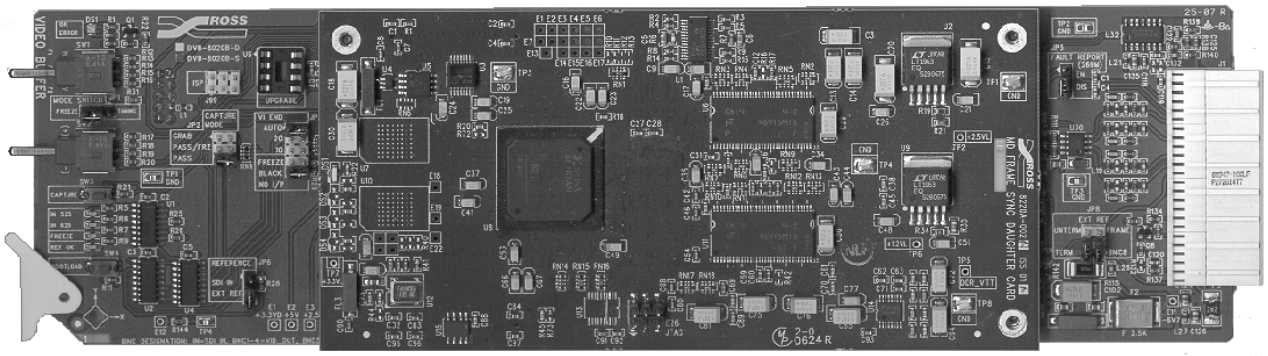
Ross Video Limited

DVB-8020B-S

Digital Video Buffer
Frame Synchronizer Version

User Manual



Ross Part Number: 8020BSDR-004
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Live Production Technology™

DVB-8020B-S • Digital Video Buffer - Frame Synchronizer Version User Manual

- Ross Part Number: **8020BSDR-004**
- Document Issue: **01A**
- Printed in Canada.

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Trademarks

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

EUROPE

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

INTERNATIONAL

This equipment has been tested to **CISPR 22:1997** along with amendments **A1:2000** and **A2:2002** and found to comply with the limits for a Class A Digital device.

Notice

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

Maintenance/User Serviceable Parts

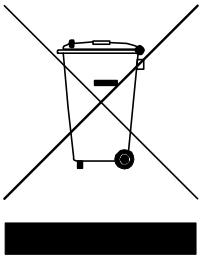
Routine maintenance to this RossGear product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the numbers listed under the "Contact Us" section on the last page of this manual. All RossGear products 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.

Contents

Introduction

In This Chapter

This chapter contains the following sections:

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

A Word of Thanks

Congratulations on choosing the Ross Video **DVB-8020B-S Digital Video Buffer, Frame Synchronizer Version**. The DVB-8020B-S is part of a full line of Digital 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 DVB-8020B-S 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 DVB-8020B-S, please contact us at the numbers listed on the back cover of this manual. Our technical support staff is always available for consultation, training, or service.

Overview

The DVB-8020B-S is the ideal solution for synchronizing SDI video sources in any facility. The DVB-8020B-S provides full frame synchronization with adjustable horizontal and vertical sub-pixel phasing.

The DVB-8020B-S drives four serial digital outputs. Both 525 and 625 line video formats are automatically supported. When the card is passing live video, embedded audio, and other ancillary data are passed untouched. The DVB-8020B-S processes SDI signals with full 10 bit accuracy.

The output video is synchronized either to an external analog reference or to the input digital signal. When the input digital signal is chosen as the reference, the DVB-8020B-S functions in delay mode. The timing settings are maintained in the event of a power failure.

The DVB-8020B-S can be remotely controlled by GPI or an optional control panel. This DA sized card will also freeze video from any SD-SDI source. The freeze is triggered remotely by GPI or a pushbutton on the card. Freeze frames are saved instantly into volatile RAM memory. Field 1, Field 2, or a frame of frozen video, can be captured and displayed. When the input signal is lost, the DVB-8020B-S will either automatically freeze the last field of video received or output black. In both cases, embedded audio and other ancillary data will be muted.

The DVB-8020B-S occupies one slot in the Ross DFR-8104 1RU and the DFR-8110 2RU digital rack frames. It is also fully compatible with the Leitch* 6800 series digital rack frame.

Ross digital frames have a master reference input which feeds all modules. Optionally, each module can have a separate reference, using BNC 8.

For applications where only delay of a digital signal is required, consider using the more cost effective DVB-8020B-D.

Functional Block Diagram

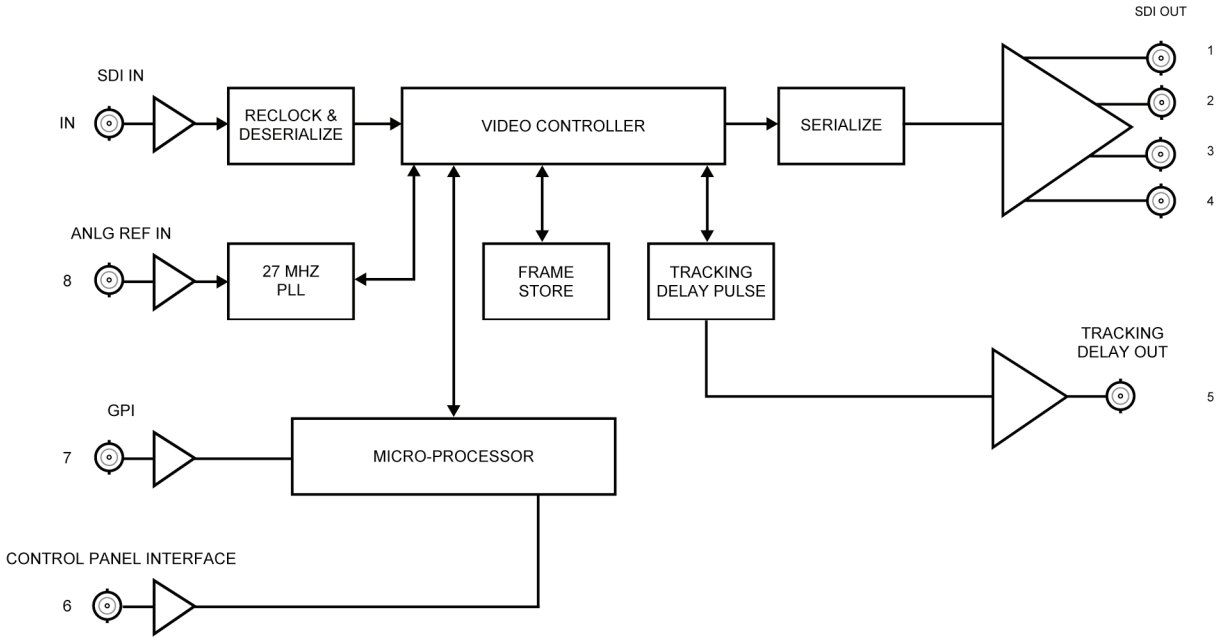


Figure 1. Simplified Block Diagram of DVB-8020B-S Functions

*Leitch is a trademark of Harris-Leitch Technology Corporation.

Features

The following features make the DVB-8020B-S the best solution for SDI signal buffering:

- Fully digital 10 bit signal processing and storage
- Automatic 525/625 input format detection
- Reference selectable from either digital video input or external analog reference
- Card-edge horizontal, vertical, and frame timing delay adjustments
- Timing adjustments are automatically restored following a power loss
- Three vertical blanking output modes - 10 line, 20 line, or auto detect
- Card-edge and/or GPI remote controlled operation
- Frozen field output mode for flicker-free images with motion content
- EDH is recalculated on the output
- Mute of embedded audio and ancillary data when the input video is lost and the image is frozen
- Optional control panel
- Four serial digital outputs
- 10 modules fit into a 2RU frame
- 5-year transferable warranty
- Also fits Leitch™ 6800 series frames

Documentation Terms

The following terms are used throughout this guide:

- "**Frame**" refers to the **DFR-8104A** and **DFR-8110A** frames that house the **DVB-8020B-S** 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**" refers to the person who uses the DVB-8020B-S.
- "**Board**", "**Card**", and "**Module**" refer to the DVB-8020B-S module itself, including all components and switches.
- "**System**" and "**Video system**" refers to the mix of interconnected digital and analog production and terminal equipment in which the DVB-8020B-S operates.
- "**Active video**" refers to the video signal as it is presented to the input BNC of the DVB-8020B-S.
- "**Captured**" or "**frozen**" refers to the frame of video stored in the DVB-8020B-S volatile memory.

Installation and Setup

In This Chapter

This chapter contains the following sections:

- Static Discharge
- Unpacking
- Board Installation
- BNC Labels
- Cable Connections

Static Discharge

Whenever handling the DVB-8020B-S and other related equipment, please observe all static discharge precautions as described in the following note:

ESD Susceptibility

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

Unpacking

Unpack each DVB-8020B-S 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.

Board Installation

Use the following procedure to install the DVB-8020B-S in a RossGear 8000 series digital distribution frame:

1. Refer to the User Manual of the RossGear 8000 series frame, to ensure that the frame is properly installed according to instructions. If this card is to be installed in any compatible frame other than a Ross Video product, refer to the frame manufacturer's manual for specific instructions.

Note

> 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 convectional cooling.

2. After selecting the desired frame installation slot, hold the DVB-8020B-S card by the edges and carefully align the card edges with the slots in the frame.
3. Fully insert the card into the frame until the rear connection plug is properly seated.

This completes the procedure to install the DVB-8020B-S in a RossGear 8000 series digital distribution frame.

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 DVB-8020B-S when mounted in the RossGear 8000 series Digital Products Frames. Refer to the following frame rear panel diagram for BNC input and output designations:

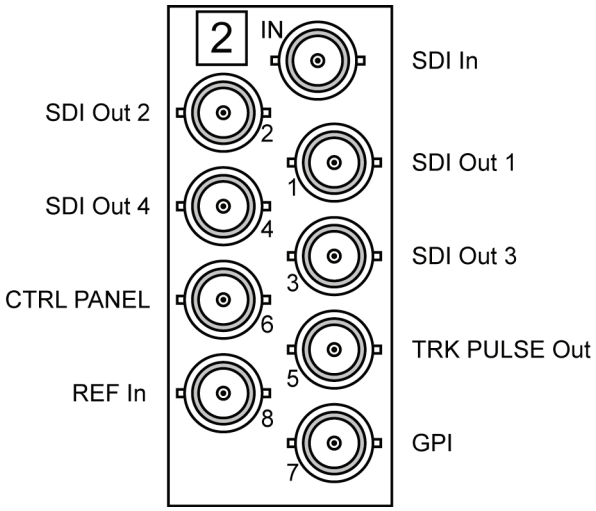


Figure 2. BNC Designations for the RossGear DFR-8110A (2RU frame)

User Controls

In This Chapter

This chapter contains the following sections:

- Card-Edge User Controls
- Jumper Locations
- LEDs

Card-Edge User Controls

This section provides information about the card-edge user controls of the DVB-8020B-S card.

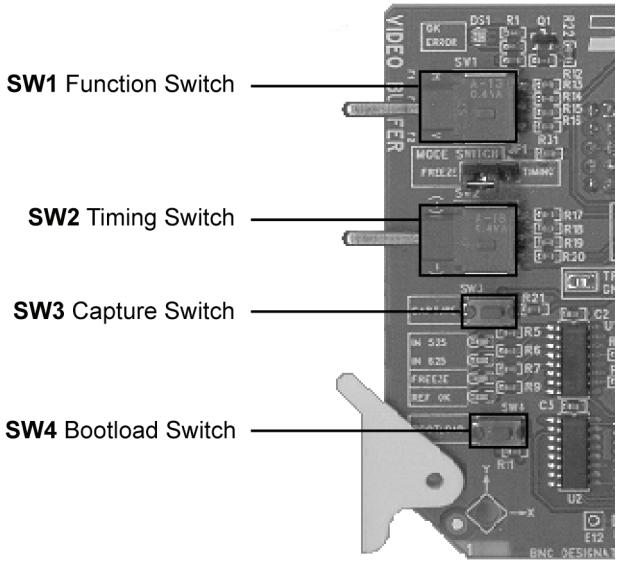


Figure 3. Card-Edge User Controls

Refer to the section "**Operational Modes**" for instructions on operating your DVB-8020B-S with the Card-edge User Controls.

SW1 — Function Switch

SW1 – Function Switch has two sets of functions based on how jumper **JP1** – **Switch Mode** is set. When **JP1** is set to **FREEZE**, **SW1** selects what is output when **SW3 – Capture Switch** is pressed.

Select one of the following **SW1** functions:

- **F1** — Select this option to output **Field 1** in both fields.
- **FRM** — Select this option to output the whole **Frame**.
- **F2** — Select this option to output **Field 2** in both fields.

When **JP1** is set to **TIMING**, **SW1** selects what is affected by **SW2 – Timing Switch**.

Select one of the following **SW1** functions:

- **H** — Select this option to move the output in half-pixel increments.
- **FRM** — Select this option to move the output in frame increments.
- **V** — Select this option to move the output in line increments.

SW2 — Timing Switch

SW2 – Timing Switch is used to adjust the output delay. The timing parameter that can be adjusted using **SW2** is dependent on which function is selected on **SW1** when **JP1** is set to **TIMING**.

SW2 can be used to make the following delay adjustments:

- **(+)** — Increases the amount of output delay relative to the **REF** selected by **JP6**.
- **(-)** — Decreases the amount of output delay relative to the **REF** selected by **JP6**.

SW3 — Capture Switch

SW3 – Capture Switch is used to capture a frame of video when **JP1** is set to **FREEZE**. Note that GPI remote operation performs the same function as **SW3**. Refer to the section "**GPI**" for details.

Note

> Regardless of what mode **JP1** is set to, if **JP2** is in the **GRAB** or **PASS/FREEZE** modes, pressing **SW3** will always capture a frame of valid input video.

SW4 — Bootload Switch

SW4 – Bootload Switch is used to upload new software, and for zeroing the delay in conjunction with **SW2 – Timing Switch**.

Jumper Locations

Use the following information to set up the DVB-8020B-S jumpers.

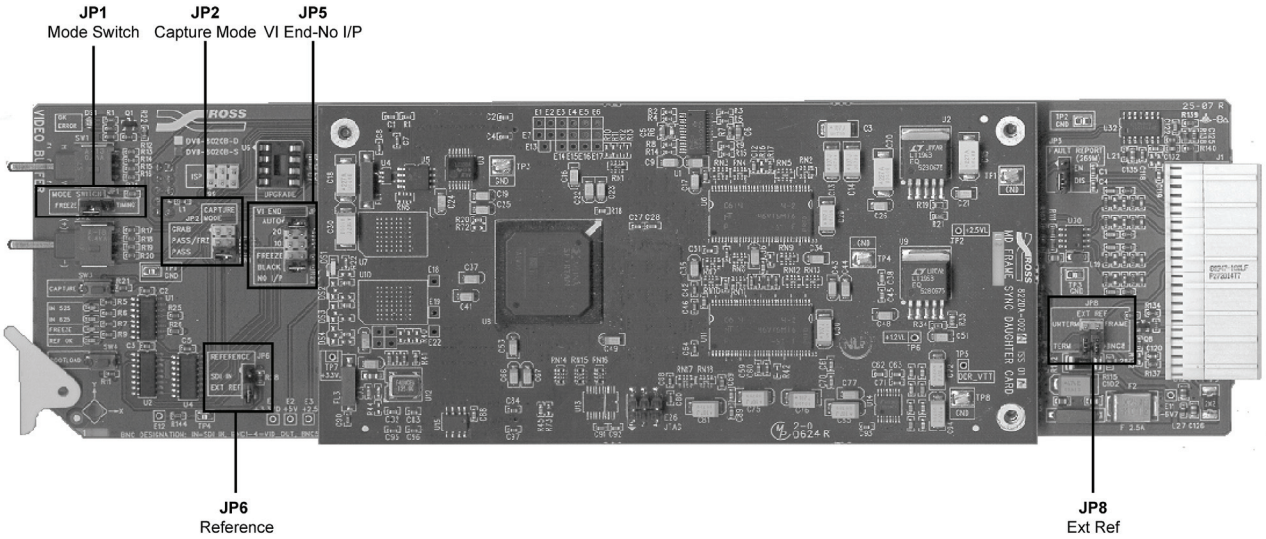


Figure 4. Jumper Locations

JP1 — Mode Switch

JP1 – Mode Switch selects which set of functions are active on **SW1 – Function Switch**. The default is **FREEZE**.

Select one of the following modes:

- **FREEZE** — Selects field or frame freeze options.
- **TIMING** — Selects horizontal, vertical, or frame delay options.

Note

> Regardless of what mode **JP1** is set to, if **JP2** is in the **GRAB** or **PASS/FREEZE** modes, pressing **SW3** will always capture a frame of valid input video.

JP2 — Capture Mode

If jumper **JP1** is set to **FREEZE Mode**, use **JP2** to select a sub-mode as follows:

- **GRAB —** The card does not pass live video. By pressing the **SW3 – Capture Button**, the captured frame becomes the output. Subsequent presses of **SW3** will capture another frame, creating a new output.
- **PASS/FREEZE —** The card passes live video until **SW3** is pressed. This will capture a frame of video to use as the output. Subsequent presses of **SW3** alternates between outputting live video and capturing a frame for output.
- **PASS** — The card outputs live video only. **SW3** is disabled.

Note

> The **Capture Mode** functions only when there is a valid input signal.

JP5 — VI End and No I/P

JP5 – VI End and No I/P has the following distinct functions:

Note

> The **V-Bit** adjustment is only available for 525 line formats.

- **VI End** — Sets the length of the output vertical interval. Select one of the following:
  - **AUTO** — Follows that of the input vertical interval. This is the default.
  - **20** — Interval is set to 20 lines.
  - **10** — Interval is set to 10 lines.
- **No I/P** — Sets the state of the output when the input signal is lost. Select one of the following:
  - **FREEZE** — The output is frozen.
  - **BLACK** — The output goes to SDI black. This is the default.

    This jumper setting only applies to the card's output when a valid reference is present, and **JP6** is set to **EXT REF**.

Note

> The line format of the SDI black output will be the same as the line format of the external reference selected on **JP6**.

JP6 — Reference

JP6 – Reference selects a reference timing source. The default is **EXT REF**.

Select one of the following settings:

- **SDI IN** — The card is forced into **Delay Mode (D)**.
- **EXT REF** — The card is set to **Frame Sync Mode (FS)** if the reference is valid and the same line format as the input otherwise the card will return to **Delay Mode**.

JP8 — EXT REF

JP8 – EXT REF has the following functions:

- **External Reference Selection** — Selects a source for the external reference. Select one of the following:
  - **FRAME** — Selects the frame reference as the source. This is the default.
  - **BNC 8** — Selects the reference connected to BNC 8 as the source.
- **Reference Termination** — Selects an external reference termination option. Select one of the following:
  - **UNTERM** — The external reference is not terminated. This is the default.
  - **TERM** — The external reference is terminated.

Note

> Do not select **TERM** if **FRAME** is selected.

LEDs

The front edge of the card includes LED indicators which show the status of the card. This section provides information on the LED indicators of the DVB-8020B-S card.

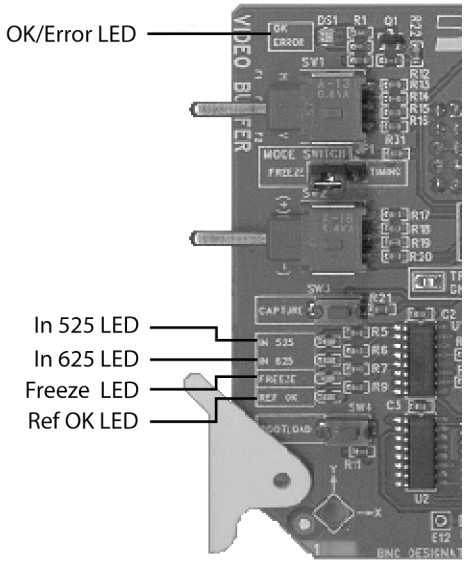


Figure 5. LED Locations

Table 1. LED Status Indicator Descriptions

LED	Color	Status Description
OK / ERROR	Green	When lit green, this LED indicates that the input signal is valid*.
	Red	When lit red, this LED indicates that the input signal is not valid.
IN 525	Green	When lit, this LED indicates that the input signal is 525 line format.
IN 625	Green	When lit, this LED indicates that the input signal is 625 line format.
FREEZE	Green	When lit, this LED indicates that a frame of video is captured into memory.
REF OK	Green	When lit, this LED indicates that the reference is valid. When flashing, this LED indicates that the reference is valid but does not match the input signal's line format.

* A valid signal is one that is present, either 525 or 625 lines per frame, and the card is able to lock to it.

Card Operation

In This Chapter

This chapter contains the following sections:

- Reference and Card Output
- Operational Modes
- FREEZE Mode
- TIMING Mode
- Vertical Interval
- GPI

Reference and Card Output

The output of the DVB-8020B-S comes from one of two sources:

- **BNC IN** — This is referred to as active, or pass through, video. The active video from **BNC IN** is unmodified by the DVB-8020B-S.
- **Memory** — This is referred to as frozen, or captured, video. The frozen video is a frame of video repeatedly played out from the memory of the DVB-8020B-S.

Both sources can be delayed as they are output. The reference dictates how much the output video is delayed. If the reference is selected by **JP6** to be **SDI IN**, then the output video is delayed by the minimum delay through the card plus whatever you set using **JP1**, **SW1**, and **SW2**. If the reference is selected to be **EXT REF**, then the output video is delayed to be synchronous, with the analog external reference. This also provides a minimum delay plus whatever additional delay has been added using **JP1**, **SW1**, and **SW2**.

The clock used to output video is extracted from one of two places. If the reference is **SDI IN**, then the extracted clock comes from the input signal. If the input signal becomes invalid, then the output will be muted. If the reference is **EXT REF**, then the extracted clock comes from the reference. If the reference becomes invalid, then the card will start extracting the output clock from the input signal and the card will also stop synchronizing and will then operate like the DVB-8020B-D.

Operational Modes

The DVB-8020B-S has two main modes of operation. These two modes are set using the jumper **JP1 – MODE SWITCH**.

The following modes are available:

- **FREEZE** — Selects field or frame freeze options.
- **TIMING** — Selects horizontal, vertical, or frame delay options.

You can toggle between the two modes while the DVB-8020B-S is powered on. All user adjustments in both modes are saved to the non-volatile memory. Each mode is described in the following sections.

FREEZE Mode

In this mode a frame of the input signal can be captured and stored into memory. If the power is lost the stored frame is lost as well. The input signal must be valid before a capture can take place.

SW1 – FUNCTION SWITCH

SW1 allows you to select the output format of the displayed captured video. Depending on the image content, it is possible that there will be an apparent one line shift up or down and loss of vertical resolution. This flicker is a side effect of capturing moving video. Use either the **F1** or **F2** setting to remove it. **FRM** can be used on captured video with no motion content such as graphics from character generators.

- **F1** (**Field 1**) **—** Field 1 is output into both fields.
- **FRM** (**Frame**) **—** Both Field 1 and Field 2 are output.
- **F2** (**Field 2**) **—** Field 2 is output into both fields.

Note

> **F2** (**Field 2**) is not available when using 525 line format. When using 625 line format, **F1** (**Field 1**) is not available.

SW3 – CAPTURE SWITCH

Use **SW3** to capture a frame of video from the input signal. The GPI performs the same function as this switch. Any mention of the capture switch applies to the GPI as well. The input signal must be valid before a capture can take place.

JP2 – CAPTURE MODE

JP2 enables you to select the type of capture as follows:

- **GRAB —** Pressing **SW3** causes a new capture of the active video. Active video is not passed through the card, only captured video is output. When the output video is frozen, and **JP1** is set to **FREEZE**, **SW1** is active, EDH is re-calculated, and ancillary data is muted.
- **PASS / FREEZE —** After power-up, active video is passed through the card unmodified. Repeatedly pressing the capture switch alternates between capturing and displaying another frame of active video or passing it. When the output video is frozen, the switch **SW1** is active, EDH is re-calculated, and ancillary data is muted.
- **PASS** — Incoming video and ancillary data are passed through the card unmodified. **SW3** is disabled. **SW1** has no effect.

TIMING Mode

In this mode the output signal, either active or frozen, can be delayed with respect to the input signal, or the reference signal. There will always be a nominal delay through the card even if minimum delay is selected.

When you set the Frame Delay to 0, the input signal takes one line (of time) to progress from the input to the output of the card in one of two methods:

- If the input signal leads the reference frame by one line more than the output, it can be synchronized and the output aligned to that reference frame.
- If the input signal does not lead the reference frame by more than one line than the output, the output is delayed, and the output is aligned to the next reference frame. In this case, if you increment the frame delay from 0 to 1, the card will not increment.

When the user sets the Frame Delay to a value greater than 0, the input signal is required to lead the reference signal by at least one-eighth of a line. If this condition is not met, the card forces an extra frame of delay on the output.

SW1 – FUNCTION SWITCH

Sets how the output video is to be delayed.

- **H (Horizontal) Mode — SW2** adjusts the delay in 37ns increments.
- **FRM — SW2** adjusts the delay in frame increments.
- **V (Vertical) Mode — SW2** adjusts the delay in 1 line increments.

SW2 – TIMING SWITCH

Increases or decreases the amount of output delay relative to the reference selected by **JP6** and depending on the mode set on **SW1**.

- **(+)** — Increases the amount of output delay relative to the reference selected by **JP6**.
- **(-)** — Decreases the amount of output delay relative to the reference selected by **JP6**.

Refer to the following table for minimum and maximum delay values based on the line standard being used. For information on selecting the reference, refer to the section "**JP6 – Reference**" for details.

Table 2. Delay Values for Minimum and Maximum Delay

Mode	Line Standard			
	525		625	
	FS	D	FS	D
H Min	0	0	0	0
H Max	1715	1715	1727	1727
V Min	0	1	0	1
V Max	524	524	624	624
FRM Min	0	0	0	0
FRM Max	105	105	87	87

When **SW1** is in **H Mode**, **SW2** adds or removes delay in single clock (± 37ns, or one-half pixel) increments. The following behaviors apply when increasing or decreasing **H** delay, based on the values in Table 2:

- If **H** delay is incremented to **H Max**, the next increment will reset **H** delay back to 0, and increase the **V** delay by one. If **V** delay was at **V Max**, then both **V** delay and **H** delay are reset to 0.
- If **H** delay is decreased to 0, the next decrease will wrap **H** delay around to **H Max**, and decrease **V** delay by one. If **V** delay was already at 0, then both **V** and **H** delay are reset to **V Max** and **H Max**.

When **SW1** is in **V Mode**, **SW2** adds or removes delay in single line increments. The following behaviors apply when increasing or decreasing **V** delay, based on the values in Table 2:

- If **V** delay is incremented to **V Max**, the next increment will reset **V** delay back to 0.
- If **V** delay is decreased to 0, the next decrease will set the **V** delay to **V Max**.

When **SW1** is in **FRM Mode**, **SW2** adds or removes delay in single frame increments. The **FRM** delay cannot be incremented past **FRM Max**, or decreased past **FRM Min**.

Note

When setting the DVB-8020B-S to **FRM Max**, any previous Horizontal and Vertical Delay values are reset to 0 to allow a maximum delay of 105 (when using 525 line formats) and 87 (when using 625 line formats).

Accelerated ballistics are applied to switch **SW2** for fine and coarse control. When the switch is pressed, the minimum possible change will take place based on the position of **SW1**. If **SW2** is held, additional changes will then be added at an accelerating rate until a maximum rate of change is applied. As a result, "tapping" the button will change one step of delay. Holding it in one direction will cause the delay to be added slowly at first, and then accelerate after 3 seconds.

Use **H** and **V** delay to adjust the output video to the desired phase relationship within a frame boundary. Then, use **FRM** delay to set the proper number of frame delays.

Zeroing the Delay

H, **V**, and **FRM** delay can individually be reset back to zero as follows:

1. Press and hold the **BOOTLOAD** button (**SW4**). Holding down **SW4** for more than three seconds without toggling **SW2** causes the card to start a code version report.
2. Toggle **SW2** in the minus direction.
3. Release **SW2** while still holding the **BOOTLOAD** button.
4. Release the **BOOTLOAD** button.

Note

Releasing the **BOOTLOAD** button before releasing **SW2** will engage the accelerated ballistics, causing the delay to change and not reset back to zero as intended.

Vertical Interval

JP5 – VI END enables you to select the vertical blanking length as follows:

- **AUTO** — The card matches the Vertical Interval (VI) of the input signal. This is the default.

- **20** — The card sets the VI to 20 lines.
- **10** — The card sets the VI to 10 lines.

If the output is not frozen, the DVB-8020B-S does not blank the vertical interval. It inserts blanking codes for downstream equipment (such as encoders) which may blank within the marked vertical interval. The blanking area is marked to prevent the display of vertical interval data in the active picture. Some older equipment depend on blanking being exactly 10 lines. Some newer equipment depend on exactly 20 lines. The DVB-8020B-S handles both schemes and also has the added benefit of being able to "interface" new equipment to old equipment.

When the output is frozen, the vertical interval is blanked.

GPI

The GPI input on **BNC 7** performs the same function as **SW3 – CAPTURE SWITCH**. It can be wired to a momentary push-button. For best operation, wire the push-button between the signal wire and the ground shielding of the coax cable. A 0V to 5V logic connection will also work assuming the controlling equipment is at the same ground potential. The GPI input is normally high and is negative edge triggered. The GPI input can also be tested by momentarily attaching a standard 75-ohm termination to the GPI In BNC.

Remote Control Panel

In This Chapter

This chapter contains the following sections:

- Overview
- FREEZE (Store) Mode
- TIMING (Delay) Mode
- Zeroing the Delay

Overview

The optional **DCP-8020 Remote Control Panel** controls many of the features of the DVB-8020B-S remotely. It is supplied with 10 ft (3 meters) of flexible cable with a female BNC connector. This can be extended with a conventional coax cable to **BNC 6** on the DVB-8020B-S. Up to 300 ft (90 meters) of any type of coax cable may be used. The DCP-8020 power is obtained via the coax cable.

Figure 6. DCP-8020 Remote Control Panel

The **Remote Control Panel** has the following controls:

- The **STORE** section of the remote controls the **FREEZE** operational mode
- The **DELAY** section controls the **TIMING** operational mode.

Both sections of the remote work regardless of the position of **JP1 – MODE SWITCH** on the DVB-8020B-S. Both sets of controls on the DVB-8020B-S and on the remote are active at the same time. If two different actions are pushed at the same time, one on the card and the other on the remote or both on the remote, the DVB-8020B-S will try to execute each in the order that it was received but may miss one or more of the commands.

Note

> Regardless of the selections made on the DVB-8020B-S card, the **DCP-8020 Remote Control Panel** will always allow control of the Timing and Freeze Modes at the same time.

FREEZE (Store) Mode

With these controls, a frame of the input signal can be captured and stored into memory. This memory is temporary in that if the power is lost the stored frame is lost as well. A valid input signal must have been captured in order that the output video be valid.

FREEZE Button

The **FREEZE** button captures a frame of video from the input signal. The captured frame is then used as the card's output.

PASS Button

The **PASS** button passes the input signal straight through to the output. This button is only enabled if **JP2 – CAPTURE MODE** is set to **PASS/FREEZE**.

F1-FRAME-F2 Switch

This switch sets how the video is played out of the frozen (captured) frame. Depending upon the image content it is possible that there will be an apparent one line shift up or down and loss of vertical resolution. This flicker is a side effect of capturing moving video. Use either the **F1** or **F2** setting to remove it. The **FRAME** setting can be used on captured video with no motion content such as graphics from character generators.

Use the **F1-FRAME-F2 Switch** to select from the following:

- **F1** (**Field 1**) **—** Field 1 is output into both fields.
- **FRAME —** Both Field 1 and Field 2 are output.
- **F2** (**Field 2**) **—** Field 2 is output into both fields.

Note

> **F2** (**Field 2**) is not available when using 525 line format. When using 625 line format, **F1** (**Field 1**) is not available.

ERROR LED

The input signal is not valid. A valid signal is defined as a signal that is present, either 525 or 625 lines per frame, and the DVB-8020B-S is able to lock to it.

BUSY LED

The **BUSY** LED is not used.

TIMING (Delay) Mode

In this mode the output signal, either active or frozen, can be delayed with respect to the reference signal. The source of the reference signal is selected using **JP6**. Refer to the section "**JP6 – Reference**" for information on selecting the source of the reference signal.

When you set the Frame Delay to 0, the input signal takes one line (of time) to progress from the input to the output of the card in one of two methods:

- If the input signal leads the reference frame by one line more than the output, it can be synchronized and the output aligned to that reference frame.
- If the input signal does not lead the reference frame by more than one line than the output, the output is delayed, and the output is aligned to the next reference frame. In this case, if you increment the frame delay from 0 to 1, the card will not increment.

When the user sets the Frame Delay to a value greater than 0, the input signal is required to lead the reference signal by at least one-eighth of a line. If this condition is not met, the card forces an extra frame of delay on the output.

"+" AND "-" Buttons

These buttons either increase or decrease the output video delay.

Accelerated ballistics are applied to the **+** and **-** buttons for fine and coarse control. When the switch is pressed, the minimum possible phase change will take place based on the **HORZ-FRAME/LOCK-VERT** switch position. Additional changes will then be added at an accelerating rate until a maximum rate of change is applied. As a result, "tapping" the button will change one step of delay. Holding it in one direction will cause the delay to be added slowly at first, and then accelerate after 3 seconds.

HORZ-FRAME/LOCK-VERT Switch

The **HORZ-FRAME/LOCK-VERT** sets how the output video is delayed. There will always be a nominal delay through the card even if minimum delay is selected.

Use **H** and **V** delay to adjust the output video to the desired phase relationship within a frame boundary. Then, use **FRM** delay to set the proper number of frame delays.

HORZ Mode

In the **HORZ** position, the **+** and **-** buttons add or remove delay in single clock (± 37ns, or one-half pixel) increments. The following behaviors apply when increasing or decreasing the **H** delay:

- If **H** delay is incremented to **H Max**, the next increment will reset **H** delay back to 0, and increase the **V** delay by one. If **V** delay was at **V Max**, then both **V** delay and **H** delay are reset to 0.
- If **H** delay is decreased to 0, the next decrease will wrap **H** delay around to **H Max**, and decrease **V** delay by one. If **V** delay was already at 0, then both **V** and **H** delay are reset to **V Max** and **H Max**.

VERT Mode

In the **VERT** position the **+** and **-** buttons add or remove delay in units of 1 line increments. The following behaviors apply when increasing or decreasing the **V** delay:

- If **V** delay is incremented to **V Max**, the next increment will reset **V** delay back to 0.
- If **V** delay is decreased to 0, the next decrease will set the **V** delay to **V Max**.

FRAME/LOCK Mode

In the **FRAME/LOCK** position the **+** and **-** buttons add or remove delay in single frame increments. **FRM** delay cannot be incremented past **FRM Max**, or decreased past **FRM Min**.

Zeroing the Delay

H, **V**, and **FRM** delay can individually be reset back to zero. The **ZERO** button zeroes whatever delay the **HORZ-FRAME/LOCK-VERT** is pointing to.

Upgrades

In This Chapter

This chapter provides instructions to upgrade your DVB-8020B-S and contains the following topics:

- Equipment Supplied
- Socket and Button Locations
- Software or Firmware Upgrade
- Confirm Upgrade

Equipment Supplied

The following equipment is supplied for upgrades:

- A DVB-8020B-S User Manual
- The required upgrade chip(s)

Note

Contact Ross Video Technical Support to order an DVB-8020B-S Upgrade Kit. When contacting Ross Video Technical Support, ensure you have the software and FPGA version numbers ready.

Socket and Button Locations

Refer to the following diagram when upgrading the DVB-8020B-S card.

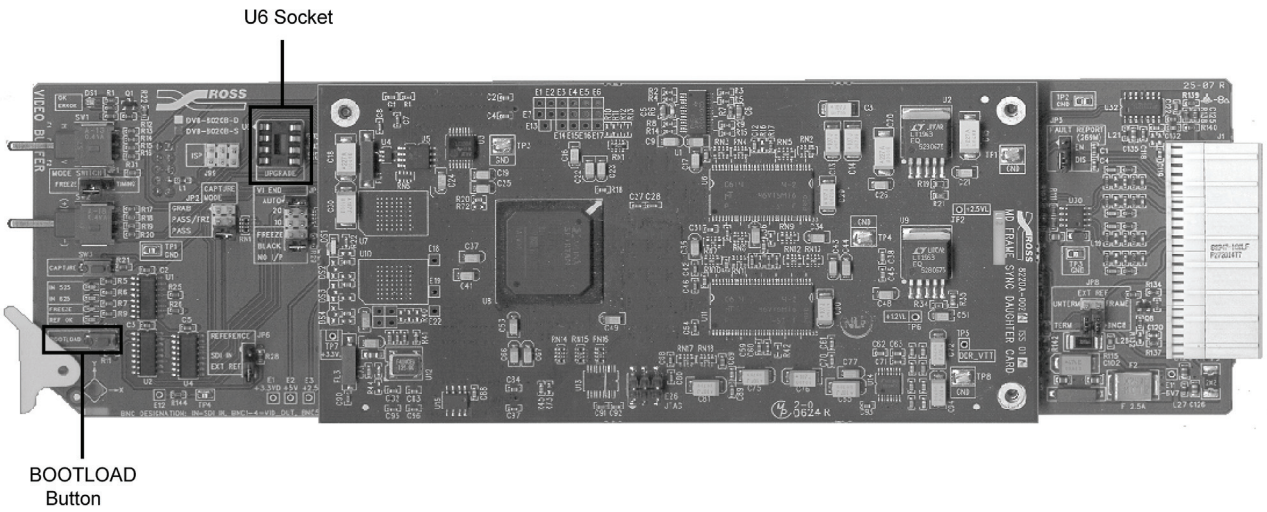


Figure 7. DVB-8020B-S Upgrade Socket and Label Locations

Software or Firmware Upgrade

This procedure applies to any software or firmware upgrade you may perform on the DVB-8020B-S. If you are upgrading multiple cards, repeat this procedure for each card to be upgraded.

Use the following procedure to upgrade a card:

1. With the card out of the frame, refer to **Figure 7**, to locate the **U6** socket.
2. If the socket is occupied, remove the chip from the socket as follows:
    - Use a tong-type IC chip removal tool (not supplied) to grab the chip by the leadless ends and gently pry the chip out of the socket.
    - Store the chip in a labeled static-free container.
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.
5. Gently and firmly press the chip into the socket.
6. Press the **BOOTLOAD** button while inserting the card into the powered frame and wait for the upgrade to complete. Alternately, you can insert the card and power up the frame if it is off.
    - When the green **OK LED** starts flashing, the upgrade is in progress and you can release the **BOOTLOAD** button.
    - The **OK LED** will flash at various rates throughout the upgrade.
    - The upgrade is done when the LED stops flashing. Upgrades can take approximately 90 seconds to complete.
7. Confirm the upgrade following the steps in the section, "**Confirm Upgrade**".
8. Remove the card from the frame.
9. Repeat step 2 to remove the chip from socket **U6**.

This completes the procedure for upgrading a card.

Confirm Upgrade

When confirming a card upgrade, the version number of the software and FPGA load is reported by LEDs flashing the same number of times as the version. The software and FPGA versions can be reported as **M.R TO** where:

- **M** represents the major version number of the software
- **R** represents the minor revision number of the software
- **T** represents the tens place of FPGA load number
- **O** represents the ones place of FPGA load number

Use the following procedure to read version numbers after a card upgrade:

1. Ensure the card is properly installed in the frame.
2. Power up the card and wait until the green **DS1** LED on the daughter card is lit.

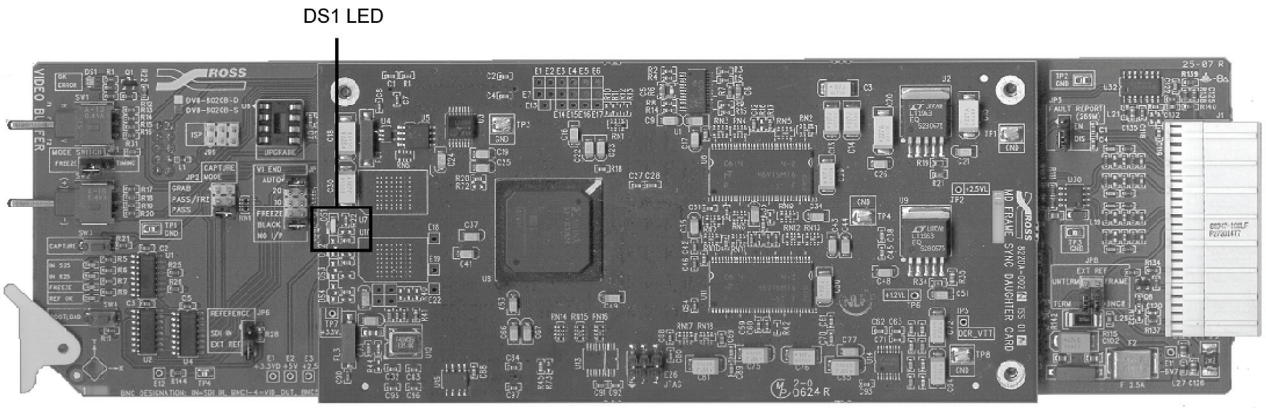


Figure 8. DVB-8020B Daughter Card DS1 LED

3. Hold **BOOTLOAD** down for three seconds. The card begins to flash the LEDs in the following cycle:
   - The **ERROR** LED flashes a number of times equal to the major version number of the software, or **M**.
   - The **IN 525** LED flashes a number of times equal to the minor revision number of the software, or **R**.
   - The **IN 625** LED flashes a number of times equal to the most significant digit of the FPGA version number, or **T**.
   - The **FREEZE** LED flashes a number of times equal to the least significant digit of the FPGA version number, or **O**.

Note

> The LEDs will continue to cycle through the numbers until the **BOOTLOAD** button is released.

4. Confirm that the displayed numbers match the upgrade versions you have performed.
5. If you are upgrading multiple cards, repeat the relevant upgrade procedures as necessary.

This completes the procedure to read version numbers after a card upgrade.

Specifications

Technical Specifications

This chapter includes the technical specifications for the DVB-8020B-S.

Table 3. DVB-8020B-S Technical Specifications

Category	Parameter	Specification
SDI Input	Number of Inputs	1
	Standards	SMPTE 259M 270Mbps 525/625 Lines
	Return Loss	>24dB to 270MHz
	Equalization	320m
	Input Impedance	75Ω terminating
SDI Outputs	Number of Outputs	4
	Output Impedance	75Ω terminating
	Output Return Loss	>18dB to 270MHz
	Signal Level	800mV ± 10%
	DC Offset	0V ± 30mV
	Rise & Fall Time	800pS (20 - 80%)
	Overshoot	<2%
Reference Input	Number of Inputs	1
	Standards	NTSC or PAL
	Input Impedance	75Ω
	Return Loss	>45dB to 6MHz
	Nominal Signal Level	1V pp or 2V pp sync.

Category	Parameter	Specification	
Delay Range	Minimum for 525 lines per frame	**Frame Sync (FS) Mode** (in relation to the reference)	**H**– 0 **V** – 0 **FRM** – 0
		Delay (D) Mode (in relation to the input)	**H** – 0 **V** – 1 **FRM** – 0
	Minimum for 625 lines per frame	**Frame Sync (FS) Mode** (in relation to the reference)	**H**– 0 **V** – 0 **FRM** – 0
		Delay (D) Mode (in relation to the input)	**H** – 0 **V** – 1 **FRM** – 0
	Maximum	**H** – 1715 **V** – 524 **FRM** – 105	**H** – 1727 **V** – 624 **FRM** – 87
Phasing Range	37ns or ½ pixels	0 μS to 1 frame	
Signal Quantization	Throughout	10 bit	
Power	Total Power Consumption	6.2W	

Specifications are subject to change without notice.

Service Information

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 DVB-8020B-S, 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 card, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check –** Check the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Reseat the Card in the Frame** – Eject the card and reinsert it in the frame.
4. **Check Control Settings –** Refer to the Installation and Operation sections of the manual and verify all user-adjustable component settings.
5. **Input Signal Status –** Verify that source equipment is operating correctly and that a valid signal is being supplied.
6. **Output Signal Path –** Verify that destination equipment is operating correctly and receiving a valid signal.
7. **Card Exchange** – Exchanging a suspect card with a card that is known to be working correctly is an efficient method for localizing problems to individual cards.

Warranty and Repair Policy

The RossGear DVB-8020B-S 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 DVB-8020B-S 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 DVB-8020B-S has failed after your warranty period has expired, we will repair your defective product should suitable replacement components be available. You, the owner, will bear any labor and/or part costs incurred in the repair or refurbishment of said equipment beyond the FIVE (5) year warranty period.

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

This RossGear DVB-8020B-S User Manual provides all pertinent information for the safe installation and operation of your RossGear Product. Ross Video policy dictates that all repairs to the RossGear DVB-8020B-S 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 DVB-8020B-S, 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 DVB-8020B-S. If required, a temporary replacement module will be made available at a nominal charge. Any shipping costs incurred will be the responsibility of you, the customer. All products shipped to you from Ross Video Limited will be shipped collect.

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

Ordering Information

DVB-8020B-S and Related Products

Your **DVB-8020B-S Digital Video Buffer - Frame Synchronizer Version** 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, keyers, switchers, as well as analog audio and video products.

Standard Equipment

- **DVB-8020B-S Digital Video Buffer - Frame Synchronizer Version**
- **8020BSDR-004 Digital Video Buffer - Frame Synchronizer Version** User Manual

Optional Equipment

- **8020BSDR-004 Digital Video Buffer - Frame Synchronizer Version** User Manual (additional User Manual)
- **DCP-8020** Remote Control Panel
- **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)

Contact Us

Contact our friendly and professional support representatives for the following:

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

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

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