Cobalt Digital Inc.

9021

Standard Definition A/D Analog Composite, Y/C or Component to 10-bit SDI

Owner's Manual

9021-OM
Version: 1.2

9021 • Standard Definition A/D Analog Composite, Y/C or Component to 10-bit SDI Owner's Manual

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- COBALT is a registered trademark of Cobalt Digital Inc.
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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 openGear™ frame. Refer to the openGear™ frame Owner's 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.

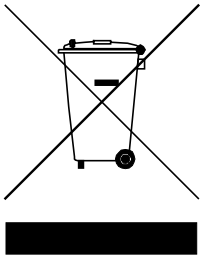
Only use attachments/accessories specified by the manufacturer.

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, Cobalt Digital 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 Cobalt Digital for more information on the environmental performances of our products.

Contents

Introduction

In This Chapter

This chapter includes the following sections:

- A Word of Thanks
- Overview
- Functional Block Diagram
- Supported Audio and Video Formats
- Documentation Terms

A Word of Thanks

Congratulations on choosing the 9021 **Standard Definition A/D Analog Composite, Y/C or Component to 10-bit SDI**. The 9021 is part of a full line of modular conversion gear for broadcast TV environments. The Cobalt Digital openGear™ line includes video decoders and encoders, audio embedders and de-embedders, distribution amplifiers, format converters, and much more. Cobalt openGear™ modular conversion gear will meet your signal conversion needs now and well into the future.

Should you have questions pertaining to the installation or operation of your 9021, please contact us at the numbers listed on the back cover of this manual.

Overview

The 9021 is a high quality full 10-bit analog to digital decoder for converting 525 and 625 line, analog composite, Y/C and component signals (YPbPr) to 270 Mb 4:2:2 SDI (SMPTE 259M compliant) output with SMPTE EDH. The user can select four different Y-C separation modes (4-line adaptive, 4-line non-adaptive, 3-line adaptive and notch filter) for composite input and three different YPbPr inputs (BetaCam™, MII™, or SMPTE/N10) for component inputs.

Features include differential inputs, user configurable 75-ohm input termination, user Proc. gain controls, de-jitter filter on/off, Color Bars on/off and Pedestal on/off. User Proc adjustments can be saved and factory defaults can be restored. The configuration controls are mounted on the card edge for in-frame adjustments.

The input and outputs of the 9021 are the following:

Input:

- (1) SD analog video input on three BNCs (CVBS, S-video, or component

Outputs:

- Seven SD-SDI video outputs

Software Version

- This manual is written for software release number 1.2.
- To view the current software release number of your 9021 check the information submenu on the front edge controls or the card info menu in Dashboard.
- To upgrade your 9021 software, go to the download page at www.cobaltdigital.com to download the latest release, and upload the file through Dashboard™ (see Dashboard™ user manual, 3-5).

Functional Block Diagram

This section diagrams the basic signal flow of your 9021 product.

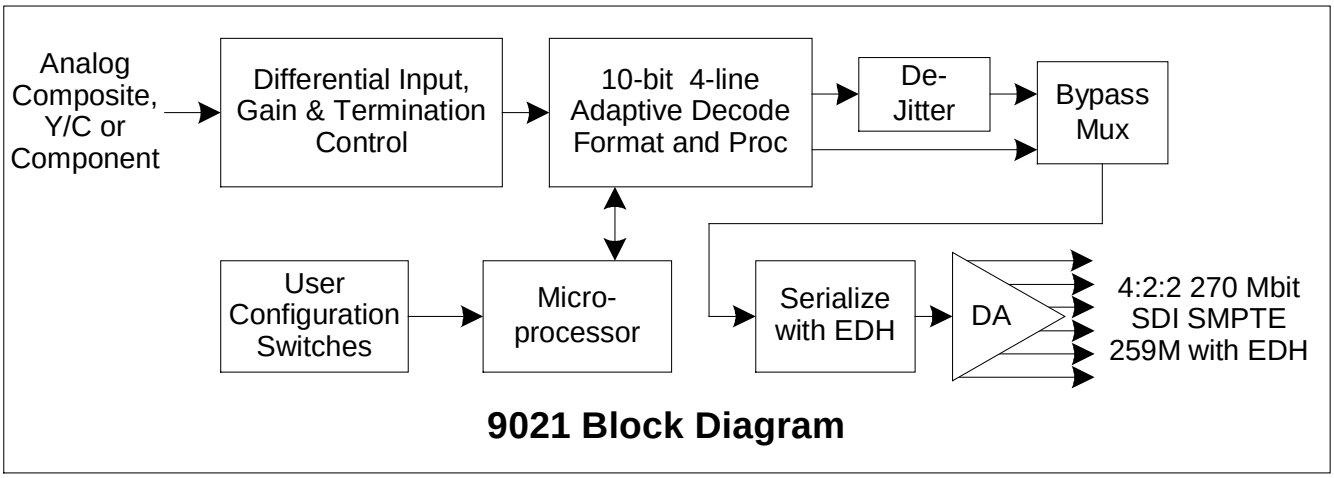


Figure 1. Simplified Block Diagram of 9021 Functions

Supported Video Formats

Input and Output Video

The 9021 supports both NTSC and PAL formats.

Raster structure	Frame Rate
486i[1]	29.97
575i[1]	25

Notes:

1. All rates displayed as frame rates, interlaced ("i") field rates are two times the number shown.

Documentation Terms

The following terms are used throughout this guide:

- "**Frame**" refers to the **HPF-9000** or similar 20-slot frame that houses the **9021** card.
- "**Operator**" and "**User**" both refer to the person who uses the **9021**.
- "**Board**" and "**Card**" all refer to the **9021** card itself, including all components and switches.
- "**System**" and "**Video system**" refers to the mix of interconnected production and terminal equipment in which the **9021** operates.

Installation and Setup

In This Chapter

This chapter includes the following sections:

- Static Discharge
- Unpacking
- Rear Module Installation (Optional)
- Board Installation
- BNC Connections
- Menu Structure
- Factory Defaults

Static Discharge

Whenever handling the card 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 card 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 Cobalt Digital directly.

Rear Module Installation (Optional)

If you are installing the card in a 8310-C-BNC or 8310-BNC frame (one with a 100 BNC rear module installed across the entire back plane), skip this section.

If you are installing the card into a slot with no rear module, you should have ordered and received an appropriate 9021rear module. You will need to install it in your frame before you can connect cables.

Use the following steps to install a rear module in a frame:

1. On the rear of the frame, locate the card frame slot.
2. As shown in Figure 2, seat the bottom of the rear module in the seating slot at the base of the frame's back plane.

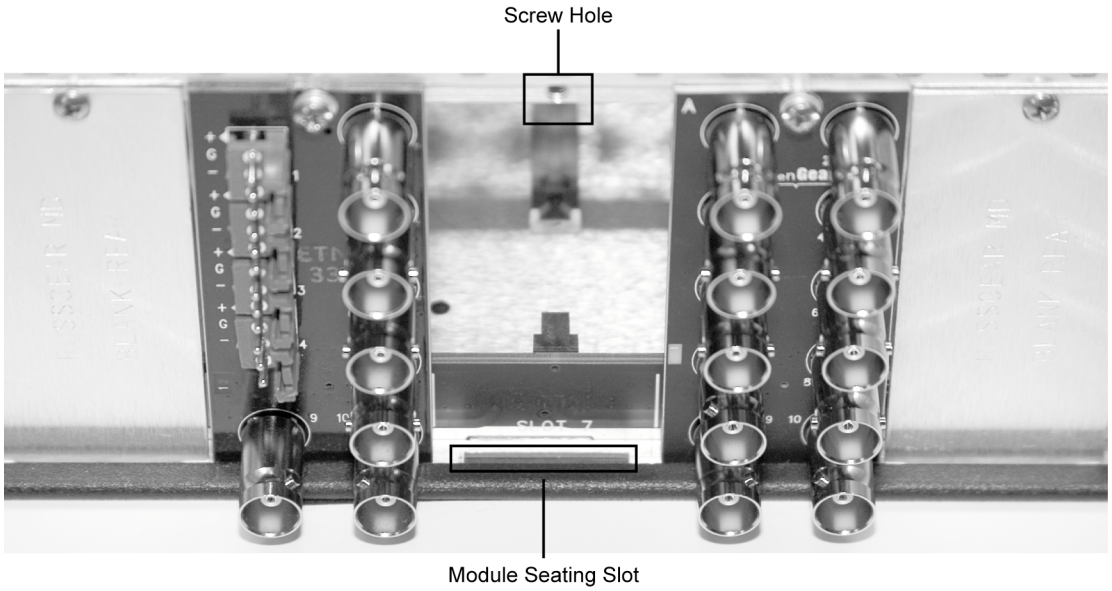


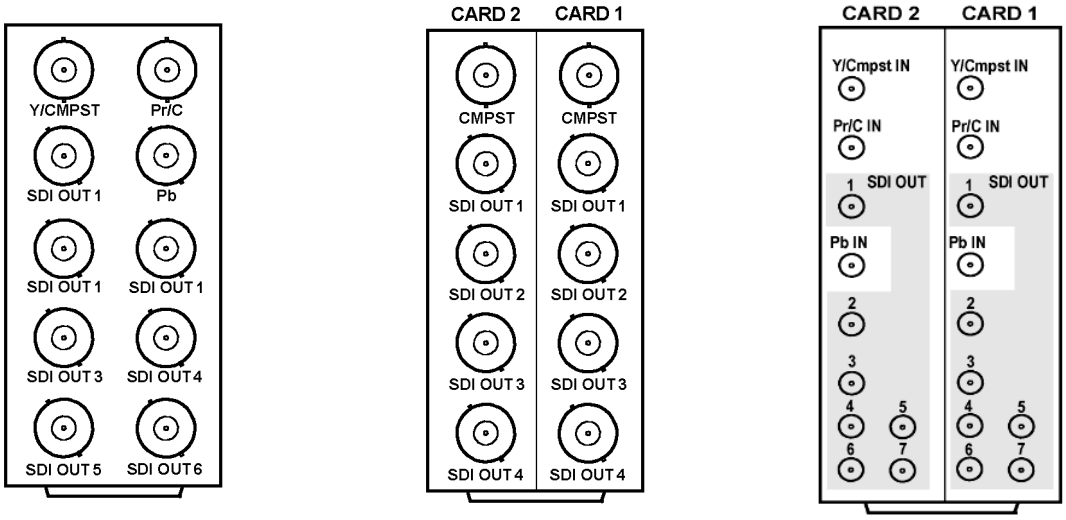
Figure 2. Rear Module Installation

3. Align the top hole of the rear module with the screw hole on the top edge of the frame back plane.
4. Using a Phillips driver and the supplied screw, fasten the rear module to the frame back plane. Do not over tighten.

All modules are installed using the same method above.

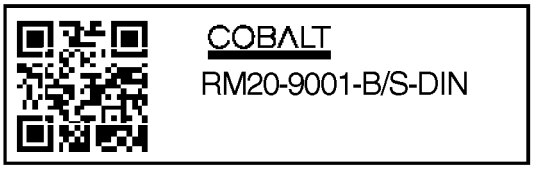
Rear Module Available for 9021

This section provides instructions for connecting cables to the installed BNC rear modules. Connect the input and output cables according to the applicable diagram below. Split rear module RM20-9021-A/S and RM20-9021-B/S allow two cards to be installed in adjacent slots. B/S versions are available in DIN1.0/2/3 and HDBNC versions.



RM20-9021-A **RM20-9021-A/S** **RM20-9021-B/S**

Figure 3. Connector Designations for the 9021 Rear Modules.



SAMPLE-NOT FOR USE

Due to the density of connector placement on Rear Modules using high-density connectors (e.g., RM20-9001-B/S-DIN), these modules use a QR barcode label instead a regular label. Simply scan the image with a smart phone and a link to the rear module label (as shown in our catalog) will appear. (Smart phone must have a QR reader app such as QuickMark QR Code Reader or equivalent.)

Not all devices may be able to acquire the image. If this occurs, use the device to access the web page for card/rear module to view the diagram.

Board Installation

Use the following steps to install the card in the frame:

1. Refer to the frame product manual to ensure that the frame is properly installed according to instructions.

Warning

> 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 convection cooling.

2. After selecting the desired frame installation slot, hold the 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 plugs are properly seated on the midplane and rear modules.
3. Connect the input and output cables according to the diagram for the rear module being used. The inputs are internally terminated with 75 Ohms. It is not necessary to terminate unused outputs.

This completes the procedure for installing the card in the frame.

Card Control and Status

Card Control Switches

The majority of the card control can be performed by the 8 switches on switch bank S1. Their operation is detailed in the following table.

S1.2-4	VIDEO INPUT AND COLOR SEPARATION MODE			
On	**On**	**On**	**On**	Composite 4-Line Adaptive Comb
On	**On**	**On**	**Off**	Composite 4-Line Non-adaptive Comb
On	**On**	**Off**	**On**	Composite 3-Line Adaptive Comb
On	**On**	**Off**	**Off**	Composite Notch Filter
On	**Off**	**xx**	**xx**	Y/C (S-Video)
Off	**On**	**On**	**On**	Component YPbPr BetaCam™
Off	**On**	**Off**	**Off**	Component YPbPr MII™
Off	**On**	**Off**	**On**	Component YPbPr SMPTE/N10
Off	**Off**	**On**	**On**	Component Y only BetaCam™
Off	**Off**	**Off**	**Off**	Component Y only MII™
Off	**Off**	**Off**	**On**	Component Y only SMPTE/N10
S1.5	**MANUAL GAIN CONTROL**			
OFF	Manual gain control enabled			
ON	Automatic gain control enabled			
S1.6	**COLOR BARS ON/OFF**			
OFF	Display Video			
ON	Display Color Bars			
S1.7	**JITTER FILTER**			
OFF	Jitter Filter Off			
ON	Jitter Filter On			
S1.8	**SETUP**			
OFF	Pedestal not removed (recommended for PAL)			
ON	7.5 IRE pedestal removed (recommended mode NTSC only)			

Other, less used, parameters are adjusted by dialing S3 and S4 to certain values, and then moving the thumb switch S2 up or down. These parameters are detailed in the following table. For any given parameters, pressing the REGISTER RESTORE button (S5) will restore the parameter to it's saved setting.

S3	S4	Internal
0	**0**	**Normal card operation**
1	**1**	**Y Gain**
1	**2**	**Y Offset (Black level)**
1	**3**	**Color Saturation**
1	**4**	**Hue (for Composite and Y/C inputs only)**
5	**1**	**Luma Peaking Filter adjustment**
6	**1**	**Vbit transition (S2 Up = ITU, line 10) (S2 Down = SMPTE, Line 20, Default)**
8	**8**	**Restore Factory Defaults (Press S2 Up)**
9	**9**	**Save Settings (Press S2 Up)**

Card Status LEDs

The card LEDs report the lock status of the device. See the table below for an explanation of each function.

LED NAME	DESCRIPTION
LOCK LED	Flashes green when not locked to input signal. When locked illuminates steady green. When S3 or S4 not at 0, indicates state of parameter.
NTSC LED	On when locked to NTSC input, off otherwise
PAL LED	On when locked to PAL input, off otherwise
RMT LED	reserved for future use

Factory Default Settings

The factory default settings are as follows

1) S4 - Color is On
2) S5 – Test Pattern is Off
3) S6 – Setup is On
4) S7 – Output Sample Mode is 16:16:16
5) S8 – De-Jitter Filter is On

Remote Control

In This Chapter

This section provides a detailed explanation on using remote control functions with your card.

DashBoard Control System Software

The DashBoard Control System enables you to monitor and control openGear™ frames and controller cards from a computer. The DashBoard software and manual can be downloaded from the Cobalt Digital Inc. website (www.cobaltdigital.com).

Using the Menus and Menu Descriptions

You must first install the DashBoard Control System software on your computer. Refer to the ***DashBoard User Manual*** for software installation procedures and for using the DashBoard interface.

The following pages list the parameters from the menu tabs available in the DashBoard software when connected to a 9021.

Menu	Item	Format	Description
Card Info (Read-only)	Product	CDI-9021	The product name
	Manufacturer	Cobalt Digital Inc.	The manufacturer of the product
	Serial Number	###########	The product serial number
	Software Release Number	###	The release number of the firmware in this card
	PIC Software Build Number	##	The internal build number of this software
	Temperature	Degrees C / Degrees F	The surface temp of the board
	+12 V Power Rail	#.## W	Positive Supply Power
	-7.5 Power Rail	#.## W	Negative Supply Power
	Power	#.# W	Total power consumed by the board
	Input Signal	###########	Detected standard of the input signal.

Technical Specifications

Table 4. Card - Technical Specifications

Category	Parameter	Specification
Serial Digital Video Outputs	Data Rates Supported	SMPTE 259M-C SD-SDI: 270 Mbps
	Frame Rates Supported	486i 29.97 NTSC, 575i 25 PAL
	Output Error Coding	SMPTE EDH
	Equalization	1000ft (300 meters) Belden 1694A
	Output Return Loss	>17dB at 270MHz
Analog Video Input	Number of Inputs	3
	Input Type	Differential, Common Mode Rejection (< 4.8V p-p)
	Video Inputs	Composite, Component YPbPr (BetaCam™, MII™, SMPTE/N10) and Y/C
	Conversion Bit Depth	10-Bits
	SD Color Separation	4-Line Adaptive Comb, 4-Line Non-adaptive Comb, 3-Line Adaptive Comb or Notch Filter
	Frequency Response	Y- 0-5.0MHz ± 0.25db
	Differential Phase	< 0.8%
	Differential Gain	< 1.8%
	S/N	>50 dB
	K-Factor	< 1%
	Input Return Loss	> 35dB at 5MHz
Other	Total Power Consumption	<5W
	Warranty	Five Year Transferable

Specifications are subject to change without notice.

Service Information

In This Chapter

This chapter includes the following sections:

- Troubleshooting Checklist
- Warranty and Repair Policy

Troubleshooting Checklist

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

1. **Visual Review —** Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the module, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check —** Check the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Reseat the Card in the Frame** — Eject the card and reinsert it in the frame.
4. **Check Control Settings —** Refer to the Installation and Operation sections of the manual and verify all user-adjustable component settings.
5. **Input Signal Status —** Verify that source equipment is operating correctly and that a valid signal is being supplied.
6. **Output Signal Path —** Verify that destination equipment is operating correctly and receiving a valid signal.
7. **Module Exchange** — Exchanging a suspect module with a module that is known to be working correctly is an efficient method for localizing problems to individual modules.

Warranty and Repair Policy

This product is warranted to be free from defects in material and workmanship for a period of five (5) years from the date of shipment to the original purchaser, except that 4000, 5000, 6000, 8000 series power supplies, and Dolby® modules (where applicable) are warranted to be free from defects in material and workmanship for a period of one (1) year.

Cobalt Digital Inc.'s ("Cobalt") sole obligation under this warranty shall be limited to, at its option, (i) the repair or (ii) replacement of the product, and the determination of whether a defect is covered under this limited warranty shall be made at the sole discretion of Cobalt.

This limited warranty applies only to the original end-purchaser of the product, and is not assignable or transferrable therefrom. This warranty is limited to defects in material and workmanship, and shall not apply to acts of God, accidents, or negligence on behalf of the purchaser, and shall be voided upon the misuse, abuse, alteration, or modification of the product. Only Cobalt authorized factory representatives are authorized to make repairs to the product, and any unauthorized attempt to repair this product shall immediately void the warranty. Please contact Cobalt Technical Support for more information.

To facilitate the resolution of warranty related issues, Cobalt recommends registering the product by completing and returning a product registration form. In the event of a warrantable defect, the purchaser shall notify Cobalt with a description of the problem, and Cobalt shall provide the purchaser with a Return Material Authorization ("RMA"). For return, defective products should be double boxed, and sufficiently protected, in the original packaging, or equivalent, and shipped to the Cobalt Factory Service Center, postage prepaid and insured for the purchase price. The purchaser should include the RMA number, description of the problem encountered, date purchased, name of dealer purchased from, and serial number with the shipment.

Cobalt Digital Inc. Factory Service Center

2406 E. University Avenue — Office: (217) 344-1243

Urbana, IL 61802 USA — Fax: (217) 344-1245

www.cobaltdigital.com — Email: info@cobaltdigital.com

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In Case of Problems

Should any problem arise with your openGear™ card, please contact the Cobalt Digital Inc. 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 openGear™ card. 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 Cobalt Digital Inc. will be shipped collect.

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

Ordering Information

9021 and Related Products

Your **9021 Standard Definition A/D 10-bit Analog Composite, Y/C and Component to SDI** is a part of the openGear™ family of products. Cobalt Digital offers a full line of openGear™ terminal equipment including distribution, conversion, monitoring, synchronizers, encoders, decoders, embedders, and de-embedders, as well as analog audio and video products.

Standard Equipment

- **9021** Standard Definition A/D 10-bit Analog Composite, Y/C and Component to SDI
- **9021-OM** Standard Definition A/D 10-bit Analog Composite, Y/C and Component to SDI Owner's Manual

Optional Equipment

- **9021-OM** Standard Definition A/D 10-bit Analog Composite, Y/C and Component to SDI Owner's Manual
  (additional Owner's Manual)
- **RM20-9021-A** 20-Slot Frame Rear I/O Module (Standard Width) Composite, Component and Y/C Inputs, 7 Converted SDI Outputs
- **RM20-9021-A/S** 20-Slot Frame Rear I/O Module (Split) Composite In, 4 SDI Outputs
- **RM20-9021-B/S-HDBNC** 20-Slot Frame Rear I/O Module (Split, High Density) Composite, Component and Y/C Inputs, 7 SDI Outputs (connectors are per card; all connectors are HD-BNC)
- **RM20-9021-B/S-DIN** 20-Slot Frame Rear I/O Module (Split, High Density) Composite, Component and Y/C Inputs, 7 SDI Outputs (connectors are per card; all connectors are DIN 1.0/2.3)
- **HPF-9000-CN** High-Power 20-Slot Frame; 2RU with fans, cover plates for unused slots. Includes one PSU-9000 Power Supply Module and MFC-8320-N Network Controller Card.
- **OG3-FR** 20-Slot Frame and Power Supply with Cooling Fans and Network Controller Card (2RU, holds 20 cards maximum)

Contact Us

Contact Cobalt Digital Inc.

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	Fax	217.344.1245
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