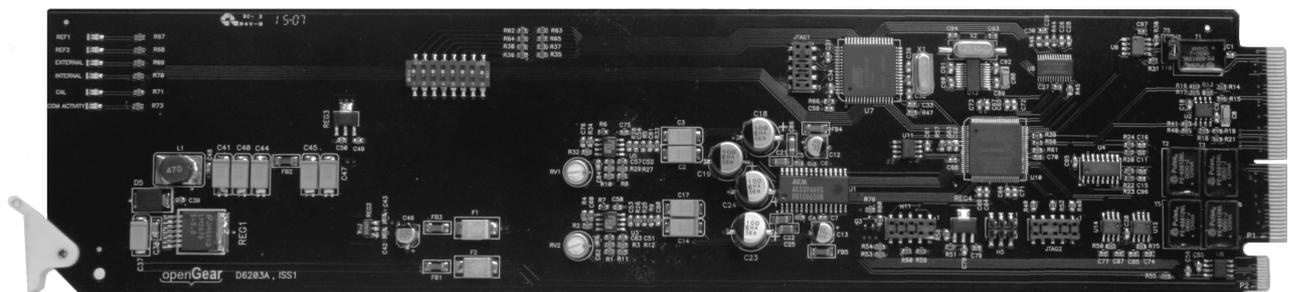**Cobalt Digital Inc.**

9345

Analog to AES/EBU Digital Audio Converter
User Manual

COBALT

openGear

Cobalt Part Number: 9345
V1.2

9345 • Analog to AES/EBU Digital Audio Converter User Manual

- Cobalt Digital Part Number: 9345
- Version 1.2
- Printed in the USA

The information contained in this User Manual is subject to change without notice or obligation.

Copyright

Notice

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

Warning

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

Warning

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

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

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

Only use attachments/accessories specified by the manufacturer.

EMC Notices

US FCC Part 15

This equipment has been tested and found to comply with the limits for a class A Digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

Notice

Changes or modifications to this equipment not expressly approved by Cobalt Digital Inc. could void the user's authority to operate this equipment.

CANADA

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

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

EUROPE

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

INTERNATIONAL

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

Notice

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

Maintenance/User Serviceable Parts

Routine maintenance to this openGear product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the numbers listed under the "Contact Us" section on the last page of this manual. All openGear 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, Cobalt Digital Inc. 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.
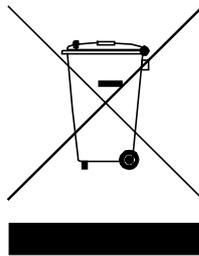
If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

Introduction

This chapter contains the following sections:

- Overview
- Functional Block Diagram
- Features
- Documentation Terms

Overview

The 9345 is an analog to AES/EBU digital audio converter designed for broadcast use. It provides digital to analog audio conversion along with AES/EBU signal distribution.

The 9345 supports audio sampling frequencies from 30kHz to 192 kHz. It converts the incoming stereo analog audio signal to an AES/EBU digital audio signal using 24 bit conversion technology.

The 9345 is housed in the openGear 8300 series frames.
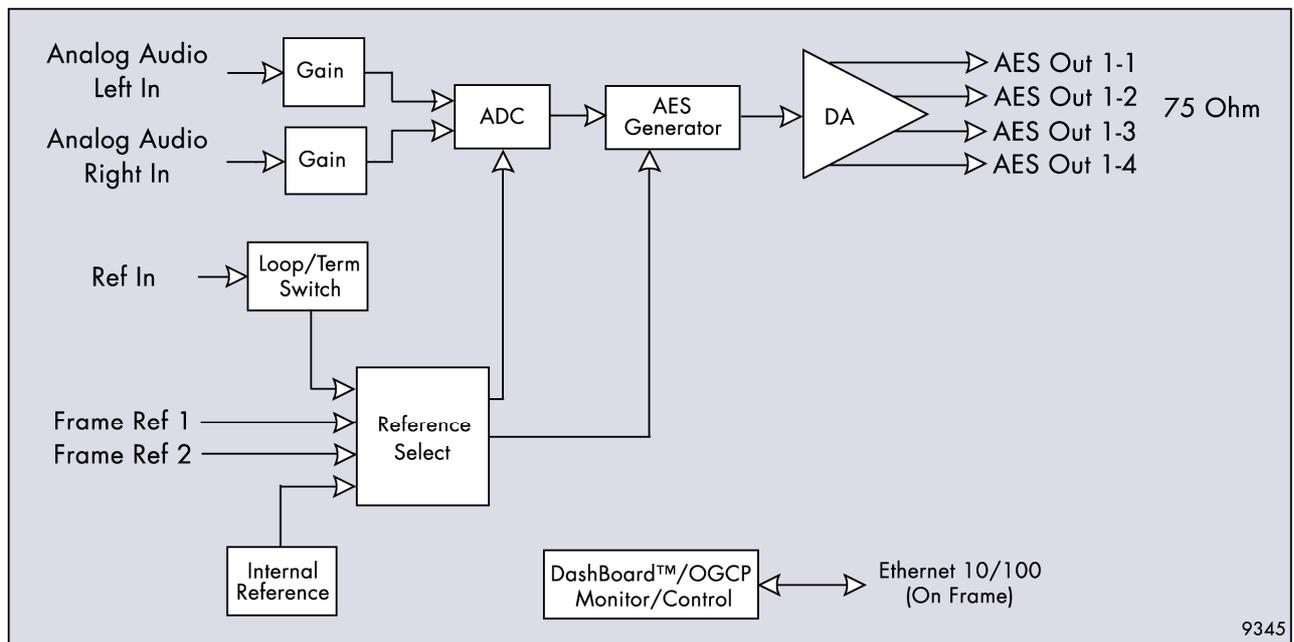
Functional Block Diagram

Figure 1. Simplified Block Diagram of the 9345 Functions

Features

The following features make the 9345 an excellent solution for analog to digital audio conversion.

- Converts analog audio to AES/EBU digital audio and provides AES/EBU signal distribution
- Can synchronize to frame, external or internally generated reference signals
- Internal clock generates audio sampling frequencies from 32kHz to 192 kHz
- 24-bit technology provides the highest quality signal conversion
- 5-year warranty
- Fits openGear 8300 series frames

Documentation Terms

The following terms are used throughout this guide:

- "**Frame**" refers to the **8310** or the **8320** frame that houses the **9345** card.
- "**Operator**" and "**User**" refer to the person who uses the **9345**.
- "**Board**", and "**Card**" refer to the **9345** card itself, including all components and switches.

Installation and Setup

This chapter contains the following sections:
- Static Discharge
- Unpacking
- Rear Module Options
- Board Installation

Static Discharge

Whenever handling the 9345 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 9345 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 Inc. directly.

Rear Module

If you are installing the card into a slot with no rear module, you should have ordered and received one rear 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.
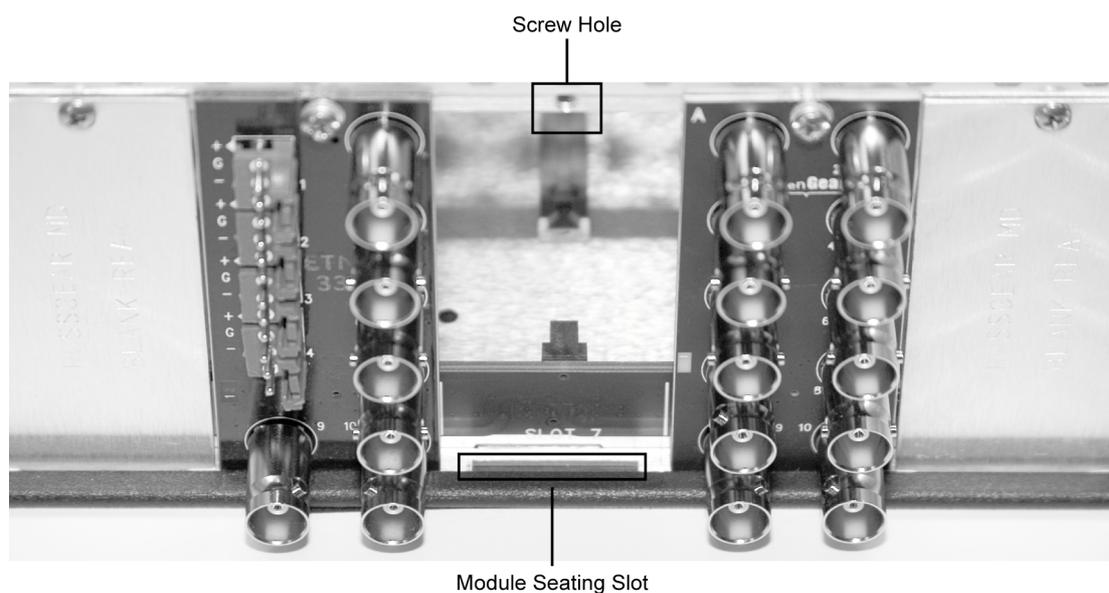

Figure 2. Rear Module Installation

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.

This section provides instructions for connecting cables to 9345 rear modules. Connect the input and output cables according to the following diagram. Split rear module RM20-9345-B/S allows two cards to be installed in adjacent slots. Both of the rear modules shown are compatible only with 20-slot frames (RM-9345-B rear module is for use with 8310-series (10-slot) frame).
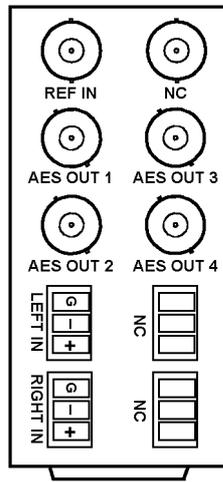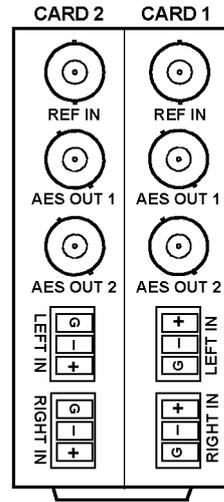
RM20-9345-B   **RM20-9345-B/S**

Figure 2. 9345 Rear Modules

User Controls

This chapter contains a description of the 9345 user controls:

- LEDs
- DIP Switch Settings

REF 1 LED ———

REF 2 LED ———

External LED ———

Internal LED ———

CAL LED ———

COM Activity LED ———
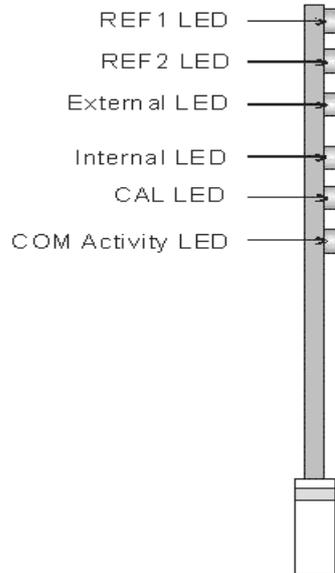
Figure 3. Card-edge User Controls

LEDs

The front-edge of the card features LEDs that display the card's operational status.

As selections are made or a change in conditions is detected, the LEDs illuminate to reflect the status of the card. Descriptions are provided in the following table:

LED	Color	Location	Display and Description
REF 1	Green	Top of the card	When on indicates that frame reference 1 is selected and the card is locked to that signal. When flashing it indicates that REF 1 is selected but the signal is missing or corrupted. (The card will automatically switch to the internal reference and the internal reference LED will turn on)

|			
REF 2	Green	Second from the top	When on indicates that frame reference 2 is selected and the card is locked to that signal. When flashing it indicates that REF 2 is selected but the signal is missing or corrupted. (The card will automatically switch to the internal reference and the internal reference LED will turn on)
External	Green	Third from the top	When on indicates that external reference is selected and the card is locked to that signal. When flashing it indicates that External Ref is selected but the signal is missing or corrupted. (The card will automatically switch to the internal reference and the internal reference LED will turn on) .
Internal	Yellow	Fourth from the top	When on indicates that internal reference is selected either through dip switch selection or automatically and the card is locked to the internal reference (see above)
CAL	Red	Fifth from the top	When on indicates that the sampling frequency has changed and the card is self calibrating (very short duration)
COM Activity	Green	Sixth from the top	When on indicates that communications on the CAN bus is operating properly

Table 1. Status LED Descriptions

DIP switch settings
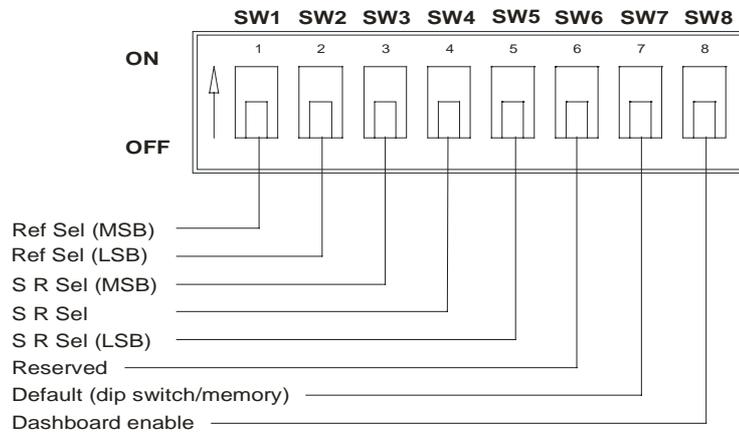
Figure 4. DIP Switch

Table 1 Reference Select

	Ref Sel (MSB)	Ref Sel (LSB)	
1	OFF	OFF	Frame Ref 1
2	OFF	ON	Frame Ref 2
3	ON	OFF	External Ref (rear module)
4	ON	ON	Internal Ref

Table 2 Internal Sample Rate (SR) Ref set

	SR Sel (MSB)	SR Sel	SR Sel (LSB)	
1	OFF	OFF	OFF	32 kHz
2	OFF	OFF	ON	44.1 kHz
3	OFF	ON	OFF	48 kHz
4	OFF	ON	ON	96 kHz
5	ON	X	X	192 kHz

Default (power up default parameter settings)

'ON' – Get card parameters from non volatile memory, ignore dip switch settings. (Configurable with Dashboard Control system)

'OFF' – Get card parameters from the Dip switch.

Dashboard Enable

'ON' – Only card status is available on Dashboard, users are prevented from changing parameters.

'OFF' – Normal operation, users have full access to the cards parameters.

Specifications

Technical Specifications

ANALOG INPUT

Input Level	+4 dBu
Input Impedance	>20K Ohms
Frequency Response	+/-0.2 dB, 20 Hz to 20 kHz
Noise (unweighted)	-84 dBu ,20 Hz to 20 kHz
THD+N	< 0.01%
Stereo Separation	100 dB, 20 Hz to 20 kHz

DIGITAL OUTPUT

Resolution	24 Bit
Output Level	1 V p-p nominal
Output Impedance	75Ω unbalanced
Sampling Frequency Range	32 kHz to 192 kHz
Jitter	Less than 5 ns

GENERAL

Power Requirements	+12 V, 4 Watts, MAX
Dimensions	3.025" high x 12.800" deep
Weight	approx.0.115 kg (0.252 lbs)

Cobalt Digital Inc. reserves the right to change performance specifications without prior notice.

Warranty and Service Information

Warranty and Repair Policy

Cobalt Digital Inc. Limited Warranty

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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COBALT'S LIABILITY, WHETHER IN CONTRACT, TORT, WARRANTY, OR OTHERWISE, IS LIMITED TO THE REPAIR OR REPLACEMENT, AT ITS OPTION, OF ANY DEFECTIVE PRODUCT, AND SHALL IN NO EVENT INCLUDE SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS), EVEN IF IT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

In Case of Problems

Should any problem arise with your openGear 9345, please contact the Cobalt Digital 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 9345. 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 Technical Support Department will continue to provide advice on any product manufactured by Cobalt Digital Systems, beyond the warranty period without charge, for the life of the equipment.

Ordering Information

Standard Equipment

- **9345** Stereo Analog Audio to AES A/D Converter

Optional Equipment

- **RM-9345-B** Rear I/O Module (Standard Width) 2 Balanced Analog Audio In, 4 AES Output BNCs, 1 Reference Input BNC (for installation only in 8310-C frame)

- **RM-9345-B** 20-Slot Frame Rear I/O Module (Standard Width) 2 Balanced Analog Audio In, 4 AES Output BNCs, 1 Reference Input BNC (for installation into HPF-9000 or 8321 20-slot frame)

- **RM-9345-B/S** 20-Slot Frame Rear I/O Module (Split) 2 Balanced Analog Audio In, 2 AES Output BNCs, 1 Reference Input BNC (per card)

- **8321-C** openGear Frame and Power Supply with Cooling Fans   (2RU, holds up to 20 cards)

- **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.

Your **9345** Stereo Analog Audio to AES A/D Converter is a part of the openGear family of products. Cobalt Digital offers a full line of openGear terminal equipment including distribution, conversion, monitoring, muxing, demuxing and processing of AES/EBU and HD/SD-SDI as well as analog audio and video products.

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**	217 • 344 • 1243
	Fax	217 • 344 • 1245
E-MAIL	**General Information**	sales@cobaltdigital.com
	Technical Support	support@cobaltdigital.com
POSTAL SERVICE	**Cobalt Digital Inc.**	2406 E. University Ave. Urbana, IL 61802

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