFR-8110A** Digital Products Frame and Power Supply (PS-8102)\* (2RU, holds 10 modules, includes 1 power supply)
- **DFR-8110A-C** Digital Products Frame with Cooling Fan Module and Power Supply (PS-8102)\* (2RU, holds 10 modules, includes 1 power supply)
- **CFM-8104A** Cooling Fan Module (cooling kit for standard DFR-8104A)
- **CFM-8110A** Cooling Fan Module (cooling kit for standard DFR-8110A)

- **PS-8102** Power Supply (85-264 volts)  
(redundancy option power supply for Ross 8000 series 2RU digital product frames)
- **FSB-7110** Rear Support Bars and Brackets  
(additional support for rear frame-to-rack mounting)
- **CRB-8110A** Card Retaining Bracket  
(module retainer used in field installations such as mobile trucks etc.)
- **CSB-8100** Cable Support Bracket  
(cable support bar for rear of digital frames)
  - \* One User Manual is supplied with each of these RossGear products.

Your **DAC-8016A** SDI to Analog Composite Converter is a part of the RossGear family of products. Ross Video offers a full line of RossGear terminal equipment including distribution, conversion, monitoring, synchronizers, encoders, decoders, AES, keyers, switches, as well as analog audio and video products.

**Notes:**

**Notes:**

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# 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

<b>PHONE</b>	<b>General Business Office and Technical Support</b>	613 • 652 • 4886
	<b>After Hours Support</b>	613 • 349 • 0006
	<b>Fax</b>	613 • 652 • 4425
<b>E-MAIL</b>	<b>General Information</b>	solutions@rossvideo.com
	<b>Technical Support</b>	techsupport@rossvideo.com
<b>POSTAL SERVICE</b>	<b>Ross Video Limited</b>	8 John Street, Iroquois, Ontario, Canada K0E 1K0
	<b>Ross Video Incorporated</b>	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
- On-line catalog
- Trade show information
- News
- Testimonials

[www.rossvideo.com](http://www.rossvideo.com)

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